THE DEVELOPMENT OF THE NORTH-EAST COAL PORTS, 1815-1914;

THE CONTRIBUTION OF ENGINEERING

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Abstract of Thesis

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The development of the ports of the North-East was a direct consequence of the region's increasing coal production; existing ports were expanded and new facilities created. Improvement required capital and it became necessary to form commissions to administer the ports, subsuming the powers of individuals and companies. Through them the greatest and most beneficial developments took place.

Of an engineering nature, improvements involved rail transport, trans-shipment facilities, the building of docks and breakwaters, and river deepening and straightening. The advice of the nation's most eminent engineers was acted upon and, through the works undertaken, coal shipments from the North-East increased from 3 to 35 million tons per annum over the century which began in 1815.

Certain ports were over-capitalised, others starved of funds, but by 1914 all competed on equal terms. Based on throughput, all exhibited similar capital expenditure and annual revenue. Development was not uniform but, generally, capital expenditure resulted in increased coal throughput and revenue. Docks were built as necessary, their costs comparable with those of other U.K. ports. Their value was marginal although two of them were so efficient that they were equalled in unit throughput only by Cardiff, the principal port of the analagous South Wales coalfield.

Mining, railways and ports were inter-dependent, collieries owning staiths and several railways themselves operating docks. In 1865 the ports came to experience the virtual territorial monopoly of the North Eastern Railway, its financial power unrivalled. Itself operating docks, it came to determine the strategy of coal shipments.

This thesis explores the evolution of the ports and their railways, the contribution made by the engineering profession to the development of both, the formation of the region's port authorities and the relationships which existed within and without the governing bodies.

CONTENTS

PREFACE

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Notes

In the text of this thesis abbreviations have necessarily been used. The principle adopted has been to state in full the company or authority

at the beginning of each chapter, followed immediately by the abbreviation later used.

Imperial measurements have been adopted throughout as it was this system which was in use during the period considered. The metric equivalents of the Imperial units are as follows:

1 inch	=	25.4 mm.
1 foot	=	0.304 m.
1 mile	=	1.609 km.
1 acre	=	0.4047 hectare.
1 square mile	=	259 hectares.
1 U.K. ton	=	1.016 tonnes.

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1 chaldron	=	2.65 tons, or 53 cwt.

The maps included in the text have been prepared from many sources; they should be considered only as diagrammatic although approximate scales are shown on each of them.

1. INTRODUCTION

North-eastern England has been described as "a finite entity, rich in its legacy of the centuries of industrial development and marked by a relatively simple frame"[1], the Northumberland and Durham coalfield. The coal-bearing strata, the Carboniferous series, dip eastwards to the sea - and under it - but the coal seams, shallow in the west, are overlain by Permian limestone in the eastern area of County Durham. Rivers flow generally from west to east but they differ in the configuration of their navigable lengths. The Tyne, its catchment embracing the greatest area, has developed meander haughs above Newcastle whereas below the town it runs between steep banks which, although impeding development, proved advantageous for the trans-shipment of coal; to a smaller scale the Wear is similar. Second in magnitude, the river Tees follows a meandering course in its lower reaches but at Stockton - in its unimproved state - it entered an area of tidal flats, discharging to the sea through an extensive estuary.[2] Over their usable lengths, both the rivers Coquet and Blyth flow through low-lying ground.

The mining of coal and its transport to the rivers Tyne and Wear, traditionally by waggonway, dominated the region's economy before 1815. From that date the pattern changed as a result of three major factors, the successful winning of Hetton colliery, the inauguration of the Stockton and Darlington Railway and the development of steam power for both rail locomotion and for ship propulsion. The first proved the existence of coal beneath the limestone of eastern Durham and so opened the way to the establishment of ports at Seaham and Hartlepool; the second led to the Tees and, later, West Hartlepool becoming coal-shipping ports; and the third brought to both land and sea transport a new effectiveness. These changes enabled the region to meet the growing demands for coal, for local use, for shipment to south-east England and, increasingly, for use abroad. Increased production of coal brought with it a growth in

the region's settlements, an expanding network of railways, the formation of new ports and the development of the earlier-utilised rivers.

The century which began in 1815 was one of continuous - but not uniform - growth in the North-East. Before the inauguration of the first railways little development had taken place but their construction, together with increased mining output, brought about a significant colonisation of the region, this phase ending at mid-century. Afterwards followed extensive new mining developments, major engineering and shipbuilding activity and the almost unknown large-scale provision of port facilities, the last-named based almost entirely on coal and its shipment.[3] Even on the Tees, its prosperity from mid-century centred on iron and steel, one of the major industrial phenomena was the vast transport requirements of the iron industry.

Mining activity was not uniform: at first erratic but spreading generally southwards from the Tyne and Wear, it then pushed northwards into the steam-coal areas of Northumberland; later, mining in west Durham flourished as a result of the gas-making requirements of London while the last phase of mining expansion witnessed the development of large undersea collieries on the Durham coast. Rail transport improved by the use of bigger waggons, more powerful locomotives and improved track, steel rails being adopted in place of iron. So far as shipping was concerned, steam supplemented wind-power; iron, and later steel, replaced wood in the hulls of ships; ship sizes, speeds and utilisation increased.

Between railway and ship lay the ports. Other than the importation of timber and iron ore, little notice need be taken of any commodity other than coal; although glass-making, chemical manufacturing and engineering were in evidence on a large scale their significance in relation to the north-eastern ports was relatively small. Perhaps the only factor of significance was ship-building, its relationship close to both shipping and port development. Shipbuilding, although by nature cyclical, expanded

during the period considered and its continuing growth, and that of the shipment of coal, masked the fact that Britain, in the later years of the 19th century, had suffered a slowing-down of its growth rate.

Forming as they do a coherent industry, it is impossible to separate completely the four principal elements in the development of the North-East, the production, rail transport, trans-shipment and shipment of coal. Of these four, it is port development which has perhaps been least studied. Mining, railways and shipping have been chronicled and analysed, both by contemporary and by twentieth century authors, but the development of the region's ports, as an entity, has not yet been investigated. Although individual rivers and towns have been studied, the inter-relationships have not been explored, neither has their growth between 1815 and 1914 been considered fully with regard to the influence of the region's railways, especially the North Eastern Railway. As the carrier of minerals on a massive scale and of a size such as to enable it to dictate the pattern of the region's development, the power and territorial monopoly of the North Eastern Railway were such as to engender the criticism and apprehension of port authorities and municipalities alike.

Although inter-port rivalry within the North-East was significant, competition with ports outside the region was almost non-existent. The major ports of the U.K. - London, Liverpool, Hull and Glasgow - did not compete with the North-East in any way; it was only the threat of losing a proportion of the coal trade to Hull which led the North Eastern Railway to be criticised for its policies. The major competition to the North East, in theory if not in fact, was South Wales, the development of the two regions running in parallel. It is significant that South Wales sought markets different from those of the North-East and it is perhaps because of this fact that its ability to compete passed almost without mention in the region. Nevertheless, so similar was its development that it forms a useful comparator against which to assess - in broad terms

- the growth of the ports of the North-East.

Over the hundred year period the export of coal came to occupy a much greater importance but, nevertheless, "so completely did coal dominate coastal shipping that the trade in all other minerals taken together could not match it in volume."[4] This study is concerned with the development of the port facilities required for this most significant element of the Nation's economy. Its objects are to investigate the factors which led to the establishment of new ports, the reasons which caused the formation of commissions to undertake river improvements, the rivalries which existed between the various port authorities and the conflicts which prevailed within each of them. It is intended, too, to seek confirmation of the power and influence of the railways upon port development, especially the ability of the North Eastern Railway - with its massive resources and itself a major dock operator - almost at will to inject capital into a chosen port and so reap the benefits of the resulting growth in its trade.

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2. PORT DEVELOPMENTS PRIOR TO 1815

2.1 Introduction

Prior to 1815, the two rivers in the North East which had undergone the most significant improvements were the Wear and the Tees, a result of the formation of the River Wear Commission in 1717 and of the Tees Navigation Company in 1808. The Tyne, the region's principal river, had been almost neglected under the conservatorship of the Newcastle Corporation. Of the other ports, the Coquet was under the jurisdiction of the Dukes of Northumberland and the Blyth under the Delaval and, later, the Ridley families. Like the Wear, the Tees had earlier been the responsibility of the Bishop of Durham. Seaton Sluice (or Hartley) was owned by the Delaval family and Hartlepool had traditionally been the port of the Bishop of Durham. Superimposed on this pattern of conservatorship was the ownership of tidal lands by the Crown, the protection of navigation by the Admiralty, the interests of riparian owners and the control of navigation by Trinity House, the Brethren in Newcastle being responsible for navigation between Holy Island in the north and Whitby in the south. Of the region's ports, only the Tees and Hartlepool traded exclusively in non-coal merchandise and, of the coal-shipping ports, the Tyne and Wear were predominant; before 1815 their supremacy was unchallenged.

2.2 River Tyne

In 1613, the conservancy of the river Tyne passed from the Crown to the Corporation of Newcastle. Although several industries - glass making, shipbuilding, engineering and chemical manufacture - were to be established on the river it was the coal industry which depended most upon it; between 1613 and 1815, shipments increased from 240,000 to 1.83m tons.[1] Coal was shipped principally via waggonways to riverside staiths and then, by means of keels,* downriver to colliers. The exploitation of collieries both upstream and downstream of Newcastle had led to the

* By 1815, keels were of 21 tons capacity.

construction of a network of waggonways. Extending up to eight miles in length and in a generally north-south direction, some of them were able to discharge direct into ships, so eliminating the use of keels, still used by the collieries above Newcastle bridge.

To extend and improve navigation, the construction of canals was several times considered but never executed. In 1710 a canal was proposed to extend the river westwards from Newburn to Hexham[2] and in 1767 a suggestion was made to by-pass, by means of a canal, a severe bend in the river at Stella[3], a scheme reviewed by John Smeaton in 1778. Further canals were proposed to link the Tyne with Carlisle, and even the west coast. Detailed by Hadfield they may be summarised as follows: William Chapman produced several reports in 1795; a scheme was produced by Ralph Dodd; further suggestions emanated jointly from Chapman and William Jessop; Jonathan Thompson produced a scheme; and in 1796 reports were made by John Sutcliffe, Robert Whitworth and Chapman. It was not until 1810 that a prospectus was issued for a canal to Hexham but it proved impossible to raise the capital necessary and nothing further ensued. [4] Communication between the Tyne and the Wear was never good, only two waggonways - from the Mount Moor area - running between them. In 1796 Dodd suggested that a canal be formed along the Wear to Durham and, via the river Team, to the Tyne at Redheugh.[5] The scheme was reported upon by Whitworth[6], who noted Smeaton's earlier consideration of it, but in spite of support from the area's principal coal owners, no further progress was made.

Neither the construction of waggonways and staiths nor the proposals for canals resulted in the Corporation effecting improvements to the river. Surveys by Captain Grenville Collins in 1723 and John Fryer in 1782 showed seven feet of water on the bar at low tide. John Rennie had recorded a lower figure in 1816, with shallower water up-river. Disputes between shipowners and Corporation were frequent, the latter, perhaps unjustifiably, being accused of having contributed to the river's deterioration.

Such were the feelings of the North and South Shields shipowners that they called upon Dodd in 1796 to report on the harbour. He declined to suggest improvements to the river itself, which "in many points, stands unrivalled as first in this Island",[7] but he did recommend docks at Coble Dene - later adopted - and at Mill Dam, referring to an "absurd idea"[8] on the part of the Corporation to fill the site with ballast. He also propounded the need for a north pier which, in turn, would provide a site for a dock or a new town. No action was taken.

In 1802 Chapman, at the request of the Corporation, reported on the removal of two of the worst obstructions in the river's channel[9] but, in spite of the fact that the Corporation had been indicted - but acquitted - for the river having been obstructed, his views were rejected. Before 1815 the only significant improvement made to the river was the construction, in 1810, of new leading lights but it is significant that this work had been undertaken, not by the Corporation, but by the Newcaastle Trinity House.[10] Quays and staiths had meanwhile been financed privately, to the Corporation's approval, but such were the river's restrictions that navigation was dependent upon the tidal range - some 12 feet - and only ships of shallow draught were able to use the river safely at all states of the tide.

2.3 River Wear

As on the Tyne, the production and shipment of coal from the Wear was of long standing, shipments rising from 120,000 to 895,000 tons between 1609 and 1815.[1] Of lesser importance were salt making, glass production and shipbuilding with, unlike the Tyne, the manufacture and shipment of lime. It was, however, the coal trade which called for river improvements and it led in 1717 to the formation of the River Wear Commission, responsible for the river from Sunderland, not a good natural harbour, to Durham City. Before the birth of the commission the Bishop of Durham, c 1670, had perhaps built a pier and a move to form a commission in 1706 had

been defeated by the Newcastle Trinity House. The successful transfer of powers in 1717 was not unopposed, principally regarding the levying of a duty on coal and its collection by a body dominated by the principal coalowners, amongst them the Lambton and Tempest - later Londonderry - families[2], but it resulted in a 66 - strong body, although realistically providing that a quorum should comprise only seven.

From its inception the commission received reports from several engineers, James Fawcett, William Lellam, John Thomas and Charles Labeleye who, in a report of 1748 suggested that the commissioners should appoint a resident engineer to supervise all improvement works. In 1752 William Vincent was so appointed. In 1747 the commission had been reconstituted, but not before a quay had been built, together with a south pier assessed by Skempton as a major work of maritime construction;[3] additionally the formation of a north pier had been discussed.

Following Vincent, further improvements were made to the river under the direction of a succession of engineers.* The channel was deepened, the south pier extended and realigned and a north pier provided. Built initially as a temporary structure it was rebuilt in masonry by 1793, reducing dramatically the river's silting. In the last years of the century a steam dredger, the first in the country[4], was purchased by the commissioners but it was not until the appointment of Matthew Shout that the forming of a dock was suggested, of a size to accommodate 200 to 300 ships. Faced with this proposal, the commissioners requested Jessop to report upon it, his view being that such construction, although feasible, would prove expensive.[5] Jessop considered other items - such as pier extensions and the reclamation of land to the south of the entrance - more important but it was under Shout that a further dredger was bought in 1810 and the piers' extensions completed in 1816, marking an end to the first phase of the development of the Wear.

By this time the pattern of coal shipments was showing change.

* Between 1752 and 1815 the River Wear Commission's engineers were William Vincent, Joseph Robson, James Shout, John Shout, Robert Shout, Jonathan Pickernell and Matthew Shout.

The Newbottle railway ran directly to Sunderland, so reducing the number of keels in use, and the building of other railways was to continue this trend. The revenue of the River Wear Commission rose from £1,234 in 1748 to £5,490 in 1803,[6] this income being used wholly to finance the port's improvement and Miller gives totals of expenditure as £33,000 between 1717 and 1738 and £420,000 between 1747 and 1830.[7] In comparison with the Tyne, expenditure was impressive.

2.4 River Tees

In the 12th century Yarm was the only port on the river Tees and its position was later consolidated by the construction of a bridge there, the lowest on the river. Due to the river's sinuous course, navigation was difficult and in the 18th century Yarm was threatened by Stockton, especially when the bridge was brought into use in 1769. A further advantage held by Stockton was the fact that in 1680 the Customs House had been transferred there from Hartlepool, then in decline. The construction of a canal in the area had been first proposed by George Dixon in the 1760 s, envisaging it as transporting coal from Cockfield Fell to the Tees.[1] Due to lack of available capital it did not proceed but, later, further plans were made for a canal from the south west Durham coalfield to Stockton and Darlington, a move backed by the Pease and Backhouse families.[2] A report on the feasibility of the project was prepared by James Brindley and Whitworth in 1769 and they estimated that the canal, some 27 miles long, would cost c £64,000;[3] its revenue would derive from the carriage of c 100,000 tons of coal and 3,000 tons of lead annually. The trade figures were disputed by the opposition; their views prevailed and the scheme was abandoned. A further canal was proposed in 1773 by William Brown, a Newcastle colliery viewer, to link the Earl of Darlington's colliery to the Tees[4] and later it was suggested that the rivers Swale and Tees be linked. In 1810 a further variant of the canal from the south west Durham coalfield was propounded, joining the Tees at Darlington.[5]

None of these schemes was put into effect.

