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Social & Technical Forces Constituting the Silent Valley Reservoir Project: Mourne Mountains to Belfast (1893-1932)

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Social & Technical Forces Constituting the Silent Valley Reservoir Project: Mourne Mountains to Belfast (1893-1932)

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A thesis presented for the degree of PhD
History of Science,
School of History and Anthropology
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September 2007
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Summary of Thesis

Initiated in 1923, the Silent Valley Reservoir in the Mourne Mountains was the first large scale civil engineering project after political partition of Ireland. Before being completed the project had to overcome several obstacles. Firstly, the Mourne Mountains were claimed by the South of Ireland and thus subject to the Boundary Commission of the Anglo-Irish peace treaty. Secondly, the combination of fluid subsoil and the failure to locate bedrock at expected depth brought construction to a halt while an engineering, political, and legal solution was sought for the expensive and now publicly controversial project. Air-shafts for excavating under increased atmospheric pressure were designed taking in mind both technical and political difficulties. Today the 3000 million gallon reservoir, first imagined in the late 19th Century, continues to be a major water source for the city of Belfast. This study utilises a technology studies approach which connects social and technical forces, exploring how social relationships are materially present within technology and similarly how material effects influence social practices. A disparate network of people, knowledge, and materials was involved in the completion of the Silent Valley Reservoir. This thesis explores the social and technical forces that enabled this network to come together and looks at how the resultant arrangement of forces differed from the initial arrangement. The thesis then explores how this changing arrangement of forces can be described in political terms. For example, in what ways might the state be said to be a participant? How are social relations such as gender or political identity encoded within the technological solutions?
Preface

More people today are questioning the role of technology in contemporary society. Traditionally, technology has been seen as derivative of scientific know-how and not much more thought about it. If one had knowledge of the philosophy of science this was considered sufficient. But technology itself, as a political, social and cultural phenomenon, was rarely contemplated. However, from the vantage point of what is increasingly being recognised as a technological society,¹ a more specific philosophical understanding of technology and in particular its political implications has now become an important project².

The following case study in the history of technology is first and foremost a social history of the Silent Valley Reservoir. As an important contribution to the historical and cultural understanding of Ireland during the period of partition I have written it as much as possible in a way that can be understood by those from a variety of academic and professional disciplines. By returning to the early twentieth century to look at what a hydraulic engineering project in the mountains of Ireland tells us about the relationship between technology, society, and the individual during this period, this thesis also makes an empirical contribution to the political understanding of technology. It engages with that study of practices which has brought together historical, philosophical, sociological, and anthropological discourses into a credible argument that technology (and scientific knowledge), rather than being predetermined, are to some extent consequences of social and cultural choices. These discourses are, therefore, a relevant matter for political consideration.

The title of this thesis is Social and Technical Forces Constituting the Silent Valley Reservoir Project: Mourne Mountains to Belfast (1893-1932). So if

¹ For the notion of a technological society see Andrew Barry, Political Machines, pp1-6, 216. A technological society is not a chronological period so much as a qualitative concept, a set of attitudes to the presence of technology within society.
² Social changes brought about by information and communication technologies (ICTs), the expansion of industry across ecological boundaries, the advent of biotechnologies (particularly genetic engineering), and the perceived threat of weapons of mass destruction are some of the factors that fuel the new emphasis on political analysis of technology. Both the commonplace everyday presence of technology and its presence in the myths, fears, and hopes of Western Culture lend significance to the philosophy of technology project.
technology is in some way interlinked with social and cultural choices, what then is
the distinction (if any) between a social and a technical force? Do they mutually cast
influence upon, or determine, one another? The distinction is one of rhetoric,
emphasis, and context. Our traditions of communication often allow us to be more
clearly understood in a particular context if we use one word or the other. Perhaps a
more accurate replacement for the two words ‘social’ and ‘technical’ would be single
word ‘socio-technical.’ Although I have rarely used this term, the sense that social
actions are materially enacted and that technical objects have social (or political)
implication is implicit throughout this thesis.\(^3\)

Making the argument (with the subtle study of practices) that technology and
science are political has been satisfactorily accomplished.\(^4\) But engaging with how
they are political is made difficult precisely because the study of practices is subtle.
Our political categories traditionally separate things, people, nonhumans, ideas,
social choices, technical objects. Incorporating our understanding of the socio-
technical into modern political knowledge is a difficult translation. Particular feminist
understandings of the world are already written in the language of practices. Other
political rhetorics such as state theory are more difficult to make amenable to a
socio-technical understanding grounded in the study of practices. With this case
study I am contributing to a language that spans from political structures to technical
details, and from technological structurings to political difference. The history of
technology has important contributions to make to our contemporary concerns,
including those concerns framed as political discourse.

Michael Reinsborough
September 2007

\(^3\) This also sheds light on the very particular use of the term ‘constituting’ in the thesis title. Forces are normally
said to affect of influence an object rather than to constitute it. However, the term ‘constituting’ has been used
to emphasize the materiality of social action (or force) and the forcefulness (or social/political potential) of all
physical objects. Thus if materials and objects can be said to affect or influence political and social interaction,
then so also can forces be said to ‘constitute’ physical things.

\(^4\) For this argument see Rouse, *Knowledge and Power*. See also Langdon Winner, “Do artefacts have politics?”
*Science in Action* among others.
Acknowledgements

I would also like to thank persons who I have had the opportunity to talk with or who have otherwise helped me in some way during this research: Ruth Bayles, Paul Bew, Peter Bowler, Wendy Brown, Benjamin Cohen, Donald Philip Cranmore, Nicola Creighton, Hastings Donnan, Laura Haydon, Bob Jessop, Lisette Joesiphides, Grit Lauber, John Law, Debbie Lisle, Iwan Morus, Sorcha O'Brien, John O'Neill, Alex Plowsa, Steve Pumphrey, Gordon Ramsey, Kieran Rankin, Alan Reavie, Neil Ross, Elina Rowley, Lesley Veronica, Deirdre Wildy, the Newcomen Society, the Public Record Office staff, Muir and Addy Chartered Accountants, the Science Museum Library staff, members of the Geography Discussion Group at Queens University Belfast, and my family who have been especially helpful. I benefited from two very different styles of academic supervision by Peter Bowler and Debbie Lisle. But if one thing unites them it is their commitment to high quality writing which I hope I have lived up to with this thesis. Neil Ross, retired reservoir engineer, was also of great assistance in orienting me and allowing me to share his enthusiasm for local engineering history. The research was made possible by a grant from the Department of Education and Learning. I also benefited from a student travel bursary from the Society for the History of Technology and an invitation to speak in London by the British Association of Irish Studies.

Figure 0.1 The Mourne Wall encircles the Silent Valley catchments area.
Source: http://www.bbc.co.uk/northernireland/yourplaceandmine/down/A1068518.shtml
Chapter One
Introduction

Before his death in 1927, Fred McCullough was to be elected a member of the Institution of Civil Engineers and become chief engineer to the Belfast City and District Water Commissioners. He was to marry and father two children, become President of the Institution of Water Engineers, and he was to design and supervise the initial construction of the Silent Valley Reservoir. Before it was complete, in fact, at a point in time when the completion of the reservoir was threatened by questions, he would die. But in 1893 all that was a long way in front of him. He was in the Mourne Mountains surveying the impressively quiet valleys through which the Kilkeel and Annalong Rivers flowed under the supervision of Luke Livingston Macassey, M.Inst.C.E. and chief engineer to the Belfast Water Commissioners. Their task was to look for a new water supply that might provide for the needs of the growing industrial city of Belfast in the north of Ireland. Macassey would select and recommend to the Water Commissioners diversion of Mourne rivers as the best possible option from the various potential sources in his survey.1

This chapter introduces the case study of this thesis, including the historical and political context in which it is set. After remarks on technology studies and some relevant political theory, I discuss specific methods for historical studies of technology, and in particular, how I have undertaken the research required for this thesis. The chapter concludes with an outline the themes and organization of the thesis.
Chapter 1: Introduction

**Background to the case study**

The industrial boom in the second half of the nineteenth century contributed significantly to the urbanisation of Belfast, its population increasing as many rural persons took up work in the linen mills, foundries and shipyards. Belfast at the end of the nineteenth century was the third most important port city in the British Empire. The population had tripled from 70,000 in 1841 to 270,000 in 1890. The increasing population and increasing needs of industry increased the demand for water.

The Water Board was formed by Parliament in 1840 by the Belfast Water Act as an elected board charged with maintaining and increasing the water services for Belfast and outlying regions. It was frequently the focus of controversy and frustration when disputes with property owners arose over water rights, during periods of low rainfall or other points when the demand for water outstripped the supply. Several larger projects were undertaken: the water works on the Antrim Road, the very promising Woodburn reservoir designed in the hills north of Belfast by prominent hydraulic engineer David Bateson, and the Stoneyford reservoir near Lisburn. Although each added to the supply, each proved insufficient to resolve Belfast's growing thirst. The waterworks suffered from legal disputes; the Stoneyford reservoir acquired a perhaps unmerited reputation for poor water quality (particularly during the 1898 Typhoid outbreak), and the Woodburn reservoir did not live up to its water-supply expectations as the rainfall in the catchment area had been overestimated. By comparison other industrial cities such as Dublin, Manchester and Glasgow had organised large abundant supplies of water.

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1 Jack Loudon, *In Search of Water*, p77.
4 ibid., p45.
5 ibid., p66.
6 ibid., pp72-74.
7 Ibid., p72.
In 1891 the Water Board set Mr. L. L. Macassey, M. Inst. C. E., to survey for possible sites to secure more water for Belfast and no doubt with the hope of once and for all resolving the problem. This is certainly the institutional sentiment that author Jack Loudon, writing in 1940, attributes to the Water Board and their agent Luke Macassey. The scale of the scheme which he recommended, set out in three separate stages, supports this interpretation. The initial stage would double Belfast’s current water supply, and the second and third stage, to be completed as and when needed, would each add an equal amount of water again. If successful the Water Commissioners would be supplying Belfast’s industrial and personal needs well into the twentieth century. Five sites had been taken into consideration, including pumping from Lough Neagh, and the most promising one, according to Macassey, was in the Mourne Mountains.

Designed sequentially in three separate stages, the first stage was to reroute the waters of the Kilkeel and Annalong rivers to bring a 10,000 gallons per day supply of Mourne rainwater along 35 miles of conduit to be constructed between the Mourne Mountains and a minor reservoir just outside of Belfast. The second stage was to build a major reservoir in the Mournes and increase the flow along the conduit by an additional 10,000 gallons per day. For the third stage, a second major reservoir in another Mourne valley was to be built and the conduit capacity increased to support a final 10,000 gallons per day.

![Figure 1.1 The Silent Valley before the dam was built - around 1922](http://www.bbc.co.uk/northernireland/yourplaceandmine/down/A742079.shtml)

8 ibid., p75, see also McIlldowie, *The Construction of the Silent Valley Reservoir*, p3.
In 1893 the first of several Water Acts for Belfast was passed by the Westminster Parliament giving the Water Board the water rights in the Mournes, permission to raise finance, and purchase the land along the thirty five mile conduit path to Belfast. Between 1893 and 1901 the first stage was successfully completed by a variety of contractors primarily from Ireland. When increase in demand for water again made a greater supply desirable the second stage was initiated in 1910. Mr. F.W. McCullough, M. Inst. C. E., then the Chief Engineer for the Water Board, having succeeded the late Mr. Macassey (died 1908), drew up plans for reservoir construction in the Silent Valley, the contract for which was put to tender (after being delayed by the Great War and the Anglo Irish War) and construction began in 1923. The contractor selected was Messrs. Pearson and Son, Limited, an English firm of considerable reputation and experience. After some difficulties this reservoir was completed in 1932.

### Table 1.1

<table>
<thead>
<tr>
<th>Outline of Water History in Belfast</th>
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<tr>
<td>• From early water projects in Belfast the Charitable Society acquires the water rights during the latter 18th Century.</td>
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<tr>
<td>• Water Board established in 1840.</td>
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<td>• Legal disputes over water rights during construction of Antrim Road waterworks.</td>
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<td>• 1865 Water famine in Belfast.</td>
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<td>• Woodburn reservoir construction planned by D. Bateson, important 19th Century engineer. Rainfall in catchment area turns out to have been underestimated.</td>
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<tr>
<td>• Stoneyford reservoir constructed near Lisburn. Later accused of being source of 1898 Typhoid outbreak.</td>
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<tr>
<td>• 1891 Luke Macassey surveys possible water sources. Selects Mourne Mountains as most likely candidate. Three separate stages of construction.</td>
</tr>
<tr>
<td>• 1893-1901 First Stage. 35 miles of conduit, pressurized pipe, and tunnel for the diversion of Kilkeel and Annalong River water to Belfast.</td>
</tr>
<tr>
<td>• 1904-1922 building of Mourne wall to surround the catchment area.</td>
</tr>
<tr>
<td>• 1922-1932 Second Stage. Building of the Silent Valley Reservoir.</td>
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<tr>
<td>• Crisis as engineers have difficult excavating cut-off trench down to bedrock 1926.</td>
</tr>
<tr>
<td>• Second reservoir built in 1950s. Ben Crom Reservoir was built further up the Silent Valley on surface level bedrock rather than in a glacial moraine valley as had originally been suggested. Tunnel through Slieve Binian diverts water from the Annadale River.</td>
</tr>
<tr>
<td>• Pumping from Lough Neagh begun in 1970s.</td>
</tr>
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</table>

10 ibid., p.94-95, Loudon cites accounts from the *Northern Whig* newspaper.
The subject of my research is the construction of the Silent Valley Reservoir including the design of the air-shafts and how they were used to solve particular political and technical difficulties encountered during the construction of the reservoir.

**Case study: The Silent Valley Reservoir and the air-shafts**

In 1923 the contractor began by constructing a railroad and other infrastructure to transport materials and necessary machinery to the base of the Silent Valley where a cut-off trench was to be dug down to and into bedrock and then filled with concrete in order to prevent a structurally fatal leakage of groundwater beneath the reservoir.\(^{12}\) The small town that built up in the valley included family houses, shops, a police station, and a recreation hall and cinema. It came to be known as Watertown. The coal-fired power plant provided electricity for the works as well as some of the earliest electric street lighting for an Irish town.

In December of 1926, when the original borings to determine the depth of bedrock proved to be inaccurate and excavation was made difficult by the presence of inwards flowing wet silt and large boulders, Messrs. Pearson and Son, Limited went to arbitration with the Water Commissioners over release from the original terms of the contract.\(^{13}\) This situation was not made easier by the public controversy in the press accusing the Water Commissioners of throwing Belfast's good money down what was now being described as an ancient glacial moraine created at the recession of the previous Ice Age, down a 'swallow hole!' Nor did the illness and eventual death of Mr. McCullough, the Water Board's chief engineer, associated with this reservoir since its inception (and said to know more about the Silent Valley than any other engineer alive), help the situation.

An 18 month exploratory period was agreed upon under the direction of an independent board of three prominent engineers, in which time exploratory shafts were sunk in an attempt to prove the bedrock depth and drain the ground water

\(^{12}\) ibid., p5.

\(^{13}\) Jack Loudon, *In Search of Water*, p.111, See also McIlworie, p5.
Standard methods had been ineffective so Messrs. Pearson suggested the use of compressed air, which they had experience of in previous construction projects, although never before on such a scale. Circular rings were built down into the ground within which compressed air was used to prevent watery silt from flowing back into the excavation. Within the airshaft special precautions had to be taken to prevent the labourers from taking Caisson's disease (where nitrogen bubbles entering the blood under pressure expand painfully, possibly lethally, after depressurization, more commonly known as "the bends"), including the use of a medical airlock for its treatment.15 Loudon claims, with a flair for narrative clarity, that it was not until just before Christmas in 1927, at the end of the first year of the exploratory period, that there was an announcement that the bedrock depth had been ascertained.16

In 1929 the trench was completed and the first concrete laid. Lastly, puddle clay from a nearby location was brought by train and used to build the core of the dam behind the concrete. In May of 1933, the reservoir was formally opened by the Duke of Abercorn, Governor of Northern Ireland, in a public ritual with 700 guests culminating in a military band playing the national anthem of the state as the first water rushed out of the reservoir towards the industry and residents of Belfast.17

At the end of the section on method I discuss the particulars of the Silent Valley Reservoir Project in more detail including relevant archives and make critical remarks on existing literature specific to the case study. However, what follows immediately is a more general review of the Northern Ireland political context leading up to the 1920s for those who are not already familiar with this history.

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15 ibid., pp30-32.
16 Jack Loudon, p127 As we will see in later chapters the clarity of when certainty was achieved differs based on who presents the story.
After the drought of the year 1910, the Water Commissioners began once again considering an increase to their supply of water for Belfast. The chief engineer of the Water Commissioners was now Fred McCullough, having replaced Luke Macassey upon his death in 1908. McCullough was beginning to change his work plan to include a survey of the Annalong and Silent Valleys, hiring new assistant engineering staff in order to complete the surveys. Taking up the public aspect of his new role he firmly issued comment on previous disputes regarding the wisdom of building a reservoir in the Silent Valley. There was also a need to update the Water Act of 1893 which was soon to go out of date.

When the Great War began in 1914, all civil construction projects were suspended until the end of the war. “In August the Great War broke out. The entire resources of Ulster, in men, money and material, were placed at the disposal of King and country. Once again the Silent Valley project was abandoned.”

At the end of the war the new Water Commissioners were not quick to leap into the huge undertaking. Many other matters concerned them presumably, the Anglo-Irish war was now beginning, and prices of labour and construction materials were unusually high directly after the war. There was a feeling that this would improve at some point. There was also the matter of general political unrest in Belfast and throughout Ireland because of long standing disputes about the political autonomy of Ireland.

**Political context and partition of Ireland**

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18 During this drought residents were asked to economise. While this was not popular anywhere in Belfast, “it was resented more by the people of the new suburbs that had sprung up than by any other section of the community.” Loudon, p97.
19 “Ever since the Mourne catchment area was acquired, a rumour was in circulation….Men who professed to have inside knowledge on the subject drew their business friends discreetly aside and asked them if they had heard the news? did they know that secret tests had been made and engineers had reported that the Silent Valley being the track of an old glacier, had no rock bottom and was so full of ‘swallow-holes’ that it could never be made a watertight dam?…. For almost twenty years this rumour had a vacillating existence.” Loudon, p99.
20 Loudon, p101.
In the elections of December 1918 constitutional nationalists (United Irish League) were largely defeated throughout Ireland by the more radical Sinn Fein party who advocated the immediate separation from the British monarchy, even by use of military force if necessary. The elections returned 73 Sinn Fein to the Parliament and a handful of Unionist and independents and a few nationalists (26 in total). The Sinn Fein representatives set up their own parliament (the Dáil) and began organizing direct governance of Ireland in practice rather than awaiting legal blessing. In Belfast Joe Devlin was one of the few remaining constitutional nationalists to retain an electoral seat.

Military resistance to the British control of Ireland began in the period 1918-1919.
From 1913-1918 the essence of the *Pax Hibernica* was devolution plus partition. The formula proved resilient because it succeeded in conciliating a violent conflict in the British ruling class as well as one in Ireland, and became a relatively stable reference point for all parties. Equilibrium was disrupted temporarily in 1916 and permanently in 1918-19 by the onset of popular guerrilla warfare, the electoral destruction of the UIL, the constitution of the first Dáil and other associated changes.\(^{21}\)

British policy to deploy auxiliary forces of repression (special squads known as the black and tans) was not militarily successful and morally it was a great defeat. The repression caused a popular backlash. A concessionary legislative strategy was the flip-side of ineffective British policy in Ireland.\(^{22}\) The Local government of Ireland Act provided a proportional representation scheme meant to more evenly distribute political representation and enable unheard voices of dissatisfaction to gain elected representation. Despite Unionist protest, the Local government of Ireland Act became law on June 3\(^{rd}\), 1919.

Despite disgruntlement, “Belfast Corporation submitted a scheme dividing the city into nine wards, co-extensive with the nine parliamentary divisions” that had been established by the Parliamentary act in the previous year.\(^{23}\) During the elections of January of 1920, 147 candidates were put up for the 60 seats on the Belfast city council. “The results produced a council more balanced politically and socially than before or since.”\(^{24}\) Unionists were very much diminished in their control of Belfast although they still retained a majority.

The PR Elections benefited the Northern Ireland Labour Party the most with broad support spread thinly throughout the wards rather than concentrated as a majority in particular wards as Unionist and Nationalist support was. Sectarian rioting over the previous century had built a pattern of segregated neighbourhoods.

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\(^{23}\) Ibid., p138.

\(^{24}\) Ibid., p138.
The 1896 ward structure had been designed to reflect this pattern to the benefit of nationalists or unionist majorities in these wards but to the disadvantage of minority opinions.\(^{25}\) In Belfast these were the first elections that women could vote in. There were even a half dozen female candidates put up for election.\(^{26}\)

The Water Commissioners, however, were not covered by Local Government Act. Their elections occurred in March of 1920 along the boundaries of the previous (1896) wards. These are discussed in Chapter 2.

Although in Belfast and other parts of Ulster the new PR system had a significant effect in the composition of elected representation, elsewhere in Ireland the PR had not made an impact. The polarization of Ireland was just as extreme as ever. Militant nationalism of Sinn Fein swept the local government positions. Even in the Ulster Province, Counties Cavan, Monaghan, Donegal, Tyrone, and Fermanagh, as well as Londonderry Corporation, were to become a nationalist majority. The failure of these elections to end polarization, the Anglo-Irish War, and continued resistance in Ulster to Home-rule would result in the partition of Ireland. In September of 1920 the British Parliament decided to set up two regional governments in Ireland with a significant degree of autonomy effective the following year.\(^{27}\) In November the British Government allowed a special constabulary to be established in Ulster as a response to sporadic military attacks by republican forces in Ulster.\(^{28}\)

The Parliament of Northern Ireland did come into existence in May 1921; the Parliament of Southern Ireland was still-born; the Truce of July 1921 was followed by the Anglo-Irish Treaty of December 1921, which conferred dominion status on the whole of Ireland but allowed the Northern Ireland

\(^{25}\) When the 1896 wards were agreed by Catholic Bishop Hervey, Joe Devlin opposed them, saying that they institutionalized sectarianism. "...Labour's attempt to change the main political cleavage from religion to class may have posed more of a long-term threat to the Unionists, in Belfast at least that the disunited Nationalists' espousal of a cause on which there was a built-in Unionist majority." Budge and O'Leary, *Belfast: Approach to Crisis*, p194-195. This dynamic is even more clear from the work of Bew, Gibbon, and Patterson emphasizing political forces and social classes.


\(^{27}\) Ibid., p141.

\(^{28}\) Ibid., p141.
Parliament to opt out within one month of April 1922 – a right which was duly exercised.  

Origins of the ‘populist’ character of the Northern State

The protestant working class had a militant tradition of anti-Catholicism plus democratic, anti-landlord, and anti-capitalist sentiment. They had an established “tradition of autonomous political activity by Protestant labour aristocracy, urban petty bourgeoisie and small employers.” At the end of the nineteenth century an Independent Orange Order with anti-capitalist rhetoric had troubled the local conservative establishment who had always relied upon conservative Orange sentiment to prevent working class solidarity between Protestants and Catholics. In 1905 when the Unionist party was formed by the protestant establishment (replacing the conservative party) it had emphasized issues of religious cleavage rather than those of class politics. This had the effect of consolidating the class power of the establishment. The threat of Independent Orangeism then began to decline.

There were two consequences of the new integration. The more obvious was that the politics and ideology of the Protestant masses were stripped of their progressive elements. These remained only residually, in the form of a militant lack of deference to bourgeois authority. While the new ideology occasionally accommodated reformist labour views, it found its main expression in a stronger version of the loyalism of the bourgeoisie. The other was that with the establishment of large-scale political and military organizations there emerged a professional political leadership possessing its own relative autonomy from the Unionist bourgeoisie. This was popularly known, after its headquarters, as the Old Town Hall circle. Here the situation rested until 1918.

In 1918 there were militant strikes in the shipyards including a General Strike Committee that “assumed powers to issue permits allowing ‘necessary’ production,

29 Ibid., p141.
30 Bew, Gibbon, and Patterson, The State in Northern Ireland 1921-72, p46.
31 Ibid., p47.
published a daily newspaper and generally adopted the attributes of a local soviet."\(^{32}\) Carson was then promoting a "New Unionism" through the recently formed Ulster Unionist Labour Association (UULA). This was to be a more socially conscious unionism designed to prevent the electoral losses to the labour party. Although this failed the future role of the UULA would be to organize sectarianism in the labour movement and in the shipyards in particular. Large numbers of demobilized soldiers were unemployed but well organized as a political force.

...the UULA succeeded in giving the problem a sectarian twist. It identified the unemployment problem, especially that of Protestant ex-servicemen, with the alleged 'peaceful penetration' of Belfast industry during the war by 'tens of thousands' of Catholics from the south and west.\(^{33}\)

The south and west were now part of the republican Ireland that threatened Unionism. After a big gathering in July in the shipyards "attacks began on Catholics and workers identified as Labour party members and socialists. They spread throughout the engineering and some sections of the linen industry to result in over 8,000 expulsions within a week."\(^{34}\)

This resulted in mass rioting. The situation in Belfast from 1920 onwards was one of riots, violence and pogroms for two years.

A shift in political relations within the Protestant class bloc had taken place. In its anxiety to re-establish a militant basis for resistance to republicanism which could operate independently of the British, the Unionist leadership had been obliged to concede a portion of bourgeois class power to the Orange section of the working class. Having done so, they strove to confer institutional and official status on the arrangement. Popular Protestant practices of workplace exclusivism became linked to the efforts of Carson

\(^{32}\) Ibid., p47.
\(^{33}\) Ibid., p48.
\(^{34}\) Ibid., p48.
and Craig to reconstitute the UVF and secure British government approval and funds for it and UULA-based constabularies in Belfast.\textsuperscript{35}

Thus the nature of the particular state that came to be established in Northern Ireland under the guidance of the Old Town Hall crowd was one of protestant populism.

The British Government policy was somewhat disorganized but as late as 1921 the Prime Minister Lloyd George was still holding on to getting Craig to go into a United Ireland as the "easiest route to a general Dominion settlement."\textsuperscript{36} After 1921 the consensus in ruling circles of the British state was that 1) Ulster could not be coerced into a United Ireland, 2) The Free State party was a better outcome to Anglo-Irish war than a government under De Valera, the leader of the most republican (and thus opposed to a Dominions settlement) element of the nationalists. But some saw the only way to make the Free State government creditable was to convince Ulster to go into a United Ireland. At the very least the nationalists would have to be convinced that this was a possibility. Thus part of the British establishment sought to take a hard line against the Ulster Unionists. This was roughly the position of Lloyd George, British Prime Minister. The Colonial Office (with Winston Churchill) was in support of the Unionists. The Treasury opposed the expense of supporting Ulster Unionism and simply wanted to tighten their budget (to the point that a Unionist Government would not have been able to survive).

**Boundary Commission**

As part of the December 1921 treaty arrangements ending hostilities, formalizing partition, and establishing "Dominion" status for the south of Ireland (now to be called the Free State), a boundary commission had been agreed to resolve outstanding issues of territory division. The viability of Northern Ireland as a self governing body depended on the outcome of the Boundary Commission. The state (at least as conceived during the 20\textsuperscript{th} century) requires a territorial

\textsuperscript{35} Ibid., p49.

\textsuperscript{36} Ibid., p50. A Dominion settlement would give Ireland independence but retained some beneficial connections to the British Crown.
integrity. In this case the economic viability of Ulster was thought to be only possible with the six counties (these six counties had been given in the 1920 legislation establishing two regional governments in Ireland). Thus the PR elections that gave majority control of Tyrone and Fermanagh Counties, and the city council of Londonderry to nationalists were of grave concern to the unionists. PR elections had to be reversed. The other issue considered within this territorial integrity was the question of water for Belfast from the Silent Valley. Under one conception the boundary commission might concede the Mournes area (from which Belfast now drew its water supply) to the Republic. Belfast was the primary city of Ulster.

The presence of a Boundary Commission issue in the Mournes was important when negotiating a contract for the construction of the Silent Valley Reservoir. It affected planning and contract negotiation although not the specific design.37

During negotiations the southern government were possibly given intimations that more would be given them than actually was. The British government solidified the partition and 'Dominion' status arrangements (and ended the war) by leading the South of Ireland negotiating forces to believe that there might be real concessions from the Boundary Commission to the Free State. Another possibility is that those Southern negotiating forces merely needed to be able to present a believable expectation of significant boundary concessions to their more militant elements (to bring them into the agreement) but were not themselves concerned about boundary concessions.

The Boundary Commission met and made some agreements.38 The report was leaked in 1925 but then suppressed. This had the effect of solidifying the

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37 PRONI, WAT records, "contract A" (1923).
38 "The entire area of South Down surrounding Kilkeel was Catholic/Nationalist and the Irish Free State Government argued that it ought to be transferred. However, the Water Commissioners argued that it would be extremely inconvenient for them if the water supply of Belfast were under the control of another State. This argument convinced the Boundary Commissioners who in 1925 voted to keep the Silent Valley within the jurisdiction of Northern Ireland. Budge and O'Leary Belfast: Approach to Crisis, p114. See also Report of the Irish Boundary Commission, 1925, edited by G. Harland (Shannon, 1969) Chapter 5, p133.
Northern Ireland state. Regarding the relationship between the Boundary Commission report and the Northern Ireland state, Bew, et al., write

The subject of this study, the Northern Ireland state was born in 1921- or more precisely, between that date and 1925, when the Boundary Commission was finally laid to rest.39

In the next chapter much of this history as it specifically affects the Water Commissioners and their civil engineering project will be invoked again. What follows immediately presents the historiographical framework that will guide this thesis.

**Historiography and the Study of Technology**

The editor of a recent history of civil engineering series noted a nineteenth century description of the profession: “Civil engineering is the art of directing the great sources of power in Nature for the use and convenience of man.”40 Nature and civil engineering have important interconnections, some of which will be described in this thesis. However, it is suggestive that the term ‘civil engineering’ was only taken up first in the eighteenth century, previous to which the same work was done by military engineers.41 The ironic origin of the ‘civil’ within the martial powers of sovereigns and city-states suggests the interconnection not just of nature and civil engineering, but also of political sovereignty. Finding these relationships for a reservoir will require some thoughts on historiographical method. Historical material on dams and reservoirs has tended to focus either on the development of reservoir design (often written by engineers) or on the bureaucratic politics of water authority institutions.42 A historian of structures in the latter category suggested the importance of an awareness of

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39 Bew, Gibbon, and Patterson, *The State in Northern Ireland 1921-72*, p44.
...the relation of hydraulic construction to social and economic necessities and to military conquest. We are thus able to see a little way into the extent to which the level of material and spiritual well-being is bound up with this most fundamental of technologies. Indeed, without it the civilizations of Egypt, Mesopotamia, the Arabian Peninsula, the eastern Roman provinces, and Spain could never have flourished as they did.43

Perhaps the most significant of the water history and civilization writings is The Despotic State by Karl Wittfoegel. The Wittfoegel thesis is normally understood as the idea that the construction of large irrigation projects required central authority and thus initiated the state.44 Donald Worster is a more recent writer connecting big water projects to big power.45 Some literature also exists in the labour history and archaeology tradition dedicated to the lives of those who construct reservoirs.46 Particularly writings from industrial archaeology emphasize a bottom-up understanding of the social organization of reservoir construction.

A good example of the minority portion of the literature on dams which properly engages a social history of technology is Donald Jackson's interest in how "different designs might reflect varying interests and objectives on the part of engineers, financiers, and governments."47 Forthcoming work by Sorcha O’Brien focuses on the design history of the Irish hydro-electric dam on the Shannon River and its cultural commitments during the period directly after partition of Ireland.48


45 Donald Worster, “Hoover Dam: A Study in Domination” pp337-354 in Jackson (ed) Dams
46 A. E. Rogge, D. Lorne McWaters, Melissa Keane, and Richard P Emanuel, Raising Arizona’s Dams: Daily Life, Danger, and Discrimination in the Dam Construction Camps of Central Arizona, 1890s-1940s
This is discussed in Chapter 7 in comparison to the Silent Valley Reservoir built during the same time period on the other side of the Irish border.

The recent work of environmental historian Richard White on the Columbia River is perhaps the best example of water history that firmly takes into account not just the social and technical history but also does so in a way which does not focus on the biography of individuals (nor the macrosociology of corporate units) as causal agents. He rather more carefully draws together a variety of forces, including the actions and energy inherent in the material interactions of nature, that have come together to bring about the state of affairs in the Columbia River basin today. His work is discussed again below in relation to his presentation of a very active nature.

Path dependency

Focusing on the biography of individuals as causal agents has a very long history in the study of technology. One of the earlier historians of technology was Samuel Smiles writing during the period of the industrial revolution. He emphasized the role of the entrepreneurial engineer. The individual engineer was praised for inventiveness as well as ability to orchestrate the necessary factors to bring an invention into productive use within the economy. During the early 20th Century opinion began to shift. New technology was not from inspiration out of nowhere but instead built upon previous technology through gradual change and the combination of already existing technology.

Technological determinism is today one of the most common beliefs in popular, governmental and corporate opinion. However previous technology is not the only factor in the development of new technology, merely a precondition of technological development. Previous technology cannot conclusively be said to be determinative of any new technologies that borrow from it. Technological determinism has also been presented as a theory of society. For example, Lynn

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50 Samuel Smiles “The Engineer and the Industrial Revolution” in Hughes, ed *The Development of Western Technology since 1500.*
White has famously attributed the development of feudal society to the military invention of the stirrup, allowing mounted combat which was the basis of feudal aristocratic culture. In historical change, however, technology is at best only one type of factor among others, such as political, economic, cultural and so on.

Path dependency, rather than technological determinism, is a better way to explain how previous and subsequent technological development relate to one another. Path dependency suggests that the initial design of a technology will receive the effort and resources of development, and therefore in the adoption of any type of a technology the alternatives will be left behind. Local, short term contingencies in initial development of a technology can have significant and lasting effects on the overarching long term design process. Path dependency becomes a much more significant factor in situations of complexity and uncertainty. In these cases there is little that would prove the merit of an alternative system and therefore justify transition.

Economic shaping of technology has also been looked at as a primary force within the development of technology. Considerable evidence indicates that economic forces are very significant in many if not all cases. Typically technological decisions are also economic decisions. It must be remembered that economic shaping is a type of social shaping as economic forces are the result of social forces and not in and of themselves independent or external to society. How economics are pursued is a matter of social shaping. An economic decision to minimise the costs of labour, the cost of materials, or the cost of production, is a matter of social shaping. Marxist philosophy has emphasized the role of technology in forming the relations of production and shaping the people who exist within these relations. For Marxists however these relations are always reducible to social relations of economic production.

53 Brian Arthur, Increasing Returns and Path Dependency in the Economy, Paul David, Path Dependency and the Quest Historical Economics, Rosenberg Exploring the Black Box: Technology, Economics and History
54 MacKenzie/Wajcman, The Social Shaping of Technology, p13, See also Rosenberg.
Examples of social shaping of technology which are independent of (or if not independent, at least less influenced by) economic shaping, are state sponsored technology projects. The seventeenth and eighteenth century mercantilism of European colonialism had “different implications for shaping technology than straightforwardly capitalist judgements.” These state sponsored technology projects would have been shaped by state goals of national power, population, and treasure. Not only state sponsored technology projects must be taken into consideration, but also state sponsored social and economic structures which give rise to the social impetus for particular technologies. The framing of the social imagination upon a desire for particular technological solutions can be an implicit and indirect effect of state sponsored social or economic structures that are not directly a technology project of the state.

The idea of technological paradigms is derivative of the work of Thomas Kuhn and his notion of the paradigm as firstly, an exemplary case by which other attempts are figured, and secondly, as a constellation of beliefs and values, techniques shared by a community. Similar to the idea of paradigms, the idea of system has been important in the study of technology. According to a systems approach an item of technology must be integrated into an entire system. For example, Thomas Edison designed the electric light bulb with the needs of an entire system in mind. The light bulb needed to produce light in the context of an electrical power grid and it needed to be cheaper than the cost of gas lighting that was currently available. Thomas Hughes, who is most commonly associated with the systems approach to the study of technology, uses the phrase “reverse salient” to describe a set of critical problems that can be identified by the developers of a technological system as what is holding back further development. Continued development of the system requires a focus on solving this set of critical problems. In this way the previous development of technology shapes the subsequent development. But Hughes argues this is not the only way. A technological system

55 ibid., p15.
57 Hughes, Networks of Power, p14.
58 ibid., p14.
is always also economic, organizational, political, social, and cultural in its functioning.\textsuperscript{59}

The social construction of technology (SCOT) is a way of theorizing the relationship of technology to society which emphasizes the 'interpretive flexibility' of technology in ways which debates about path dependency have not. Not only can the different particular uses of a technology be emphasized or sought by different users, but even whether or not an artefact or system of technology is deemed to work can vary based on social interpretation. This approach was developed by Wiebe Bijker and Trevor Pinch from Bloor and Barnes' sociology of scientific knowledge which seeks 'symmetry' of explanation when dealing with material, psychological and social processes.\textsuperscript{60} Accepted scientific facts had to be explained in terms of why they were accepted. Their initial acceptance could not be explained by retroactively privileging the fact that they now continue to be accepted within the scientific community.\textsuperscript{61}

According to SCOT theories, machines 'work' because they have been accepted by relevant social groups. The researcher cannot explain the success and acceptance of a technology by whether or not it works. This would be taking for granted how it is that it is judged to 'work'. Problematically, Bijker says that the researcher can determine the relevant social groups by examining who are mentioned in the historical literature concerning a particular technology.\textsuperscript{62} This however is inadequate; many implicitly relevant social groups might not be featured in the literature because they have been excluded. As a methodology this technique fails to examine the possible effects of structural exclusion.


\textsuperscript{62} Bijker, \textit{Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change}, p46.
People and technology

Social and political forces within society can always be a factor in the social shaping of technology. Particular social relations of class, gender, race or ethnicity might be embodied in a technology. Technologies can be designed (consciously or implicitly) to open certain options and close others. The motorist who accidentally exits an urban motorway into a low income neighbourhood to discover there is no entrance ramp back onto the motorway is literally experiencing how technologies of urban design "ghettoise" particular classes of people based on race or income. The original boundary of the city walls of Belfast, which divided the important from the pauper in the early provision of safety and status, still retain their relevance even today.\(^63\) Feminist historian of technology, Cynthia Cockburn, emphasizes the mutual construction of gender and technology.\(^64\) She went past equal opportunity questions about the presence and number of women in science and technology professions to ask, 'Is technology shaped by gender?' and more so, 'Is gender shaped by technology?' Cockburn argues that the appropriation of technology for men and the exclusion of women is one of the formative processes for masculinity. Her work is discussed further in Chapter 7. Particular uses of technology can be similarly implicated in the construction and maintenance of ethnicity, religious or racial hierarchies.

The social shaping of a technology does not necessarily have to relate to the traditional political distributions such as class, gender or race. Social shaping of technology can also be the result of more specific forms of culture or sociality (which often seem less political), for example institutional cultures within the engineering industries. This would suggest that besides considering whether an influence upon the development of a technology is an external (and social) force or an internal (and therefore technical) force, we must also consider forces that are internal and yet can be described as social forces\(^65\). The traditional debate in the

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\(^{63}\) For example, the 1970s routing of the M2 motorway almost exactly coincides with the original boundaries of the city walls and similarly performs an exclusion of lower status and working class neighbourhoods from the provision of services in the city centre. On this point I am indebted to Grit Lauber, unpublished cartographical research.

\(^{64}\) For further study see the case study on printing press technology in Cockburn, "The Material of Male Power" reproduced in MacKenzie and Wajcman The Social Shaping of Technology.

\(^{65}\) Sapolsky The Polaris System Development, MacKenzie, Inventing Accuracy.
historiography of technology known as the externalist/internalist debate is an oversimplification.

**Actor-network sociology, material semiotics, and similar approaches**

Actor-network theory (ANT), like SCOT, is another way of theorizing the relationship between technology and society. Actor-network sociology extends the principle of symmetry so that human and nonhuman actors (sometimes called actants) are treated the same methodologically. This raises philosophical questions, not least of which is whether or not machines and technological devices might be attributed agency. In previous studies of technology, including social constructivism, either machines or human relations were determinate in the last instance. Rather than this reduction, ANT links the human and the technical as part of a network of agency. Social structure, agency, and machines are treated as a product or an effect of a network of heterogeneous materials.

Social interactionism and especially ethnomethodology have emphasized that there is no fixed structure to human society within which social agents act but instead structure emerges from social interaction. While ANT builds on this type of approach to the structure/agency question it also points out the previous lack of emphasis on the material aspects of social interaction in much sociology and anthropology. Unlike other primates, humans use tools and technology to mediate their social interaction. Material things are used to build and reify social structure. Large scale society requires material artefacts to be feasible. So when Marx emphasizes that the use of technology to subordinate labour to capital is a social relationship, Bruno Latour re-emphasizes that it is a socio-technical relationship. Society and technology are linked together, made of the same stuff.

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68 “Redefining the Social Link: From Baboons to Humans” Shirley Strum and Bruno Latour in MacKenzie and Wajcman *The Social Shaping of Technology*, pp.116-125. This case is somewhat exaggerated. Other primates also have fixed material features in their environment, rocks, trees, grass, rivers, etc. Even micro-organisms interact in the context of an epigenetic background.
Thus the researcher might effectively focus on understanding the networks that interlink human and nonhuman entities.  

As a sociology of translation, actor-networks can be used to map a sense of agency onto arrangements of humans, machines, objects, structures, landscapes, animals, substances, fluids, and other non-human elements of interaction. The researcher examines to what extent and how one element of a heterogeneous network is translated by another. This process is called enrolment. Some elements of a network have discernable strategies of translation which make enrolment more effective. Some locations of a network can be described as centres of calculation about translation and are thus useful points through which enrolment can be translated.

The reflexive turn in actor network theory began when the researchers utilizing actor-network theory discovered that in some circumstances they were quite obviously part of the network that they were describing and therefore needed to include themselves in their description. Presumably their description of the network might also be a relevant part of the network in which case what happens in the network might be influenced by how it is described. The implication of this point is that how a person (researcher, historian, technologist, ordinary user) understands and describes an artefact of technology may affect the outcome of use or even what the technology becomes over time. Conversely, the method of the description might also be influenced by what happens in the network- thus the researcher's attempt to be "objective" or methodologically separate from the object that is studied is likely to be ineffective. A researcher who attempts an unreflexive 'objectivity' may be subject to hidden influences.

Donna Haraway has suggested that knowledge might be situated within the material context of its production in order to be closer to what she describes as a

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new type of objectivity, one that takes into account the location of the observer.\textsuperscript{71} There can be no "view from nowhere", which is how she describes traditional scientific methods of concealing their located position in a cloak of universality.\textsuperscript{72} Normally the scientific viewpoint has been presented as universally valid and therefore from no particular place. After the fact, the specific circumstances of experiment and knowledge construction are simply forgotten. In contrast, Haraway advocates a material semiotics, in which the signs and indications that are interpreted must be contextually related to their material circumstances of production.\textsuperscript{73} Haraway suggests that understanding comes from being situated with respect to the object, thus in some way connected to it rather than "objectively" distant from it. This identifying and locating of connections must also always include what emotional connection one has. The supposedly emotionless rationality of the technoscientist, she describes as the "emotion of no emotion."\textsuperscript{74}

Her view of technoscience parallels her approach to technology.\textsuperscript{75} Like actor network theory approaches, she does not make clear divisions between the human and nonhuman, machine and organic, or even the material and the immaterial. Because description of the sociotechnical relationship influences the sociotechnical relationship, Haraway is attentive to metaphor, utilizing figures or tropes in her academic work to illustrate her purposes. Her most famous figure is that of the cyborg, a science fiction image of a half human half machine combination, which she uses to emphasize the sociotechnical relationship. As a feminist (and an antiracist) she is attentive to how the sociotechnical relationship (and its description) can not only inscribe gender (as Cynthia Cockburn has

\textsuperscript{71} Dona Haraway, "Situated Knowledge" in \textit{Simians, Cyborgs, and Women}. pp.183-201. John Law has suggested that the human body is a particularly sensitive instrument by which the researcher might attune herself to the influences of the object (and its history) and thus situate herself within her own research. Chapter 3, "Subjects" in John Law, \textit{Aircraft Stories: Decentring the Object in Technoscience}, pp.38-64. See also Kay Milton and Marushka Svasek, \textit{Mixed Emotion: Anthropological Studies of Feeling}.

\textsuperscript{72} Dona Haraway, "Situated Knowledge" p189: "the god-trick of seeing everything from nowhere."

\textsuperscript{73} Dona Haraway \textit{Simians, Cyborgs and Women}. See also David Livingstone, "Tropical Hermeneutics and the climatic Imagination" in Science, Space and Hermeneutics (Hettner Lecture 2001).

\textsuperscript{74} Haraway, \textit{Modest Witness @ Second Millennium: femaleMan meets Oncomouse"}: Feminism and Technology, pp24-25.

\textsuperscript{75} Emphasizing the interconnectedness of scientific and technical practices the term technoscience was originally used by Jacques Derrida but has been popularized within Science Studies by Donna Haraway. Derrida, "No Apocalypse Not Now- Full Speed Ahead: Seven Missives, Seven Missiles" in \textit{Diacritics}. On this point I am informed by Maureen MacNeill, unpublished lectures.
suggested), but more than this, the body itself can be reinterpreted, described, and ultimately changed by scientific or technical interpretations, particularly interpretations of gender (or race). For this reason she connects her image of the cyborg to that of the black woman, whom she sees as being most subject to a sociotechnical reinterpretation within the global technical economy of information capitalism. And therefore the cyborg for her is not necessarily an unsympathetic image (as it might be if it was merely associated with its roots in militarism and capitalism).

**Technology and territory**

Those who have in the past worked with actor-network theory have now sought other methods of describing the social space created by items of technology or systems of technoscience. Obviously sociotechnical space can be described with Euclidean geometry as regions. Actor-networks are another type of topology by which space might be described in a different manner. An object that functions by holding shape continuity (which is also to say that its components exist in a fixed actor-network of relations to one another) as it moves from one spatial region to another (for example, the hull of a sailing ship that moves from Portugal to India), has been described as an immutable mobile. The use of immutable mobiles has had great significance for technoscience, colonialism, and civilization. An immutable mobile creates sociotechnical space by simultaneously existing in both the regional type of space and the network type of space. However, this concept from ANT does not describe objects that are successful as objects precisely because they do not hold shape continuity throughout their movements but instead change or adapt to differing circumstances. These more fluid objects might be described as mutable mobiles. The social (or sociotechnical) space that they describe can be called fluid social space. The continuity of the sociotechnological object relies upon its interpretive flexibility, unclear boundaries, variable shape, and changing components. In this way it

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76 Cockburn, “The Material of Male Power” in MacKenzie and Wajcman, *The Social Shaping of Technology*


might satisfy multiple demands of various social and technical actors to which it must relate.

An object is often said to be constituted in the way that it is performed by the social actors or actants that surround, interact with, and define the object. Differences in how the various actors/actants constitute the object (the interpretive flexibility of the object) can lead to contradictions in which case the object often fails to do what is required of it by various actors/actants and thus fails to be constituted as a fully formed object with boundary integrity. However in certain circumstances a multiplicity of the object comes to exist. Rather than being limited by an either/or requirement of the differing constitutive performances, it is sanctioned by a both/and possibility that makes the object more than one thing. Because the differing actors/actants that constitute the object enact it in multiple but not mutually exclusive ways, the object is constituted as a multiplicity. John Law has argued that this circumstance is not necessarily a singular object that is viewed from multiple perspectives but is in fact qualitatively different. He names this state “fractional coherence.” He further argues that the prejudice against such a multiplicity of our social and material reality, the prejudice that an object must be one way or another (but never unclearly more than just one way) often limits our ability to recognise such occurrences when they are present or precludes them from being developed, even when they are possible.

Andrew Barry in his work on the relationship of governance and technology in our contemporary technological society of Europe focuses on the process of negotiating technical standards and how this creates certain technological zones. For example if I travel from Belfast to Eastern Europe then as the continuity of electrical outlets change (and depending on whether or not I have an adapter that fits between the eastern European wall socket and my mobile phone recharger) I may lose the use of my mobile telephone. Such is a description of the fuzzy

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79 John Law and John Urry, "Enacting the Social" Economy and Society, 33/3:390-410 (August, 2004). To cause something to be so by enacting it is conceptually similar to performative grammar (Austin). For a discussion of the use of performative ideas in history see “Performing History: The Importance of Occasions” by Peter Burke, in Rethinking History Vol. 9/1:35-52, (March 2005).
80 Law, Aircraft Stories.
81 ibid., p2.
boundary of a technological zone, and how it might be extended or renegotiated. Barry’s work pays close attention to how the negotiation of technical standards is an important political aspect in the ongoing shaping of what the European Union is to be, what possibilities a future citizen might have or not have. What is seemingly only a technical negotiation about standardisation is in fact intimately associated with the political shaping of social life and European governance. In this case, governance is perhaps best thought of as an exceedingly broad term, from governance of a national state, to governance of a population, to governance or even self-governance of one’s personal conduct. In all of these cases the material configuration of technology might play an important role. And standardization of these material configurations creates zones and boundaries in which and by which practices of governance might occur. It is a further concern of Barry’s how this process of technical governance interacts with the person to create the subject (or individual) of a technological society, including the type of politics considered valid by this individual. This sociotechnical shaping of people is part of what we might call subject formation.

In any type of technological structuring (whether that be the creation of a technological zone, use of a set of technical practices, subject formation, construction of a technological object, etc) there must necessarily also be exclusions that operate. Technological zones will zone some people, practices, or objects in, and likewise some other people, practices or objects will be zoned out. When technological structuring supports particular processes of subject formation this implies that there may be values, behaviours, or types of people that are not being supported or are even in fact being excluded. Whereas actor-network theory has always been quite successful at finding out what components and features must be present for a network to work, it has not been particularly strong at studying what must be absent in order for an actor-network to function. For this reason, some specific attention might be taken by the historian of technology to locate the presence of necessary absences within technological systems.

82 For further study see Andrew Barry, Political Machines: Governing a Technological Society.
83 For further study see wind gust factor research in John Law, Aircraft Stories: Decentring the Object in Technoscience. Further critique of actor-networks descriptions is discussed in chapter 3 p138.
Political terms defined in relation to technology studies

At the larger scale, Max Weber has defined politics as "striving to share power or striving to influence the distribution of power, either among states or among groups within states." The state he defined as "human community that ... claims the monopoly of physical force within a given territory." The state defends property relations in a hierarchical society, serves as a source of sovereign authority, and monopolizes the legitimated use of coercive power within a given territory. At the smaller scale, feminist political philosophy has circulated the aphorism that the personal is political (and vice versa), indicating a definition of politics as existing in the realm of personal interactions between people. The importance of 'big politics' according to this aphorism, might also be seen in 'small politics.' Across these two scales a sociology of translation should be able to describe the material basis of political interaction, thus including a politics of technology.

Wendy Brown considers how state power is often increased by a protective legal structure to defend the rights of socially disadvantaged people. Litigation targets immediate perpetrators rather than ending structural causes of discrimination. The identity of individuals is both a product of power and the basis by which power continues. The politics of personal interactions (such as gender relations, or religious discriminations) become the matrix of interaction upon which a hegemony is maintained. Hegemony encourages a narrower politics of identity where the conflict of interest groups can be balanced against one another. The word hegemony comes from Marxist state theorist Antonio Gramsci. Marxist state theory describes the leaders of the state as the executive committee of the capitalist class. They act in the collective interests of capitalism by providing common goods (for example transportation systems, education for workers, and other forms of social capital that all employers benefit from but no single employer would provide themselves). Gramsci examined how a governing set (in order to

84 Max Weber "Politics as a Vocation."
85 Max Weber "Politics as a Vocation."
86 Wendy Brown, States of Injury.
87 Gramsci Prison Notebooks.
88 For a less abbreviated description of Marxist State theory see Bob Jessop State Theory: Putting the Capitalist State in its Place Polity Press (1990) particularly Chapter 1.
secure hegemony) must reflect the interest groups within the ruling class. This principle is resonant with Bew, Gibbon, and Patterson's analysis of factions within the Northern Ireland Government (discussed in Chapter 6, p206), part of which supported Protestant sectarian interests (thus dividing the working class), and part of which sought to ameliorate the destructive and fiscally liberal aspects of such a dividing strategy.⁸⁹ Rudolf Rocker provides a similar analysis of the divisive role of nationalist populism.⁹⁰ V. Spike Peterson looks at how patriotic nationalism requires women to be the reproducers of the nation through child bearing.⁹¹ The relation of beliefs about motherhood to state organisation is another example of Brown's thesis that ideologies of identity contribute to political and cultural hegemony.

Brown's thesis is also consistent with Anthropological theories of the state. State power is formed through two rituals of delegation.⁹² The primary delegation is when the people delegate authority to a charismatic leader. The secondary delegation is when that leader delegates authority in the form of roles back to particular individuals or groups in establishing a system of governance. The state develops out of and must be more or less consistent with the culture and morals of the society which it stands over. People have a set of primordial affections for where they live which is drawn upon by states.⁹³ Through law the sovereign can execute or punish but no other person (unless delegated) can kill another person. Thus law provides protective rights as part of centralizing control.

State theory is a disparate body of political knowledge that helps structure political discourse when regarding the aggregate role of governance. Certainly not

⁸⁹ Bew, Gibbon, and Patterson, *The State in Northern Ireland 1921-72*, p76.
⁹² Lawrence Krader *Formation of the State* (1968).
all definitions of politics are haunted by the presence of the state as a primitive term. However, because political rhetorics such as state theory are more difficult to make amenable to a socio-technical understanding grounded in the study of practices, the translation of state theory is a limit case for the more general project of describing politics in socio-technical terms. A materialist sociology which sees social structure as resulting from social (and material) interactions will look at the state as being enacted by these interactions. Sovereignty is an effect of socio-material practices.

Mark Neocleous argues that the state as abstract and in some ways invisible entity must be imagined in order to be enacted. He examines some of the ways in which the state has been imagined emphasizing four thematic categories- the body of the state (emerging from the imagery of the body of the sovereign), the mind of the state (by which some have "imagined the state as a necessary mechanism for human knowledge"), the personality of the state ("the idea that some forms of collective power can be imagined in terms of personality"), and the home of the state (the way in which the territorial imperative which constitutes the state is "imagined and legitimated through the rhetorical trope of 'home' and through the use of maps as a political imaginary.

Giorgio Agamben traces the collapsing relationship between politics and biological reality under modernity. A greater amount of what was once sacred life (and therefore outside the sphere of politics) comes to be included within the political sphere by its very exclusion from political discourse. This is to say, the

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94 Pierre Bourdieu suggested that "to think the state is to risk either taking over, or being taken over by, the thought of the state." Pierre Bourdieu, "Rethinking the State: genesis and structure of the bureaucratic field" in George Steinmetz (ed.) State/Culture: State-Formation after the Cultural Turn, p53. Mark Neocleous suggests that thinking politics in terms of the state limits the political imagination. Mark Neocleous, Imagining the State, p6. Niklas Luhmann suggests that the state is nothing more than the self description of the political system used as a point of reference for action in a system otherwise too complex to understand. (Bartelson The Critique of the State, p6). Jens Bartelson argues that the state concept has been foundational to political science. Thus critique of the state (from within the discourse of political science) is often ineffective or even an important part of legitimating the state. Jens Bartelson The Critique of the State, p5.
95 Mark Neocleous, Imagining the State.
96 Mark Neocleous, Imagining the State, p4.
97 Ibid.
98 Ibid.
99 Giorgio Agamben, Homo Sacer.
operation of political power (for exclusion) affects the biological level of life, with political consequences (thus within the political sphere). Previously this biological level of life was deemed natural or sacred. As a political constant it had no political consequence. Within the legal framework of the nation-state Agamben defines the sovereign as he or she that decides the exception (similar to Schmitt). For Schmitt sovereignty lies with he who decides the exception within the law (for example, use of extra-constitutional violence by the state) which maintains and reproduces the legal system across points when formal procedures and the requirements of reality seem (to Schmitt at least) to conflict.\(^{100}\) For Agamben the 'exception' which the sovereign arbitrates is the exclusion or ban of some types of life from political consideration. Agamben sees this as happening when a factual level of life is given over to political power (by the sovereign exception). The sovereign exception emerges historically from the power to ban or exclude individuals from political society or from the law. In Roman legal custom the Homo Sacer was that which could not be sacrificed but could be killed without sanction. In Germanic custom a vargyr (or wolf-man) was banned from human society but not executed, although, like the Homo Sacer, this refugee could be killed by others without legal consequence, because the vargyr was considered 'bare life' (a wolf) rather than a citizen. Says Agamben, "The fundamental activity of sovereign power is the production of bare life as originary political element and as threshold of articulation between nature and culture." Agamben is particularly concerned to trace this in relation to the early twentieth century difficulties of constituting the state out of the nation (or place of birth). As we shall see (especially in chapter 5), his work can be used to think about how political sovereignty is relevant to this case study.

The relationship between political sovereignty and the scientific method (for natural philosophy) are explored in one of the earliest and most important works in science and technology studies. *Leviathan and the Air Pump* explores Robert Boyle's philosophy of knowledge in relation to the politics of Thomas Hobbes. Both were aristocrats during the English Civil War with similar beliefs, support for the monarchy, enthusiasm for the mechanistic philosophy. Boyle advocated the experimental method. For Boyle knowledge could be achieved through

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\(^{100}\) Carl Schmitt, *Political Theology: Four Chapters on the Concept of Sovereignty.*
experiment. Boyle’s claims of knowledge regarding the weight of air and the possibility of a vacuum were established using three types of method or technique:

...a material technology embedded in the construction and operation of the air-pump; a literary technology by means of which the phenomena produced by the pump were made known to those who were not direct witnesses; and a social technology which laid down the conventions natural philosophers should employ in dealing with each other and considering knowledge-claims.  

These techniques produced a statement about things which although circulated by humans could be claimed to be the things speaking for themselves. To the extent that these material techniques were repeated elsewhere, circulated, the statement became true in these locations also. In some respects, Boyle’s experimental method was a “theatre of persuasion.”

Hobbes in contrast felt that knowledge must be demonstrated not through a small group of witnesses but within the greater public realm of authority. Otherwise multiple claims of knowledge might result in dispute with political authority. Bruno Latour points out that the resolution of these differences becomes what he calls the modern constitution in which political power is charged with representing people (Hobbes believed in the sovereignty of the corporate body) while scientific knowledge represents things, objects, non-humans, and the stuff of nature (Boyle believed in an experimental method). While certain humans and the nonhuman objects of nature are arranged and conflated by modernity in hybrid networks (which Latour calls the work of translation), modernity at the same time represents nature and human culture as conceptually separate (which Latour calls the work of purification). Thus despite human-non-human networks of interaction in practice, scientific knowledge is only legitimate in principle if it can not be

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102 Ibid., p507.
103 Bruno Latour, We have Never been Modern, p29.
interfered with by the political power, which in turn is considered legitimate if its judgements are based on accurate knowledge provided by an apolitical science.

Perhaps one reason for the acceptance of Boyle's controversial new experimental method was that it explicitly modelled itself upon the legal practices used by political authorities. Thus witnesses were more credible if they were aristocratic, male, and close to the establishment. Those who did not own property weren't considered independent and thus could not have an independent or 'modest' opinion. Boyle adopted the legal standards for witnessing from Clarendon's 1661 Treason Act, thus directly tying the power to speak for the nonhuman objects of nature (to distinguish subjective opinion from objective fact) to practices of upholding sovereignty.^{104} Political theorists such as Agamben and Neocleous define sovereignty in its ability to ban or exclude and thus there is a significant link between state sovereignty and the world-establishing experimental method for determining facts about nature, for distinguishing subjective opinions from objective knowledge.

The political quality of scientific and engineering judgement has sometimes led to public controversy, particularly when statements of expertise are seen to be in some way aligned to existing political hierarchies and interests or when experts disagree.^{105} Public perception of uncertainty and risk is often mediated through and dependent upon expert knowledge. Brian Wynne has argued that despite the mute quality of dependent publics, unsuspected levels of informal mistrust,

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ambivalence or alienation may lay dormant beneath the relationship of dependency. \(^{106}\) The perceived trustworthiness of institutions and judgements of "institutional body language" are some of the ways that individuals manage the social risk to their identity that being dependent upon expertise represents. \(^{107}\)

That facts of nature have in certain ways the quality of being constructed or adjudicated by humans has led some to dismiss the concept of nature. Nature is simply a social construct. \(^{108}\) John O'Neill however has argued that the concept of "nature" has historically been linked to the appropriation of land. \(^{109}\) Land that is unimproved, pristine wilderness for example, land which has no work done to it, was valid to appropriate according to philosopher John Locke. \(^{110}\) But once human improvement work has been applied to land then it is no longer pristine. For the purpose of property relations, nature has been defined as purely untouched by humans.

The problematic relationship between property and purity has also been looked at by Val Plumwood although in a slightly different way. By analogy to the Marxist theory of labour and value, Plumwood argues for acknowledgement of the work done by nature to be included in our appraisal of whether or not or to what extent the appropriated landscapes or products of nature can still be said to be natural. \(^{111}\) To say that a table is man-made does not acknowledge the role of trees in making the wood. A table is to a large extent natural. Val Plumwood would argue that the agency of trees (in the labour of wood production) be recognized in the production of a table.


\(^{107}\) Ibid., p57,65.


\(^{110}\) Locke was secretary to a colonial proprietors association linked with the Carolina colony in seventeenth century America. O’Neill notes that the aboriginal people in America did interact with the land and it was changed or ‘improved’ in many ways, a fact which was not acknowledged by colonial appropriators. O’Neill, pp37-38.

This same role of nature as an active participant in the histories of humans and engineering is seen in Richard White’s work on the Columbia River. Early explorers recognized the power or energy of the river. They measured it by the damage it did as it threw ships or boats or bodies against rocks or sandbars. And they measured it by the work they had to perform to counter the river’s work. They knew something we have obscured and are only slowly recovering: labour rather than “conquering” nature involves human beings with the world so thoroughly that they can never be disentangled.

White looks at the interlocking roles of human bodies, nature’s labour, machines, engineering plans, salmon, government and corporate agendas, and various cultural groups from the original natives of the region to immigrant labourers and white settlers of the American West. His narrative carefully preserves this sense of entanglement even as it slowly fleshes out the relations of political power and environmental infrastructure that have come to structure and organise the Columbia River basin today.

Chandra Mukerji and Patrick Caroll have also looked at the material features that manifest social and political organisation, many of which are directed at the improvement of nature. Mukerji has suggested that establishing modern states has been as much a material feat of engineering as political accomplishment. Patrick Caroll has followed this with research on the material culture of establishing the state form of social organisation in Ireland from the seventeenth century onwards showing that government involvement in the improvement of land, draining of bogs, the orchestration of surveys for mapping, construction of model schools, roads, canals, workhouses, prisons, the railway system, and a sanitation infrastructure always also had a moral objective of

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113 Ibid., pp6-7.
improving the population, rendering them governable, as well as being the material infrastructure by which the state is enacted.115

A statement about technology to direct this research

From the above discussion I would like to emphasize the aspects which are particularly relevant to the approach I have taken in this research. The forces that contribute to the design of a technology can often be seen in the changes to design during the design/redesign process of adaptation. Design can also have effects on who people are (both their conscious and unconscious understandings of themselves as manifest in habits and practices- this is sometimes referred to as their 'subjectivity'). These effects can be immediate to those working with the item of technology or secondary to those working in the sphere of effect of an item of technology (For example, the organisation of machine-work to support men as skilled labourers helped create an 'aristocracy of labour.' This emphasis on male skilled labour encouraged secondary effects upon who people were (gendered relations) and how communities come to be organized in relation to industrialization). Technology or effects of technology also circulate and thus affect subjectivity. Standardization of a technology creates a region within which a subject can operate some set of standardized technological processes. This region or territory can be linked to political ideas of territory.