The idea of straightening the river Tees has been credited to Edmund Harvey but it is possible that his proposal, made in 1769, was a result of the survey undertaken earlier by Whitworth. The project was adopted by William Sleigh, mayor of Stockton, and Pickernell was engaged as engineer. He recommended that a cut be made through a loop downstream from Stockton but, again, no action resulted. In 1796 Dodd, when reporting upon a further canal project, noted that the Tees, "with some necessary improvements, may be made the first river in this part of the Kingdom, the Tyne excepted"[6]; a canal should, in his view, be formed to link the Tees to Durham City.[7]

In 1802, a committee was formed to investigate the improvement of the river. It found it woefully inadequate; ships were forced to discharge cargoes into lighters, long delays were suffered due to lack of water and ships of up to 200 tons, built at Stockton, were forced into being towed to sea. The river, though, if deepened would

> admit laden Vessels of 160 or 200 tons burthen to come up from Sea to the Wharfs at Stockton for the delivery of their Cargoes, when the wind is suitable in one tide. Such dispatch may be an inducement to have Goods ordered to this Port which have hitherto been received by the way of York, Hull etc., to those inland Towns which lie at no great distance from this Port. 8

No estimate of cost was made and it was left to Chapman, in 1804, to do this. He approved of Pickernell's plans but envisaged the river's flow doing much of the channel widening, noting that the material excavated - or washed - from the cut would lodge in the old loop "where the tide will be languid, because of its length of course, being upwards of two miles and a quarter, whilst that of the proposed Channel will only be 200 yards"[9]. To emphasise the feasibility of his proposals he commented that similar work had been carried out on the Ganges and the Rhine.

To undertake the river's improvement, the Tees Navigation Company was formed in 1808 to be responsible for the river from Stockton to

the sea.[10] It was empowered to raise capital of £7,000, with facilities for borrowing a further £5,000, and to charge dues, based on tonnage, on ships using the river. Chapman was appointed as engineer, the views of Rennie were sought, improvements were put in hand and the cut completed in 1810, having cost some £12,000, £8,000 of which was for construction work, compared with Chapman's estimate of £3,184.[11]

Meetings of the Company were held in Stockton and such was its success that a dividend of 10% was paid in 1814, totally absorbing the revenue of £1,204, some 50% greater than had originally been anticipated.[12] Like the Tyne, the Tees was to experience much rivalry among the towns on it, Stockton, Yarm, and, in effect, Darlington. By 1815, Yarm was in decline vis à vis Stockton which through the 1808 Act had gained control of the river but its dominance was not complete, due to the influence of Darlington Quakers such as Pease and Backhouse, shareholders in the Tees Navigation Company.

2.5 River Blyth

The first of the region's many wooden waggonways was built in 1605 to transport coal from collieries at Bedlington, Cowpen and Bebside to the river at Blyth for shipment; the mines' output was c 3,000 tons p.a. when the lines were closed in 1614.[1] In 1699 the Plessey waggonway, four miles long, was built to carry coal northwards to Blyth and it survived until 1813, during part of its life having been in the hands of the Ridley family, from 1730 land and coal owners. It was later supplemented by other lines. The quantities of coal shipped at Blyth are difficult to ascertain as it was not classed as an independent port. Nevertheless, it would seem that from some 58,000 tons in 1723,[2] shipments rose to c 123,000 tons by 1816, although the throughput from Hartley, some three miles to the south, is included in the latter figure.[3] Hartley, or Seaton Sluice, had been used by the Delaval family since c 1670 and sluicing arrangements, a cutting - completed in 1764 - through rock to form a

new entrance[4], and new piers had all been constructed subsequently.[5]

Before 1815, the river Blyth had been slightly improved: quays had been built on the south shore; a pilot's watch-house was built in 1730; the North Dyke (or Pier), 1200 ft long, was built to protect the river's entrance in 1765; and in 1788 new leading lights were provided, the high light a substantial lighthouse, later heightened.[6] Harbour improvements do not seem greatly to have improved the depth of water available. At high water it amounted only to 14 feet, providing some two feet at low tide and so forcing ships to lie grounded when loading, a phenomenon not unique to the Blyth.

2.6 Hartlepool

During the 13th century the port of Hartlepool was protected by means of a chain across the entrance. By 1473 the Old Pier had been built and it was repaired extensively in 1588 and 1719; by 1723 it was reported as being somewhat decayed. By 1808 the harbour had silted up to such an extent that it was used as agricultural land and the harbour's small trade was restricted virtually to farm produce.[1] Mining near Hartlepool had been unsuccessfully attempted in 1735 and 1808.

The port was reported upon by Dodd in 1795. He noted that its south-facing haven was unusual for the North East but he foresaw its improvement by the forming of a wet dock there and considered that there was not "a more eligible situation in the whole island for a naval depot or harbour for ships of war".[2] To achieve his object, he proposed to form a break-water from the peninsular to the mainland. 1,330 ft in length it would incorporate gates for access and drainage.

Dodd's proposals were not taken up and in 1809 Matthew Shout was asked to report upon the condition of the pier, damaged by heavy seas. Shout proposed that repairs should be in the form of heavy blocks of masonry, larger than anything used earlier.[3] Such, however, had been the decline of the port that by the 19th century it was used only by fishermen and at their instigation, and with little income, an Act of Parliament was

acquired in 1813, its object the establishment of a commission to improve navigation and raise revenue from shipping for that purpose.[4]

2.7 Summary

In the century preceding 1815, the output of coal, both nationally and in the North East, increased, although the region's share fell; exports, increasing prior to the Napoleonic Wars were reduced as a result of them.

Coal Output and Shipments: 1700-1815[1]

Coal, 000 tons	1700	1750	1775	1800	1815
U.K. Output	2985	5230	8850	15045	22265
N.E. Output	1290	1955	2990	4450	5395
NE/UK %	43	37	34	30	24
NE Shipments	750	1119	1692	2482	2988
NE Exports	50	120	200	150	150
Exports %	6	12	17	6	5

Growth was not uniform and the annual compound rates for three separate periods show national production rising at an increasing rate with the production of the North East's collieries also rising, but at a decreasing rate.

Coal Statistics: annual compound percentage increase; 1750-1815.[2]

	1750-1775	1775-1800	1800-1815
U.K. output	2.13	2.15	2.65
N.E. output	1.7	1.6	1.3
Tyne shipments	1.0	1.8	1.1
Wear shipments	2.1	1.3	0.7

In the region, the coal exporting rivers were the Tyne, Wear and Blyth, the two first-named between 1750 and 1815 shipping from 95 to 97% of the coal leaving the North East. The ratio of shipment was approximately 2:1 in favour of the Tyne, compared with the Wear, but the following

table would seem to indicate that the formation of the River Wear Commission had strengthened the position of that river, but only for half a century. The later success of the Tyne was due to the opening of further collieries using improved mining techniques and pumping rather than to river improvement.

Shipments of Coal from North East Ports: 1750-1815.[3]

Shipments	1750		1775		1800		1815	
	000 tons	%	000 tons	%	000 tons	%	000 tons	%
Tyne	763	66	986	60	1550	64	1883	65
Wear	344	29	580	35	803	33	898	32
Blyth	50?	5	75?	5	80	3	100	3

By 1815 the Tyne had changed little but the Wear - with fewer natural advantages - had been greatly improved by dredging, channel protection and by the formation of piers. Paradoxically, though, it was on the Tees - with less traffic - where the most imaginative improvement had taken place, the shortening of the river below Stockton by some two miles. In two respects, the North East diverged from national patterns in that neither canals nor docks were built in the region. With an extensive network of waggonways leading to Tyne and Wear, it is unsurprising that canals were not constructed, principally due to an inability to attract capital, but is of interest to note that almost without exception, the lines proposed for them were later adopted by the railway companies. Prior to 1815, dock construction in the U.K. had proceeded to such an extent that an aggregate dock area of 840 acres had been provided at London, Liverpool, Bristol and Hull.[4] In the region only the Tyne and Wear possessed trade to warrant such construction but the Newcastle Corporation was unwilling to finance such an enterprise while the River Wear Commission then saw its role simply as that of river improvement. The diversity of the colliery interests, with heavy capital investment in waggonways and river staiths, militated against any reorganisation resulting from

dock construction. Nevertheless, the need for improved accommodation for shipping was evident, both from the point of view of providing a greater, constant, depth and also in the provision of additional areas of water for the mooring of ships. The Tyne and Wear especially suffered from frequent overcrowding.

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Summary

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2. Ibid; also S.T. Miller, op.cit, table "Wear Coal Exports, 1721-1858".
3. S.T. Miller, op.cit.; also Appendix.
4. S.T. Miller, op.cit, p201.

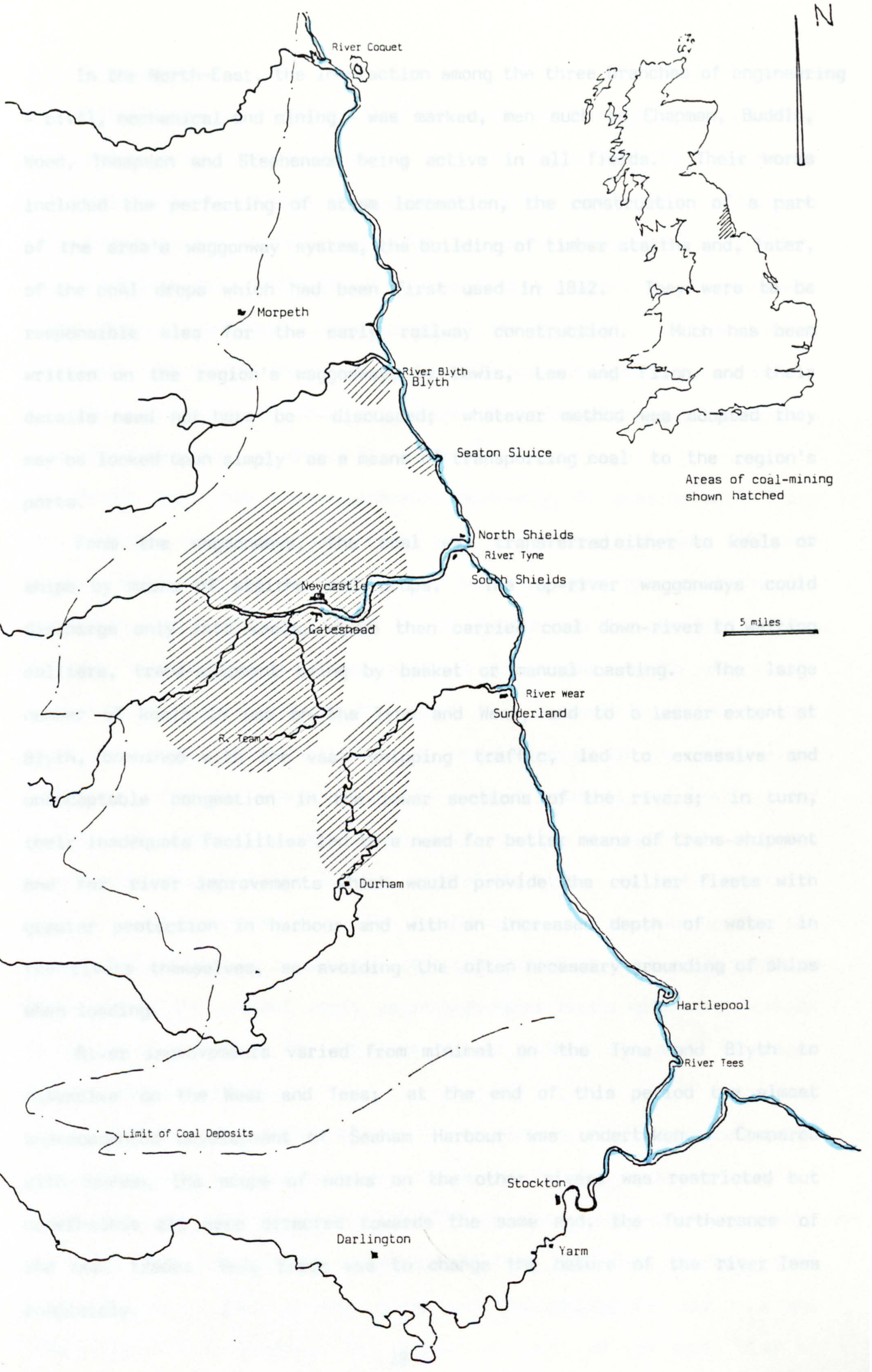
3. PRE-RAILWAY RIVER MANAGEMENT, 1815-1830

3.1. Introduction

During the Napoleonic wars the ports of the North-East had suffered from a reduction in their export trade. In 1815, with the prospect of greater freedom in the coal trade and an expansion of their foreign markets, the members of the Common Council of Newcastle instructed their two Members of Parliament, Matthew White Ridley and Cuthbert Ellison - significantly they were both coal-owners - to present to the Prince Regent an address concerning "the late glorious and extensive victory obtained by the allied armies."[1]

In 1815, the ports of Tyne and Wear, with Blyth, shipped 2.988m tons of coal, approximately 95% of it for London and east coast use. Total output from the region amounted to 5.395m tons,[2] a quarter of the U.K. total, and the coal was transported principally by waggonways, where over a period of some 20 years the change from wooden construction to iron had been taking place.[3] Carriage was exclusively by the chaldron waggon, nominally of 53 cwt capacity, drawn by horse or, up inclines, by ropes. With a general traffic from higher to lower ground it was possible in places to use self-acting inclines, patented in 1750 and first adapted on Tyneside in 1784;[4] stationary winding engines were becoming more common. The fifteen years comprising this period were to see the successful adoption of steam locomotion and the formation of the region's first railway built under Parliamentary powers.

Simultaneously, developments in mining enabled operations to proceed more effectively, among them more efficient steam-operated mine pumps, better winding engines and improved ventilation. The more general use of iron tubbing in the sinking of mine shafts - a technique later adopted for tunneling - used at Wallsend and Walker in 1792 led to the formation of the deeper Durham collieries, such as Hetton, sunk to a depth of c 900ft.[5]



Map 1: The North-East, c 1815

In the North-East, the interaction among the three branches of engineering - civil, mechanical and mining - was marked, men such as Chapman, Buddle, Wood, Thompson and Stephenson being active in all fields. Their works included the perfecting of steam locomotion, the construction of a part of the area's waggonway system, the building of timber staiths and, later, of the coal drops which had been first used in 1812. They were to be responsible also for the early railway construction. Much has been written on the region's waggonways by Lewis, Lee and Flinn and their details need not here be discussed; whatever method was adopted they may be looked upon simply as a means of transporting coal to the region's ports.

From the waggonways, the coal was transferred either to keels or ships by means of staiths and drops. The up-river waggonways could discharge only into keels, which then carried coal down-river to waiting colliers, trans-shipment being by basket or manual casting. The large number of keels in use on the Tyne and Wear, and to a lesser extent at Blyth, combined with the vast shipping traffic, led to excessive and unacceptable congestion in the lower sections of the rivers; in turn, their inadequate facilities led to a need for better means of trans-shipment and for river improvements which would provide the collier fleets with greater protection in harbour and with an increased depth of water in the rivers themselves, so avoiding the often necessary grounding of ships when loading.

River improvements varied from minimal on the Tyne and Blyth to extensive on the Wear and Tees; at the end of this period the almost unprecedented development of Seaham Harbour was undertaken. Compared with Seaham, the scope of works on the other rivers was restricted but nonetheless all were directed towards the same end, the furtherance of the coal trade; this trade was to change the nature of the river Tees completely.

3.2. River Tyne

Although the river Tyne had for many years been a major port, little had been done to improve it and it was not until 1813 that John Rennie (1761-1821) was called upon to inspect and survey the river. Following very comprehensive surveys made for him by Francis Giles (1787-1847) and John Rennie Jnr., (1794-1874)[1] he submitted his report to the Newcastle Common Council in 1816. Indicative of the Council's attitude towards its river - to obtain the greatest benefit for the least cost - it was not until 1836 that the then newly-formed River Committee heard the report read and ordered that it should be printed.[2]

Rennie began his report, somewhat ominously, by stating that there was, perhaps, no other river in Britain "on which it is more difficult to give a satisfactory opinion, as to the best mode of improving its navigation, than the river Tyne".[3] As Rennie saw it, the problem was that two incompatible qualities were to be sought, width and depth; increasing one would decrease the other. As a result he advised against solid longitudinal retaining walls and instead advocated the construction of groynes , filling between them with dredged material and then joining their river extremities by rubble walls built to half-tide height. By so reclaiming land the surface area of the river - below the Newcastle bridge - would be reduced from 1344 to 896 acres and to make up for the volume of water lost he recommended removing several of the river's sandbanks. Rationalising the channel would raise high-water levels up-river, increase the scouring effect of the ebb tide and so augment the depth of water over the bar by two feet.

Considering the mouth of the river, Rennie drew comparisons with Aberdeen which in 1770 had been very similar to the Tyne's present state. There, advice of John Smeaton (1724-1792) had been sought and his suggestions as to the form the entrance works should take had been adopted, with great success. This example could well be adopted for the Tyne and Rennie accordingly suggested that a pier be built on the south side of

the entrance to the river, presumably envisaging that the projecting point to the north would complement it.

Rennie estimated the works as costing £519,320, an expenditure much in excess of anything previously considered and 20 times the gross revenue derived from the river. By causing the masonry walls at North and South Shields to be built at the expense of the riparian owners - the Corporation would provide dredged material as backfill - a saving of some £80,000 could be achieved. In order not to impede navigation, the work should be undertaken gradually with the first operations being the formation of a uniform channel with the associated removal of projecting obstructions. Rennie did not comment on the provision of docks, other than to note that they could readily be provided at a later date, neither did he expand regarding their possible location although proposals for wet docks had already been made; at Mill Dam, South Shields;[4] at Coble Dene; and at Ouseburn, where William Chapman (1750-1832) had envisaged the terminus of his project for a canal from Newcastle to the Irish Channel.[5]

In spite of the major works recommended by Rennie not having been carried out, nevertheless the Common Council did continue to oversee the river Tyne, especially so far as the provision of new quays and staiths was concerned, the latter reflecting the opening-up of new collieries. Early mining had been in the vicinity of Newcastle itself but with the introduction of more effective pumping plant, better ventilation and improved haulage methods it had become possible to mine coal from greater depths, so leading to collieries situated some distance from the river, and to the east of Newcastle, being developed[6] and, in some instances, re-opened. These developments led to no fewer than 28 applications being made to the Corporation between 1815 and 1830 for permission either to build or extend existing staiths or spouts; 17 of them were on the north bank of the Tyne between Walker and North Shields.* Principally, the

* From the volumes of the Calendar of Common Council Book, Newcastle covering the period the following applications have been listed:
1815: Hebburn.
1817: Heaton colliery at Wallsend Quay; Brandlings at Wallsend staith. (continued overleaf)

applications were for outlets at, or near existing staiths or spouts, some necessary due to river silting and others the result of shippers seeking deeper water to accommodate ships of greater tonnage.

Several of the applications were for new staiths associated with waggonways and although not within the scope of this study, nevertheless some will be outlined. Prior to the end of the 18th century the waggonways to the north of the river had been limited in number and modest in scale, sample figures - they varied as collieries began and ended production - were six below the bridge and four above it, the longest some five miles; south of the river the comparable figures were three and eight, the longest eight miles. With the expansion in mining activity came the need for additional shipping facilities and in 1818 Benjamin Thompson (1779-1867) applied for a staith at Scotswood where a waggonway from Wylam terminated; this colliery was later to use the Newcastle and Carlisle railway. In 1820 an application was made by the Brandlings for an outlet at Bill Quay for their colliery at Heworth but this proposal encountered problems regarding the Pelaw Main waggonway, in 1809 planned by Thompson, the leading advocate of rope-haulage systems.[7] A further application for a new shipping place was from the Grand Allies for the Springwell waggonway, opened in 1826; John Buddle (1773-1843), later to be associated with the Marquis of Londonderry and the construction of Seaham Harbour, had made a financial appraisal and, the colliery's promoters being satisfied as to the scheme's viability, it was proceeded with.[8] The line ran to the

1817: Heaton Colliery at Wallsend Quay; Brandlings at Wallsend staith.
1818: Ellison at Hebburn; Carr and Grace at Walker.
1819: Ellison at Hebburn; Thompson at Scotswood.
1820: Percy Main; Elswick; Brandlings at Heworth; Liddell at Willington; Willington Colliery extension; Ridley, for ballast quay.
1821: Russell at Wallsend; Wallsend colliery; Bulman, for ballast quay; West Jesmond Colliery; Whitley colliery; Brandlings at Bill Quay.
1822: Elswick colliery.
1823: Walker colliery.
1824: Jarrow colliery; Earsdon colliery at Whitehill Point; Seghill colliery; Cramlington Colliery.
1825: Seghill colliery at Hendon; Bowes; Mount Moor at Jarrow; Elswick.
1829: Jarrow colliery.
1830: Brandlings at Wallsend; Heaton colliery.

river at Jarrow and was later connected to the Mount Moor colliery, formerly shipping coal to the Wear. This line, later to become the Pontop and Jarrow Railway, was to have been 11½ miles in length but only the eastern half was constructed initially; steam locomotives, rope haulage and self-acting inclines were used.[9]

Up to 1814 the staiths located on the river's banks were of simple construction, platforms with the dual purpose of storing coal and enabling it to be easily carted or barrowed into keels or ships. In that year, however, more complicated arrangements were provided by Thompson at Wallsend for the Fawdon colliery. Here a covered shed was provided some 24 feet above low water, so enabling coal to be stored at the river until such time as ships were available; the same design had been used at Pelaw Main two years earlier, the shed there being 600 ft in length.[10] Further developments led to spouts being incorporated into the staiths, or gears, and these timber trestle structures were in places built to a length of up to 250 ft beyond high water, so enabling bigger ships to load direct; the gears were some 30 ft above high water level. In 1830 the owners of Burdon Main colliery made application for a coal drop, "this lately invented Improvement",[11] whereby a loaded chaldron was lowered to deck level by means of a contrabalanced platform. It had been patented by Chapman in 1807[12] and adopted only by Thompson at Wallsend in 1815.[13] It was not until after the expiry of Chapman's patent that the use of coal drops, designed to reduce the breakage of coal, became general throughout the region. Of the waggonways to the north of the Tyne the most ambitious of the pre 1830 lines was the Brunton and Shields railway, almost ten miles long, which carried coal from collieries to the north west of Newcastle to the point on the Tyne where the Northumberland Dock was to be later built, at Hayhole.. The line was built by Thompson and was completed in 1826.[14] To a larger scale than the waggonway proposals of this period was the suggestion made by Chapman in 1824 that the line which he had surveyed in 1795 for a canal between Newcastle and Carlisle could be easily

adapted for railway use.[15] His suggestion was adopted and led to Chapman producing a report on the proposed railway, his estimate for it being £252,000 as opposed to the £800,000 which the canal would have cost; the later surveys were undertaken by Chapman and Thompson together.

Associated with the export of coal was the bringing into the river of the ballast used by colliers returning light to the Tyne. To save time in port there was a temptation to off-load it in the harbour entrance, and in the river itself, and regulations - not easily enforced - strove to prevent these dangerous and, for the river's conservators, expensive practices. The regulations aimed at ensuring that ships discharged ballast only at approved points, the Corporation receiving dues of up to 1/3 per ton.[16] Some ballast was used as raw material for the river's glass and chemical industries but the major part formed the vast ballast heaps on the river banks; the Corporation paid contractors for its off-loading but continued to extract profit from the operation. Between 1815 and 1830 the profit to the Corporation on ballast averaged £6,420 p.a.[17] Illegal dumping of ballast in the river exacerbated its silting problems and although not recorded some minor dredging - a barge was purchased in 1820 - must have been undertaken, the reputed expenditure on the river averaging £1,924 p.a. during this period. Ballast also brought other problems and in 1825 a committee reported to the Common Council that Josias Jessop (1781-1826), when in the area, had inspected the ballast quay at Willington where the superimposed load was forcing the masonry quay wall into the river; Jessop judiciously advocated leaving it alone until it collapsed as no secondary damage would occur and the longer the heap had to settle into the soft underlying strata the better.[18] It was however, recommended that the heap be raised no further and an adjoining site used instead.

The increase in the numbers of staiths, and their improvement, led to an increase in the tonnage of coal shipped from the river; between

1815 and 1830 it rose from 1.83m to 2.46m tons. The rise was accompanied by a reduction in the numbers of keels employed on the river, symptomatic of additional down-river staiths. Between 1822 and 1827 the number of keelmen in employment below the bridge fell from 300 to 150 while the number operating from collieries above the bridge rose from 600 to 700.[19] By this time some two-thirds of the river's shipments were being made from below Newcastle.

By 1827 the number of keels on the Tyne was some 300 but their existence could, by then, be seen to be threatened by the improvement in methods of shipment. That the keelmen were antagonistic towards the use of staiths is borne out by a dispute in 1819 when the keelmen demanded that staiths at Whitehill Point be removed as a nuisance was being caused.[20] One of the coalowners, William Russell, was indicted by the keelmen regarding staiths at Wallsend, leading to a court case, King vs Russell in 1824.[21] In spite of all protestations, the use of keels was in decline.

In spite of an increase in coal shipments there was no rise in revenue; it was c £24,000 p.a. in both 1815 and 1830, averaging c £22,000 over the period.[22] The sum used on the river's maintenance - there were no improvements - amounted to less than £2,000 p.a. leaving the balance to be appropriated by the Newcastle Corporation to use as it wished, whether for town improvements or for other purposes. It was the despotism of Newcastle in relation to the river which resulted in the disputes which took place, principally between Newcastle on the one hand and North and South Shields in the other.

One of the causes of the sporadic disputes was the matter of Customs. As the river's principal town, the office was located in Newcastle and in 1815 a "Committee of the Shipping Interest"[23] from North and South Shields agreed to write to the 2nd Duke of Northumberland (1742-1817) for his support and also to seek advice as to the powers of the High Court of Admiralty, "the general Conservators of all navigable Rivers".[24]

At this time, of the 800 ships registered in the Tyne, some 75% were owned by North and South Shields and as the greater part of the shipping activity took place in the lower river it was thought, understandably, that Customs facilities should be provided in either of the towns. The case of the shipowners was taken up by the Duke, who put to the Treasury his views as to "the Propriety (and) almost the absolute necessity of granting the Shipowners of North and South Shields the Indulgence they desired."[25] The case put by Newcastle to counter the claim was that a considerable proportion of the river's collieries were situated above Newcastle "which may at present be fairly stated to be the very centre of the coal district"[26]; this view prevailed in the deliberations of the Treasury, the Corporation's case - presented by Ridley and Ellison - being based upon the fact that there were 28 collieries in Newcastle but only three in North Shields and the proportion of coal vended was 1.51m and 135,000 tons respectively.[27]

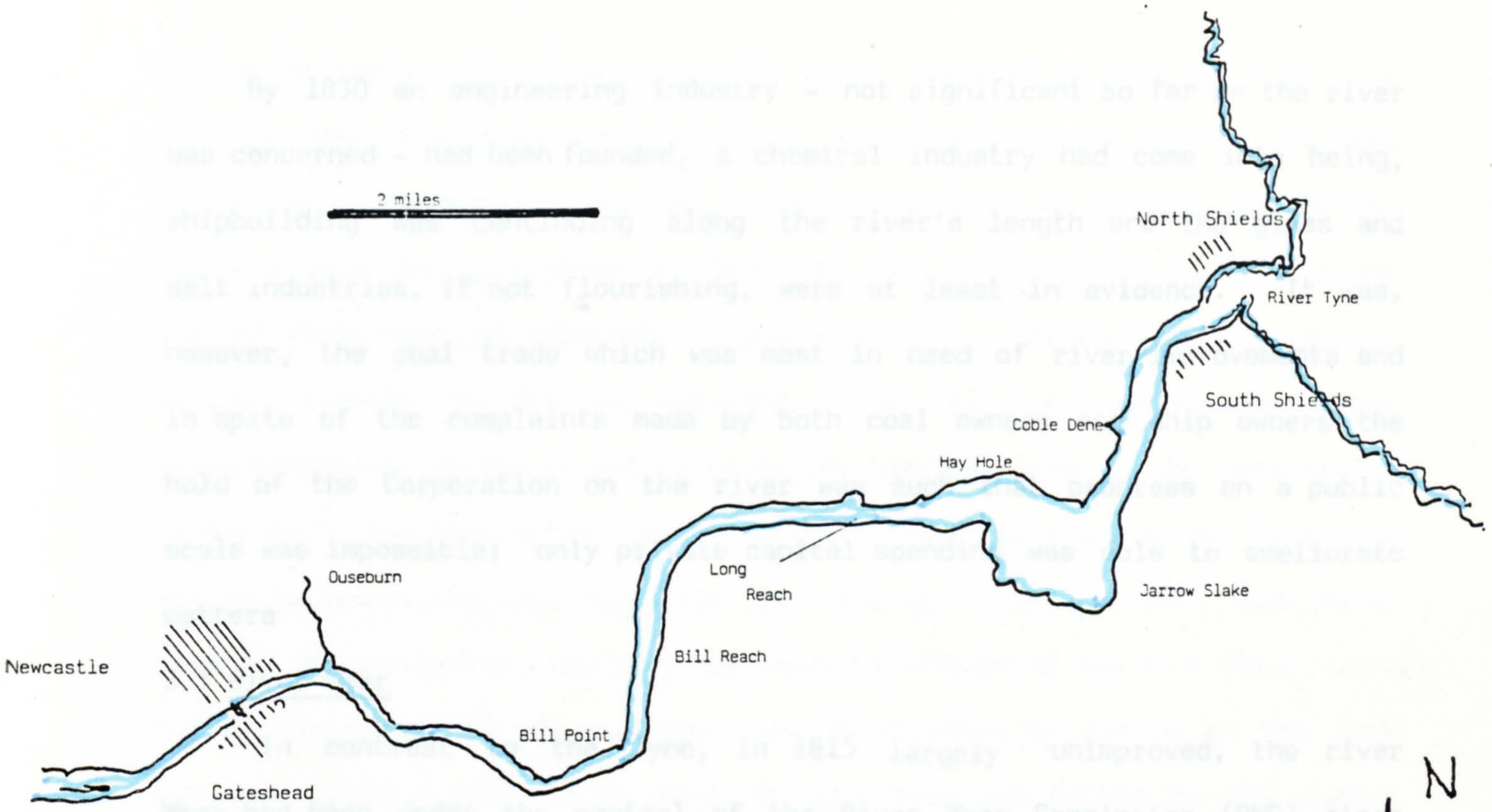
Failure in 1815 was followed by another application in 1827, through the Duke of Northumberland, and, no result having been achieved, the matter was revived in 1830 by the shipping interest of Shields. The case was similar to that of 1815 but details were given as to the parts of the river from which coal was shipped: 324,000 tons by keel; 808,000 tons from staiths less than three miles from Shields; 292,000 tons from staiths equidistant from Newcastle and Shields; 347,000 tons within four miles of Newcastle.[28] Using these figures, Shields again felt justified in seeking a separate Customs Office but the cause was again opposed by the towns of Newcastle and Gateshead and their Chambers of Commerce. The case for Newcastle was that more than half of the port's shipping was registered there while some 80% of the coal was shipped "at the staiths of the several collieries on the shores of the river in the intermediate space between Newcastle and Shields."[29] It was noted that ships of up to almost 400 tons register were able to deliver goods to within two or three miles of the town, although this view was disputed by North

Shields which considered it to be risky for ships to proceed up-river to Newcastle.