Thus for this thesis I am attentive to changes of design which can reveal some of the social and technical forces at play in the creation of the Silent Valley Reservoir. I also look for effects which circulate or forms of standardization emerging from this reservoir construction history. The region or territory enacted by such effects or standards will be of interest in linking social and political history to the history of technology.

With this in mind, the following question has directed my research:

Chapter 1: Introduction

The completion of the Silent Valley Reservoir Project involves a disparate network of people, knowledge, and materials. What arrangement of social and technical forces enables this network to come together and how does this arrangement of forces change? How might this process be understood politically? For example, in what ways might the state be said to be a participant? How are social relations such as gender or political identity encoded within the technological solutions enacted?

The following section on method unpacks the relevance of the above discussions for specific case studies. It details the interpretation of source material, and the location of archives regarding the Silent Valley Reservoir.

METHOD

Using an archival method this research has sought to link the reservoir construction project, relevant technologies, and the social context (particularly political controversy) during the time period I have selected. Archival research utilises interpretive strategies to bring out the most relevant material. The strategies below are derivative of the theoretical literature reviewed above.

First, the researcher should begin by assembling the narratives told during the period in question about the technology. Eloquent primary sources such as newspaper accounts, personal letters, and the texts of speeches, in addition to providing the facts, details, relevant persons and locations of events, also provide a narrative interpretation that can be read closely for theme, discontinuity, or conflict (when multiple accounts or multiple interpretations of the same event are available). Points of disagreement in narratives of an event told from differing perspectives often indicate points of interest for an investigation.

Second, from a broader reading of literature (not technology specific) on the social circumstances the researcher can seek any parallel politics that may be present in the context of a technological situation. Third, from less eloquent primary sources, particularly technical documents, maps, and descriptions, the
researcher might be able to determine the context and network (socio-technical) that enacts the technological objects relevant within the study. Technical objects might be "opened up" to socio-technical analysis rather than kept closed as "black boxes" of input-output functionality.\textsuperscript{116}

Fourth, in this the researcher can also be watching carefully for hidden social or socio-technical actors/actants. To "read against the grain" is one method of looking for concealed conflict and dissident actors/actants.\textsuperscript{117} Although understanding how a socio-technical network enables a technological object to function requires looking at the purposes ascribed to such an object, there is no reason to presume any unity of purpose. Interpretive flexibility is often an important aspect of function. Differing actors/actants interpret the object differently, ascribe to it different purposes. In eloquent narratives, the researcher must more or less ignore technological determinist arguments as a false story that depoliticizes circumstances of social or political effect.

Attention should be given to indicators of gender, nationality, and religion. Below the level of group identity the researcher can watch for accounts of personal identity and interests dictated by circumstance. Bureaucratic politics including social/cultural practices internal to technological design, and spatial structures should be given attention. Fifth, the material factors of technical construction (not just the social plans) can be sought in sources that narrate construction or instalment with particular attention to difficulties that emerge in contrast to the predictions of planning and design documents.

\textsuperscript{116} See Donald MacKenzie, \textit{Inventing Accuracy}.\textsuperscript{117} To "read against the grain" means to seek out differences, discrepancies, and inconsistency within a text.
Table 1.2

<table>
<thead>
<tr>
<th>Primary and Secondary Source Types</th>
<th>Sources for Technology Development and Standardization</th>
<th>Sources for Technology Commentary</th>
<th>Sources for Parallel Social Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eloquent Narrative Sources</strong></td>
<td>Design &amp; planning stage</td>
<td>material circumstances of construction/implementation</td>
<td>Newspaper Accounts. Non-scientific books or articles.</td>
</tr>
<tr>
<td><strong>Secondary Sources</strong></td>
<td>Scientific or technical histories of Belfast (or similar regions)</td>
<td>Social histories that comment upon attitude to technology</td>
<td>Histories of Belfast. Obituaries, biographies, retrospective reminiscences. Interviews.</td>
</tr>
</tbody>
</table>

Sixth, in addition to looking at the development of new technology, the researcher can be looking at ways in which technological innovation is standardized so that it can be implemented in new locations and exert influence at different locations and have effects within a larger spatial geography. Why is a previously developed technology or convention exported and what forces bring about whatever standardization or circulations that occur? Again, the material circumstances of construction, installation or implementation are important to investigate, particularly for their idiosyncrasies or deviation from planning.
Chapter 1: Introduction

documents or previous experience. These differences say something about the location and also feed back into the standardization process. Finally, the socio-technical network that constitutes an object of technology can be looked at in the context of larger systems within which it is integrated (including economic, trade, and governance). Some of this at the larger end of the scale can be inferred from a more general reading of the history of the region, colonialism, gender, industrialism, capitalism and nationality.

Archival and Other Sources

The primary archives relevant to the Silent Valley Reservoir are located in the Public Record Office of Northern Ireland (PRONI) and the Science Museum Library in South Kensington. The Public Record Office contains information from the Water Board including meeting minutes, engineering documents, accounts, staff records, correspondence, etc. A particularly eloquent source was newspaper clipping books assembled by staff at the Water Commissioners’ offices.118

118 PRONI WAT/1/3F/3/3-7 Although unpaginated these books are organized chronologically thus the date and the name of the newspaper (when given) serves to locate references. Newspaper references throughout
Besides being a condensed source of the public record relevant to water in Belfast, these books also speak to the diverse range and boundary of institutional interests of the Water Board.

The engineering documents in the Public Record Office represent the original design as commissioned. In order to explore the design as built I also used the contractor records as well as a technical paper (discussed below) published by one of the engineers directly after completion. The contractor records are part of the Pearson Collection in the Science Museum Library. These include disputes and deviations from the design and give a better feel for how the construction process actually proceeded. In particular, legal documents proved very useful. The extent to which official records left in public archives document social and technical practices can be limited. However in this case details emerge from the legal conflict at the centre of the circumstances examined. In the failure for things to go smoothly an opening occurs in which normally unrecorded processes become visible because their meanings are contested.

Table 1.3
Archival Sources detailing the 1922-1932 construction of the Silent Valley Reservoir

- Public Record Office of Northern Ireland (PRONI) contains records from Water Commissioners, includes Board Meeting minutes, engineering documents, accounts, staff, etc.
- Contractor Records (S. Pearson & Company) held in the Pearson Collection at the Science Museum Library, Imperial College Road, London.
- Public newspaper accounts at the Belfast Newspaper Archive, Library Street.
- Additional Water Commissioner material that is not deposited in PRONI remaining with the Water Service.
- Material in Linen Hall Library, Donegal Square, Belfast.
- Some material in Belfast City Library, Royal Avenue.
- Water Act Legislation in Law Library, Queens University Belfast.
- Material from Newcastle, Kilkeel, or Annalong, Co. Down. Personal letters, newspaper accounts, folktales, interviews.

I am especially thankful to Neil Ross, retired engineer and local historian with considerable expertise on the Silent Valley, for his insightful tips and for

this thesis have been given in this format to distinguish them from those consulted directly from newspaper
helping me arrange access when I began this project. Alan Reavie, now a retired engineer but formerly employed with the Water Service before the onset of privatisation, was also helpful in allowing Neil Ross and I to go through an old store room of dusty Water Commissioners’ material still resident in Water Service facilities.

I was also privileged to work with Laura Haydon in a BBC radio documentary about the history of the Silent Valley. As part of this experience I was able to meet with and interview stoneworkers, engineers, and knowledgeable Mourne seniors. Although none of this material appears on these pages it nonetheless informs my understanding of the Silent Valley and its broad impact within the culture and history of the Kingdom of Mourne. A 'learn by' doing education in the journalism of local culture, history, and technology, (and the insights provided from this) has been as valuable to this project of understanding technology politics as any other aspect of my research. Not least, it demonstrates that historical research is always also a contribution to regional culture and as such requires an ethical commitment to the people of the region, something which I have kept uppermost in my mind throughout this process. Included with the thesis is a copy of this broadcast from BBC Radio Ulster. Copyright and permission to reproduce the broadcast remain with the BBC.

Much of the research method has involved publicly available material (newspapers, public legal records, etc.). Only to a small extent have I made use of private letters and correspondence (which become available well after the events in question) or ethnography. For this reason the historical research method demonstrated here is also in many ways valid for studying contemporary political technical controversies. This distinguishes an 'open source' research method from most historical research methods which have little use when contemplating immediate matters.\footnote{The metaphor used here comes from intelligence work. ‘Open source’ intelligence is information gathered from publicly available sources. It involves less resource expenditure to acquire and is often just as accurate as intelligence gathered from private sources.}
Publications

Few books discuss the Silent Valley Reservoir Construction Project. Despite the widespread public controversy that surrounded it most political historians of Ireland have deemed it an engineering project and therefore outside of their remit. However three important publications regarding the Belfast water supply have been important to my research. Two of them contain direct information about the Silent Valley available nowhere else and the third is an example of the reservoir construction narrative as commissioned by the Water Board.

The most recent of these publications is *The Dam Builders*, by W.H. Carson. His work might be described as historical ethnography. He searched through the older Mourne community interviewing those who built the dam over 50 years before. Their associates and family members were often included (or become an interview substitute for the deceased). In this way his description of "the men who built the Silent Valley Reservoir" also includes much valuable information about women's lives, particularly labourers' direct kin but also other women working in or around the construction project. Carson's stories flicker between the silent valley reservoir construction and fifty years later when the memory is being told. Much material which otherwise would not be available to a historian (through documents and archives) is brought into the public record. The book is illustrated with a mixture of 1920s archival photographs, family album pictures and Carson's own photosnaps of the septuagenarians he interviews. Although not rigorous if read as a factual account, as a narrative it is full of details like food, travel to work, working culture of the Silent Valley, gossip, folktales of the workplace, funny stories, memories, and the day to day stuff of the interviewees lives during the 1920s. It draws on sources that presumably are no longer available (many of these persons having passed away since the books publication

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120 One exception is Budge and O'Leary pp 112-114. Estyn Evans' book on the culture of Mourne people makes few references to the Silent Valley despite the effect that the construction project would have had on the local economy during the early part of the twentieth century. Estyn Evans, *Mourne Country*, pp15, 46, 51, 65, 215-216.

121 A fourth publication contains useful information on the Ben Crom reservoir, a 1950s extension of the Mourne Water Scheme which is outside the remit of this thesis.


123 ibid., quotation is the subtitle of the book.
in 1981). As such it has been an invaluable source for the workplace culture and social life of Watertown.

Conflict of an overtly political character is absent from the text, which instead focuses on interesting stories from the old days which generally agree upon the moral value of hard work without trouble making. Presumably those who were successful at the Silent Valley Reservoir construction often took such an attitude.

Jack Loudon's book *In Search of Water* is subtitled "being a history of the Belfast Water Supply" and is "published on the occasion of the centenary of the Belfast City and District Water Commissioners, 1840-1940". Although this work is certainly linked to establishing with certitude the sometimes-doubted authority of the Water Commissioners, it is by no means an unuseful or merely ideological history. Its subtle attention to details locating the Water Board amongst other organisations of civic governance makes it a political history in a way that Carson's book is not.

The author of the Water Commissioners' centenary publication, Loudon does not explore the sectarian politics of Belfast except as they most manifestly impose upon issues of water (such as the 1924 Boundary Commission debates in which the concern arose that Belfast's existing water supply in the Mournes might become part of the Free State) and then only briefly. The underlying theme of the book is the vindication of the Water Commissioners. He details the controversies, difficulties, and failures of the previous century and then goes on to show how the Water Board's most recent project, the controversial and dramatic construction of the Silent Valley Reservoir, has finally laid all doubt and controversy to rest, securing the reputation of the Water Board once and for all.

One is given the impression of a rather carefully spoken Water Board taking

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124 Loudon, *In Search of Water*, quotation is from the title page.
125 ibid., pp 107-109.
privilege as much as possible to avoid being unfairly subject to the unwashed discontent of general opinion.

For example, Loudon's narration displaces any examination of the Christmas 1926 crisis. In the disagreement between Messrs. Pearson (the contractors) and the Water Board, both were sincere protagonists of equal claim to validity. A conflict between social groups was not where the "real opposition" came from. Writes Loudon,

Drama is a conflict between right and right and not between right and wrong. Judged by that standard, the position in which the Water Board now found itself had all the elements of fiction.... In the desire to construct a reservoir the Commissioners and the contractors were as one. The real opposition came from something over which neither party had control, from Nature herself, who had fashioned the valleys and mountains of Mourne in her own design and had deposited there a strata of intractable substance that would not yield to the puny strength of man and his machines126.

The political disputes that most would have seen as the real opposition were according to Loudon without basis,

The majority of the people did not take the trouble to study the bare outline of the facts. They were content to believe that public money had been foolishly thrown away and add their quota to the general condemnation. The Belfast papers expressed the feelings of most of the citizens when they laid the blame entirely on the shoulders of the Commissioners. "A gigantic blunder has been made." "There is a possibility that the city will sink into the Silent Valley financially bankrupt." "We are heading towards civic ruin." "Some years ago we heard a lot about the Free State getting hold of the valuable Silent Valley. We may

126 ibid., p113.
yet live to regret Southern Ireland's failure to secure it.” These were typical of the comments that appeared day by day in all the papers.127

Thus the social and political forces in conflict around the interlocking issues of governance and water are narratively set aside so that contractors and Commissioners can negotiate a mutual solution. The marginalised majority waits for 18 months as the exploratory period continues. What was political becomes concealed in quiet. The previously clamouring Silent Valley, filled with the noise of construction, was now silent. Only a few labourers, engineers and experts were working with difficulty to translate a political problem into a technical solution, to encapsulate the one into the other and thus conceal it. While Loudon’s book is a secondary source only offering a particular interpretation of the events in question it does serve as a material example of the closure achieved upon the completion of the reservoir. It is an artefact example of an effect being circulated within Belfast's culture, politics, and common self-understanding of local history.

The earliest published work of relevance contrasts to the later two in its emphasis. It is a reprinting of a paper that George McIlldowie, Assoc. M. Inst. C.E., presented to the Institution of Civil Engineers in 1934.128 While the other publications focus on the political, journalistic, and personal tension in the period directly prior to the December 1926 arbitration, their account of the consequent silence in the Silent Valley during the exploratory period (1927-28) is only a small part of their telling of the story. McIlldowie’s publication is in reverse proportions focused primarily on the 1927-28 exploration period and the technical development of the air-shafts which sought firstly to determine if bedrock level could be attained and secondly to drain the water level out of the ground and enable excavation. For other narrators this was an expectant period of silence and waiting. Those in the know about how the politically charged situation was proceeding kept their own counsel until success. As an eloquent narrative of technology design written within a year of the reservoir's completion, I have treated this as a primary source.
It is worth noting the impersonal style of the writing does not situate the place from which knowledge is known. This is typical of most scientific and technical writing since the genre was invented. Seventeenth century member of the Royal Society Robert Boyle spoke of being a "modest witness" when documenting scientific or technical advance.\textsuperscript{129} The documents seemingly form a surface of technical knowledge that can be impersonally employed to whatever ends sought by their reader. The readers were the civil engineers all over Britain and Ireland who would employ the knowledge for other sociotechnical purposes throughout the Empire.

This publication is also a particular interpretation of the events in question and once published and circulated a material artefact of technology standardization within the region of its circulation. Taken together, these two books, Loudon's administrative political history and Mclldowie's technical circulation, illustrate the work of purification which separates the social and political from the technical and natural.\textsuperscript{130} I now conclude with an overview of the subsequent chapters in the thesis.

**Thesis Overview**

The next chapter examines the political and social foundations of the project. It argues that these social/political foundations are also closely interwoven with what are normally assumed to be merely technical matters. This negotiation of the boundary between social (or political) matters and technical matters is of some fundamental concern to governance projects. The claim by the water commissioners to be a non-political organization is situated within the highly politicized history of Ulster. For the Water Commissioners it took time to construct the political and financial mandate to initiate the Silent Valley Reservoir. A variety of social, political and economic forces were tied to the political fortunes of the water commissioners (including swimming societies, the national boundary, and local populist conventions of governance). Engineering knowledge was used to

\textsuperscript{129} Steven Shapin, "Pump and Circumstance: Robert Boyle's Literary Technology" in *Social Studies of Science*, p494.
ground social, political and financial negotiations. In this process the status of the engineers were consolidated. Scientific and technical knowledge was carefully portrayed (by engineers and by others) as non-political. The social and political foundations of the project are not always easily distinguishable from the technical elements of the project. The presentation of engineering knowledge as 'non-political' closely parallels the presentation of the Water Commissioners' actions regarding the Ulster boundary dispute as 'non-political.'

Once the project had been authorized, the contractor mobilized a network of resources and labour to begin the actual work. The third chapter describes the initial organisation of construction, plant, transportation, skilled labour, and the proposed engineering arrangements in the Silent Valley. The project was situated within the location and culture of the Mournes but also included expertise, cultural influence, and labourers brought to the mountains from elsewhere. The network of technical implementation is traced outwards into the requirements of sustaining the working community which manifests the project. This includes providing for social and family life. The hidden role and labour of women within a technical project are shown. The chapter again demonstrates that technical elements of the project are intimately associated with the social aspects required to support labour and materials. There can be no clear distinction between the social and technical forces that initiate the Silent Valley Reservoir.

The fourth chapter discusses knowledge in an engineering context. Soon after beginning excavation along the line of the concrete cut-off trench (which is necessary to make the reservoir water tight) the unusual properties of the sub-soil and then the uncertainty of depth became an issue of concern for those involved in the construction. Water below the surface of the ground gave the sub-soil fluid properties while the presence of large granite boulders also made excavation difficult. The depth of bedrock (within which the cut-off trench was to be grounded) was uncertain but gradually it became clear that it was considerably below what was expected and below what the engineering design plans had suggested. This led to conflict between the contractors and the Commissioners. Knowledge claims
about what was below the surface were shaped by the ends to which that knowledge was to be put. When both parties developed different intentions with respect to liability, agreement about the relevant facts broke down. The construction of knowledge had foundered because it was being grounded in uncommon purposes. It became necessary to resolve the dispute by arbitration. However, the knowledge of the material developed during early attempts to excavate does suggest later developments of technology which might successfully constrain the material, enabling drainage and excavation of the sub-soil.

The fifth chapter details the legal conflict. When the controversy became public the Commissioners and the contractor were driven once again to a common purpose by the threat of public hostility. They were thus able to resolve the dispute by a mixture of arbitration and negotiation. The contractors were to be retained on a cost plus percentage basis for an exploratory period of eighteen months during which time a new board of engineers would supervise and report back on the feasibility of successfully excavating the cut-off trench. The political and legal precedents of the compromise are discussed as well as the rhetorical use of nature for the construction of alliance and political/professional creditability.

The sixth chapter narrates the exploratory period from the perspective of the Belfast public. For the next year the Water Commissioners avoided drawing public attention to the Silent Valley Reservoir. After the investigatory period returned positively that the sub-soil could be dewatered and the reservoir could be completed, the political will to continue the controversial project took some time to be reconstructed. Following the precedent set during the arbitration, the rhetorical deployment of 'nature' was used to displace blame (as best as possible) for project difficulties from the project's political coordinators. When the excavation to bedrock was finally successful the Water Commissioners credibility improved. They then began to accept and even encourage public attention to the Silent Valley Reservoir. Tours were arranged and the Water Commissioners were able to consolidate their political reputation. The science and engineering at the Silent Valley Reservoir was associated with the political establishment and used to demonstrate practices of 'good' governance for a wide variety of individuals and
public bodies. In this we see procedures of standardization, the circulation of conventions, and the creation of political norms and discourse all being used to consolidate practices of governance and political territory.

The seventh and final chapter examines what was occurring in the Silent Valley during the exploratory period of political silence. The air-shafts were the central technical innovation that enabled the excavation of a water tight cut-off trench and the construction of the reservoir. They resulted not from an obvious linear application of top down engineering design principles but from bottom-up forces of innovation and careful adaptation to circumstances. The effects of the reservoir building technology (both upon people and within the region of their circulation) are examined for their political consequences.
Chapter Two
Social and Political Foundations

"The Water Authority of Belfast is a strictly non-political body," claimed the secretary of the Water Commissioners to British Members of Parliament on the occasion of their visit to the Silent Valley in September of 1924.\(^1\) This statement from the Water Commissioners requires some consideration. At one level it is a simple political manipulation of self representation. The British legislators were in Ulster to discuss the upcoming Boundary Commission that had been negotiated by the Free State in the South of Ireland. Despite British assurances that significant territory could not be given away, Sir James Craig, Prime Minister of Northern Ireland, had reiterated his refusal to appoint a member to the Boundary Commission, feeling that assigning a member to the Boundary Commission would obligate them. Like many unionists, he questioned the motives of "the British Signatories to the Surrender Treaty."\(^2\)

This chapter is about the political and social foundations of a civil engineering project in stone, a project to provide water. It argues that these foundations, social and political, are closely interwoven with what are normally assumed to be merely technical matters. This negotiation of the boundary between social (or political) matters and technical matters is of some fundamental concern to governance projects.

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1 WAT/1/3/3F/5 Newspaper Clippings, unpaginated, located at the label ‘Sep 13 1924 News-letter,’ hereafter listed simply by date label and source label. Within the book clippings are organized chronologically and usually attributed to a source paper.
2 Sep 12 1924 Northern Whig.
The claim by the Water Commissioners to be a non-political organization is situated within the highly politicized history of Ulster. In the 1920s Ulster became a semi-independent State with factional populist conventions of governance (aligned to displacing class conflict with sectarian disagreement) and a great deal of indeterminacy regarding its precise boundary (as discussed in Chapter 1).

For the Water Commissioners it took time to construct the political and financial mandate to initiate the Silent Valley Reservoir. A variety of social, political and economic forces had to be tied to the political fortunes of the water commissioners (including swimming societies, the national boundary, and Ulster's populist conventions of governance).
Engineering knowledge was used to ground social, political and financial negotiations. In this process the status of the engineers was consolidated. Scientific and technical knowledge was carefully portrayed (by engineers and by others) as non-political. The social and political foundations of the project are not always easily distinguishable from the technical elements of the project.

**Not a Political Body**

If the Water Commissioners' statement to the British M.P.s was non-political, it was certainly surrounded before and after by political remark. That evening the M.P.s were to be entertained at the Ulster Reform club where Craig would speak with them. That morning the Rt. Hon. J. M. Andrews, Minister of Labour in Craig's cabinet, and the Rt. Hon. Richard Best, Attorney General for Northern Ireland had been most prominent in the escort of prominent persons bringing the legislators to the Silent Valley. The *Telegraph* had published a picture of them on the departing train going up to the works in the valley with the Attorney General "on footboard acting as checker". Writes the *Northern Whig*:

> The visitors were evidently impressed by the magnitude of the works, and several when told that the railway system extended for seven miles amongst the magnificent scenery of the Mourne Mountains expressed surprise.3

This impressive scenery contributes its part to the Commissioners non-political statement. At the end of the train ride into the mountains lunch was served beside the Commissioners bungalow. After toasting the King the chairman of the water commissioners welcomed Lord Curzon and the other legislators. The chief professional of the Water Commissioners, the Water Board Secretary, then read their statement. His name was Mr. W. I. Quinn. He had been hired five years previously.4

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3 Sep 12 1924 *Northern Whig.*

4 In September 1919 Mr. R. Hamilton, secretary to the water board for 44 years, retired. Mr. W. I. Quinn was appointed the new secretary. Since 1899 Quinn had been the accountant and cashier. [16Oct1919 telegraph] In turn his vacancy was filled in November by Mr. McGarrigle (There had been 82 applicants) who was until then the chief accountant for the Railway Co. [11 November 1919 *Northern Whig*.]
Quinn described the history of the Water Commission. Begun in 1840 by Charter, and serving 72,500 persons in what was then the town of Belfast, the Water Commission now served 500,000 citizens. Close to a million pounds had already been spent on connecting a flow from the Mourne rivers to Belfast and when this reservoir was complete close to another million would be invested, plus £300,000 for ancillary works to make it distributable in Belfast. It would hold 3,000 million gallons and be complete by 1931. Mr. Quinn warned,

It must be apparent that if by any unhappy circumstance the supply from these mountains could be rendered unavailable, or in any way interfered with, there would follow consequences which would be highly disastrous to the manufacturing
and shipping industries and inflict injury and loss upon the community, the extent of which it is impossible to overestimate.\(^5\)

Quinn then went on to acknowledge that this bit of County Down was under discussion. It is “of interest to mention”\(^6\) that the catchment was only six miles from Carlingford Lough.

This lock penetrates inland for many miles and at present effectually separates, y [sic] reason of its wide expanse of waters, a large part of the Free State from the Northern Province, and geographically it thus forms an ideal section of the existing boundary.\(^7\)

He went on to mention the republican attack which had “maliciously damaged” the reservoir two years previously. The reservoir was presently under constabulary protection. The Water Commissioners would feel “alarm” at the possibility of a handover of a portion of South Down. Speaking in the grammatical imperative Mr. Quinn said this area must “be under the jurisdiction of the same Government to whose control the Belfast Waste Authority is subject.” The newspapers printed this speech in Belfast headlined it as “Peril of Water Works: Just Six Miles from Frontier” and “Mourne Water Works: Must Be Under the Northern Government: Statement By Commissioners.”\(^8\) The *Northern Whig* would editorialize a few days later that renewal of border troubles near the water supply would justify use of Imperial Troops!\(^9\)

Quinn (later to receive an OBE for his work as a public servant) finished on a note of pride in “our Great Empire” but not before carefully pointing to the nature of their authority,

\(^5\) Sep 13 1924 *News-letter*.
\(^6\) Sep 13 1924 *News-letter*.
\(^7\) Sep 13 1924 *News-letter*.
\(^8\) Sep 13 1924 *News-letter*, and unlabeled clipping.
\(^9\) Sep 15 1924 *Northern Whig*.
The Water Authority of Belfast is a strictly non-political body, and its Board of Commissioners recognize that fact and that their constituents comprise all classes of political thought. They consider the efforts they are making to prevent bringing about of changes which would be capable of interference with the full rights of property they own and enjoy is a matter entirely nonpolitical.\textsuperscript{10}

The Lord Mayor of Belfast, Sir William Turner, also part of the escort, followed Quinn's speech with his own. He began by highlighting the non-political nature of the speech,

As the chief magistrate of the city, he confirmed and emphasized every word contained in Mr. Quinn's speech. He noticed he had carefully refrained from discussing in any way that most important question which at the moment was stirring the minds of the people with regard to the boundary between Ulster and the neighboring State, and he thought in doing so they had acted wisely.\textsuperscript{11}

He then went on to discuss his fears about the consequences to water supply if the Boundary were to shift. He appealed to the British parliamentarians' sense of fairness asking that

they would decline to support legislation which would give unlimited power to any commission to place this vital and indispensable water area outside of the authority of the Government of which the great city of Belfast was proud to be subject.

The water commissioners and their impressive mountain scenery were being presented as the non-political center of a fairly political sandwich. Craig's government would be in serious trouble and the Northern Ireland state would be threatened if the boundary issue was not resolved in their favor. The non-politicalness of the Silent Valley Reservoir was politically convenient. It gave a rationale of nonpartisan water necessity to

\textsuperscript{10} Sep 13 1924 News-letter.
\textsuperscript{11} Sep 13 1924 News-letter.
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the British legislators, some of whom were perhaps already inclined to support the Unionist cause.

At one level the statement that the Water Board was not a political body is simply a manipulation. It side-stepped the politically charged boundary issue by emphasizing administrative decision making which was said to be non-political. It is an example of rhetoric. The statement is written by Quinn but arguably the significance of the statement for the MPs is inscribed by the context into which it is squeezed. Andrews (Minister of Labour) and the Attorney General escort the parliamentarians into the Water Commissioners mountains in the morning while Craig receives them in the evening. The Boundary is the question and Craig's government is at stake. But at another level the non-political statement is an indication of a more fundamental conflation of the political and technical categories. Whereas a political action can be contested, different opinions might be considered, a technical action can not be contested. It is said to be the consequence of scientific or natural fact. In this case, rational, administrative, interests for a trust were presented as determined.

Although this conflation is convenient, it is also consistent. What is considered social and political is closely interwoven with what might at first seem to be technical matters. The negotiation of the boundary between social/political matters and technical matters seems to be of some fundamental concern to governance projects. Can we find patterns in the way these negotiations take place?

In this chapter I will be asking this question: to what extent and when are technical issues and political issues separated or connected during the process of initiating the Silent Valley Reservoir? By 1919 the need for water in Belfast and its surrounding areas was being felt. The Commissioners were turning down applications for water from regions outside of Belfast. The example of the Cregagh region demonstrates that the contentions that fuel political disputes sometimes revolve around technical issues. If the desire to retain Belfast's water supply is described as “non-political” within the very political boundary conflict, the water pressure dispute between the Commissioners and
Cregagh residents can be seen as a minor "technical" issue which becomes political. After discussing the Cregagh water dispute, I will then describe the Water Board elections of 1920 and the subsequent legislative initiation of the Silent Valley Reservoir. But although it took the new Water Commissioners of 1920 only a short time to achieve legal authority to begin the project, the construction did not begin for three years. Among the reasons for the delay, we must include the political and social instability of Ulster during the period of 1920 to 1923. The certainty of Ulster political arrangements seemed unclear even up until 1925 when the Boundary Commission's report was finally buried. During this time the Commissioners worked unevenly to initiate the project.

**Cregagh Water Dispute**

The Water Commissioners explained their wartime waiting strategy in March 1917. The occasion was the annual statutory meeting for the selection of the chair and deputy chair of the Commission. The suspensory Acts of 1916, 1917, and 1918 prolonged the political term of local authorities until after the war. The Water Commissioners had pursued only small increases in reserve capacities while they waited for the construction of the Silent Valley Reservoir at end of war. Not only had the Silent Valley project been around for a long time, it was also accumulating in the careers of civic men. Some of the Water Commissioners had spent years waiting for conditions to become such that the long-discussed project could be begun. Commissioner James Miskimin of Pottinger district was nominated to become the vice chair of the Water Board. It was said of him that he "had for many years waived his right to a still higher office owing to his desire to continue as chairman of the Works Committee, in order that he might see the second installment of the Mourne Scheme started."

Even more dramatically, one commissioner's death was testimony to his commitment. In June of 1919 it was written of the late Mr. James Hollywood, Water Commissioner, "He had been looking eagerly forward to the completion of the Mourne Scheme, and even in his last illness he often thought and spoke about that work."

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12 Budge and O'Leary *Belfast: Approach to Crisis,* p. 36. Elections were not to be held until 1920. 17 July 1918 *News-letter.*
13 Mar 22 1917 *News-letter.*
14 Jun 27 1919 *News-letter.*ler
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The low rainfall in 1919 was causing problems with the water supply. This was particularly true for Cregagh. For the last several years the residents of this new suburb had complained that they did not always receive an adequate supply of water. But during the drought of 1919 this grievance became enough to stir them to action. The residents of this very recent suburb were located South East of the city on the rising slope of the hills surrounding Belfast. For those of Cregagh the problem was compounded by the fact that they were outside of the statutory area of supply for the Water Commissioners. Castlereagh Rural Council, who had official responsibility for Cregagh, had little water to offer them. A syndicate of business men and property owners arranged purchase of some supply at cost of laying their own pipes from the city boundary at whatever pressure was available. For this water the Cregagh residents were surcharged by half again the rate applied within the statutory area, to be paid a year in advance. But many residencies at the higher altitudes did not get water during some parts of the day.

The Water Commissioners had described this problem as one of water pressure (rather than water quantity). In June of 1919 the Cregagh Ratepayers Association replied that they did not believe in these supposed engineering difficulties. W.F. Heaton, Honorary Secretary of the Cregagh Ratepayers Association, explained that a syndicate of business men and property owners paid nearly £1000 to extend the 5" pipe in 1905 and had been given estimates that supply for 300 potential houses could be provided there. In other outlying districts there were no “pressure” problems. He compared the water commissioners to the granite stone of the Mournes. Yes, it was true the situation of people of Cregagh was outside the legal requirements of the commissioners to resolve but it was not outside of their moral obligation. Heaton invoked the threat of disease or even an epidemic that might spread from this area lacking adequate water. To the Water Commissioners he recommended the maxim, “Where there is a will there is a way.”

Unlike the Water Commissioners, he did not seem to be making the technical distinction between water pressure and water supply.

15 Nov 21 1919 Telegraph.
17 Jun 19 1919 Telegraph.
Water in the Southern portion of Belfast was primarily supplied by the Knockbracken reservoir at the bottom of the 35 mile long conduit diverting water from the rivers in the Mournes. This tiny reservoir did not have the capacity to last through prolonged rainfall shortages such as during 1919. According to engineering calculation the planned reservoir in the Mournes would fulfill water pressure requirements for places of higher elevation like Cregagh. Only when a consistent reservoir supply of water was present could the new residencies being built in Cregagh be guaranteed continuous water.

Even to the North of Belfast, towns hungry for water were turning to the Belfast City and District Water Commissioners. When the Carrickfergus application for more water was turned down, the need for the Mourne storage reservoir was invoked again.18

By August 1919 the headlines were describing “The Prolonged drought. Lowest rainfall in 45 years.”19 The details of water curtailment by the commissioners were given alongside the rainfall statistics. In an interview the chief engineer, Fred McCullough, commented on the increased population since the war, forty to forty-five thousand more people. In addition to the population increase, the per capita consumption of water had also risen. There was now a net increase in consumption of two million gallons a day. McCullough explained that more baths were now taken- men who served in the army had become accustomed to baths every day. There was also an expansion of the shipyards. Even though the prices of labour and materials were increasing significantly, the Commissioners were, he explained, reapplying to Parliament for sanction to proceed with construction of the Silent Valley Reservoir.

These first public remarks on the reinitiation of the Silent Valley Reservoir project were made by the Water Commissioners’ engineer. The social and political pressure generated by lack of rain were given a technical voice through the engineer’s newspaper presentation in 1919. The attention to demobilized servicemen in McCullough rationale

18 June 27 1919 News-letter.
19 Aug 1 1919 News-letter.
is consistent with the political importance that they had during this period.\textsuperscript{20} The actual impact of ex-service men on water consumption is not as important as the perception being given. Water is here being associated with the political merit of returning veterans.

As the chief engineer had intimated, renewing Parliamentary sanction for the reservoir was done by submitting legislation. But any parties could contest legislation if it interfered with their interests. The Cregagh rate payers association hoped to be one of the petitioners against the legislation sought by the Commissioners. They met with Sir James Craig at his office in the Old Town Hall to articulate their opposition to the Water Commissioner's proposed legislation.\textsuperscript{21} Craig was then an important Unionist politician. He had been the logistical strength behind the organizing of the Ulster Covenant in 1913. Within two years he would be Prime Minister of the newly formed Ulster. They also went to the Castlereagh Rural Council arguing that it should oppose the Commissioners legislation until amended to bring Cregagh within the statutory boundary of supply.

What was required was to force the Water Commissioners to introduce a clause [for such a purpose]. The commissioners could give them a supply if they liked, and if pressure on them was steady enough the question of water pressure would automatically right itself.” Mr. Gosney of the Castlereagh Rural Council pointed out that the cost of legal opposition would at minimum be £300.\textsuperscript{22}

On December 12\textsuperscript{th} of the 1919, provision of water was returned to a full 24 hours basis.\textsuperscript{23} The next day newspapers reported that the Castlereagh rural district would not seek to oppose the legislation. They had been given to understand that “In the future however, if the new supply would be large enough the Commissioners would give them every concession in their power.”\textsuperscript{24}

Early in January of 1920, Mr. Quinn, Secretary for the Water Commissioners, had

\textsuperscript{20} Bew, Gibbon, and Patterson, \textit{The State in Northern Ireland 1921-72} see discussion chapter 1 p28.
\textsuperscript{21} Nov 17 1919 Telegraph.
\textsuperscript{22} Nov 21 1919 Telegraph.
\textsuperscript{23} Dec12 1919 News-letter.
\textsuperscript{24} Dec 13 1919 News-letter.
clipped the notices of 5% redeemable stock on offer by the corporation of Belfast and carefully placed them in a Newspaper clippings book. These details would have been relevant for the Commissioner’s offices because they also engaged in funding their public projects by giving the sale of public stock at a fixed percentage of return. The stock offer by Belfast Corporation was to finance their planned work on Gas, Tramways and Electricity. Belfast was modernizing.

Perhaps it is only a footnote in history to mention that at the same meeting of the Castlereagh Rural Council which first considered pursuing the Cregagh residents water grievance by contesting legislation, a letter regarding a quite different matter was also discussed. A letter from an Irish government department requesting information on fisheries and natural resources as part of a national survey had arrived and the clerk was concerned that compiling the information requested would take a lot of time. The scientific and economic survey performed by such a letter implied a particular geography of the sovereignty of knowledge. In contrast, the geography of sovereignty implied in the the act of attaching a grievance to a piece of legislation that would ultimately be debated in the parliament buildings on the Thames River in London was quite different. With this dialogue Castlereagh Rural Council ended their their contemplation of the request from the South of Ireland.

“We're not Sinn Feiners here yet.”

“Mark it 'Read'”


26 Reported in Irish News 15 Nov 1919. For a similar discussion see remarks on the “moving metropolis” in Nicholas White “Science and Nationality in Edwardian Ireland” in Peter J. Bowler & Nicolas White, eds. Science and Society in Ireland: The Social Context of Science and Technology in Ireland 1800-1900. See also in this same volume Roy MacLeod “On Science and Colonialism” pp1-18. In the above council meeting the conception of sovereignty per se in the reading of the letter or in the petitioning of legislation are more or less the same. The difference is in the implied geography of sovereignty, that is the specific locations which are privileged when decision making or knowledge construction are organized. Neither White nor McLeod provide a qualitative analysis of privileging in knowledge construction. The moral issue is thus implied to exist in the choice of which state through which knowledge is organized. For a qualitative analysis of how knowledge is organized and a critique of the state form of knowledge organization see Chapter 2 “The Mind of the State” pp39-71 in Mark Neocleous, Imagining the State. For identifying the state form of organization as something to which there can be alternatives, see chapter 2.2, “Sovereignty of the Nation-State” in Hardt & Negri Empire which gives a critique of the association within most political philosophy of popular identity (such as
This interaction demonstrates the contention growing in Ireland. The shadow of violence was emerging from conflicting and exclusive geographies of sovereignty. The island of Ireland could not simultaneously be ruled by the British monarchy and an independent republic as some in the South were now intimating. Another letter traveling by post in late 1919 went from the Water Commissioners. Mr. W.I. Quinn, Secretary of Board had been instructed to dispatch a letter to the Lord Lieutenant conveying "respectful congratulations on his providential escape in the dastardly attack recently made upon him." The rebellion against British forces was heating up. During 1918 and 1919 "British political and military dominance was broken by the IRA." The growing political instability in Ireland was giving rise to new arrangements.

The 1920 Government of Ireland Act hoped to be an effective response. Elections during the previous year had polarized Ireland. The 73 newly elected Sinn Fein promptly followed through on their independence agenda by forming a separate Irish parliament, the Dáil. Only in Ulster did the 26 remaining Unionists and a few constitutional nationalists (Joe Devlin of West Belfast the most important among them) remain with the Westminster Parliament. Elsewhere in Ireland the dual power strategy of duplicating the functions of government and thus replacing it was effective for replacing British control. The more mild mannered constitutional nationalism had been destroyed electorally, leaving a more militant acceptance local self organized government. Furthermore guerrilla style warfare was making British governance of Ireland increasingly difficult.

The authors of the 1920 government of Ireland act hoped it to be a concessionary

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27 Dec 24 1919 News-letter.
29 Budge and O'Leary, Belfast: Approach to Crisis, p136.
response to these problems by instituting a proportional representation system by the Hare method. This was intended to produce a greater variety of elected persons, more than just representatives of the dominant opinion. Only in parts of Ulster (where unionists had opposed the legislation) did the new method return a broader spread of elected representation. Elsewhere Sinn Fein continued to control local governance. The failure of the conciliatory local government act was paralleled by an unsuccessful military policy of repression by auxiliary forces (known as the black and tans) which increased the hostility of the ordinary population. During the spring and summer of 1920 the guerrilla war of the Irish Republican Army (I.R.A) in the other “three provinces showed that, backed by a sympathetic population, they could wreck the administration of the country.”

In Ulster the new method of proportional representation achieved the well-balanced local authorities “which it's parliamentary sponsors had envisaged.” In Belfast the dominance of official Unionist politicians on city council was significantly diminished. The previous block of 52 Unionist councilors out of 60 was reduced to 29 officially endorsed unionist candidates. Independent unionists and labor unionists were also elected. Members of the British Labour Party received 10 seats. Independents and independent labour candidates received council seats. Sinn Fein and the Constitutional Nationalists each received 5 council seats. The diversity of economic and social backgrounds from which candidates came also increased. A greater number of councilors (40%) were now from the working classes. The shift from a majoritarian system to proportional representation in which minority candidates could be elected in proportion to their support within larger multiple candidate districts had brought a greater diversity to the political spectrum. Old famous first citizens such as Lord Pirrie who built the major shipyards of Belfast were now retired but other councilors continued such as W. F. Coates, the Lord Mayor, Sir William Turner, the Lord Mayor in 1924, Sir Crawford McCullough, a previous and future Lord Mayor (soon also to be at the center of

31 Ibid., p141.
32 Ibid., p141.
33 Ibid., p140.
the housing scandal), Mrs. William McMordie of Pottinger, and the newly elected Mr. Thomas Henderson, independent unionist from the Shankill, who would in 1926 ask embarrassing questions in the yet to be established Northern Parliament about the work in the Silent Valley claiming that no progress had been made, work had stopped, no foundations for the reservoir could be found and that millions were being spent on a "wild cat scheme!"34 Other places throughout the six counties of Ulster province that were more unionist had similar results. The city council of Londonderry became a constitutional nationalist majority. Likewise the county council of Fermanagh and Tyrone came to be controlled by a nationalist majority.

The New Water Board of 1920

Because of the greater chance of electing candidates who would have been marginal under the old electoral system the Hare method of proportional representation had increased political involvement in the Belfast City Council elections. 147 candidates had competed for 60 seats during January of 1920.35 Those who were not status quo Unionist had a possibility of seeing their views represented. Not all local authorities were subject to the proportional representation system however.

The Water Commissioners were not included in the 1919 Government of Ireland Act, perhaps because their unusual constitutional status (discussed on page 69) would have been unfamiliar to many English legislators. In March of 1920 the Suspensory Act of 1918 no longer applied. The electorate in 15 separate wards throughout the city would select a commissioner to represent their interests on the Water Board by majority vote. Without the Hare method of Proportional Representation it initially remained to be seen if the enthusiastic political participation of independent unionists, Labour candidates, and Sinn Feiners that had occurred during the January elections to city council would be repeated. As per an agreement negotiated between the Catholic Association and the Unionist establishment in 1895 the wards had been allocated definite majorities for either

34 Mar 25 1926 Telegraph. Budge and O'Leary, p140.
35 Budge and O'Leary, Belfast: Approach to Crisis, p67.
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Unionist or Nationalist politics. The official unionists were the largest section of the vote in 13 of the 15 majority takes all election wards. The Falls and Smithfield wards were primarily Nationalist. This would be an old Belfast election. However, there was to some extent a continuation of January’s participatory enthusiasm. There were contests in 11 of the 15 wards, far greater than in subsequent or previous years. Candidates put up by Sinn Fein (the more militant of nationalist political party supporting immediate separation from Britain and the establishment of an Irish Republic) were to contest the Falls and Smithfield Wards (which were now held by the constitutional Nationalists). Labour party candidates were to contest Falls and Smithfield wards as well, but only those wards. In other districts the traditional majoritarian election system, guaranteeing unionist candidates, must have discouraged them. On the 8th of March the Irish News editorial claimed popular interest was not aroused by these elections and advocated that nationalist candidates should seek proportional employment for Catholics in water work. On the 9th of March the Northern Whig newspaper claimed there was an “unusually keen interest” in the elections.

Just before the elections there was a large rally supporting the reelection of the nationalist candidates, Dr. A.G. McKenna and Mr. James Smith from the Smithfield and Falls ward respectively. The rally emphasized their commitment to labour issues. In each ward there was also a labour candidate in the mix as well as their main political rivals Sinn Fein. Dr. McKenna, at home sick with pleurisy, did not attend his own rally, but was well spoken for. He had originally been on the Poor Laws Board and was now well known to his constituency. The two candidates had, through their voting and by their influence as Commissioners, done much for labour, it was claimed – pensions, reduced hours, etc.

On the 10th of March 1920 the Irish News reported the results from the previous

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36 For the history of how these ward boundaries were established in 1895 see Budge and O’Leary p118-119. See also chapter 1 page 10.

37 Water Board seats were rarely contested, either because of disinterest or because it was understood that the incumbent still had the support of the dominant parties local committee.
days voting. Sinn Fein and the nationalist candidates were almost equal in their vote take. But in each case Sinn Fein was narrowly defeated.

Table 2.1

<table>
<thead>
<tr>
<th></th>
<th>Election Results Falls Ward</th>
<th>Number of Votes</th>
<th>Election Results Smithfield Ward</th>
</tr>
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<tbody>
<tr>
<td><strong>Constitutional Nationalist Candidate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith</td>
<td>1637</td>
<td>Dr. A.G. McKenna</td>
<td>799</td>
</tr>
<tr>
<td><strong>Sinn Fein Candidate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carolan</td>
<td>1436</td>
<td>F. McCurry</td>
<td>756</td>
</tr>
<tr>
<td><strong>Labour Candidate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McRandall</td>
<td>139</td>
<td>James Boyce</td>
<td>37</td>
</tr>
<tr>
<td><strong>Spoilt Ballots</strong></td>
<td>22</td>
<td>unknown</td>
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</tr>
</tbody>
</table>

The Labour candidates in the two wards had each received only a very small sliver of the vote. But their presence in the election was surely influential and could easily have been the toppling point for the nationalist candidates. The two members of Board from nationalist wards, Smith and McKenna, were fairly consistent in raising and promoting labour related issues such as wages or fairness at Water Board meetings. That summer they would be asking holidays for water workers in accord with what city employees already received. Perhaps a measure of how quickly the enthusiasm for contested elections faded was the replacement of the Commissioner of Falls ward later that year. Mr. James Smith passed away in November and was replaced by Mr McAlevey, a

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38 This article is clipped and placed in the Water Commissioners newspaper clippings book (indicating their institutional interest in this election)
39 10 mar 1920 *Irish News*
40 25th June 1920 *Irish News*
nationalist party member. He was the only nomination and there was no contest held.

By the conclusion of the March 1920 elections, one independent unionist had taken a seat in preference to an official unionist candidate and all incumbents who sought reelection were returned. A newspaper described the elections as "Dull as ditchwater." Drizzly rain came down over Belfast on the day of the vote. Of note, remarked the Belfast Telegraph, there were lots of women out exercising their recently acquired chance to vote. Nevertheless, this election brought one of the largest turnovers in the history of the Water Board. The long period during the war (and just after) under the Suspensory Acts for local government had kept many persons in office longer than they had perhaps expected. Three members had died in the past year and 5 were not returning. Although this was the board that would be required to carry through the Mourne Scheme plans they were a significantly different Board from the one that had set the scheme in place. When the election was complete eight out of 15 members of the board were new and another would be replaced within the year. This was great discontinuity for a board which rarely saw contested elections.

Two constitutional nationalists in the Catholic wards and all other candidates were official unionists endorsed through the unionist party with the exception of Mr. Joseph Shaw who was elected in Victoria Ward. Shaw was an independent unionist. It was a brand new Board.

41 James Smith had been a member of the Hibernian Order and an active nationalist, working with Joe Devlin's revitalization of the constitutional nationalists. Since 1915 he had been the deputy chairman of the Law Committee. On the day after his death the flag at the Water Office was flown at half mast and the Chairman, Mr. Miskimmin gave tribute to his service, saying that "whilst upholding in the most independent manner his own views, he was always courteous and the very soul of honour in his association with them." Sep 17 1920 Irish News.

42 Dec 3 1920 Irish News.

43 Mar 16 1920 Telegraph 16.

44 Mar 9 1920 Telegraph.

45 The Water Act of 1923 would make it impossible that such a level of discontinuity would happen again. The procedure for elections then changed from one election for the entire board every 3 years to an election for one third of the members of the board every year. The length of the term of office remained three years.

46 Telegraph Mar 171920. See also Feb 27 1920 News-letter 27.
The Water Commissioners in the early 1920's

What did it mean to be a water commissioner in the early part of the Twentieth Century? At the first meeting of the new board the annual business of selecting a chairman, deputy chairman, and the heads of each of the committees was done. The new members were learning the rituals of being a Water Commissioner. General board meetings were public, although they also met 'in committee' (where specific topics were discussed privately). During the public board meetings the press would often be present and sometimes a Commissioner's speech would be in the newspaper the following day. The News-letter finished its account of the first meeting of the new Board of 1920 with "this concluded the business and subsequently the members were kindly entertained at tea by the chairman." 47

47 Mar 17 1920 News-letter.
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The Chair of the Water Board was an important position. At public events it was usually the Chairman who spoke on behalf of the Commissioners. Every year at an annual statutory meeting (usually March) a chairman and deputy chairman were selected. The Chairman of the Board would be "invested with the chain of office by the retiring chairman." There would undoubtedly be some public speeches. The new chairman would address the public on matters and vision of the Water Board. At the end of the formal meeting there was a celebratory informal time with food and beverages. At the 1920 meeting Mr. James Miskimmin was reselected as chairman. Miskimin was also a significant unionist. He had been involved in the reelection campaign of Carson. Frequently, Water Commissioners were engaged in other prominent social roles, either gained (in part) through being a Commissioner or perhaps these roles had helped them to become a Commissioner.

The Water Commissioners divided their work into committees. Usually there were only three committees. The Works Committee dealt with all decisions that needed to be made regarding constructing, maintaining, and repairing the systems of water provision. This included the piping, reservoirs and new applications for water. The Finance Committee were in charge of taking out loans by issuing redeemable stock. They also recommended the rate that must be paid by all households in the area of water provision. The Law Committee prepared new legislation to authorize the activities of the Water Commissioners. Each committee had its own chair and deputy chair although the membership of each committee consisted of all of the Commissioners. The committees made recommendations at the meeting of the full Board (when the press or public might attend) which were then accepted or rejected. At the meetings of the full Board the press and the public were often in attendance.

Water authorities in England, Scotland, and Wales were usually part of the local corporation. But the Belfast Water Commissioners had held an independent charter from the Crown since 1840 when they had taken over water distribution responsibilities from

48 Mar 22 1917 News-letter
49 Mar 17 1920 News-letter
50 Oct 9 1919 Telegraph Carson was the most significant unionist of this period.
the spring water commission of the Belfast Charitable Society. This charter gave them certain statutory powers and responsibilities, including the power to raise finance by borrowing, the issue of stock, and the collection of rates. The primary responsibility of the Trust was the provision of water for the Belfast city and district, an area that had expanded during the history of the Board. Although by charter they were an independent body, the Water Commissioners also included two ex-officio members who were members of other local government institutions in Belfast. The Lord Mayor of Belfast and the Chairman of the Harbor Board were both entitled to participate as Commissioners in the affairs of the Water Board. By this mechanism there was some interconnection between the local governance boards in Belfast, although in practice the ex-officio members only rarely participated.

Being a Water Commissioner gave one status. There was the prominence of a public profile and the possibility of promotion through the committee structure until eventually one might become the chairperson of the Board. This public prominence might encourage other benefits. In October of 1919 Chairman James Miskimin had been appointed a magistrate by the Lord Lieutenant of Ireland. On the same occasion John Courtney, another Water commissioner who had spent time as Chairman of the Board was appointed a magistrate. Water Commissioners often became Justices of the Peace during their tenure. After 14 years on the Board a celebratory dinner was held in honor of Miskimin. When Mr. McCalla became chairman of the Water Commissioners he was featured by a cartoonist in Ireland's Saturday Night lending him a gossip column type of familiarity. The prominence of being a Water Commissioner could also be leveraged to further one's political career. After being a Water Commissioner, Samuel McGuffin had become the Member of Parliament for the Shankill area.

51 Belfast Water Acts 1840-1912, p3. This is a quite unusual status for a water authority, most of which by the twentieth century were controlled by the local municipal authority.
52 For a delineation of the expanding geographical boundaries of Water Board responsibility see Budge and O'Leary, Belfast: Approach to Crisis, pp112-14.
53 Oct 9 1919 Telegraph. The Lord Lieutenant was a type of governor who administered Ireland from Dublin up until independence.
54 Oct 9 1919 Telegraph.
55 Apr 8 1921 Northern Whig.
56 Mar 19 1921 Ireland's Saturday Night.
57 Jan 8 1919 Newsletter.
Other aspects of being a Water Commissioner also indicated status. The offices of the water commissioners were on Royal Avenue at the center of the city. Work on the Law Committee might involve traveling to London to consult experts on legislation. The Commissioners purchased a luxury automobile for necessary travel. A Motor News article described in detail its status as an exemplary vehicle.\(^58\) The very recent rates increase that the Commissioners had decided upon just before placing the vehicle order was indicated with some irony. At another point in time the newspapers quickly picked up on one of the Water Commissioners saying they were "never at a loss for money,"\(^59\) during a discussion about financing unemployment relief schemes.

The Water Commissioners also were required to deal with issues of public concern. During the 1920s Belfast's depressed economy led to high unemployment. Involvement in relief schemes was one activity that brought the Water Commissioners into public profile. Beyond deliberate schemes to temporarily reduce unemployment the Water Board had a regular staff of laborers for maintenance and were frequently involved in contracting construction projects to extend the water provision system for the city and district of Belfast. The role of public bodies in maintaining wages and conditions was important to those with working class sympathies. Because elected officials had to be responsive to those who elected them public boards were challenged to maintain the standard of wages. Water sports were also occasionally an issue of public interest. Starting in 1891 the Commissioners' reservoirs were frequently seeded with trout and fry so that angler's might enjoy fishing.\(^60\) One sporting interest that became a public concern in the 1920s was finding a place to swim in Belfast.\(^61\) The Commissioners possessed two ponds on the Antrim Road which were no longer used to supply drinking water and were thus eligible to become a public park where summer bathing could occur. The discussion about making this happen reached the newspapers. Resolving the swimming issue eventually became a source of positive publicity for the Water Commissioners which

\(^{58}\) Oct 23 1920 *Motor News.*  
\(^{59}\) Aug 24 1928 Newsletter.  
\(^{60}\) PRONI WAT/1/3AD/1 *Water Board Meeting Minutes* p35,42.  
\(^{61}\) Apr 16 1920 *News-letter.* This was one of the first issues discussed by the new Board of 1920.
could be utilized strategically during much more controversial debates such as investment in the Silent Valley Reservoir. Initially however, it seems merely to have been incidental to the concerns of the Commissioners.

Likely disagreements that might typically involve a water authority were land controversies such as moving residents out of a new water catchments area, public health controversies in which certain parties were attempting to connect disease epidemics and water quality, and fire safety controversies in which water pressure inadequacies were claimed to have limited firefighting effectiveness. Occasionally the water commissioners were in court regarding non-payment of water rates or a liability dispute when water damage or personal injury occurred from broken pipes or a stopcock accident.

Promoting the new reservoir- rhetoric and rationale

The brand new Water Board was now involved in promoting the Silent Valley Reservoir project. By April 1920 the Finance, Works, and Law committees all had chairs. The Law committee had met with 47 petitioners against their legislation regarding the Mournes Extension Scheme project and the bill would be presented before Parliament unopposed. Around about this time the Northern Whig newspaper ran a promotional article on the Silent Valley. The specific author of the article was given only as “an old fogey.” Of the four newspapers in Belfast the Whig would over time demonstrate the most consistent and the greatest level of advocacy for the reservoir project. The Northern Whig emphasized that the plans were now in place and that despite previous queries by critics, it was up to the new Commissioners to enact these plans. What the old board prepared might now be done by the new board who had merely to "push the lever." 62

Under the subtitle "Nothing Wrong with Foundations" the article included quotations from an interview with the chief engineer F.W. McCullough. McCullough had moved the line of excavation down the valley from the line shown on the parliamentary plan ("such things are quite common engineering practice"). The original

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62 March 30 1920 Whig.
line would have required excavation to a depth of 130 feet but now the line of the reservoir embankment had bedrock a mere 50 feet below the surface. The interview included the results of experimental tests showing what nature evidenced of itself regarding the depth of the glacial moraine across which the reservoir was to be constructed. "See these samples" - "cores" brought up by boring machine. They were gestured to, demonstrated. The interview took place in the engineer's office on Royal Avenue at the headquarters of the Water Commissioners.

"As explained by the engineer... a delightfully easy business. But... nothing in engineering design that requires greater care," warned the old fogey. There were potential difficulties such as the danger of flooding and a lack of contractors plant and rolling stock available, much of which had been commandeered for the war effort and was still in Europe.

It is worth considering the strategy underlying this promotion of the reservoir. In response to a previous history of scientific disagreement, the author aims to convince the reading public that the reservoir is feasible. Under these circumstances claims that the construction of a 3,000 million gallon reservoir would simply be easy would not be creditable. But it was creditable to say that the difficulties claimed by critics were not the real difficulties. Yes, there would be difficulties and dangers but not the ones presented by the critics and rumor spreaders. Rather than dismiss the concerns about potential difficulty, the article written by "an old fogey" displaces the concerns. The difficulties to be expected were difficulties anticipated by the engineer and modern science. They were difficulties the engineer could explain. Thus the expertise on the potential problems was back in the hands of the Water Commissioners via their engineer. Critics of the project were not the experts who understood the real difficulties. The Northern Whig was passing ownership of potential difficulties to the engineer and thus to the Water Commissioners. If whatever was under the surface of the earth would not speak for itself then the person who could speak on its behalf was the engineer and his core samples.

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63 March 30 1920 Whig.
Two weeks later in the middle of April, the *Northern Whig* ran the second installment of this well researched article on the Silent Valley.\(^6\) Again, the erudite author is given only as "an old fogey." This article revealed to readers more of the history of the valley. The valley was also sometimes known as Fox's Knowe Valley because of the mound in the middle. Foxes had inhabited this mound in the days when Cornish miners had worked there during the previous century. These prospectors had called the place "the Happy Valley", which was what most Mourne folk still referred to it as. How had the name changed? The story was that years ago when the Mourne Water Scheme was first planned, Luke Macassey, chief engineer for the Water Commissioners, and his assistant, the young Fred McCullough, were doing the original survey work in 1893. They were struck by the inspiring silence of the mountain valley which they then called the Silent Valley. This name "went down in their notebooks, was transferred to parliamentary plans.." Thus it became the legal nomenclature for this location in the parliamentary legislation which authorized the Mourne Water Scheme. The legislation gave the Water Commissioners borrowing power to finance the river diversion construction and specified the future line upon which the Extension Scheme reservoir was to be erected. It also gave the valley its legal name.\(^6\)

This second article used various references to poetry to extend to the valley a romantic reputation. The factual absence of skylarks notwithstanding, the Silent Valley was reminiscent of the Lake of Glendalough by Tom Moore. Rasselas the Prince of Abysinnia might not feel out of place here. The poetry of Sir Walter Scott regarding Cumberland might just as well be used to describe Belfast's valley. Soon the work here would begin and the valley would be filled, as Byron might say, with "the din and hum of

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\(^6\) Apr 14 1920 *Whig.*

\(^6\) Other authors writing on the Belfast Water supply such as Loudan seem to attach a great deal of mystery to the name change (Loudan, p86). Perhaps this aura of mystery accumulates because the name "Silent" and the name "Happy" were frequently used by journalists in an ironic manner during the ensuing public controversies. In addition to the above given newspaper description of the name change I would encourage those following Loudan's question to speculate whether Luke Maccassey in 1893 considered the rhetorical difficulties of promoting a public project to flood the "Happy Valley." It is also possible that the two surveyors were genuinely unaware of the local name. In either case, as scientific professionals doing official survey work, it seems they would have felt entitled to choose their own name.
The article went on to explain the increased water consumption of growing Belfast and its surrounding towns that made the reservoir necessary. The construction would be "a colossal task" requiring labour and engineering skill- and there were possible dangers. However, "Modern Science has reduced the menace to a minimum provided constant vigilance." The person responsible for that vigilance was very capable, according to the writer. Elected by his peers, McCullough had for the last 5 years been President of the Institution of Water Engineers. He had been in charge of tunneling during earlier construction phase of the Mourne scheme. He was "sanguine". Again the persuasive strategy involves engaging existing concerns and displacing them rather than ignoring or dismissing the concerns. Potential difficulty is acknowledged, thus weakening its force as criticism. These concerns are displaced into the capable hands of the engineer.

By the end of April 1920 the new Water Act was read in Parliament. The chairman Mr. Miskimmin, had been on hand in London to give evidence and answer questions. Shortly thereafter the bill was passed and the Water Commissioners had the authority they needed to proceed with the Mourne Scheme Extension. The lever that had been prepared by the old Board might now be pushed. However, it would be three more years before spade work on the project would finally commence. In the following sections of this chapter I will talk about these three years of delay and some of the political turmoil overshadowing this time period.

Belfast Curfew Begins 1920

In 1920 applications from outside the city for water were being refused. Sectarian tensions were unusually high. Unemployment was a concern. After July, with the

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66 Apr 14 1920 Northern Whig.
67 Apr 14 1920 Northern Whig.
68 The first construction phase of the Mourne Water Scheme lasted from 1893-1901. The diversion of the Kilkeel and Annalong rivers through conduits, pressurized piping, and tunnels had encountered engineering difficulties, particularly in the tunneling.
69 Apr 28 1920 News-letter.
expulsion of catholic workers from the shipyards, a prolonged period of civil disturbance began. The worst rioting and sectarian violence that Belfast has ever seen continued for more than two years. Much of the conflict initiated between the protestant shipyard workers and the largely catholic dock laborers. In an attempt to maintain order local authorities put Belfast under curfew beginning in the summer of 1920. Not until 1924 was the curfew order finally lifted.  

In September of 1920 the works committee reported to the public meeting of the Water Commissioners that the plans and specification were now complete. Tenders for the construction might now be sought. Attendees to this significant meeting included the Lord Mayor of Belfast, W.F. Coates, and the chair of the Harbor Commission, Mr. H.M. Pollock. Pollock would soon be the Finance Minister in the Northern Government. Although they rarely attended they were, as per the Commission's charter, ex-officio members and entitled to vote. This inter-membership of the governing boards of Belfast was noted harmoniously. The friendly discussion even extended to an offer of helping with public finance of such a large project. At the reading of the Works Committee report Mr. James Smith inquired regarding the recent water cut off in the Albert and Leeson Street area (part of his constituency in the Falls ward, and primarily Catholic). He and the other Nationalist Water Commissioner, McKenna pointed out that an unfavorable impression would be created by the incident.