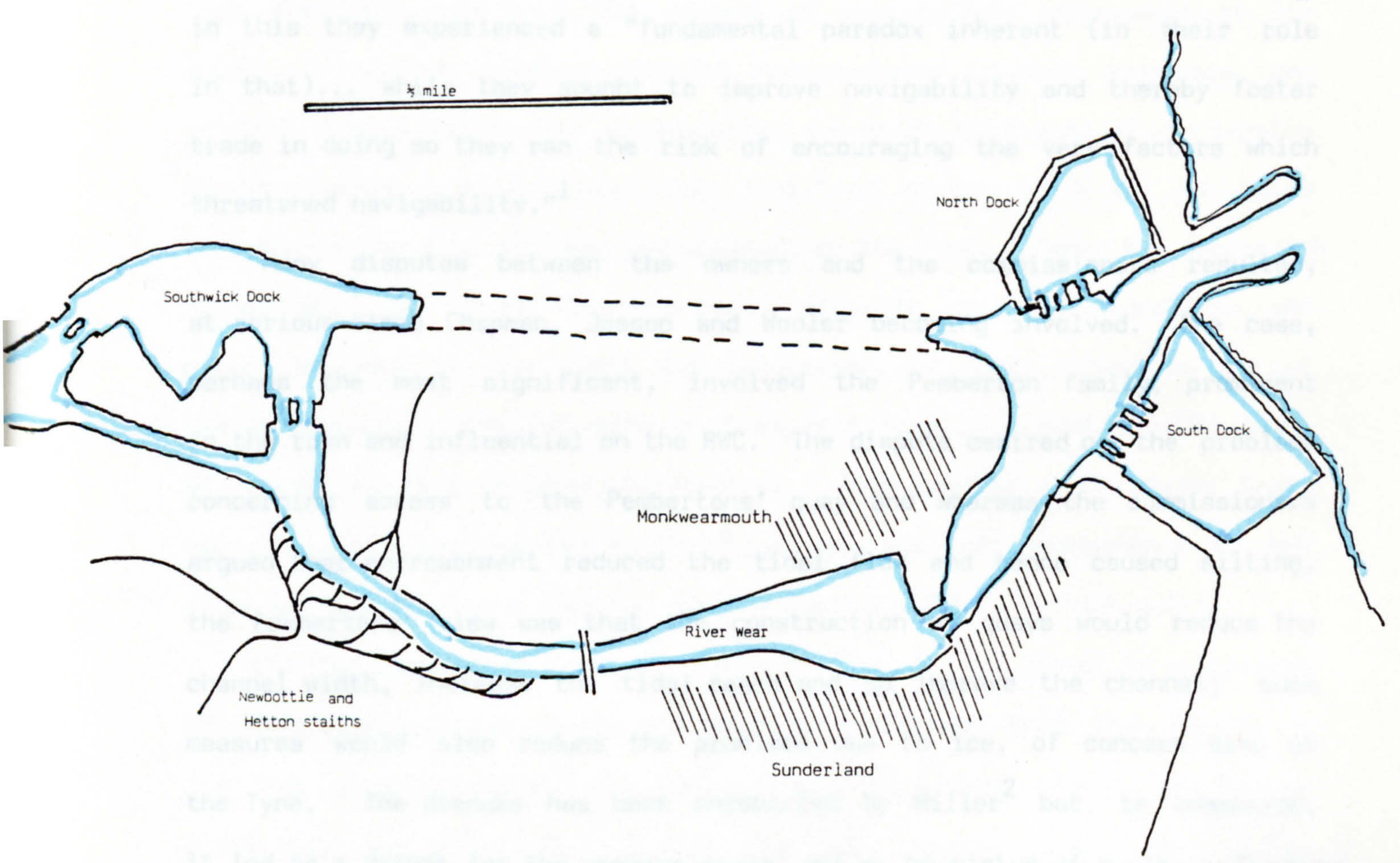
Once again, Newcastle's case was espoused by the two Members, propounding the view that Newcastle, with Gateshead, now having a population of c 50,000 saw itself as the river's paramount town and it was contended that all the region's coal companies, and its manufacturers, maintained offices in Newcastle and in any case, all the principal Shields manufacturers lived in Newcastle. The verdict again went against Shields.

That the Corporation was unwilling to fulfil its obligations so far as river management was concerned is confirmed by events in 1824 when due to some reluctance on Newcastle's part to remedy a nuisance caused by staiths at the Low Lights, North Shields, Chapman wrote to Rennie, then engineer to the Admiralty, who wrote to the Admiralty that "the conservators of the River Tyne should without delay be requested to adopt some general and effectual system of improvement to prevent encroachment upon the tideway"[30] which at this time had taken the form of a build-up of land at the gears. At the Inquiry held in 1833 as a precursor to the formation of a reformed Council it was held by one of the witnesses, Robert Plummer, that of the twenty recommendations made by Rennie almost 20 years earlier, only two - including the removal of the Tyne Main shoal - had been implemented. In his opinion the river had not improved since 1816; the only factor which had produced some amelioration was that by the 1830 s the use of steam greatly assisted the handling of ships.[31]

At the time of the inquiry the Newcastle Chronicle quoted "Mr. Cobbett (in the House of Commons): I will only say that I believe the corruption of the corporation of Newcastle to be as great as it possibly can be."[32] Whether corrupt or not, its lethargy in improving the river Tyne is indicated by the negligible increase - a crude indicator - in coal exports over the 15 year period and to the fact that the river still possessed its shoals, to the great impediment of shipping.



Map 2 : River Tyne, 1815-1830



Map 3: River Wear; proposals made by R. Stevenson, 1829

By 1830 an engineering industry - not significant so far as the river was concerned - had been founded, a chemical industry had come into being, shipbuilding was continuing along the river's length and the glass and salt industries, if not flourishing, were at least in evidence. It was, however, the coal trade which was most in need of river improvements and in spite of the complaints made by both coal owners and ship owners the hold of the Corporation on the river was such that progress on a public scale was impossible; only private capital spending was able to ameliorate matters

3.3 River Wear

In contrast to the Tyne, in 1815 largely unimproved, the river Wear had been under the control of the River Wear Commission (RWC) since 1717; as a result it had become the best-maintained port in the region. Over the years,the commissioners had experienced problems with the riparian owners, largely on account of encroachments being made into the river; in this they experienced a "fundamental paradox inherent (in their role in that)... while they sought to improve navigability and thereby foster trade in doing so they ran the risk of encouraging the very factors which threatened navigability."[1]

Many disputes between the owners and the commissioners resulted, at various times Chapman, Jessop and Wooler becoming involved. One case, perhaps the most significant, involved the Pemberton family, prominent in the town and influential on the RWC. The dispute centred on the problems concerning access to the Pembertons' quay and whereas the commissioners argued that encroachment reduced the tidal flow and hence caused silting, the Pembertons' view was that the construction of quays would reduce the channel width, increase the tidal reach and so improve the channel; such measures would also reduce the problems due to ice, of concern also on the Tyne. The dispute has been chronicled by Miller[2] but, to summarise, it led to a defeat for the commissioners' policy by virtue of a vote influenced

by the Pembertons - the decision was later reversed - and it caused the RWC to take the Pembertons to court, the commissioners losing the case and being called upon to pay the Pembertons c £145 in damages and costs. It was this decision which in 1818 led the commissioners to seek a new Act of Parliament to strengthen their powers.[3] Through the assistance of Lord Lambton the Act was obtained, one of its most important provisions being that marker posts be set up to define the Quay Line to be established by Rennie. Any encroachment of the river by developers was to be compensated for by "a Space...between high and low Watermark...for so much Tide Water as shall be obstructed...so that the scouring effects of the Tide Water...shall not be diminished."[4] Whereas the line established by Rennie on the Tyne was not wholly enforceable, that on the Wear was backed by the powers of Parliament.

The other principal points wherein the two rivers differed was, firstly in the engineering supervision accorded to them and secondly in the fact that the Wear had been the subject of considerable improvement to its mouth. From its inception the RWC had employed resident engineers, and in 1817 Thomas Milton was so appointed by which time some of the impetus for improvement appears to have been lost;[5] in contrast, it was not until 1832 that a resident engineer was employed on the Tyne. Under the succession of engineers the river Wear had been improved, dredging undertaken and piers provided at the mouth and Sunderland, by 1815, ranked as one of the major ports in the U.K. with coal exports totalling some 950,000 tons, of which 94% was shipped coast-wise. This traffic - the major trade was in coal - was carried in 5747 [6] cargoes and the improvements to the river bar had been such that the minimum depth was 17 ft at high water.

On the Wear, coal was originally brought to the river by a network of waggonways but the system was somewhat different from the Tyne's in that the shipping points were, in the main, much more tightly grouped on a two-mile stretch of river between Fatfield and Cox Green; the latter

some seven miles from the river's mouth. The waggonways on the north bank brought coal from the Washington area with two longer routes, some nine miles in length, bringing coal from the Beamish and Pelton Moor areas lying to the west of Fatfield. On the south bank of the river the collieries served were those in the Penshaw, Newbottle and Lumley areas, their waggonways extending for four miles in a generally north-south direction. Superimposed on these earlier lines, however, were two of more recent construction, the Newbottle waggonway of 1815 - or Lord Durham's railway - and the Hetton colliery railway of 1822, both leading to Sunderland itself rather than to the up-river shipping points.

The southern collieries were larger than were the northern and were controlled principally by the Vane-Tempest, or Londonderry, and Lambton families, with the Hetton Coal Company an aggressive competitor from 1823; it, unlike the others, was in part financed from London, Buddle - he was employed by the Londonderry concern as salaried Viewer in 1819 - writing that it had been enabled to begin operations only by its promoters "prowling round the Royal Exchange and the Stock Market...(whereby they) completely got Hetton under weight in London."[7] Buddle's involvement in the coal trade of the North East was perhaps the most influential of any. Himself heavily involved in the Tyneside coal trade, he also invested in railways and shipping and, in addition, was Secretary of the Tyne Committee, interested in the trade's regulations; from 1819 he also attended meetings of the Wear Committee. Two of the Durham coal-owners dominated the Wear's trade and in 1814, with a total Wear vend of 950,000 tons, the Vane- Tempest interests totalled 250,000 tons and the Lambton 245,000; the Hetton collieries were later to rival them.

The Newbottle railway was built to transport coal into Sunderland itself, where spouts or drops were provided for loading direct into colliers. At the same time Sir Henry Vane-Tempest had given consideration to providing his own railway to Sunderland but in 1819 Buddle suggested to his successor,

Sir Charles William Stewart, later the third Marquis of Londonderry, that an alternative would be to share the railway from Newbottle, so obviating the need for horse-drawn transport to the Wear at Penshaw. The suggestion was not taken up but, perhaps because of the 1819-20 freeze-up of the Wear and the purchase by Lambton of the Newbottle interests in 1822, the matter was revived, the plan this time being that Lambton and Londonderry share the same line into Sunderland. No agreement was reached and Londonderry instead decided to proceed with the construction of his own port at Seaham.[8]

The second of the later waggonways to the Wear was the Hetton Colliery railway to Sunderland where new staiths were built on the south bank of the river up-stream of the bridge. The engineer for this line was George Stephenson (1781-1848), perhaps employed through the influence of Nicholas Wood (1795-1865), a partner in the Hetton company. The railway, the first designed specifically for steam haulage - at least in part - opened in November 1822; on the level stretches of its eight-mile length locomotives were employed while winding engines hauled traffic on the inclines. The Hetton colliery, the sinking of which had begun early in December 1820, was by 1823 shipping 44,000 tons in a six-month period.[9] At the terminus of the railway - or railways - a "very convenient apparatus (was) built for discharging into ships, and a huge warehouse"[10] established adjacent to the river, where apparently three variants of coal drop existed by 1826, worked in conjunction with self-acting inclines.

Before the construction of these later waggonways all coal was loaded via the several staiths into keels, from which it was trans-shipped into colliers at Sunderland. In an effort to reduce transport costs, Buddle introduced to the Londonderry concern the principle of tubbing "whereby the waggons of coal were lowered by a drop at Penshaw staith into keels fitted with tubs which were then transferred by machine from the keels into the ships at Sunderland".[11] It would seem that two versions of this trans-shipment equipment were used, one shore-mounted and loading

coal from a keel moored to the shore with the ship on its river-side[12] and the other a floating device, invented by Chapman in 1821.[13] Chapman's crane lay between ship and keel and with a 6 H.P. steam engine, 50 tons of coal could be transferred in an hour.[14] By 1828 some 70% of the coal not loaded direct into colliers was being transhipped by tubs, the remainder by normal handling from keel to ship.[15] Differences betwen sources make it difficult to ascertain the numbers of keels used on the Wear: in the 1771 flood, it was noted, 200 keels were sunk or badly damaged and, in addition, 300 were swept out to sea;[16] by 1799, 520 were reported as being in use on the Wear, more than on the Tyne[17] and Flinn notes 452 keels on the Wear and 338 on the Tyne as averages for the 1790 s but records a decline by 1828 to 200 and 300 respectively;[18] by 1862 the use of keels had ended. The figures are not incompatible and compared with the numbers of keels used on the Tyne reflect the greater reliance placed upon them c 1820 on the Wear and, in fact, the figures given for that year show that no less than 90% of the coal was shipped by keel,[19] while some 7,000 colliers, and other ships, cleared the port.

The RWC was somewhat unwieldy with no fewer than 200 members qualified by virtue of an income of £200 p.a. or estate of £6,000; unbelievably, such had been the problems in holding meetings that the quorum was reduced in the commissioners 1809 Act[20] from seven to five.* Day-to-day river improvements were controlled by successive resident engineers but, in common with many other public bodies, reports were periodically called for from more eminent consulting engineers and although Rennie had originally been asked to report only upon the 1819 Quay Line his remit .. was soon extended to include the whole river, piers and harbour. He expressed doubts as to whether he could undertake this work - the RWC looked to Thomas Telford (1757-1834) as an alternative - but discussions were held with him concerning the possible replacement of the south pier. A report was duly received from Rennie in which he recommended that the piers be again extended but set further to the north to combat currents and tides,

* The 1717 Act provided for 65 members; the 1759 Act for 350; and the 1789 Act for 300.

to increase the scour and to assist shipping. The commissioners were in some doubt as to what procecdure to adopt; the south pier had been damaged and in order to assist them in their deliberations Chapman was asked for his opinion.[21] Repairs to it were put in hand under Milton's superintendence and a length of almost 700 ft was rebuilt using masonry in place of the earlier timber structure. The blocks, weighing from five to seven tons were laid "at such a depth as to guard, as much as possible, against any injury which the piers might sustain from the effects of scouring".[22] With this rebuilding the pier was now 1950 ft in length and to assist with the better laying of the foundations, a diving bell was eventually acquired from Rennie for £385.[23] Problems arose regarding the stone used for the pier's construction; initially it was to have been supplied by the Londonderry interests but a dispute involving Buddle, since 1819 a commissioner himself, caused the RWC in 1828 to open up its own quarry.

Rennie had died in 1821 and the RWC approached the Admiralty seeking his replacement by Giles. Refusal led to George and John Rennie jnr., being appointed jointly but the RWC soon asked for simplification as there were "technical objections"[24] to a joint tenure. The eventual appointment of the younger Rennie led to the publication of the quay line and to riparian owners being asked to remove jetties projecting beyond it. Subsequent negotiations with riverside owners were few: in 1816 the RWC had noted that a quay owned by the Lambton and Vane-Tempest interests on the south bank of the river was defective; the previously-noted dispute with Pemberton had arisen; an application was made by the Londonderry collieries to form a quarry on land owned by Sir Hedworth Williamson near the bridge, this application being granted as Chapman was engineer and the quay line was being respected. It is probable that this quay was projected to accommodate the coal-tub hoist noted previously.

Sunderland was one of the earliest ports in Britain to employ mechanical

dredging, the first there being operated in 1798, using a 4 H.P. engine; not a success it was sold in 1804[25] and the RWC presumably resorted to hand dredging. A further dredger had been purchased from the Butterley Company in 1811, this time with an 8 H.P. engine although, by virtue of the fact that it was loaned both to the Newbottle colliery owners and to Hartlepool, it can not have been fully utilised[26] and the RWC supplemented it in 1814 with a vessel to remove the dredged material to sea. In 1817 Milton was instructed to report on the cost of providing a dredger "with a double set of buckets"[27] but it was not until 1824 that he was asked to have built a barge to accommodate the dredging machinery and the following year he was "to put up a new engine and a complete set of machinery to work on both sides of the dredging barge, lately constructed."[28] The RWC suffered, as did the Tyne conservators, from problems relating to ballast. Regulations were extant forbidding its being dumped in the river but the RWC encountered difficulties greater than the Tyne's, due to the Wear flowing in a more restricted valley, so precluding the formation of ballast heaps on the same scale. In 1827 a committee was formed to investigate the problem and it reported that further disposal of ballast on land was impracticable; it must be deposited at sea and to that end recommended that six 100 ton barges be acquired.[29]

By 1828 coal shipments on the Wear were rising at a rate of almost 3% p.a. compound, greater than were the Tyne's, but a new development had by this time taken place, the formation of the Stockton and Darlington Railway with its export of coal from the river Tees, and it is probable that it was this factor, more than any other, which led to the commissioners forming a committee to investigate the means which could be best adopted to improve the harbour. The membership of the committee included Cuthbert Sharp, Capt. Cochrane of the Hetton Coal Company and Wood[30] and in July 1829 it reported both as to provision of better accommodation and as to a renewal of Parliamentary powers.

The committee, noting that it "is universally admitted that the Port is too small for its increased trade...(and it therefore) becomes a subject of imperious necessity to consider by what artificial means this deficiency may be supplied,"[31] pointed out that although the river's depth had been progressively increased "the want of superficial space is the great and serious difficulty",[32] a problem which could be solved only by the provision of wet docks. The report noted earlier comments made by Ralph Dodd (1755-1822) in 1794 giving his view that a dock could well be formed on the north bank of the river, "one of the first docks or basons of any that I know of in this kingdom for its convenience, being so near the open sea".[33] Dodd foresaw that his proposed dock would contain 237 ships of 90 ft length and 27 ft beam, larger than those then frequenting the port,and the 13 acre dock, up to 15 ft in depth,could be formed for £28,946. Four years later, Jonathan Pickernell (1765-1814) had reported to the same effect, envisaging a seven acre dock costing £50,000. In contrast William Jessop (1745-1814) had in 1807 reported against the proposal, looking instead to an extension of river moorings above the bridge, although he admitted that a dock could be made on the north bank. The last of the earlier reports referred to was that of William Bell, made in 1816. Noting the destruction of shipping which had at times taken place he recommended that wet docks be built but, discounting the north side, described how one could be constructed to the south to hold 300 ships of 250 tons; he did not venture to make an estimate of cost. The report concluded with the prediction "that when we have a floating dock at Sunderland... the collieries upon the Wear will become more extensive...as the vesels will be encouraged to trade to the port...and Sunderland will become the first sea port in the Kingdom, as far as respects the coal trade..."[34]

Having considered the past plans the committee had met the town's shipowners who, however, did not offer any constructive suggestion and its attention then turned to the possible location. The northern site provided a suitable foundation and an easy access to the sea but it was on private land and

had the great disadvantage that all the principal collieries were to the south of the river. Mainly because of this fact the Committee decided in favour of a dock on the south bank of the river, either at the South Battery or at Rector's Gill, above the bridge. A dock at the former site would involve the reclamation of land and would necessitate the collieries by-passing the town on its south side to enable their coals to reach the loading points by rail; only if the dock were provided with staiths or spouts could it become remunerative. This site would decrease river traffic but the alternative site, Rector's Gill, would tend to increase it by providing an up-river dock near the existing staiths. Either scheme could cost £150-200,000 and it was considered that the funds of the RWC could not be used in the construction of dock works, "leaving the matter perfectly open to any body of adventurers."[35] The RWC should be responsible only for the preservation and improvement of the river and any future Act sought should not make provision for dock construction.

To assist the committee Robert Stevenson (1772-1850) was asked in 1828 to report on "the places where it will be practicable to form wet Docks"[36] and the following year he suggested that, due to the importance of the river and its coal trade, Telford should be consulted, a move not agreed to by the commissioners. Like the committee, Stevenson stressed the inter-dependence of river and coal, railway transport with steam locomotion having cheapened transport. He noted that 800 keels* used the river, and with 22 ft beam with a draught of only 2½ ft., they caused considerable nuisance and congestion. To obviate the problem docks should be built as the river's useful area was only 40 acres and even that was impeded by sandbanks at low tide. Stevenson investigated four options for the forming of docks: cutting off the bend at Southwick to form a floating harbour of 36 acres; converting the river into a wet dock of some 46 acres by forming a cut and tunnel through Monkwearmouth at a cost of £233,300; constructing a dock on the Potato Garth - the north dock site - of some

* c.f p 31.

20 to 30 acres; and building docks on the south bank, east of the barracks, where 30 acres could be provided. Stevenson discounted the first as being inaccessible, the second would prove expensive, and the third was unconnected by rail with the coal-field and also subjected to wave effects. He therefore recommended that any dock should be to the south of the Wear and although considerable expense would be incurred, the "acquisition would be great, but certainly not more than the advancing state of the trade of the port seems to require."[37] With facilities for connections by rail, the proposed dock would cost £193,300 and would hold 300 ships of 100 tons.

Although both Stevenson and the committee had stressed the necessity for docks, nevertheless the RWC, in the 1830 application to Parliament, did not seek such powers and the Act principally confirmed the 1819 quay ... line, gave the commissioners no powers as to docks or railways, and stipulated the number of commissioners as 134; all the region's coal-owners were included, other than Londonderry, although his viewer, Buddle, remained a member. River improvements had been limited since 1815 but nevertheless there had been a growth in trade with 1.385m tons of coal shipped, an increase of 46%, with the number of Wear collieries in 1829 being stated by Buddle as six to the north of the river and twelve to the south.[38] The principal change, however, was in the fact that the greater part of the coal was now shipped in Sunderland and with the two waggonways completed and Hetton colliery in production some 75% of shipments originated from the Londonderry, Lambton and Hetton collieries;[39] the last-named was, by 1830, perhaps the largest colliery in the U.K. with an output of c 400,000 tons p.a., significant in the total North-East output of 6.915m tons.[40]

So far as other industries were concerned the Wear showed both differences from and similarities to the Tyne. Whereas chemicals were produced on the Tyne, the Wear manufactured little but, like the Tyne, possessed a thriving glass and pottery trade. With the presence of establishments such as

Abbot, Hawks Crawshay, Hawthorn and Stephenson the Tyne had by 1830 a flourishing engineering industry, not nearly so important on the Wear, which conversely had an important limestone exporting trade, shipping in 1816 30,000 tons of limestone and c 25,000 tons of lime, figures which by 1830 had increased to 40,000 and c 35,000 respectively.[41] On both rivers, shipbuilding was important and the Wear by 1830 had some 30 shipyards, many of them small establishments building timber ships; of the yards destined to survive, Laing had established a yard at Deptford in 1818, Austin at Monkwearmouth in 1826 and Thompson at North Sands in 1819. In 1830, the Wear produced 15,000 tons of shipping, Newcastle 5,000 tons and the U.K. a total of c 60,000 tons.[42]

3.4 River Tees

By 1815, the Tees Navigation Company (TNC),by virtue of the powers granted by its 1808 Act, had completed its first improvement to the river Tees, the formation of the Mandale Cut, shortening the distance from Stockton to the sea by some two miles. What was, perhaps, of even greater significance for the area's future was that it was at the dinner held to celebrate the opening of the new river channel - it took place on 18th September 1810 - that the proposal was made by Leonard Raisbeck (1783-1845) that a committee be formed to investigate "the practicability of building either a canal or a railway to join Darlington and Stockton with Winston, for the more easy and expeditious carriage of coals"[1] from the south-west Durham coalfield to the Tees. The committee did not report until 16 months had elapsed, and it was then agreed that Rennie should be called upon for his advice.

His survey was wide-reaching but he concluded that Whitworth's earlier line, already noted, could not be bettered; Rennie's estimate, submitted in 1813, was higher than those previously made by Whitworth and others. The 31 ft wide canal would cost £205,618, of which sum £95,600 was for the sections between Darlington and Stockton. It was not until 1816

that public consideration was again given to the project and proposals were made that only the Stockton to Darlington section should be built as a canal, the extension westwards being by means of a railway; without branches, the comparable costs would be £179,578 for a canal and £141,460 for the canal/rail scheme.[2] Subsequently, it was considered that the railway would be better to the north of Winston, so connecting the collieries near West Auckland by a more direct line to Darlington.

Concurrent with the Stockton and Darlington proposal was another projected by Christopher Tennant (d:1839), "a public spirited inhabitant of Stockton, who had come to the conclusion that the Tees might compete successfully with either the Tyne or the Wear in the exportation of coals."[3] He employed George Leather (1787-1870) to survey a line from the Tees at Portrack, almost directly to Shildon and Evenwood. Leather estimated that the canal - an interesting feature was its crossing of the river Skerne where the river passed beneath the canal in the form of an inverted syphon[4] - avoiding Darlington completely would cost £205,283 and a further £35,812 would be involved should it be provided with a branch to Durham. His report was in 1818 brought before a public meeting in Stockton, called to consider "the practicability of connecting the town of Stockton (by means of a canal) with the western Part of this County, which is known to be so abundantly stored with treasures, viz., coal, lead, lime, ironstone etc..."[5] and such was the enthusiasm engendered that it was resolved to seek immediate Parliamentary powers for the canal's construction, although some dissent had been expressed by Raisbeck, solicitor to the TNC. He put forward the view that the canal should begin at Stockton, not downstream from it, and should pass through Darlington; if the line were to connect only the coal-field to the river the scheme "must produce a most serious injury to the three principal towns of this port, by withdrawing trade from them."[6] With the improved section of the Tees threatened by the possibility of its being by-passed, it is understandable that Raisbeck

feared a subsequent diminution in river revenue. He also anticipated correctly the intentions of Tennant in that "the wishes of the present projector, whose only object appears to be the acquisition of coal, may be accommodated by means of a railway at one half the expense...";[7] herein lay the germ of the proposal to form later the Clarence Railway.

Both Darlington and Yarm were concerned regarding the proposals to route the canal to the north and it was from Yarm that opposition first emanated, in the persons of Thomas Meynell, Richard Miles and Jonathan Backhouse. Miles, to whom Tomlinson gives the credit of having first proselytized for the adoption of a railway, mustered support for the southern route on the grounds that the export of coal from Stockton should not be emphasised; the greater populations served by the Darlington route should ensure success through landsale. By 1818, largely through the advocacy of George Overton (d:1822?) the decision was taken to form a railway, a public meeting in Darlington having considered reports from Rennie and Overton regarding canal and railway, respectively. Among the speakers in favour of a railway were Edward Pease (1766-1858) and Backhouse - they were both on the committee responsible for furthering Tennants proposition[8] - the former pointing out that the coal-road to Darlington from the collieries was at that time already let at £2,000 p.a., equivalent to a rate of ½d per ton mile; the projected rate of 1½d on the railway would, at once, bring in an income of £6,000 p.a., sufficient to satisfy Pease as to the railway's profitability.[9] The meeting agreed that a company should be formed and that £124,000 be sought, the cost of the railway as estimated by Overton. What was of especial importance was the fact that an Act was to be obtained so obviating the need for the arranging of the complicated and expensive wayleave agreements which had be-devilled earlier lines, and a problem which was to recur later. It was this principle, too, which instigated opposition to the

railway from other colliery interests, fearful that it would bring unfair competition into the area.

The proposal to form the canal avoiding Darlington did not fare well, the prospective subscribers evidencing some alarm at the results of tramway building in other parts of the country, Overton having shown how their construction in Wales had damaged canal traffic. Such were the doubts that it was decided to investigate here, too, the possibility of forming a railway, Stockton distrusting the Darlington proposals, especially in view of the fact that collieries lay within 14 miles of the town; the railway line would be much longer, increase transport costs and render the port less competitive. Agreement between the promoters of the rival lines was reached in 1819 and it was then resolved that a further application - the first Bill, plans for which indicated a canal,[10] had failed - should be made to Parliament.[11] By this time the railway promoters, doubtful as to Overton's ability, had consulted Robert Stevenson, active in tramway proposals, for his advice and comments on the line. Stevenson in 1819 visited lines recently built by Thompson, the Pelaw Main and Fawdon waggonways, and it was with his support that the promoters obtained the necessary Act "for making and maintaining a railway or tramroad from the river Tees at Stockton to Witton Park Colliery".[12] Royal Assent was granted on 19 April 1821 and the company's formation was to strengthen the interests in the area of the Pease family, already involved in the T.N.C.

Subsequent to the formation of the Mandale Cut the TNC had made few, if any, further improvements to the river. Perhaps because of this it was able to pay dividends at the rate of 10%.[13] In common with the conservators of both Tyne and Wear, the TNC was forced into regulating the deposition of rubbish in the river, to protect its banks and to consider the building of jetties "to confine the river to a proper Channel";[14] powers for works of this type, between Stockton and the sea, had been incorporated in the Act of 1808. These maintenance works for the years 1817-19 involved

the expenditure of only £244, £113 and £57 respectively.[15]

Details concerning the trade of the Tees up to 1825 are somewhat scant. The river served an area which was mainly agricultural in character and its principal exports were so orientated but nevertheless it is conceivable that some coal was exported before 1825. With the combined population of Darlington, Stockton and Yarm being some 12,000 in 1821[16] and an average coal usage of perhaps 1½ tons p.a.[17] it would appear that 18,000 tons would have sufficed for the three towns, a figure much less than that claimed by the canal promoters as being produced by the western collieries. Navigation on the Tees was restricted to ships of 100 tons trading to Yarm[18] and of 150 tons to Stockton.[19]

The trade of the Tees, too, was mainly coastal; in 1811, 10,811 tons of shipping cleared the port for coastal destinations and 1,660 tons of shipping entered it from foreign parts.[20] Within two years the figures had virtually doubled, undoubtedly the result of the completion of the Mandale Cut. Trade increased gradually between 1815 and 1825, revenue rising from £1,104 to £1,594,[21] figures which do not substantiate any significant coal shipments.

The period of relative inactivity ended with the opening in 1825 of the Stockton and Darlington Railway (S & DR)*, its formation chronicled by Tomlinson and Jeans and it is sufficient to note here the growing domination of the Pease family in its affairs and the introduction to railway construction of George Stephenson; it was due to him that locomotive traction was adopted, this method not having at first been certain. Shipment of coal at Stockton began in January 1826, the lines formal opening having been celebrated in the previous September when Thomas Meynell (1775-1854), now the comapny's chairman, announced that the S & DR was already poised to ship 100,000 tons p.a. for five years to one London merchant.[22]

The improvement in land transport which had been effected by the railway reduced very quickly the price of coal in Stockton from 18/- to

* See Map 7.

12/- and later was to cause it to fall to 8/6 per ton.[23] River transport, however, was found to be a problem in spite of the improvements which had been made. Although the Mandale Cut had removed some two miles from the river's length it still remained tortuous and its many sandbanks rendered difficult, and hazardous, the navigation to Stockton. The TNC was not unaware of the problem and in 1824 two reports were presented by Henry Habberly Price as to possible improvements. In his first report Price castigated the TNC regarding the complete absence of charts and plans of the river, noting that he had been unable to ascertain whether they had ever existed. As a result of this deficiency, Price was forced into providing a plan of the river and carrying out an investigation of the tidal effects upon its channels, at the same time keeping in mind the fact "that the present trade of the port and the funds of the company, are inadequate to attempt much more than the improvement of the river between Cargo Fleet and Stockton";[24] he would report upon the river's lower reaches and the harbour, works which he considered should be undertaken by means of Government funds, in due course. He concluded his report:

> When I look on the map of this part of the kingdom, at the extensive coal-field north and west of your river, and contemplate the probability of a trade which may, at a future time, rival that of Newcastle and Sunderland; when I think of the vast mineral wealth which enriches the bowels of your country, and see its surface abounding in fertility; when I see large capitals in the course of expenditure, to bring down to your river all the produce of the interior; and all these requiring only facility of communication with the sea to bring them advantageously into action; I am more than ever impressed with the importance of carrying on, with as little delay as possible, every improvement that is practicable in your navigation, and consistent with your means of expenditure: [25]

In his second report to the company, Price detailed his proposals for the improvement of the river. He was somewhat critical of the situtation and condition of certain quays in Stockton, noted the problems - the formation of sandbanks and multiple river channels - caused by the river's excessive width and made the suggestion that building pairs of piers or jetties would reduce the river's width, increase scour and reduce the propensity

to silting. He sought to provide a minimum of 6 ft at low water with 16 ft at high tide; these depths would permit ships of 250 tons to trade to Stockton. Price estimated that the necessary works in the Stockton length of the river would cost £4,221 and he gave alternative prices for two options which could be adopted downstream, an improvement at Newport costing £6,707 or a new river channel at Portrack, costing £10,923; this latter, comprising a channel 180 ft wide and 3,600 ft long, he thought preferable as it would enable ships to reach Stockton on a single tide.

Moving downstream, he noted that

> in the Billingham Reach, which is of great length, the principal fault is that it is wider than is necessary to carry off the waters of the river and of the space covered. This arises from its banks never having been protected and the channel never having been confined by jetties or other means into a proper width. For the most of it the waters meander along a soft and sandy bottom whereas any fortuitous obstruction may give them a direction.. 26

and commented that to improve the stretch of the river by means of substantial jetties would cost £15,591.