Two weeks later in mid-September the Water Commissioners attracted the attention of the Belfast commercial business community by announcing a rates increase. It was explained that they had increased their expenditure so that wages might be kept in line with what other government boards paid their workers. But also the finance committee was quietly looking at building a reserve fund to pay for the Silent Valley Reservoir. The cost of labor and materials was high in the year directly after the Great

70 Budge and O'Leary *Belfast: Approach to Crisis*, p142.
71 Sep 2 1920 *Telegraph*.
72 The Corporation of Belfast also financed large projects by public subscription. Presumably some cooperation regarding their actions in the bonds market would prevent public projects from being in competition with one another for financing.
73 Sep 2 1920 *Telegraph*. 
Chapter 2: Social and Political Foundations

War. Many construction firms were not available because they were engaged in other work. In mid December it was reported that the deadline for accepting tenders had closed six weeks earlier. Only six companies had put tenders in. Newspapers reminded the Water Commissioners that they could not exceed their allotted borrowing powers.74

In January the corporation offered bonds at 6\% to finance modernization projects. Three days later all newspapers carried advertisements for bonds at the same rate on offer by the Water Commission. The bonds were redeemable with six months of notice which could be given on any gale day.75

**Belfast Water Shortage 1921**

In March of 1921 at the statutory meeting, Mr. James Miskimmin stood down as Chairman and Mr. William McCalla was selected to replace him. Mr. William Scarlet took McCalla's role as the Deputy Chairperson. Several city officials attended this meeting including ex-officio members of the Board: The Chairman of the Harbor Commission and the Lord Mayor. “Mr. McCalla afterwards entertained the members and a number of public officials to afternoon tea.”76

In April there was a letter in the *Telegraph* suggesting that the pleasant waterworks area on the Antrim Road (no longer a drinking water source) become a public park. The Water Commissioners could even turn it over to a committee of the Corporation which dealt with public parks.77 An article the following day in the *Telegraph* written by “Purpoise” questioned why the Water Board refused to allow public swimming while other activities were permitted.78 The following week at the Water Board meeting the Commissioners spoke in reply to the recent publicity.79 The

74 Dec 17 1920 *Telegraph*.
76 Mar 16 1921 *News-letter*.
77 *Telegraph* April 7 1921. At present the gated area was open privately to those who had purchased access to this area. Keyholders could let themselves into the park. In 1920 much of North Belfast in the area (directly beside the old waterworks) where the Cave Hill Road intersected the Antrim Road and became the Limestone Road was an affluent suburb.
78 *Telegraph* April 8 1921.
assumption was that this could be arranged by the Corporation.

The swimming issue continued to be a controversy. The assumption that the city government would accept responsibility for the difficulty simply because it had the appropriate committee for regarding public parks did not prove accurate. Furthermore, the Ulster Model Yacht Club had for 37 years been granted privilege to do events in the waterworks.\(^80\) They were primarily shipyard workers.\(^81\) The chairman of the Board, Mr. McCalla, met personally with the model yacht club and the Queens Island swimming club in an effort to resolve the controversy of use.\(^82\) During this period the Water Commissioners also began issuing precautions against waste of water.\(^83\) A hot dry summer was beginning. Two swimming concessions were announced on Saturdays in July and August.\(^84\) One of these was a non-charity event. The participant’s fee would benefit the Irish Amateur Swimming Association. By July it became necessary to announce restrictions on the use of water throughout Belfast until further notice.\(^85\)

Recreational bathing disputes and low rainfall were not the only difficulties in Belfast during 1921. Unemployment was a difficulty. Continued sectarian rioting occurred and at some points even directly interfered with the day to day responsibilities of the Water Board’s staff.\(^86\) But still more directly would the civil war affect the business of providing water in Belfast. The elections of May 1921 in the highly sectarianized atmosphere did not repeat the diversified election results of the previous year. In the six counties of Ulster that had shown greater allegiance to Britain than the rest of Ireland, 40 unionists and 12 constitutional nationalist were elected. Sinn Fein had boycotted the elections. By British legislation two separate governments were to be created in Ireland.

Early in the darkness of June 14\(^{th}\) 1921 (a mere six weeks before a ceasefire

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\(^{80}\) May 4 1921 *Northern Whig.*

\(^{81}\) April 30 1921 *Northern Whig.*

\(^{82}\) May 13 1921 *News-letter.*

\(^{83}\) April 18 1921 *Telegraph* also April 29 1921, May 13 1921, July 8 1921.

\(^{84}\) April 28 1921 *Telegraph.*

\(^{85}\) Jun 30 1921 *Telegraph,* July 1 1921 *Whig, Irish News, News-letter.*

\(^{86}\) Jul 2 1921 *Northern Whig.*
would be negotiated) the Silent Valley water facilities suffered military action. Saboteurs burnt out the valve house and threw bags of cement into the conduit. An attempt was made to blow up the waterworks embankment with gelignite but this blew out upwards rather than inwards. The other staff buildings were also burnt. These included the engineers office, lodges for workers, and semi-detached houses for members of the permanent staff, all of which had been built six years previously to facilitate the Mourne Scheme extension. The attack was well organized. Telegraph lines were cut and trees were felled across the road to delay pursuit. Newspapers initially reported an estimate of £30,000 pounds damage. There had been some advance information that an attack in the Silent Valley was a possibility but preparations had never been taken. After that security was arranged to protect the Silent Valley. Initially the Water Board itself was to pay half of the costs of securing but in the following year this stipulation was dropped. The Home Office of the new Northern Government never charged the Commissioners the full amount, a detail which came out later in a government accounting review.

On the 21st of July a cease fire in the war was declared. About this time a disagreement between the Water Commissioners occurred in their public meeting. Dr. A.G. McKenna of the primarily nationalist Smithfield ward wanted a small reservoir scheme now and a large one later according to the newspapers. The issue was cost of materials and labor which were presently quite high but expected to go down. He hoped the press would take notice of the disagreement.

At the beginning of August an editorial in the *Northern Whig* by an “old fogey” blamed the Commissioners for “fatal procrastination” and invoked the history of the

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87 June 14 1921 *Whig, Telegraph, News-letter, Irish News*
88 Dec 12 1921 *News-letter*
89 The Water Board claimed £15000 compensation from Newry Local Authority Nov 29 1921 *Telegraph*
See also Dec 10 1921 Newsletter. The Water Board was ultimately awarded £7800 in an arbitration that debated issues of existing legal precedent and insurance Jan 17 1922 *Irish News*. The Attorney General of Northern Ireland presented the case for the Water Commissioners Dec 10 1921 *News-letter*
90 April 29 1921 *News-letter*. This entry has a typed label in the Water Commissioners Newspaper Clippings book.
91 Dec 12 1921 *News-letter.*
92 July 22 1921 *Irish News.*
Silent Valley from 30 years previous. There was some respite from the water shortage. For rain that had fallen in the past week the author attributed thanks for to Jupiter Pluvius. In fact on Saturday July 30th, during a summer otherwise marred by water shortage, the Victoria Amateur Swimming event at the Commissioners' waterworks on the Antrim Road had been cancelled because of dreadful rain. Only water polo was played because the teams from Wales and Dublin had already arrived. The score was a draw 5-5.

In September of 1921 a city alderman proposed a motion to unite the water commissioners, harbor trust, and poor law guardians with the corporation. This would require pursuing legislation in the New Northern Parliament. The organization of government envisaged by this scheme was consistent with how most cities elsewhere in Britain were organized. The proposal however received a negative reaction. The following week newspapers criticized how the city was managed invoking the present difficulties with the electric power project. By inference, how would the city deal with more difficulties such as taking on the problem of water in Belfast. The city's Electricity Committee, like the water commissioners, had to contend with the “after-war state of the money market, and the greatly enhanced price of labor and materials.” The Northern Whig printed a historical article emphasizing the worst year for water in Belfast's history. During the water famine of 1865 it was said that there was “not enough water to boil an egg!” An elderly gentleman who was interviewed told newspaper reporters that he wasn't sure about boiling an egg but there was “enough water for my baptism that year.” Previous water shortages were listed as happening in 1911, 1914, and 1919. The present year was the driest on record since records had been kept.

The Anglo-Irish treaty (December 1921)

In Nov 1921 control of law and order in the province had passed to the Northern
Government as part of devolution agreements. Early in December the Anglo-Irish treaty was negotiated between representatives of the British Government and representatives of the Dail government in the South of Ireland. The treaty granted dominion status to all of Ireland, a form of legal independence from Britain which still recognized the British Empire. The Northern Parliament however was entitled to reject Dominion status within one month of April 1922 if they so desired, thus retaining their position within Great Britain. The following May the Northern Parliament would exercise this option, thus legally completing the partition of Ireland which had in practice existed for some time now. Article XII of the treaty proposed a Boundary Commission to reconcile the precise territorial border between the Northern Government and the newly formed Irish Free State. Parts of the six counties under the jurisdiction of the Northern Parliament that were majority Catholic in population were potentially to become part of the Irish Free State. The areas contemplated included Belfast’s water catchments in the Mournes.

This was an immediate concern for the Belfast Water Commissioners. Under the title “Our London Letter: Sir James Craig and the Boundary Question,” the Belfast Newsletter discussed the issue of boundary.

“In Nationalist and Sinn Fein quarters one hears the prediction that South Down, no less the bulk of Tyrone and Fermanagh, may be regarded as lost to the Northern Parliament....”

But in Unionist quarters the concern was how English officials who negotiated the treaty would respond to their concerns.

“...yet Ministers can not be ignorant of what is being said and thought in Ulster. Do they imagine- apart from any other consideration- that Belfast would lightly

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100 Budge and O’Leary Belfast : Approach to Crisis p141.  
101 Dec 19 1921 Newsletter.
contemplate the prospect of losing, say, the area from which it draws its water supply, and works upon which it has spent something like a million of money?/102

In the subsequent months of 1922, during negotiations, the Irish Free State made explicit demands for territory in Armagh and South Down.103 In Belfast violence and sectarian rioting were at their worst in this whole three year period of trouble. While the boundary issue remained outstanding, some agreement between the two governments in Ireland was negotiated by March. In the Craig/Collins Pact the Irish Free State government agreed to drop their boycott of Ulster goods.104 This was considered important for the depressed Northern economy. In return Craig's government was to protect the interests of the Catholic/Nationalist community in the North. The Ulster Government, using its dramatic Special Powers Act105, brought rioting to a halt by the summer of 1922. By 1923 peace was generally restored in Ulster. Neither Craig nor Collins were in good faith with one another. Craig's protection of Catholic/Nationalist interest was limited by his populist commitments to the often sectarian protestant majority. Craig's failure to convince made Collins more inclined to negotiate with the political portion of republicanism that did not accept the Anglo-Irish treaty, those who wanted full independence rather than mere dominion status. In fact, the Northern IRA had never accepted the treaty and was continuing to fight. Collins was secretly supplying them with arms. In order to strengthen the faction of the republican movement which was willing to accept the dominion status the British Government promised Collins that Craig's government would be subject to a judicial inquiry regarding the failure to protect Catholics as agreed. In June Craig went to London and managed to stave off a judicial inquiry which would have toppled his government. Shortly thereafter divides in the republican movement widened and became a civil war engulfing the Irish Free State. By August Collins was dead. By the end of the year control of the British government had

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102 Dec 19 1921 News-letter.
103 Feb 28 1922 Telegraph.
104 Michael Collins was the Chairman of the Provisional Government of the Irish Free State. Craig of course was the Prime Minister of Northern Ireland. Negotiations occurred in London.
105 The Special Powers Act, passed in 1921 by the new government, severely restricted habeas corpus, enabling the Minister of Home Affairs, Bates, to arrest and detain without trial. Budge and O'Leary Belfast:Approach to Crisis p142.
changed hands and the Liberal Party was out of office. Only Craig and his cabinet
returned to negotiations. For Britain and Ireland it was necessary to supply new
diplomatic representation. The fledgling Ulster state was seemingly more secure.
Perhaps it would last through these troubled times.

Choosing the Contractor 1922

In March of 1922 the issue of rates and property were beginning to heat up. At an
executive committee meeting of the Belfast Chamber of Trade the concern was raised
that the Works Committee of the Water Board would soon be recommending acceptance
of one of the tenders submitted for the Silent Valley Reservoir construction.106 There
was concern about how this large project would affect the rates. The Corporation had
recently lowered the rates in response to a Chamber of Trade request.107 The comparison
between the prewar estimate given by the Commissioners previous engineer (the late
Luke Macnassey) and the tender likely to be accepted that was now on offer was startling.
The prewar estimate had been much lower. The Chamber of Trade appealed for delay,
suggesting that the arrangement and extension of pipes within Belfast so that the water
might be received could happen now and the expensive reservoir project could happen
later. The Belfast Wholesale Merchants and Manufacturers Association also called for
delay.108 Alarmed letters to the editor associated high rates with the project.109 On the
14th of March the Belfast and District Property Owners Association held a large meeting
in the Carlton Hall. The Evening Telegraph reported this as “Property Owners on
Warpath!”110 Various alternative proposals were made for the water arrangements of
Belfast.

The Engineer's report challenging these proposals was released to the
newspapers.111 Even if the Commissioners staff were to construct the “new bridge over
the River Lagan, lay the additional large mains in the siphons along the present aqueduct,
and also lay the large mains across the city at an expenditure of £300,000” this would not provide “one drop more water, in dry years than is now available from the present works. Besides the difference between pipe capacity and reservoir supply various other concerns were listed. Hardest hit during water shortages had been “middle and working class districts.” High areas at “Belmont, Knock, and County Down districts at Cregagh can only be supplied from the Mourne system.” The city would in a few years ask parliament for an extension of its present boundary necessitating a greater water supply. The engineer also drew attention to contract details that left the Commissioners unbound until the contract was fulfilled. With the reserve fund expected to be £300,000 by 1924 and then a new loan at a lower interest rate than available now, the project could be completed. Possibly there would only be a 1d or 2d increase on the present rates. The authority of the engineer is used by the article to present more than just technical facts. Various arguments for reservoir construction proceeded from his interview. The article further went on to suggest that

The greatest sufferers from the shortage of water in the past dry years have been the majority of population resident in the middle and working class districts, where the supply for all domestic and sanitary purposes is limited in these small houses to one hand tap and a flushing cistern for closet purposes. In these working class districts the houses have no store cisterns, and no water is available for sanitary purposes, from the turning off at the mains each evening till the water is turned on again the following morning during the period of restricted supply.112

The meeting of the Water Commissioners on March 16, 1922 to consider the Works Committee's recommendation to accept one of the tenders was well attended. It lasted four and a half hours.113

Alternative water arrangements were suggested by a minority of Water Commissioners. Mr. W. Dowling put forward a motion to refer the matter back to the

112 Mar 15 1922 Telegraph Mar 16 1922 Newsletter.
113 Mar 17 1922 Newsletter.
Works Committee. Even if we can't be sure of eight months definite supply, he said, increasing the city mains capacity would enable full use of the Mourne water supply. The water supply in other reservoirs, such as the Stoneyford and Woodburn reservoirs, could then be preserved. Mr. David Adams seconded the motion, saying that he did not know if Mr. Collins or Mr. James Craig was right in their reading of the treaty. Inside six months the reservoir could be situated in the Free State.114

Mr. S. Rea said that only two firms had seriously been considered.

It is common knowledge amongst the commissioners that Mr. McCullough gave a report on both and practically ruled the lower one out of court as not having complied with the conditions and for other reasons.... It would almost appear as if only one firm in the kingdom could carry out this work.115

Mr. William Courtney was the fourth Water Commissioner to disagree. He suggested that the Board wait for twelve months and a reduction in the tenders would occur.

Other Water Commissioners however did not agree. Mr. J. Miskimmin J.P. said "he did not think the Mourne Mountains would ever go to Southern Ireland. They could rely upon their Northern Government to see to it that the Southern Government never got a yard of it."116 Mr. A. P. Dalzell asked what financial sense it made to build a £300,000 bridge if there was no extra water supply for it to distribute. Mr. Scott said he would be guided by Mr. McCullough, the Board's engineer. Mr. Armstrong seconded the motion saying that the 1908 estimate had been only £300,000 because the cost of labor was given lower consideration. He would oppose tenders which proposed to employ on wages as low as the pre-war estimate expected. Mr. McCalla diplomatically emphasized that this motion did not bind the Board in any way; it was only a motion empowering them to negotiate a contract.

114 Mar 17 1922 News-letter.
115 Mar 17 1922 News-letter.
Indeed, even though the motion to authorize negotiation carried, no immediate commitments were made. With this level of controversy it seems likely that the political consensus to move forward still didn't feel fully constructed. An editorial in the *Evening Telegraph* entitled “Silent Valley Scheme: Cry from the Wilderness: Foresight vs. Stagnation.” urged Belfast citizenry to support the new reservoir. The author, listed only as “friend of progress” asked whether the citizens of Belfast are

to emulate the primitive characteristics of the Chinese, or are they to emulate the pioneers of progress who have looked ahead, and who having succeeded in adding to the industrial territory and widening the geographical boundaries of our capital?\(^\text{117}\)

The Belfast of today was not the result of men with “narrow vision.” If so, for example the electricity system would never have been built. The author continued,

Let me say in conclusion as a fairly large ratepayer the scheme has my complete approval. Progress was never made by pessimists... Stagnation is alien to the spirit of Ulster.\(^\text{118}\)

Although the Commissioners had now given themselves the legal authority to begin, nine months later nothing had been resolved. In December newspaper summarized the year for the Water Board. Although the Board had been congratulated for their forward thinking by some of the biggest ratepayers in the city for pushing on with the Silent Valley Reservoir despite controversy, it turns out they have only taken powers to negotiate and after nine months nothing has happened, complained the *Northern Whig*.\(^\text{119}\)

Well, at least there had been plenty of rain this year.

Perhaps the political opposition to beginning the project immediately encouraged

\(^{117}\) Mar 17 *Telegraph*.

\(^{118}\) Mar 17 *Telegraph*. Lord Pirrie’s name was prominently associated with supporting the reservoir scheme. Pirrie, often thought of as the first citizen of Belfast, made his name as the proprietor of the Harland and Wolff shipyards. It is plausible the writer “friend of progress” is Pirrie.

\(^{119}\) Dec 27 1922 *Northern Whig*. 

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delay. Political instability could also be credited with delaying the project. During the first half of 1922 violence and rioting in Belfast was the worst it had been since beginning in 1920.\textsuperscript{120} The Commissioners also felt they required more precise authority. The preparation of further legislation by the Commissioner's Law Committee may have encouraged delay. Although the proposed Water Act would now be submitted to the Parliament of Northern Ireland, members of the committee still traveled to London to consult with their customary parliamentary experts. Mr. William Courtney drew attention to the expense this incurred. He thought that there must be experts who could be consulted locally.\textsuperscript{121}

In March of 1922 at the same time that such a debate regarding expenditure on the Silent Valley Reservoir was being heard, another issue was also being discussed and action taken. The political process of transforming the Antrim Road waterworks to a bathing area was beginning. The city council's Baths & Lodging House Committee had failed to take on any responsibility so the Water Commissioners were approached to organize something. A bathing area with diving boards was to be constructed.\textsuperscript{122} During several Saturdays in August and September free use of the lower pond area was granted to the Irish Amateur Swimming Association and the Queen's Island Amateur Swimming Association. Nationalist Water Commissioner Dr. A.G. McKenna of the Smithfield Ward stood up in May to advocate a swimming gala.\textsuperscript{123} This might be considered a positive gesture during a time of political violence and rioting.

Swimming was popular. Although not all of the publicity that the Water Commissioners received was positive they were generally appreciated for their provision of public bathing facilities. Initially the diplomacy required to negotiate between swimmers and the model yacht club (members of whom were primarily shipyard workers, presumably protestant) during a time of heightened sectarian tension had seemed quite incidental to the primary purpose of the trust. But what was initially an

\textsuperscript{120} Budge and O'Leary \textit{Belfast: Approach to Crisis} p143.
\textsuperscript{121} Nov 24 1922 \textit{News-letter}.
\textsuperscript{122} Mar 1 1922 \textit{Telegraph}.
\textsuperscript{123} May 12 1922 \textit{News-letter}.
incidental dispute inherited by the Water Commissioners was gradually becoming a vehicle for good publicity.

The bathing facilities were used by both Catholics and Protestants. In August of 1923, the Nationalist Water Commissioner, Mr. MacAlevey of Falls Ward (who was in fact an athlete and a swimmer himself\(^{124}\)) spoke out during the Water Commissioner's fortnightly meeting.\(^{125}\) He wanted to let the public know that the Works Committee had turned down Sunday morning bathing—he did not mind what hours. Mr. William Courtney responded that nine to eleven were the hours that were mentioned. Mr. McCalla diplomatically said that he thought the objection to the proposal was that the hours were so late in the day, and it might prevent people from going to Church. He did not think there would be any objection to opening the pond from seven to nine in the morning. Mr. MacAlevey indicated his intention to take the matter back to the Works Committee. Religious practices regarding how to observe the Sabbath varied between Ulster Protestants and Ulster Catholics. In particular Presbyterians have strongly emphasized the observance of the Sabbath.

The Water Commissioners were also involved in public work schemes to relieve unemployment. In May of 1922 the Northern Government had announced a £500,000 grant for employment schemes. The terms of the grant required employment of ex-servicemen. Some Commissioners remarked that unfortunately the eligibility requirements did not include munitions workers, although they had certainly been important to the war effort.\(^{126}\) Mr. Armstrong indicated further concern for all of the unemployed, expressing that at least ex-soldiers received a small stipend. Many of the unemployed had nothing. Mr. McCullough was to organize the project of laying new water pipes that would employ men on the terms of the scheme. The following year another broader unemployed relief project was announced by the Commissioners in April just a week before the final meeting to accept the contract which had at long last been

\(^{124}\) Oct 3 1925 \textit{Sport}.
\(^{125}\) Aug 3 1923 \textit{News-letter}.
\(^{126}\) May 12 1922 \textit{News-letter}. 
mostly negotiated. These projects of social welfare might have made the Commissioners more popular with certain portions of the population, thus increasing their political clout for pushing forward a potentially controversial project.

**Signing the Contract 1923**

In March of 1923 at the conclusion of his two terms as chairman of the Board, Mr. McCalla spoke in reply to recent rates criticism explaining that the water rates had remained 2s since 1921 and before that hadn’t been raised since 1902. The new Chairman selected to replace Mr. McCalla for the year 1923 was Mr. Scarlet, the previous Deputy Chair.

Two weeks later a deputation from the Water Board went to London to negotiate the contract. The engineer Mr. McCullough and the legal counsel for the Water Board Major R.E. McLean were also present. Negotiations occurred all day Friday March 23, 1923 and carried into Saturday.

Beginning in April the debate regarding the final acceptance of the contract began. The *Northern Whig* newspaper continued its enthusiastic support for progress by discussing the tenders on the Silent Valley Reservoir construction project. The chosen contractor was now reestablishing the part of their firm that did engineering work as a sub-company owned by the parent company. By critics this was described as an action to limit their liability. The well attended meeting to accept the contract happened on April 19, 1923. After this newspapers generally began reporting favorably on the initiation of the new project. It was a new epoch in the Board’s history, they said.
The Spoils of Engineering

In the summer of 1923 when construction of the reservoir had finally begun, F.W. McCullough, the chief engineer for the Water Board received a substantial salary increase. Perhaps this indicates more than anything the degree of importance attributed to the engineer in establishing the necessary political acceptance to begin the reservoir project. Further in September his responsibilities shifted entirely to dealing with only the Silent Valley project. The routine responsibilities of Chief Engineer were taken on by Mr. C.F. Wheeler who had previously been the Assistant Engineer. Junior engineers were promoted, including George Mcllldowie who became McCullough's second at the Silent Valley project doing much of the day to day work, particularly in the later stages of the project when McCullough fell ill. The salary of all engineers increased.

The increase in salaries was not entirely unprecedented. The Whitley scheme (which had increased the salary of civil servants in England) had been applied in Belfast City Council back in November of 1920. All the professional staff with the Water Board were at this time receiving some kind of bonus. Also the city had just three weeks before given substantial salary increases to their top officials. If the engineers' increase was not unprecedented the magnitude was certainly notable, particularly for Mr. McCullough. In addition to a £2000 bonus McCullough's salary was increased to £2000 per annum making him one of the highest paid civic officials in Belfast. Only the Town Clerk's salary at £2100 per annum was higher. McCullough was equal in pay to the Town Solicitor and the City Surveyor of Belfast, whose salaries had only recently been raised to that level and not without controversy.

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135 Sep 28 1923 Northern Whig.
138 July 3 1923 News-letter. Alderman Boyd opposed the increases saying that during an industrial depression was not the time to raise the salaries of top officials. Councilor Thomas Henderson said that "the very men who proposed increase in salaries to the heads of departments were those who reduced the wages of the lower grade workers in the corporation." The salary increase was successful on a vote of 29 to 18.
If the spoils of engineering were notable they were also contentious. This contention indicates that not everyone accepted the neutrality of the engineering role to provide the Water Commissioners and the public with necessary facts so that decisions could be made and understood. What had been presented as purely technical was questioned. It was believed to have a political dimension. On the day of Mr. McCullough’s salary increase, Water Commissioner David Adams handed a letter of resignation to the Secretary Mr. Quinn. To the Board he had written,

I take this step with great reluctance, but for some time I have not agreed with the policy adopted by your Board relative to the Silent Valley contract. You accepted a tender for these works without competition and today you have given the engineer a bonus of £2000 and a salary of £2000 with two increments of £250. This bonus and salary is out of all reason, and as a protest against your action I resign my position.¹³⁹

A few weeks after this resignation, a Northern Whig journalist in an article about the attempt by the Corporation to take over the responsibilities of the Water Commissioners writes,

I learn that the back of the proposal is the action of the Water Commissioners in increasing the salary of their engineer to £2000 a year.¹⁴⁰

By this time however, Mr. Adams had already returned to the Water Board. After being renominated by the “Cromac Ward Branch of the Cromac Unionists Association” for the vacant Commissioner seat he was declared the winner by the election officer (Mr. W.I. Quinn) when no other nomination papers were submitted.¹⁴¹ He would eventually take responsibility for the Finance Committee and ultimately became chair of the Water

¹⁴⁰ Aug 27 1923 Whig. Note that Mr. McCullough does not seem to be referred to by name during this debate. The reference of concern is “the engineer.” From this emphasis it would seem that the role of the engineer is in question rather than the person. Contrast this with earlier newspaper articles in the Northern Whig in which the person of the engineer is interviewed to promote the feasibility of the reservoir, for example Mar 30 1920, Apr 14 1920 Northern Whig.
¹⁴¹ Aug 23 News-letter.
Commissioners before the Silent Valley was complete. Before then his status as part of the Water Boards dissenting minority and his political opposition to the contractor, even his distrust of engineers, would gradually change. In exactly five years as head of the Finance Committee he would sponsor a motion to renew the contract with Mssrs. Pearson and, in a reversal of roles, other minority Commissioners would be threatening to resign because they didn’t feel that engineers should dictate the Board’s policy.\textsuperscript{142} If Mr. Adams dramatic resignation was fleeting, the proposal by the Corporation to absorb the Water Commission was similarly ephemeral, never coming to fruition.\textsuperscript{143}

**Conclusion**

This chapter has traced the process of initiating the Silent Valley Reservoir. While the power of legal authorization was vested in the 15 Water Commissioners they additionally needed social and political acceptance for this expensive project. Likewise they had to achieve agreement among themselves. Much of this acceptance for the project was created by insistence on its non-political nature. Controversies were resolved by recourse to the technical details of the matter. The engineer's remarks were given authority, particularly by those who agreed with the project and wanted it to go forward. There is always a political interest in the technical. The practices which differentiate the political from the technical are also those in which both the political and the technical are created. We saw this

- in the Cregagh water dispute
- in arguments forwarded by the *Northern Whig* newspaper and other enthusiasts for water progress
- in the debates with the commercial ratepayers community about delaying or proceeding with the reservoir
- in the deference shown to the technical opinion of the engineer- and the choice to support political decisions with statements by the engineer.

\textsuperscript{142} Oct 18 1928 *Telegraph* Oct 19 1928 *Irish News, News-letter, Whig, Daily Mail*

\textsuperscript{143} Although proposed several times, Budge and O’Leary note the last serious attempt to absorb the Water Commissioners was in 1896-97. At least one speaker on this issue in 1923 drew attention to the Corporations failure to take responsibility for public bathing in comparison to the Water Commissioners more popular response.

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We also can now see this in large scale political concerns such as the Water Commissioners' "non-political" role in the Boundary crisis. The actions of the new Northern government in arranging for British M.P.'s to visit the Silent Valley place the Water Commissioners' speech about their border concerns at the center of an argument. The Water Commissioners can describe their position in this debate as non-political. They can imply that, under the circumstances, their concerns are natural. They desire to protect their property and their investment. As a trust they have an obligation to consider the water interests of the citizens of Belfast. Under the circumstances of property arrangements, conventions of national territory, legal conventions for public trusts, the previous history of Belfast water investments, and under the circumstances of North-South hostility, the Water Commissioners imply that they are simply doing what any public trust would do under such circumstances. Even the boundary suggested by Mr. W.I. Quinn in his speech for the Water Commissioners is implied to be a non-political or natural choice. Of Carlingford Lough he says, "This lock penetrates inland for many miles and at present effectually separates, y(sic) reason of its wide expanse of waters, a large part of the Free State from the Northern Province, and geographically it thus forms an ideal section of the existing boundary." The edge of reservoir catchment area is six miles East of this suggested boundary, thus placing the Silent Valley within the North. Literally it is water, a wide expanse of it, which is said to form the natural geographical separation of Ulster and the Free State.

By comparison to the Boundary argument, the Cregagh water dispute is a political issue at a considerably smaller scale. The same emphasis on arguments deemed true because they are "non-political" is used to resolve this. Although at the smaller scale the "non-political" delineation is more often described as "technical." Water pressure is considered to be a technical aspect by some but not by others. The words "non-political", "natural", and "technical" have something of the same character in the way that they are used in relation to that which is deemed to be "political." This boundary of designation, the political/technical boundary, is of considerable political interest to those attempting to

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144 Sep 13 1924 News-letter
establish and maintain sovereignty. The table below anticipates further examples of this boundary designation, all of which will be discussed in subsequent chapters.

<table>
<thead>
<tr>
<th>year</th>
<th>Dispute</th>
<th>statement</th>
<th>position put forward by</th>
<th>the matter is</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>Cregagh Water Dispute (Chapter 2)</td>
<td>New houses can not be promised more water.</td>
<td>the Chair of the Works Committee</td>
<td>technical</td>
</tr>
<tr>
<td>1924</td>
<td>Boundary Dispute (Chapter 2)</td>
<td>The Water Commissioners have concerns regarding potential change to the boundary</td>
<td>position put forward by the Secretary of the Water Commissioners to British M.P's</td>
<td>non-political</td>
</tr>
<tr>
<td>1926</td>
<td>Contract Arbitration (Chapter 5)</td>
<td>The dispute is between man and nature.</td>
<td>barrister for the contractor during arbitration arguing for mutual resolution</td>
<td>natural</td>
</tr>
<tr>
<td>1928</td>
<td>Contract Renewal Debates (Chapter 6)</td>
<td>the problem was caused by Nature</td>
<td>Water Commissioners in explaining why there had been a problem</td>
<td>natural</td>
</tr>
</tbody>
</table>

In this chapter we saw the majority section of the Water Commissioners, as well as their engineer, and some parts of Belfast’s establishment push for the initiation of a long planned water project. To legitimize the project they emphasized that it was technical and non-political in nature. At the same time these groups of people were also part of and affected by the social and political changes that were occurring in Belfast, Ulster, and throughout Ireland. The Water Commissioners of 1920 were a mostly new Board required to establish the reservoir project. The presence of James Craig and H.M.
Pollock (who both later become important members of the Northern Government) during the early process of negotiation indicates the broad background of social and political forces connected to the initiation of the project. The institutional power consolidated by the engineers indicates some of the changing arrangement of forces from the negotiation of the project to its initiation. It perhaps also indicates the perceived importance of engineer's role in compelling social and political forces to consider technical requirements. During the boundary crisis, the territorial sovereignty of fledgling Ulster is at stake. The strategic presentation of the Silent Valley is perhaps derivative of the previous process of differentiating technical things from political things. Some of the presentation's effectiveness might also be said to come from the aesthetics of both the valley and the vast engineering task which was to be accomplished within the impressive mountains. When the Water Commissioners made the claim that their status quo boundary suggestion was nonpolitical and under the circumstances only natural, they were also linking this claim to their presentation of the Silent Valley itself, a train ride into big quiet mountains with a vast works underway. The rhetorical argument was grounded in the rather convincing physicality of the natural and technical surroundings.

Completion of the reservoir would also need to be grounded in more than the rhetorical arguments which successfully initiated the project. As we will see in subsequent chapters, difficulties arose in the construction of the reservoir. It was not until these are resolved that the reputation of engineers, Water Commissioners, and some of the important political figures of the Northern Government who had supported the project are ultimately vindicated. In contrast to this chapter which has looked at the social and political foundations of the reservoir to discover that they can only be articulated in their differentiation from the technical, the next chapter will examine the technical requirements of construction with attention to the aspects which might be considered social.
Chapter 3
The Technical Requirements of Construction

The Railroad will traverse over hill and dale, and can be seen ploughing through the fields and clearing the way for the adoption of locomotive transit. Several iron bridges are being built to span the rivers. Most of the apparatus for the new reservoir will be necessarily brought from across the water—first by vessel to Annalong, thence by motor from the harbour to the depot, and finally by rail from the depot to the valley. Huge cranes installed at various points, cannot fail to facilitate the loading and unloading of material. The reservoir will be a concrete problem in truest acceptation of the term. At the moment 200 men are occupied in the undertaking... which will ultimately give employment to 500 hands. To accommodate these wooden houses are being built, and before long the slopes of Carginagh will be peopled by a small army of workers and will have architectural and commercial features of a newly formed colony. The grocer, the victualler, the haberdasher, and others as well will be side by side in the life of the constituency, and thus convenient to the valley of silence there will be the vibration of movement, the hum of many voices, and the noise of routine pursuits.¹

This description of the recently begun preparations in the Silent Valley appeared in a Belfast newspaper in October of 1923. Before any excavation could begin a transportation infrastructure was required so that a million ton earthen embankment dam might be built in the mountains. Much of the raw materials were to be sourced locally. Granite for masonry was to be taken from a quarry on the west side of the valley. The Commissioners had acquired a nearby area with a large quantity of clay and other earthen

¹ Oct 6 1923 *Telegraph*
materials that could be used. Other materials and equipment were to be brought from elsewhere. Much of this would arrive by sea coming to the harbour in nearby Annalong a few miles below the valley. From there it would need to be transported up into the valley by the railroad which the contractor was required to build.

Once the project had been authorized, the contractors mobilized a network of resources and labour to begin the actual work. This chapter describes the initial organisation of construction, plant, transportation, skilled labour, and the proposed engineering arrangements in the Silent Valley. The project was situated within the location and culture of the Mournes but also included expertise, cultural influence, and labourers brought to the mountains from elsewhere. The network of technical implementation is traced outwards into the requirements of sustaining the working community which undertook the construction. This included providing for social and family life. The hidden role and labour of women within a technical project are shown. The chapter again demonstrates that technical elements of the project are intimately associated with the social aspects required to support labour and materials. There can be no clear distinction between the social and technical forces that initiated the Silent Valley Reservoir.

The idea of a network has become an important metaphor for the arrangement of technology systems. During the 1990s “network” became an ever more popular intellectual concept used to describe all manner of things from the global economy to social and personal interaction. This chapter describes the technical arrangements for constructing the Silent Valley Reservoir as a network. By tracing all of the connections that support the production process I demonstrate that the engineering or technical understanding of construction must be extended to include non-technical or social aspects of labour if we hope to understand the production process as a whole. While this is not a formal attempt to describe a set of actor-networks for the construction of the Silent Valley Reservoir I will be placing material from different sources together to uncover

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3 The theory of actor-networks is discussed in the introduction, p21
some of its connections and demonstrate the basic principle of actor-networks theory, that social and technical things are in the same order and that their descriptions require one another.

These connections between social and technical things are often obscured by the way in which historical events are recorded. In the case of the Mourne Extension Scheme, official documents were useful to the contractors and the Water Commissioners and thus became a matter of record. The details of people’s lives and social interaction however did not as frequently receive institutional attention and thus are not as readily available to the historical record. This chapter engages with two sets of source materials: Firstly, technical pamphlets and contract documents that describe the planned construction process, and secondly some journalism and personal interview material in which the human interactions of a construction process are discussed.

Much of the second type of material comes from a unique secondary source, a set of interviews published as a book in 1981 by W.H. Carson, a local historian. His work is an important resource for my analysis because much of material he solicits by interview is no longer readily available. Oral histories must be gathered within the lifetime of persons living through the event. Many of the interviewees were quite old in 1979 when he recorded their feelings about previous events 50 or more years in the past.

Carson’s method of interview was to follow kinship links. This is consistent with Mourne culture which emphasizes strongly connections within kinship. Many of his interviews were with women because they were still alive while their husbands had by then passed away. This location of knowledge shows what most technical histories leave out: the role of an extended network beyond the engineers, managers, and primarily male workforce. Thus the role that women played in the Silent Valley is discernable from the work of Carson.

4 W.H. Carson *The Dam Builders: The story of the men who built the Silent Valley Reservoir*

5 Estan Evans, *Mourne Country*.
Although Carson’s work is not a particularly critical examination of events (a point discussed below), it does provide a number of valuable insights. After 50 years many of the stories that survive do so because of some poignancy of memory. Their particular narrative power makes them memorable. One characteristic of note for the historian is the presence of personality within Carson’s narratives. Personality is something which quickly fades from most technical histories. The strong affirmative basis of the history makes it useful for the people he writes about. The author celebrates the lives of local people from that time. In Mourne the book serves as an important part of collective memory. Necessarily an objective work must be connected and sympathetic to its subject matter. A dispassionate examination of the emotional and social connections of a community can not properly describe them. Thus there is a way in which the historical or cultural investigator must participate in the community which is studied. By being positioned in relationship to the community and the material discussed, Carson (who is from the Mourne region) gains the ability to speak with many people’s voices but perhaps becomes subject to some of the dynamics of the community. In 1979 a critical analysis of power relations in the Silent Valley of fifty years previous would be of little interest to those remembering their youth. Perhaps such an approach would even conflict with the element of nostalgia which must in part be some of the motivation of interviewees. Thus Carson’s work provides particular insights but not others.

The contractors

The contractor selected by the prolonged process described in the previous chapter was S. Pearson & Son (Contracting Department) Ltd. Pearsons was an engineering firm emerging from the heyday of the British Empire with an extended network of finances, personnel, technical expertise and a reputation around the world for completing large contracts. It had the political and legal experience to secure contracts and complete them. Perhaps because of all of this the Water Commissioners’ engineer

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6 Haraway “Situated Knowledge”
7 This is counter to a more traditional perspective on objectivity taken from the physical sciences which has suggested separation and distance from the object. Contemporary history of sciences suggests that even the physical sciences must consider the social and personal aspects of their research if they are to be objective.
McCullough had deliberately pushed for their selection. In 1856 Samuel Pearson had founded the original company in Bradford, Yorkshire as builders and contractors. More than half a century later his grandson, Weetman Pearson, was created the first Viscount Cowdry and was the lead figure in a company with interests on most of the continents of the world. During the 1880s the company established a reputation with construction projects such as the main sewers of Sheffield, the docks in Halifax, Nova Scotia, and the Empress Dock in Southampton. By the 1890s they were the largest contractors in the world. In 1890 Pearsons were involved in reopening the Hudson River Tunnel project in New York. They began the construction of the Thames Tunnel (the Blackwall Tunnel) in 1891. They also worked on the Dover Harbour. In Mexico they were responsible for the drainage canal of Mexico City and the Tehuantepec railway. Regarding Mexico, the author of the 1907 Report of the Directors writes, “The experience gained by nearly eighteen years working in the country and the somewhat unique position that the company occupies in that Republic, enable the Directors to select promising business on favourable terms.” After the Hudson River Tunnel project (which will be discussed in Chapter 5), Pearsons returned to New York to build four major tunnels under the East River for the Pennsylvania Railroad Company between 1903 and 1910.

During the first two decades of the twentieth century the construction business of the company was diversified. Pearsons & Son, Ltd. accepted a stake in some of the projects it was contracted to construct. It became involved in oil and mining interests. The financial side of the company was strengthened by initiating a securities subcompany. By 1910 the annual report listed Whitehall Securities Company as having a successful first two years and increasing its initial capital “reserve fund”. The Great War slowed contracts in Britain but in 1916 Pearsons began certain war works at request of His Majesty’s Government. By 1918 some of the considerable interests that Pearsons had in Mexico (such as railroads) were limited by decree of the new Congress of the Mexican Revolution. The 1920 Report of the Directors explained that, “the company on the 31st of December 1918 ceased to carry on business, and consequently is now only a

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8 Pearson Collection, Box 67
10 1907 “Report of the Directors”, Box A.10 Historical Records Chief’s Papers. Pearson Collection
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Holding Company.” During the 1920s the Pearson family of companies were involved in enterprise throughout the world. They had oil and mineral interests on six continents.11

The contracting and building part of the company was spun into a sub-company, S. Pearson & Son (Contracting Department), Ltd., and incorporated on the 7th of February 1919. The directors were Viscount Cowdray, P.C. Chairman, Sir Clarendon G. Hyde, Vice Chairman, Sir Edward E. Pearson, Sir Ernest W. Moir, BART. M. Inst.CE, and Frederick T. Hopkinson, M.Inst.C.E. In its initial years S. Pearson & Son (Contracting Department), Ltd. began the construction of the Littleton Reservoir for the Metropolitan Water Board of London and the oil dock on the Manchester Ship Canal. In 1922 they began the Blue Nile Project in Egypt. This was a ten million pound contract. The 1924 Report of the Directors describes the year 1923,

During the period contracts have been entered into for the construction of the Valparaiso Breakwater Extension for the Chilean Government and for the construction of the Silent Valley Reservoir for the Belfast City and District Water Commissioners. Work on the Blue Nile Dam and Gezira Irrigation Works for the Sudan Government, and on the other contracts of the Company has proceeded satisfactorily during the year.12

S. Pearsons & Son (Contracting Department) Ltd. was ended as a legal entity in 1930 at the death of Lord Cowdray. Legal arrangements were made to complete the work at the Silent Valley by shifting the contracting arrangement to a new company, Sir Ernest William Moir, Ltd. This new company, while different on paper, effectively represented a continuity of contractor personnel for the Silent Valley project. Sir Ernest Moir was the director from the previous legal entity assigned to execute the Silent Valley contract and an active force in resolving the engineering difficulties that arose during the construction work in the Silent Valley. Even the registered legal address of the new company remained the same, 10 Victoria Street, Westminster, S.W. 1.

11 Box C52 File LCO 6/89 Oil History 1927 “A short history by Mr. Scriving in 1927 of various countries in which SP&S Ltd have been engaged.”
12 1924 “Report of the Directors” (Contracting Department), Box A.10 Historical Records Chief’s Papers.

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Up into the mountains

Infrastructure was required so that a million ton earthen embankment dam might be built in the mountains. Local raw materials were to be transported. Equipment and other materials would arrive by sea at the Annalong harbour. A railway line was to be built 4½ miles up into the valley. This was to be a full English gauge railway 4'8 ½" with heavy steel rails and sleepers\(^\text{13}\) suitable for full-size locomotives and rolling stock. From a depot to be made in Annalong, it would need to convey heavy materials, plant, and machinery up into the Silent Valley. It was also to be suitable for conveying hundreds of local workmen and a million tons of material from the Commissioners’ nearby clay lands.

The contract specified “an earthen embankment, 1,500 feet in length, with a puddle core, the maximum height of the dam above the river-bed being 88 feet, whilst below ground a concrete cut-off wall extended down into the rock.”\(^\text{14}\) An embankment dam is made of earthen material held in place primarily by its own weight.\(^\text{15}\) The length of the embankment at the top level was to be 1503 feet, and 90 feet over the river bed at its maximum height. At the river level the base width of the embankment would be 560 feet.\(^\text{16}\) This massive volume was to be made of earth and several grades of clay that would be dug up from lands secured by the Water Board. These clay lands were some 1¾ miles south of the line of the embankment. But before the embankment could be raised up the existing level of ground was to be excavated down to and then below the level of the bedrock supposed to exist below the floor of the valley. This trench along the line of the embankment would seal or cut-off the disastrous possibility that water could

\(^\text{13}\) Wooden railway sleepers are laid our perpendicular to the direction of travel and used to affix the rail.
\(^\text{14}\) George McIlldowie *The Construction of the Silent Valley Reservoir, Belfast Water Supply* p5
\(^\text{15}\) The Silent Valley Reservoir is an earthen gravity dam. Other types of dam such as arch dams (usually constructed in narrow steep sided valleys) and masonry (or concrete) gravity dams require solid rock foundations near to the surface. An arch dam consists of a concrete barrier that curves backwards into the water it withholds. A gravity dam is made of concrete of masonry and uses its own weight to hold itself in place. A buttress dam is similar to a gravity dam however it is braced with triangular buttresses on the downstream side. See Donald Jackson *Dams* “Introduction” ppv-xl. The Ben Crom reservoir, constructed several miles further up the Silent Valley between 1954 and 1957 as the final instalment of the Mourn Extension Scheme, is an example of a gravity dam. For more information on types of dams see the British Dam Society [http://www.britishdams.org/about_dams/types.htm](http://www.britishdams.org/about_dams/types.htm)
\(^\text{16}\) Oct 6 1923 *Telegraph*
percolate underground and erode or blow out the dam. The cut-off trench was to be secured by proper timbering so that men could safely work within it. The dam would be made water tight by filling the trench with a concrete core. This core would be grooved into the solid rock underneath and then come up as high as the original river level of the valley. No timbering was to be left behind within the rising concrete pour. Above the concrete cut-off wall a core of specially prepared clay was to form the centre of the embankment. Around this centre puddle core were to be placed a series of other grades of clay and earthen material piled up to a slope of 3 to 1. Upon the top line of the reservoir would eventually be a road for walking and inspection.

The 1,500 foot embankment was set on an east/west line. It ran from the slope of Molieve Mountain on the east side to the slopes of Slievenaglogh on the west side. Work at several places in the embankment was required to allow the water to pass through. On the east end an arched outlet tunnel (shaped like a horseshoe)

17 Contract diagrams
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12 feet in height by 13 feet in width, built in blue brick\(^{18}\) backed with concrete, was placed to accommodate the waters of the Kilkeel river during construction, and ultimately to house two lines of 36-inch cast-iron supply-pipes, communicating with the existing conduit via a screening-chamber and a 36-inch venturi meter.\(^{19}\)

Water was abstracted from the reservoir at three levels into a dry valve-shaft situated on the line of the outlet-tunnel. The two 36-inch diameter supply-pipes were arranged to act as scour-pipes also.\(^{20}\) Top water-level was at 500.0 O.D.\(^{21}\), the top of the bank being 8 feet higher. Water could be drawn off at 475.0 O.D., 451.0 O.D., and 427.0 O.D., the last being the invert\(^{22}\) of the supply or scour pipes. Water could not be drawn off for supply purposes below 432.0 O.D., this being the level of delivery into the existing conduit.\(^{23}\)

The supply pipes provided a supply of water to Belfast. The screening chamber was to filter or screen the water of large objects. The supply pipes also functioned as the scour pipes which were to be used to flush out or reduce the reservoir water level quickly. The valve shaft (with venturi meter) enabled the rate of water flow into the supply pipes to be regulated. This valve shaft and tower would attach a flow of water from the reservoir to the existing tunnel and conduit path supplying Belfast. This would be located on the east

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\(^{18}\) Blue brick is also known as Staffordshire brick after the west midlands area of England in which it is made. Made from Etruria marl (red brick clay) the “hard solid blue colour is achieved during their firing using a reducing atmosphere cutting down on oxygen in the kiln. By using higher firing temperatures and slightly reducing conditions, the surface of the brick was slightly vitrified and this gave a dark blue colour and a very high crushing strength.” During the 19\(^{th}\) Century Staffordshire brick was widely used throughout Britain for railway, road and canal bridges. From ‘focus on brickmaking’ at http://www.thepotteries.org/focus/006.htm (accessed June 2007)

\(^{19}\) A venturi meter calculates the rate of flow through a conduit by limiting the diameter through which flow occurs, measuring the increased pressure and calculating rate of flow from the Bernoulli equation for fluids of constant density. For more detailed explanation see http://www.case.edu/artsci/phys/courses/demos/vent.htm (accessed June 2007)

\(^{20}\) Scour pipes are used to flush out or reduce the reservoir water level quickly. See http://www.britishdams.org/about_dams/scour.htm (accessed June 2007)

\(^{21}\) O.D. or Ordnance Datum is a measure of altitude. On the works it was taken from the foundation cornerstone of the old valve house building (burned during the republican attack on the valley in 1922, which was considered to be 432 O.D. The riverbed level from which trench excavation downwards began and the embankment above would be piled was approximately 432 O.D.

\(^{22}\) An invert is the lowest point of a conduit section, the bottom of the pipe. taken from “definition of terms” at http://www.cspi.ca/english_files_handbook/definitions.pdf (accessed June 2007)

\(^{23}\) George McIlldowie *The Construction of the Silent Valley Reservoir, Belfast Water Supply* p5
side of the valley near the line of the embankment. McCullough had specified “extensive underground and superstructure buildings for controlling, screening, and gauging the varying daily flows of water to be drawn from this reservoir, also for measuring the surplus floodwaters which will pass to the sea from this mountain catchment.”

The other place that water might pass the embankment was through the overflow arrangements; originally designed as a weir on the west end of the embankment (these arrangements were changed in the final construction process as discussed in Chapter Seven).

The overflow-weir, 250 feet in length, was sited at the west end of the embankment, discharging into the river-bed by a stepped waste-channel from the south end of the outlet-tunnel converged into the waste-channel from the south end of the outlet-tunnel, and was 45 feet in width. The two channels were designed in concrete, faced with granite masonry. The buildings included a valve-tower house, a screening-chamber and valve-house, and a scour-valve chamber, all of granite masonry.

An overflow mechanism is built to preserve the integrity of a reservoir when fully operational. The 250 foot long overflow crest wall or waste weir was planned on the West side of the embankment. Lined with granite ashlar at the top it would include a safety valve after completion. The exit flow would come down steps of successive tiers to reduce its velocity. This waste weir channel was to be 680 yards long, 55 feet wide, and 7 feet deep.

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24 Cited in *Telegraph* Oct 6 1923
25 “A weir is a small overflow type dam commonly used to raise the level of a small river or stream. Weirs have traditionally been used to create mill ponds. Water flows over the top of a weir, although some weirs have sluice gates which release water at a level below the top of the weir. The crest of an overflow spillway on a large dam is often called a weir.”
http://en.wikipedia.org/wiki/Weir
26 George McIlldowie *The Construction of the Silent Valley Reservoir, Belfast Water Supply* p5-6
27 Ashlar is stone cut smoothly (or ‘dressed’) into blocks and laid in regular courses, separated by only the thinnest of joints.
28 Cited in *Telegraph* Oct 6 1923
During the excavation and construction the Kilkeel River needed to be diverted. A river diversion channel was to be built along the east side of the valley 700 yards north of the line of the embankment. It would be 506 feet long, 50 feet wide, and have granite pitching. The river would be diverted into a tunnel passing through the forebay29 290 yards north of the embankment line. This tunnel would go around the east end of the embankment passing under the slope of Moolieve Mountain. It would be constructed first by a cut and cover method (excavating to where the tunnel would be and then building a ceiling and covering the excavation back in) and then by cutting through rock. The river would exit through the tailbay30 165 yards on the south side of the embankment line. This arched horseshoe shaped blue brick outlet tunnel is described above. After passing into the outside at the tailbay the diverted river water would travel 160 yards before rejoining the original course of the Kilkeel River below the line of excavation and embankment construction. This course was to be lined with concrete backing and Staffordshire brick and be 13 feet wide and 12 feet high. The biggest of the winter floods would need to pass through this channel if the line of the embankment was to be preserved during construction. The river diversion was designed adequate up to a gravitational discharge of 1,565 cubic feet/sec (or 845 mil gal/day). Its safe maximum pressure capacity was 2270 cubic feet per second.31

A high level road was to be constructed up the east side of the valley to travel above the top water level of the reservoir along the slopes of Slieve Binian all the way to the north end of the reservoir. When completed this road would be 18 feet wide and 2½ miles long. Finally, before the reservoir could be filled the peat bog base of the valley had to be covered over with soil. Otherwise the reservoir would pick up the dark discolouring and the water delivered to Belfast would look more like stout. “The capacity of the intended reservoir was approximately 3,000,000,000 gallons, and the contract sum for the whole works was £983,000.”32

29 A forebay is a place where water from the reservoir (or river) enters the tunnel. The Silent Valley reservoir had three forebays which were referred to in diagrams of the works as the forebay, middle forebay, and upper forebay.
30 The tailbay is the location which the water exits the underground passage.
31 Cited in Telegraph Oct 6 1923
32 George McIlldowie The Construction of the Silent Valley Reservoir, Belfast Water Supply p6
McCullough, the designing engineer, had also briefly considered what might be necessary support for the labouring men who were to fulfil the contract. "Suitable hutments, with necessary hospital and other accommodation, will be provided near the site of the reservoir, for the comfortable housing of the workmen coming from outlying districts beyond convenient reach of the works railway." While certainly this provision is written into the project as a consideration, there is no deliberate examination of the social realm of workers' lives and how it relates to the construction project more generally. In the subsequent sections of this chapter I shall review some of the details of the construction process that enables the contractor to finally tackle excavating the cut-off trench. In this description I pay attention to the ways in which the written design must encounter and interact with the technical and social details of the construction process including the lives of workers and their families. Since largely this emphasis exists in W.H. Carson's work but not in other material, much of this chapter is a critical review of his work with a clarification of what I think his work accomplishes (and in some cases what it leaves unrevealed).

**Initiating Work in the Valley**

Work at the Silent Valley began in 1923. Signing of the contract, known as Contract "A", happened on the 25th May. A Bond for £15,000 from Whitehall trust, Ltd., "sureties for the contractor" had been sent to The Belfast City & District Water Commissioners (specifically to Captain R.E. McLean, their solicitor) on the 23rd May to cover "the 'Silent Valley' Storage Reservoir, Works Railway No.4 and other Works." Within two and a half weeks of the final negotiations happening and signatures being placed on the contract the work in the Mournes began.

The personal and anecdotal material collected by W.H. Carson describes what life was like for the working community. On June 10th, 1923 local labour was hired to clear

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33 Cited in *Telegraph* Oct 6 1923
34 Pearson Collection Box 7
the ground for a railway yard and track in Annalong. Mourne men were keen to find employment.

Tom Clarke, of Annalong remembers the day well for he went up to the site at 6 o’clock in the morning, and asked for a job... “The sun was shining,” says Tom, “and there wasn’t a breath of wind. But they were short of picks and shovels, although many of the men offered to go home and fetch their own tools so they could get a start.35

Not all the labour was local. The contractor had an extended network of persons whom they might employ and expertise was brought from throughout the British Empire.

...carpenters, electricians, plumbers, platelayers, steel erectors, and engineers of every type poured into the district from all parts of the British Isles and abroad. Kilkeel on a Saturday night was like a carnival town.36

Nor was all the arriving expertise foreign. Dan Dooley was a steam man who had been working for Pearsons in Africa but returned when Pearsons took up a contract in the place where he was from and where his family still lived. He was,

one of a great family of steam-men, came back from North Africa, where he had been working on an irrigation scheme on the Blue Nile. By that time, Dan’s father, and four of his brothers, Jack, Harry, Eddie and James, were already working in the valley.37

36 Cited in W.H. Carson The Dam Builders: The Story of the Men who Built the Silent Valley Reservoir. Mourne Observer Press: Newcastle (1981) p22. The largest influx of labour presumably happened later than the summer of 1923. In October of 1923, two hundred men were employed (Belfast Telegraph Oct 6 1923). By February of 1924 there were at least twice those numbers employed (Feb 18 1924 Newsletter). A year and a half later in the summer of 1925 one newspaper gave the figure as 670 workmen then employed (Irish News July 7 1925).
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Another example that Carson notes is John Henry Lyons who "came from Newry as engineer in charge of the power house, and his son, Jack became power house attendant." By Mourne tradition family kinship structures were involved in securing work for one another. 38

By October (1923) the project was well under way and a ceremony was being prepared to celebrate and draw public attention to the fact that the work had begun. From the depot in Annalong lines of track were being constructed up the valley and would eventually extend to the site of the actual reservoir. The first locomotive had been put together. It was called the "Ulster."

Lord Carson cuts the first sod

Lord Carson, the premier of Northern Ireland, would cut the first sod in the valley along the line of what would become the reservoir embankment after it had been suitably excavated to bedrock and sealed water tight with a concrete base and then a puddle clay core. The week before the event a Belfast newspaper described to its readers the location, associating subliminal impressions of the landscape with sovereignty.

The locale of the actual sod-cutting is a natural plateau in the midst of majestic scenery. Five mountain turrets look down on the valley like mute sentinels jealous of their silent sanctuary. They are wonderful in their singular greatness; spectacularly beautiful as a tableau. They suggest a sovereignty of the seas as well as dominion over the hillsides of Mourne. In a word they are monarchs of all they survey. 39

The arrival of Lord Carson, celebrated figure of Ulster Unionism, is here being linked to the Silent Valley and to a sense of sovereignty that the new Ulster state, in some measure, has almost achieved in 1923.

38 Estyn Evans Mourne Country p130.
39 Oct 6 1923 Telegraph.
At least part of this ceremony was arranged by Sir Ernest Moir. He arranged for the granddaughter of Water Commissioner Ebenezer McElroy to participate in the ceremony with Lord Carson. Ann Mary Beatrice Jamison was better known as Ambi. Sir Ernest Moir wrote to her mother, Evelyn Innes, on the 17th of September to request the granddaughter take a role in the ceremony.

It would give everybody great pleasure if your little daughter would participate in the function of the cutting of the first sod in connection with the Silent Valley Reservoir on October 10th. She would only have to wheel the cut sod in a little barrow some 50 or 60 ft. from where it was cut and then tip it over.

I’m sure she would appropriately do this work, and it would be of great satisfaction to her grandfather’s colleagues to have her perform this ceremony, not to mention the pleasure it would give me.40

The granddaughter seems to be familiar to Moir, perhaps indicating his social interaction with the Water Commissioners was not just in a business setting. The use of kinship connections within the ritual for beginning excavation certainly indicates an informal

40 Cited in Carson p24.
talent on behalf of the contractors for engaging with those who have hired them. The association of his granddaughter with important persons in an important ceremony might have pleased the deputy chairman of the Water Board. Perhaps also a division of labour (between the senior gentleman and the young girl, one to cut the sod and the other to carry it away) reminds one of the divisions of labour that this chapter explores. In his letter to request Ambi, the senior engineer from Messrs. Pearson labels her activity as “work” which she would be able to do appropriately, as well as “performance” within a ceremony.41

W.H. Carson interviewed Ambi in 1979 and she was able to describe the events of the day with quite good memory and from the perspective of a young girl. She arrived that day in a chauffeur driven family limousine dressed in a “blue velvet coat trimmed with silver fox, and a huge matching velvet hat.”42 The imposition of doing her work appropriately brought her into slight disagreement with her mother.

“I wept bitter tears at having to wear that awful hat!” sighs Ambi Innes (Now Mrs. Ambi Jamison, Cultra, Co. Down) to this day. But her mother was adamant:

“You will wear that hat,” she told Ambi firmly. “So behave yourself child! And stop your nonsense at once!”

Ambi’s memorable hat was made by Lindsay’s, of Donnegal Place, Belfast, and her little velvet coat tailored by a dress-maker in the city. Before the sod cutting ceremony, Ambi presented Lady Carson with a bouquet of roses, and then she wheeled up the beautifully carved and silver chased oak barrow, into which the noble lord dropped the cut sod.43

Harbour, Railroad, and Plant

Not only labourers and social ceremony were enrolled to the service of the reservoir. To build a million ton embankment high in the mountains materials and machines would be necessary.

41 Cited in Carson p24.
42 Carson, p24.
43 Carson p24-25.
Annalong harbour was the closest port for bringing in equipment and materials. It was only four miles from the base of the Silent Valley. The cost of construction of a railroad up into the mountains was lowest from here. The harbour itself was very shallow. It was best used during either of the two tides after the full moon or the new moon when the tide-generating force of the sun acts in the same direction as that of the moon, reinforcing it and causing the greatest rise and fall in the tidal level. Says Carson “in those days the vessels could only enter on the spring tide.”

28,000 tons of coal came from the Llay Main Colliery in North Wales. 14,000 tons of cement from the Magheramorne works in Co. Antrim were piled on quayside. These were carried by six ships of varying size between 130 and 200 tons which had been chartered by John Kelly Ltd. of Warrenpoint from the Ramsey Steamship Co., of the Isle of Man. Another ship of 150 tons named ‘The Scotsman’ brought in building bricks from Connah’s Quay in North Wales.

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The steam locomotives and material to build the railroad also came in on these ships. Carson notes "[a]n old, dark picture in the Harbour Bar, Annalong," which shows a ship called the "Jolly Frank" with a water tank for a steam locomotive named the Charleton.\(^\text{46}\) In the harbour cranes helped the process of unloading material. Then it could be loaded onto one of four "ex-first world war stock of American "Peerless" lorries with solid tyres, and a top speed of about 12 m.p.h., picked up ship cargoes and moved them over to the rail-head".\(^\text{47}\) The rail depot began in Annalong and extended four miles to the Silent Valley. Gangers supervised the laying of track up the line to the valley. The task of some of the first workmen hired was "laying and packing the sleepers, and putting down the lines."\(^\text{48}\)

Dick Dooley and his sons built the first locomotive. It was assembled from parts that had been shipped and became known as the ‘Ulster’. Carson lists the names of several of the ten steam engine locomotives that were used by Messrs. Pearson: the ‘Ladysmith’, ‘Number Eight’ (known as the ‘Wee One’), and the ‘Ulster,’ the ‘Mourne’, the ‘Lyttleton’, the ‘Ashford’, the ‘Londonderry’ and the ‘Courtney’ shipped from Avonmouth on the Bristol Channel. The ‘Lyttleton’ was assembled by Sam Breeze the steam boss.\(^\text{49}\) At the end of the line into the valley, an extension railway enabled material to be transferred around the various locations within and around the works. When complete the five and a half miles of track in valley was organized by the ‘slasher,’ a transport manager who directed the drivers to various worksites.\(^\text{50}\)

Spare parts for locomotives and steam cranes were stored in Pearson’s warehouse at top of the valley road.

The head store-keeper was an Englishman called Peter Kitchin, who lived in one of the huts. Jack Lyons describes him as a very straightforward man who would let

\(^\text{46}\) Ibid., p23.
\(^\text{47}\) Ibid., p28 See also A.H. Muir, “Reports by A.H. Muir,” pp 18-20, 23
\(^\text{48}\) W.H. Carson p23.
\(^\text{49}\) Ibid., p29-30.
\(^\text{50}\) Ibid., p32.
nothing out of the store without a signed order, but some of the men found him to be a bit of a "crabbit."\textsuperscript{51}

A night shift that worked from six in the evening to six in the morning cleaned the engines. Each man was assigned to his own engine. "Cleaning waste was drawn from the store every Friday along with a quantity of Colza oil for the working parts and tallow for the smoke box."\textsuperscript{52}

Each engine was crewed by a driver, a fireman, and a rope-runner. The rope-runner coupled and uncoupled wagons, opened and closed gates at the road crossings, and changed the points. When the rolling stock was uncoupled on an incline, the rope-runner was responsible for preventing them from rolling away. This was done by placing an oak stave in the spokes of a wheel.

This operation was known as 'spragging the wheel' and was a fairly dangerous job. The "sprag" was about 3ft. long, and approximately 6in. in diameter. It was tapered like a cigar at each end, and if the wagons started to move back the rope-runner ran alongside and pushed the sprag in between the spokes of a wheel at a point where it jammed against the frame and halted the train.

The right time to sprag a wheel on a moving wagon was a critical decision, because a wrongly placed sprag could fly out from the wheel and strike the rope-runner in the face. Tommy Whiteman was hit on the chin, and on the nose, by a flying sprag, and still carries the honourable scars where he had to be stitched up.\textsuperscript{53}

Discussing his apprenticeship as a fireman on the 'Londonderry' Jack Chambers explained, "She was hard to regulate, and hard to get steam up, Many an oul' burn I got!"\textsuperscript{54} Another fireman John Nugent gave Carson the following story,

\textsuperscript{51} W.H. Carson p34
\textsuperscript{52} Ibid., p34
\textsuperscript{53} Ibid., p30-31
\textsuperscript{54} Ibid., p30
One day I mind the ‘Mourne’ engine hauling a powerful heavy load of cement up to the valley from Annalong. The fire was lifting clean out of the fire box, and the red hot cinders came belching out of the funnel and set the whin bushes on fire on both sides of the track. The oul’ hairy bags of cement on the last two wagons were on fire as well, and as we rattled past a thatched house near the clay fields a shower of cinders lit on the roof and burnt it clean off the house. The whole family had to clear out.$^{55}$

Figure 3.4
The Railroad into the Silent Valley
Source: Pearson Archive

Because of this incident a wire cage was put over the funnels of all the locomotives. These locomotives and the other heavy machinery could be adjusted or repaired in the Valley. Parts, equipment, and a machinery shed were all part of the valley infrastructure. Each locomotive had a particular crew and a specific man to clean it at night. The idiosyncrasies of the separately shipped and assembled machines would have been managed in the tacit knowledge of the particular crew.$^{56}$

$^{55}$ Ibid., p30
$^{56}$ The term tacit knowledge describes implicit skill or ability within craft knowledges (such as science or engineering). Often unacknowledged, tacit knowledge is neither written nor discussed but must be learned by practice. For explanations relevant the Science and Technology Studies see Collins, H. M. (1974). The
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There were various dangers associated with operating the railroad and two workman deaths.

A rope-runner named George Phillips was fatally injured when he tried to jump on the footplate of a moving loco after changing the track points, but missed his grip on the hand-rail, and, as he fell back to the ground, a projecting steel pin on the moving crank lacerated his thigh. A tourniquet was applied to the injured limb, and George was rushed to Kilkeel hospital, where they had to amputate. The following day gangrene set in, and after a second operation poor George passed away.

Another tragedy on the rail system occurred when the father of Johnny Cousins of Mourne was squeezed between the buffers of two wagons and dropped dead on the track without uttering a word.57

Locomotives with large loads coming down hill were sometimes difficult to stop. Even with sprags jammed in the wheels a train might skid down the track, wheels not turning or it might come “off all sixes!” meaning all six wheels were off the track. On the 12th of August 1925 the crew of the “Charleton” were in danger.

The bank under the railway line had caved in, and as the engine left the track and toppled over, John Trainor from Ballyveagh, the rope-runner, leaped out the other side with fireman Morgan and Dick Dooley, the driver. Seconds later the “Charleton” crashed on her side in a cloud of steam, with all six wheels spinning in the air. Fortunately all the crew escaped injury.58

Much of the plant used at the Silent Valley was transferred by Pearsons from other contracts such as Charlton Storm Relief Sewer and the Littleton Reservoir contract. Some items of plant came from the London office and some came from the Blue Nile

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57 W.H Carson, p31.
58 W.H Carson, p31.
Dam and Irrigation contract in the Soudan. In addition to locomotives, railhead, and various automobiles, a few of the larger items of plant were listed in the contractors accounting documents included five-ton steam locomotive cranes (as well as Wilson Cranes and Ruston No. 6 Steam Navvies), some ten-ton cranes (an overhead crane and also a Wilson locomotive crane), air compressors, boilers, wagons and side-tip wagons for emptying material, 40 H.P. petrol tractors with Dorman engines, several four-ton Peerless lorries, dynamo's and generators, a No. 6 McKeran Terry Steam Piling Hammer (with extractor gear), concrete mixing equipment and a class 60 dragline excavator. Other items of plant included pneumatic drills, diving apparatus, blacksmith gear, all the necessary apparatus for a machine shop, well-boring gear, and various pumps. Horses were also used in the works. The s.s. 'Scotsman' was chartered to provide delivery direct to Annalong rather than delivery to Belfast with subsequent railway and motor haulage costs from there.

As has been apparent from the discussion in this section, this machinery depended upon an arrangement of harbour and railway so that it might effectively arrive in the Silent Valley. Even the gravitational rhythms of the moon were utilized as they lifted water into a harbour that was usually dry thus allowing ships to arrive and unload. But more than a physical network enabling machinery to arrive and function is being described here. Careful human mechanics, clerks, sailors, dockers, gangers, and labourers were involved at every location. Always arrangements were subject to disruption, failure, or if possible reenrolment. In response to the locomotive smoke with thatch-roof-burning cinders a wire cage was added to the funnel. When the Charleton came "off all sixes!" the train leaping survivors were fortunate. When rope-runner George Phillips lost the arrangement with his locomotive that he intended, he entered into a new arrangement with bacterial gangrene, one which unfortunately he did not survive. The arrangements that built the reservoir were not just machines, rail track and steamships. The lives of human beings and all that they require were woven into every

59 A.H. Muir, “Reports by A.H. Muir,” p14
part of reservoir building. The following sections will begin to examine these entanglements of humans and what it was like to work and live in the Valley.

**Working in the Valley**

Much of the material available describing working life in the Valley comes from interviews by W.H. Carson during the first six months of 1979. These memories emphasize the events that are memorable because they were either unique or routine. A certain amount of enthusiasm can be gathered from his assembled account.

The Silent Valley was a god-send to Mourne, for the only available work at that time was in the stone quarries and the fishing boats. The job-hungry men of Mourne walked almost incredible distances to get work in Watertown... 

Family kinship structures in Mourne were involved in securing work for one another. For Mourne folk the term ‘friend’ meant family relations. The junction of so much employment provided by a stranger and the practice of referring one’s kin must have meant that in many cases brothers, cousins, fathers, and sons all worked in the valley maintaining their traditional lines of connection as well as simultaneously taking up many new ‘friendships’ with those others (non-relatives) with whom they worked. The immediate circumstances of a large work force sharing a common situation must have encouraged new connections, some ‘friendships’ outside of traditional kin-lines.

Labouring men arrived walking, by bicycles, or came up on the train from Annalong. Some were living in the valley encampment. Men walked from as far away

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The preface details his sources and method of research.


64 Estyn Evans: "‘Friends’ are blood relations, divided into those on the father’s side and those on the mother’s, and a distinction is made between ‘close friends’ and ‘far-out friends’ – second cousins and beyond. Allegiance, tested in times of difficulty, is strongest to close friends on the father’s side of the house. Relations by marriage are known as ‘connections’ and all who are outside the kinship system, even near neighbours, are ‘strangers.’ Formal visiting is predominantly among kinsmen, and bonds of affection are not normally formed outside the group. It is to kinsmen rather than neighbours that a family turns in emergencies, and a man seeking employment will look to his close kinsmen: it would be considered reprehensible if mere neighbours were given preference.” p130.
as Hilltown, Cabra, Moneyscalp and Greencastle. Some came for the week and a few walked every morning a quite large distance.

Bertie Stephenson... remembers a man who walked the whole way from Greencastle every morning with his 'piece' tied up in a red handkerchief, and was reputed to be the first man to reach the timekeeper's office.65

Boots could be soled and heeled by the cobbler Walter Mayhew in Annalong.66 Johnny Burden walked five miles to and fro every day, had his boots soled and heeled for ½d, and was "known as 'Johnny the Hut' because he carried a home-made lamp shaped like a hut that he had knocked together out of a box, and put a bit of glass in front, and a stump of candle inside, to light his way across the mountain"67. Travel at night often requires lamps. James Killen was a mechanical blacksmith in the valley and describes travelling to work at 5 a.m. on a winter morning looking up from the Calligan bridge on Carginagh road,

"I could see the wee flickering lights of the workmen's lamps as they came across the mountains in the dark, and climbed down to the valley," says James. "It was just like starlight."68

Johnny Cousins lived

in the highest farmhouse in Mourne, on the foothills of Bignian Mountain... One winter’s night, Johnny was coming home across Moolieve from a late shift in the valley when his lamp went out-

"It was so dark on the mountain," says Johnny, "that you couldn’t see your hand in front of your face. Then I found a dry stone wall and felt my way along it till I spied a bit of a light in the darkness. I knew the wife would be waiting up for me,

66 Ibid., p21.
so I put the two fingers in my mouth and whistled twice. Then I saw the door open, and the wife came out with a lamp, and she came up the mountain and brought me home."

Walking could also encourage an unexpected form of danger. With long walking journeys the desire to leave work as soon as possible must have increased. John Murphy walked from Lisnamulligan, near Hilltown, crossed the Mournes every morning to get to work and then returned at night. When the line of the embankment was finally being excavated (see Chapter 6 & 7) he was working in the trench they were digging out to rock bottom and, when quitting time came, John climbed up the ribs in a hurry to get home instead of waiting for the skip to hoist him out with the rest of the gang. Near the top of the trench, he missed his footing and fell to the rock 100ft. below...

This boundary between length of the work day, getting away, and safety also showed up elsewhere. During the period of trench work in which progress was made by putting the excavation under air pressure the workmen in the airshafts had to take time to depressurize slowly. Those who rushed their decompression of the crew in order to leave work sooner were known as "homers". Rapid decompression could result in problems for the men leaving the air-shaft.

Initially a train was provided to bring workmen up to the valley. It left from Annalong at 645 in the morning. On dark winter mornings it had a carbide lamp up front. Along the track up the valley there were various stops where men could board the train.

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69 Ibid., p19.
72 This is discussed in Chapter 7, p259

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The passenger wagons were painted red and held between fifty and sixty men in each, and there was a boxed off section for the timekeepers and office staff. The seats were wooden. There was a roof, but no glass in the windows-

'We used to put a few ouf' bags up in the winter months to keep the sleet out,' says Jack Chambers.

Bicycles were another means of travelling to work in the valley.

When they had saved a few pounds, many of the road walkers bought themselves push bikes. Tom Clarke recalls that he and about twenty other young lads used to pedal off from Annalong every morning, heading for Kilkeel and the Old Bog Road up to the valley.73

One man writes to Carson of the sense of unity that he remembers those working in the valley shared. “Among the workmen, charge hands, and gangers, there was a united sense of purpose…”74 Danny McCartan walked to the Valley from Annalong by the Old Bog Road and back again every day. His wage in the fitting shop was 9d. per hour.

“They were amongst the best days of my life,” says Danny.75

These stories of what it was like to work at the valley may be influenced by time, narrative and memory. They may only be the perspectives of a few individuals told 50 years after the fact. In W.H. Carson’s text this affirmative presentation of the old days is thematic. Carson is a social historian, an interviewer and one who respects local knowledge. He is not a political historian; nor does he excavate conflict. Quite appropriately, his ethic seems to be for those he writes for. Memories of one’s youth are most happily assembled in a particular way.

We can assume that perhaps there was more conflict in work place relations than Carson’s book presents. Nonetheless, presumably the situation in such a project had

73 W.H. Carson, p21
some ability to create purpose and bring the workforce together. The value of being men-being workers- being skilled workers (or being involved in a project that involved so much skilled work) was brought out in these circumstances. Presumably those who didn’t work or who came into dispute with the contractor were dismissed or never hired. Selection criteria for who were involved would tend to encourage an affirmative attitude towards the work to be done. The employer brought men to Mourne who they knew or thought to work hard and possess practical skills. Those locally who put themselves forward were interested in working, pleased to obtain work. Certainly the people of Mourne are described as having a strong culture of work in Ulster at these times. Sir Ernest Moir said in his initial description of the project “I have had a very good account of their capabilities, their willingness, and their enterprise”76 Labourers at the Silent Valley would have been discursively positioned as hard workers. De-selection criteria applied as well. Once the excavation stage began, Harry Lovatt, the agent for the contractor, was in charge of the overall construction. He told one bricklayer seeking work that he didn’t hire men. He sacked them.77

Labour relations narrated as humour

The following story is about the levelling of the valley floor to increase the capacity of the reservoir, enable trench excavation and cover up the peat floor of the valley. It illustrates the affirmative work ethic as presented by W.H. Carson. It also illustrates the interaction between the contractors and the labour. Dan Dooley was a steam man who received the credit for this exploit.

Dan and his fireman, Harvey Chambers, on their No. 10 Ruston excavator, had cleared 400 wagon loads in one day the previous week, but the site bosses disputed the claim for bonus. They said it was impossible to fill 400 wagons in that time, and H.W. (‘Mad Harry’) Lovatt, the valley boss, challenged Dan to prove his claim. Dan Dooley took up the challenge, and at 6 o’clock the following morning he and Harvey Chambers swung their big steam shovel into action on Foxes Knowe.

76 28 May 1923 Telegraph
77 W.H. Carson, p60.
At 9 a.m. Dan and his mate stopped, and fried their breakfast of bacon and eggs on the crane. Then like giants refreshed, they went flat out until 1 p.m., by which time they had loaded and despatched 300 wagons, each containing 6 cubic yards of soil, and were well within sight of their target. After a snack, and a 15 minute break, they started off again like men possessed, firing and swinging the crane, shovelling and loading, and, as quitting time drew near, the site bosses gathered round to watch the final stages of the heroic struggle. At half-past five o'clock, Dan and his mate climbed down from their steam navvy amidst cheers from onlookers, having clocked up the astounding total of 500 wagon loads.

"It's a world record!" claimed the bosses, and H.W. Lovatt presented Dan with a watch and a £10 note, plus a £5 bonus. No other steam man in the valley ever equalled Dan's performance that day and henceforth the expression "They'll never come up to Dan Dooley!" passed into the folklore of the Dam Builders.\textsuperscript{78}

\textsuperscript{78} W.H. Carson p36-37.
The phrase, “They’ll never come up to Dan Dooley!” indicates an affirmative standard, a measurement of men to be sought. This story is described as becoming part of the folklore associated with the dam builders. It indicates a sense of achievement. It also celebrates the local labourer (in relations to outside bosses).

As a wage labour workforce under a lump sum contractor there would certainly have been tension between the contractors and their employees. H.W. Lovatt was in charge of the valley.

“When Lovatt shouted,” says Jack Chambers of Annalong, “everybody jumped. He sacked men left, right, and centre!”

As an ex-army man, Lovatt brought a military type of supervision to the job that kept the whole workforce on their toes, and the wild, un-nerving look about his eyes earned him the nickname of “Mad Harry.”

Lovatt lived in a large house in Newcastle and arrived every day in a chauffeur driven Armstrong Siddley car provided by the company. He toured the whole valley twice every day and carried around a “blackthorn walking stick exactly 3 ft. in length which he used for doing snap measurements.” W.H. Carson interviewed several men who were dealt with by Lovatt.

George Crutchley tells of the day that he and Jim Higgin were cutting up lengths of timber with a two-handed crosscut saw, when Mad Harry stormed on to the site, and sacked the pair of them.

He was in a towering rage say George, “because a steam crane had broken down on Foxes Knowe, and he was looking for a couple of scapegoats. We just happened to be on the spot!”

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9 Ibid., p60-61.
10 Ibid., p62.
11 Ibid., p62.
12 Ibid., p61.
Carson chooses to emphasize the humour in these situations. Jack Chambers who as a nipper in the engine shed was told one day by his immediate foreman that he could “slip away after dinner.”

“But,” says Jack, “Mad Harry caught me slipping away, so I dodged into the fitting shop, pulled off the coat, and ran back into the engine shed. Mad Harry didn’t recognise me without the coat on. ‘Find that nipper Chambers!’ he roared at me. So I ran out of the shed again to look for myself!”

The narrative quality of Carson’s stories and the humour of the telling seems to undermine any real sense of conflict.

Labour disputes
But there were labour disputes. In December of 1923 the men asked for a 4d increase in wage. By February of 1924 380 labourers were out on strike.84 Mr L. McCurdy of The Amalgamated Transport and Workers Union for Ireland had met with Sir Ernest Moir and suggested that if a 1d increase was offered then he would try to get the men to accept it. In England the wages of men employed in engineering contracts had only been improved by a ½ penny per hour as a result of an agreement with trade unions regarding the increase in the cost of living. This increase in wage was put into effect in the Silent Valley in the early part of the year. But at the same time notice was given that the hours of work were to be increased by a half hour later into the evening so that quitting time was to become 530 rather than 5 pm. Particularly for those who had a long return journey this must have seemed undesirable. The labourers refused to work past 5 in the evening and in fact work ceased entirely. Andrews, the new Minister of Labour for the Northern Government, suggested arbitration but the contractor did not seem to be willing. The newspapers all made clear to their Belfast readers that the strike was a disagreement between the contractor and their employees and in no way concerned the Belfast Water Commissioners.

14 Feb 18 1924 Northern Whig, Feb 18 1924 News-letter.
In the spring a year later 600 men went out on strike in support of 70 masons and 50 steam men. The masons had stopped on the April 8 1925 after a demand for higher wages. In May, as a particularly warm and dry summer was beginning, 50 steam men which included engine drivers, machine drivers, and electricians also asked for an increase in wages. "The power plant being idle practically all work on the site has come to a standstill" reported a Belfast newspaper. The dispute was resolved shortly thereafter.

The social organisation of labouring people was differentiated by craft. Skilled labour held a more prominent position and often thought of itself as important. The differentiation of the steam men as a separate and distinct category of workers is noted by Carson,

The steam men of the valley were a very special class of people. They wore a distinctive uniform, a buttoned-up short blue coat, with blue dungarees, as opposed to the standard bib-and-brace overalls worn by tradesmen, and they were always spick and span on Monday mornings.

The only death among the steam men was Mick Sinnet who overturned his crane on the High Road above the dam.

**Entertainment and the problem of alcohol**

Initially there were no buildings associated with entertainment in the Silent Valley. Perhaps the contractor was focused only on the construction and did not see organizing the social lives of their workforce as a relevant aspect of the task at hand. Perhaps it became more apparent as more people worked and lived in the valley. Nor was alcohol initially provided for. Perhaps because of this a more clandestine distribution network occurred.

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15 May 16 1925 News-letter.
17 W.H. Carson p57.
In November of 1924 there were 205 bottles of illegal stout apprehended by the police near the Silent Valley. Mr. John Woods was summoned to court for January. Just a few days before his court date another alcohol related incident was being uncovered. Late on the 25th or in the early morning of the 26th of December 1924 the night watchman T. Burton had found J. Beehan underneath the crushing plant, perhaps fallen from the above staging. Beehan died on the 13th of January with septicaemia from injuries to the thigh and head. At the inquest it was determined that the deceased had admitted to Dr. Floyd (who had given medical assistance) that he'd had some drinks that day.

A few days later in the Newcastle petty sessions before Mr. W. Gore Moriarty, R.M. (chairman) and Mr. W.J. Hardy, R.M., Sgt. Baker described concealing himself outside the house of Mr. John Woods and observing the purchase of alcohol and some cigarettes by a visitor to the house. He then entered the house with a search warrant and found 205 bottles of stout and 25 empty bottles. Mr. Woods was fined £2 with £1 costs attached to this. The presiding authority was quoted in a Belfast newspaper,

Mr. Hardy expressed the opinion that in view of the large number of men engaged at the works, some steps would be taken to legalise the sale of liquor at the works. It was, he said, very unsatisfactory that this sort of thing should go on.

Captain Creeny said the firm, he understood, had contemplated establishing a canteen some time ago, but nothing had been done.

Shortly after these incidents, Messrs. Pearson, the contractor, opened a recreation hall. On the 18th of March, 1925, Harry Lovatt, top man in the Valley, performed the opening ceremony.

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88 Jan 16 1925 Telegraph.
89 Jan 13 1925 Northern Whig.
90 Jan 16 1925 Telegraph.
91 Jan 16 1925 Telegraph.
His wife played the piano, and two of the junior engineers, Harold E. Campbell and R. H. Kirkpatrick, blacked their faces and entertained the valley folk with a few of the old American coon songs. Tommy Kirby sang “Somewhere in Sahara”

“Somewhere in Sahara,
Far across the eastern sea
Someone to me there is singing
Sweet songs of Araby...”

Tommy Kirby was in his late teens at that time. The family lived in one of the workmen’s houses on the Back Road, sometimes called the Far Valley Road, below Slievenaglogh Mountain, where the valley children romped on the heathery slopes, and rolled their eggs on Easter Day. Some nights, when the wind blew from the west, they were wakened from their sleep by foxes howling on the mountain.92

The business of constructing a reservoir required more than just clay, concrete, and steam navvies. Songs and music were also part of this process. Houses for children and a licensed canteen were part of this process. The contractors were negotiating potential issues of conflict by contributing to the social life of the valley and extending their productive influence beyond the people counted and the time measured by timekeepers every morning to evening work day. Eventually the valley would have quite an active social life and a wide variety of activities, many of which the contractors had some role in enabling. The strike (discussed above) began within a month of the entertainment hall opening and is another example of conflicts occurring that spring of 1925 as the valley built up into a community.93 The technical work of excavation also required social structure. And this had to be organized.

Entertainment on the opening night seems to note other places in the world which some of the engineers and other skilled labourers had had some experience. The world extension of the contractor brought not only machinery, plant, engineering practice, and skilled labouring professionals, but it also brought an imagination about some of the other

93 This is also a time when early disagreements between the contractors’ engineer and the Water Commissioners’ engineer about the nature of the subsoil had begun to occur (see Chapter 4 and 5).
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places in the world, an imagination attached to some experience. When Harold Campbell and R.H. Kirkpatrick played “coon” songs with blackened faces it’s likely they had some experience of the black American music (they could play it) but it seems unlikely they would have extensive knowledge about the lives and culture of black Americans. The Mourne Extension Scheme was situated within a limited but developing global economy of cultural exchanges.

In the following section, I will look at the material features and social relations that upheld the lives of labourers outside the working hours, enabling them to return daily and commit energy to the production of a reservoir.

**Watertown and the reproduction of daily life**

The houses that the Commissioners built to house some of their staff became the beginning of a small establishment. There were huts with workmen and their families along the Back Road on the west side of the valley. Just outside the Commissioner’s gates seems to have become the focus for much of the commercial life of the valley. Near this, the required recreation house was built by the red painted entrance gates just inside and to their left. Dances were held in the recreation hall at the weekends. The hall also became a picture house showing silent films several nights a week.

The picture house was lit up at night. George Hodgkinson, the valley cashier, ran the 5-reel silent movies to a piano accompaniment three nights a week. Admission was 2d for a seat on the wooden benches, and the programmes included romantic ‘oldies’ with stars like Douglas Fairbanks, Mary Pickford, Rudolf Valentino and Pola Negri. There were Charlie Chaplin farces that hissed and jerked across a screen encrusted with flickering black specks.

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94 W.H. Carson p62
95 Ibid., p62
Eventually there was a licensed canteen in the valley—the barman is said to have raised prices if lots of glasses were broken.96 There was a club for working men in which one could play darts or billiards. A boxing club put on contests at the Mourne picture house in Kilkeel.97 The pubs in Kilkeel were also an important location for the social life of people associated with the reservoir construction. A young woman named Kathleen Rooney cycled up to the valley “with two big cans of milk strapped one on each side of her bicycle.”98 These cans provided milk for some of the families living in the houses on the Back Road. The personal exchanges that are frequently remembered indicate women were prominent in the social and commercial portion of the valley community.

Many shops sprang up near the valley gates. Among the best remembered was Annie Mulvaney’s grocery shop at the valley corner beside the police barracks...

There was a cobbler who sold ‘good kip hob-nailed boots’ for 7/6d (37 ½ p)... Billy McBriar sold newspapers and cigarettes on Carginagh Road, and Willie Cousins mended punctures in his cycle shop at the foot of McConnell’s lane. Mrs. Jennie Highton was in cigarettes and minerals, but was noted mainly for her lovely garden.

“Everybody knew Jennie Highton,” says Mrs. Dan Dooley of Leestone. “She was very jolly, and talked to everybody,...”

Another lovable lady of the valley was the first wife of Jimmy Dick, the man in charge of the Water Commissioners grounds.99

The valley was described as a very friendly place— you could go into anyone else’s house. Children could play loose in the valley, although they were kept out of the works. Evelyn and Violet Nugent were sisters who lived in the valley when they were around seven years of age.

96 Ibid., p67
97 Ibid., p62
98 Ibid., p68
99 Ibid., p64
“Violet and I fished for trout at Calligan Bridge,” says Evelyn. “We used to put our hands in below the stones and lift them out, fresh and beautiful. They did taste good! And in the valley, everybody was free and easy. You just lifted the latch, and walked into the neighbours’ houses, and you were always welcome.”

Not every house visitor would have had the same experience as seven year olds but the example of affirmative social interaction here perhaps indicates the type of community where resources are available, conflict is less likely, and cultural expectations are shared to some degree, even when many of the residents were not originally from the immediate area of the Mournes. Carson’s descriptions of the valley are often through the eyes of women and children who have outlived the men who worked in the valley. Alex Lundy was a carpenter who did much of the interior work for the huts and houses on the Back Road in which the workmen and their families would live.

His daughters, Elizabeth and Sally, went up to the valley to watch their father planing the boards—

“We gathered up the long shavings and fastened them in our hair like yellow ringlets,” recalls Elizabeth, now Mrs. Sloan, of Newcastle.

The site of the construction also became for many of the working men the site of their lives. Thus to build a reservoir the concerns of daily life needed to be met. Men who came to work needed food and a place to sleep, so that, day after day, they might reproduce the labour for which they were being paid. While some men walked or otherwise travelled from nearby or further residencies others brought their families and took a house on the Back Road. Still others found weekly lodging in the area. A regular bus to Belfast enabled working men from that town to return on weekends and maintain their relations with kith and kin. Further down the valley from the gates, and the shops, there were houses of families who lived in the general vicinity, many of whom kept lodgers.

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100 W.H. Carson p66
101 Ibid., p66
Among the remembered lodging houses was one kept by Mrs. Johnny Rooney, better known by her maiden name of Sarah Ann Harrison. Hughie Rooney, the stone man from Ballyveamore, was one of her lodgers. Alice Mulvaney and Bella Newall took in many Silent Valley men. Bella’s house was favoured by the Belfast men who travelled home in a special bus from the valley every Saturday. Mrs. Jimmy Collins took in twelve men, and bedded them in one big room, and fed them for around 50/- per week. There was a separate room for meals, and a boiler house at the back where the men could dry their clothes.  

Primarily the labour of cooking seems to be done by women. In some cases (as in the above lodging house) this was a service paid for by the working men from their wages. In other cases cooking was done by women in kinship bonds with the working men—wives, sisters, and mothers. Although few women in the valley worked for wages given by the primary capital of the valley (either by the contractor or from the Water Commissioners directly), the labour of women was an important part of maintaining and reproducing the productive capacity of the workforce. In certain respects the systems arranged by the contractors acknowledged this. The contractors provided an old blue van every Friday and Saturday to take the housewives of the valley into Kilkeel for weekend shopping. The driver dropped the ladies off and picked them up again at the Kilmorey Arms Hotel. This blue van acquired the nickname “the tin Lizzie.”

One woman who was on the payroll at the valley was Dorothy Buchanan (later Mrs. Fleming of Nailsea, Bristol). She lived at the valley hospital with Nurse Anderson. She was the first woman to become a corporate member of the Institution of Civil Engineers. Presumably there were no arrangements for housing a woman engineer in the valley considered in advance. It is unlikely that it would have been considered

102 Ibid., p68
103 The work maintaining and reproducing the productive capacity of the workforce is often described as ‘reproductive labour’. See V. Spike Petersen “How (the meaning of) Gender Matters,” New Political Economy, 10/4: 499-521 (December 2005), p511.
104 W.H. Carson, p68.
105 W.H. Carson, 44.
culturally appropriate to house an unmarried woman with the other engineers. The other 'professional woman' who was on staff was the nurse. Her housing arrangements had been set at the hospital. This association of both being a 'professional woman' appears to be what linked their housing arrangements. If the contractor and Commissioners had never considered the different needs of female staff, perhaps these women organized the housing arrangements themselves. The position they were in suggested common interests and might have led to cooperation. Even if Dorothy Buchanan was a woman engaged in the productive engineering labour or reservoir construction her housing arrangements were at the hospital, a location for maintaining labourers who were injured and thus a site of secondary support to the direct production of a reservoir, a protective site for reproducing the capacity of injured labourers, a location of care-giving labour.

Conclusion

The technical plans prepared by the Commissioner's engineering staff were for a million ton earthen embankment dam with a puddle core and an appropriate cut-off trench excavated to bed rock and sealed with concrete to guarantee its water tightness. To accomplish this, an extensive network, including a full sized English gauge railway, to transport materials was envisioned. The contractor, S. Pearsons & Sons (Contracting Dept.) Ltd. was a large engineering firm with experience, capital, and a reputation throughout the British Empire. It had the political and legal experience to secure contracts and complete them. Skilled labour was recruited both locally and through the circuits in which Messrs. Pearson worked.

However a network of the purely technical dimensions is inadequate to describe what was necessary for construction work to take place. Examples such as labour disputes, arrangements for the provision of alcohol, the requirement to contribute to the social life of the valley (such as by building an entertainment hall) show that the contractors had to attend to more than just the technical requirements of the contract. Working men required food and a place to sleep as well as many other living necessities. Shopkeepers and other business persons such a cobbler and bicycle repair shop were arranged around the area because the need for their services were recognized and
compensated (by financial exchange) in the local economics of the Valley. Housing and food in some cases were also compensated by financial exchange, particularly in the case of the boarding houses in which unmarried men (or those who returned to their families on the weekend) were the main residents. Much of this social aspect of production is taken on informally and in this case much of it seems to be done by women. In the case of married women the exchange is informal. In the culture of the Mournes (and Ireland generally as well as Britain and the majority of Europe at this point in time) cooking, cleaning, and childcare were roles more frequently undertaken by women. Family life is always closely connected to production. As a term ‘production’ can be extended into the social realm. Production can be described within the materiality of the economic world. It can also be described within the materiality of the social world. The world which produces connections does not itself differentiate between them by type. These connections are only separated by our description of them as separate forms of production. Thus the economy of the valley includes financial exchanges and other forms of exchange. Entertainment, friendship, community, even a personal feeling of security, while perhaps requiring money for some aspects (purchase of admission to the picture house or the price of sharing pints in the licensed canteen), were all an important part of the economy of informal exchange in the valley. Although this economy is not measurable, and sometimes not even predictable, it played an integral part in enabling the construction of the reservoir.

I would like to identify two ways in which this social production might be organized. Firstly, it is organized in an informal and ad hoc manner by those involved in the life of the valley. For this to be successful some basic parameters are necessary such as a general availability of resources and some structures within which interaction and exchange can occur. These structures might be as ethereal as shared cultural practices (such as communication through language or economic exchange with money) or as definite as a physical building within which social production can occur. Secondly, the contractor might take responsibility for some of this task of producing and reproducing a social community as a part of constructing a reservoir, either affirmatively in its own right or negatively, as something that must be done to prevent disruption of the labourer’s
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daily work routine. The production of housing, particularly for important members of staff such as engineers and foremen, was foreseen in the original planning process. The construction of an entertainment hall seems to have been pre-empted by turbulence in the social fluid of the valley community. That such turbulence might occur is consistent with research regarding comparable labour camps. After examining evidence from industrial archaeology and historical records A.E. Rogg, et al., suggest the presence of alcoholism and tensions between ethnic groups within the labour camps that built the Arizona dams (early twentieth century).\(^\text{106}\) The absence of social facilities in the at-that-time growing Silent Valley community came to be felt by the contractors who then set out to encourage the social life through the construction of the recreation hall and eventually through provision of a licensed canteen. Once these parameters were changed by the contractor much of the informal organisation of the valley community could occur of its own accord. Beyond the construction of the entertainment hall and presenting the opening night of performance, many other activities by the contractors indicate an involvement with the less predictable aspects of the social and exchange life of the valley:

- negotiating wages and hours;\(^\text{107}\)
- managing alcohol distribution;
- provision of silent films in the entertainment hall;
- providing a weekend bus to Kilkeel, 'the Tin Lizzie', primarily to enable wives who lived in the valley to do shopping.

These are just some of the examples where the sovereignty of the contractor is engaged in the social production process for the purpose of enabling an environment in which construction will be successful. Particularly in the case of alcohol distribution we can see that some regulation (primarily negative) was already in place through local government

\(^{106}\) A.E. Rogg et al *Raising Arizona's Dams: Daily Life, Danger, and Discrimination in the Dam Construction Camps of Central Arizona 1890s-1940s* The authors are more successful at describing the presence of different ethnic groups than demonstrating discrimination.

\(^{107}\) Wages provided a flow of money for exchange of services within the Valley. The hours worked form the boundary of social productions and formal production. Changes in the boundary might be qualitative as well as quantitative. Particularly consider the volatile dispute regarding a half hour extension of the employer's workday into the employee's personal evening. The contractors confronted class conflict labour strikes from a position of interest.
and law enforcement procedures. However, the contractor was encouraged to be proactive in engaging with this issue to the extent that the large workforce required to construct the reservoir was beginning to disrupt local alcohol regulations. This is an example of how lines of local sovereignty passing through different organisations (law enforcement, contractors) but interacting cooperatively can mutually be engaged in setting the parameters within which production occurs.

Finally it is important to note that within these parameters much of the production of the type discussed here is organized informally by participants. The role of women in the production of this reservoir was most often located closer to this informal sector of exchanges of all types. Even Dorothy Buchanan, an engineer, and thus dealing with the aspects of production which can most directly be described as technical, receives her housing in a portion of the works associated with the maintenance and reproduction of the workmen, in the hospital alongside Nurse Anderson.

Much of the material upon which the analysis of this chapter is based comes from the work of W.H. Carson who’s extensive interviews during 1979 with senior members of the Mourne communities is represented in his 1981 publication *The Dam Builders: The Story of the Men who Built the Silent Valley Reservoir*. Despite being subtitled as a story of men, many of the interviews were with women from the valley and with widows surviving their husbands who worked there. Thus the relation of women to the project is clearly illustrated in W.H. Carson’s work. Some of the aspects of production that are not inscribed in the technical documents drawn up by engineers are apparent from Carson’s insightful interviews. Perhaps furthest from engineer’s diagrams is the unique perspective given in the memories of those who were children during the construction of the reservoir.

Most simply stated, the technical work of building the reservoir requires the labour of people and the associated support network for this labour. By looking at the role that women play in the Valley we receive an idea of aspects of reproductive labour that are associated with the production of the technical aspects of the Reservoir. By looking at
the social arrangements in the valley we see that the contractors had to provide for the entertainment needs of labourers. In the production of the reservoir there is no “purely” technical aspects which can be separated and made independent of the social life of the Valley.

This chapter has taken insights from actor-network and related theoretical approaches (discussed in the introductory chapter, p21) and used them to reflect on and analyse the initial construction process at the Silent Valley Reservoir. I have followed a few of the interlocking threads and in particular emphasized what role women played in the construction (and to a lesser extent some of the class relations and cultural difference between the local and arriving labour force). Interestingly Carson’s book, embedded in Mourne culture, by accident or tradition, also traces this line quite well. Although actor-networks theory conflates social and technical agency in a way that Carson’s common sense understanding of ontology is not interested in considering, Carson’s work can be used to construct an actor-networks description of the reservoir construction process. Just as there can be a critique of Carson’s presentation of life in the valley there can be a
similar critique of actor-networks descriptions of technology systems. Often the description is enabled by a particular vantage point. In Carson’s case he works through the memories of those associated with life in the valley. He does not elicit a critical sense of conflicts that were present in the construction process. He has no interest in following political and interpersonal disputes or describing how power was arranged in the valley. Similarly, an actor-network approach relies upon tracing the existing lines of power that enable what is present in the network. This approach makes it difficult to understand how in certain ways a socio-technical network is made possible by the absences, by what is not present in the network, by unseen exclusions.

108 For example investigating whether or not prostitution occurred in the Silent Valley could never be addressed from the material and the method that Carson produces. Prostitution is often connected with military bases as noted by Cynthia Enloe, *Banananas, Beaches, and Bases*, a fact which was correlated by the nineteenth century Belfast observations of Rev. W.M. O’Hanlon, *Walks among the Poor*, 5. Ex-military men were present in the Silent Valley, certainly among the engineers and managers and to a lesser extent the general workforce.

About August or September 1924 the first cut was made by the steam navvy through what is known as 'the Knoll' which is near the middle of the site of the Main Embankment. Almost immediately after the cutting was commenced it was observed that there was a tendency on the part of the material forming the sides of the cutting to slough in and run almost horizontally on to the excavated portion and it was also noted that the navvy was in difficulties as the material did not form a suitable foundation for it.¹

Already at the first moment of attempted excavation, the encounter with the subsoil was being marked as unusual. Foxes’ Knowe was a slight hill in the Silent Valley directly on the centre line of the proposed reservoir embankment. By the time excavations began whatever foxes whose presence had presumably given the little hill its name had long since left, although, as the engineers and labourers were soon to discover, perhaps their mischief had been left behind. The embankment was to be made water tight by the excavation of a trench down to the level of, and then grooved into, the bedrock of the mountain valley, which was presumed to lie 50 to 75 feet below the general surface. This trench was to be sealed with a concrete cut-off wall upon which a massive puddle clay core was to be set. This boundary was to form the all important water tight seal without which water might make its way under the embankment, eroding and eventually undoing the reservoir with disastrous consequences. Piled around the puddle clay core, earthen materials were to make up the mass of the reservoir embankment wall. Since the line of the trench passed through Foxes’ Knowe, one of the first tasks was to cut through this and the surrounding hillocks.

However, excavations began only after the initial preparations (such as a powerhouse, an infrastructure of buildings, and the transportation railroad for materials) were complete. The line of the trench was divided into 23 cross sections. It was in total 23 chains² long running east to west

¹ “Brief for S. Pearson & Son (Contracting Department) Limited”, Pearson Archive Box 7 section 4a p4.
² A chain is a unit of length in the system of Imperial measurements equivalent to 22 yards or 66 feet.
and rising up the sides of the valley. In the centre, hillocks and mounds of earth were to be levelled first before digging downwards into the earth would begin. The river diversion channel and the tunnel (under Moolieve Mountain, east side of the valley) to carry the water around the site of excavation were also an early priority. A series of extensions for the railway around to various sites of activity in the works were begun so that equipment could be moved and earthen material might be removed or placed.

This chapter will discuss some of the difficulties of the initial excavation and the eventual conflict that arose because of these. I will examine the development of an ‘unknown material’ problem, and show how conflicts in the production of knowledge about an unknown material can illustrate the social and technical forces involved in the production of supposedly neutral knowledge. Competing accounts of scientific and geological facts can be aligned to particular political agendas. The following chapter (chapter 5) will continue the examination of the unknown material problem by showing how it is resolved within a legal framework. The legal issue of liability ultimately comes to dominate the knowledge production process until the entire problem can only be resolved by recourse to higher legal authority.

Soon after beginning excavation along the line of the concrete cut-off trench the unusual properties of the sub-soil and then the uncertainty of depth became an issue of concern for those involved in the construction. Water below the surface of the ground gave the sub-soil fluid properties while the presence of large granite boulders also made excavation difficult. The depth of bedrock (within which the cut-off trench was to be grounded) was uncertain but gradually it became clear that it was considerably below what was expected and below what the engineering design plans had suggested.

The contractor and the Water Commissioners disputed who was responsible for resolving the dilemma. Sir Ernest Moir, engineer for the contractor, maintained that the design in the contract specified a timber-lined excavation trench which would not be possible with such fluid material. Therefore the burden and expense of a solution was with the water commissioners. The Water Commissioner’s engineer, Mr. F.W. McCullough maintained that the contractors had agreed to construct a reservoir by whatever means necessary and that therefore the burden and expense of a solution lay with Messrs. Pearson. “Without prejudice” negotiations eventually broke down and the contractor sought arbitration as per the conflict resolution clause in the contract. Knowledge of the sub-soil material in the valley became a matter of importance for the legal resolution of the conflict.
Chapter 4: Geological Foundations

If the material could be dewatered then trench excavation utilizing timber supports was plausible, the design was not defective, and the responsibility and expense was the contractors. If the material was not able to be dewatered then excavation was not possible as specified in the contract and thus the Water Commissioners would bear the responsibility. Under such circumstances the engineers for the respective parties disputed the properties of the sub-soil. This chapter will examine how engineering knowledge of the sub-soil was constructed under circumstances in which the intended uses of that knowledge were different and conflicting.

Much of this chapter relies upon material prepared for the legal case which describes the first encounter with the sub-soil. But for the legal conflict, the interaction between engineers and this glacial morainic material with unusual properties would not have been preserved in the public record. For the historian of technology there are two methodological notes to make. Firstly, legal conflict records details of social and technical practices which might otherwise not be available. Secondly, some caution might be taken in interpreting these details. To some extent the assembled account is already a re-interpretation of the events in the light of a particular purpose, legal success.

After the First Sod

At the initial encounter with the sub-soil a steam navvy floundered. "there was a tendency on the part of the material forming the sides of the cutting to slough in and run almost horizontally on to the excavated portion..."³ By the time the legal brief is written this curious material has been assessed and many of the problems it presents are framed in its association with water.

Observation was kept on the material and it was noticed that it was very fine and apparently water-logged. It was also noticed that the apparently dry surface of the material, after it had been exposed for some weeks to the air, would become just like jelly when patted. This fact indicated that the material was one from which water could not readily be disassociated.⁴

In this description we see that the material and the water are being deemed separate even though they are not initially encountered in a separate manner (except at the very surface where the soil is exposed to air). Why not say the material is fluid, that water is intrinsic to it? In civil engineering material and water are assumed to be disassociable. Because excavations are more difficult when

³ "Brief for S. Pearson & Son (Contracting Department) Ltd.,” Pearson Collection, Box 7 section 4a (hereafter cited as “Brief”)
the material to be removed is fluid, there is a history of wanting to separate water from soil and thus also a history of wanting to categorize water and soil separately. Civil engineering defines a material in relation to its uses of the material.

The legal brief goes on to inform readers that,

Sir Ernest Moir was the Director of Pearsons in charge of the Contract and his experience in connection with matters of this kind is practically unrivalled.

Sir Ernest Moir came to the conclusion that the nature of the sub-soil on the line of the trench should be definitely ascertained.5

After collecting in Moir a validating sense of his expertise, the brief uses the word 'nature' for the first time. This word will later become a larger part of the rhetorical aspects of the legal case. The nature of the sub-soil was to be “definitely ascertained.”

The word ‘ascertain’ is a transitive verb with its first meaning being “to determine or discover definitely.” The archaic meaning of the word (coming from the 15th Century old French word ‘acertener’) is “to make certain”.6 The adverb in the phrase ‘definitely ascertained' is arguably redundant. This redundancy indicates the uneasiness with which uncertainty was being received. Action was to be taken to find certainty. If we consider the archaic meaning of the word an even greater sense of action is conveyed. Certainty was to be made, constructed. If archaic meanings of a word linger within the connotations of present meanings and if connotations influence diction (choice of words), then the archaic use of the word ‘ascertain,’ with the much more active sense of “making certainty,” perhaps influences the authors’ choice of words. We can see here words being arranged to facilitate engineering purposes.

In the sentence considered, the grammatical object of the transitive verb 'to ascertain' is 'nature,' the nature of the sub-soil. It is the nature of the sub-soil which is to be definitely ascertained.

Sir Ernest Moir identifies the important task as making or determining certainty about the nature of the subsoil. The legal brief attributes the sinking of the sump to this investigation.

He therefore decided that he would sink near Cross Section 16 (marked on contract drawing No. 14) a timbered Sump sufficiently wide to enable pumping to be carried on at both sides on the lines of the Trench. [sic] 7

This location CS16 was perhaps chosen because of the depth of excavation required here. The contract drawings predicting the depth of the trench indicate this location as being the expected lowest point of bedrock that was not directly over where the Kilkeel River crossed the trench. For practical purposes it was the deepest easily investigable point.

The connection between bedrock depth and the watery nature of sub-soil, although not articulated, is clearly an engineering concern from the beginning. If the uncertain (potentially fluid) nature of the material makes excavating difficult, then this difficulty will be the greatest challenge at the deepest locations of the trench. So the nature of the material was to be determined at that location (rather than on the knoll where the excavation first encountered the sub-soil problem).

The construction of the sump at CS16 was begun in October of 1924. The legal brief records this initial investigation as not very successful.

The first few feet of the excavation were relatively easy. Then a series of runners or vertical timbers were pitched in the usual way all round and the bottom of these were driven and kept well below the surface of the excavation as it was taken out. After the first few feet had been sunk, however, as quickly as the excavation was taken out, other material, rising from below, filled up the excavated space. The result was that a space was formed all round and behind the timbers from whence the incoming material had come and a general collapse nearly took place. The material was of exceptional fineness charged with water and would not give it up, i.e. the material came with the water when pumped and it could not be prevented from so doing because the material would not drain. 8

Again material is defined separately from water.

A further attempt to separate the material was then made by driving 4 in. pitch pine sheeting

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7 “Brief,” p4
8 “Brief,” p4-5.
piles around the side of the Sump to an approximate level of 398 O.D.\textsuperscript{9} It was hoped that this would help stabilise the material by reason of the piles reaching better material. The result was otherwise as the material continued to flow under the points of the sheeting piles. The material rose as it was excavated although the piles were driven 8 ft. lower than the excavated level. It was thus indicated that the material was practically fluid. It will be seen from Plan B.W. 170 that the timbering of the Sump subsided several feet and became unsafe.\textsuperscript{10}

\textbf{TIMBER-LINED DRAINAGE SUMPS BEFORE AND AFTER COLLAPSE}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure41.png}
\caption{Drainage Sump}
\end{figure}

Here the material is described as "practically fluid". Whether the material is separate from water or whether the material is continuous with water is less clear in this way of describing it. The material is defined differently at different moments in the process of ascertaining its nature. Is it a fluid or is it a solid but "one from which water could not readily be disassociated"? 

This grammatical inconsistency points to the difficulty of "ascertaining" the material. The

\textsuperscript{9} Ordinance datum is a measurement of distance from sea level. Measurements are made be surveying relative to a fixed point established during the Irish Ordinance Survey.

\textsuperscript{10} "Brief," p5.
nature of the material is being defined in relation to the actions that the engineers perform with it in order to know its properties. The nature of the material will be known through action. The knowledge gained will better enable the material to be worked in ways that accomplish the goals of the engineers and those that the engineers work with. In the field of engineering, knowledge might be said to be an arrangement of the facts\(^{11}\) in order to accomplish some particular purpose. As we will see below, the legally important knowledge of the sub-soil came to be disputed. Because the Water Commissioners and the contractor had two slightly different purposes in knowing the material they began to have competing understandings of what should be taken as the true nature of the sub-soil. The problem becomes more complicated if we also consider engineering knowledge to be active rather than passive: that is to say, knowledge of the material can only be acquired by working with the material and thus changing it in some way. Knowledge of the material in the context of two different purposes might discover two different materials, their properties aligned to the way in which they had been worked.

The actions that engineers perform with material in order to know, ascertain, or discover its properties can be said to be an enactment or a performance of the material. The sense of the word perform used here is not theatrical (with a stage and a back stage). Rather, the meaning is to perform as in to perform an action.\(^{12}\) Enactment similarly is not conceived as having an audience.

Action upon material can select its properties. This is not to imply that engineers can do anything

\(^{11}\) To carry this argument further, even facts are an arrangement of data. The data is an arrangement of noise versus signal. For an overview of post-empiricism see Rouse, p9. For an example from contemporary astronomy see Barry, pp116-120

\(^{12}\) Enactment and performative actions (particularly in relation to Austin’s performative grammar) were discussed in chapter 1, p25.
with matter. The matter itself is also part of the action, thus matter enacts itself in line with the forces and interactions that also act upon it.

When Sir Ernest Moir discusses ascertaining the nature of the sub-soil he places nature at the point of engineering action and interaction. This is consistent with the approach of some recent history and sociology of science which sometimes makes no distinction between nature and the scientific representation of nature. Some have dismissed the idea of nature as merely a rhetorical feature of (political) discourse. Still other writers have emphasized a more substantial idea of nature without losing sight of the rhetorical aspects of its use.

Constraining the Material

During these attempts to excavate the material a particular trajectory of increasingly stronger containment procedures developed. 4 inch pitch pine sheeting was driven into the earth in an attempt to uphold the sides of the sump. When that proved insufficient a metal cylinder was used. As the fluid material failed to maintain shape consistency the response was to gradually strengthen from timber struts to pitch pine sheeting and then to metal. The knowledge of the material developed during early attempts to excavate suggested later development of technology which could successfully constrain the material, enabling drainage and excavation of the sub-soil. This is discussed more in chapter 7.

At the beginning of February 1925 the timber which had already been inserted in the Sump was re-arranged and made safe and steel piles forming a circular shaft 9 ft. in diameter were driven within the line of the Trench and approximately in the middle of the Sump by means of a steam pile hammer. While these piles were being driven they struck boulders of more or less large size which had to be removed by grabbing or splitting. The steel piles were driven as far as possible and were greatly distorted in so doing owing to the presence of boulders. This showed that timber piles could not have been used for the purpose.

There is a legal significance to the final sentence regarding timber piles being unsuitable for the purpose of lining the trench. Timber lining during the excavation of a trench would be standard

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16 "Brief" p5.
practice for most civil engineering applications but in this case, rather than simply indicating that the trench should be made safe, the contract plans specifically state a timber lining will be used to uphold the stability of the excavation. As the exploration of increasingly greater methods of constraint developed past what was given in the contract this meant that this particular detail of the contract might be relevant in attributing responsibility for the difficulty of construction. Although the legal significance may not have been immediately apparent at the time, it has retrospectively been written into the legal brief for presentation during arbitration hearings at this point in the narrative. This history of events was assembled by the contractors’ legal team.

What was beneath the surface had extremely troublesome properties. It was both fluid such that it flowed into the excavation and made the works unstable and unsafe, and it was also solid at certain moments, such that it could make steel piles buckle when being driven into it. Even when the steel cylinder was driven, the excavation of the material was still not successful.

When the steel piles had been driven, attempts were again made to excavate inside them. These attempts failed because the material continued to rise up the shaft formed by the steel piles. In fact the material rose up some 5 or 6 feet. While excavating it was necessary to attach ropes to the men in readiness to pull them out in case of danger. Efforts were continued to excavate until the 29th of August 1925 when such efforts were abandoned with the concurrence of Mr. McCullough the commissioners’ Engineer.17

This material which had both fluid and solid properties was ambiguous enough that the men excavating had to be harnessed with a rope so that they could be pulled up and out of the excavation quickly if the ambiguity should suddenly prove dangerous. Engineers and workmen were confronting a dangerous ambiguity with their bodies and with what tools they had, even tools as simple as rope. There was an uncertainty in the nature of the sub-soil which in some ways could threaten the humans who had to interact with it. However, the immediate danger to labourers was about to become a larger issue of risk to the employers.18 The difficult sub-soil was set atop a morain of unknown depth, which meant that the sub-soil was potentially an even greater problem than at first imagined.

17 “Brief,” p5.
18 Risk discourse separates ‘risk’ from ‘danger’. Historically risk was an issue of insurance calculation (the risk to a major merchant of loosing one of his ships at sea) whereas danger was more immediate (the danger to sailors of being drowned at sea).
Chapter 4: Geological Foundations

Mapping the Depth

In February 1925 the Engineer McCullough had written to the contractors’ engineers providing the details of all the borings that had been made including the original 1893 borings further north in the valley. These borings indicated a depth of 150 feet or more to be excavated. With the results of borings from three separate lines the contractor attempted to put together all the information that they now had on the depth of the valley’s elusive bedrock.

Sir Ernest then had particulars of the three lines of borings plotted on Plan B.W.168. On the left hand side of the Plan are shown the principal contours of the Hard shown by joining up the three sites of the borings made by the Commissioners as shewn by such particulars and the Contract Plans. It will be seen that all these contours are regular excepting Contour “400” which shows a distinct bulge in an easterly direction. If Mr. McCullough had considered the borings in a similar manner he would have observed this bulge and presumably would have made further borings on the line of the Trench to ascertain whether this bulge in fact existed and he would have found that it did not exist.

There is some figurative abbreviation written here. Sir Ernest and the Commissioners are the representatives of a network of institutional activities (especially the Commissioners, none of whom had been Commissioners in 1893 and would not have done the borings themselves in any case). With the benefit of retrospect the contractor arranged all of this data into a particular representation (a contour map), and then suggested that one part of it is worthy of further examination. In the legal brief this is made out to be an oversight on the part of McCullough.

The arrival of this information from McCullough seems to have been something of a surprise.

The commissioners therefore, in the Contract Plans, disclosed the Borings which in Clause 10 of the Specification are stated to be probably wrong and did not disclose the borings on the 1893 line which were correct.

It should be stated that it has been ascertained that when tendering for the Contract, Pearsons were informed of the boring on the 1893 Parliamentary Plan disclosed in the letter of 10th February 1925 as having gone down to a depth of 157 feet. None of the other borings

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were, however disclosed at the time of tendering.\textsuperscript{21}

Despite the difficulties with excavating a sump nearer the centre of the Trench, the contractor began on April 23\textsuperscript{rd} of 1925 to excavate the trench from closer to its West end, beginning at C.S. 7 and working in both directions, westwards up the side of the valley, and eastwards back down into the centre of the valley. Westwards excavation was not problematic.

The result of the excavation eastwards from C.S.7 was very different as the sub-soil was found to consist of the same material as that found in the Main Sump before described. When the excavation had reached 6 ft. east of C.S.10 an inrush or "blow" of the material occurred and the excavation was stopped.

It was further found that the rock or Hard to the eastward of C.S.7 dipped to an unknown extent below the level of the 'approximate top level of Hard taken as rock' shown on Contract Drawing 14. Bars were driven and borings were made by Pearsons in 1925 at various places and the results of these are shown...\textsuperscript{22}

A barrier was erected to uphold the excavation from the west. No further eastward progress of the trench would occur here in 1925. The contractors were now concerned to measure the depth of the earth.

The contractors constructed a diagram of their results. This document has an affixed label (discussed below) as well as the original title written on the page as "B.W.169 Record of Borings & Prickings made by SP+S in 1925".\textsuperscript{23} The diagram shows a cross section of the main trench indicating the exposed surface of rock trailing down into the valley from the first cross section in the west to CS7 where the rock enters the earth. Beyond this are shown borings and prickings in the main trench from CS7 eastwards (towards the uncertain and deeper centre but only as far as CS 10). To these lines and points of data are added a pair of coloured lines (projections). The "top of

\textsuperscript{21} "Brief," p6. It is a considerable leap for the contractors to say that these earlier borings were correct but on the basis of the information that the contractor has by 1926 (when the legal brief is being prepared) they seem more leading than misleading. There is some question of what information was given to the contractors and when. The contractors note that they actually have received all this information previously and thus there is no legally relevant point regarding withheld information. Presumably there is nothing duplicitous about the parsing of the information by the Commissioners' engineer. However, it arrived in a way that did not reveal all the information at once. The potential concerns that might have been raised by markedly different data about the depth of the valley were never raised at the point of negotiating a contract price. The legal brief states that the information presented all together suggests a bulge in the contours of the bedrock, and thus further investigations would have been necessary.

\textsuperscript{22} "Brief," p5.

\textsuperscript{23} "B.W.169 Record of Borings & Prickings made by SP+S in 1925" Pearson Archive Box 7 section 4c.

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A steeper line in yellow, which is a "prolongation of line joining surface of Rock as shown in Trial Pits C and D," runs alongside the exposed surface of rock until CS7. Trial Pits C and D were two early pits dug down to the rock at the upper west end of the valley. The yellow line is a projection of the depth of rock estimated linearly from the rate of decline derived from the trial pits. The exposed surface of rock (shown in green) seems slightly to follow the yellow line projection until C.S.7, where it enters the earth more steeply. This entrance is described with a dotted green line and the words "Rotten Rock." Here the line of the rock seems to become steeper, dipping below the yellow projection. Indeed the borings and prickings ahead seem to confirm a steepening curve of depth to bedrock. The linear sequence of investigations in the earth is marked with dates. In September, "Bar driven to here 26-9-25 stopped on Hard" at 394 O.D. and further along "Bar to here still in soft 30-9-25" at 398 O.D. Very near that is "Borehole to here stopped apparently by small boulders 12-10-25". Still further eastward are several drillings "Borehole to here 17-10-25 stopped apparently by boulder" 388 O.D. At the same location "Bar to here stopped on Hard 21-10-25." The yellow line projection (of the depth of rock estimated linearly from its rate of decline higher up in the valley) ends near CS10 where a borehole is diagrammed with various dates at various depths such as "28-10-25 still driving." These depths are below the yellow projection indicating (if they are correct) a steepening decline. The most recent date reaches the greater depth of 372 O.D. on "23-10-25". Until CS7 the Rock had been entirely exposed and discovered at a higher level than the contract drawings suggest. But after that it seemed that the import line of hard rock might be disappearing steeply into the earth. The contractor was ready to be concerned about this. The difficulty of working with the ambiguous sub-soil must have seemed multiplied by the possibility of an unknown depth to which excavations would need to be made. This greater possibility of risk meant the contractors and subsequently the Water Commissioners began to consider all of the facts not just in light of normal engineering purposes. The facts were also being considered in the light of possible liability. The possibility of disagreement in attributing responsibility (for risk) could mean resolution by the sovereignty of the legal process. In such a situation, normal26 engineering purposes began to change. Legal considerations began to alter them. This intrusion of sovereignty was about to disrupt the small amount of coherency that assembling engineering knowledge had under the difficult circumstances.

24 "B.W.169.".
25 "B.W.169."
26 'Normal' here can simply mean previous or it can be taken as 'normal' in relation to post-normal. For the discourse of 'post-normal' science. Jerry Ravetz, "Uncertainty, Complexity and Post-Normal Science" Environmental Toxicology and Chemistry 13/12:1881-1885, (1994)
In addition to the original title of the diagram, document B.W.169 has a sticky label attached to it so that it might be displayed during the arbitration hearings. The sticky label is pre-printed with designs made of lines framing the space for writing a title upon it and thus giving it a more presentational appearance. On this label is carefully written “Borings and prickings made by Messrs Pearsons prior to Notice of Arbitration. (November 1925).” This double labelling indicates the use of the diagram in separate ways. It is first part of the engineering practices of assembling data and projecting or determining depth. Secondly the diagram is being lifted into the legal discourse as a set of technical facts or a representation of what is below the surface and what is reasonable to assume at a particular point in time. The contractors’ legal team (presumably Horace Davey, chief counsel for Pearsons) places this label on the diagram so that it will indicate that this information was determined by the contractor prior to filing any grievance. Even if the facts are the same, the significance attributed to particular facts and how they are assembled into a statement can be different. The purpose for which facts are used may vary with different engineering or legal contexts.

Knowledge and Legal Conflict

The negotiations in 1925 were happening outside the public eye. No remarks on any difficulties occurred in the newspapers. The legal brief says,

On the 26th June 1925 Sir Ernest had an interview with Mr McCullough on the site of the...
Works and discussed the question of the sub-soil, the depth of the Hard and the method of making the Trench. Sir Ernest expressed the view that the Trench could not be constructed in the manner specified owing to the nature of the sub-soil and the depth of the Hard. Nothing was decided at the meeting.

On the 28th of September 1925 Sir Ernest again met Mr McCullough on the site and the same matters were discussed. Sir Ernest maintained definitely that a drastic change in design was necessary but Mr McCullough stated that the responsibility was Pearsons and that they must construct the Trench somehow or other.27

During this long period of time between June and September the investigations to ascertain the nature of the sub-soil and the depth to bedrock at the valley centre had found no easy answers. Sir Ernest Moir felt it necessary to travel from London a second time to take up a personal interview with the Commissioners’ engineer. He returned to London and a response was forthcoming. On the 8th of October Pearsons wrote a letter to follow up on the meetings, contending that

the design of the timber Trench was unsuitable and dangerous to the workmen. They [Pearsons] referred to what had happened in connection with the sinking of the Sump and also to the fact that a drain in the Dam founded on the material discovered in the sub-soil had already sunk to a considerable extent.28

In this letter Pearsons also specified clauses in the contract and specification which made the Commissioners responsible. It is explicitly clear that by this point the phrasing of the contract in relation to conflict resolution is being considered (probably the legal framework was being considered implicitly before this point in time). If the additional and unforeseen difficulties of the excavation are to be dealt with (and it is not yet clear that this is even possible) then someone must take responsibility for an additional expenditure of resources and effort to make this happen. The issue is no longer the merely technical details of how the excavation can be made to happen. McCullough and Sir Ernest are beginning to contest who should be providing the resources to make up for the gap in expectation. By emphasizing deficiency of design the contractors hope to place the responsibility on the Commissioners, utilizing a clause in the contract that makes the contractor not liable or responsible for insufficient and unsuitable design of any portion of the intended works. This clause and other legal details relating to the arbitration will be discussed in Chapter 5.

27 "Brief," p6-7.
As early as this letter in October 1925 a collapsed drain (referred to above) was being mobilized as evidence to make a case for a change in the plans. The contractors were claiming that the design of the reservoir provided by the Commissioners’ engineer is insufficient to deal with the nature of the sub-soil. The collapsed drain is an indication of the nature of the sub-soil. By the time the arbitration hearing was to happen this collapsed drain was yet another piece of evidence to bring to bear upon the Water Commissioners. Considerable information, photographs, diagrams of the collapsed drain, and other evidence was now being assembled (ultimately for the arbitration hearings) because it indicated what the contractors were suggesting, that the plans were not suitable, mainly because of the unexpected qualities of the sub-soil. McCullough's reply on October 23rd (1925) contended the design was for a permanent concrete trench and not a temporary timber trench; the responsibility was with the contractors.

The contractors replied by letter on the 31st of October that the matter would need to be dealt with as provided for in the arbitration clause of the contract (clause 49). On the 7th of November, McCullough replied that he did not agree. The contractors responded quite quickly (10th of November) that further exploration needed to be made of the bottom of the Trench by drilling bore holes. Again on the 13th Pearsons wrote to Mr. McCullough reminding him of the most recent borings at CS9 had reached 359 OD and only stopped because of large gravel stones in the tube. Finally on the 25th of November, after almost two more weeks, Pearsons served the notice of arbitration. According to the legal brief, McCullough then wrote that the Commissioners were under no liability to put down any further trial holes or borings and that it was a matter for Pearsons to do this within approved limits as they had undertaken to sink the Main Trench through either hard or soft materials to whatever widths and depths might be found necessary and he referred to Clause 148 of the Specification.29

Other aspects of dispute were becoming clear in December of 1925. Pearsons began taking water temperatures in both the Kilkeel River near the flood stanks30 and at the site of the excavation. This data was recorded for purpose of comparison because it had been suggested that

29 "Brief," p7. The legal brief places the date of Pearsons’ reply to this letter prior to the date of the letter replied to. Although the exact sequence of dates is unclear, it seems that what had been one strand of communication regarding technical issues (with legal undertones) has now become two strands, the second clearly emphasizing the legal issues. The contractors are now writing to both the Commissioners’ engineer and to the Commissioners directly.

30 Flood stanks are embankments designed to hold back water.
the river had not been properly diverted and thus water was flowing underground into the site of the excavation making the sub-soil difficult to drain. If this were the case then the contractors would be made responsible for the watery sub-soil because it could be said they failed to successfully divert the river as specified in the contract. The choice to collect data is here a defensive action in the building dispute. To push our explanation of engineering knowledge further, not only is knowledge the arrangement of facts to suit a particular purpose, but the data from which facts are constituted may in some cases be collected with regard to the purpose and context of the engineering project.