Price summarised his suggestions: if the Portrack channel were to be adopted the cost would be £26,073; if a new channel were to be formed the cost would be £30,290. One point of great interest was his proposal for the reclamation of land resulting from his works, an area which could be as great as 115 acres, the sale of which would reduce the capital expended by the TNC. Price also noted the possible effect of the railway proposed on the north side of the river, in that its formation could lead to removing much of the trade of Stockton lower down the river; on the other hand, river improvements would benefit the town and, if completed, Price "should as soon expect the trade of London to be carried on at Gravesend, as that of Stockton at Haverton Hill".[27] In the event of a further Act being sought to impose increased dues, he recommended that the views of Telford be sought, "certainly the most eminent man of the day in his line."[28]

Following the submission of Price's report, dissatisfaction was expressed

by Raisbeck who suggested that a more worthwhile improvement would be "to make a canal across Mr. Hustler's holme to Newport"[29] with another from Newport to Cargo Fleet, but although his view was partially upheld the plans deposited in 1825 show a single canal from the eastern end of the Mandale Cut to Port Cleveland, a distance of 4¼ miles; a lock, or basin, was to be provided at each end of the canal.[30] In turn, this plan was changed and in 1827 revised drawings were deposited in anticipation of an Act of Parliament. The revisions showed, again, a canal from Mandale to the lower part of the river but, this time, the canal - perhaps in deference to Raisbeck's wishes - was divided into two sections, so enabling shipping to use either the canal or the river over the greater length; all traffic would use the new cut to reach Stockton. The drawing prepared by Price shows a canal only 2¼ miles in length, the saving effected by omitting the down-river section of canal which had run parallel with the river. It terminated at what was to become Port Darlington.[31]

To confirm the opinions of their engineers the TNC sought the views of Stevenson who, on 22 November 1827, reported critically of the measures suggested by Price:

> To project numerous jetties into the river I regard as inexpedient being often a dangerous encumbrance to navigation tending to distort the current and to destroy the uniformity of the bottom. I would prefer continuous or parallel dykes on either side which have been successfully adopted in deepening the Clyde after its navigation had sustained material injury from a previous system of jetties. 32

Subsequent to Stevenson's report the TNC decided to form only the cut to shorten the river and omit completely the considerable length of canal to the lower river. This decision was perhaps enforced by the S&DR which had already, through its engineer Thomas Storey (1789-1859),deposited plans for a railway extension following almost exactly the first proposal for a canal. The S&DR envisaged building two docks in the Tees, one at Linthorpe and the other at Ormsby, in effect the TNC sites of Port Cleveland and Port Darlington. The docks were to be of only 1½ acres

each with entrances of some 30ft in width while the railway was to cross the Tees by means of a suspension bridge of 240 ft span.[32] The TNC was naturally concerned by the move of the S&DR to transfer trade from river to railway and a committee was established - Joseph Pease (1799-1872) was a member of it - to ask the railway company to suspend its "projected extension...till the effect of this improvement of the River be ascertained";[34] Lords Londonderry, Cleveland and Harewood were to be asked to support the TNC Bill which sought additional funding for the works. Outlined in the plans deposited, the proposal was simply for a second cut, downstream of the Mandale Cut, it being realigned.[35]

In 1828, Royal Assent was given to three Acts of Parliament for works which concerned the riverTees, the first for the extension of the S&DR to Port Darlington, the second for the formation of the Clarence Railway* and the third for the improvement of the river by the TNC. The object of the Clarence Railway - its principal promoter was Tennant - was to shorten the distance between the collieries served by the S&DR and the Tees by building a line between the earlier railway at Simpasture and the north bank of theTees, in effect the suggestion made by Tennant at the time of the formation of the S&DR. Understandably, the railway was opposed by the S&DR as "it was a shorter distance to the place of shipment and was done at the desire of certain coal-owners"[36] who wished to break the monopoly of the earlier company and secure the most economical means of shipping the excellent coking coal from the south-west Durham areas [37] and it is of interest, too, to note that Tennant, remembering the opposition accorded the S&DR, realistically suggested that powers be sought in Parliament only "when Lambton was out of the Kingdom."[38] Ostensibly the proposal was a sound one as it reduced the distance of the collieries from the Tees by six miles, so providing great anticipated economies even for the most remote collieries, distant 25 miles from Stockton; in practice its insuperable disadvantage was that it was not able to be independent of the S&DR as

* See Map 7

all coal was transported by that railway for the first stage of its journey.[39] The first meeting of the new company was held on 8 July 1828 under the chairmanship of Henry Vansittart; the engineer was Edmund Steel.[40]. The proposal of the S&DR to extend its line to Middlesbrough was the cause of much dissent within that company. As the TNC had agreed to put river improvements in hand, certain of the S&DR directors were doubtful as to the wisdom of, in effect, providing duplicate routes, rail and river. The S&DR called upon George Stephenson - he was inexperienced in river matters - to report on the river improvements and, his view being that the Tees works would meet all the needs of the S&DR, it was suggested that further time be given to the TNC. This suggestion was not agreed and it was thereupon resolved to seek powers for the line to Middlesbrough. This move led to both Meynell and Raisbeck dissenting as they considered it inappropriate both to extend the line only for the export of coal and to expend a sum of £35,000. The proposed extension of the S&DR to Middlesbrough was naturally opposed by the town of Stockton but nevertheless, the Bill was passed by the Commons although meeting severe opposition from the Lords, principally from the northern coalowners who "caught napping in 1821, were now wide awake to the danger of the Tees competition (and resolved) to prevent the continuation of the railway to deep water."[41]

In addition to its involvement in the affairs of the S&DR the Pease family at this time expanded its industries in the area while at the same time continuing its representation in the TNC. In 1828, perhaps at the time of the passing of the Act authorising the railway to Middlesbrough, negotiations were initiated for the purchase there of the Chilton estate.

In August 1828 the site was first visited by Joseph Pease when, with his partners, he "took a boat and entering the Tees Mouth sailed up to Middlesbro' to take a view of the proposed termination of the contemplated extension of the Railway, was much pleased with the place altogether."[42]

A contract for the purchase of the estate was drawn up in 1829 and the

land formally acquired in May 1830 by the partners, Joseph Pease, Edmund Pease jnr., Thomas Richardson, Henry Birbeck, Francis Gibson and Simon Martin; all Quakers, the three last-named were from the Norwich area.

A sum of £30,000 was paid for 520 acres of farm land, the plans for the town were prepared and laid out by Richard Otley, construction work began immediately, sanction was soon sought by the S&DR for a branch railway "into Thomas Richardson's Land"[43] - the estate was so described - and the first shipment of coal was made on 27 December 1830.

Subsequent to the report submitted by Stevenson concerning the state and the future of the river Tees, a special meeting of the TNC was held on 4 January 1828 to discuss it. It was then "ordered unanimously - save for Joseph Pease, who remained neutral - that (the work)... be forthwith carried into effect,"[44] Pease's abstention being the result of his involvement in other concerns. In his report Stevenson had estimated that the new cutting would cost £21,181[45] and sanction was granted by the TNC's 1828 Act for the raising of a further £20,000 capital with borrowings not to exceed £30,000; work was to be completed within seven years.[46] To undertake the forming of the new channel, drawn up by Price and approved by Stevenson, a contract was awarded in May 1829 to Ward and Biggs, contractors.[47] At first, work proceeded well but, some twelve months later, William Alexander Brooks (1800-1877), who was appointed as assistant engineer at a salary of £200 p.a. in 1828, complained that the work was behind programme; in his opinion, at least 200 men should be employed to ensure the progress necessary to achieve completion by early 1831.[48] His threat to terminate the contract should progress not improve was heeded and the Portrack Cut was opened on 10 February 1831.[49] The channel, 3,300 ft long, 225 ft wide and 15 ft deep, had cost £25,995; of this amount, labour and materials totalled £16,307, the remainder being accounted for by compensation, engineering services and Parliamentary expenses.[50]

Although the Clarence Railway was to influence later developments,

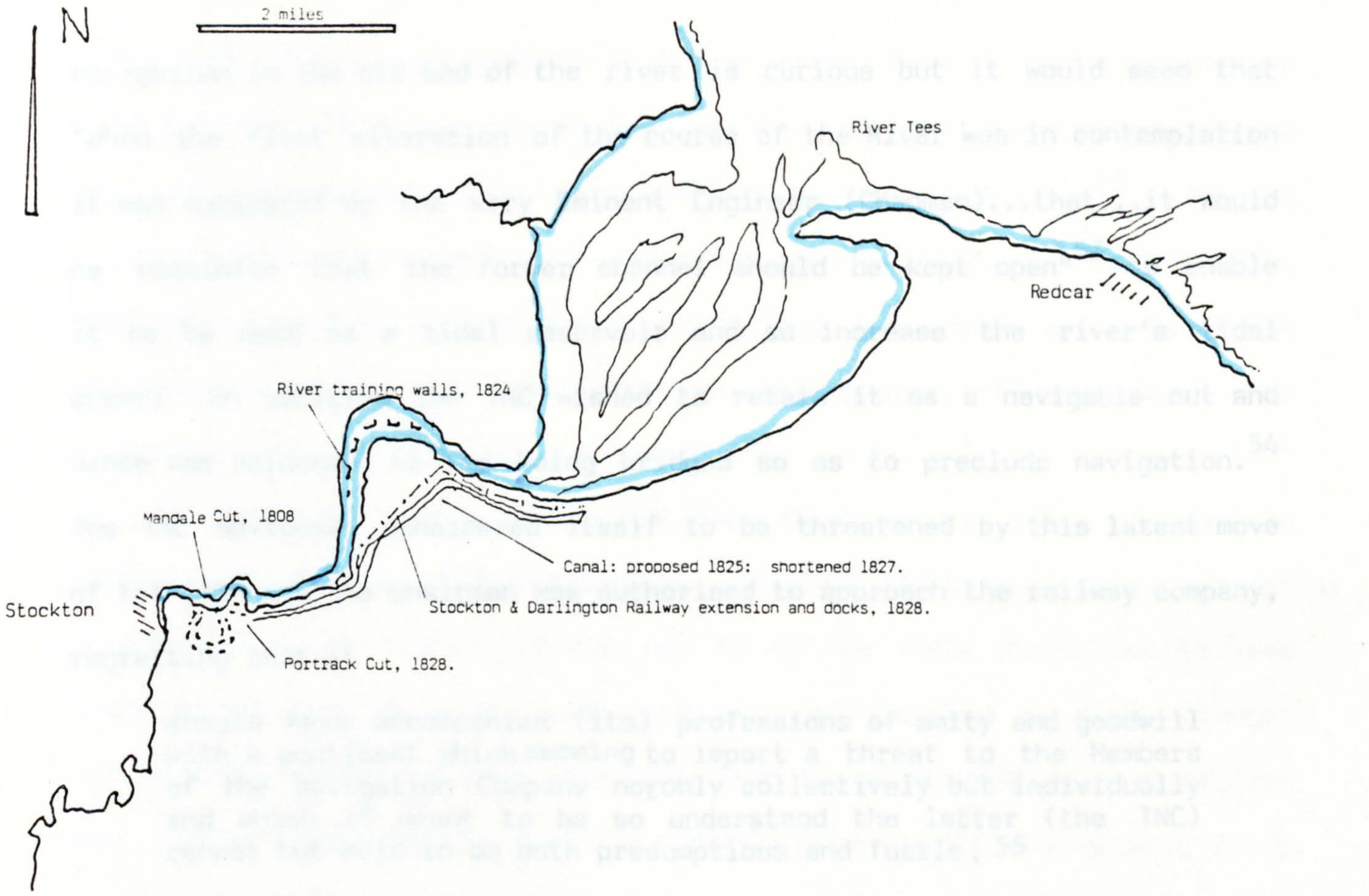
it was between the S&DR and the TNC that conflict became first apparent. Initially, the dispute concerned only the plans to form the railway to Middlesbrough and this move was opposed by the TNC. As a body which represented principally the interests of Stockton it was foreseen, correctly, that the furtherance of the Darlington interests - through the S&DR - into the Middlesbrough area would militate against Stockton's pre-eminence on the Tees. Some doubt as to whether the S&DR proposal to develop Middlesbrough did not date from the railway's inception is evidenced by Francis Mewburn (1785-1867), solicitor to the company. Writing at the time of the initial opening of the railway in 1825 he noted that the south-west Durham coal-field, hitherto remote from a shipping place, would be served by the newly-built railway and the

> greater the tonnage the cheaper could the Proprietors afford to carry goods, minerals etc., and with respect to an export trade in coals it was contended that the distance of the coals from the river and the difficulties of the river presented obstacles too great to be surmounted but that if an export trade could be established the Darlington line was superior to the others more especially if a canal were made from Stockton to Cargo Fleet.
>
> *I did not think when I wrote the above that there would be a line to Middlesbrough!.51

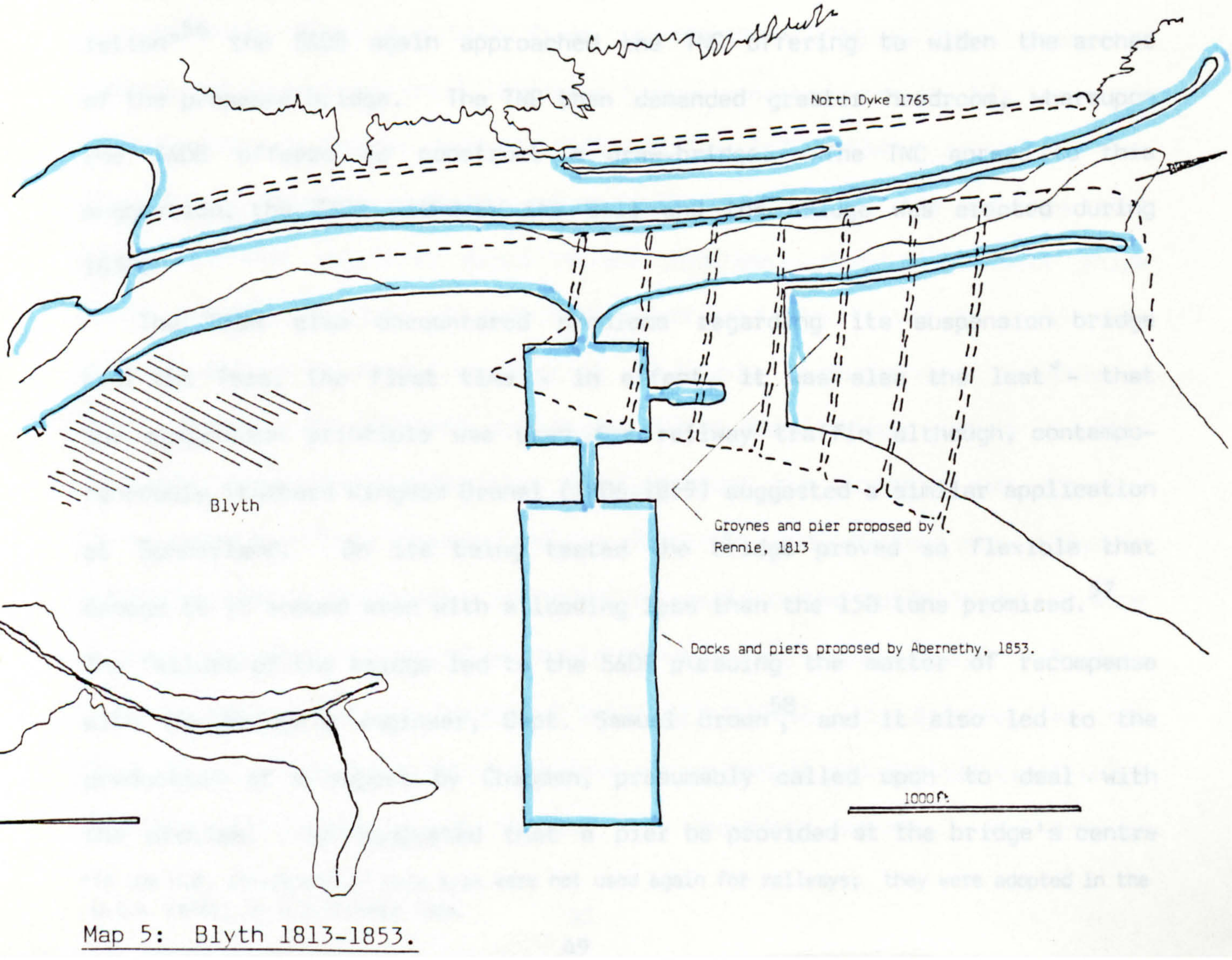
In spite of the Pease family having been represented in the TNC, the S&DR was not sanguine as to the river's capabilities, borne out by Mewburn's comment. In addition, the railway company had in 1824 acquired from Robert Stephenson & Co., a steam tugboat, the Albion, to circumvent navigational problems in the river and expedite the passage of ships from Stockton to the sea.[52] Although the two companies had co-existed, if not co-operated, from 1825 the Middlesbrough proposal brought immediate conflict.