The contractors also gave a second notice of arbitration on the 8th December 1925. This regarded a dispute that had been gathering during 1925. Masonry work including granite ashlar dressing, random rubble masonry, and class III pitching were all described in the contract for various features of the reservoir and surrounding works. The workmanship and materials were to be reviewed and approved by the engineer, however, Mr. McCullough was refusing to approve much of the workmanship, demanding improvements that the contractors felt were costly. All ashlar work according to clause 63 of the contract was to have "all the exposed surfaces truly wrought and finished with 1\frac{1}{2}" chisel draft all round and the intervening spaces punched and tooled to a fine and smooth surface back to the level of the chisel draft." It was Pearsons' expectation that "the fineness of the dressing of the ashlar work was to be governed by its position in the Works." Pearson contended that "exposed face" meant the face of the stonework that would remain when the reservoir was complete and did not include those ashlar works which would eventually be covered with cement or other materials. The legal brief also notes that the finest dressing is done by bush axing rather than with a chisel draft.

Pearsons were unable for a long time to find what dressing Mr. McCullough required until finally Mr. Lovatt of Pearsons on the 14th of December 1925 submitted a sample of dressing to Mr. McCullough. Mr. McCullough for the first time expressed his approval of any Ashlar whatever and said he would be satisfied with dressing of the nature shewn to him. Mr. Lovatt will say that this dressing was produced by axing.

The timing of this event just after the second notice of arbitration indicates legal motive on the part of the contractor to gain an advantage in the dispute.

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31 "WAT/1 Contract A," these terms represent different grades of stonework outlined in the specification.
32 Ashlar is stone cut smoothly (or 'dressed') into blocks and laid in regular courses, separated by only the thinnest of joints.
33 "Brief", p25. See also clause 63 of "Contract A"
34 "Brief," p25.
of the contractors. Similar disputes arose in connection with the random rubble masonry category of stonework in which small stones called “snecks” were usually placed in the wall alongside the larger stones in order “to prevent the joints or beds of adjoining stones running in a continuous line.”

Mr. McCullough has ruled that the snecks are not to be of less than 6” in thickness. The result is that owing to the limitations of the sizes of the stones specified in Clause 66, namely, from “9 to 15 inches depth of face” the work cannot be carried out unless some of the snecks are of less than 6” in thickness or unless the stones are coursed.”

However coursed rubble masonry was a different category. Random Rubble Masonry on the Commissioners’ buildings in the valley which predated the contractors’ arrival, such as the Valve Chamber and the offices, did not have limitations on the number and size of snecks. Class III Pitching was to be used for the river diversion channel which was to be buried upon completion of the reservoir. Mr. McCullough refused to approve work in which the stones did not significantly touch one another for much of their length. This, Pearsons contended, required the stones to be worked using the plug and feather method to cut their rounded edges. Again the claim by the contractor is that this quality of work is not specified in the contract so Mr. McCullough is actually asking for more than the contract requires. For the arbitration Pearsons produced photographs of stonework that had been rejected by McCullough and stonework that had finally been accepted. To these pictures they compared pictures of the stonework already existing in the valley such as on the Commissioners offices or on the valve house. Comparatively, this stonework pre-dating the arrival of the contractor was not done to the standard that Mr. McCullough was now demanding.

37 The plug and feather method is a craft knowledge means of splitting granite by the grain.
There are several possible explanations for these disputes. Mr. McCullough’s interpretation of the contract seems consistently to push the boundaries of what the contract requires without being definitely outside of the requirements. As an experienced engineer he may know exactly how to place his demands at the boundaries of workmanship grades. Perhaps McCullough wants to establish in the contractors manner a habit of or precedent for high quality work. At the same time as these masonry workmanship issues are arising, the concerns about excavating the trench are also arising. Perhaps he is using this dispute to put pressure on the contractors. Perhaps in their legal brief the contractors emphasize these demands made by Mr. McCullough because they hope to make the engineer seem unreasonable during the arbitration hearings, showing him in a manner that frames him as petty or absurd, for example, the demand for perfectly formed, carefully crafted masonry that will be buried under the ground. The visible places that were to be walked through and inspected were to be finely done. This seems clear to everyone. But Mr. McCullough may have a particular logic to the aesthetics of the masonry work which does not relate directly to the vision of visitors. Perhaps also there is a local labour issue here. The masons, as skilled labour, are in a position to demand good wages for their work and spent a portion of the spring of 1925 on strike (as discussed in Chapter 3, p125). Regardless of what particular explanation accounts for the
conflict, it is clear that both McCullough and the contractors were increasingly concerned about words in the contract and activities in the Silent Valley intended to represent these words. Legal sovereignty was becoming more important.

On the 21st of December Pearsons wrote directly to the Commissioners a letter marked “without prejudice” a legal term indicating communications which occur between disputing parties outside of the parameters of a legal dispute. They explained the events which had happened and gave their views “arising from such events, which views had been endorsed by Pearsons' experts whom they had called in to view the site.” A meeting was arranged in Belfast for January 1926. At the January meeting, Sir Ernest presented all that had happened directly to the Commissioners and their Secretary Mr. Quinn. They received the information but did not comment at that time. Shortly after that Mr. Quinn travelled to London to talk with Sir Ernest Moir. He took careful notes of their conversation, including 6 paragraphs entitled “Summary of Experts Opinions and Advice.” It remained for the Commissioners to acquire expert opinion that could be utilized to verify or refute the contractors’ claims in a like manner. Although knowledge of the reservoir was to be in common, the purpose which that knowledge was to support was in dispute. The Commissioners felt obliged to protect their interests by collecting their own data. Because of the threat of sovereignty through legal imposition, the engineering knowledge was splitting. The contractors’ and Commissioners’ presentations of knowledge had to compete with each one another in order to establish which one would be legally legitimate.

Questions Asked Away from the Valley

In the February elections of 1926 five Water Commissioners were up for re-election. There were four uncontested seats and one contested seat in the Woodvale area. That contesting individual rescinded his candidacy and was thanked in the newspapers for the manly way that he came forward and withdrew. In the Irish News there was a letter to the editor regarding the election process and “the present underhand methods of acquiring seats on this important board.”

Other conflicts on the Water Board around this time may indicate some of the tension around the response to the Silent Valley difficulties. After the elections it was customary to

38 “Brief,” p8. The five engineers that Pearsons had called in to advise them were “Mr. W.A. Tait, Mr. H.P. Hill, Sir Alexander Gibb, his partner Mr. Ferguson, together with Mr. Robert Brodie of Nott Brodie & Co., Civil Engineering Contractors and Mr J.L. Brydon of Messrs. MacAlpine & Sons Ltd.”
39 Feb 25 1926 Telegraph.
40 Feb 24 1926 Irish News.
reorganise the committees. McAlevey, a nationalist, had been the deputy chairman of the Finance Committee. He had some expectation that since the previous chair was being replaced and there was an occasional convention to promote the deputy chair, that he would take this seat. However he was not made chairman of the important Finance Committee. Instead the strongly unionist fiscal renegade Mr. David Adams, who had spoken and voted against the Board’s majority opinion on rates increases, was made chair. McAlevey accused the other Commissioners of “coddling” him. He felt that the Water Board was “keeping Catholics from taking part in administration”.\(^41\) The Irish News suggested there was a ban on Catholics at the Water Board.\(^42\) McAlevey resigned.

By this time the very quiet conflict in the Silent Valley was beginning to be whispered about in Belfast. At the end of March in the Northern Ireland Parliament Mr. Thomas Henderson M.P. asked questions regarding the Silent Valley. The work at the Silent Valley had virtually stopped, he claimed. No foundations could be found. Millions had been spent on a “wild cat scheme.”\(^43\) The Water Commissioners denied this: “There is no ground whatsoever for the statement made by Mr. Thomas Henderson.”\(^44\) Their statement issued by their secretary, Mr. Quinn, was apparently not intended to be a pun.

Hendersen was a founding member of the Ulster Unionist Labour Association\(^45\) but despite such credentials (or perhaps because of them) he did not receive support from the Unionist establishment. He had been elected to the city council in 1923 as an Independent Unionist and his vocal opposition to the Unionist government on behalf of working-class interests had made him a concern for the establishment who tried to associate him with nationalism because he often voted with them. Hendersen however claimed to be supportive of the government on the issue of the border. He opposed any land concessions to the Irish Free State. In 1925 he had become a Member of Parliament for North Belfast. He was for many years after that a city alderman elected from the Shankill district of Belfast.

The newspapers of Belfast, always ready to be suspicious, were now alert to the possibility that the Water Commissioners were withholding information, concealing a potential scandal. At this time the Water Commissioners were given quite visible support by the Northern Government.

\(^41\) 25 March 1926 Telegraph.
\(^42\) 26 March 1926 Irish News.
\(^43\) 30 March 1926 Telegraph.
\(^44\) Mar 31 1926 News-letter.
\(^45\) Bew, Gibbon, and Patterson, The State in Northern Ireland 1921-72, p46.
The Prime Minister accepted an invitation to attend the annual dinner of the Water Board. In his speech he credited their work which he thought "was almost the Silent Service of Ulster."\(^{46}\) The Irish News wrote to its primarily nationalist readership that these were "extravagant statements." Ratepayers' money was being poured into a pool.\(^{47}\)

The prior resignation of nationalist Water Commissioner McAlevey, left an opening on the Water Board. Gerald Kennedy was chosen to replace him and filled his position as Deputy Chairman of the Finance Committee.\(^{48}\)

**Information Conflict**

On April 10\(^{th}\), two and a half months after Sir Ernest Moir's initial presentation to the Commissioners, the Secretary, Mr. Quinn, had sent their reply. The letter explained that the Commissioners' experts could not harmonise their opinion with Pearsons' experts. The letter went on to suggest a further meeting "without prejudice". Pearsons requested a summary of the Commissioners experts which they received in 6 paragraphs. A meeting between the two sets of Experts was arranged for the 30\(^{th}\) of April 1926.

At this meeting it appeared quite clear that the only point of agreement between the parties was that the timbering of the Trench had been carried out satisfactorily by Pearsons. On the question of sinking the Trench it would appear that both sides agreed that the Trench could not be sunk in accordance with the Contract design if the sub-soil could not be dewatered and it was on the question of dewatering that the two sides differed.

The proposal apparently put forward by Mr Lapworth, one of the Commissioners' Experts, was that the sub-soil could properly be drained if a large number of sumps were sunk along the line of the Trench. Pearsons' Experts did not agree that this proposal would effect the object desired but unfortunately it would appear that one or two of them were rather inclined to accept the proposal that sumps should be sunk, not because they thought the drainage would be effective but rather to satisfy the Commissioners' Experts that the dewatering could not be done.

All the experts were agreed that further borings should be made in order to ascertain the exact position of the rock.

The above meeting was 'without prejudice' and nothing transpiring thereat can be

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\(^{46}\) Apr 22 1926 *Irish News, Telegraph, Northern Whig, News-letter.*

\(^{47}\) Apr 22 1926 *Irish News.*

\(^{48}\) Apr 23 1926 *News-letter.*
Chapter 4: Geological Foundations

referred to at the Arbitration but the notes shew what was passing in the minds of the various Experts.49

At the meeting of the experts the point of cleavage became the ability to separate water from the sub-soil so that it might then be possible to excavate a trench. If the sub-soil could be dewatered, then the design specified in the contract, a timber-lined excavation trench, would be possible. If it could not, then the design was unsuitable for its purpose and the burden and expense of a solution would lie with the Water Commissioners. The phrase above that starts with the word ‘unfortunately’ shows the distinction between the construction of a legal knowledge for resolving liability and the construction of an engineering knowledge for excavating the trench. The engineering attitude was inclined to be experimental, whereas the legal perspective would have liked to more clearly demonstrate and resolve liability. The continuing desire to build a reservoir flowed into the uncertainty of whether or not the sub-soil could be dewatered. From the perspective of Pearsons’ legal team this was unfortunate.

During this entire period of time the status of Mr. McCullough is uncertain to Pearsons. But after the Commissioners’ experts have met with Pearsons’ experts and verified the position of the Commissioners, Mr. McCullough begins again to communicate. This extended period of silence on his part may have seemed like his removal by the Commissioners. But in May McCullough wrote to the contractors ordering a temporary trial pit to be put down.

This work was obviously far from sufficient to ascertain the position of the line of the Hard and the possibility of de-watering the sub-soil so Pearsons telegraphed to the Commissioners asking whether Mr McCullough’s order had been given with their knowledge and authority and to Pearsons surprise the Commissioners replied that this was so and they thought that if the work were carried out and the River Diversion works were proceeded with, Pearsons difficulties would probably be overcome.50

Investigation of the river diversion work was now how the Water Commissioners wished to proceed. Mr. McCullough’s plans included diversion of the river by two temporary stanks (A & B) positioned up the valley above the line of the Trench. If the water was coming into the excavation site from the river by subterranean stealth then if the river was taken fully away into the diversion

tunnel the sub-soil would presumably be able to be dewatered. This theory or performance of why the sub-soil is difficult to dewater holds closely to Mr. McCullough's original plans. If it proved so, then the extra difficulty of watery subsoil could be dealt with separately from the additional depth of the rock base. Solving the problems in an order that allowed the contract plans more closely to be adhered to would make it more difficult to argue that the design specified in the contract was unsuitable. When deciding how to proceed the Commissioners opted for the plans that would most likely protect them in a legal dispute. Pearsons, on the other hand, preferred first establishing all the facts by investigation. This approach would engage the least with the design specified in the existing contract. Thus it would be more likely to discover details that would make the design seem less suitable, thus placing the contractors in a stronger position legally. They continued to correspond with the Commissioners, encouraging their preferred direction of action and attempting to establish what the Commissioners’ intentions were.

In the meantime, Pearsons proceeded with the temporary trial pit that Mr. McCullough had ordered and sought tenders from outside firms for making the borings. When the pit was sunk to a depth of 16 feet, the material fluidity problems previously encountered again prevented further excavation. With some estrangement the legal brief records Mr. McCullough’s inspection.

Mr. McCullough visited the site on the 14th of June and on the 17th wrote to Pearsons that he had instructed Mr. Lovatt, Pearsons' agents on the site not to sink the Trial Pit any further as he, Mr. McCullough, 'was quite satisfied with the results already obtained.'

Unbidden, the contractors also drove a test bar into this pit, which “went down easily to 390 O.D.”

The contract for the test borings went to Le Grand, Sutcliffe & Gell, who began their work on the Summer Solstice in 1926. The communication between Pearsons and the Commissioners had continued without any further agreement. The failure to reconcile left the burden of action or acceptance with the contractors. On July 1st 1926 Pearsons broke off ‘without prejudice’ negotiations and wrote to the arbitrator asking him to fix a date.

On the 10th of August 1926 Pearsons also gave notice of arbitration for a third grievance. The grievance claimed that the design of the temporary stanks specified in the contract for the deflection

and diversion of the river was inadequate. This action responds to the legal strategy of the Commissioners team by again questioning the design specified in the contract. If a problem with subterranean water flowing into the site of excavation did transpire, then the contractors would seek to attribute it to the design developed by the Commissioners' engineer.

The Water Commissioners' legal strategy could also be challenged using the water temperature measurements which they had begun collecting the previous December. These measurements compared the change in temperature of the river water near the stanks upstream with that of the water in the sump at the works. This temperature information could be used to connect or disconnect the water in the river from the water in the works. From this information the contractor constructed chart B.W.197 which shows the variation in temperatures graphically over the period of time December 1925 to November 1926. While the river water temperature varies between 36 and 64 degrees Fahrenheit (these extremes occurring in January and July respectively), the water temperature in the Sump is more consistent. It is usually between 45 and 50 degrees. From July to October the temperature is more frequently at the warmer end of that small spectrum of variation. The two lines show little correlation. Perhaps because of this no attention whatsoever is given in the legal brief to the third grievance, the claim that the design of the stanks was inadequate. Perhaps this grievance was brought to the arbitrator for purely strategic reasons. Presumably if the lines had shown correlation then the grievance regarding the stanks would have received attention in the legal brief.

In preparation for the arbitration case the contractors were assembling evidence to display what nature says about itself, what is under the depth of the earth, what is the constitution of the material and what is likely to be possible. The contractors were gearing up to do information conflict by mobilizing charts and graphs to associate data in a particular way and thus present a particular performance of nature. The term 'information conflict' denotes a conflict between parties in which the ability to assemble, control and manipulate information is a key determinant of the outcome. It derives from popular or informal use of the term 'information warfare.' In a strict sense information warfare would be defined as the use of information in military conflict, but the term has come to be associated with the strategic use and management of information in conflicts more generally, including those which do not involve potentially violent military confrontation.

53 "B.W.197" Pearson Collection box 7 section 4c.
such as conflict between businesses or political factions. The term information conflict is a better term for such conflicts because it does not rely upon use of the word 'warfare' as a central metaphor for conflicts of other types.

On November 24 1926, Mr. F.W. McCullough, M.Inst.C.E. suffered a seizure while driving home by car from the Silent Valley. He remained at home stricken with pleurisy and was unable to participate in the arbitration hearings. Deprived of their chief engineer, Mr. McCullough, the Water Commissioners would also have to prepare for the arbitration hearings. Could they build a team of experts and lawyers who could cross connect the legal and technical details in a way that would compare with S. Pearsons & Son, a company which had been at the centre of the Empire (and constructing around the margins) for decades, a company whose experience and expertise in such matters was great? The slippery fluid way in which technology, possibility, social practices, and the nature of materials interact would have to be woven into a strong legal argument.

Chapter 4: Geological Foundations

The Threat of Public Scrutiny

In Belfast not much was known about what was happening in the Mournes. The early summer of 1926 seemed like it might be as dry as the previous year. Comments were made about the unlikely availability of water for houses outside of city boundary that were now being built.\(^{56}\) Later that year, there were discussions about whether or not houses in Cregagh would get electricity, since the Water Commissioners had not yet granted them water.\(^{57}\) It seems their general status within the geographic community for which public services were being provided was now being tied to whether or not the Water Commissioners extended to them rights.

Despite denials there was a growing awareness in Belfast that something was wrong in the Silent Valley, although the arbitration wasn’t made public until almost December. In November there was a city council resolution to amalgamate governance and assume the responsibilities of the Belfast City and District Water Commissioners.\(^{58}\) But the corporation had been under special committee investigation for all summer for “corruption, inefficiency, nepotism”\(^{59}\) and the suggestion had little effect. In early December, less than a fortnight before the date set for the arbitration hearings, the Commissioners were still making very few remarks, claiming legal “subjudice” prevented them from speaking publicly about the details of the case prior to the hearing. Instead they were quite willing to explain the unemployment relief works that they were organizing, something that would be viewed more positively in the current time of economic hardship.\(^{60}\)

As the reality of arbitration became clearer the threat to the Water Commissioners was not just losing their legal case. Public scrutiny was also undesirable. The building pressure of potential scandal made the Commissioners and the contractors more likely to talk. Certainly they must have seen the potential for both of their institutional interests to be eclipsed by public action if the Mourne Extension Scheme was completely discredited. In the week before the December date set for the arbitration hearings Mr. Quinn, the Secretary, wrote to the hotel in Newcastle, where arrangements were being made for the hearings to take place, telling them that perhaps not all the facilities would be needed. Some discussions had been had in recent days between Pearsons and

\(^{56}\) Jun 18 1926 *Telegraph.*

\(^{57}\) Nov 12 1926 *Telegraph.*

\(^{58}\) Nov 3 1926 *News-letter.*

\(^{59}\) July 16 1926 *Northern Whig.*

\(^{60}\) Dec 3 1926 *Irish News, News-letter.*
the Water Commissioners.61

Conclusions

In this chapter knowledge in the field of engineering is described as an arrangement of the facts in order to accomplish some particular purpose. The initial curiosity of the sub-soil and difficulty of working with it made the sub-soil along the centreline of the Silent Valley excavation an object of engineering knowledge. Sir Ernest Moir felt that the nature of the sub-soil should be "definitely ascertained." The uncertainty of the material properties when multiplied by the uncertainty of depth through which this material would need to be excavated brought about genuine concern. These uncertainties destabilized the previously negotiated agreement of common purpose between the Water Commissioners and Pearsons. Of course both had wanted to build a reservoir but for slightly different reasons. As a publicly elected body, the Water Commissioners sought the provision of water, but only within a careful set of parameters (cost, viability, public acceptance, etc.). Pearsons was willing to construct the reservoir as a business venture. They sought profit from their work. The uncertainty destabilized the carefully balanced interests of the Commissioners and Pearsons. When their interests seemed different and possibly exclusive to one another, then resolution by recourse to the sovereignty of law began to become a possibility. This possibility had detrimental effects on the coherency of engineering knowledge because the purpose for which that knowledge was to be used was suddenly different for different participants.

The legally important knowledge of the sub-soil came to be disputed. Because the Water Commissioners and the contractors had two slightly different purposes in knowing the material they began to have competing understandings of what should be taken as the true nature of the sub-soil. The problem becomes more complicated if we also consider engineering knowledge to be active rather than passive: that is to say, knowledge of the material can only be acquired by working with the material and thus changing it in some way. Knowledge of the material in the context of two different purposes might discover two different materials, their properties aligned to the ways in which they had been worked. With varying degrees of control or effectiveness, engineers might be said to 'enact' the material and its properties. This is to say action by engineers is one force (among many) that makes up a material and its properties. Knowledge of the material is the latent possibility of utilizing force or action to enact the material in a manner desirable to the purpose of those who know.

61 PRONI WAT/1/3D/41 Letter book.
Chapter 4: Geological Foundations

Inherent multiplicity in the nature of a material (which is to say the potential of discovering two or more possible materials residing within one material) is generally not acknowledged. Scientific knowledge assembles an explanation of a material that can be given as a simple unity. This unity is described as the nature of the material. The word nature is often used (rhetorically) to deny alternative properties of an object or material that might be present under different circumstances. The work or effort required in changing or manipulating the properties of a material is perhaps some measure of the parameters that could be described as the nature of the material. Thus the later ability of engineers and labourers to act upon the sub-soil in such a way that a trench could be excavated should not suggest that the sub-soil is devoid of properties or characteristics or that change is created by mere mental attitudes to matter. On the contrary, a great deal of labour went into enacting a reservoir, as will be discussed in Chapter 7.

The unity of scientific knowledge usually works well in a court. The legal process requires a certainty of facts, known as evidence, from which to pass judgement. Scientific knowledge can be used to present definite answers about the non-human things relevant to the case under consideration. Although scientific and legal knowledge have generally been considered different kinds of things, Shapin and Shaffer note that the original model for scientific evidence was taken from the legal process of the Seventeenth Century. With this in mind we can see how easily the threat of legal sovereignty attaches to the engineering procedures for determining the nature of a material. The conception that the nature of a material can only be given as a simple unity is similar to the idea that only one party can accept liability. The ease with which scientific engineering expertise can shift quickly into legal postures show that they have some common character.

Both scientific and legal institutions draw inspiration from a law like reality which can be controlled by proper observation and analysis. Both rely upon claims to generate rational knowledge, under strictly objective conditions, for public justification of their authority.

In preparation for the arbitration both Pearsons and the Water Commissioners began assembling data and facts in particular ways to present a particular performance of nature. Within

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63 Shapin and Schaffer, *The Leviathan and the Air Pump*.

the narrow confines of a legal case this preparation amounted to information conflict with charts and graphs being brought to bear as demonstration. Ultimately the possibility of public disapproval that might destabilize the interests of both Pearsons and the Commissioners led both to consider negotiation as a possible outcome.

Despite legal conflict, the knowledge of the material, gained gradually while wrestling with its unusual properties, enabled action upon the material in such a way that ultimately a reservoir might be constructed. In part, the development of the technology used to constrain the material is prefigured by the active development of the knowledge of the material. Conflicts in the purpose around which knowledge is to be constituted, and the arbitration and negotiation process used to resolve these conflicts, are also part of the knowledge creation process. Chapter 5 continues this examination of an unknown material problem by showing how it is resolved within the sovereignty of law. Subsequent chapters will examine to what extent the stamp of this resolution can be seen in the development of technology used to constrain the material, drain the sub-soil, and ultimately to construct a reservoir.
SIR LYNDEN MACASSEY – Are you ready, sir?

THE ARBITRATOR – Yes.

SIR LYNDEN MACASSEY – Sir, as you probably know from the submission to you in this case this is an Arbitration between S. Pearson & Son (Contracting Department) Ltd., and the Belfast City and District Water Commissioners. I hardly like to call it a dispute. It really is an application to you for the purpose of arriving at some solution to difficulties in connection with the contract between Messrs Pearson and the Belfast Water Commissioners for the construction of a Reservoir in the Silent Valley.¹

With this exchange the arbitration proceedings began on Monday morning 13th December, 1926. Mr. Quinn, secretary for the Water Commissioners, had made the arrangements. A function room in the Slieve Donard Hotel in Newcastle had been reserved.

The room where the arbitration was held was full of important people. On the walls were an array of maps and diagrams of the engineering work at the Silent Valley, ready to illustrate the technical matters to be discussed. The counsel representing Pearson & Sons was Sir Lynden Macassey, K.C. and Jim Whitaker, K.C. instructed by Horace Davey in London and Mr. Charley McDowell in Belfast. Horace Davey was the regular legal counsel for Pearsons. He had prepared most of their cases, including similar legal contests that Pearsons had been involved in, such as the

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Littleton reservoir dispute (discussed below). The other solicitors had been retained specifically for this dispute. Sir Lyndon Macassey was an interesting choice for counsel and perhaps not accidental. His father Luke Macassey had been the chief engineer for the Water Commissioners before McCullough, and had designed the original Mourne Water Scheme. Luke Macassey with the young McCullough as his assistant had selected and surveyed the valley in 1891, given the valley its name for the parliamentary legislation, and designed the initial portion of the Mourne water scheme, the diversion of the Kilkeel and Annalong Rivers. After 1908 when the senior Macassey had passed away, McCullough had taken the role of chief engineer and had begun plans for the next stage of the Mourne water scheme, the reservoir. Sir Lynden Macassey would not have been unfamiliar with the history of this project. The Belfast City and District Water Commissioners were represented by the Attorney-General for Northern Ireland (the Right Honourable A. B. Babbington, K.C., M.P.), Mr. E. S. Murphy, K.C., and Mr. R. D. Megaw, K.C., instructed by Mr. R. E. McLean in Belfast. Mr. McLean was the regular solicitor for the Water Commissioners retained for all their legal disputes. The Arbitrator as specified in the contract clause on dispute resolution was Mr. William J. E. Binnie, M.Inst. C.E. of the firm Sir Alexander Binnie, Son, and Deacon, 30, Buckingham Gate, Westminster, S.W. Sir Ernest Moir, described in the *Daily Mail* as the engineer-in-chief to Messrs. Pearson, was at hand and prepared to do much of the presentation himself.¹ All these important persons and others associated with the case were present in the function room of the Slieve Donard hotel that winter morning in Newcastle when Sir Lynden Macassey rose and asked Mr. William Binnie “Are you ready, sir?” With that statement the long awaited arbitration began.

In this chapter the legal resolution of the dispute between the Water Commissioners and Messrs. Pearson is outlined. During the arbitration a situation of conflicting authority is released by arranging nature in relationship to human authority. As we will see, the contractors’ legal team puts the nature of the sub-soil at the foundation of their argument. Because of the sub-soil, the design was said to be unfit for purpose. Thus the Water Commissioners were responsible because (according to a particular reading of the contract) the Water Commissioners were responsible for errors of design. This particular arrangement of the facts enables them to claim their argument and force renegotiation of the legal and financial arrangements for constructing the reservoir. Although they wanted to find a solution to the excavation details they did not want to pay out of their own pockets. In this process we will see that the contractors’ legal team, represented in the arbitration hearings by Sir Lynden Macassey, must carefully connect a dispute at the level of nature to an

¹ Dec 16 1926 *Daily Mail.*
arrangement of forces in the legal and political arena without directly challenging the sovereign interests of the Northern State or their delegates the Water Commissioners. The fact that the Water Commissioners are represented in the legal case by the Attorney-General for Northern Ireland is a sign that the Northern Government is taking the dispute seriously.

**Emphasizing Common Interests**

From the start it was clear that Sir Lynden Macassey presenting the case on behalf of Messrs. Pearson was to be very diplomatic. The legal dispute was characterised as a common difficulty that both the Water Commissioners and Pearsons shared, that perhaps the Arbitrator could resolve. His characterisation of the Water Commissioners was very flattering:

> and I think I may say that the Belfast Water Commissioners have discharged the very responsible and onerous duties which Parliament has imposed upon them with very great foresight and enterprise in the past.³

With some flourish and introduction, Macassey gave to the Arbitrator the history of the reservoir project by way of reading from a booklet printed in 1923 by the Water Commissioners on the occasion of the inaugural sod-cutting ceremony (done by Lord Carson and Ambi Jamison) to initiate the work at the Silent Valley.

In pursuance of their policy of providing Belfast with water they projected some years ago a scheme of works in the Mourne Mountains. The scheme, of which the reservoir is a part is very admirably described, - if you have the good fortune to have it – in what I see is called a brief history of the Belfast Water Supply by Mr. M'Cullough, who is engineer to the scheme. It is a very admirable little document and puts very precisely the main outlines of the Scheme, and while, sir, I am referring to that I would like to say that very unfortunately, and no person regrets the circumstances more than Messr Pearson, that Mr. M'Cullough, as I believe you know, is unfortunately ill, and I would like here to express on behalf of Messrs Pearson their great regret that you will be deprived of his assistance in the course of this Arbitration. In this little book which describes the Scheme of Works very admirably Mr M'Cullough gives you the main outlines of the scheme.⁴

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³ WAT/1/3E/1/8, p 2a.
⁴ WAT/1/3E/1/8, p 2a-3a sic.
Sir Lynden then proceeded to read the concise description of the project from the Water Commissioners' booklet. He was establishing an initial description of the circumstances from a source, their own engineer, which the Commissioners would find awkward to dispute. He continued in the booklet to read a flattering description of Messrs. Pearson.

The contract for the construction of that Reservoir was, as Mr. M'Cullough has stated in his book, let in May 1903, if I may adopt his words, to the well-know firm of Messrs S. Pearson & Son (Contracting Department), Ltd., of 10 Victoria Street, Westminster. S.W.1. Perhaps I may be forgiven if I just make another quotation from Mr. M'Cullough's book

He says –

“Messrs Pearsons & Sons have a wide range of experience in constructing and completing many varied extensive Civil Engineering Works of this and other similar kinds both at home and abroad, also a high reputation for doing good work with a specially trained staff of experienced Engineers and Overseers; and it is to be hoped that they will be favoured with suitable weather conditions and good luck to complete this very important Reservoir Work within the time stipulated in the Contract.”

THE ARBITRATOR – Did you say May 1903 or 1923?

SIR LYNDEN MACASSEY – It is May, 1923. I am sorry to say Mr. M'Cullough's expectations in this respect have been frustrated. Difficulties have occurred which I think I may say were not foreseen by either the Water Commissioners or the Contractors at the time the Contract was entered into, and so serious have those difficulties turned out to be that we are here, sir, before you under the Contract to see really what is the best way out.5

By using this text written by the Engineer and published by the Commissioners, Macassey enables himself to both speak for the engineer and also for the Commissioners. Repeating their friendly description of the Contractors reinforces the idea that this legal interaction is more about negotiating common interests between two friendly parties than a conflict between enemies. The Commissioners' engineer, F.W. McCullough, M.Inst.C.E., is conspicuously absent from the arbitration hearing. By using the engineer's words, Sir Lynden enables himself to speak as the Commissioners' engineer. Just before he, as he says "adopt his [the engineer’s] words" there is a perhaps trivial mix up of dates. As an error in an otherwise seamless presentation it is perhaps worth speculating about. The correct date 1923 would have been used by Sir Lynden to mark the

5 WAT/1/3E/1/8, p3a-4a sic.
Chapter 5: The Arbitration of Nature

introduction of the Contractors (whom he identifies his sympathies with) to his narrative of the basic facts of the case necessary for the arbitrator to know. 1903 would have been a time that Sir Lynden’s father was alive and working as the chief engineer of the water scheme. The young Sir Lynden probably also identified sympathetically with the project at that time, in the years just before his father died. So it is possible to surmise a link in Sir Lynden’s thinking between the people he identifies with most. He identifies most with the London contractors whom he is employed to represent but also he identifies with the Belfast project more directly at the time when his father was the engineer in charge of the project, before 1908 when his father passed away.

Having established a basic description of the project, Sir Lynden then began to describe in more detail the circumstances which had brought all parties to this arbitration. Amongst the many diagrams arrayed upon the wall, he drew attention to one for the arbitrator to see which could summarize the difficult situation.

To indicate the character of the difficulty, there confronts you, sir, on that wall is a cartoon and it shows the longitudinal section along the centre line of the embankment of the Reservoir. The other line on the cartoon is the surface of the ground, and below that line you will see another line which is called the approximate surface of rock taken by the Engineer… …That cartoon shows, subject to one qualification it shows the surface, the depth at which the rock has been found to exist by actual bores which have been put down on the Valley and you will see that instead of existing anywhere near the approximate line which was taken by the Engineer the rock in point of fact is not reached until you arrive at a very considerable depth below that.6

This diagram showed the cross section of the trench. First, the expected depth of bedrock given by the Water Commissioners engineer was illustrated by a line across the trench. The additional depths estimated by recent borings and metal bars thrust into the earth were also indicated on the diagram. With these, an estimated actual line of bedrock could be shown to be very probably at a considerably greater depth than predicted by the Engineer. But more than that,

But that is not the whole story of it, because on Saturday last the bore at the deepest point down at the apex of the inverted triangle has been continued still deeper and it has been found

6 WAT/1/3E/1/8, p 4a-5a sic.
that the rock does not exist at the depth which a few days ago it was thought to exist. The bore has gone down, not to a depth of 150 feet, as shown in that cartoon, but it has now reached a point of 210 feet and at that depth of 210 feet it was found as recently as on Saturday last the rock does not, in point of fact, exist.\(^7\)

![Diagram of Belfast Water Silent Valley Reservoir](image)

With this drastic summary of the situation Macassey is then able to hint at the possibility of a negotiated resolution, something that the contractors would like to bring to the dispute.

That sir, raises of course, a condition of things which in the view of Messrs. Pearson calls for most serious consideration, not merely by themselves but by the Water Commissioners, and it raises matters which call for your consideration, and we are fortunate in having you, with your experience in such questions as this, as the arbitrator between the two parties. The real crux of the whole problem is to ascertain what is to be done in the way of arriving at a

\(^7\) WAT/1/3E/1/8, p 5a-6a. Regarding this 210 foot figure, it is worth noting that the trench ultimately grounded in rock at 212 feet at its deepest point. If the Contractors or the firm subcontracted to make the boring measurements had any suspicion that they were very close to rock after the Saturday measurements this information did not appear during the arbitration. Note that the contractors legal team seems to have mislabelled this in their cartoon. The arrows representing 150 feet (or 210 feet) should stretch between between ‘surface of ground’ and ‘approximate surface of rock as deduced from recent borings’ rather than beginning at ‘approximate surface of rock taken by
solution of this problem. I may say this, that of course one recognises that the object of the Belfast Water Commissioners is to obtain a reservoir. That is what they desire to obtain. I may equally ask them to recognise this, that the object of Messrs. Pearsons & Son is to build a reservoir for them, if that reservoir can be built. That is their object and therefore, sir, I think I may say that there is not much discord of view between the two parties, that is to say, between the Water Commissioners who desire a reservoir and Messrs. Pearson who desire to build them a reservoir, but what I think I shall satisfy you is this, that neither of the aspirations of the two parties can possibly be satisfied under the terms of the existing contract, as we say. 8

This shows how the contractors' legal team seeks to resolve this conflict. The conflict between parties is to be displaced to a commonality which can not be satisfied under the existing contractual arrangements. Pearsons would like to continue the construction, if possible (and it seems they do think it is possible, otherwise they would not pursue such a legal strategy) but under new financial arrangements. At issue are the additional costs of resolving the unforeseen engineering difficulties.

The strategy of Pearsons' legal team was not to place blame on the other party but to displace blame entirely. Such a strategy must have developed and come to seem plausible in the face of few other options. The Contractors did not wish to shoulder the blame and be made financially responsible for the difficulties. But neither did they wish to make enemies of or undermine the Water Commissioners on whom they depended as sponsors of the project. Undermining the Water Commissioners in a public trial might result in the termination of the water scheme. Ratepayers and other political opposition to the Water Commissioners had to be considered. These other parties could destabilize the project if given opportunity within this controversy. Also, as a business S. Pearson & Son's reputation for getting work done was important. Their reputation would enable them to pursue other business elsewhere. A difficult and vindictive legal battle resulting in no reservoir being constructed would not reflect well upon Pearsons.

There is this very unfortunate state of circumstances. Rock is not found at anywhere near the depth at which either party contemplated it would exist. Neither party is responsible for this unfortunate happening, and I think I may lay that responsibility on Providence, but there it is. It raises a condition of things which calls for very careful and anxious consideration by both engineer.

8 WAT/1/3E/1/8, p 6a.
Macassey names “Providence” as the location to which blame can been displaced. As we will see in Chapter 6, “Providence” and “Nature” served as similar rhetorical tropes to displace politically damaging discussions of blame away from the two main parties involved in the reservoir construction, the Water Commissioners and the contractors.

From this basic explanation of the circumstances and suggestive remarks about negotiation Sir Lynden says that he will now lay out the legal case for responsibility from the Contract. But just before doing this he finishes this part of his presentation with a final gesture of summarizing evidence.

I don’t know, sir, whether you have got a copy of one of these small plans or whether – I think I would like to hand this plan to you…

(Copy of plan handed to Arbitrator)

From Sir Lynden, the Arbitrator receives a piece of paper which indicates a glaring lack of foundations, a situation for which Providence is to be credited. Technical facts on a piece of paper are here being made to summarize the problem at hand.

**The Legal Argument**

At this point Sir Lynden switches from his outline of the situation to discussing the legal argument. He will now explain the contract and demonstrate its relevance to his argument. While the general strategy of Pearsons is to displace blame and promote negotiation, the specific legal strategy with regard to the Contract is more directly an attempt to gain the upper hand during negotiations in order to force a settlement beneficial to Pearsons. Pearsons’ legal team intend to demonstrate authority for their position from the Contract and thus mark negotiation as the only option for the Water Commissioners. This very direct legal conflict is smoothly covered over with the diplomatic rhetoric of common interests that Sir Lynden has presented in his initial description of the situation.

Sir Lynden’s first task is to identify for the other members of the arbitration the Contract.

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9 WAT/1/3E/1/8, p 6a-7a sic.
10 WAT/1/3E/1/8, p 7a.
This he does by emphasizing its unusual condition. He is particularly keen to push aside the more simple representations of the signed agreement which might at first seem to contain the relevant information.

The contract in this case is a peculiar Contract. It is one which, so far as my experience goes, is of a form which is seldom seen, but your much greater experience of course will enable you to arrive at a judgement in that matter. You may have the printed document – I do not know whether you have – but if you have the printed document that is not in point of fact the contract. The contract is a document which consists partly of print and partly of manuscript amendments and alterations, and I think it will be necessary for you in following my argument to have before you a copy of the exact document which was signed so that you can see the deletions of the print which are made in manuscript and the additions to the print in manuscript which were inserted. I do not know whether you have a copy of the printed contract. It looks nice clean print.

THE ARBITRATOR – Mine is clean print.

SIR LYNDEN MACASSEY – That I do not think will be sufficient for you. I think you will probably want the original. I want you to see the original so that you may see the exact form of the contract which was in fact made. I do not know whether I may call for the original contract.

THE ATTORNEY GENERAL – We have not got the original contract here but we have a printed copy of the contract and specification.

SIR LYNDEN MACASSEY – That was what I was rather demurring to being put before the Arbitrator as representing the contract. The contract in point of fact, as I understand it, was a printed document with a large number of red insertions and a considerable number of red deletions. That of course was the original document which was actually signed.

THE ARBITRATOR – Could we not follow it from this printed one?

SIR LYNDEN MACASSEY – I am afraid not. May I hand you what I understand is a facsimilie copy of the original and ask you to be good enough to use that until you have an opportunity of seeing the original. I am handing you now our original counterpart of the contract, and you will see here in the contract, which has been sealed by both parties, and appended to the contract and made part of the contract are the documents called the specification, which include first of all the general conditions of contract and then the particular divisions of the specification. You will see that this document, which was an original document, contains a large number of alterations in red, some taking the form of
The contract and specification which was signed was the result of a long negotiation process. A version of the contract and specification had been printed in advance of the actual signing of the contract. In the last few days before the contract was signed considerable renegotiations happened. These renegotiations were represented with sheets of typing paper insertions and red lines crossing out those sections which were to be removed. The contract and amended specification was then signed in this state of production, rather than waiting for a printed version which removed the history of the negotiations. The contractors’ copy of the original similarly indicates the history of the negotiation. After the signing occurred, printed versions of the contract were made by the Water Commissioners. These did not show the editing marks created during negotiation but rather merely the end results. Macassey had to insist to both the Attorney General and the Arbitrator that this printed version which they both had was not an acceptable representation of the signed contract. According to the record of the arbitration the original was in fact never produced during the proceedings but rather the original replica held by the Contractors was used in the Slieve Donard hotel for the Arbitrator to follow the argument. To the Arbitrator the distinction between the printed representation of the contract and the edit marked original document is almost certainly novel information. For the Attorney General of Northern Ireland the legal implication of asserting this distinction may or may not have been immediately recognized but like the Arbitrator he also indicated a ready willingness to use the printed representation. As we will see below, the greater level of detail in the edit marked original (and the replica of the edit marked original), will allow the contractors’ legal team to assert particular connections to the past.

Having successfully asserted to the other participants in the arbitration that the document indicating the Contract will be the original replica, Sir Lynden now begins to outline the structure of the legal documents. The contract includes several attached documents which set out a covenant of payment in return for service. The ‘Form of Tender’ was signed and sealed by the agent of the Contractor (and then additionally signed and sealed by the agent of the Water Commissioners). Attached to the form of tender was the ‘Specification’ including a schedule of quantities, written by the Water Commissioners’ engineer. After generally outlining the remit of the contract, the Specification details the design work that is required of the Contractor. The schedule of quantities lists specific items of labour or materials to be provided and gives the prices for which the

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11 WAT/1/3E/1/8, p bl sic.
12 WAT/1/3E/1/8, pb2-b3.
Contractor has agreed to provide such. The Drawings are also legally included within the contract. During the signing of the Contract each of twenty odd engineering drawings were examined and initialled. The first provision of ‘Contract A’ states that in considerations of the covenant of payment the contractor, having

carefully examined the lines and sites of the Works and the said Drawings and the Specification, and having fully considered all matters whatsoever affecting the construction of the Works will execute complete and maintain the works in accordance with [the specification, contract and tender].

Sir Lynden then presents the tender which the Contractors have signed. The Tender specifies that the Contractor agrees to execute the construction of the reservoir according to the diagrams and the amended specification.

Sir Lynden especially emphasizes that it is the amended specification which has been agreed. The implications of this he explains thus:

So when one looks at the amended Specification you come to what appear to be the really important matters for consideration in connection with this unfortunate case, and if you will be good enough to look at the very last clause in the amended Specification – you will find it on page 86 – you will observe that the last clause in the amended Specification is 356 and that it is struck out. Would you be good enough to look at that because these deletions, of course, which exist in the signed document, are just as much part of the signed document as the print.

The contract and form of tender actually signed requires the execution of the Drawings and that which is “in the amended specification.” Sir Lynden repeats this phrase to emphasize that the relevant document to be considered is the original replica with deletions and insertions. It is a particular deletion at the end of the amended specification which Sir Lynden wishes to emphasize. The deletion would not have been present in the printed representation of the Contract which the Water Commissioners' legal team had provided for the arbitration process. Going to clause 356 (of amended specification), Sir Lynden points out the deletions. “Would you be good enough to look

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13 WAT/1/3E/1/8, pb2-b3.
14 WAT/1/3E/1/8, pb3-b4.
at that because these deletions, of course, which exist in the signed document, are just as much a part of the signed document as the print.”

having two drawers in each table. Three neat hardwood desk stools 2' 9" high, and three neat hardwood ordinary chairs are also to be provided for each room. The Contractor is also to provide and deliver, at regular intervals, into the Storeyard at existing Lodges, a supply of best English household coals, at the rate of One ton per month, for the heating of the foregoing Offices, from the beginning to the end of the Contract.

355. The hollow places marked as ‘‘Spoil Ground’’ on the Drawings, along each side of the Kilkeel River, on the south side of the Main Embankment, may be used for depositing the surplus materials arising from the excavations for the Main Trench, Seat of Embankment, Waste Channel, Outlet Tunnel, Outlet and River Channels, and from other excavations. These surplus materials shall be deposited in regular layers up to the level of 455.00, extending southward from the outer slope of the Main Embankment and having the upper surfaces dressed off to suitable fall, with slopes formed at ends and sides to regular templates, and the filled area properly drained, covered 6" deep with suitable soil and sown with grass seed, to the lines and levels as approved of by the Resident Engineer and Inspector?

F. W. McCULLOUGH, M.Inst.C.E.,
CHIEF ENGINEER,
WATER OFFICE, ROYAL AVENUE,
BELFAST.

AUGUST, 1920.

AMENDED AND REPRINTED,
MAY, 1923.

The clause which is struck out is part of the warranty clause 356

“The Contractor further agrees and binds himself to provide and execute all matters and things whatsoever, in addition to those shewn on the Drawings and herein-before specified, as may be necessary to make the intended Reservoir and other works complete in every respect, and that without any payment beyond the Contract sum, and the Contractor further agrees and warrants that, notwithstanding any defect in the design of the Works, or any

15 WAT/1/3E/1/8, pb4. In sociolegal studies of contract law a recent approach is to look directly at the contract as a material object with effects. Mark Suchman emphasizes “(1) the microdynamics of why and how transacting parties craft individual contract devices, and (2) the macrodynamics of why and how larger social systems generate and sustain distinctive contract regimes.” Mark Suchman, “The Contract as Social Artifact” Law & Society Review, 37/1:91-142 (2003). p91. Contract regime is not discussed in this thesis.
provision in the Drawings or Specification, or any deficiency, insufficiency, or omission in the same, he shall complete and maintain and hand over the said intended Reservoir and other Works complete in every respect and in every way suitable and efficient for their purpose."

If that clause stood it was an assumption by the Contractor of full reliability and responsibility for executing the Reservoir, notwithstanding any defect in the design of the Works. That was struck out and there are certain very significant insertions, and I shall have to devote some time to explaining the general scheme of the Contract, but at this stage I will, if I may, just point you out what the insertions were.16

Sir Lyndon goes on to explain the organisation of the contract giving special attention to these insertions. These insertions exist he claims in clause 5 regarding the extent of the Contract and clause 7 regarding Drawings.17 It is worth noting that his narrative imposes a chronological logic to

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16 WAT/1/3/E/1/8, p b4-b5.
17 I have been able to locate two versions of the negotiated contract, one at the Public Record Office of Northern Ireland (PRONI WAT/1/3/3) and one in the Pearson Archives attached to the South Kensington Science Museum Library. The PRONI version does not include these insertions so it is probable that this was not a document from the final stages
the negotiation of the contract. By beginning at page 86 of the Specification, giving significance to
a deletion, and then returning to page 2, clause 5 and page 3, clause 7 to claim that the insertions at
these locations are in response to the deletion Sir Lynden presents the significance of the contract in
a particular way. He interprets it diachronically. With the greater level of detail in the edit marked
original replica Sir Lynden can tell a historical narrative about the meaning of the contract as it
emerged from the original negotiation process. Some of the influences upon the original
negotiation process (discussed below) become influences upon the arbitration.

Clause 5 describes the extent of the contract. A long list of the tasks, types of labours, and
responsibilities included within the contract make up the beginning of this clause. The end it
additionally specifies the liability of the contractor for damages caused by executing the plans
incorrectly but, significantly, not such damages as caused by defects in plans which were executed
correctly. Sir Lynden: “So you see that, so far as any defect in the design is concerned, there is a
very material difference in the contract as drafted and the contract as signed.” Clause 356 as
drafted had required of the contractor responsibility for defects in the plans. With that clause now
struck, Sir Lynden claimed that clause 5, saying something quite different, was instead the relevant
clause for the issue of liability.

Clause 7 refers to the Drawings as part of the contract. The drawings are to be accepted by
the contractor as sufficient

Then you will see clause 7 – the side note is Drawings – goes on to describe the Drawings.
Perhaps I had better read it. It says:

“The Drawings of the intended Works, with all the lines and levels of the ground as
it now is, which are identified by the signature of the Contractor, are hereby taken and
accepted by him –

Then there are certain deletions –

“as sufficient in all respects to indicate the nature extent and particulars of the intended
Works and the requirements of the Commissioners; and the Contractor binds himself and

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of contract signing but is instead an earlier version exchanged between Pearsons and the Commissioners during the
process of negotiation. This Specification Wat/1/3J/3 has a hand written note on it (signed WQ) which says “Secretarys
copy, amendments in red made by Messrs. Pearson + Son Ltd. and received with their letter of 21 May 1922 WQ note-
page 9 out of place + follows page 12.” Sic. In the Public Record Office document page 9 and 12 are not out of order.
This suggests the document has been rebound. The version of the contract which exists in Pearson Archive is a
facsimile of the original signed document. Most probably it is the actual original replica that was handed to Mr. Binnie
and used during the arbitration.
agrees to make no claim whatsoever against the Commissioners.

Then originally there were the words “for any payment”, but those have been cut out—

“in respect of any error, discrepancy, omission, or insufficiency in the Drawings or in this Specification as such—

then there were certain words in the clause as it originally stood: “or on the ground that any portion of the Works shewn upon the Drawings is of unsuitable or insufficient design, dimensions, arrangement, or materials”. It is very significant indeed that in the signed Contract those words which appeared in the original print have been deleted, and I shall show you the reason why later. Then the clause goes on:

“and the contractor further agrees to supply and execute—

“without extra charge” that is cut out in the signed document—

“all additional materials, workmanships, and superintendence (if any) which may be required by reason of such error, discrepancy, omission, or insufficiency as above mentioned; and such additional materials, and workmanship and superintendence shall be deemed to be part of the Works to be done and executed under this Contract—

Originally you will see the words then ran: “as already described, and as covered by and included in the Contract Sum.” Those have gone and the fact that they have gone is a matter of great significance. In place of those words you will see that certain words have been inserted:

“and shall be dealt with under clause 22”

The paradigmatic comparison of phrases such as “agrees to make no claim whatsoever against the Commissioners” and “agrees to make no claim whatsoever against the Commissioners for any payment” (the latter phrase being struck out and replaced by the former) enables Sir Lynden Macassey to imbue a history of particular meanings to the words in the Contract. Clause 22 (which is to be invoked if additional work is required by reason of design error) refers to payments for extra work ordered which is not specified in the Contract. Macassey makes use of clause 7 and 22 to emphasize that the Contractor is not responsible for errors in the design of the reservoir and that liability for design errors lies with the Commissioners. He summarizes the legal argument thus:

You will note the difference between the print and the Contract as executed. Under the print there was, as I have shown you, in clause 356 a provision which made the Contractor liable

18 WAT/1/3E/1/8, p B6.
19 WAT/1/3E/1/8, p B6-B7 sic.
Chapter 5: The Arbitration of Nature

and responsible for any defects in the design of the Works; notwithstanding what any such defect might be, under clause 356, was made fully liable and responsible for it. That was part of his liability under the contract. In the Contract as signed that clause was cut out, and in place of it you have very significant insertions at the end of clause 5 and at the end of clause 7, which, in my submission, relieves the Contractor from any liability or responsibility for the insufficient and unsuitable design of any portion of the intended Works...

That really is at the bottom of the whole trouble here, but again I say the desire of the Commissioners is to obtain a Reservoir and the desire of Messrs. Pearson is to build a Reservoir, but obviously the design which was originally arrived at on the assumption of rock being at the Engineer's level must be altered if a Reservoir is to be built having regard to the wholly different conditions now disclosed by these borings.20

This is the main portion of the argument presented by Macassey at the arbitration. If the legal Contract, as he claims, holds the Commissioners responsible for defects of design then Macassey must also establish that the design as provided by the Water Commissioners is unfit or unsuitable for its purpose. According to Macassey’s presentation the important issue is now whether or not the trench can be excavated as per the method originally stipulated in the Specification.

The Design Argument

The initial point at which the design first seems inadequate is the suggestion that a timber-lined trench (as per Specification) will enable excavation.

Clause 148 of the Specification gives directions regarding the excavation of the Trench. The Trench is to be excavated along the centre line of the main embankment to the depths or widths as the Engineer may direct, or the nature of the material may require, until a solid and water-tight foundation is obtained.21

The next issue to look at was the timbering method specified to uphold the sides of the trench. Sir Lynden said to the Arbitrator that he would not go into the details of plans because he knew that the Arbitrator would already be very familiar with the plans, to which the Arbitrator replied that he had not seen the plans. Macassey produced contract sheet No. 14, a longitudinal section of the trench so that the Arbitrator might compare it to the cartoon that the Contractor had prepared.

20 WAT/1/3E/1/8, p B8-1C.
21 WAT/1/3E/1/8, p 3C.
You will see the surface of the ground; below that the approximate surface of rock taken by
the Engineer, which is reproduced in the cartoon, and below that you will see the bottom of
the Trench, the depth to which the Engineer contemplated the Trench would penetrate into the
rock. With that plan in front of you may I just direct your attention the next clause in the
Specification. That is Clause 150. It says “The whole of the main and arm Trenches are to be
securely Timbered with all needful stays, struts, sheet piles, and close sheeting of suitable
quality and dimensions, to support the sides in an efficient and stable manner, by the most
experienced workmen, as will prevent any slipping or movement of the adjoining material,
and be so arranged and maintained that each separate timber may be safely withdrawn at any
time, from the bottom upwards as and when the permanent concrete is ready for depositing
in position. Great care must always be observed in removing any of the timbers, so that no
loose earth, rock, or other material is allowed to fall into the trench or on to the concrete
below. No timber of any kind or other loose material must be left in or be embedded in the
concrete.”

Clause 150 in the contract specified that the trench was to be securely timbered and that in the
process of concreting no timbers could be left behind.

Macassey claimed that this very specific method being dictated from within the contract was
unusual. More frequently engineering contracts of this period simply specified the required results
and let the Contractors determine methods. At least in retrospect these remarks on the quality of
the workmanship seemed odd or could be made to seem so by a skilled barrister.

it is very common perhaps the most common thing in engineering contracts to leave methods
and expedients and especially anything in the nature of temporary works to the contractor....
That method, that is to say, the usual method, was not adopted in this case... but the
Commissioners – and they of course are the judges of their own actions – the Commissioners
in this case not merely provided for the finished work but they put the Contractor under
specific terms and obligations as to the methods and means by which that finished work was
to be constructed instead of leaving that discretion to the contractor

\[\text{WAT/1}/3E/1/8, \text{p 5C-6C.}\]
\[\text{Expertise has been retained by the authors of the Contract rather than relinquished to Contractors.}\]
\[\text{WAT/1}/3E/1/8, \text{p 6C.}\]
In the above example the Commissioners are used as the source of error in the contract rather than the engineer who presumably was the professional from their staff most involved in the writing of the specification. The legal counsel for the contractors again notes the weaknesses of the contract and opens up difficult questions about why and whose responsibility are these errors. In doing this the contractors’ legal team can lean on a weakness of the Commissioners, their lack of an engineer and the absence of McCullough due to illness. Similar remarks apply to Clause 151 which clarifies the drainage of the trench by use of suitable sumps and other methods. This is another example of specific methods being dictated rather than specifying the results and allowing the contractors to determine their own methods. Having indirectly referenced the Engineer, Macassey now chooses to directly bring speculation about the Engineer into his narration.

Again I assume the Engineer had particular reason or the Commissioners had some particular reason, for departing so specifically from the ordinary procedure.... You will observe this that contrary to the ordinary practice of leaving the Contractor with a free hand to devise such means as his experience suggests/ or the nature of the ground dictates for dealing with water which may be met with in the excavation of the trench 25

Sir Lynden Macassey summarized the most important bit of his argument before going on to question other parts of the design. The timber lined trench as the specified means of excavation was the salient error in the design.

So that my submission is that the Contract provided for a timbered trench. The contract design proceeded on the basis of the Trench being a timbered trench and the whole procedure of the Contractor was regulated to his carrying out that work in accordance with that design and no other. 26

He then talked about other problems with the design such as the concrete shoe and the slopes of earthen material that makes up the bulk of the reservoir embankment. These too he suggested were no longer adequate to the situation as discovered. The nature of the material to be excavated required that the design be re-examined.

25 WAT/1/3E/1/8, p 8C.
26 WAT/1/3E/1/8, p 11C sic.
Additional accusations regarding the design, such as the suggestion that the concrete key would fracture because the design had not properly considered the circumstances arising, placed a weight of uncertainty upon the validity of the Contract beyond the issue of the timber lined trench. However, from a legal perspective the primary argument of Pearsons’ team was the issue of the timber lined trench. Failure of design only had to be shown once to resolve the question of liability. Having established what the design required, they now had to demonstrate that the circumstances and the nature of the material made such a method inadequate for excavation.

The History of the Excavation and Explanation of the Nature of the Sub-soil

Macassey began to describe the circumstances during excavation that led to the initial concerns. Much of this description follows the material I have already discussed in Chapter Four however I will cite some of his remarks and make some comments on the way the events were presented during the arbitration. The nature of the material was invoked both in the way that it could be seen to relate unusually to water and in the presence of a groundwater level below which excavation was difficult.

The curious thing about this material is that when you look at it after it has been exposed for some little time to the air it looks perfectly dry but when you proceed to pat it either with your hand or with your foot for some reason or other – I dare say scientists will differ as to the reason but will agree as to the fact – it proceeds to become a kind of jelly, and when you pat it you will find precisely the same effect as if you shook a piece of jelly because the vibration seems to extend in cylindrical rings for a considerable distance from the particular point where you apply pressure to the material.\(^27\)

Then follows an explanation of the investigation of the material, and attempts to drain the sub-soil by building a sump. Around about the depth of 416 feet ordnance datum\(^28\) the water level was always encountered and the timber runners to uphold the stability of the sump excavation suffered subsidence.

when you get down to that depth the water proceeds, and as the material cannot part with its water without accompanying it you get not merely the water, but a flow of mixture consisting

\(^{27}\) WAT/1/3E/1/8, p 4D.

\(^{28}\) Ordinance Datum is a measure of altitude. 432 OD was the surface level of trench excavations.
both of water and material\textsuperscript{29}

The relationship of this difficult to excavate semi-fluid material to the possibility that bedrock is also considerably lower than expected was also given. The excavation of the trench from the high sides of the valley had been much easier until the rock suddenly disappeared steeply into the earth.

Of course, a serious state of things confronted us there, and naturally we took steps to see to what extent the rock was dipping below the line shown on the drawings. We made a number, I can hardly call them bores, they more usually take the form of driving down bars - a number of prickings ... This plan shows the result of the borings and prickings which Messrs. Pearson made to ascertain the approximate level of the rock up to the month of November 1925.\textsuperscript{30}

The diagram had been constructed a year previously from data available then. Although better data now existed, by using this diagram from a particular point in the narrative Macassey encourages his audience to think from the perspective of Pearsons' engineers a year previously. He includes his audience within the circle of those making estimations, threatened by uncertainty.

Macassey's narrative ends with the final trial pit ordered by Mr. McCullough. The results of this exercise were to confirm what had already been known. Macassey concludes by drawing attention to the nature of the sub-soil, which both predicates unforeseen difficulties and founds his argument.

That brings me roughly to an end of the general circumstances connected with the actual work done on the line of this main trench. It indicates sufficiently clearly the nature of the material which exists. It shows you the sort of unforeseen difficulties which existed in practice and indicates I think beyond any question the necessity of both sides endeavouring - and I hope we shall succeed in the end with your assistance in doing that - to arrive at some possible solution to overcome this unfortunate state of circumstances.\textsuperscript{31}

\textsuperscript{29} WAT/1/3E/1/8, WAT/1/3E/1/8, p 7D-8D.
\textsuperscript{30} WAT/1/3E/1/8, p 3E. This diagram is discussed in chapter 4, pp 149-150
\textsuperscript{31} WAT/1/3E/1/8, p E8.
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At this point the case for the Contractor had been stated quite strongly and the session adjourned for lunch. The participants all had much to consider as they went for their meal. Macassey finished by suggesting the “necessity of both sides endeavouring to arrive at some possible solution.” By placing the nature of the material at the focal point in the summary of his presentation Macassey makes the fluid nature of the sub-soil the foundation of his argument. From nature came the fluid properties of the sub-soil, from which arose unforeseen difficulties. The design given in the specification was inadequate to deal with these difficulties and the legal arrangements of the contract made errors of design the responsibility of the Water Commissioners. Perhaps, suggested Macassey very quietly inside the minds of the Water Commissioners and the Attorney General, perhaps it was time to negotiate.

From Arbitration to Negotiation

The informality of lunch allowed conversations to happen which were not as easily pursued in the formal legal setting of the arbitration room. When the session resumed after lunch the Arbitrator intervened to ask if some of the morning’s argument was contested by the Commissioners. Began Mr. Binnie,

I listened very carefully to your opening and there were three points which I should like to know which you have dealt with. I should like to know very much whether they are contested by the Belfast Water Commissioners. These three points were:-

(1) That the design contemplated the carrying down of this trench until it reached the rock;
(2) That the design contemplated upholding the sides of the trench by means of timber; and
(3) That the rock has not been found at the depths anticipated by the contract, but at very much greater depths, and that it has not now at one point been reached even at a depth of 200 feet below the level it was assumed that it would be met.

If those points are not contested, I think it would be advisable it the parties met together to see if some arrangements might not be arrived at whereby this work could be carried out on some altered design. I should like to know Mr. Attorney-General, whether these three points I have mentioned are contested.33

The Attorney-General rose to answer this. While gracefully noting minor quibbles, he said that substantially there was not disagreement on these points and that during lunch he had had the

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32 WAT/1/3E/1/8, p E8.
33 WAT/1/3E/1/8, p 1F.
opportunity to discuss with Sir Lynden. He repeated Sir Lynden’s remarks that the object of the Water Commissioners was to obtain a reservoir and that the object of Messrs. Pearson was to build a reservoir and that therefore

…it would be very much better if there were no break as between Messrs. Pearson and the Water Commissioners, and the Water Commissioners themselves recognise that, and therefore I think if we could have a discussion between the Counsel representing both the parties that we might, having regard to the way in which Sir Lynden Macassey has stated the case for Messrs. Pearson, and the attitude they have taken up through the whole of this controversy, that we might be able to get rid of the difficulties which have arisen up to the present, and provide for a re-exploration of the situation with a view not only to ending the difficulties that have arisen on the present contract as between Messrs. Pearson and the Water Commissioners, but to provide for the carrying out of this embankment and reservoir on a plan based on accurate knowledge of all the circumstances in the Valley, and with full approval of experts whose opinion shall be given after careful examination of the facts as they are now known.34

The arbitration was suspended until the following morning at 10 am so that the two parties might negotiate a solution themselves outside of the legal hearing.

Negotiations

The following morning comments were brief. Progress was being made but the negotiations were not yet complete so the arbitration hearings were suspended one further day until Wednesday. The Belfast newspapers all covered the arbitration hearings. Even the *Daily Mail* from London sent a reporter to cover the case. However the press was not admitted into the proceedings. Instead, they were informed by a public statement made at 530 in the evening.

The *Daily Mail* article described slightly more details for a London audience. Sir Ernest Moir was described as the engineer-in-chief to Messrs. Pearson. Their article for the second day ended poetically with a description of the weather which had blanketed the negotiations, “snow fell throughout the forenoon. Slieve Donard a white mantle.”35 One letter in the *Irish News* on that day

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34 WAT/1/3E/1/8, p 4F.
35 Dec 15 1926 *Daily Mail*.
declared the policy of secrecy “in the Silent Valley.” The text of the first morning of the arbitration was never released to the press.

The Wednesday morning December 15th, the participants of the arbitration reconvened with a negotiated solution and presented it to the Arbitrator, Mr. Binnie, who published his award a week later. Although the resolution of conflict clause in the contract laid out binding arbitration, the written award of the arbitrator was drawn from the results of the negotiations between the two parties to the dispute, Pearsons and the Water Commissioners. Mr. Binnie’s award stated that Contract A was to be rescinded as of December 15th 1926. This was by mutual agreement. The Water Commissioners were to pay the Contractors all costs of construction accrued to date. In addition they would pay 10% extra for profit and 2½% extra towards the administrative costs of the Contractors’ London office. Exploratory work would continue at the Silent Valley for an 18 month period in order to determine the feasibility of completing the reservoir. This exploratory work would be done by Pearsons. The remuneration was to be on the same cost plus percentage basis. In the absence of F.W. McCullough, the Water Commissioners engineer, the exploratory work would be directed by a Board of Engineers. Mr. Binnie, the arbitrator would act as Chairman of the Board of Engineers. Two other engineers were to be nominated, one by the Water Commissioners, and one by Pearsons. Respectively they nominated Mr. Edward Sandeman and Mr. Prescott Hill, M. Inst. C.E. Actions of the Board of Engineers would be by majority decision. Remuneration of these engineers was to be paid by the Commissioners, and negotiated accordingly, or failing agreement between the engineers and the Water Commissioners, to be negotiated by Sir Lynden Macassey and the Attorney General, the barristers for each party. At the end of the 18 month exploratory period, the Board of Engineers would make a recommendation regarding the feasibility of constructing a reservoir on the present line and, if necessary, they would prepare plans for doing so. If the Commissioners decided to go forward with the reservoir construction, the contractors, Pearsons, would be prepared to construct the reservoir on the same basis of remuneration under the direction of the Board of Engineers. The fees and costs of the hearing were to be born by the Contractor as specified in the arbitration clause of the original Contract A. “I have taxed or settled my fees and the costs of this Award at the sum of Four Hundred Pounds,” concluded William Binnie.

On the final day the press announced agreement. Rock had not been found at 75 feet, nor at

36 WAT/1/3E/3/10 “Award of the Arbitrator” December 24th, 1926.
Chapter 5: The Arbitration of Nature

150 feet, and presently at 218 feet of depth they were into running sand, claimed one newspaper. Remarks by Macassey that Pearsons were “surrendering a lucrative contract,” made it into print. It was also noted that those negotiating were following the precedent set by the Metropolitan water authority (said to be the largest in the world). In the Irish News a correspondent claimed

A gigantic blunder has been made... Belfast will sink into the Silent Valley financially bankrupted... hastening towards civic ruin... one of the great arguments against any interference with the boundary of the County Down used by the Government while the ‘Border’ humbug lived was the horrible danger of giving the Free State control over the invaluable Silent Valley. We may yet live to regret the Free State’s failure to secure it

The actual content of the negotiation was never made public. Much of it was probably never written down. Most of the outcome of that negotiation (certainly the legal arrangements) is apparent in the agreement published as the Arbitrator's Award a week later. All the negotiation of substance happened on the Monday and Tuesday (if not before) and the final day of the arbitration proceedings seems likely to have been choreographed. The conclusion to the arbitration gave both Water Commissioners and the contractors the appearance of having designed a well made and mutually agreeable solution to a difficult problem. This would protect the project from potential critics in the city of Belfast who might make the situation even more difficult if given any opportunity. Neither the Water Commissioners nor the contractors wanted it to look like the contractors had got the best of the Commissioners.

Two precedents are perhaps relevant to the negotiations. The final legal arrangements were very similar to the arrangements made in the similar Littleton Reservoir controversy (discussed below). This case was cited in the newspapers and used as evidence that the Water Commissioners were following an established precedent. The City of London had commissioned the reservoir at Littleton. The Water Commissioners were said to be following the path of the largest water authority in the world and were thus in good company. The other possible precedent for establishing a solution emerges from the engineering experience of Sir Ernest Moir.

37 Dec 16 1926 News-letter.
38 Dec 16 1926 News-letter.
39 The case of Stockport was also a precedent.
40 Dec 16 1926 Irish News.
41 Dec 16 1926 News-letter.
Whereas the legal arrangements that came out of negotiations are apparent in the Arbitrators Award, there would certainly have been other discussions about technical feasibility that must have happened during the negotiations. It seems likely that Sir Ernest Moir (as the lead engineer on behalf of Pearsons and a primary participant in the arbitration and negotiations\textsuperscript{42}) would have made a case as to how to proceed. The legal argument had hung on whether or not the fault existed in the engineering plans supplied as part of the contract. It was clear that the fluid nature of the material prevented the timber lined trench (as specified in the contract) from being an effective or safe means to enable excavation. Some debate had hung on whether or not the material could be dewatered. Before the arbitration Pearsons had insisted that it could not be, at least not in such a way that timber lining could then be used to excavate the trench. There is not evidence however to suggest that they ever felt that the entire task was impossible. It is probable that at this point the suggestion to use air pressure was made.

Sir Ernest Moir had considerable experience in using compressed air to hold back water and enable excavations. In 1889 British capital had helped finance construction of a sub-aqueous tunnel beneath the Hudson River in America. S. Pearson & Sons were contracted to do the work and Mr. E.W. Moir was responsible for designing the shield, to be used in conjunction with compressed air in order to push through the wet clay like silt and sand beneath the river.\textsuperscript{43} The tunnel had begun several years before but after difficulties with financing (and other difficulties such as a legal injunction and the notorious Hudson Tunnel disaster in which twenty men were drown when compressed air escaped causing a drop in the air pressure and the tunnel flooded\textsuperscript{44}) the work had stopped for six years. The Hudson Tunnel Railroad Company originally formed in 1873 to connect Jersey City and Manhattan Island by tunnel below the Hudson River.\textsuperscript{45} This was the first sub-aqueous tunnel to be excavated by use of compressed air to hold back the inflow of water during the excavation.\textsuperscript{46} Under the direction of Dewitt Clinton Haskin the original excavation had proceeded through silt, which when suitably moist was capable of retaining its own shape without use of the type of shield that later became standard in sub-aqueous tunnelling.\textsuperscript{47} In 1890 when the tunnel was

\textsuperscript{42} According to the contractors' legal brief he was to make much of the presentation for their side. Because the formal arbitration quickly became an informal negotiation he was never required during the public testimony to speak.

\textsuperscript{43} Tunnelling the Hudson” (by Masters) \textit{Wonders of World Engineering}. Harmsworth Press, pp429-436. Moir had worked with Sir Benjamin Baker and Sir John Fowler during the construction of the Forth Bridge in Scotland, which was then the largest cantilever bridge in the world. When Fowler and Baker were consulted about reopening the Hudson River tunnel, Baker asked Moir to design the shield.

\textsuperscript{44} Tunnelling the Hudson” (by Masters) \textit{Wonders of World Engineering}. Harmsworth Press, pp432-33.

\textsuperscript{45} Fifty years of rapid transit, 1864-1917 / by James Blaine Walker. New York City: Law Printing Co., 1918, p284

\textsuperscript{46} “Tunnelling the Hudson” (by Masters) \textit{Wonders of World Engineering}. Harmsworth Press, p429.

\textsuperscript{47} Tunnelling the Hudson” (by Masters) \textit{Wonders of World Engineering}. Harmsworth Press. Sir Marc Isambard Brunel designed the shield that built the first sub-aqueous tunnel under the Thames. In 1868 Barlow and Greathead

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reopened, Mr. E.W. Moir designed a circular shield driven forward by hydraulic jacks and made strong by its division into sixteen cells. The shield was airtight except at the cutting face and was entered by air-locks in the rear. Problems arose.

Eventually they were tunnelling at the rate of 10 feet a day, but the loss of life from compressed-air sickness was so alarming that the New York newspapers grew critical. According to Sir Ernest Moir the death rate from this cause among the tunnellers averaged 25 per cent annually. As was to be expected, the tunnellers became chary of the work and labour difficulties began to arise, for the tunnel acquired a bad reputation.

Alarmed at the mortality, Moir providentially recalled that while sinking one of the caissons for the Forth Bridge, the Belgian and Italian labourers who suffered from compressed-air sickness were at once relieved when they went back to work in the compressed air. In a flash he reasoned that it was coming out of the compressed air too quickly that caused the illness. He therefore designed the first decompression chamber for use on the work so that the men who were attacked by “bends” could be placed inside and the pressure raised again to relieve them of pain and gradually lowered until it was the normal atmospheric pressure.  

Known as the medical air-lock this device was very successful, greatly reducing the death rate (down to approximately 1%). Although further capital financing problems meant that the project was stopped again in 1893, Mr. Ernest Moir returned to England to design the (improved) shield and equipment for the Blackwall Tunnel under the Thames, a task which Pearsons had been contracted to do for the London City Council. On this project, the supervising engineer for the city was Alexander Richardson Binnie. From this previous history it is clear that Sir Ernest Moir was familiar with the use of compressed air in excavation work. The arbitrator, Mr. William Binnie (of the firm Sir Alexander Binnie, Son, and Deacon) is likely to have also been familiar with Moir’s

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improved upon the previous tunnelling shield by lining the tunnel with iron rings, by forcing liquid cement into the space between the iron lining and the material around it, and by adding hydraulic jacks (as had been suggested by Brunel).

48 Tunnelling the Hudson" (by Masters) Wonders of World Engineering Harmsworth Press, pp435-436.  
49 Tunnelling the Hudson" (by Masters) Wonders of World Engineering Harmsworth Press, p436. Twelve years later a new company formed to complete the tunnel. “So carefully had the British engineers sealed it off that they were able to uncover the shield and drive it through to the other side.” The North Tunnel was completed in March of 1904 and the South Tunnel was completed in September of 1905. Fifty years of rapid transit, 1864-1917 / by James Blaine Walker. New York City: Law Printing Co., 1918. p287. “In 1892 the contractors, S. Pearson and Sons, filed a lien for $20,000 on the tunnel.” p286. In 1902 legal counsel Crevey & Rogers wrote to Sir Weetman Dickman Pearson (later Lord Cowdray) in Mexico City to say that as advised they had refused offer for $75,000 dollars on Pearsons interests in the tunnel and that this had proven to be a good decision when new bonds were floated to finance the completion of the tunnel. Pearsons also acquired more tunnelling contracts in New York around this time (1903) because of reputation.
The other important precedent for the resolution of the arbitration was the Littleton Reservoir case. The London Metropolitan Board had contracted a reservoir at Littleton but problems arose with the chosen line of excavation upon which to place an embankment. As a result of arbitration, it was decided to arrange payment for the additional work necessary to resolve the problem on a cost plus percentage basis. The circumstances leading to grievance shared some similarities with the Silent Valley case. The contract was made in 1919 to complete work already begun (the war in 1914 stopped all non-critical building work). By contract the Littleton reservoir was to be completed within five years or else the contractor would receive penalties for non-completion. But if the work was completed on time and underneath the estimated costs much of those savings would go the contractor in the form of profits. The contractors had

...excavated a length of trench and on the west side of the said reservoir and found that the subsoil where described in the Contract drawings as London Clay did not in fact consist of London Clay but of clay containing a large percentage of sand and that the results of the trial borings made by the Board previously to the date of the said Contract at or near the alignment of the western puddle trench (as shown on Contract drawing...) were incorrect and misleading.

The contractors suggested moving the line of the Western puddle trench to avoid the difficulty and expense of excavation at that location. As explained by the Metropolitan Board's later legal documents, the contractors "became apprehensive that there would be great expense and difficulty owing to the nature of the sub-soil, in excavating the puddle trench down to the sound and solid London clay..." and thus the contractors would be less likely to make any profit on savings from reductions to the likely cost. The engineer for the London Metropolitan Board wanted to compensate for the loss of capacity by shifting the line of one of the other puddle trench embankments. The contractors wrote a letter which suggested sacrificing some of the storage area rather than risk putting the bank in the sandy clay area. In October of 1921 the engineer instructed the contractor to change the position of the Southwest puddle trench and its containing embankment.

50 Contract and Specification documents, Pearson Archive, Box 67.
51 Dec 16 1926 News-letter. The Stockton reservoir dispute was also settled on a cost plus percentage basis.
52 "Statement of Claim" and "Defence" documents, Pearson Archive, Box 15
53 "Defence" p2, Pearson Archive, Box 15
54 "Statement of Claim" p3, Pearson Archive, Box 15
thus restoring lost storage capacity but also increasing the expense for the contractors. The contractors refused. The London Metropolitan Board took the case to arbitration. A new contract was signed between the parties in 1923 which resolved the problem of remuneration on a cost plus percentage basis. The percentage of profit was 10 (although the cost of office administration for the contractors also came out of this 10%).

Another fact perhaps sheds a slightly different light on the relevance of the Littleton Reservoir dispute to the Silent Valley arbitration in Newcastle. The contractors in the Littleton Reservoir dispute were S. Pearson & Sons, Ltd. Thus in 1923 when Pearsons were negotiating a contract with the Water Commissioners they were also resolving the Littleton Reservoir dispute. It is quite likely that when they negotiated the contract language they were considering especially carefully what would protect them if a similar case of uncertainty arose. It seems probable that the powerful and effective interpretation of the original replica contract (with all of its additional record of detail) enabled Sir Lynden Macassey to link these past circumstances with the present ones in such a way that the previous resolution was re-enacted.

**Conclusion: Subject, Object and Sovereign**

As we saw in the previous chapter, for some parties it was not acceptable to have indefinite disagreement and the eventual suspension of work at the Silent Valley. Some resolution of the conflict had to be found. When other forms of resolution failed the contractors turned to the legal frameworks and filed a grievance to be resolved by the arbitration as per the dispute resolution clause in the Contract.

Legal frameworks might be thought of as a matter of sovereignty enacted at the procedural level. This means that they resolve conflicts between several alternative (and often assumed to be conflicting) actions, arrangements or options so as to bring about (usually by legal imposition) a common course of action on all parties. While the general actions of legal procedures are an expression of sovereignty (procedural sovereignty), the legal system as a whole is connected to the sovereignty of the state. This is because the overall system is designed to uphold the day to day economic and social order which the state both supervises and is upheld by. State sovereignty establishes and authorizes a legal system. In a case of arbitration using a legal framework we would thus expect there to be (in addition to the legal framework itself being described as sovereignty at a

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55 Mo. No. 697 in the High Court, Chancery Division, 1922, under Justice Mr. P.O. Lawrence.
Chapter 5: The Arbitration of Nature

In this particular arbitration the interests of 'state-level' sovereignty can be more readily intuited. Furthermore, the arbitration must also resolve a dispute about nature. Thus the procedural level of sovereignty is asked to make a judgement on the boundaries of nature. The linking of procedural sovereignty and the greater interests of the state is suggestive about the relation of the state to questions of nature in the early Twentieth Century.

State Sovereignty: The circumstances of this disagreement are more immediately recognizable than most legal disputes as an issue of concern to state sovereignty. For example,

- The Attorney General is the legal spokesperson for the case of the Water Commissioners. It is quite clear that the Northern Government has a vested interest in making this project successful in whatever way it can be. The Attorney General's presence as the highest legal authority in the Northern State is indicative of the attention which this matter of water is receiving from the governing agents of sovereignty.

- Remarks in the Irish News reminded readers of some of the recent uses to which the Silent Valley had been put (these uses were reviewed in Chapter Two): "... one of the great arguments against any interference with the boundary of the County Down used by the Government while the 'Border' humbug lived was the horrible danger of giving the Free State control over the invaluable Silent Valley. We may yet live to regret the Free State's failure to secure it"

Sovereignty and the Boundaries of Nature: The arbitration also concerns definitions or constructions of nature.

- The uncertainty of depth (particularly when multiplied by the uncertainty of the sub-soil's properties) was a key factor in the description of the design as unfeasible.

- As part of the dispute, conflicting representations of nature were prepared in the form of charts, graphs, and diagrams. These performances of nature were to be shown to Mr. Binnie, who is both the Arbitrator and an engineer, so that he might judge which were to be considered matters of fact and how these facts should be arranged.

- An important question for those involved in the arbitration was 'What is the nature of the
sub-soil? For example, is water intrinsic to the material or can the material be dewatered?

- The contractors' legal team puts the nature of the sub-soil at the foundation of their argument. Because of the sub-soil, the design was said to be unfit for purpose. Thus the Water Commissioners were responsible because (according to a particular reading of the contract) the Water Commissioners were responsible for errors of design. The particular arrangement of the facts at this point enables them to claim their argument and force renegotiation of the legal and financial arrangements for constructing the reservoir.

The disagreements about the nature of the sub-soil (for example, is water intrinsic to the material) are at one level a classic subject/object boundary disagreement. As described in Chapter four, knowledge of the object (including the boundaries which define the object) will be constructed within the context of a purpose to which the knowledge will be put. That purpose is based on the boundaries of the subject which acts upon the object (both in constructing knowledge about the object and utilizing that knowledge through further actions of the object). In order to understand the relationship of sovereignty to the drawing of these types of boundaries let's review Sir Lynden's argument.

Sir Lynden had to accomplish two things. At the level of nature the contractors hoped to find a solution to the excavation difficulties without being forced to pay for it out of their own pockets. But at the level of political authority the contractors were ambivalent about confronting the Attorney General of Northern Ireland or the Water Commissioners whom he represented. The presence of these parties (particularly the Attorney General) indicated a sovereign interest in the outcome. Pearsons depended on the authority of Water Commissioners for the construction contract. A bitter legal battle resulting in an un-built reservoir would not benefit the contractors.

According to a particular reading of the contract, the Water Commissioners were responsible for errors of design. Because of the sub-soil, the design was said to be unfit for purpose. At the procedural level of sovereignty, Sir Lynden did not have to conclusively resolve the nature of the sub-soil. The nature of the sub-soil (as understood in court) merely had to be delimited to a range of values where it seemed a timber trench wouldn't be practical for excavation. This delimitation was determined by information conflict with charts, diagrams and graphs, and also to some extent the material itself as an actant lent credibility to the interpretation.

At least one part of the difficulty in ascertaining the material is that the Water Commissioners
and the contractors had approached it with different purposes in mind. Their subject positions had been split because of concerns about who will bear the burden of additional costs (and also carry the risk of failure should the reservoir construction fail). Thus instead of investigating with a common purpose each sought to demonstrate the properties of the material which most supported their own best position in relation to the contract. For example, the Water Commissioners felt it was important to determine if the difficulty in de-watering the line of the trench was because the contractors had not sufficiently diverted the Kilkeel River from the works and thus the groundwater level was continually being replenished. That would not have been an error in design. The Water Commissioners and the contractors did not have common interests. Until the dispute between them was negotiated they would approach the question of the nature of the material from different subject positions.

By achieving a strong position within the procedural level of sovereignty, Sir Lynden was able to push for negotiation. Successful negotiation would help unite subject positions of the Water Commissioners and the contractors, thus enabling knowledge (the arrangement of facts for a particular purpose) to be constructed in the context of common purpose. The nature of the sub-soil could be investigated without diverging intentions. This common subject position at the level of questions of nature is emulated by the construction of commonality at the level of questions of sovereignty. In order to make space for the Water Commissioners and the contractors to have a common purpose (building a reservoir) Sir Lynden picked Providence as the reason for difficulties. In this way blame would be drawn away from the Water Commissioners and their political authority (connected to sovereignty) would not be challenged. The identity of the subject position is formed by opposition to some other. Both the Water Commissioners and the contractors can unite in their opposition to those who prefer them both to fail. In this case the other is said to be nature or Providence. However the blame which requires being sheltered from comes from opponents of the Mourne Extension Scheme. Thus implicitly they are another ‘other’ which the Water Commissioners and the contractors share. Opponents of the Water Commissioners such as

56 In theology, Providence is the sovereignty, superintendence, or agency of God over events in people’s lives or at historical moments. Thus it comes to be something like a divine characterisation of chance, circumstance, or luck. Providence is here treated as a religious or divine characterisation of nature. Claiming that “God has stopped us” would have sounded very different from the statement that “Providence has thus far prevented us.” There is a greater sense of agency associated with the former statement. By implication those who are stopped by God are morally culpable of some wrong. But saying that Providence prevents gives a divine association to the confrontation with nature. Being defeated by God’s nature is not a sign of weakness in the way that being defeated by nature might be seen as. For Sir Lynden, Providence is a characterisation of the state of facts or circumstances within the nature that god has created.
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the well-to-do Rate Payers Association and those nationalists who followed the criticisms of the Irish News were another source of common opposition which helped align the Commissioners and the contractors to a common subject position.

Ultimately the resolution enacted happens at several levels. At the procedural level of sovereignty the “arbitration” award is clearly the results of negotiations. The arbitrator rather than make a sovereign decision enacts his sovereignty in the form of an award mutually agreed upon during negotiations. At the level of disputes about nature there is merely an agreement to “investigate” for 18 months but crucially the subject positions have been united in order that knowledge will be grounded in one purpose rather than two opposing purposes. The threat to the authority of the Water Commissioners has been protected by the political cover story of Providence or nature. This threat to the Water Commissioners is also indirectly a threat to the Northern State which had backed the project against difficulties. During the formation of the Northern State the reservoir project was even used to stabilize the territorial boundary of the state (See discussion of Boundary Commission in chapter two).

As we will see in chapter six, the narrative constructed during the arbitration proceedings not only enacts resolution of the immediate legal dispute; it also continues to be useful to the Water Commissioners and their immediate allies in upholding the ongoing project. As per the narrative of Sir Lynden, nature is used to displace political blame for the project difficulties away from the Water Commissioners. This serves as an answer to questions about progress in the Valley and enables a policy of non disclosure until such time as some form of success can be announced. Later the successful science and engineering project can be associated with good governance and displayed publicly.

Sir Lynden’s argument, on behalf of the contractors, established dominance at the procedural level of sovereignty and linked the resolution of a dispute about nature with a particular arrangement of political forces including the authority of the Water Commissioners and the sovereignty of the state. As we have seen in this chapter, the resolution of a dispute about nature requires the resolution of subject-object promiscuity at the ontological level. I would like to suggest that these types of resolution are executed as a form of sovereignty. The implication of this is the triad subject, object, and sovereign (which might be considered more informative than the Cartesian pairing of subject and object without any associated description of how they come to be distinguished).
Chapter Six
Political Completion

Following the arbitration settlement of December 1926 different newspapers gave different editorial opinions although the general sentiment was not favourable to the Water Commissioners. A million pound project (with £400,000 already expended) under the supervision of the Water Commissioners seemed for unknown reasons to be on the brink of failure. Following the precedent set at the arbitration hearings the Commissioners suggested that the reason for difficulty was “the dispensation of natural forces.”¹ A less charitable column in the Belfast Newsletter spoke of nasty rumours that it was not nature or Providence at fault but that it was in fact the original test borings.²

This chapter will discuss what people in Belfast knew of the Silent Valley project after the arbitration case until the completion of the reservoir. The chapter relies mainly on newspaper accounts of public knowledge. In contrast, the following chapter (chapter 7) examines the developments in the process of construction which would not have been public knowledge but were happening in the valley during this same period. As we shall see in chapter 7, the technical details are intricately linked to the political debate and eventual public approval of the project. However, in this chapter we shall look at the difficulty the Water Commissioners faced in pulling together the political will and public support to authorize the completion of the project even after the independent Board of Engineers pronounced possible the construction of the reservoir. At two moments in particular the push to establish political support for completion of the project was felt. Important members of the Northern Government participated in the Water Commissioners' annual dinner in May of 1928 as a sign of support for the project. The final push for political completion came to maturity in October of 1928. If the first push

¹ Dec 17 1926 Telegraph
² Dec 17 1926 Newsletter
enabled the project to continue the second designated who would be the contractor that would complete the project. The second half of the chapter describes what was felt after construction of the reservoir had surpassed the most difficult and uncertain points. During this period the success of the Silent Valley gradually came to be promoted as a showpiece of science, technology and governance. This contrasts greatly to the period of uncertainty when the Belfast Water Commissioners tried to say as little as possible about the project. They kept their heads down and hoped that the public would be interested in other business. Whereas before the arbitration the Commissioners had fended off embarrassing questions with the legal claim of subjudice now they used the precedents constructed during the arbitration hearings: that nature or Providence had thus far prevented success and this was a disappointment to all.

Conclusion to the arbitration

The immediate aftermath of the arbitration hearings set the precedent for the following year. The Belfast City and District Water Commissioners had been accused of withholding information, so necessarily they had to respond to this. But after making this response and despite their many affirmations that yes, full publicity should be given of their affairs to the public, the Water Commissioners kept quiet about what was happening in the valley. Despite whatever noise or knowledge was being made in the Silent Valley during the exploratory year as engineers, machines, and manual labourers toiled and tinkered beneath the surface of the earth, the Belfast newspapers heard none of it. With journalistic propensity for language they would describe this throughout the year as ‘Silence from the Silent Valley.’

The *Northern Whig* however was initially quite supportive. It went so far as to “pardon” the ratepayers for being upset with the Water Board. It recorded the courage of the Water Commissioners and noted the legal precedents to the way the case had been resolved. The Littleton reservoir and the Stockton reservoir had both been resolved with a cost plus percentage basis solution for the remuneration of the contractor. The Belfast Water Commissioners were said to be following the precedent set by the London

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3 Dec 18 1926 *Northern Whig.*
Metropolitan Board, largest Water Authority in the world, when they had encountered similar difficulties at their Littleton Reservoir project.

The day after the arbitration hearings concluded the Water Commissioners made a public statement.4 George Condell, J.P., Chairman of the Water Board refuted the charge of secrecy. He explained to members of the press that he knew that they would be just, fair and equitable, as was their duty. Seven years previously with eight new members the Water Commissioners had set out as custodians to begin this long anticipated project. The present difficulty was caused by the “dispensation of natural forces.”5 Mr David Adams also spoke. Adams had been one of the original four voters to oppose the project, especially the way in which the contractor had been selected. He had gone so far as to resign. He had now returned to the Board and was in fact a very important member as Chairman of the Finance Committee. Adams said that they (the four original ‘no’ voters) were not ‘crowing’ as a newspaper article that morning had suggested. His original vote against the project had never been on the basis of any engineering knowledge.

The *Irish News* editorial suggested that these statements were to stave off public criticism. For thirteen months they had kept secret a story which once “boiled down” amounted to the fact that after 400,000 pounds had been spent the engineer’s plans were found impractical by the contractor.6 The difficulty of following and making sense of the facts was also pointed out. “Belfast had not 500 citizens who can follow the parties to this almost unprecedented transaction through mixed up masses of technical detail.”7 The relevant figure was said to be the man on the street: “...what the man in the street, who has to pay his share when the mighty bill is presented wants to know is...”8 The “man in the street” is a slightly different image than that given by using the word “ratepayer,” which was used by most other newspaper commentators. The ratepayer might also be a property owner or employer. The Irish news cited a remark by Condell, the chairman which seemed “to suggest that some marvellous geological change occurred.

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5 Dec 17 1926 *Telegraph.*
6 Dec 18 1926 *Irish News.*
7 Dec 18 1926 *Irish News.*
in the mysterious valley between 1912 and 1920.” The commentator then went on to doubt the assertion of knowledge by Condell. How did Condell know that “the depths at which the rock lies under the surface” were not so great that the trench excavation had no possibility of success “even if the resources of the British Empire were at the disposal of the Trust?”9 Invoking the recently released Megaw report (local government scandal), the writer suggested that Belfast was becoming case-hardened to administrative bungling and theft even at the same time that there were 50,000 unemployed on the street. In general, the Irish News presented the most critical response to the Water Commissioners. Its readership were more likely to be Catholic and less likely to be unionist. A column entitled “searchlight” was particularly pugilistic in its attempts to shine light on the Water Commissioners’ silence. One of the articles in the Irish News was titled “the Silent Valley Fiasco.”10 In addition to criticizing the execution of the reservoir the Irish News suggested alternatives such as Lough Neagh. The water of Lough Neagh once chlorinated could supply Belfast’s needs, they claimed.

Shortly after the conclusion of the arbitration a letter from the new Board of Engineers was published. The Chairman, Condell, was “pleased that the time has arrived that every particle of information is available.”11 Three exploration shafts were by means of compressed air to be put down north of the embankment line so as to facilitate dewatering of the sub-soil. More experimental boreholes for measuring the depth of the earth were to be made.

The Chamber of Trade versus the Water Commissioners

Despite the claim that full publicity had now been given to all of the arrangements in the Silent Valley, the Belfast Chamber of Trade was not satisfied.12 The full text of the first day of the arbitration had never been made available. Other information was also felt to be missing.

8 Dec 18 1926 Irish News.
9 Dec 18 1926 Irish News.
10 Dec 18 1926 Irish News.
The issues (which had been "ruthlessly pushed aside"\textsuperscript{13}) were taken up again in the Chamber of Trade. Critics of the project felt that they needed to make their remarks in relation to expertise. One speaker suggested that the Chamber of Trade should impress upon the three engineers a modular approach rather than a grand approach. This would be low cost. They wanted more piping in the city rather than a big project. They wanted a smaller scheme. A speaker, Mr. Lowry, who, it was explained, although he was not a geological expert he knew something of the Mournes, made comments at the Chamber of Trade meeting. About this time in the Irish News the "searchlight" columnist wrote, "I do not wish to be an alarmist but has rock bottom been found?" The columnist claimed his or her information came from a chat with an engineer. All of these critics were concerned to speak with or through expertise.

The Commissioners were compelled to respond. During a meeting (January 1927) the chairman Mr. Condell was described as saying,

As he had frequently said the board had nothing to hide from the ratepayers in respect of the construction of the reservoir. That the hidden and strong forces of nature had so far prevented the successful carrying out of the scheme was a disappointment to all...\textsuperscript{14}

Whereas the chairman of the Board emphasized "the dispensation of natural forces" suggesting that there was no human blame, the chair of the Finance Committee said something slightly different. David Adams:

If there be blame, I want it to be clear, none of it is on the shoulders of the Board, but should be rightly transferred, if there be any blame, to the engineers who were entrusted with the job.\textsuperscript{15}

\textsuperscript{14} Jan 27 1927 Telegraph Jan 28 Irish News, Northern Whig, New-letter.
\textsuperscript{15} Jan 27 1927 Telegraph Jan 28 Irish News, Northern Whig, New-letter.
He also responded to various assertions in the *Northern Whig* regarding rates, exploratory reports, etc. The line of blame displacement articulated by the Water Commissioners was now double. Nature was responsible and if that did not work then the engineer was at fault. This duplicity was noted in the *Northern Whig* column: Adams says engineer, the chairman says nature. The columnist, ‘an old fogey,’ wrote explicitly that just as an engineer battles with the dispensation of natural forces so a public body must accept responsibility for what is done or neglected by its engineer. He also commented on Mr. Adams “new character as a protagonist of the Board instead of his former one of sharp critic” of Board finances in “correcting alleged misstatements in my column.”

At the beginning of February the Chamber of Trade decided to write to the Water Board to organise a deputation that would visit the Commissioners. The letter gave a list of documents that the Water Commissioners should provide for them. In the middle of this row between the Chamber of Trade and the Water Commissioners nominations were due for the annual reselection of five (out of fifteen) members of the Water Board. Water Board elections were rarely contested. However Ebenezer McElroy of the Pottinger district was not standing again for re-election because of poor health. Successful candidates for this district were normally the product of a nomination from within the Pottinger Unionist Association (as McElroy had been). A younger man, Mr. Alexander Dalzell was selected for that nomination.

At the meeting of the Pottinger Unionist Association the populist character of Ulster’s political culture (as discussed in Chapter 1, p28) is illustrated by some of the issues raised. For example, near the beginning of the meeting a Mr. Hugh C. Stitt complained that the Ulster Hall had been let out to socialists! Socialists were thought not to prioritise the link with Britain to the extent unionists felt necessary. Despite this negative sentiment against socialist politics, working men’s issues such as good wages

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16 Jan 28 1927 *Northern Whig.*
17 Feb 7 1927 Around about this time the Water Commissioners also announced concessions to large consumers of water (many of these businesses may also have been large ratepayers and thus likely to have similar interests and pay attention to the Chamber of Trade).
18 Feb 18 1927 *News-letter.*
were important to many of the unionists. Many of these unionists worked for their living and were thus inclined to be at odds with employers of the type who sat in the Chamber of Trade. When James Price, head of the Chamber of Trade, and a member of the Pottinger Unionist Association, raised a motion of concern with the Water Commissioners, many persons spoke out. Councillor McBride payed tribute to the Water Commissioners – It was no fault to them if their officials had let them down. Mr. Hugh C. Stitt, who had complained so ardently about socialists, joined in to say that the people condemning the Commissioners today would be the first to complain if there was no water. Every fine scheme had been a success. J. Anderson, a working man, gave remarks on what he felt the Chamber of Trade beliefs were regarding public employment policy and the rates. In his opinion the Chamber of Trade would be happy if workers’ wages were lowered so as to reduce the rates tariff on their businesses. Mr. James Price’s motion was defeated by a large margin. The economic and political elites of Ulster were subject to the working class sentiments of their Ulster loyalist supporters. The establishment’s support of populist unionism helped curtail working class defection to class based politics. When Mr. Alexander Dalzell spoke he said he did not support those in the newspapers who were saying “cut losses”. This was unconstructive. He spoke in favour of fuller publicity and full consultation of experts without ever implying that the present Commissioners were concealing something.

The author of the “Searchlight” column in the Irish News picked up on the debate at the Pottinger Unionist Association and encouraged the Chamber of Trade to engage their complaints with the Water Commissioners as an election issue. However in most wards the endorsements of local Unionist associations was the most significant factor in installing a Water Commissioner. The Chamber of Trade had already done their best to intervene. At the March 1927 election the four Commissioners up for re-election were returned without contest. Mr. Dalzell became the new member to the Water Board from the Pottinger ward. Joeseph Shaw, JP and Mr. William Dowling became chairman and deputy respectively.

19 Feb 18 1927 News-letter. For description of the populist character of unionism see Bew, Gibbon, Patterson, pp47-50. This is also discussed in Chapter 1, p11.
Shortly after the elections, the Chamber of Trade received a sharp letter from Mr. Quinn, Secretary to the Water Commissioners, regarding the Chamber of Trade’s previously unanswered request for a deputation. A deputation would be acceptable. But regarding their requests for information before such a delegation would occur, the Commissioners

absolutely decline to give any undertaking and do not recognize the right of your Board to seek to impose such a condition. Perhaps when replying you will be good enough to inform me whether your Board claims to represent the water ratepayers of the city and district, and if so their authority for putting forward such a claim.20

In reply to the reading of this letter at the Chamber of Trade meeting it was suggested that since such a long delay had occurred and the response to their request had come “well after the election of the Board in fact,”21 that no discussion would happen until the letter had been carefully reviewed in committee.

Death of the engineer

On the 28th of March at his residence “Moolieve Park,” Mr. Frederick W. McCullough, M.Inst.C.E., chief engineer to the Water Commissioners and primary architect and designer of the controversial reservoir at the Silent Valley, passed away after a long period of illness. He had been a long time member of the Masonic Order, holding numerous offices and positions within that organisation. In 1907 he was one of the principle witnesses before the Belfast Health Commissioner. He had been elected a corporate member of the Institution of Civil Engineers since 1889 and a member of the Institution of Water Engineers since its formation. During the Winter meeting of 1915-16, held in the Geological Society’s rooms in Picadilly, London, he was elected the president of the Institution of Water Engineers. Although his eldest son had made the

“supreme sacrifice” in the Great War, he was survived by his wife (originally from Edinburgh) and two other sons. The telegraph wrote,

he may be said to have practically died in harness, for he contracted the illness which has regrettably proved fatal after an attack of pneumonia, whilst engaged with the experts at the Silent Valley inquiry in Newcastle towards the close of last year... 22

In April another old engineer died. The death of Ernest Weetman Pearson, better known as Lord Cowdry, meant that the vast empire which was Pearson & Sons Ltd. would quietly be packing itself up. Pearson & Sons (Contracting Department) announced it would not be undertaking any new contracts. This would “bring to an end a history of more than eighty years, during which the concern has become one of the most famous in the engineering world.” 23

1927: The exploratory year and the Water Commissioners’ silence

At the beginning of April Mr. Thomas Henderson again raised a question about the Silent Valley in the Northern Parliament. He asked Mr. Andrews the Secretary of Labour what was happening in the Valley. Mr. Andrews replied that the project was not an unemployment relief scheme and therefore he had no authority in the matter but “work might be continued as soon as the investigations, which were absolutely necessary should be completed.” 24 Later in April the Northern Whig columnist ‘an old fogey’ complained that there have been no forthcoming reports about progress in the valley for four months. 25 The Irish News wrote frequently about the Silent Valley, usually in a critical manner. All the time the Commissioners did not speak in public about the Silent Valley.

But the Commissioners were involved in public activities. Swimming associations thanked the Commissioners for new improvements to the bathing facilities in the water

22 March 28 1927 Telegraph.
23 May 6 1927 News-letter (citing the Evening Standard).
24 April 6 1927 News-letter.
25 April 21 1927 Northern Whig.
works park on the Antrim Road. The Water Commissioner Mr. William Courtney "intimated his intention to provide a cup to the Association for some competition organized by that body to take place at the waterworks." The Commissioners were offering to pay for the trophy and present it to the winners if the swimmers were to organise a public competitive event. In August the Association's rally was reported as a "Waterworks Frolic." By the end of August the number of swimmers during the season was given as 10,000 of which 5,000 had visited in the previous fortnight.

Despite the overarching deliberate lack of publicity for the Silent Valley project during 1927, there was some presentation of the engineering project to a limited but important audience. Use of Silent Valley as a site of political promotion began to happen as early as June 1927, even before it was clear that the problems of excavation were resolvable.

In June William Robinson, chairman of the Newry Council and now President of the General Council of Municipal Authorities, an organisation dealing with "matters so diverse as public health, roads, housing, and rating," convened a meeting of that organisation in the Newry technical school. Members of the Northern Government were present. Major George E. Harris, C.B.E., D.S.O., Permanent Secretary to the Ministry of Home Affairs was present. Also Lieutenant Colonel W.B. Spender C.B.E., Permanent Secretary to the Ministry of Finance and head of the Civil Service in Northern Ireland was there to address the local government representatives. These two persons came from allied but quite different trends within the organisation of the Northern Government. Major Harris came from the populist tendency which included Sir James Craig, Prime Minister, John Andrews, Minister of Labour, and R. Dawson Bates, Minister for Home Affairs. "Broadly speaking, this group sought to generalise to the state as a whole the relation between Protestant classes epitomised in the B Specials. This relationship was characterised by a combination of sectarian and 'democratic' practices, and by a high consumption of public funds." However Lieutenant Colonel Spender was a key member of the ameliorating tendency which sought to "press the state along a via Britannica of a

26 21 May 1927 in the Belfast Saturday Night.
27 9 Aug 1927 Telegraph.
29 June 25 1927 News-letter.
Other key members of this tendency included Ministers of Finance Hugh Pollock and John Milne. After a toast to the King and a toast to the Government, Spender addressed the members of General Council of Municipal Authorities. He said

he thought perhaps the public was inclined to expect too much from governments, and it was possible they also expected too much from municipal authorities. They might have been encouraged in the past by a certain statesman who after the war had promised them very refreshing fruit. Neither governments nor municipal authorities could do as much for the people as they expected. The most they could do was try to get the machine working smoothly and the administration working first of all with efficiency; Secondly with economy, and, thirdly, and perhaps mainly, with general justice.32

The speech by Harris was slightly different in its emphasis. The association was designed to be "an organisation of benefit to the whole community and particularly to the urban areas in Northern Ireland."33 He discussed some of the successes of the association in bringing members of the Municipal Authorities together, and then submitting suggestions for legislation to the Ministry of Home Affairs. The new Motor Traffic Act and Roads Improvement Bill were both examples.

These two visions of the role of government (efficiency, economy, justice versus the provision of benefit) were slightly at odds. However, the program for all of the participants, regardless of which message they took home with them, included a trip to the Silent Valley. After singing the National Anthem and viewing the local fire brigade, the participants

30 Bew/Gibbon/Patterson, p76.
31 Bew/Gibbon/Patterson, p76.
set out in comfortable motor buses for the Silent Valley. On the way a brief halt
was made at Kilkeel where the harbour was inspected... They spent a very pleasant
hour in the valley inspecting the work that has been carried out in connection with
the construction of the new reservoir, and afterwards, through the thoughtfulness
and kindness of Mr. Robinson, had tea in the open air.

....Mr. Shaw... welcomed representatives of the urban authorities there so that
they might see for themselves the magnitude of the task which the Board had
undertaken. They were, he added, optimistic that the scheme would be a success
yet. (Applause)³⁴

The presentation of the engineering project to this audience was organized by Mr.
Robinson of Newry City Council. Newry, a border town was very close to the Valley.
Officials in Newry might have been aware of or participated in previous tours of the
Valley. While use of Silent Valley as a general site of public attention would have hardly
been favoured by the Water Commissioners at this time, this particular event was
acceptable. This presentation of the Valley under difficult circumstances to an audience
of municipal leaders was perhaps a precedent for later visits, first by members of the
Government but eventually to many organisations. The valley even became a public
tourist destination. For the Chairman of the Water Commissioners to say that they were
optimistic that the scheme would yet be a success was a performative action. This is to
say that by its very iteration the statement contributes to the political and social
confidence in the project thus reinforcing the project as a whole.

As part of the settlement Muir, of Muir and Addy accounting firm, were sent to London
to audit the Contractors expenses to date. If the accountant gave a good report then
Pearsons might be paid for those expenses as per the arbitration agreement. The Irish
News suggested deferring payment of Pearsons' account.³⁵ At the Water Board vote to
approve payment, Mr. William Courtney voted against the majority.³⁶

³⁵ 16 July 1927 Irish News.
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Throughout the autumn the searchlight columnist of the Irish News wrote critically of the enterprise in the valley giving negative details about the progress and calling for the Government to set up an investigation committee as had been done with the housing scandal. The columnist claimed to have been to the Mournes and wrote a mixture of gossip and facts. Variously it was claimed that there were some impurities in the water, that Englishmen were being paid better wages than Ulster tradesmen, that big salaried engineers were killing time while wage workers were involved in difficult dangerous pit sinking, that excavation had mysteriously stopped in some of the shafts. A biblical motif was given: Moses of old struck rock to bring forth water, why not our modern engineers. Although all of these Irish News articles by the searchlight column were noted by the Water Board there was never any consideration of providing a response.

Criticism from the Northern Whig however did receive a response. At the end of November it reviewed what was said by the Commissioners in January after the exploratory period began. The Commissioners had been “close as oysters” and were perhaps wearing “rose coloured spectacles.” In response the Commissioners released part of the report from contractors but only the ‘progress of investigations’ portion. The ‘method advisable to recommend’ section was left out. Mr Shaw said that no statement that they could make would convey to the public definite information. The following day the Irish News, Whig, and News-letter all reported “No definite Statement”. In the Searchlight column the Commissioners were referred to as “will-o-the-wisp”.

The report of the Board of Engineers and the deleted paragraph controversy

In December of 1927 at the end of the exploratory year the Board of Engineers gave their report. At the Pottinger Unionist meeting Dalzell talked of the “courage of fellow board members, grit and determination, I am now in a position to tell you that

37 Irish News Sept 14, October 8, 10, Nov 3, 8 1927. The Megaw report exposed corruption in the provision of housing by the Belfast Corporation. The Collins Report, released in 1927 included other types of corruption in the administration of Belfast.
38 WAT/3F/3/6 clippings book.
39 Nov 28 1927 Northern Whig.
40 Oct 1 1927 Telegraph.
41 Oct 2 1927 Northern Whig, Newsletter, Irish News.

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Board of Engineers has pronounced good.**42** James Price of the Chamber of Trade congratulated Mr. Dalzell and his fellow Water Commissioners on their report and then enquired about buildings or other costs in excess to which Dalzell replied.

The newspapers all reported the information. In the *News-letter* an article “Hopes for the Silent Valley” gave a lot of the technical explanation. They repeated the conclusions of the report: There were now only two options—go on as advised or abandon. Delay however, would accomplish nothing and be expensive. Currently resources were being used in pumping bog water from 70 foot depth inside cased steel drainage shafts and in holding back (by use of compressed air) the muddy inflow of water logged silt and sand. The cause of difficulty was described.

No more difficult ground through which to construct an embankment for a great reservoir could be imagined than this. The whole of the Silent Valley, in short, is disclosed to be an enormous quicksand, to the depth of from 140 feet to 200 feet, with boulders through, a sort of sandy pudding batter, with boulders in it like raisins in a half-boiled pudding.**43**

A few days later much of the enthusiasm for the Water Commissioners that the good news might have generated was suddenly gone. Mr. Courtney was recorded by the press as objecting to the Commissioner’s meeting minutes not recording that his vote against the report being released with deletions.**44** The press now alerted to something being concealed from them ran articles with titles such as “Deleted Paragraph” and “Full Publicity Not Given.”**45** The deleted paragraph suggested who should complete the contract. The Board of Engineers favoured Pearsons.

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**42** Dec 23 1927 *News-letter.*  
**43** Dec 23 1927 *News-letter.*  
**44** Dec 29 1927 *Telegraph.*  
**45** Dec 30 1927 *News-letter, Northern Whig.*
The Irish News also ran a story on the Council of the Institution of Water Engineers emphasizing the value and scientific details of chlorination. The chlorination of water from Lough Neagh, largest fresh water lake in the British Isles, was their favoured alternative to the Mourne Scheme extension (and perhaps also a useful tool for discrediting the Water Commissioners).

The ‘Searchlight’ columnist pointed to the “public money being poured into this bottomless pit.” ‘Searchlight’ also began connecting its suggestions on chlorination to the reorganisation of local government services, taking quotations from and citing scientific sources. Perhaps there should be a geological survey to collect statistics and prepare future plans as well as a central water authority (similar to a central electricity authority) such as was done in America. When the Cabinet of the Northern Government was to inspect the Silent Valley the following day (reported on February 14) searchlight suggested that “the old method” would be used, “on the lines of the old town hall in pre war days,” when “susceptible English or Scotchmen visited Ireland to study the Irish problem on the spot....These tourists were chained and led round like so many sheep.” Searchlight also suggested some pertinent questions for the Cabinet ministers to ask (including are English tradesmen being paid more?) and remarked on where to find some real information.

If any member of the Cabinet tomorrow wishes to go down No. 13 shaft, I suggest that, in order to safeguard his valuable life, he should don a diver’s costume. If he does not, he will be in grave risk owing to the quantity of water.

Mr. Pollock, Milne Barbour, Sir Dawson Bates, and Mr. Andrews, all ministers in the Northern Government were to tour the valley (although Viscount Craigavon was “on the continent basking in the sunshine” and “conspicuous by his absence.”) The interest in the water project that the Northern Government had shown in 1924 during the

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46 Jan 9 1927 Irish News.
47 Feb 7 1928 Irish News.
48 Feb 7 1928 Irish News.
49 Feb 14 1928 Irish News.

boundary crisis was once again visible. In fact recently the old issue of border security had re-emerged in the newspapers. The select committee on Public Accounts had asked why a bill of only £194 was presented to the Water Commissioners for security around the Belfast water supply during the early 1920. Properly calculated this bill might have come to £2500-3000. The error had never been corrected despite being pointed out by comptroller and Auditor general. The minister of Home Affairs (Sir Dawson Bates) had decided not to bill for the full amount. The searchlight column asked

what influence had the Water Commissioners over the Government at that time? If any other public body in the Six Counties had contracted the debt mentioned the Ministry of Home Affairs would have taken prompt steps to make it pay up or take the consequences, it is evident the water board is immune, with no obligations to pay its lawful debts. Truly, strange things happen behind the scenes in Government circles.

In the March election of 1928, members of the Water Board up for re-election were all returned without opposition. William Dowling became the Chair of the Board and Mr. Courtney the Deputy Chair. Since the election process had validated the Commissioners, searchlight appealed to another type of legitimation in which to ground its rhetoric. Searchlight claimed that the most influential gentlemen of Belfast were watching the Commissioners- and if information was not forthcoming they “are determined to force it in another way.” However, quite to the contrary, support for the Water Commissioners was in fact now arriving from quite influential gentlemen. Lord Craigavon and members of the Cabinet of the Northern Government would be attending and speaking at the Water Commissioners’ annual dinner.

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50 Feb 14 1928 Irish News.
51 Jan 13 1928 News-letter.
52 Jan 17 1928 Irish News.
53 Mar 20 1928 Telegraph.
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1928: The Water Commissioners’ dinner

On May 2nd 1928 the Prime Minister spoke at the dinner given by Mr. William Dowling for his fellow Water Commissioners and other guests. Mr. Dowling, Chairman of the Board, also gave an informative speech. Because one spoke of the politics of a government and the other spoke of the politics of supervising engineering details in the interaction of humans with nature it is easy to think of the contingent presence of these two speeches as a slightly awkward conflation within a dinner party of separate and mismatched themes. Indeed, the majority of newspapers in Belfast reporting on the important event presented the speeches in two separate articles. Despite this separation (or purification) of politics proper from the sub or non-politics of interactions with nature, the presence of these two speeches together, should not be seen as accidental. The technical means of achieving interaction with nature is a precondition for politics proper.

Responding to the toast of “the Parliament of Northern Ireland,” Lord Craigavon reported that his Government had reviewed the budget put forth by Churchill’s Government and that soon Mr. Pollock, minister of finance would be presenting something quite similar. Regarding taxation the Prime Minister hinted that they might not be proceeding along “exactly the same lines as Great Britain”

Lord Craigavon went on to congratulate the Water Commissioners on their afforestation work in the Silent Valley. The Government, he said, had planted 2000 acres of the proper type of trees and were involved in negotiating for 7000 more acres.

Proceeding to speak of the laying of the foundation stone of the new Ulster Parliament Buildings, Lord Craigavon said he hoped the people of Northern Ireland

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54 May 1 1928 Irish News.
55 May 3 1928 Irish News, Telegraph, News-letter. Only the Northern Whig presented both speeches in a single article. The relative size of the title and subtitles indicate priority of importance given to the Water Commissioner’s statement. The Whig article uses the word “foundation” in two ways. It is used in “the laying of the foundation stone for the new Ulster Parliament Buildings” and also during the subheading titles in sense of finding a foundation for the reservoir: “FOUNDATION THIS YEAR: Reservoir Certain at Silent Valley.”
56 The ‘work of purification’ is discussed in chapter 1, p33.
would show their interest in their Parliamentary institutions by turning out in their thousands on May 19.\(^{57}\)

Craig's speech then returned to his hosts, praising them.

Mr. William Dowling then responded to the toast of “the Chairman,” proposed by the Prime Minister. Speaking on behalf of the Water Commissioners, Mr. Dowling informed all that the clouds over the Water Board for a considerable time were now beginning to disappear. In December past the Board of Engineers was of the opinion to go ahead even though they could not guarantee the depth. The Water Commissioners decided to instruct engineers to continue the exploratory work, put down whatever shafts were necessary in the centre portion, so as to expose the foundations at every point, and so remove any doubt or suspicion which was present heretofore...The citizens might rest assured that everything would be done to safeguard their interests in every possible way, and when the Board had anything further to report it would be given to them. So far as he personally was concerned, he had no hesitation in saying a reservoir would be constructed at the Silent Valley on the present lines.\(^{58}\)

In the newspapers of Belfast commentary on the pronouncements varied. In the \textit{Northern Whig} 'an old fogey' gave a Shakespeare quote “Now draw up the curtain and let's see your Picture,” suggesting that frankness would be more calculated to keep the sympathy of the ratepayers than secrecy.\(^{59}\) 'Searchlight' suggested the dinner was purely a political stunt. It was critical of the effect on Northern Ireland of following the British Budget. Regarding Craig searchlight said “his reference to the laying of the foundation stone of the new Parliament buildings showed beyond the shadow of a doubt that this ceremony will be a purely partisan manifestation.”\(^{60}\) In the Telegraph however letters appeared

\(^{57}\) May 3 1928 \textit{Northern Whig}
\(^{58}\) May 3 1928 \textit{News-letter}. The word 'lines' is plural in the original.
\(^{59}\) May 5 1928 \textit{Northern Whig}
\(^{60}\) May 3 1928 \textit{Irish News}
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asking for improvements to the water works swimming facilities on the Antrim Road. A reduction of the fee, flowers, beach sand for children, and band performances, were all suggested as potential improvements.\textsuperscript{61}

Over the summer little changed in Belfast. In the Valley a workman named Quinn died in June. He was 18 years of age, had been employed for only two weeks, working for the ‘Black Gang’ relieving valves. He was found drowned.\textsuperscript{62}

By July and August the Commissioners had suggested they would be in a position of knowledge regarding the excavation. But whatever piece of knowledge or certainty they felt they needed to announce a definite decision was still elusively beneath the earth. The public activities that the Water Commissioners were involved with were more popular. At the beginning of August the Ulster District of the Irish Amateur Swimming Association had organised (in cooperation with the Water Commissioners) an “Association Night”. A new 33 foot high diving board was being unveiled. A. R. Knight a candidate for the British Olympic team and English diving champion came to Belfast to participate.

During the event a dramatic life saving presentation was enacted. While the presenters were talking a fellow and a young woman went out in a row boat. They are called upon to return but refuse. They were “obdurate” wrote the newspapers.\textsuperscript{64} While leaning over to retrieve her hanky she falls into the water splashing about and the young man with her calls out to save her, that he can not swim. Fortunately, the men presenting the talk on lifesaving were there to pull the young woman from the water, demonstrating heroism in contrast to the obdurate and perhaps feminine foolishness of the row boaters. Many commented on how initially they were fooled by this staged demonstration.

\textsuperscript{61} May 5 1928 Telegraph.
\textsuperscript{62} June 23 1928, June 26/28 1928 Newry Reporter.
\textsuperscript{63} Aug 12 1927 Telegraph.
\textsuperscript{64} Jul 17 1928 T Aug 4 1928 Telegraph.
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The Gala was considered a success. However, few Water Commissioners were actually present. William Courtney the Deputy Chair later explained that they had had a meeting on that evening which had lasted until 9 o’clock. But the swimming is still important to us, Mr. Courtney reassured them.65 Outside of the public eye the Water Commissioners were now wrestling with their present contractor who did not wish the contract to complete the reservoir to go to public tender.

The Water Commissioners were also involved with public unemployment relief schemes.66 By the end of August the Commissioners had expended their 9000£ budget for relief schemes but they were discussing further financing. One Board member let slip that the Commissioners were “never stuck for money,” a statement that the newspapers were quick print.67

As the autumn of 1928 came the failure of the Commissioners to commit to some course of action in the Mourne Mountains was being noted. The *Northern Whig* wrote “a plain statement needed.”68 A debate broke out in correspondence pages about a meeting in the Belfast Museum more than a quarter of a century previous in which the Commissioner’s engineer at that time, Lyndon Macassey, had presented a controversial scientific paper about the Mourne Water Supply indicating an appropriate line upon which excavation could happen and the probable depth until bedrock.69 The Belfast Telegraph wrote that there should be discussion about what was to happen at the Silent Valley regarding the recommendations. The article was entitled, “Silence about Silent Valley unbroken for months- time ripe for statement”.70 There were now rumours of dissension among the Commissioners. The most drastic final pronouncement was made by the Irish News in an article entitled “Silence of the Silent Valley” when they stated, “We believe that the Silent Valley has no rock bottom.”71

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65 Aug 9 1928 *Telegraph.*  
66 Aug 10 1928 *News-letter.*  
67 Aug 24 1928 *News-letter.*  
68 Sept 1 1928 *Northern Whig.*  
69 Sept 10, 17 1928 *Northern Whig.*  
70 Oct 3 1928 *Telegraph.*
That previous unresolved controversy about the line of the embankment should resurface at this point in time seems unsurprising. A correspondent had sent in clippings of a report of a 1902 meeting at the Belfast Museum where the late Lyndon Macassey read a paper on the Mourne Water Supply. While critics at the time were described as saying that there was no bottom to the valley, Macassey pointed out that drilling had established bedrock at a depth of 60'. Although these critics had been labelled simply as "misinformed folk" they included several prominent people, including W. S. Carlisle a Water Commissioner at the time, and John Fisher of Fisher and Le Fanu. The biblical motif of truth repressed by God's punishment was invoked when the correspondent wrote, "But the voices crying in the wilderness were of course silenced by the authoritative rebuke of the engineer." Aggrieved, Lynden Macassey, K.C. the son of the engineer so grievously described (and very recently the eloquent barrister presenting for the Contractor during the arbitration hearings), wrote to the Whig urgently to correct matters of "fact." There had been three different lines upon which construction of reservoir embankment had been proposed, he explained.

Under circumstances which I hope I may not be driven to discuss as Mr. McCullough to the greatest regret of everyone has died, the site of the reservoir for some reason or other was changed for the third time, and the line of the embankment put still further down the valley to its present position.

**Political completion**

Finally in mid October the political move for completion emerged. The Telegraph reported that the Board of Engineers were recommending Pearson as the Contractor and that on "Thursday of this week recommendations of board in committee come for confirmation in Public meeting." The possibility of one or two resignations was anticipated. Even a London paper reported the controversy.

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71 Oct 16 1928 *Irish News*
72 Sept 1 1928 *Northern Whig.*
73 Sept 10 1928 *Northern Whig.*
74 Sept 17 1928 *Northern Whig.*
Differences of opinion have developed among members of Belfast Harbour Board (sic) as to proper course to adopt with regard to the scheme for erecting a great dam in the Silent Valley of the Mourne Mountains to provide a water supply for Belfast.\textsuperscript{76}

The meeting of the Water Board on October 18, 1928 commenced by receiving a deputation from the Ratepayers Association. While they desired a reservoir like the rest of the city, they were concerned about entering into a new contract without competitive tendering.

The Board of Engineers had recommended the present Contractor, Messrs. Pearson & Son on the existing arrangements of a cost plus percentage basis and that the possibility of bettering these circumstances was limited. Exchanging contractors would be fraught with the possibility of additional expense or new problems emerging. The total expenditure for the completed scheme was estimated to be £1,365,000. The majority of the Water Commissioners favoured following the advice of the Board of Engineers. A minority of the Board, including the Chairman responsible for facilitating the meeting discussion, opposed this course of action feeling that competitive tendering was the best business practice. Mr. David Adams presented the opinion of the majority.\textsuperscript{77}

Mr. Condell presented much of the argument for the opposition.

He denied the right of the engineers to interfere with the policy of the Commissioners to say that Messrs. Pearson must do the job....

\textsuperscript{75} Oct 16 1928 \textit{Telegraph}.
\textsuperscript{76} Oct 17 1928 \textit{Daily Mail}. Journalist confusion about the name of the public body might indicate a familiarity with Mr. William McCalla who was both a prominent Harbour Commissioner as well as being a prominent Water Commissioner.
\textsuperscript{77} The engineers had reported that the project was feasible at the beginning of the year and then again in June. It was in June that the resolution to instruct the engineers to prepare drawings, a specification, etc for the purpose of inviting tenders. Regarding this the \textit{Telegraph} writes, "That is a very important resolution, but no mention of it appears in the Press reports of either the meetings of the 14\textsuperscript{th} of June or 28\textsuperscript{th} of June. That may possibly be the fault of the press." Oct 19 1928 \textit{Telegraph}.
He refused to hand over the Belfast Water Commissioners’ cheque book to Messrs. Pearson and the Board of Engineers to fill in whatever amount they choose...  

The legal opinion given by the Water Board’s solicitor, Major McLean, was referred to and backed up first by Mr. E.S. Murphy, K.C. an eminent legal practitioner in Ulster and then further by an English barrister specialising in contract law. Mr. Hurst, K.C. Mr. Condell said that

Personally he was content to stand or fall by public opinion on the matter as he had expressed it, before he would vote for the resolution and sacrifice the great principles involved and his own independence. He would rather withdraw and obliterate himself from public life for all time.

Mr. Condell addressed Mr. McCalla who had originally voted against motions of the Board to go forward with the expensive Silent Valley project but eventually (when he had become Chairman) had put his considerable social skills into the effort of promoting the reservoir and helping to authorize the project.

That, he said, was a complete change of front, and he wanted to know what had happened to bring that about.

Mr. McCalla – Knowledge.

Mr. Condell – Knowledge?

Mr. McCalla – The report.

Mr. Shaw – The engineers’ recommendations.

Mr. Condell said they wanted to lead the Board into the mouth of Messrs. Pearson & Sons. Ltd.

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78 Oct 18, 19 1928 News-letter.
79 Oct 18, 19 1928 Telegraph.
80 Oct 18, 19 1928 Telegraph.
81 Oct 19 1928 Telegraph.
Although Mr. Adams finally spoke for one and a half hours explaining all that had occurred behind the "veil of secrecy," no further motions to resolve the matter (such as giving the contract for the completion of the reservoir to Messrs. Pearson) were proposed.\(^8^2\) The Water Commissioners decided to let stand the issue for another two weeks agreeing to meet again on Monday, October the 29\(^{th}\). An engineering report had entered a public debate.

![Figure 6.1](https://example.com/figure.png)

**Figure 6.1**

The Certainty Trough


Uncertainty about scientific and technical results increases for those who are directly involved in their production (thus they know the contingent nature of knowledge production) and also for those who are alienated from the projects or its goals.\(^8^3\) The association of the Silent Valley with Unionist rhetoric against boundary concessions may have alienated many nationalists (who were most often Catholics). Says Margaret O'Callaghan: "Catholics in Ulster held onto the idea of the Boundary Commission up until 1925."\(^8^4\) It is reasonable to suspect increasing/declining commitment to the reservoir project along a unionist/nationalist axis. Reception of the engineering report varies sharply between the unionist *Northern Whig* newspaper and the more nationalist *Irish News*.\(^8^5\)

\(^8^2\) Oct 19 1928 *News-letter*.


\(^8^4\) Margaret O'Callaghan, "Old Parchment and Water: The Boundary Commission of 1925 and the Copperfasting of the Irish Border" *Bullán* 4/2:27-56 (1999/2000) p34. Hope for the Boundary Commission was connected to a desire for political leverage to stop sectarian pogroms against Catholics.

\(^8^5\) It might also be remembered that the opinion of a newspaper readership is only indirectly correlated to the editorial representations of that opinion.
The Whig editorials said that rumours were ended; they had assurance from high authority that it was possible. Running into glacial drift was unfortunate, but running into litigation would be a disaster. It quoted from the engineers’ report, particularly regarding the cost of 9-12 months of delay that would be required if the contract was put out to tender. The News-letter said the Commissioners had acted wisely in delaying the decision so that “citizens” could study the facts and arguments now before them. The Irish News editorial emphasized Mr. Condell’s statement that the Commissioners were giving the Contractor a blank cheque. Of the engineers ‘Searchlight’ remarked, “but experts are no more infallible than non-experts.”

The supposed certainty of those less alienated from the project is not necessarily shown in the response of the Telegraph and News-letter (which were also mainly unionist in their perspective, the News-letter in an often populist manner). Publics often recognise (and are concerned by) their dependence upon expertise. Thus many people (such as the Water Commissioners themselves) were constrained in their relation to the engineers’ report. They must negotiate their own identity in relationship to expertise. We can begin to understand why the Water Commissioners had been so reluctant to commit without reservations to the program of the engineers. For those who felt constrained by or dependent on the experts in the Silent Valley, the later success of the project would have significance. Particularly in its incorporation into Belfast’s civic identity (shown later in this chapter- for example, the pride with which the British Water Association conference was hosted) we can see the negotiation of identity through expertise.