In its Act of Parliament for the line the S&DR had obtained sanction for a bridge over the river Tees but not for one across the bed of the loop by-passed by the Mandale Cut. The TNC was not slow to point out this error on the part of the S&DR, which maintained that such powers were unnecessary. At first sight the decision of the TNC to maintain

* The note was added later.



Map 4: River Tees, 1815-1830



Map 5: Blyth 1813-1853.

navigation in the old bed of the river is curious but it would seem that "when the first alteration of the course of the River was in contemplation it was suggested by the very Eminent Engineer (Chapman)...that...it would be requisite that the former channel should be kept open"[53] to enable it to be used as a tidal reservoir and so increase the river's tidal scour; in addition the TNC wished to retain it as a navigable cut and hence was reluctant to its being bridged so as to preclude navigation.[54]

The TNC obviously considered itself to be threatened by this latest move of the S&DR and the chairman was authorised to approach the railway company, regretting that it

> should have accompanied (its) professions of amity and goodwill with a sentiment which seeming to import a threat to the Members of the Navigation Company notonly collectively but individually and which if meant to be so understood the latter (the TNC) cannot but hold to be both presumptious and futile..[55]

The S&DR could see only one solution to the dispute, the authorisation of a bridge by another Act of Parliament. However, "in a spirit of conciliation"[56] the S&DR again approached the TNC offering to widen the arches of the proposed bridge. The TNC then demanded greater headroom, whereupon the S&DR offered to construct a draw-bridge. The TNC agreed to this suggestion, the S&DR withdrew its Bill and the bridge was erected during 1830.

The S&DR also encountered problems regarding its suspension bridge over the Tees, the first time - in effect, it was also the last*- that the suspension principle was used for railway traffic although, contemporaneously, Isambard Kingdom Brunel (1806-1859) suggested a similar application at Sunderland. On its being tested the bridge proved so flexible that damage to it ensued even with a loading less than the 150 tons promised.[57] The failure of the bridge led to the S&DR pursuing the matter of recompense with the bridge's engineer, Capt. Samuel Brown,[58] and it also led to the production of a report by Chapman, presumably called upon to deal with the problem. He suggested that a pier be provided at the bridge's centre

*In the U.K. structures of this type were not used again for railways; they were adopted in the U.S.A. later, in a stiffened form.

point with teak arches supporting the existing deck; when in position "the Catenary of Suspending Chains (may) be dispensed with; which ought or might be disposed of to some other Bridge on Highways."[59] Chapman perceived correctly that such a design was not compatable with rail traffic. Some doubt exists as to the final outcome but the bridge was later noted as being supported by four starlings, or supports, the assumption thus being that Chapman's plan was not adopted.[60]

By 1830, the initial steps had been taken on the Tees towards the formation of the town of Middlesbrough. The S&DR had been largely instrumental in opening up the river; it too was to be the force which was to lead later to the eclipse - at least partial - of Stockton by Middlesbrough. Although the export of coal from the Tees began in 1826, the quantities were still comparatively small by 1830; as a result the growing trade of the river will be discussed as an entity in the chapter following.

3.5 River Blyth

The river Blyth had been first inspected in 1756 by Capt. Grenville Collins but it was not until 1814 that Rennie reported upon it, his inspection made at the request of Matthew White Ridley (1778-1836), in effect the river's conservator. Rennie noted that the rocks at the entrance were dangerous, that southerly winds caused problems, that only small ships could use the harbour at neap tides and that the "river is very small and the bottom is hard...so that it is unable to scour and maintain a deep channel (in addition to which, heavy seas) throw such a quantity of stones into the channel that they obstruct the current and occasion it to spread..."[1] so leaving only a foot of water at low tide. Rennie suggested that a breakwater be built to replace the North Dyke; a work of some magnitude it would be 4,110 ft long and cost £38,015. To form a new river channel he suggested building jetties, or groynes, on the south shore to protect the land from storms and to channel all tidal water into one watercourse and so improve the scouring effect. The groynes

would cost a further £9,064. Should his works be undertaken, they would "render Blyth one of the best Harbours in the North of England for vessels employed in the Coal Trade",[2] if of less than 15 ft draught.

Rennie commented also on a more revolutionary idea which had been suggested to him, cutting through the rock to the north of the North Dyke and so forming a new channel into deeper water, so avoiding the long and exposed channel to the sea; a cut of this type was already in existence at Hartley and was later to be suggested at Amble. Rennie considered that a breakwater was essential, and expensive, and so could not recommend this proposal but considered that, if trade at Blyth were to increase, "a Wet Dock might be formed in the Slack capable of giving an extension which would for many years be adequate for any probable increase of trade..."[3] With the works estimated at £47,019 Rennie foresaw problems in the financing of them as they would inevitably lead to a severe tax on shipping; the only cheaper alternative he could think of was to provide a rock mound in place of the pier, in effect an enlargement of the North Dyke. His suggestions were not put into effect.

Ridley's involvement in the river's management is a little uncertain but it would appear that his interest in it began only with the death of his father in 1813; by 1819, however, he was indicted - but later exonerated - regarding an alleged obstruction in the river's channel. Documentary evidence indicated that £956 had been spent over the past two years, mainly on the North Dyke, and that a further outlay of £500 was anticipated. Furthermore, he was then thanked by letter for his efforts in that he had, at his own expense, employed Rennie, although the writers - pilots and shipowners - considered that the improvements required were such that they could be made only at public expense.[4] Ridley subsequently received a letter from Armorer Donkin, his Newcastle solicitor and himself a coal owner, regarding the forthcoming Admiralty hearing, informing him that Donkin "could not see what fair objection the

the Admiralty can have to delegate the conservatorship of the harbour to yourself, or... to their appointing a reputable local engineer - Mr. Chapman, for instance - (for) any future projected improvement..."[5]

Prior to this time there were minor developments: a ballast crane had been designed by John Rastrick in 1817 and erected on the south quay; reflecting the needs of the trade a new ballast quay was built on the north shore; Netherton colliery sank its shaft in 1818 and built a waggonway through Bedlington to a private staith on the river.[6] In 1823 Ridley became the sole owner of the Cowpen colliery but on his death in 1836 his successor, again confusingly of the same name, leased it to Messrs. Carr and Jobling, who "became tenants of both the colliery and the harbour so far as Sir M.W. Ridley was concerned, and for some years the Cowpen colliery owners managed the harbour affairs,"[7] a situation very similar to that which was to occur at Amble.

Under Ridley's ownership of the port, few developments had taken place although he was aware of what needed to be done. It may be that capital was not readily available; perhaps, he did not wish to cede what control he had; perhaps the port was sufficiently profitable in its unimproved state: records for this period of Blyth's development are scant. Ridley may simply have had interests elsewhere. He was Member of Parliament for Newcastle from 1812 until 1836[8] and with his involvement in both Parliamentary affairs and in the coal trade he had been retained by the Durham and Northumberland Coal Owners' Association, formed in 1805, to act on its behalf and he had been successful in the fight against duties, won in 1831 when dues in coal shipped abroad were reduced by a third.[9]

3.6 Hartlepool

Unlike the Tyne and Wear, the trade of Hartlepool was restricted only to general merchandise but such was the port's condition that its trade and hence its revenue, was minimal. To improve the harbour, principally by repairing the pier, a subscription was opened in 1810.

Among those who subscribed were the Sunderland shipowners, Trinity House, London, the Bishops of Durham, Sir Henry Vane-Tempest, Sir Ralph Milbank and J.G. Lambton. Despite the support of these shipping and mining interests a total of only £2,578 was received, compared with the sum of £3,500 sought.[1] In order to raise funds sufficient to complete the work in hand an Act of Parliament was obtained, legislating for the maintenance of the pier then in "imminent danger of total destruction."[2]

For administrative purposes a commission of 25 members was established, including Cuthbert Sharp (1781-1849), largely instrumental in seeking the Act and then a member of the River Wear Commission. Powers were granted to borrow money and to raise revenue by means of a toll of up to 2d per ton on shipping together with a rate on houses in the town. The first meeting of the commissioners was held in August 1813 and it was there decided that they should be held monthly, a decision which caused problems in that, with 25 members and a quorum of only five, it nevertheless proved difficult to make decisions due to poor attendance. Perhaps as a result of Sharp's involvement on the Wear, a dredger was borrowed and, following the death of Shout in 1817, his successor Milton was called upon to undertake work at Hartlepool.[3]

Between 1817 and 1823 no records of the commissioners' meetings are extant but it would seem that in this period Rennie had been called upon to report on the harbour, perhaps regarding a proposal - not proceeded with - to ship coal from the Hetton area at Hartlepool.[4] Details are uncertain.

In spite of its revenue-raising powers the commission, by 1829, was experiencing severe financial problems with only £31.15.0. to its credit[5] and to enable its finances to be placed on a more secure footing it was agreed to seek subscriptions from, amongst others, the Bishop of Durham and the Marquis of Londonderry. Perhaps exasperated by the lack of a quorum, three of the commissioners in 1829 formed themselves into a Committee of Management and subsequently made a determined attempt to raise money by means of

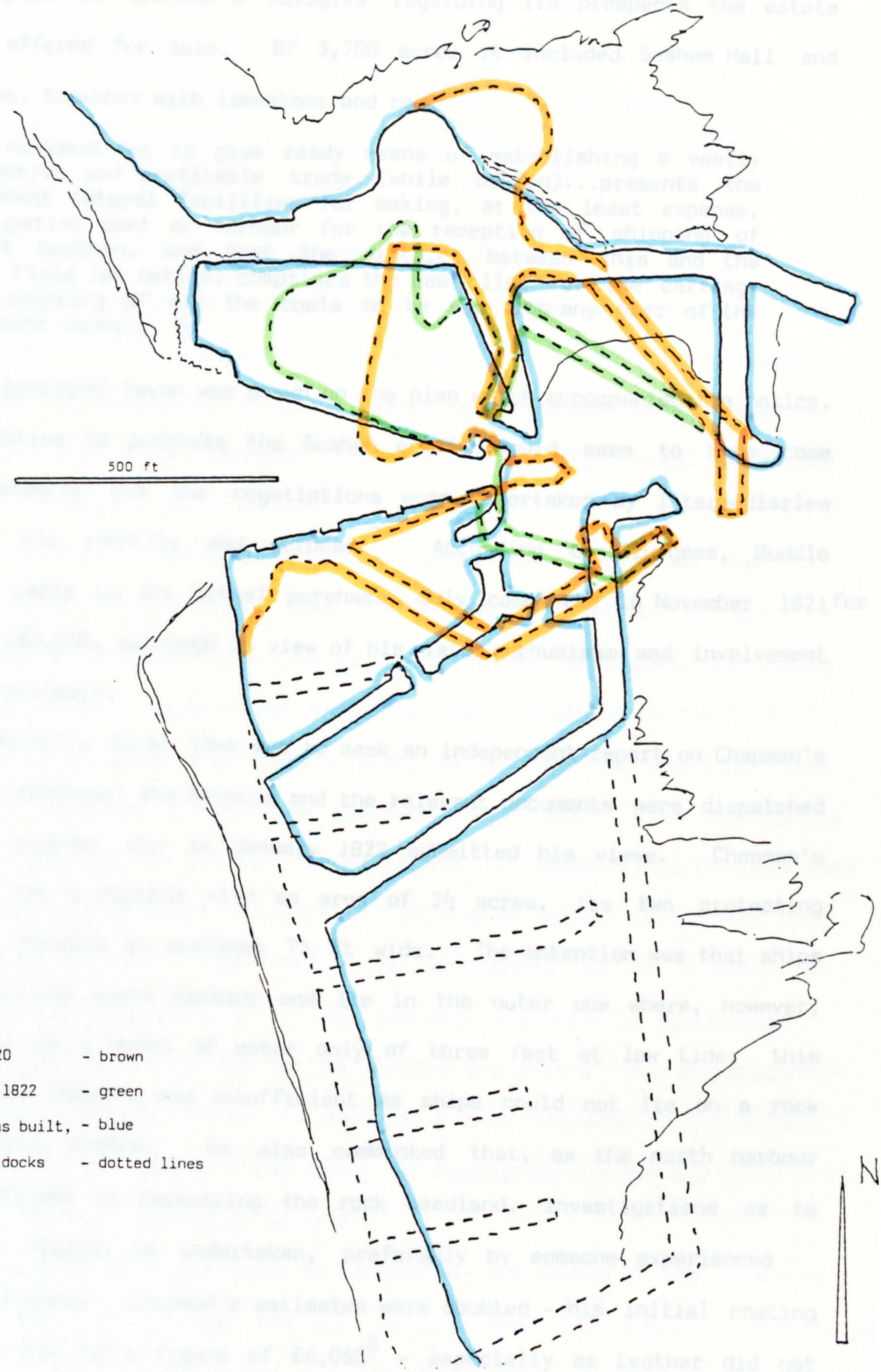
appealing to the Duke of Northumberland, Lord Durham, the Pease family, Trinity House, shipowners and others; the results of the appeal are not recorded.[6]

The need for funds was vital for the harbour's well-being as due to the continuing improvement of the Wear and the forming of the Mandale Cut in the Tees, Hartlepool had been starved of trade and although figures for shipping have not been located the total revenue for the six-year period ending in 1831 amounted only to £400; of this sum £200 was from vessels trading to the port and £112 was from fishing boats.[7] In comparison, the revenue of the Tees, then also a non-coal-exporting river, was £1,594 in 1825 alone. By 1831, however, it had been made known that port developments were to take place with the prime object of shipping coal from Hartlepool and with the prospect of greater prosperity and involvement in the port's affairs the number of commissioners was increased to 36, a further Act was sought and the Hartlepool Dock and Railway Company, whose Act was passed in June 1832 was asked "for the use of their Engineer to carry on the proposed works in the Harbour".[8]

3.7 Seaham Harbour

The establishment of the port of Seaham, five miles south of the Wear, was due to the efforts and co-operation of three men; the 3rd Marquis of Londonderry (1778-1854), John Buddle, his agent, and William Chapman, perhaps the most eminent of the engineers living and working in the area. In 1819 Londonderry, then Lord Stewart, had by marriage to Frances Anne Vane-Tempest come to control the family's collieries at Rainton and Pittington, between Durham and Seaham, which despatched coal by waggonway to the Wear at Penshaw. In 1819, too, Buddle was appointed as agent by Londonderry to revive the flagging fortunes of the mining concern, the largest colliery, Rainton, having limited reserves and the prospect that its lease would not be renewed. It was, however, the proposed sale of a neighbouring estate which brought Chapman into contact with Londonderry and Buddle.[1]

The affairs of Londonderry and Buddle, in particular their involvement in Seaham, have been investigated both by Sturgess and by Hiskey but, nevertheless, it is important to outline the events which led to the establishment of the harbour. In 1820, the presence of coal beneath the magnesian limestone was confirmed by the winning of Hetton colliery, begun in 1810, abandoned and then revived in 1818.[2] Although it was to be two years before production began, the sinking of it was viewed with great interest by Sir Ralph Milbanke (Noel), the owner of the Seaham estate, and his agent, William Taylor, especially in view of the possibility that the same deep seams would underlie Seaham also. What was of greater importance, though, was the fact that at Dawdon Ness there was a site suitable for a harbour. At Milbanke's instigation, Chapman was asked to report upon the possibilities of the site. He was enthusiastic; the rock was suitable; work could proceed as the harbour was brought progressively into use; the excavated material could be burnt for lime. The site, with two small inlets already formed in the headland, could be made "ready for use in two seasons; which is before any colliery can be won and have the waggonway laid down to it."[3] Chapman queried whether transport to the harbour would be cheaper than to the Wear and speculated as to the maintenance of his planned depth of 15 ft at high water. He envisaged too, the formation of a town in conjunction with the harbour and, perhaps having had his proposals questioned, added in a post-script to his report that it was no disadvantage for the harbour to be dry at low tide; the coal exporting ports of Maryport and Whitehaven experienced no ill effects from being absolutely dry.[4] Chapman did not then envisage a dock as being part of the scheme and the works were to comprise only an outer harbour with protecting breakwaters, some 900 and 600 ft long, a small southern harbour and the north, or inner harbour, cut into the rock;[5] a waggonway would lead from it to the collieries intended to supply the port.