The Telegraph and the News-letter also discussed the legal point regarding whether or not the Commissioners were bound to Messrs. Pearson as a result of Agreement B which came out of the arbitration arrangements providing for an exploratory period. The Newsletter wrote that Messrs. Pearson,

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87 Oct 20 1928 Irish News.
contend that the clause gives them definite rights as regards the completion of the work, and have, in effect told the Commissioners that they will be held to the letter and spirit of the agreement. We are constrained to remark that the phraseology of the clause scarcely seems compatible with any other interpretation than that which the Commissioners give it. Lay opinion, however, has no value in such matters, and if Messrs. Pearson, as appears, have taken counsel’s advice, and are supported thereby in their reading of the clause, then there is a definite clash of expert legal opinion which, in certain circumstances, might lead to costly litigation, as well as prolonged delay in the completion of the scheme. How far the Commissioners may have been influenced by this consideration on Thursday when, by a majority, they rescinded a resolution ... that competitive tenders might be invited, we are not in a position to say. 89

Intermission

During the two week intermission between Water Board meetings Mr. Dowling and Mr. Courtney were active in attempting to promote support for their position. The Windsor Ward General Committee of the Cromac Unionist Association, of whom Mr. Dowling was an officer, passed a motion saying that they

having considered the position of the Silent Valley scheme, are strongly of the opinion that, one side of the question having been heard, and the other side having yet to be heard next week, the Water Commissioners should allow a reasonable time to elapse before coming to a final decision, in order that the ratepayers may have an opportunity of considering both sides of the question. 90

It seems probable that this somewhat neutral resolution was the best consensus that could be achieved in a multi-opinioned Unionist meeting.

88 Brian Wynne, “May the Sheep Safely Graze? A reflexive view of the expert-lay knowledge divide.”
89 Oct 23 1928 News-letter.
90 Oct 20 1928 Telegraph.
The forces of the majority were also active during the intermission. From the official photographs commissioned by the Water Board, the Telegraph provided for their readers a spread of pictures documenting the work at the Silent Valley. The pictures had been taken by famous industrial photographer of Belfast R.J. Welch. They showed readers the line of the trench, the curved cast iron segments which were being used to line it and also the air locks "by which access is obtained to the deep shafts in the central section of the trench." The text accompanying the pictures (perhaps also primed by members or officials of the Water Board) was full of geology words.

A few days later the Newsletter also published pictures from the Silent Valley alongside an article giving a positive view of the construction process. The article included sections on "The Embankment," "The Use of Compressed Air," "Pumping Operations," and the last section "Contractors World Wide Reputation." It concluded with a tribute to the now deceased engineer who initially designed the Reservoir, F.W. McCullough. Perhaps the enthusiasm of the representatives from the News-letter can best be explained by their direct encounter with the impressive engineering works and the surrounding forces of nature. The energetics of the environment and the work of engineers and labourers are carefully saluted in their account of their visit to the valley. Heavy thick clouds had been impatient to fill the valley with water. Mist and torrents of rain had delayed their human purpose by two journeys and a week.

We reproduce today a series of photographs taken yesterday at the Silent Valley, which convey some idea of the immense work... That these interesting pictures did not appear last week is the fault of rain clouds... When the "News-letter" party visited the Valley last week they found the whole area shrouded in mist and rain descending in torrents. In the circumstances, photography for newspaper purposes was out of the question, and yesterday, when the visit was repeated, the weather conditions were not very much better.

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91 Oct 22 1928 Telegraph.
93 Oct 22 1928 Telegraph.
94 Oct 22 1928 Telegraph.
But neither the camera nor the pen can convey an adequate impression of the immense job that has been undertaken here.\textsuperscript{96}

The airlocks were described as having "to the layman... a fearsome appearance."\textsuperscript{97} Their tour had been delivered under the tutelage of Mr. George McIlldowie, A.M.Inst.C.E., resident engineer for the Water Commissioners at the Silent Valley. They also praised Mr. F.W. McCullough, the original architect for the reservoir, which when completed would remain as a tribute to his memory and his genius.\textsuperscript{98} While certainly the affirmative position brought across by these admitted "laymen" is influenced by the presentation of experts, the article also indicates something of an aesthetic appreciation of the sublime magnitude of the work, the mountains, and the machines.

The visit was certainly an instructive one. The immensity of the task fills the mind with admiration for the engineers who can conceive and undertake it. In this wild and lonely corner of Mourne there is being created a work which will rival in impressiveness the "eternal hills" by which it will be surrounded. The southern end of the valley has been transformed. Tall cranes and chimney stacks tell of ceaseless activity, nine miles of broad-gauge railway lines radiate hither and thither, and the houses of the workers and the many other buildings required cover the slopes where only a few years ago the song of the river was the only sound to disturb the peace of the Silent Valley.\textsuperscript{99}

**Doubting Thomas shown**

At the second meeting (Monday, October 29\textsuperscript{th}, 1928) of the Water Commissioners Mr. Courtney, who had been speaking against the motion when the previous meeting adjourned, began by continuing the history of the project that he contrasted with the descriptive history given by Mr. Adams. The arrangement of explanation that emerged from the arbitration was still used in his description. "The fault did not lies (sic) with

\textsuperscript{95} Oct 24 1928 News-letter.
\textsuperscript{96} Oct 24 1928 News-letter.
\textsuperscript{97} Oct 24 1928 News-letter.
\textsuperscript{98} Oct 24 1928 News-letter.
engineers or anyone but Providence, Who had filled up the Silent Valley with material that could not be dewatered.”

Picking up on this remark the article in the Telegraph was entitled, “Blaming Providence. The Silent Valley Scheme.”

The Newsletter, perhaps invigorated by their recent visit, wrote the most detailed report. Mr. Dowling confronted the biblical metaphor that Mr. Adams had labelled the minority with. He said that Mr. Adams

...had referred to the minority as “Doubting Thomas’s” because they asked that the rock should be exposed in the valley before any instructions would be given. Not only was he not ashamed to earn that distinction, but he was proud of it. He should very much prefer to be a “doubting Thomas” than a “simple Simon” on a scheme over which suspicion and anxiety had hung heavily for the past 30 years. ...and he ventured to say... that if a plebiscite were taken in Belfast at the present time, the majority would get a shock in regard to the “doubting Thomas’s” (sic) amongst the public outside.

He really wondered did the majority feel as optimistic as their resolution indicated with not a doubt to disturb their peace of mind. ...he asked Mr. Adams to produce one person who would give them a guarantee that the Commissioners, or the rate-payers, could pin their faith to.

Mr. Adams would indeed produce an expert into which the doubting Thomases and the public could put their hands. He would also produce a map at a crucial moment in the argument. For Mr. Adams and the other Commissioners this gesture was perhaps reminiscent of the way in which diagrams had been deployed with conclusive effect by the contractors legal team during the arbitration hearings. The case for the majority was argued decisively by Mr. Adams.

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100 Oct 29 1928 Telegraph.
101 Oct 29 1928 Telegraph.
102 Oct 30 1928 Newsletter.
Dealing with the chairman's speech he said that from practically every standpoint Mr. Dowling had set himself up as opposed to the Board of Engineers.

The Chairman- Nothing is confirmed!

Mr. Adams said that if the chairman had confined himself to saying so, he would not have criticised him. The chairman had also raised the question as to whether rock had been found. He could most deliberately state that rock had been got right across the valley, and in the deepest portion a borehole had been sunk to a depth of 90 feet into rock.

At this stage a map was produced, and Mr. Adams remarked that apparently some Commissioners were not conversant with all that had been going on.

Immediately afterwards Mr. Adams's remark- that not only had they gone 90 feet into rock but 100 feet- caused the chairman to ask why all that information had been kept dark.

Mr. Adams said he was surprised at the chairman asking such a question. He thought the chairman was conversant with all that was going on.

Several members answered in the affirmative Mr. Adams's question as to whether the Commissioners knew all about that; and

The Chairman asked when they got information to that effect.

Mr. Adams- If you are not conversant with it all the other members seem to be.

The Chairman was about to intervene again when Mr. Adams said to him: "Please restrain yourself until I get these points out for the benefit of the public, and apparently some of the Commissioners.

Proceeding, Mr. Adams said that Mr. Binnie was in the Silent Valley on Sunday, and was perfectly satisfied with what had been revealed by the borings. The shaft which had been sunk verified what the bore holes had revealed twelve months ago, and all that the engineers had told the Commissioners a year ago had come true.

The Board of Engineers was delighted with the results attained, but evidently the chairman set himself up as opposed to them.

The Chairman- I am not disposed to put myself in opposition to them at all. I wanted doubts cleared away.

Mr. Miskimmin- You are getting that now!
Mr. Adams said the doubts so far as the engineers were concerned were at an end in January, but he admitted that he was one of the “Doubting Thomases” who said: “Show us the rock: let us put our hand on it, and then we will be satisfied.” The engineers proceeded, by means of the shafts, to show them the rock, and asked to be allowed to get on with the trench.

Mr. Dowling, having based much of the rhetorical force of his speech on the uncertainty of rock, was flustered when Mr. Adams could produce engineers and maps that would testify to their certainty.

Mr. Adams explained that Mr. Binnie, the chairman of the Board of Engineers, was leaving for Egypt on Thursday as a member of a commission and would need a definite answer by then. Adams was willing to delay the decision until then and he did not want anyone to have to resign.

The Chairman reminded Mr. Adams that he resigned himself on one occasion, and

Mr. Adams said he was coming to that. A few years ago he did not agree with the rest of the Commissioners on certain points, and he was egotistical enough to think that the public would support him and pat his back for resigning.

“I came back,” he proceeded, “and I may say that I was a foolish man for having handed in my resignation. The action I took was the height of folly and nonsense.”

The meeting was adjourned, reporters were asked to leave, and the Commissioners went into committee to negotiate the issues in private.

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On the Thursday meeting of November 1st (1928), the resolution was carried. Without agreement the minority had consented to stand aside. There were no resignations. Peace had been negotiated.

**Technical completion**

The reports of the Board of Engineers were now being shared with the press regularly. In December the contractors began to open up the trenches. Almost 500 men were employed at the Valley.

During 1929 the work continued. Several deaths occurred during the year. John Cousins, aged 53, was crushed between the buffers of two wagons near the vicinity of the trench. “He was conveyed on a locomotive to the motor ambulance, but died on the way.”

Two of his sons were working in the vicinity at the time. A few days later, also in March, William Forsyth, aged 20, was in the Trench when a supporting timber gave way, fell a considerable distance, and killed him instantly, leaving his wife a widow. In August John Murphy, aged 20, fell from staging a distance of 30 feet and received such injuries to the head that he died in a few hours.

By autumn of 1929 the excavation of the trench seemed certain. The annual dinner of the Water Commissioners normally held in May was held off until October and used to celebrate the now almost completely excavated trench. Mr. Courtney the Chairman spoke,

...the Belfast public will within the next three to four years be in a position to let the world know that our city possesses not only the largest shipyards, the largest tobacco factory, and the largest ropeworks, but also one of the largest reservoirs in the Kingdom.

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108 March 11 1929 *News-letter*.  
109 Aug 14 1929 *Telegraph*.  
110 Oct 5 1929 *Northern Whig*.  

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Speaking at this dinner, Mr. E.S. Murphy, K.C., M.P. for Londonderry revealed he was one of the first (accidental) visitors to the Valley.

Alluding to the Belfast project at the Silent Valley, Mr. Murphy disclosed an adventure which he and a Belfast friend had experienced there. Mist-bound on the summit of Slieve Binnion, without a compass, they had difficulty in retracing their steps to less isolated parts, and guided by the noise in the valley they ultimately succeeded in finding their way. “The Silent Valley,” he said, is wholly undeserving of the name.” There were now dreadful sounds of puffing locomotives and the appalling din of a steam navvy making the mountainside re-echo.111

A further ceremony to mark the occasion of success had been planned for December in the Valley. The Silent Valley would be displayed.

While the Commissioners had avoided publicity as much as possible when they were uncertain of their reservoir’s foundation, the curiosity and attention regarding the Silent Valley in newspapers was bound to generate an interest in the location. A tradition of travelling to the Mournes area already existed. Nearby Newcastle was a prominent tourist destination for Ulster holidaymakers. The celebrated 1893 luncheon trip to the Silent Valley organised by Water Commissioner Chairman, Sir Robert McConnell, Bart., hosting 120 people and marking the beginning of the river diversion scheme, had been remembered in a newspaper during August.112 The writer praised the beauty of the landscape and suggested that since there was a “Glasgow School” of landscape painters, why not a “Belfast School.” The Mournes would be the proper subject of these artists.113

In September when it was clear that the excavation was successful a group of visitors from Pearsons Headquarters in London had come to inspect the works. “The visitors spent almost a week, and examined in the most minute way every yard of the valley

111 Oct 5 1929 Northern Whig.
112 Aug 21 1929 Telegraph.
where operations have been going on for several years past."\textsuperscript{114} The Irish News asked why the press were not informed about this visit and what had the secret visitors been doing. Secrecy at the works however was slowly leaking away. The curiosity of the public would eventually ripen into a host of public visits and tours. The Silent Valley was changing slowly from a place of secrecy to place of public demonstration.

\textbf{Ceremony for the first trowel of concrete}

On the 11\textsuperscript{th} of December, 1929 a ceremony marked the laying of the foundations at the deepest part of the trench in the Silent Valley.\textsuperscript{115}

The party was lowered – five men at a time – by cranes carrying the fig iron buckets used for transporting material to or from the bottom of the trench.

The narrow space at the bottom was lit by electric lamps; and the visitors to the workings searched for loose pieces of rock to take away as souvenirs.

Mr. Scott having placed the first slab of concrete, declared the foundation laid in words of fitting solemnity.\textsuperscript{116}

The words of suitable solemnity were as follows:

\begin{quote}
On behalf of the citizens of Belfast who now derive a supply of pure water from these mountain slopes and from this Silent Valley; and on behalf of the unborn multitude, whose number it is impossible to estimate, but who during year after year in the centuries of the future will derive similar benefit;

In the names of the chairman and members of the Belfast City and District Water Commissioner and of their official staff;

In the name of the late Mr. F. W. M'Callough, who designed and inaugurated this great work;
\end{quote}

\begin{flushright}
\textsuperscript{113} Aug 21 Telegraph.
\textsuperscript{114} Sep 20 1929 Irish News.
\textsuperscript{116} Dec 12 1929 News-letter.
\end{flushright}
Chapter 6: Political Completion

In the names of the Board of eminent Engineers who have so far successfully carried out that work, and of the contractors who, by their wonderful engineering skill, ability, and indefatigable efforts, have overcome immense physical difficulties;

In the names of the managers, engineers, foreman, workmen, and all others who have been engaged, and some of whom have laid down their lives, in this work; and

In the name of the Most High God, the Supreme Architect, I now lay the foundation of the embankment of this great reservoir, praying that His eternal blessing may be bestowed and continually rest upon the labour of our hands.\textsuperscript{117}

The workmen all cheered when it was announced that they were to get an extra day’s pay.\textsuperscript{118}

\textsuperscript{117} Dec 11 1929 Telegraph.
\textsuperscript{118} Dec 12 1929 Telegraph.
Chapter 6: Political Completion

This possibly apocryphal story, “Irish Baptism for Silent Valley Dam,” appeared in the Irish News two days later. At the bottom of the trench conflicting libations were poured,

Sir Ernest Moir had just “christened” this cement with the contents of a bottle of champagne when one of the Commissioners watching events from the wooden staging a few feet higher up the shaft felt his patriotic blood stirring.

“What’s that!” he cried. “French wine for christening an Irish dam! Not likely! Let’s have some Irish fluid down there.”

Then, like a conjurer, he produced a bottle from beneath his coat, deftly drew the cork, and to the amazement of the solemn party beneath, poured its contents down upon the champaigne-drenched cement.

It was a bottle of stout!119

The following spring one new Water Commissioner was selected, John Wilson, J.P. replacing the late Mr. James Miskimmin, who passed away in February of 1930. In June the last skip of concrete was placed in the trench. The Irish news wrote “something accomplished.”120 For the ceremony a flagpole was erected. “When Mr. Scott had shovelled in the last of the concrete, the Union Jack was run up on a flagpole above the trench, amid loud cheers from the assembled workmen.”121 In the Telegraph a picture of the Union Jack was shown high above the crowd of men and steam navvies. On the printed page the flag was above and outside the frame of the picture, giving it a special transcendent character.122

The previous year of construction had brought more deaths. A young labourer named George Johnston had been killed as a result of an accident at the works in February 1930.123 In May, Sam Cooke, a labourer in the trench, had been killed when a falling

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119 Dec 13 1929 Irish News.
120 June 18 1930 Irish News.
121 June 19 1930 Telegraph.
122 June 19 1930 Telegraph.
123 June 6 1930 Telegraph.
timber hit him. On August 21\textsuperscript{st} 1930, shortly after attending a meeting of the Water Commissioners at the Water Office on Royal Avenue, Mr. Courtney took a seizure in his car, and died shortly after. Aged 67, he had been the principal of the firm of Messrs. Courtney & Co., Ormeau Building Works, Shaftesbury Avenue. Like most of the Water Commissioners he had been a member of an Orange Lodge and a Mason.

**The Beginning of many visits**

Shortly after the final concrete the Newcastle urban council visited the Valley and inspected the works. This early visit was perhaps arranged more by coincidence than plan. H.M.S. Repulse anchored in the bay of Newcastle on June 24\textsuperscript{th}, 1930. Because of a heavy swell in the bay the council’s arranged visit to the battleship was called off at the last minute.

The members of the Urban Council were keenly disappointed, but they recognised the force of circumstances which prompted the message from Captain Dickens, and decided to await a later opportunity. Meanwhile they proceeded on an informal visit to the Silent Valley, and had an opportunity of inspecting the great scheme of the Belfast Water Commissioners, which is now progressing so favourably.

Newcastle was very close to the Valley and some of their officials might have toured the Valley when the completion of the project was still in question during the Local Government Association meetings held three years previous in another nearby town, Newry. It is perhaps significant the visiting council is that of Newcastle, which was and continues to be a frequent tourism destination for the people of Ulster. This may have helped link seaside tourism of Newcastle with scientific tourism to the engineering works at the Silent Valley.

\textsuperscript{124} May 3 1930 *Telegraph.* Around about that same time an important Belfast high diver was killed in the water works when he hit his head on the diving board. June 3 1930 *Telegraph.*

\textsuperscript{125} Aug 22 1930 *News-letter, Telegraph.*

\textsuperscript{126} June 25 1930 *News-letter.*
It was not until the following year (1931) when the Silent Valley would properly become an object of display. In that year Belfast would be elected to the presidency host the British Waterworks Association. The B.W.A. was an association of municipal water providers throughout Britain. The difficulties and drama of the Silent Valley, now seemingly overcome, made Belfast of interest to the Association. At the end of the year a quiet article about the Silent Valley was given by the header “Troubles Practically Over.”\(^{128}\)

But in January of 1931 there was a sudden interest once again in the Valley. The occasion was a tour of inspection by Lord Craigavon, the Cabinet of the Northern Government, the Water Commissioners and various important civic chiefs.\(^ {129}\) At the time the *News-letter* updated the public with a dramatic account of the “wonderful battle in which man is slowly but surely conquering nature.”\(^ {130}\) Sir Ernest Moir read a letter from Lord Carson who gave his admiration for the “pluck and courage shown by the Water Commissioners.”\(^ {131}\)

The Prime Minister spoke about bringing the public to see the works, “He spoke of his great interest in the tour of inspection, and said it was a pity that more of the public could not see the work being accomplished in the Silent Valley.”\(^ {132}\) He also demonstrated his familiarity with the many other civic works going on in Ulster, noting the bridge to be built over the river Foyle at Londonderry, the expansion of the Belfast Harbour and especially the draining of the Bann.

We also have a great scheme for draining the Bann. This, in the opinion of the Government, is not only a matter of easing Lough Neagh of its high winter flood-water, but a scheme that will transform the weather conditions of practically the whole of the Ulster area. The idea is confirmed by experts.\(^ {133}\)

\(^{128}\) Dec 29 1930 *News-letter.*


\(^{130}\) Jan 29 1931 *News-letter.*

\(^{131}\) Jan 28 1931 *Telegraph* Jan 29 1931 *News-letter, Northern Whig.*

\(^{132}\) Jan 29 1931 *News-letter.*

\(^{133}\) Jan 29 1931 Whig.
The Government’s advance on nature might even “sponge out from the heart of Ulster” the damp weather.\textsuperscript{134} Craig finished by remarking on the contractors’ connection to the spirit of Carson.

Early in 1931 Water Commissioner William McCalla passed away while on a cruise in the Caribbean\textsuperscript{135} He had been heavily involved in the shipping industry as a principal of Messrs. W. McCalla & Co. In 1906 he had helped negotiate Belfast to Canada route connecting with the Canadian Pacific Railway replacing the port of Derry. In addition to being a Water Commissioner (since 1913) he had also been a prominent member of the Harbour Board since 1919. “All the flags on shipping in the port and also those at the Harbour Board and Water Board Offices, and over the principal shipping and Commercial premises passed along the route”\textsuperscript{136} of his well attended funeral. R.L. Hendersen, a director of the Belfast News-Letter was selected as a Water Commissioner to replace him.\textsuperscript{137}

In June of 1931 members of the Cork Harbour Board and Cork Corporation and the Chairman and officials from other Irish port authorities were hosted in Belfast by the Harbour Commissioners.\textsuperscript{138} They saw both the harbour extension work being organized by the Harbour Commissioners and were also taken to the Silent Valley reservoir to inspect the works and have lunch.

These ports officials from the Free State were described as “tourists” in one Belfast newspaper.\textsuperscript{139} A smaller story accompanied their visit. Mourne stone men with years of experience quarrying had been given pneumatic drills so that with the power of modern technology they might more effectively remove boulders. However the traditional plug and feather method by which they used the grain of the granite to split the

\textsuperscript{134} Jan 29 1931 Northern Whig.
\textsuperscript{135} February 25 1931 Telegraph News-letter Northern Whig.
\textsuperscript{136} Mar 9 1931 Telegraph.
\textsuperscript{137} February 26 1931 Telegraph News-letter.
\textsuperscript{138} Jun 27 1931 Telegraph, Northern Whig, News-letter.
\textsuperscript{139} June 27 1931 Telegraph.
stone for the past century proved to be more effective.\(^{140}\) The article invoked the mystery of how the ancient Egyptian stoneworkers of old had built the pyramids. This anecdote served as notice that expertise comes in many forms but most importantly, Ulster men are a form of expertise even if often unacknowledged. Regional identity was supported and upheld in such a story.

1931 The British Waterworks Association meets in Belfast

A very important occasion of civic and regional pride occurred in July of 1931 when the British Waterworks Association met in Belfast.

For the first time in its history the British Waterworks Association which counts among its 300 odd members innumerable engineers and experts, are holding the annual conference outside Great Britain.

There is immense satisfaction in Ulster that Belfast has been chosen as the venue this year.\(^{141}\)

In Belfast newspaper coverage of this event was enthusiastic. Mr. David Adams had this year become the chair of the Belfast City and District Water Commissioners. On the first day of the meetings he took over the role of presidency of the British Water Association previously held by the Lord Mayor of Liverpool. Scientific papers were read and the Reservoirs (Safety Provisions) Act of 1930 was discussed and contested. A motion was considered to urge more power to local government in choosing who their engineers will be for large projects rather than being required to select from within the Parliamentary list of accepted experts. Papers included a discussion of the Silent Valley Reservoir by Mr. Binnie, a discussion of the use of compressed air in the Silent Valley by Sir Ernest Moir, a paper on bacteria in water by Professor R.J. Wilson of Queens University Belfast, and a paper on local geology and hydrology by Mr. John J. Hartley, a lecturer at Queens.\(^{142}\)

\(^{140}\) Jun 27 1931 Telegraph.
\(^{141}\) July 20 1931 Daily Express.
The members of the association were also taken for a tour and luncheon at the Silent Valley on the Thursday of their week in Belfast. On Friday they were shown the industry of Belfast, being given a tour of the York Street Flax Spinning Company's premises; followed by visits to the world-famed tobacco factory of Messrs. Gallaher; the Belfast Gas Works, and the new electricity station. At 2-30 p.m. delegates will visit the new Parliament buildings at Stormont, where they will be received by Minister of Home Affairs. Later they will visit the Belfast Ropeworks, Oldpark Waterworks, Queen's University, and the new Municipal Art Gallery. ¹⁴³

The evenings included hosted dinners and a formal reception. During the luncheon at the Silent Valley tour, Sir Ernest Moir said

"It takes some courage, and perhaps some ignorance- and a good deal of both- to work 210 feet below the surface in a trench such as we have had to build, when cast-iron plates are cracking and going off like pistol shots around and above you." ¹⁴⁴

The journalist from the *Northern Whig* was philosophical about the deeper silence of the mountains and of nature despite man-made noise. He wrote that the valley was "almost a monument of civic disaster."¹⁴⁵ The reception for the British Waterworks Association in the city hall after the return from the Silent Valley included invitations to 1,200 members and their friends, prominent citizens of Belfast, and the officers of the London Irish Rifles. The press articles described the elegant attire of many of the prominent participant's wives and daughters.¹⁴⁶

¹⁴³ Jul 21 1931 *News-letter*.
¹⁴⁴ Jul 24 1931 *Northern Whig*.
¹⁴⁵ 24 Jul 1931 *Northern Whig*.
¹⁴⁶ Jul 24 1931 *News-letter, Northern Whig, Telegraph*. 

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The following day at Stormont, the delegates were received by Sir Dawson Bates, Home Affairs Minister. Mr. Pollack, one of the ministers of Finance was also there to greet them.\textsuperscript{147} It was claimed that Belfast was the “visitor’s envy” because in Belfast the rates were so low.\textsuperscript{148}

The regional pride brought out by hosting this conference manifest itself in various ways. A newspaper decided to print a story about the complimentary remarks made by the B.W.A. Secretary on “Belfast’s charming women”\textsuperscript{149} when receiving a souvenir Irish shillagh inscribed, “Good Luck: The Land of the Shamrock.” When Mr. David Adams throughout the following year was required to chair meetings of the B.W.A. in London the newspapers of Belfast remarked on this with pride: “Belfast man presides in London.”\textsuperscript{150}

\textbf{Many Visits}

Although these visitors were not described as tourists they may have inspired some tourism. Within a fortnight of the conference weekly motor coach excursions were approved by the Commissioners.\textsuperscript{151} A letter to the editor had described interactions with the delegates of the conference:

They spoke in glowing terms of the day they spent at the Silent Valley. Alas, I had to confess that – although a resident in Belfast for sixty years – I have never had an opportunity of visiting the Silent Valley to wonder at its grandeur...

During the construction of the Shannon hydroelectric enterprise the Free State Government were exceedingly liberal in arranging cheap excursions for its inspection. I –with some six hundred others- journeyed from Belfast to the Shannon. Can the Belfast Water Commissioners not take a leaf from the Free State

\textsuperscript{147} Jul 25 1931 \textit{Northern Whig}

\textsuperscript{148} Jul 24 1931 \textit{Telegraph.}

\textsuperscript{149} Jul 27 1931 \textit{Telegraph.}

\textsuperscript{150} Nov 19 1931 \textit{Telegraph} Feb 13 1932 \textit{Telegraph.}

\textsuperscript{151} Aug 7 1931 \textit{News-letter.}
Government' (sic) book and encourage one of the local bus companies to arrange afternoon tours …\(^{152}\)

From August through to the middle of September on every Wednesday the Commissioners agreed to provide a competent guide to give members of the public a tour of the works.\(^{153}\) This form of scientific tourism was extended from existing networks of tourism already developed to bring holiday makers to Newcastle.

Many other visits to the valley were arranged. The Central Board of Governors of the Shiels Charity Foundation arranged to tour the Silent Valley.\(^{154}\) Sir Robert Baird, D.L., the owner of the Belfast Telegraph was one of the members of this charity. Medical students studying at Queens University visited the Old Park Reservoir in North Belfast as part of their studies in hygiene. In addition to a group picture in a newspaper, five of their number were also pictured again under the caption "Women Students Took a Deep interest in the Care of Belfast’s Water Supply."\(^{155}\) At the invitation of the Water Commissioners the Lord Mayor (Sir Crawford McCullagh) and members of the Belfast Corporation toured the Silent Valley in February of 1932.\(^{156}\) Mr. David Adams, who was then the Chairman of the Water Commissioners, and also Mr. W.E. Binnie, the leader of the Board of Engineers were on hand to guide their inspection. Mr. Binnie told them that the "reservoir was now absolutely water tight; he assured them there was not one drop of water coming through anywhere."\(^{157}\) A newspaper article suggested that the Silent Valley might be a future holiday resort.\(^{158}\)

Other visitors included a party of 50 members of the Telegraph Messengers and staff of the General Post Office.\(^{159}\) Amongst all the tours one letter to the editor asked why the delegates from across the water participating in a program on public health were

\(^{152}\) Jul 31 1931 News-letter.
\(^{154}\) Sep 12 1931 Telegraph.
\(^{155}\) Dec 9 1931 Telegraph.
\(^{157}\) Feb 18 1932 Northern Whig.
\(^{158}\) Feb 20 1932 Telegraph.
\(^{159}\) May 17 1932 Telegraph.
not visiting the Silent Valley.\textsuperscript{160} The members of the Chamber of Trade, who had for so long been the big ratepayers at odds with the scheme, accepted an invitation to tour the works of the Silent Valley in June of 1932.\textsuperscript{161} Mr. David Adams, past Chairman of the Water Commissioners, had addressed the Chamber of Trade earlier that year in April on the history and engineering of the Valley explaining how the work there had shown the world "new methods."\textsuperscript{162} In June he gave the tour personally.

The scientific tourism organized after the meeting of the British Waterworks Association was reinstated the following year. The Silent Valley today continues to be a popular spot for visitors and tourists.

![Figure 6.3](image.png)

**Completion of the Reservoir**

After the excavation of the trench centre line and the pouring of the concrete cut-off wall, the final tasks of construction presented little difficulty except in their magnitude. Around the cut-off wall a huge puddle clay wall had to be tramped into place. And around this waterproof core the bulk of the embankment was mixed earth

\textsuperscript{160} May 14 1932 Ireland Saturday Night.  
\textsuperscript{161} Jun 2 1932 Telegraph.  
\textsuperscript{162} Apr 4 1932 Telegraph.
materials of varying grades. The embankment consisted of a million tons of earthen material to be moved into place by the labour of humans and what machines the humans had brought with them up into the mountains.

In the autumn of 1931, the contractor had connected the conduit which conveys water from the valley to the city with the water that was now stored in the reservoir. Newspapers reported that Belfast's water supply was now coming direct from the Silent Valley. The News-letter wrote, "A Dream Realized. Silent Valley now a lake. End of Work in Sight." The embankment wall was still being raised higher but already the reservoir was holding water. A picture of the huge bell shaped overflow shaft being constructed was given in the newspaper.

To the eye of the layman, the scheme has now taken definite shape. Order has come out of what seemed to the uninitiated to be something like chaos, and the view of the scene at the mouth of the valley inspires one with admiration for the men who conceived and carried through a work of such magnitude.

At a meeting of the Pottinger Unionist Association in December 1931, Water Commissioner Dalzell was able to announce the good news that the cost of the scheme was thousands of pounds under estimate.

At 7am on the 8th of September, 1932 the reservoir top water mark was reached. Those listening to the wireless learned this that evening when it was "broadcast from the Belfast Station in News Bulletin at 9.40 pm. 8/9/32." The final ceremony to celebrate the new reservoir was organized for the following May with 700 invited guests.

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164 Nov 28 1931 News-letter.
165 Nov 28 1931 News-letter.
166 Dec 12 1931 News-letter.
168 WAT/1/3F/3/7 border note at Sep 9 1932
Further work needed to be done to integrate the reservoir into the existing network of water provision. As soon as the commitment to complete the reservoir had been made the Law Committee of the Water Commissioners sought authorization for new borrowing powers. They wished the sum of £950,000 to complete not just the reservoir but also the other contingent projects bringing the reservoir water into and around the city: "the duplication of the siphons in the Mourne conduit and mains from Knockbreckan Reservoir into the city, the laying of additional arterial mains and general extension of service mains and other work of a capital nature..." 169

An interesting case for comparison at the same time is the construction of the Shannon Hydroelectric Dam in the Republic of Ireland. As shown in forthcoming research by Sorcha O'Brien this project was intimately associated with the aesthetics of the Gaelic cultural revival at the same time as being a modernising project for the newly established Republic of Ireland. Just as the Silent Valley Reservoir was the first big civil engineering project in the North of Ireland after partition, so the Shannon Hydroelectric Dam was the first big civil engineering project in the South of Ireland after partition. The service it provided was not water but rather electricity that flowed out from its turbines for use by people and industry. Both projects encountered some crisis in which they had to lean heavily upon external knowledge. The resources of engineering within the network of the British Empire helped Ulster's capital city resolve its water investment difficulties. In the case of the South the question to be resolved was how to give this new modernizing project a fundamentally Irish stamp. Technology transfer would typically be expected to diffuse regionally to contingent provinces. English hydroelectric expertise might under normal circumstances be expected to be their first source of assistance. Ireland, England, Scotland and Wales had previously exchanged much of their technical know-how. 170 But having just fought for national autonomy, there was a desire to demonstrate independence. If there was not a specifically Irish hydroelectric tradition then it must be constructed. Judged by the resolution of the problem, the Irish hydroelectric tradition turns out to be German engineering expertise brought in to help

169 Dec 14 1932 Northern Whig.
170 Ulster and Scotland in particular shared many technical exchanges.
design and construct the new Irish electrical modernity. Irish electrical modernity is carefully placed within the context of the Gaelic cultural revival, a project of some importance in constructing the new national identity. Similar to the Silent Valley Reservoir, public display was an important aspect of the project.

**Conclusions**

This chapter has documented a policy of secrecy which slowly gave way to one of display. First this happened by display to important individuals in order to enlist their support. Then eventually more general display occurred. Even members of the public and tourists could come on a tour of inspection of the works at the Silent Valley.

Display happened at first by accident, but with positive consequences, then by habit, and eventually deliberately. The urban council of Newcastle had planned to inspect a battleship. Because of the wind and swell they went instead to the Silent Valley.

Visiting the Silent Valley and hearing the powerful narrative was an effective social experience for building political cohesiveness. The reputation of those associated with the reservoir was improved, whether that was the engineers and labourers, the Water Commissioners, or the people of Ulster who used the water supply. The engineers and the Water Commissioners became accustomed to demonstrating their valley. Certain habits developed. Visits took on a ritual character. Eventually the display was quite deliberate. Belfast City Council and Chamber of Trade were invited on a tour by the Water Commissioners. Mr. David Adams, who had been one of the key proponents of completing the scheme in the way suggested by the engineers, was deliberate in his presentation of the scheme to those who had been some of its key detractors.

Mr Adams, on whose invitation the inspection was made, was thoroughly at home in the role of a man from the cooks. He revealed himself again as a living encyclopaedia of facts and figures incidental to the gigantic undertaking, and seemed

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171 The Cumann na nGaedheal government and the Electrical Supply Board (created to promote the scheme) were in fact, carefully placing electrical modernity within several 'Irish' contexts. See Sorcha
as much at home in expounding the geological and engineering features as in analysing the factors contributing to the two and a quarter million total cost.¹⁷²

Reasons for displaying the Silent Valley included preventing suspicion and securing cooperation. Eventually display was used to demonstrate success and thus secure decision-maker status for those associated with the success. The visits marked engineering success. They also marked the success of decision makers within urban politics, mainly the Water Commissioners. They could also be associated with the success of decision makers in the larger level of governance, the figures of the Northern Government. The visits and pride in the Silent Valley could be used to celebrate regional identity. They could be used to mark a more general pride in Ulster and in the industrial identity of Belfast. At the first intimations of success the Chairman of the Water Commissioners announced that

“...the Belfast public will within the next three to four years be in a position to let the world know that our city possesses not only the largest shipyards, the largest tobacco factory, and the largest ropeworks, but also one of the largest reservoirs in the Kingdom.”¹⁷³

When Water Commissioner David Adams as chair of the B.W.A. facilitated their meetings in London the proud newspaper headline was “Belfast man presides in London.”¹⁷⁴

The interest generated from press coverage and the associated prestige led to more public displays of the Silent Valley to satisfy the curiosity of people. Scientific tourism developed partly through being linked to existing circuits of tourism. At least in the case of one letter writer, some of the precedent which encouraged tourism came from the

O’Brien “The Shannon Scheme.”
¹⁷² Jun 2 1932 Telegraph.
¹⁷³ Oct 5 1929 Northern Whig.
¹⁷⁴ Feb 13 1932 Telegraph.
comparison to how the Shannon Hydro-electric Scheme in the Irish Free State had been made available to visitors.

One of the benefits of demonstrating the success of the valley was the consolidation of political reputation, position, status, and power. The Water Commissioners were celebrated for the "pluck and courage shown" by pushing the reservoir project to completion. Their Secretary Mr. Quinn received an O.B.E. honor from the monarchy. The Northern Government, as well as local and regional identity, was also given a boost by being associated with the enormous and difficult construction project. Members of the Government at the Water Commissioners' dinners often borrowed from the success of the Silent Valley to talk about other things on their legislative agenda during their speeches. During the conference of the British Waterworks Association public officials from urban councils all over Scotland, England and Wales were shown not only the foundation of the Silent Valley but also the culture and industry, (even the scenery) of Ulster.

The Silent Valley was used as an example of the equation of good governance and good science. When the General Council of Municipal Authorities were permitted to see the Silent Valley in early 1927, the difficulty of a yet unsolved problem was being confronted with optimism. Several years later when tourists and members of the public came on buses arranged by Great Northern Railways to participate in a tour arranged by the Water Board, the narrative of success through technical prowess, tenacity, and political courage was well established in the Valley.

The following chapter returns to the exploratory period to examine not the public record but the quiet work in the Valley which was unknown to newspaper readers.

175 Jan 28 1931 Telegraph Jan 29 1931 News-letter, Northern Whig. Citation of the message of Lord Carson.
Chapter Seven

From inside the Silent Valley:

Design of the Air-shafts

A filter-bottom was then made, as in shaft 10, but in this case a reinforced-concrete diaphragm was also constructed to provide for future sinking after a period of pumping.

The diaphragm was built above the deck of the filter in order to provide headroom below it when the filter-material was removed. It consisted of a reinforced-concrete ring 5 feet deep, with a 6-foot 6-inch diameter opening in the middle. The reinforcement was fastened to the bolt-holes of the shaft-iron, and a section of 6-foot 6-inch internal diameter tube was built in at the top of the concrete, leaving a flange clear to provide means of fastening further tubes when required.

The ultimate object of this bulkhead was to enable steel tubes similar to the upper section of the cage-shaft, to be built up to the ground-level, and so enable the air-locks, etc., to be erected for further sinking when conditions permitted, without necessitating the complete resealing of the upper section of the shaft. This was a very important feature of shaft D, and formed a key-link in the chain of operations that preceded the ultimate bottoming of this shaft on rock at a depth of 212 feet, and with a maximum pressure of 35 lbs. per square inch.¹

The quiet emphasis on a diaphragm in shaft D, given by the author McIlwode in an otherwise austere technical description of the work at the Silent Valley is an indication that the successful moment in the dewatering of the trench was identified by him as happening in Shaft D (the deepest point of the trench) when the planned feature was finally shown to work in October 1928. Perhaps not coincidentally this was also when the Water Commissioners, in October of 1928, finally came to agreement and resolved publicly their acceptance of the project including their acceptance (in some cases reluctantly) of the present contractors.

This chapter describes the period of political silence during the exploratory period and attempted excavation of the cut-off trench. However it describes this not from the public perspective of a newspaper reader in Belfast, but rather, from the experience of engineers and

labourers who worked in the exploratory shafts. This perspective allows us to examine the very specific role of changing design and its social and political consequences. The shafts were filled with compressed-air which held back ground-water while the shaft was dug progressively lower into the earth towards the bedrock thought to exist across the bottom of the valley. With pumps, the shafts enabled the dewatering of the line upon which the embankment was to be built, eventually making the excavation of a cut-off trench possible. While using the shafts to reach bedrock was certainly important, their primary function was to enable the pumping of water and thus lower the water table. Excavation of the trench would then be possible. 28,000 tons of coal came across the sea from North Wales, was unloaded in Annalong harbour, and taken by rail up into the Valley where it fed the electric power generators that ran the pumps.\(^2\)

The forces that constitute an item of technology can perhaps best be understood in the changes of design that occur as the item is made to apply to its object or intended purpose. The negotiation which must occur in order for the item to be declared successful often reveals the various forces which participate in the negotiation. Thus particular attention is paid to changes and adjustments in the design of the air-shafts. The relations between quiet changes in the design and political moments outside the Silent Valley are carefully traced. Also in this chapter an examination is made of the effects of the technology upon that mixture of personal practices, material conditions, and cultural history that combine to make people who they are. How does a technology shape our sense of self, our relation to science, to nature, and to each other?

The source material for this chapter is primarily the engineering publication, paper 4947, “The Construction of the Silent Valley Reservoir, Belfast Water-Supply” given by George McIdowie, Assoc. M. Inst. C.E. as part of the proceedings of the Institution of Civil Engineers in 1934.\(^3\) Written directly after the completion of the reservoir (with help from Mr. W. J. E. Binnie, M. Inst. C.E., the chair of the Board of Engineers), this paper documents the details of dewatering the subsoil and excavating a trench under difficult circumstances. As an engineering document, it carefully separates as much as possible the presence of humans out of the austere technical documentation. As a work of purification it can be presented as non-political. Thus its conclusions

(and its political effects) are all the more difficult to challenge. The text itself later becomes a product of “engineering knowledge” circulated so that others might utilize and incorporate what was learned. It is a tiny part of the larger process of the standardization of technical, scientific, and administrative processes. These standardizations create an area or territory of similarity within which people and political administration can be managed. In 1923, returning from his first visit to the Valley, Sir Ernest Moir, director and chief engineer for Pearsons, was interviewed by the newspapers.

"I can say this, that wherever the British race have the control the water supply is always reliable for purity. That can not be said of all other countries, for you have invariably to ask for a guarantee before you can use it in places outside British territory."

Dewatering the Earth

When the exploratory period was begun there was moderate confidence that a reservoir was possible. Released from the legal unity of design procedures and contract, alternative directions for proceeding could be considered.

The first decision of the Board of Engineers was the location of three additional borings. These were sited at the point where it was surmised that the surface of the granite was at a maximum depth.

With the legal dispute resolved, basic information could be sought without conflict between parties. These borings however took time to make and their results, like all subsurface estimations, could not be guaranteed for accuracy.

Mclldowie writes, “The successful desaturation of the ground had such a large bearing on the ultimate construction of the embankment that some description of the methods adopted is essential.” The river Kilkeel was diverted to reduce the possibility of it contributing to the saturation of the ground along the line of the proposed trench. A river diversion channel intercepted the water 700 yards north of the embankment line and carried the water 500 yards southeast where

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5 28 May 1923 Telegraph.
6 Mclldowie, p7.
7 Mclldowie, p8.
it was removed through the outlet tunnel under the mountain on the east side of the embankment and then released below the reservoir. The entrance to the tunnel (the main forebay) was 290 yards north of the line of the embankment. Liberation from the terms of the original contract meant the proposal to confine overflow floods by 20' high temporary clay stacks (at two particular bends in the river) could also be abandoned. Instead,

In order to contain all but the heaviest of floods to this channel, the south-west or downstream side was banked up to a height of about 10 feet above the invert with a wide flat bank of sandy material. In this bank, over a length of about 330 yards, a line of interlocking steel piles, varying in length from 15 to 40 feet, was driven to form an overflow-weir for flood-waters...

On the slopes of the valley around the works were 1200 yards of open catchwater channels that diverted water flow (either north to river diversion channel or south to river) that might potentially have come down into the works. All pools and marshy places anywhere near the line of excavation were drained. Water pumped out of the site during excavation was carried away by timber channels south to the river 300 yards below site of embankment. To the greatest extent possible all measures were taken to prevent water from lying on the site of the embankment.

**The first set of exploratory shafts**

The Board of Engineers also issued instructions and location as to where to put down “by means of compressed air, three exploratory shafts just north of the centre-line, situated at cross sections 10, 13, and 15”9 The first object of these shafts was to “ascertain the nature of the ground overlying the granite, and to verify the position of the granite as indicated by the borings…”10

Another reason for the exploratory shafts was related to the amount of water in the sub-soil. When the exploratory period began it was clear that dewatering the material was crucial to the success of the entire venture.

It was realized that the task of sinking a trench through the subsoil in its then saturated state could only be made possible by getting rid of a large part of the contained water, and it

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8 McIlwraith, p8.
9 McIlwraith, p7.
10 McIlwraith, p7.
was thought that by making use of the exploratory shafts as pumping-sumps, this might be partly accomplished.\textsuperscript{11}

Since the ultimate strategy for excavating the trench was not yet known, the first exploratory shafts were not put down on the line of the trench. Three shafts were begun slightly north (upstream) of the line of the proposed trench. When pumps were attached to these it was expected they would help dewater the subsoil, perhaps also interrupting any flow of water which came below the surface from the river.

\textbf{Figure 7.1}

Plan of the initial air-shafts.

Source: McIlldowie, p10

By March of 1927 the first three shafts were being assembled. A 27 by 27 foot hole was dug 15 feet deep from the surface level and filled with concrete except for a circle in the center which was crossed with an airtight floor (or diaphragm) of rolled-steel girders and concrete. Above this was placed the vertical cage shaft (attached to the airlock) while below this a 16 foot diameter shaft lined with cast iron rings assembled from segments was to extend downwards to bedrock. The shaft

\textsuperscript{11} McIlldowie, p7.
was airtight so that excavation could occur under above normal air pressure, thus holding water away from the point of excavation. The weight of the massive concrete block, 520 tons, was considerably more than the upwards force of pressure caused by compressed air in the 16 foot diameter shaft at 35 pounds per square inch (445 tons). The 520 tons “did not include the weight of the lock-superstructure and shaft-segments, or any allowance for skin-friction…” and was therefore more than adequate for the 35 pounds per square inch design maximum. Clay was used around the sides of the concrete block to prevent air from escaping around the edges.

The air-lock consisted of a 6 foot 6 inch diameter steel cylinder with rails along the floor allowing the transfer of men or materials in bogey wagons. A five inch diameter porthole of 1/2 inch glass was set in the circular door. The air-lock connected in a t-intersection with a 6 foot 6 inch diameter vertical steel cylinder which formed the top of the cage shaft. A series of valves allowed control over the rate of depressurization for those leaving the air shaft. The cage allowed men and materials to travel up or down the shaft. Through the top of the cage shaft housing, the winding of a five-ton steam-crane was attached so as to be able to raise or lower the cage. A mechanism was attached to prevent the possibility of over-winding.

A pair of timber guides attached to the side of the shaft kept the cage in place as it rose or descended with men, tools, cast-iron segments, or skips of material to be removed. Signalling was accomplished by several means. From the bottom of the shaft to the “lock-man” at the top signals could be made by a bell on a chord. From the lock-man to the crane-driver outside visual and audible signals were used. A control lever could be used to move a visual signal arm that could be seen by the crane-driver. A system of hammer blows on the steel tube also indicated the movement that was required of the crane-driver. Special navy-type telephones resistant to dust, damp, and shock with earpieces fitted to reduce external noise, were installed near the bottom of the shaft and communicated between the shaft and the shift-engineers office. “Electric Lighting, 240 volts direct current, was used throughout, and five-lamp clusters were extended to serve the bottom. Intermediate stages and ladders were illuminated by single hand-lamps.” High pressure air pipes and water pipes were also extended down into the shaft as well as a 10 inch diameter canvass tube functioning as an air-supply inlet-pipe and encouraging the circulation of air at the bottom of the shaft. A means for removing excess water was enabled, a suction-pipe which carried water out of

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12 Most of the special steelwork for this was provided by Pearson & Knowles C. & I. Company, Limited, of Warrington. Mcildowie, p48. A bogey is a wheeled wagon which travels on railway tracks. Also spelled 'bogie.'
13 Mcildowie, p18.
the shaft when necessary.

Valves in the airlock enabled compression and decompression at various rates for those entering and exiting the shaft. Decompression was generally done in stages\(^{14}\). The rate of compression was two pounds per square inch per minute. The rate was controlled in the air-lock, and could be shut if any men had trouble due to their ears not clearing. Occasionally it was necessary for men to leave the lock as their ears refused to clear, but generally the usual method of holding the nose and swallowing was efficacious. In time, with usage, it was found that artificial yawning or relaxation of the throat was the most convenient method of overcoming this trouble.

The rate of compression was governed by the behaviour of the ears, and in the individual cases mentioned with regard to decompression by controlled stages...\(^{15}\)

Faster rates of compression were possible (by use of the "material valve" as opposed to the "man-valve"\(^{16}\)) however the associated rise in lock temperature was very rapid.

It was possible to enter the shaft at pressures up to 30 lbs. per square inch in under 2 minutes. With responsible individuals this was permissible, but in the case of gangs, only the man-valve was allowed to be used.\(^{17}\)

As can be seen, the engineering staff and the labourers were treated differently in relation to what extent they were allowed to manually control the safety features of the device.

In the case of engineering staff, a number of visits of short duration had at times to be made while work was in progress. In such cases, decompression, using the automatic valves, would have caused delay and prevented the use of the lock for materials, and it was found that Dr. Haldane’s stage-system for divers could be directly employed. This method was possible by carrying a portable pressure-gauge and personally controlling the drops and stages by the material-valve in the lock\(^{18}\)

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\(^{15}\) Melldowie, p16.

\(^{16}\) Melldowie, p16.

\(^{17}\) Melldowie, p16.

\(^{18}\) Melldowie, p15.
A mercury pressure gauge in the form of a u-tube was installed in the cage shaft where it would be clearly visible to the lock-man. Externally Bourdon type pressure gauges were fitted allowing the pressure to be observed by those outside.

The shaft working pressure was carefully kept close to the minimum level needed to force the water level to only six to twelve inches below the level of excavation. This was checked with a bar to ensure that the water level was not lower than absolutely necessary. Owing to the great number of boulders and the open nature of the material encountered, this precaution was strictly observed to minimize air-losses through the bottom and under the sides of the shaft.19

As the excavation proceeded cast-iron segments were brought down into the shaft while excavated earthen material and pieces of removed boulder were carried up and outside through the air-lock. Eight segments and a key segment fitted together to form 16 foot internal diameter rings, 15 inches deep. These were soon changed, after an inset, to 12 foot 6 inch diameter rings, also 15 inches in depth. Both the initial segments and the smaller segments were also made in 9 inch depth so that, when necessary because of the “nature of the material,” excavation could progress in smaller stages.20 The initial segments were very heavy and the later segments for the smaller diameter rings less so but also hefty, approximately 5 hundredweight21 and 3½ hundredweight respectively. McIlldowie reports that, “[t]he segments were designed to be of a convenient size and weight for man-handling in the shaft bottom.” They were hung on Morris blocks22 in the cage and manipulated into place at the bottom with a fulcrum-bar hanging by chain. “They were handled conveniently in the bottom on account of their lightness, and were lifted up for bolting by means of a light fulcrum-bar slung by a short length of chain from the built rings above.” The segments were fitted with 4½ by 3 inch hand holes with cover-plates on them. These hand holes were for allowing water back into the shaft once it had been constructed. The water could then be pumped out of the shaft in order to dewater the subsoil. Each cover-plate also had “a 1¼ inch tapped hole and plug to

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19 McIlldowie, p18.
20 McIlldowie, p16 This design variation is discussed below.
21 An imperial hundredweight (abbreviated cwt.) is 112 pounds.
22 A Morris block is a hand operated chain hoist by which heavy objects can be lifted and placed through use of a counterbalancing weight (The original “Morris” company began in 1884 see http://www.morriscranes.co.uk/frameHandler.html?http://www.morriscranes.co.uk/hoists/hoists.htm (accessed June 2007)).
Chapter 7: Design of the Air-shafts

form a grout hole."23 Later supplies of segments were ordered with countersunk24 bolt-holes to permit the use of lead washers on all bolts, and so to minimize air-losses at these points."25

Excavation for rings was usually carried out in the following order: First a hole 15 inches or 9 inches deep, as required, was excavated to allow the cage to be lowered to the level of the bottom of the ring in progress. The material was cast to the sides and then filled into skips in the cage. The sides were then cleared to within about 12 inches of the internal diameter of the ring. Next an opening was made for one segment at a time in order to minimize air-leakage at the exposed face. Normally no difficulty was experienced in completing the ring with the key segment. Occasionally a "tight key" occurred, when the use of a bottle-jack enabled the closure to be made.26

Each crew consisted of one leading hand, four labourers, and one lock-man all inside the air-shaft under pressure. With each shift two labourers worked outside removing excavated material from the air-lock and sending segments or other necessary equipment back through the air-lock. A crane-man was also employed outside to lift and lower the cage-shaft. When the segment size and ring diameter were later reduced, one less labourer was employed in the shaft per shift. "The shift-foremen were all men with long and varied experience in compressed-air work, but, with this exception, none of the above had any previous experience of this type of work."27

A newspaper in 1928 described the work thus:

The use of compressed air is necessary in the sinking of the shafts, and this adds to the complexity of the work. When a shaft is sunk to a certain depth water saturates into the bottom. It is then necessary to seal the shaft so that compressed air may be admitted to it at a pressure sufficient to drive out the water. The excavation is then continued and additional cast iron segments are placed below the ones already in position. The pressure of air in the shafts varies from a few lbs. per square inch to a maximum of 35 lbs., according to the water pressure.

23 McIldowie, p17. Grouting is the process of sealing seams with material, in this case the seams were grouted with cement and the cover-plate holes could allow grout to be pushed into the space between the segments and the earth behind them after dewatering took place.
24 Countersunk holes are enlarged at their entrance so that a bolt or screw will lie flush with or below the surface.
25 McIldowie, p17.
26 McIldowie, p17.
27 McIldowie, p28.
Chapter 7: Design of the Air-shafts

Men are only required to work two hour shifts in the compressed air, and the method of getting them in and out of the shafts was explained yesterday by officials. From a vertical cast iron cylinder, which covers the top of the shaft, there projects another iron cylinder in a horizontal direction. This cylinder is divided into two compartments by an iron door. When a party of men are going below they enter the outer chamber of the "air lock," (sic) as the cylinder is called. Here they wait while the air pressure is made the same as that inside shaft. It is then possible to open the inner door of the chamber and to gain access to the working. When men are leaving the shaft they wait in the inner chamber of the air lock (sic) while the air pressure in the outer chamber is raised to the required level. They then enter the outer chamber, the door of the inner chamber is closed, and the party wait for three quarters of an hour while the air pressure in the outer chamber is gradually reduced.

Bogey wagons filled with excavated earth are hoisted to the top of the shaft for removal to the outer air, ad the same procedure is followed, except, of course, that the truck does not require the gradual reduction of air pressure necessary for human beings.

To the layman these airlocks (sic) have a fearsome appearance, and the idea of entering one and being subjected to an air pressure of twenty or thirty pounds to the square inch did not at all appeal to the representatives of the "News-Letter." But a workman who was waiting his turn to go below had no such qualms, and was rather amused by the doubts of the newspaper men. "It's just like working in the ordinary atmosphere," he remarked laughingly. Officials assured the party that the compressed air has no bad effect on a healthy man, and all necessary precautions are taken.²⁸

The word air-lock²⁹ is presented in the typography of the newspaper article as "air lock", air lock, and airlocks. We see here the introduction of a new scientific word to the public. In this instance of popular science it is evident that, just as the public is still considering the implications of such a device, the typographer is still considering the conventions for writing it. "Air-lock" (however it is type-set) was a word here being introduced to the Twentieth Century imagination.

Four Ingersoll-Rand type air-compressors with a total capacity of 96,000 cubic feet free air per hour were run from the power-house. Variously they ran on gas-engines or were steam-driven all with a belt-drive from a direct-current motor. The air was connected to the exploratory shafts by

²⁹ Today more frequently presented without a hyphen. Throughout this chapter I have used the spelling consistent with McIlwode's paper of 1934.
two 5 inch mains which ran for 2,000 feet to the line of the trench. Over this length condensation occurred. The air arrived at the exploratory shafts reasonably dry. For further supply an Ingersoll-Rand type “AA2” air-compressor was installed close to the site of the excavation. Air-intake towers were erected (95 and 80 feet high respectively) at a location away from the exhaust of gas engines. Some modifications had to be made, “after installing the ‘AA2’ compressor close to the shafts, the humidity increased considerably, and as the cases of the ‘bends’ increased at the same time, measures were taken to dry the air.”

A number of precautions were taken to prevent or treat compressed air-disease. A resident doctor and two first-aid men were employed. All candidates for work were given a medical examination to ascertain their fitness to work under compressed-air, as well as re-examined every six weeks.

Considerable importance was attached to acclimatization of workers, and, where possible, new men were put to work in the shafts working at the lowest pressure. Heavy woollen donkey jackets were issued to the men to enable them to keep warm during the long period of decompression, and a heated room was provided for them on the surface where free coffee was supplied on exit from the shafts. The arrangements also included facilities for drying clothes, socks, and boots.

An automatic system of decompression using an arrangement of valves provided for a close approximation of a staged decompression as recommended by Dr. J.S. Haldane. Shifts were arranged to minimize the danger of compressed-air disease. A medical airlock was constructed which consisted of two chambers, an inner and an outer. Both were well lighted, and inspection-windows were provided in the doors. The inner compartment was furnished with two cots, and was heated with an electric heater. This chamber was generally used for recompression of patients, while the outer was used for communication, such as the exit of the attendant or the admission of another case. Valves were provided both inside and outside the chamber, so that the slow decompression could be controlled by the attendant in either case.

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30 Mcldowie, p29.
31 Mcldowie, p31.
gauges were fitted, which were visible from both inside and out.\textsuperscript{33}

The labourers in the Silent Valley nicknamed this device “the Gazoon.”\textsuperscript{34} Another nickname from the culture of the valley was “homers.” Homers were men who let the air out quickly so they could leave work sooner. Sometimes this resulted in men getting the bends while walking home. One man collapsed near Annalong and had to be rushed back to the medical recompression chamber.\textsuperscript{35}

\begin{center}
\textbf{COMPRESSED-AIR DISEASE.}
\end{center}

\textbf{APPARENT INCIDENCE OF ILLNESS.}

| Total number of decompressions from the 13th June, 1927, to the 8th November, 1928 | 31,954 |
| Total number of cases of illness | 96 |
| Incidence of illness | 1 in 333 |
| Percentage incidence | 0.300 |

\textbf{ACTUAL INCIDENCE OF ILLNESS OVER THE SAME PERIOD.}

| Total number of decompressions from pressures over 15 lbs. per square inch | 22,707* |
| Total number of cases of illness | 96 |
| Actual incidence of illness | 1 in 237 |
| Actual percentage incidence | 0.423 |

\begin{center}
\begin{tabular}{|c|c|c|c|c|}
\hline
Working pressure in lbs per square inch. & Length of shift: hours. & Time in free air. & Number of decompressions. & Number of cases of illness & Incidence of illness. & Percentage of illness.
\hline
0-15 & 8 & 45 minutes & 9,487 & None & --- & ---
\hline
15-25 & 8 & „ & 6,030 & 27 & 1 in 223 & 0.448
\hline
15-25 & 6\frac{1}{2} & „ & 6,378 & 9 & 1 in 709 & 0.141
\hline
25-30 & 6\frac{1}{2} & „ & 3,666 & 28 & 1 in 131 & 0.764
\hline
30-35 & 6\frac{1}{2} & „ & 1,977 & 17 & 1 in 116 & 0.860
\hline
30-35 & 9 & 3 hours & 4,416 & 15 & 1 in 294 & 0.340
\hline
\end{tabular}
\end{center}

\textit{Note.}—Average number of cases of illness per week . . . . . 1.35

* The figures for the “Actual Incidence of Illness” were compiled at a later date than those given in the Table, when there had been a greater number of decompressions on which to base conclusions.

In June of 1927 excavation in the first air-shaft was underway and just beginning in the others. It was at this time when the use of the Silent Valley as a site of political promotion first

\textsuperscript{33} McIlidowie, p30.
\textsuperscript{34} Carson, p48
\textsuperscript{35} Carson, p48. For a discussion of long hours of work at the Silent Valley see chapter 3 p120. The term “homers” may have had more general application.
happened (previous chapter, p209). The first tour of the Silent Valley works was performed for the members of the General Council of Municipal Authorities who came up from meetings at the Newry technical school where they had been addressed by members of the Northern Government, Major George Harris, Permanent Secretary to the Ministry of Home Affairs and also Lieutenant Colonel W.B. Spender C.B.E., Permanent Secretary to the Ministry of Finance, and the head of Civil Service in Northern Ireland. The science and industry of the Belfast City and District Water Commissioners was being impressed upon municipal authorities from throughout Ulster.

Changes and Variations in the Design of the Exploratory Shafts

This section looks at changes and adjustments in the design of the air-shafts. As discussed in the introduction to this chapter (p250), the negotiation of various social and technical forces is often revealed in such changes. When some of these forces are known we can also consider what effect the technological practices might have on various people involved.

One important consideration was making the sides of the shaft air-tight.

Excessive air-leakage in the shafts required special attention, and a number of methods were devised to cut this down to the minimum. All joints were pointed with neat cement after a ring was completed.

It was also found that considerable leakage took place at bolts, and yarn grummets, dipped in red lead and boiled linseed-oil, were used. This precaution was not wholly successful, so when the segments with countersunk bolt-holes were provided, lead washers were used below the grummets and proved efficient, special care being taken to see that all bolts were well tightened. Finally, all bolts and joints were washed and plastered with cement, and this last method was practised continually. These precautions, with the care taken to ensure that the water-level was never far below the working-bottom, proved quite successful in conserving air.

Another design change that occurred during the sinking was the reduction in the size of the shaft from 16 foot internal diameter to 12 foot 6 inches. The change in segment types most likely occurred during July of 1927, just after excavation in shafts 13 and 15 had also begun. Shafts 13

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37 McIldowie, pp18-19.
38 McIldowie explains that this happened at the bottom of ring 37 in the first shaft (shaft 10). Assuming 15 inch depth
Chapter 7: Design of the Air-shafts

and 15 also shifted to this narrower excavation size, most likely at the same time as shaft 10. Since presumably it took time to plan, manufacture, and ship the new segments, the decision to change to a smaller diameter shaft must have happened fairly soon after first putting the larger segments to use. In addition to the smaller weight of the new segments the most obvious advantage was that in a smaller diameter shaft less volume of material had to be excavated. However, the smaller diameter shaft also meant that one less labourer could be assigned to each excavation crew.

McIlldowie explains that when sinking in shaft 10 stopped (and pumping began) 37 rings (then an inset) and then 14 more rings had been placed. If we assume each of the 37 rings and then the 14 additional rings were 15 inches (rather than 9 inches) and we add the initial distance of the shaft-head concrete-block, we can calculate an estimated depth at this point: 78 feet 9 inches. The actual depth of excavation at this point (given in McIlldowie, Appendix II, p50) was in fact 75 feet 3 inches. Using these figures we can make some calculations which suggest how frequently segments of 9 inches in depth were used. The significance of this will be developed below in relationship to the percentage of depth through which the material is difficult to work. With these figures it is also possible to consider the subjectivity of labourers in relationship to changes in the unit of work (discussed below). The difference between the estimated and the actual depth is 3 feet 6 inches (78 feet 9 inches minus 75 feet 3 inches). Presumably this difference represents the use of segments 9 inches in depth. Presumably 7 of these were used in the first shaft (Each 9 inch ring is 6 inches less than a 15 inch ring. Divide 3 feet 6 inches by 6 inches). Down the length of ring excavation 7 of 51 rings (37 plus 14 equals 51) were 9 inches in depth or 13.7%. The total ring excavation depth was 60 feet 3 inches (75 feet 3 inches minus 15 feet initial depth of shaft-head), of which 5 feet 3 inches (7 times 9 inches) was done in rings of 9 inch depth. In this example we can say that 8.7% (5 feet 3 inches divided by 60 feet 3 inches) of the depth of material presented to those engaged in the work the type of excavation where “the nature of the ground made it desirable to sink by small stages.”

This quotation is taken from the resident engineer’s description of when and why 9 inch segments were used. The data is directly relevant only to the first 75 feet of excavation in the first exploratory shaft. Although this percentage can not be taken as universal to the rest of excavation in this shaft or the various other shafts it gives some idea of the difficulty of the excavation work as measured by the 9 inch/15 inch design variation in segment depth. The question of most interest is segments that would be 46 feet 3 inches (plus the initial depth of 15 feet for the shaft-head concrete block). McIlldowie, appendix II, p50 (See figure 7.1 in this chapter at p253) lists this distance as being achieved in July 1927.

39 78 feet 9 inches is the sum of 46 feet 3 inches (37 rings of 15 inches), 17 feet 9 inches (14 rings of 15 inches), and 15 feet (initial depth of the shaft-head, given in McIlldowie, Figure 4, p10 (see figure 7.1 in this chapter, p253)).
how the design change in ring size might affect the frequency of using segments of 9 inch depth rather than 15 inch depth. Such a change would indicate a relationship between design, labour, and the “nature of the ground.” Unfortunately the data given does not allow us to say how many of the presumed 7 rings of lesser depth were of the larger or lesser diameter ring design. Thus comments on the effect of the design change are speculative. However, the level of detail that the author provides at this first moment of design change (not provided elsewhere in the text) indicates consideration by engineers.

Presumably the smaller diameter shafts encountered less need to “sink by small stages” since the circular area excavated was smaller and thus less likely to contain a difficult patch. The area of the smaller diameter section was (slightly smaller than) 61% of the larger diameter section \(\pi r_2^2\) divided by \(\pi r_1^2\) where \(r_1\) and \(r_2\) are the respective radii of the shaft. 121.875 square feet divided by 199.68 square feet.\(^{41}\). Let’s assume that the probability of it being desirable to “sink by small stages” would vary linearly with the area of the excavation.\(^{42}\) If there is some variation with area then the 8.7% figure derived above also changes when calculated from a dataset of rings of only larger or only lesser size (The original data set of 51 rings includes the transition from larger to smaller diameter rings.). So the actual figure for the depth excavated where “the nature of the ground made it desirable to sink by small stages,” would be likely to be higher for the larger diameter rings and lower of the smaller diameter rings.\(^{43}\)

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\(^{40}\) McIlwode, p16.

\(^{41}\) The radius used for this calculation was approximated by using half the internal diameter of the shaft.

\(^{42}\) It is not clear that the probability of it being desirable to “sink by small stages” would vary linearly with the area of the excavation. Encounters with difficulty that make it “desirable to sink by small stages” might also occur as strata across an entire horizontal level of the excavation in the shaft rather than as a problematic point within the circle of excavation at some given level. The author’s discussion of progress in the shafts (McIlwode, p27, discussed below in this chapter, p265) gives some indications.

\(^{43}\) If the circumstances varied linearly with area then let \(x\) = the number of 9 inch segments in 16 foot diameter rings and \(y\) = the number of 9 inch segments in 12 foot 6 inch diameter rings:

(eq.1) \(x + y = 7\) because the total number of 9 inch segments is presumed to be 7,

\(y = ax\) where \(a\) is some constant.

The \(y\) equation is found by considering two factors: \(y = 0.61x\) because \(y\) area is only 61% of the area of the original circle. Also \(y = \frac{14}{37}x\) if the distribution of the 7 within 51 rings is proportional to the number of smaller diameter rings compared to the number of larger rings (14 compared to 37). Thus, combining these we have

\[y = 0.61(14/37)x\]

(eq.2) \(y = 0.23x\).

From this pair of linear equations we can see that:

\[x + 0.23x = 7\] and \(x = 7/1.23 = 5.69\)

\[y = 7 - 5.69 = 1.31\]

In the larger diameter rings we could expect \((5.69\times 9\text{in})/(37\text{rings} \times 15\text{in/ring}) = 9.8\%\) of the depth of excavation which might be considered more difficult whereas in the smaller rings this figure might be only 5.8%. This decrease in the percentage of depth more difficult to excavate would only be expected if difficulty varied linearly with area, which it should be remembered, cannot be presumed. However it seems likely that there would be some linear component (i.e. \(y = ax + c\) where \(c\) is some constant). Reliable generalizations can not be made from such a small data set, but as a demonstration of a method attentive to design changes these calculations are a useful exercise.
The unit of work exchanged between labour and capital in such an excavation is presumably to be measured in depth rather than weight. At least depth is the most important dimension in the unit of work. 15 inches of excavation or 9 inches of excavation is the relevant aspect of the unit of work for those who are primarily interested in obtaining bedrock. The unit of work is important in thinking about the subjectivity of the labourer. Subjectivity might be thought of as the sum of the conscious and unconscious of an individual, emerging from their personal practices, material conditions, and cultural history. Cynthia Cockburn shows that early machinists used large heavy pieces to exploit the average strength differential between men and women thus excluding lower paid female labourers and from “skilled” machine work. Thus over time male identity came to be associated with the status of skilled labour. And female identity came to be less often associated with such status. To my knowledge, there was never any discussion of employing female labourers in the air-shafts at the Silent Valley. To the extent that the smaller diameter shaft enabled 15 inch rings to be placed more frequently, and 9 inch rings less frequently, then the change in segment size was a change in the most important dimension of the unit of work (by frequency) and probably an advantage for excavation progress. For the labourers the difference between the weight of the segment pieces (5 hundredweight versus 3½ hundredweight) which had to be slung into place using hoist and pulleys might have seemed like a more noticeable difference. The volume of soil and boulders to be excavated before beginning a new ring was slightly less (39% less), although the skips that the material was filled into and sent up the cage-shaft were just the same size. It is possible that the excavation could happen more rapidly because of this reduction in amount of material excavated although the smaller size of the shaft meant that one less labourer was put into the shaft. Labourers would certainly have noticed this when the unit of work changed. One less of their number was being employed on every air-crew.

It seems probable that the change in segments had some effect on the frequency of the unit of

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45 The labourer who must fit the heavy segments into place might have a more nuanced understanding of the unit of work. McLdowie describes the 5 hundredweight segments as of “convenient size and weight for man-handling in the shaft bottom.” p16. Even for the engineers and managers achieving depth was not the only purpose of the air-shafts. The air-shafts were as much about drainage as they were about obtaining bedrock.

46 Cynthia Cockburn, “The Material of Male Power” in Donald MacKenzie and Judy Wajcman (eds.) Social Shaping

47 As discussed in Chapter 3 there was one female engineer, Dorothy Buchanan, however I have not been able to acquire details of her work responsibilities. In particular it is not known if she was ever in the air-shafts.

48 The difference in the lesser amount of material to be excavated to set a ring of 9 inch depth was not as likely to be noticed since presumably where “the nature of the ground made it desirable to sink in small stages” was also more
work being a segment of 9 inches in depth rather than 15 inches. If so, this variation in the unit of work exchanged between labour and capital can be partially attributed to a bargain with the labour of nature. The reason segments of 9 inch depth were used was that “the nature of the ground made it desirable to sink by small stages.” Thus here there is an exchange in the unit of work between nature and humans (as well as between capital and labour). By changing the design of the air-shaft a new bargain was struck for what the unit of work (by frequency) would be. While the change in the volume of material excavated for every ring seems like a more straightforward negotiation between labour and capital, any change in the frequency of the 9 inch depth rings is also an exchange, but perhaps it should be thought of as an exchange between humans and nature.  

The author’s description of progress in the shafts also invokes nature which “varied from ring to ring.”

Progress in the shafts was largely governed by the nature of the material encountered. This varied from ring to ring, but in general it consisted of a mixture of fine to coarse sand, small stones and pebbles and numerous boulders, with a sufficient proportion of silt to provide a lubricant when the material contained water. The boulders varied from 12 inches to 14 feet in depth, and the position in which they were found in the shaft had a special bearing on the progress. When large boulders were encountered on the perimeter of the shaft, they frequently delayed the fixing of segments in a number of rings, and they had to be cut in sections by drilling and plugs and feathers as the segments were fixed. Boulders in the centre difficult to excavate regardless of the lesser volume.

I have approached the unit of work slightly differently than Cynthia Cockburn. Cockburn provides a physical analysis of the unit of work, suggesting what its effects might be, then verifies this against employment figures for women in the printing industry. Comparably, I provide a physical analysis of a more complicated unit of work. However verification is not derived from data about the (comparably smaller set of) labourers at the Silent Valley. Rather, plausibility is suggested in the fact that there was a design change (and in the interest shown by McIldowie in the details). While there may also have been effects on the ‘air-man’ who worked with these rings, what I am showing is the change in the relationship between humans and the sub-soil. As we will see later in this chapter (p273) further design changes occurred indicating the nature of the sub-soil became less uncertain. Ultimately, steel rings of 18 inch depth (rather than variable 15 or 9 inch depth) were used in the final air-shafts. The 9 inch rings seem to have been eliminated. This also would indicate that the nature of the material (particularly its uncertain qualities) has been renegotiated through changes in design and in the unit of work. The sub-soils affective properties in relation to humans were being renegotiated. This theoretical shift from the labour of humans to the labour of nature (particularly as it engages human tacit knowledge) is consonant with other recent water histories. Richard White in his history of the Columbia River writes “Such knowledge [of more skilfully canoeing against the river] was initially a bodily knowledge felt and mastered through experience and labor. Even when learned from others, the messages sent through nerve and muscle constantly validated or modified acquired knowledge. Knowledge of the river was in large part knowing how its velocity varied and where it was turbulent. With proper experience, travelling against the current on the Columbia demanded less expenditure of human energy than travelling overland. The hydraulics of the river sketched out a map of energy; this geography of energy was also a geography of labor.”

Richard White The Organic Machine, p9
of the shaft were also a source of trouble.\textsuperscript{51}

This description also gives some evidence that the difficulty of excavation varies with area in a manner which is to some degree linear, for example the presence of boulders "on the perimeter of the shaft."

### PROGRESS OF EXPLORATORY SHAFTS.

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<td>1927 June</td>
<td>Sinking 47' 9&quot;</td>
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<td></td>
<td></td>
<td>Sinking 53' 9&quot;</td>
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<td>July</td>
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<td>Sinking 34' 6&quot;</td>
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<td>Sinking 76' 3&quot; at</td>
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<td>Sinking 33' 0&quot;</td>
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<td></td>
<td></td>
<td>Sinking 71'</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>Pumping</td>
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<td>Sinking &quot;1' 3&quot;</td>
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<td></td>
<td>Pumping</td>
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<td></td>
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<tr>
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<td></td>
<td></td>
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<td>Pumping Rock at</td>
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<tr>
<td>December</td>
<td>Pumping</td>
<td></td>
<td></td>
<td>lbs. per sq. in.,</td>
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<td>76', 33 lbs. per</td>
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Figure 7.3 Table shewing Excavation Progress

Source: McIlldowie\textsuperscript{50}

\textsuperscript{50} McIlldowie, p27
\textsuperscript{51} McIlldowie, p27


## PROGRESS OF EXPLORATORY SHAFTS—continued.

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<td>Sinking</td>
<td>178' 0&quot;</td>
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<td>Pumping</td>
<td>Sinking</td>
<td>Rock at 172', 54 lbs. per sq. in., sinking 176' 0&quot;, pumping</td>
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<td>Sinking</td>
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<td>Pumping, sinking 134' 9&quot;</td>
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<td>Sinking</td>
<td>24' 2&quot;</td>
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**Note.**—Pumping ultimately ceased from the trench on the 4th September, 1930. Figures in feet and inches indicate depth of shaft at end of month, and the depth at which rock was found is given.

Besides the unit of work, another source of affect upon the subjectivity of labourers is their role. The "airmen," as they were called in the Valley, must have seemed important and knowledgeable. As one journalist wrote:

To the layman these airlocks have a fearsome appearance... But a workman who was waiting his turn to go below had no such qualms, and was rather amused by the doubts of the newspaper men. "It's just like working in the ordinary atmosphere," he remarked laughingly.

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52 Carson, p49.
In relationship to the engineers some of the men re-established their role (and presumably gained a small degree of autonomy) through the use and indeed demonstration of existing skills. Since the previous century stone-work had been an important aspect of the culture and economy of the Mournes. Pneumatic drills for the removal of boulders were provided to Moune stone-men who had years of experience quarrying. However the traditional plug and feather method by which the grain of the granite (known as the "rede") is used to split the stone proved to be more effective in some cases. Regarding large boulders,

the contractors adopted the latest methods available and decided to cut their way through the rocks by means of pneumatic drills.

This device involved considerable delay, and in some cases more than a fortnight was taken up in splitting a single boulder.

At this stage a number of local labourers at work on the scheme volunteered to execute the work in a mere fraction of the time. They have succeeded in doing this with a simple device, for which no scientific explanation can be advanced by the engineers or other experts on the site.

A series of small holes are bored in the rocks, into which steel pins wedged between two small strips of lead are inserted (sic). These pegs are tapped with hammers to a depth of half an inch into the huge granite blocks, and, no matter how large the rock may be, it is cut as clean as a whistle at the desired part.\footnote{Jun 27 1931 Telegraph This account by a journalist (written in 1931) seems to indicate that this transition took place during the later excavation of the trench itself rather than in the original air-shafts but McIlldowie indicates in his discussion of progress in the shafts that the plug and feather method was used there as well. McIlldowie, p27.}
The plug and feather method is described more accurately (than the above journalist) by geographer Estyn Evans:

The plug-and-feathers... consists of a plug or small wedge of iron which is inserted between two thin pieces (feathers) of hard steel in a circular hole about half an inch in diameter, cut with a jumper. A row of jumper holes 2-3 inches deep is sunk along the desired splitting line, at intervals of from 4-6 inches, and a plug-and feathers is inserted in each hole. A succession of hammer blows on the plugs will generally result in a clean break... Although this method of stone working is sometimes referred to as being of great antiquity, I have failed to find evidence of it much before 1860. This applies also, so far as I can discover, to the granite working districts of New England... In Dartmoor the use of drilled holes (and presumably plug-and-feathers) for splitting granite began about 1803...

We can see here an example of craft labour with long historical routes affecting the engineering design.

This is also an example of bottom-up design in which the users of a technology interpret and adjust the way that a device or arrangement of apparatus are used. The addition and application of different tools to the problem of removing granite boulders came not from engineers but from the tacit knowledge of local Mourne stone-men. The design of the reservoir brings a variety of materials, devices, techniques, and labour into an assemblage. The most important aspect of this assemblage is that it can deal with the "nature of the material." The Mourne stone-men bring an application of knowledge to the design directly relevant to this important aspect. Their knowledge of the 'nature of the stone,' although lacking scientific credentials, is acknowledged indirectly in McIlwoidie's engineering paper during his discussion of methods. It later came to be explained

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55 Estyn Evans *Mourne Country* (1967) pp168-169 In the Annalong area "a Welshman named Hugh Edwards who moved to Annalong from Newry about the year 1970... is spoken of as the first man to make setts in that district." Setts (square paving stones replacing cobbles when tramways were laid down) were made using plug-and-feathers.

56 The phrase 'bottom-up' design is variously associated with a type of software design, with user feedback in product design, and with systems design that takes account of the needs of economically marginalized people. Research interests of scholars such as Sheila Jasanoff and Lucy Suchman overlap all of these areas. A relational approach (such as this thesis) emphasizes factors involved in design (more than just engineers) as inclusively as possible.

57 The contractor's legal representative, Sir Lynden Maccassey, K.C., finished his presentation using this phrase just before the previous arbitration case broke for lunch and then broke entirely so that negotiations could amend the state of affairs. "Nature of the Material" Arbitration document pE8.

58 McIlwodie, p27.

59 'Explained' is not here meant to convey a sense of justification. To use later scientific explanation to describe why scientific knowledge came to be the way it has come to be is a methodological error. See chapter 1 p20. For a history of science that hopes to be more than a tautology, the wide curiosity about the plug and feather method must
in relation to the molecular geology of granite.60

In August of 1927 the excavation in the first shaft (shaft 10) stopped because

The air-pressure at this time was 26 lbs. per square inch, and it had been decided to work at a maximum of 35 lbs. per square inch. Calculations of pressure from the existing hydrostatic head indicated that a pressure above this maximum would be required to reach the rock as shown by the borings...61

When the excavation in the first shaft ceased, preparations for pumping operations began. Each of the segments in the rings had holes that could be un-stoppered to let water in. A stone and gravel filter was built at the invert (bottom) of the shaft. Timbers were place across the shaft at a convenient level and pumps hung from these. The air-pressure was gradually reduced and pumping began as the water flowed in through the holes.

Apparatus for a fourth shaft at cross section 16½ was assembled and sinking began using this in October 1927. This shaft was entirely of the smaller diameter, 12 foot 6 inches, from outset. Because the shaft was smaller the shaft-head block of concrete designed to weigh down the shaft from the pressure of air was also smaller, 22 feet 6 inches square. The Board of engineers had placed the first three shafts in the west side of the valley (and west of the previous path of the riverbed). This fourth shaft was on the east side of the valley. This shaft reached rock in November

be as valid an explanation for Rohleder’s 1931 publication on granite master-joints in the Mourne region (see below) as Rohleder’s work is for ‘explaining’ the knowledge of the stone-men. For the purpose of this study Estyn Evans equation of this with the crystalline molecular geology of granite (See below, first published 1951) is not relevant. By a certain way of thinking, Mourne stone-men only come to have had molecular affinities with granite in 1927 in the year 1951.

60 Says Evans: “The crystals in granite tend to be elongated in a constant direction conforming to the pressures exerted in the stress of the cooling process. This elongation, which is often visible in the grain of the stone, dictates the direction in which the granite is most easily split and worked. Although no such grain is visible in Mourne granite, the men who dress it make use of what they call the “rede” of the stone, an invisible ‘grain’ running in the direction in which the block lay in the quarry, along the master-joints bearing 16°. On the other hand the granite is difficult to work in the direction of the other master-joints, bearing 94°: this is what the stone worker calls the ‘hard end.’” (p44) In the Mournes the master-joints (lines of weakness or cracks which traverse granite areas) run at 16° and 94° from true north. Similar but subordinate joints exist at 50° and 149° (p43). These joints were mapped by Dr. H.P.T. Rohleder during the time period considered in this thesis. Evans also notes (pp42-43) their relevance to the drainage patterns in the hydrology of the Mourne region (drainage occurs more often along the axis of the joints). See H.P.T. Rohleder, A Tectonic Analysis of the Mourne Granite Mass, County Down, Proceedings Royal Irish Academy 49 (1931-32), pp160-74. For “the old people, stone conscious,” granite stones that were not aligned in this manner were known as “stranger stones.” (Evans, p49) For contemporary geologists these are thought to have been moved from their original location (and orientation) by geological forces (for example, by glaciers).

61 McIlidowie, p19 See also Appendix II, p50, (reproduced this in chapter Figure 7.3, p266) where the air-pressure at the end of August 1927 is given as 27 pounds per square inch.

270
at 76 feet and continued into the rock until 92 feet 9 inches. It was then also used for pumping.

By the end of 1927 the existence of rock across the valley had been "proved" by borings. The maximum depth was 185 feet at cross section 13. Four exploratory shafts were well advanced; one of them was completed into rock. Pumping to lower the water level had commenced. At shafts 10, 13, 15, and 16½ the ground-water levels were lowered 33 feet 6 inches, 23 feet, 18 feet 6 inches, and 21 feet respectively from an initial level of 415 O.D. or about 16 feet below the surface.

During excavation, the weight of the water in the surrounding water table could only be held back by an equivalent weight of air-pressure. In order to keep the air-pressure below the level of 35 pounds per square inch, the water-table needed to be lowered by pumping. In December the Board of engineers reported to the Water Commissioners that the project of building a reservoir in that spot was feasible. By pumping the water table could be lowered and a greater depth could then be reached while excavating under air-pressure. Then this depth could be used for further pumping to further lower the water level. At the Pottinger Unionist meeting in December Water Commissioner Dalzell talked of the courage of his fellow Commissioners and explained he was now in a position to say that Board of Engineers had "pronounced good."

The Water Commissioners then took a great deal of time in committing publicly to continuing the project (as discussed in the previous chapter). McIlidowie however, omits this from his paper delivered to the Institution of Civil Engineers and published in their proceedings. Regarding the feasibility report he writes that the Water Commissioners, "agreed to the report and recommendations, and arrangements were made whereby the contractors continued the work on the same terms as those existing for the exploratory period." This either indicates that for all practical purposes the engineers felt they had the go ahead to complete the project at that time or that for the purpose of an engineering report McIlidowie felt it unnecessary to discuss the politics of regenerating the collapsed public support for the troublesome project. Possibly there is even the desire to validate the world view of engineering by simply narrating the funder as automatically responding to the logical presentation of the problem’s solution. If the engineers could solve the problem in a rational way then the funder would respond similarly in a rational manner.

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62 McIlidowie, p20.
63 McIlidowie, p20; See also p49 (Appendix I).
64 News-letter Dec 23 1927.
Mclldowie’s account belies the fact that the Board of Engineers found it necessary to write again to the Water Commissioners when they continued to forestall making a public political commitment to the completion of the project. Their report on 23rd January 1928 outlined the method to proceed and urged the Commissioners to proceed. And then again in the summer the engineers found it necessary to write to the Water Commissioners urging them to commit to the completion of the project. In the autumn the Board of Engineers was still writing to point out the costs of sustaining indefinite pumping operations at the Silent Valley without further progress towards completion.

New air-shafts along the line of the trench

In February of 1928 the Cabinet of the Northern Government was to inspect the Silent Valley. Mr. Pollock, Milne Barbour, Sir Dawson Bates, and Mr. Andrews, all ministers in the Northern Government toured the works on February 15th. The Northern Government’s previous interest in the Silent Valley during the 1924 boundary crisis was once again apparent. About this time the Board of Engineers had decided to put five additional shafts down, this time directly on the line of the trench, in order to better drain the water and continue the excavation. The proximity of significant moments of political interest in the Silent Valley and moving forward (or backward) in the design process of the reservoir suggests a relationship between these two poles of the political-technical axis.

It was decided early in 1928, in order to hasten the unwatering process, to put down five additional shafts, to be known as shafts B, C, D, E, and F, and to place these shafts on the line of the trench and not north of it, as had been done with the four original shafts. By placing these new shafts on the line of the trench they would be of greatest use for unwatering, having in view the desirability of sinking a trench and subsequently refilling it with concrete in as dry strata as possible.

Shafts B, C, D, E and F were located at cross sections 11, 12, 13, 14, and 15 respectively. Excavation in shafts D, E, and C began in March, the most progress occurring in D. Shafts B and F were begun in April of 1928. After the successful elections in March the Water Commissioners were able to reply sharply to a Chamber of Trade request for information. The pressure was off.

65 Mclldowie, p21.
66 Feb 14 1928 Irish News.
67 Mclldowie, p21.
In the Valley changes were now being formulated. All of shaft D was constructed of 12 foot 6 inch diameter rings which had been developed in the previous exploratory shafts. But shortly after shaft C began, the dimensions of the work were changed to reflect a new strategy. After 20 feet of excavation a new type of segments was used. Ten segments, 18 inches in depth, now made a ring whose internal diameter was 11 feet 6 3/4 inches.

The new type of segment was 18 inches deep, and ten were required to form a circle 11 feet 6 3/4 inches in internal diameter. Special segments, four to a ring, were provided with shoulders which formed the connection and springing for the cast-iron trench-lining. They embodied all the improvements adopted in the first type of segment, and were similar to them in regard to suitability of weight and size for convenient man-handling.69

Shafts B, E, F were all built in this diameter ring. Apparently it was March and April that this transition was being made. Presumably this means that only at this time were the Board of Engineers and the contractors finally contemplating the full design of the air-shafts for excavating the trench. It would be done with curved metal siding, the trench being expanded from the shafts.

This new segment type was also a significant change in the unit of work exchanged between labour and capital. The segments were no longer made of cast-iron but had been hardened to cast-steel. The depth of each segment had been increased to 18 inches from 15. McIlwroe gives no indication that a lesser version of the cast-steel segments was provided (such as the 9 inch depth cast-iron segments). Whatever methods of excavation had now been settled upon after almost a year in exploratory shafts there was no longer a concern about “where the nature of the ground made it desirable to sink by small stages.”70 Changes in design and method implemented both by engineers and by the air-men themselves had resulted in a greater confidence by humans in their exchange with nature. They were gaining control over uncertainty.

The diaphragm

Since the Government’s visit in February the engineers were now making and adjusting their

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68 McIlwroe, Appendix II, p51.
69 McIlwroe, p22.
70 McIlwroe, p16.
plans to be sure that excavation was successful. Shaft D was sunk to the depth of 55 feet below the surface without air-pressure because by now progress had been made reducing the water level. When excavation under air-pressure began, difficulties occurred. "It was found that considerable air-losses were taking place from shaft D, where the pressure was about 16 lbs. per square inch, into the adjoining shaft 13." Around about this time the Water Commissioners annual dinner was being planned for May. The most important guest would be Lord Craig, Prime Minister of Northern Ireland. The original exploratory shaft just north of the line of the embankment and the first excavation shaft exactly on the line of the embankment were quite close to each other, both at Cross Section 13, the expected deepest section of the trench. However, by using clay to fill the bottom of shaft 13 the problem was resolved. What Prime Ministers know about the success or failure of engineering projects presumably depends on the confidence of those who report on their technical progress.

The original hope of alternating adjacent shafts, so that pumping occurred in one and excavation in the next, does not seem to have been enough, particularly in shaft D at cross section 13 where the depth to bedrock seemed to be greatest. During May, shaft D reached 123 feet by using a maximum air pressure of 31 pounds per square inch. The filter bottom was then made but "in this case a reinforced-concrete diaphragm was also constructed to provide for future sinking after a period of pumping." McIlidowie draws special attention to this bulkhead. It enabled steel tubes to be connected to the surface for pumping air into the shaft without having to reseal the upper portion.

This was a very important feature of shaft D, and formed a key-link in the chain of operations that preceded the ultimate bottoming of this shaft on rock at a depth of 212 feet, and with a maximum pressure of 35 lbs. per square inch.

In this way the pumping of water which reduced the hydrostatic head might continue from the shaft even at the same time that excavation was being carried out at the bottom of the shaft. The excavation was only made possible by the lowered hydrostatic head.

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71 McIlidowie, p22.
72 Perhaps this occurs because of plasticity of the water table. An examination of the water levels shows them to vary with location rather than behave uniformly across the valley floor.
73 McIlidowie, p21 A fuller description of this device occurs at the beginning of this chapter.
74 McIlidowie, p22.
Chapter 7: Design of the Air-shafts

At the beginning of May 1928, when these new design plans were soon to be implemented, Lord Craig spoke at the Water Commissioners annual dinner. In addition to foreshadowing Mr. Pollock’s “via Britania” budget and inviting all to the foundation ceremony for the new Parliament building at Stormont, he also encouraged the Water Commissioners. By standing beside them he lent his support for their Board and the water project. Running parallel to his speech were the words and explanations of the next speaker, Mr. William Dowling, Chairman of the Water Commissioners. Issues of state and issues of water administration were laid side by side in adjacent speeches during the time leading up to the implementation of the “very important feature” which the engineers had planned and McLldowie later described as a “key-link in the chain of operations that preceded the ultimate bottoming of this shaft on rock at a depth of 212 feet…” In May sinking happened in the five new shafts and pumping came from the original three shafts. By June shaft D, with a second diaphragm 123 feet below the surface of the earth, was also added to pumping total. Yet to be tested, we might say that this diaphragm was located just between Craig and the earth.

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* Hydrostatic water-pressure calculated from air-pressure. Note—After July, 1929, the water levels remained unchanged.

By August of 1928 pumping from six shafts and the two trenches (on the east and west side of the valley) was yielding approximately 1,284,000 gallons of water per 24 hours. The ground-water levels in the various trenches were beginning to reduce. Pumping and the use of air happened in a slightly different way in these new shafts. Cast-steel cones were placed above the work area.

75 McLldowie, p22.
Chapter 7: Design of the Air-shafts

These were connected with long metallic tubes to the air-shaft head. The function of the cones was to limit the volume of the shaft in which compressed air was required. By sealing the bottom of these shafts the compressors could more easily sustain the necessary air-pressure. Not only could these cones save air, it was expected that when sealed, pressure from the upper part of the shaft could be reduced, water allowed in, and pumping to reduce the groundwater level could happen above while excavation was carried on below.

In June 1928 another important moment had occurred in the testing of the design. The first excavation of the trench was undertaken between the shafts C and E using curved cast-iron segments to uphold the sides. "The segmental trench was formed of bays of cast-iron segments ... 18 inches deep in 6-foot 6-inch lengths, the radius of curvature of the back of the segments being 9 feet 5 1/4 inches."\(^7\) The reasons for such a design are given by McIlwadie in his description of the material to be excavated.

When saturated with water the silt was practically unworkable, but when dry, excavation and timbering were simple. Experiment showed that saturated silt exerted a pressure equivalent to that of a fluid having a weight of 100 lbs. per cubic foot... In addition to the silt and water problem, numerous boulders, large and small, were present, the proportion of

\(^{76}\) McIlwadie, Appendix 1, p49.
\(^{77}\) McIlwadie, p38.
boulders to fine material being in places as high as one-half. The largest boulder found in the trench was at least 15 feet in diameter. These factors precluded ordinary methods of trench-sinking.\textsuperscript{78}

As the trench depth approached the ground-water level the sinking would become progressively more difficult.

The Board of Engineers delivered another report to say that construction of the reservoir was entirely possible. The Water Commissioners were beginning to consider making the legal arrangements for the completion of the Silent Valley Reservoir. On the 14\textsuperscript{th} of June a motion was passed directing the engineers to prepare a new contract for tender.\textsuperscript{79}

**Beneath the Diaphragm**

By September, sinking was happening in two air-shafts only while pumping to reduce the ground-water level was happening in the other shafts. In Belfast negotiations were beginning for the contract to be formally extended. In late September the Commissioners met with the Board of Engineers to discuss the progress of excavation\textsuperscript{80} A minority of the Commissioners opposed renewing the contract without competitive tendering. The controversial issue was discussed in newspapers and debated in the public meetings of the Water Commissioners throughout the month of October. At this time in the Valley the engineers were preparing to attempt for the first time the use of the special diaphragm in shaft D. Although unknown in Belfast, this important test would demonstrate whether the plans that the engineers had finally put together earlier that year would work. Difficulties or failure at this time might cause the negotiations to collapse. But there was another challenge about to confront those working in the Silent Valley.

On October 10th a massive rainstorm struck the Silent Valley. The flood prevention measures were overwhelmed and the rising water threatened to flood into the shafts and directly into the newly excavated trench which was at that time 90 feet deep in places.

...the works were subjected to the most severe flooding that the catchment area yielded during the whole period of construction. For the 24 hours ending 8 a.m. on the 11\textsuperscript{th}, the gauge

\textsuperscript{78} McIldowie, p36.

\textsuperscript{79} Oct 19 1928 Telegraph This was not reported in newspapers until the later rescinding of the motion in October.

\textsuperscript{80} Oct 16 1928 Telegraph.
a ¼ mile downstream from the works recorded a precipitation of 2.11 inches. It is probable that close on 2 inches fell in 4 hours... The flood-waters overtopped the sheet-pile weir of the river diversion channel, the valley being converted into a lake. 

The water “rose to within two feet 6 inches of the ground surrounding the shafts” and caused a great deal of flood damage. It did not, however, flow into the new trench or reach the shafts.

That a potential disaster had nearly wrecked the progress at the Silent Valley was never realized in Belfast. But when the News-letter printed pictures they explained some of the difficulty in acquiring them

That these interesting pictures did not appear last week is the fault of rain clouds, which seem impatient of the efforts to fill the Valley with water, without the aid of an embankment. When the “News-Letter” party visited the Valley last week they found the whole area shrouded in mist and rain descending in torrents. In the circumstances, photography for newspaper purposes was out of the question

But the journalists were very impressed and their story conveyed this, describing “the immense job that has been undertaken here to the order of the Belfast Water Commissioners.”

The time came to reopen the diaphragm in shaft D. By continuing to pump water from the upper section of the shaft the ground-water level could be reduced at the same time as excavation happened below the diaphragm. This reduced the weight of water (the hydrostatic head) which had to be held back by compressed air. It was hoped that in this way the excavation could happen without exceeding the maximum desirable air-pressure of 35 pounds per square inch.

In October, sinking was resumed in shaft D, the 6-foot 6-inch diameter air-tubes leading up to the lock being carried on the concrete diaphragm that had been built in the shaft 113 feet 5 inches below the ground in May. Pumping was begun from the annular space between the tubes and the sides of the shaft, while sinking was carried on in the shaft below.

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84 McIlldowie, p24.
About this time there was also great difficulty in shaft F when, "air blowing into the adjoining shaft at cross section 15 caused a sudden total loss of pressure. The difficulty was quickly overcome by heavily cement-grouting under pressure..."\textsuperscript{85} Despite these many difficulties excavation was occurring beneath the diaphragm in shaft D. "A depth of 144 feet 3 inches was reached by the end of the month at an air-pressure of 20 lbs. per square inch."\textsuperscript{86} The debate at the public meeting of the Water Commissioners climaxed on Monday, October 29\textsuperscript{th} when Chairman David Adams invoked the expertise of the engineer, Binnie, chairman of the Board of Engineers, to deal with a minority of "doubting Thomases" who opposed the renewal of the contractor.\textsuperscript{87} Resignations had been expected. But on Thursday the 1\textsuperscript{st} of November the vote to accept the contractors was passed with no resignations. Sinking continued in shaft E and F. On November the 26\textsuperscript{th} at the centre of the valley in the deepest section of the line of excavation rock was reached in Shaft D "at a depth of 172 feet, air-pressure being 34 lbs. per square inch."\textsuperscript{88}

Now that excavation below a diaphragm had been shown to work improvement could be made. In December in shaft C the feature of pumping above the cone while excavating below was tested and

\textsuperscript{85} McIlldowie, p24.
\textsuperscript{86} McIlldowie, p24.
\textsuperscript{88} McIlldowie, p25.
found successful.

The advantages were notable. By reducing the volume of the shaft, it reduced the quantity of air required. It was quick to build, and could be withdrawn before pumping began, and rebuilt at a lower level if the sinking to the rock had to be carried out in stages. Such an arrangement also enabled pumping to proceed from above the cone while excavation continued below.\textsuperscript{89}

Shaft F was pushed into granite, and switched to pumping.

Pumping from all sources totalled 1,374,000 gallons per 24 hours, but it was found that groundwater levels did not drop very much further, and a level of 341.0 at which the water was standing outside shaft D in December, 1928, was the lowest recorded and was not improved on. This represented a fall of 90 feet from the beginning of 1927...\textsuperscript{90}

By January 31\textsuperscript{st} 1929 sinking completed in shaft C, D and G all on the same day. At an air-pressure of 34 pounds per square inch, shaft D, the greatest depth, continued into rock until 212 feet from the surface.

\textsuperscript{89} McIldowie, pp26-27.
\textsuperscript{90} McIldowie, p25-26.
Chapter 7: Design of the Air-shafts

Completing the Trench, Building the Embankment

During 1929 the excavation of the trench continued. As the trench approached and went below the ground-water level the sinking became more difficult.

When sinking through the saturated ground, every effort was made to encourage water to flow through the trench-sides. As soon as the grout behind the segments was set it was drilled through at the grouting-holes and the water admitted into the trench. Water entering in this way was led in improvised garlands, secured to the bolts of the trench-iron, to the nearest shaft or sump, and thence pumped to the surface. Long canvas sheets, hung against the trench-sides, confined the water to the garlands and shoots, and prevented it largely but by no means entirely from falling on the men working below. By watching the grading of the bottom as excavation proceeded, all water escaping the sheets and garlands, or entering the trench at or near the bottom, was led off to the nearest shaft. In spite of complete oil-skins, the men worked in very wet conditions.91

As the trench approached bedrock the public reputation of the Water Commissioners was improving.

The trench had reached its greatest depth in December, 1929, at shaft D, and concreting at this point began immediately. It had been found possible to begin concreting east of shaft C in June, 1929; concreting in the trench west of shaft B had been in progress since November.92

On the 11th December 1929 the contractors arranged a ceremony with a silver trowel for concreting the bottom of the now completed trench.93 On the 18th and 19th of June 1930 the last skips of concrete were placed. The Irish News wrote "something accomplished."94 From the June 1930 ceremony to celebrate the Belfast Telegraph showed a picture of the Union Jack raised above the newly completed trench flying from a newly installed flagpole.95 Just after this (June 25 1930) the Newcastle urban council came on a tour of inspection of the works at the Silent Valley.

91 McIlidowie, pp38-39.
92 Mcildowie, p40.
94 June 18 1930 Irish News.
95 June 19 1930 Telegraph.
“Construction of the embankment began in the summer of 1930, and was completed in 2 years.”96 The puddle wall was filled into the centre of the growing embankment. This clay was taken by steam navvy from the Commissioners’ clay fields locally, loaded into rail wagons and brought to the line of the embankment. The remainder of Foxes Knowe and the other hillocks in the valley were excavated bare (See Chapter 3).97 The covering of the peat beds across the valley floor (sometimes up to 30 feet deep) with 2-3 feet of clean sand was intended to prevent discolouring or acidification of the reservoir water.98 Material for the main embankment was taken chiefly from glacial deposits in the Valley just south of the line of the embankment. The rails were arranged so that side-tipping wagons of material could access the line of the embankment. Arrangements for water supply, the valve house tower, a screening chamber and scour valve chamber as well as flow meters were all put in place.

Cement came from Magheramorne, near Larne in County Antrim. Special cement with rapid hardening properties was necessary for grouting in the trench.99 Blue Brick was transported from the Ruabon district in North Wales.100 Stone was taken primarily from the works quarry located on the west side of the valley above the embankment, although some extremely large stones (such as the 4 ton sill-stones for the overflow-works and large stones for the end of the over-flow tunnel) were shipped from Norway.101 Most of the iron-work for the supply arrangements was provided by Messrs. Glenfield and Kennedy, Limited of Kilmarnock while Stanton Ironworks Company provided the 36 inch supply pipes.102 In general materials were sourced locally whenever possible.

There were several changes in the design of the reservoir. Notably the embankment (which had been discussed in the legal case as a potential error of design) was widened and the overflow weir that McCullough had sited on the west side of the reservoir was changed to a circular bellmouth overflow occurring on the same side of the works as other penetrations of water across the line of the trench.

The embankment had been originally designed with inner and outer slopes 3 to 1, but owing

96 McIlldowie, p43.
98 McIlldowie, pp45-46
99 McIlldowie, p47. The cement and special cement used were “Blue Circle” and “Ferrocrete” respectively.
100 McIlldowie, p47.
101 McIlldowie, p47-48.
102 McIlldowie, p48.
Chapter 7: Design of the Air-shafts
to the glacial silts in the ground underlying the embankment, a wider bank was decided on. The maximum height of bank was 88 feet over the bed of the Kilkeel river. Top water-level is 8 feet below top bank-level. From a top width of 15 feet, the water face has successive slopes of 3, 4, 5, and 6 to 1 down to a heavy rubble tow. On the outer face, the slopes are 3, 4, and 5 to 1. The puddle core-wall has a width of 8 feet at 6 feet above top water-level, widening as the depth increases at the rate of 1 inch to 1 foot on each side. The selected material has a top width of 3 feet on each side of the puddle, the downward increase in width being 4 inches per foot.\textsuperscript{103}

Mclldowie similarly discusses the change in the overflow system,

As originally designed the overflow was in the form of a weir and waste-channel at the west side of the dam. The Board of Engineers decided to substitute a circular bellmouth overflow ...in the reservoir at the east end of the embankment. The bellmouth discharges into a circular tunnel passing under the embankment in the solid granite. South of the embankment the tunnel changes from circular to horse-shoe section ... and the overflow ultimately reaches the tailbay of the outlet-tunnel by a short stepped waste-channel. The change in design has been amply justified from the point of view of expense, the savings amounting to about £60,000.\textsuperscript{104}

There is also evidence that excavation for the original overflow channel had proven quite difficult on the west side of the embankment line. Huge boulders had made excavation slow.

\textsuperscript{103} Mclldowie p41.

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Conclusion of the project and inauguration of the reservoir

As the project drew to completion arrangements were being made for an official ceremony in which the Governor of Northern Ireland, The Duke of Abercorn, would open the Reservoir. Plant and machinery was auctioned off or moved to other construction projects. The little community that had come to be in the Silent Valley began to disperse.

An article written by a Daily Express correspondent entitled “Crow dies from Grief” suggests a moment of nostalgia and perhaps a feeling about relations between the natural world and humans now that the Silent Valley was completed. The article noted that an interesting relationship had sprung up between steam-men at the Silent Valley and Mourne Mountains crow, whom they name “Ned.”

He was very fond of the engines, not because they were engines, but because the drivers were kind to him and fed him.... He would take food from the railwaymen, but would not allow them to touch him with greasy hands.... He would also ride on the back of an engine which was going slowly...105

While certainly poetic journalism, the article provides a level of detail about the relationship which suggests it was not merely a fictional invention. However, interpretation of this relationship is added by the journalist. With contract finished, enginemen and engines gone, “Poor Ned flew about disconsolately for a time. Casual passers-by threw him bread, but he would not eat it, and yesterday evening he was found lying dead in the Silent Valley.”106 The entanglement and separation of humans and non-humans (or nature) during the Silent Valley Reservoir construction is poetically enacted in this piece of journalism. The humans have carried into their narratives a sense of sadness or nostalgia about the fate of the so-called natural word during the project of modernization. This theme would reoccur in the ceremony opening the reservoir and making its water available to the residents of Belfast.107

104 Mclldowie, p43.
105 May 10 1933 Daily Express.
106 May 10 1933 Daily Express.
107 There are slight differences in way the Daily Express treats this theme and the more nuanced way that local Belfast papers pick it up. The local papers are more attentive to validating the existing engineering and the political forces connected with it. (see below, p292). The Daily Express at this point in time was owned by Lord Beaverbrook, had offices on Fleet Street in London and national distribution. “[B]y 1936 it had the largest circulation of any newspaper in the world, at 2.25 million.” From “Daily Express: A chequered history” (25 January, 2001) at http://news.bbc.co.uk/1/hi/business/974835.stm accessed June 2007.
On May 24th of 1933 an impressive group of people assembled at the Silent Valley embankment to celebrate completion. The guest list included 800 persons. Rain began to fall just before noon. The event opened with a “religious ceremony, notable for its simplicity and impressiveness...” The hymn “O God, our help in ages past” was accompanied by the Regimental Band of H.M. 1st Battalion the Border regiment, followed by prayers and readings from the Old and New Testaments by a variety of protestant religious leaders. At the appropriate moment, the Chairman of the Water Commissioners, Mr. Samuel Rea, J.P., signalled to the Governor who then lowered a wooden lever on a post. Receiving the signal in the valve house tower William Elder, of the reservoir staff opened the valves and let the water through.

There was a wait of one minute and a quarter- almost dramatic in its silence- before the water, with a roar crashed through the two giant outlet pipes and sped onwards to the city. Just as it made its appearance the band of the Border Regiment played the National Anthem, and produced an epoch-making event.

A large tent was provided for the luncheon at which speakers gave their remarks on the event.

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108 May 25 1933 *News-letter.*
109 May 25 1933 *Northern Whig.* The itinerary announced beforehand included “the Lord’s Prayer, which will be said by the Bishop of Down and Connor and Dromore. The Rev. Alexander Cairns, M.S., Chairman of the Congregational Union of Ireland, will read from the Old Testament Psalm civ., verses 1-13, and the Rev. J.A. Duke, B.A., President of the Methodist Church in Ireland, will read from the New Testament St. John, chapter iv., versus 5-15. The Dedication will be pronounced by the Bishop of Down and Connor and Dromore. Following the singing of the Doxology the Rt. Rev. J.J. Macauley, D.D., Moderator of the General Assembly, will offer prayer.” No Catholics participated in leading the religious aspect of the ceremony.
110 Carson, p84.
Although Lord Carson was not able to attend a telegram was sent to him and announced by Mr. Quinn, Secretary of the Water Commissioners, “Silent Valley Reservoir successfully opened by his grace the Governor. Very large assembly send heartiest greetings. -Chairman, Belfast Water Board.” Apologies for not being able to attend had also been sent by Joe Devlin, the important constitutional nationalist. From the city of Dublin however the Lord Mayor, Alderman Alfred Byrne was in attendance and was the subject of remark by the first speaker, Prime Minister James Craig, who made the opening toast to the Governor of Northern Ireland. “We welcome the Lord Mayor of Dublin. (Applause.) I would very much like him to take down south the memory of how we here in the North greet the toast of our Governor. (Loud applause.)” Responding, the Governor’s remarks tied the difficulties at the reservoir to a biblical story. “In the Holy Writ they had read how Moses, when the children of Israel thirsted for water in the wilderness, struck a rock and water gushed out. Nowadays, somehow or other things seemed to have changed. (Laughter.)” But the difficulties had been overcome by the skill of the engineers. He also congratulated the Commissioners for the grand style of architecture that they had chosen for the reservoir buildings. A new beauty spot had been added to Northern Ireland, he claimed. In a toast to the engineers, the Chair of the Harbour Commission (Herdman), tied the great engineering works of classical times to modern engineering feats. Mr. Binnie the Chair of the Board of Engineers responded saying that engineers were often accused of “spoiling the face of nature” however in this case anyone who travelled along the high level road beside the reservoir would see how beautiful the Valley now is. Sir Ernest Moir, director and engineer for the contractors, had also sent apologies (He was in the last month of his life). His statement said that he was sorry not to be in attendance but he was proud to be associated with such a project. For his part the Lord Mayor of Dublin spoke of rebuilding cooperation between nations after the turmoil of the Great War particularly within the commonwealth “of which we, in Southern Ireland, are co-equal members.” Of those who did this he said “their action will grow in men’s estimation larger rather than smaller.” A columnist in the Irish News described Craig’s opening toast as a “cheap sneer” at the Dublin Lord Mayor and a sectarian slight.

The themes of nature, engineering, and the fate of beauty when nature and engineering

111 May 25 1933 News-letter.
112 May 25 1933 News-letter.
113 May 25 1933 News-letter.
114 May 25 1933 News-letter.
116 May 25 1933 Irish News.
collide were repeated by several lunch time speakers. These themes were also picked up and written about by “A Young Woman in the Crowd” in a newspaper column. “In the Silent Valley there are two wonderful thoughts- the thought of what nature has done, and the thought of what man can do.” In addition to including ghost stories and other romantic motifs she also distinguished herself from most of the other commentators by remembering the eight men who lost their lives during the construction. She commented on the control over the water.

It was a man’s job that harnessing of the rush of waters... They have entire command and control of the water. They can make it pass through 12 miles of pipe and tunnel to Belfast; they can divert it if they wish back to the Kilkeel River; they can even record to a decimal the number of gallons which flow through the pipes.

She however did not feel like part of that control. Despite not identifying with hydraulic engineers she did appreciate their work in the context of its surroundings.

...It only remains for me to say, as one to whom engineering experience represents something entirely outside my intelligence, that what I appreciate about this glorious piece of work is that it has not to any marked extent destroyed the loveliness of the spot.

I went to the Valley, expecting I hardly know what- ugly red brick shanties, the lovely mountainside hacked to bits, and a continual buzz and whirl of machinery, but I found instead that the engineers in achieving their great feat had tried not to disturb the greater feat of the Great Engineer “Who maketh the clouds His chariot ... and sendeth the springs into the valleys which run among the hills.”

The verse she ends with (from the 104th Psalm) had been read during the ceremony. And the message was an echo of what the engineer Binnie and other prominent speakers emphasized during their luncheon speeches. The newspaper column is evidence that at least one guest came away with their own interpretation of this message. The ability of the Water Commissioners and others to encourage this type of interpretation was certainly aided by the Valley itself. New grass and planted trees had had the better part of a year to grow after the contractors’ machinery was removed back down the same railway on which it had arrived. I will now conclude this thesis not only with

117 May 25 1933 Irish News.
118 May 25 1933 Telegraph.
119 May 25 1933 Telegraph.
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remarks on this chapter, but also with remarks on its relationship to the material discussed throughout the thesis.

Conclusions

In May of 1928 at the lowest ring of shaft D (in what was expected to be the deepest section of the trench) a filter bottom was attached to seal the shaft for future reopening. Around about the same time the Water Commissioners received political support from the ruling set in the northern government. Sir James Craig, Prime Minister, lauded the courage of the Commissioners while speaking at their annual dinner. Later in the same month the foundation stone ceremony for the massive new Ulster Parliament building (Stormont) would be happening. The engineering report of the project notes that this diaphragm was of key importance. By October the contentious political process of securing the arrangements for the completion of the project was taking place. Identities were being negotiated through expertise (chapter 6, p224). At the same time the innovation in Shaft D was being put to the test for the first time. This linking of political support and technical progress seems to have happened in both directions. Without political support the project might have been stopped by its many opponents, while the technical progress was necessary to ultimately validate those who had politically engaged with and supported the reservoir. The diaphragm in shaft D was shaped to accomplish this link. As a result the contractors retained their contract and the reservoir ultimately became a site of political demonstration in which science and good governance were linked.

The air-shafts were the central technical innovation that enabled the excavation of the trench centre line and the construction of the reservoir. By examining the changes in design of the air-shaft we can think about what forces were involved in its construction. As we have seen, it resulted not from a linear application of a pre-made design but from a process of interaction between the material to be excavated, labourers, engineers, and the success of what had already been improvised. The conception of using air-pressure under circumstances in which water enters an excavation was well preceded. In Chapter 4 we saw the difficulties encountered when exploring or as Sir Ernest Moir put it, setting out “to definitely ascertain the nature of the sub-soil.” As the fluid material failed to maintain shape consistency the response was to gradually strengthen from timber to metal to an iron cylinder. Through this process of empirical exploration it became possible to envisage some type of excavation under air-pressure. Ultimately rings made of cast-

120 May 25 1933 Telegraph.
steel segments were used to excavate the trench. As we saw in Chapter 5, the legal system also required negotiation and put its own particular stamp on the design process and how the project was conceptualized. “Nature” was enacted in a particular way that best enabled the legal and political conflict to be averted as much as possible. The financial investment, and also the investment of political and business reputations gave an inertia to overcoming the difficulty of the project. All of the effort and resources (political, economic, and technical) put into the construction, including the choice of a line for excavation and the original conception of the project from 1891 (first supply of diverted Mourne river water arriving Belfast 1901), set the construction of the reservoir on an initial path. This path varied but it would have been difficult to simply change it discontinuously, abruptly or to something else entirely different. Variations in the process happened because a variety of forces, which sometimes conflicted, ultimately coalesced to become a reservoir. Without making any particular statement of cause and effect (without tracing any one particular line through this maelstrom of interconnections in preference to another), I have been drawing out some of the mutually determining influences and connections of governance and technology that emerge beside the empirical fact of the reservoir finally complete, ready to provide water for Belfast during dry years. Three important findings that I would like to articulate are given below.

- Firstly, the character of these processes of design show no single point of enunciation.
- Secondly there is a result and effect upon people (both within and outside the Valley) because of the processes. Discourses of technology and governance have effects upon those governed. They have effects upon the human subject.
- Thirdly, the construction of precedents enables future systems of governance. The circulation of precedents creates areas or territories of governance.

These points are each elaborated in the next three sections, respectively.

**Design:** The character of these mutually determining influences and connections does not support the traditional conception of top down design. Top down design is conceived as being done by engineers utilizing principles of science. These principles would dictate only one possible best design. This design, once articulated, is then made manifest through labour and practical expertise. However this design case study shows a more complex relationship indicating no single point of enunciation.

In chapter 7, I have detailed the composition of the air-shaft device during the time that the Water Commissioners were accused of being politically silent about the Silent Valley. I have
allowed this narrative to be laid parallel to that of the previous in chapter 6. As the design of the air-shafts takes shape, so also does the political will to endorse project completion. Likewise political forces shape or influence the direction of the engineering. For example, in Chapter 4 we saw how engineering strategies to “ascertain the nature of the sub-soil” differed because of the differing position of the Water Commissioners and the contractors in regard to who should be financially liable for the unexpected difficulties. Alternative engineering directions were possible. For example, obtaining water from Lough Neagh and treating it by chlorination (such as suggested frequently by nationalists at the *Irish News*). At the very least, political forces make possible a space which enables engineers, but it is arguable that they are more intimately interwoven with the differentiations of technology design.

The death of the original designing engineer and his replacement by a variety of engineers

122 In 1891, engineer Macassey had considered Lough Neagh as one of four potential alternatives to the Silent Valley. However, Lough Neagh water would require pumping to reach Belfast, nor was it, by the standards of 1891, as ‘pure’ as Silent Valley water. In May of 1934 the works committee directed the engineer to install chlorination at the Knockbracken reservoir, a fact that was never publicized. Lough Neagh became a new source of water for Belfast in the 1970s.

123 Compare the earlier work of Gallon and Law “The Life and Death of an Aircraft” (in which the macro-political forces clear a space in which engineering can occur) with the later more nuanced examination of the same case.
and individuals is another example that the design of the reservoir had no single point of enunciation. The reservoir was in fact conceived by Luke Macassey in 1893, and then designed and redesigned during the second decade of the century by Fred McCullough. After his death, the completion of the project formally occurred under the Board of Engineers, Binnie, Hill, and Sandeman but much of the expertise would have come from those more directly connected with the works, notably Sir Ernest Moir, but also other engineers on site. Not only engineers but labourers also contributed to the design. The removal of boulders by the plug and feather method, instigated by Mourne stone men (from their history of exploring options in an environment where only limited physical force could be applied) is another example of bottom up design. The rocks themselves, and the liquid complacency of the sub-soil, disputed the materials used to excavate the trench, buckling the metal sheeting, flowing back in and upwards from the depth of the excavation. Their actions lay latent in the arrangement of the earth that had been assembled by the energy of glaciers, earth, water, and time, by the forces that made the valley what it had become by 1923 when excavation began. The legal resolution of responsibility within the carefully defined agreement pressed the imagination of nature in a particular direction so as to provide shelter from blame for the reservoir project and its participants. The project was both organized and financed by government, given inertia during difficulty by political necessity. The interlocking arrangements of people, things, and ideas had come into some kind of stability without one particular origin.124 Once successful, the project became an example of good governance displayed to uphold reputation, an example to be emulated.

Subjectivity: The effect of the reservoir on people’s thinking, habits and practices varied in relation to what their relationship to the reservoir was. The wage-labour employment structure hierarchically differentiated by skill gave the primarily male work force roles, a job as a labourer or a chance to practice a trade (steam-man, mason, beginning as a nipper, etc). It also separated them from engineers and managers. Existing labour patterns of Mourne culture were integrated to the contractors’ requirements and with arriving skilled labour. Publicity regarding the effective use of the plug and feather technique added to Mourne culture a reputation for local expertise in stone work comparable to modern science. Ultimately, the scale and lasting success of the project left an impact on how those involved thought of themselves. “They were amongst the best days of my study. See John Law Aircraft Stories.

124 And as discussed at the end of chapter 3 in the critique of actor-network theory, sometimes this active, tenuous stability depended on particular people, things, and ideas not being present.
Although a minority of the work force was directly involved in the air shafts (as air-men or otherwise), the entire community of the Valley understood the success or failure of these curious new devices to be connected with their own fortunes. As discussed in chapter 3, largely the supporting roles which reproduced the daily capacity for labour were taken by women.

Beyond the Valley the idea of the reservoir circulated as a tribute to the value of engineering. Lord Abercorn’s biblical humour placed the engineers in the guiding role of Moses, who protected the Hebrew people in the wilderness. Mr. Binnie defended the engineering against the charge of harming nature, a theme which was repeated and circulated in newspapers. The column by “A Young Woman in the Crowd” indicates both a general acceptance of the nature versus engineering expectation and the feeling that in this case the engineering was also beautiful. The newspaper story of Ned the crow who came to be at ease with engines and the steam-men was written before the opening ceremony and celebratory luncheon but it is another example of how the nature versus engineering narrative was circulated. As was shown in Chapter 6, the association of the Silent Valley Reservoir with good governance was (at first accidentally and then very deliberately) pursued by the Water Commissioners and others. When “A Young Woman in the Crowd” distances herself from engineering experience saying that it is “something entirely outside my intelligence,” but none the less praises the engineering work of the Silent Valley she is enacting a separation between herself and the type of public understanding of engineering and science that would enable democratic participation. She appreciates the engineering, even seems to have a fair knowledge of what the reservoir can do, but she does not understand it in an active or engaged way. She does not identify with it. The political habit that is being reproduced in the circulation of such remarks is a ‘leave it to the experts’ attitude.

The operation of the ‘nature versus engineering’ narrative affects how people view their world and perhaps how they act within it. First nature and engineering are separated. At the same time people are separated –skilled labour, leaders, engineers are separated from the rest of society (The dimension of gender within this separation should not be missed). Then engineering is selected

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125 W.H. Carson, p19. This statement and others like it are discussed in Chapter 3, p121.
126 Exodus 17v.6.
127 Localized interests represented at the luncheon illustrated the nature versus engineering narrative (particularly in relation to beauty) in a more nuanced manner in order to validate the engineering and political arrangements that were associated with them. This type of nuanced description of the relationship between nature and engineering dam projects is also shown by Richard White in The Organic Machine pp54-57, where he discusses Lewis Mumford’s Technics and Civilization (1932) as part of this more harmonious rhetoric.
as better option than abandoning humanity to nature (however beautiful it is). Finally in the operation of this narrative, expertise (which has been associated with good leadership and to some degree with class relations) is validated.

**Standardization and Territory:** The construction of precedents enables future difficulties to be encountered with the institutional experience of the past. Belfast was the proud sponsor of the British Water Association meetings, also providing the organisation's annual chairperson. These meetings are an example of an institutional mechanism for circulating the precedents constructed in municipal water projects. During the 1931 meetings, the Silent Valley was of course an important focus. George McIldowie’s paper, presented for the Institution of Civil Engineers, described the technical details of the entire project. This paper was then published in the transactions of the Institution. This process of recording and circulating description at the disjunction of production (in this case production of a reservoir) gives an area or realm in which smoother governance can occur. Many of these circulations were concentric to the capital city, London. When Belfast sought help to build the Silent Valley Reservoir it turned to London. The contractor which worked all over the world was organised from the originating city of the Empire. For assistance in the construction of a parliamentary bill authorizing the construction, the early Water Commissioners went to London to receive legal advice. The legal resolution for the conflict also borrowed heavily from London. The arbitrator was a prominent engineer from the metropolis and the legal precedent came from a similar case previously determined in London. However regionally, the reservoir project also enabled more local circulations. The display of the reservoir as an example of good governance began with the municipal association meeting as early as 1927.

Use of the reservoir as a rhetorical device in the Boundary dispute is undoubtedly the most direct relationship of the reservoir to establishing and reproducing a territory of governance. However, there are other ways in which engineering can produce territory. Standardization of scientific, technical, and administrative processes creates a region or territory within which people and political administration can be managed. The application of sovereignty across a region can be supported or harmed by the level of technical agreement and interoperability throughout the region. The local ability to guarantee water to a larger region from a single reservoir source enabled the Water Commissioners to support new housing development with the promise of water.

128 A water example of this is Thomas Osborne, “Security and Vitality: Drains, liberalism, and power in the nineteenth century” in which sanitary engineering, the Victorian social order, and actions of government are shown to be connected.
Epilogue

Later in 1933 controversy erupted during the local elections in the city of Dublin when the opposing political party accused the Lord Mayor, Alderman Alfred Byrne, of having attended an ‘Orange’ ceremony.\textsuperscript{129} He contacted the Water Commissioners and Mr. Quinn the Secretary delivered information about Catholic attendance at the ceremony by telegram.

Over 800 guests were invited to the opening of the Silent Valley Reservoir on May 24. Upwards of 700 attended. Amongst the number who attended were many Catholics. The function was strictly undenominational, and had positively no connection with the Orange or any other Society of Association.

Belfast Water Board is strictly non-political, no distinction having been made in matters of religion or politics in distinguishing people who were invited, and attended from England, Scotland, Wales, and the Free State.\textsuperscript{130}

Constitutional nationalist Water Commissioner Gerald Kennedy (who had now been advanced to Deputy Chair of the Water Board), followed up with a telegram to confirm there had been no Catholic boycott of the event and that his attendance at the event and participation on the Water Board was evidence of this.\textsuperscript{131} As we saw in chapter 2, claims by the Water Board to be “strictly non-political” could be used to conceal unionist political interests. Northern unionists were now interested in maintaining the more moderate nationalists in the Free State (at least in relation to their more republican contenders who would contest the territorial sovereignty of Ulster). The administrative logic of being ‘non-political,’ as was discussed in chapter 2, is closely associated with the purification of the technical from the political.

Not only were the Water Commissioners playing a minor role supporting Ulster’s sovereignty outside its boundary, they were also helping inside its boundary to organise the continued expansion of Ulster’s capital city and surrounding region. Work began in 1934 installing the remaining pipes in the city of Belfast and also between the Silent Valley Reservoir and the Knockbracken utility reservoir to make Silent Valley water available to Belfast. The expensive

\textsuperscript{129} June 24 1933 Telegraph. The Orange Order was a sectarian protestant organisation.

\textsuperscript{130} June 27 1933 Independent (Dublin).

\textsuperscript{131} June 27 1933 Independent (Dublin).
Malone suburbs were among the first places to receive the prestigious Silent Valley water. New houses were also being built elsewhere. David Adams, the Water Commissioner most associated with pushing the reservoir controversy to its final conclusion passed away in July of 1934. Although he was no longer Chairman of the Board, his obituary picture showed him wearing the chain of office which he had by now passed on to the new Chairman Dalzell.

The controversial reservoir was completed in a total of ten years, taking four more years than expected. Eight laborers died during the construction period and another directly after. Today the 3000 million gallon reservoir, first imagined in the late 19th Century during the mountain survey work of engineers Macassey and young McCullough, continues to be a major water source for the city of Belfast.

Figure 7.13 The Silent Valley in 2002 Source: http://www.bbc.co.uk/northernireland/yourplaceandmine/down/A742079.shtml

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132 Sep 24 1934 Telegraph.
133 July 9 1934 News-letter.
134 The last death associated with the Silent Valley work occurred on December 6 1934. Labourer David Wilson was involved in laying the second set of 36 inch pipe from the Valley to the Knockbracken utility reservoir. When shearings to hold the piping in place slipped he sustained injuries from which he later died. Dec 7 1934 News-letter.
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**Periodicals**

*Irish News*
*Belfast Telegraph*
*Ulster News-letter*
*Northern Whig*
*Daily Mail*

Note on periodicals – Newspapers were accessed through ‘Newspaper Clippings’ located in the WAT/1 archive at the Public Record Office of Northern Ireland. The following records contained newspapers from the following dates:

- WAT/1/3F/3/5 1916-1926
- WAT/1/3F/3/6 1927-1929
- WAT/1/3F/3/7 1930-1939

Although unpaginated these books are organized chronologically thus the date and the name of the newspaper (when given) serves to locate references. Newspaper references throughout this thesis have been given in this format to distinguish them from those consulted directly from newspaper archives.