Map 6: Seaham Harbour, 1820-1830

In spite of Chapman's eulogies regarding its prospects the estate was soon offered for sale. Of 3,700 acres it included Seaham Hall and eight farms, together with limestone and coal

> so abundent as to give ready means of establishing a vastly extensive and profitable trade (while Dawdon)...presents the greatest natural facilities for making, at the least expense, a superior port or harbour for the reception of shipping of great burthen, and that the district between this and the Coal Field (at Hetton) comprises the best line for the carriage and shipping of all the coals to be won from any port of the adjacent country. 6

Chapman's proposed haven was shown on the plan which accompanied the notice.

The initiative to purchase the Seaham estate would seem to have come from Londonderry and the negotiations were undertaken by intermediaries to conceal his identity and purpose.[7] According to Sturgess, Buddle was not a party to the actual purchase, duly completed in November 1821 for the sum of £63,000, although in view of his later enthusiasm and involvement this seems unlikely.

Londonderry's first task was to seek an independent report on Chapman's proposal to construct the harbour and the relevant documents were dispatched to George Leather who in January 1822 submitted his views. Chapman's scheme was for a harbour with an area of 2½ acres, its two protecting breakwaters forming an entrance 75 ft wide. The intention was that ships would load in the south harbour and lie in the outer one where, however, there would be a depth of water only of three feet at low tide; this depth, Leather thought, was insufficient as ships could not lie on a rock bottom without damage. He also commented that, as the north harbour was to be formed by excavating the rock headland, investigations as to its quality should be undertaken, preferably by someone experienced in colliery boring. Chapman's estimates were doubted - his initial costing had brought him to a figure of £6,060[8] - especially as Leather did not think that the excavated rock would be suitable for construction purposes. It would be better to bring stone from Whitby. The report closed with a caution:

> However, I could not feel satisfied in recommending your Lordship to commence such a work, upon a venture; not that I doubt the practicability of making the harbour: but, that I wish, by a full investigation, to enable your Lordship to judge, how far the advantages to be derived will be commensurate with the outlay. Even from such an investigation many advantages will also result in the future progress and proper arrangement of the work; provided it is found advisable to carry it into execution. [9]

It was, perhaps, this report which caused Chapman to change his plans and following a meeting with Londonderry and Buddle new estimates were made, this time for a harbour costing £7,000 with a protective pier being provided for an additional £6,000. These smaller-scale works could be built as a first stage, assuming that initial through-put would be 75,000 tons p.a.; extensions could follow.[10]

After Leather's report soundings and levels were taken on the site of the proposed harbour - the idea for it had been claimed by Taylor to be his - and the drawings then produced show an inclined plane delivering coal to the north harbour and a ballast way leading from the south.[11]

Consideration was given also to the means of transporting the coal from colliery to harbour, an exercise undertaken by Buddle. He compared the costs of leading coal to the Wear and to Seaham: if despatch was to Sunderland the cost would be 3/3d per ton and if to Seaham 1/3d. If the vend were to be 132,000 tons p.a. the benefits to the harbour and so a saving on transport would be £13,073 p.a.[12] This possible reduction in expenditure for a capital outlay of £13,000 for the harbour and £9,835[13] for the waggonway must have made the formation of the harbour a most attractive proposition; the estimate for the railway - the change in description is perhaps significant - was later revised upwards to £22,292.[14]

Great consideration was given by Londonderry and Buddle to the financing of the project. A proposal was put forward that the railway - a route to Sunderland was considered, also - should be built by a speculator at his own cost, Londonderry then making annual payments to him while guaranteeing a minimum tonnage to be transported.[15] The formation of a harbour company

was investigated and a prospectus was drafted. Seeking capital of £15,000 it described Chapman's proposals, the works expected to begin in 1824, and noted that Londonderry hoped to pay the subscribers - Sunderland shipowners were initially considered - 4d p. ton on a quantity of not less than c 50,000 tons p.a.[16] The possibility of securing a Parliamentary loan was also considered, the system introduced in 1817 "for works affording employment for the labouring classes of the community by the advance of Exchequer Bills and money out of the Consolidated Fund";[17] and it was perhaps in this connection that Chapman, as an example, forwarded to Buddle the application made in respect of Scarborough, together with a further report.

Chapman's new proposal was for an enlarged harbour, still at Dalden Ness, which would provide the best southerly aspect of any harbour on the north-east coast and compared with his earlier scheme it would have twice the internal space. He proposed that six berths be provided in the harbour with a further three at the south breakwater. Noting realistically that estimating costs was difficult until work had been begun and site conditions revealed, Chapman gave estimates of £6,637 for the north harbour and ballast quay, £6,132 for the north breakwater and east pier, and £8,972 for the south breakwater, a total of £21,743.[18] This breakwater was now to run parallel with the shore and Chapman envisaged forming first the north harbour, excavated from the headland. Its completion would enable the shipment of c 50,000 tons p.a.

Some impetus was given to the plan for the harbour's construction by the fact that Thomas Braddyll, owner of an estate at Haswell was with Arthur Mowbray contemplating the building of a harbour at nearby Hawthorn Dene;[19] this threat lent urgency to Londonderry's proposals and the views of Telford and Rennie were sought. Telford, then advisor to the Exchequer Loan Bill Commissioners, reported in November 1823 that he had visited the site with Buddle and subsequently discussed the matter with Chapman and Rennie in Newcastle. He agreed that a shipping place was necessary

and as Londonderry's coal interests were substantial they appeared "to justify a work of considerable magnitude and if accomplished there can be no doubt but that the produce of other coal properties would also be shipped at the new port."[20] Telford foresaw that Londonderry could ship 132,000 tons p.a. and other owners 26,000 providing a saving - a notional revenue - of £15,000 p.a. to be offset against the construction costs of £70,000, including the railway. Rennie's reply was similar in content; the site was good and the harbour would be able to contain 30 ships drawing from nine to 13 ft. His estimate for the harbour alone was £42,000,[21] with a further £22,000 for the railway. Not differing greatly, the estimates were much higher than had been Chapman's, principally on account of the more elaborate pier works which were considered essential to protect the harbour.

Chapman reported the findings of Rennie and Telford to Londonderry, putting to him their opinion that the harbour should be built complete in the first instance and later he suggested means by which the costs could be reduced to £25,840.[22] Correspondence between Buddle and Telford followed, Buddle pointing out that Londonderry possessed 6,000 acres and the whole area would be served by the railway. He also informed Telford of the present transport arrangements: coal was carried five miles to the Wear by waggonway, then seven miles by keel; to ship at Seaham would involve six miles of railway. The correspondence also included the financing of the works in that Buddle envisaged Londonderry funding the project to the sum of £45,000 with Exchequer Loan Bills totalling £20,000. Telford, however, thought that a loan of £40,000 could be obtained, with ample time for repayment.[23] The 1823 discussions appeared to end as a result of a letter to Telford: "Certain collateral circumstances, tending to enhance the importance of the harbour, have come under discussion, which will probably suspend, for a while, further progress being made..."[24] at Seaham. What were these circumstances? There are two possibilities.

The most likely was, indirectly, the bringing into operation of the Hetton colliery. Its success caused Buddle to advise Londonderry to take up the lease of Pittington and it is possible that it was the prospect of a greater coal tonnage passing through the port and hence needing increased facilities which caused the delay, it being perhaps thought, too, that improved methods of transporting coal on the Wear - 'tubbing' had been introduced by Budddle in 1821[25] - would so cheapen transport costs as to make the Seaham project less economical. The second reason could be that Braddyll had abandoned the scheme for a harbour at Hawthorn Dene, so rendering less urgent the building of a harbour at Seaham.

Other than Chapman having produced a further report on the harbour in 1824, to the effect that extensions to his projected plan could be made, the matter seems to have been dropped for a while and it was not until 1826 that the harbour proposal was resuscitated, this time through the involvement of Alexander Robertson, a somewhat shadowy figure who, having agreed to undertake construction and operation of both harbour and railway, backed down the following year. Robertson's involvement, and for a while that of Braddyll, resulted in Londonderry seeking, and being granted, an Act of Parliament in 1828. It recited an agreement of 1822 whereby £4,000 p.a. was to be made available for the purchase of estates situated in England and Wales and noted that consent had then been given for the leasing of any property, other than the family residence at Wynyard; the new Act sought to extend the earlier and insufficient provisions. It noted Londonderry's desire to grant a lease

> for the Purpose of erecting, excavating, constructing, and making thereon any Basins, Docks, or other Shipping Places for Coals or other Commodities, or any Quays, Wharfs, Staiths, Piers, Jetties, Erections, or Buildings for the Shipment of Coals or other Commodities, and of making any Railways or Tramways, or other Ways, Roads, or Passages thereto, or any other Conveniences for the Transport or Shipment of Coals or other Commodities... [26]

and put forward the view that such an arrangement would enhance the value

of the collieries on the estate. The Act authorised the leasing of lands totalling 1,683 acres.

The granting of the Act led to a 99 year lease being arranged between Londonderry and Braddyll - reluctant to begin construction without it - but before work on the harbour and railway had commenced, Londonderry unexpectedly and inexplicably, informed Buddle that he had "entirely made up his mind to commence the harbour himself and had written to Col. Braddyll to break off negotiations with him."[27] Work on the harbour's construction thereupon began immediately.

The building of the railway was undertaken by Shakespeare Reed, not without financial problems having been encountered. During the later months of 1822 a proposal was made by Benjamin Thompson to construct a railway and to transport coal to Dalden Ness by contract. This proposal was accepted and early in 1823 Thompson wrote to the effect that construction could be accomplished within 15 or 16 months.[28] Buddle, however, still favoured using the old waggonway from Newbottle to Sunderland - at least initially - but looked forward to the time when the two lines together would provide Londonderry with great benefits. Like the harbour, so the construction of the railway lapsed until 1828 when, a month after construction of the harbour began, Buddle was approached by William Harrison, later a promoter of the Stanhope and Tyne Railway, with a proposal both to build and operate the railway by contract. Seeing the suggestion as one which would release capital for the main project it was agreed to but then Harrison's financial backer, Shakespeare Reed, attempted to withdraw. Eventually ,it was Harrison who withdrew and the railway was built by Reed and Thompson, Reed providing the finance and Thompson the expertise.[29] In 1828 a contract was drawn up between Reed and Londonderry whereby the latter was to be completely free from capital involvement but would guarantee payments on quantities up to 132,500 tons p.a. - if greater, the rate would fall - while Reed undertook to have the railway operational by 1 January 1831.[30] Work began in July 1829 and was completed

by the summer of 1831.

In 1823 Telford had propounded the view that the harbour should be built to adequate standards "and, unless made so, it had better be delayed or abandoned"[31] and in the year of its commencement Buddle, adressing Londonderry, proposed that work should be undertaken in a concerted manner.

> As it is a Political Effect which we aim at in the first instance, our object is, I think, more likely to be gained by advancing with a heavy column at once, in this manner, than by sending small detatchments, and dribbling on, day after day. We ought boldly to take the ground and at once hoist our flag. We might certainly be getting something upon the ground through the course of the week.. 32

Buddle's view was the correct one; Chapman, perhaps surprised, produced hurried plans; Londonderry, responding to Buddle's call to arms, produced the necessary finance; construction began.

The harbour was built by direct labour, Chapman stating at the inauguration ceremony in November 1828 that due to Buddle's skills "there has been no occasion for applying to any great contractor for public works; therefore the large profits they generally require as a recompense for their capital and risk, will be saved."[33] No mention was made of the abortive negotiations with Robertson. The revival of the project had brought John Dobson (1787-1865), Newcastle architect, into the affair as Londonderry, foreseeing that the construction of the harbour would induce the building of a town, sought to achieve high standards of design. Londonderry's brief to Dobson however, was realistic. "Large and expensive foundations and overgrown buildings will not inspire confidence in the completion of the work, but the reverse - small, neat, compact buildings suitable for the concerns of trade are all that we should endeavour"[34] to provide. Once construction had begun, Buddle ensured that it progressed quickly as he foresaw its prospects and, in fact, regretted that the harbour had not been built immediately following the purchase of the estate; "such a move would have deterred the Stockton and Darlington Railway promoters and perhaps at the same time have made possible some financial backing from Edward

Backhouse's bank which now, however, was committed to the Stockton railway."[35]

Dobson's appointment - in fact, little of his project was executed - led to the appointment of a clerk of works, Thomas Nicolson; Telford was again consulted; Rennie wrote that Seaham would never serve "any national or general purpose"[36] and would always remain a local coal-exporting port; and a report was submitted on the project by David Logan, engineer under Rennie for the construction of Donaghadee harbour.[37] With work having begun Logan suggested the use of a cofferdam to facilitate forming the inner harbour and extended the idea to deepening it to five to ten feet below low water, so allowing ships to remain afloat at all times. The idea was transmitted to Chapman who responded by letter to Londonderry:"In this I entirely agree in opinion with Buddle and would recommend even to go a little further, that is to deepen the inner basin to 12 or 14 feet below low water mark".[38] With regard to costs, however, Logan disagreed with Chapman's estimate of £25,000, putting a figure of £34,269 on the work.[39]

Once begun, construction continued with some expedition. Stone was obtained from Penshaw, excavation of the inner harbour proceeded and lime kilns were built. By the autumn of 1830 the quays and spouts along the south side of the inner harbour were almost complete, the falling gate at the entrance was under construction and the north pier was proceeding, albeit with problems caused by storms. Chapman reported that the 2½ acre outer harbour provided an exit to sea 100 ft wide while that to the inner harbour was 30 ft in width, giving 12 feet of water; the falling gate, raised on the ebb tide, would retain seven feet of water. The south harbour was now to be 12 acres in extent and was "capable of being enlarged to any extent that may be requisite for the vend of the adjacent collieries with every convenience for their separate shipments of coal..."[40]

Chapman's remarks regarding other collieries was significant. The

harbour was initially envisaged as serving only Londonderry's interests but the opening of the South Hetton colliery had brought Braddyll into an agreement - later rescinded - with Londonderry. As work progressed Braddyll saw Seaham as an outlet for his coal from South Hetton and negotiations began concerning his possible financial involvement. A loan of £20,000 was first considered but, later, the capital injected into the project was £17,000, in return Londonderry agreeing to ship Braddyll's coal and repay the loan at 5% from the harbour's dues.[41] The involvement of Braddyll necessitated a further railway into the town and a drawing produced jointly by Chapman and Dobson, shows a rather grandiose crescent of buildings overlooking the harbour and flanked by the two railways. It also shows a site for a possible future basin north west of the inner harbour to be formed "when the Limestone is wrought away."[42]

On 25 July 1831 the inner harbour was opened to traffic. Coal was brought down the railway and by means of the completed gears loaded into a waiting ship - the Lord Seaham, owned by Buddle - holding 300 tons. By this time the north pier was almost complete, the southern under construction although far short of its planned length, designed to enclose 12 acres; in Chapman's view this extension to the south was the most important element in the scheme. Chapman was justifiably proud of his achievement and although the harbour was still far less in extent than he had planned, nevertheless he envisaged it as becoming the port for the import and export trade of the city of Durham. He compared Seaham favourably with Hartlepool and Sunderland, noting that the former was not so well placed for use by sailing ships as was Seaham while the proposed docks at Sunderland were likely to suffer due to the Wear's restrictions. Seaham, although eventually to accommodate 200 to 300 ships could at present contain only 26 but this shortcoming was compensated for by the facilities provided for rapid loading and turn-around. Chapman was certainly justified in claiming that there was "no instance of a private Harbour being constructed with such rapidity and to such extent as the present Harbour has been...(not

least) by the affluence and adventurous spirit of the Marquis of Londonderry, and his advisors..."[43]

The harbour had not been built cheaply. Chapman's estimate for the work had been £25,000, Logan's £34,000, Rennie's £42,000. As the work proceeded, expenditure was much greater, the pay bills alone for the first four years amounting to £3,295, £18,813, £27,256 and £29,083.[44] Including materials supplied, the total cost up to the opening of the harbour would seem to have been £95,000 - 100,000; the railway perhaps cost a further £20,000 - 25,000, but having been built as a speculation by Shakespeare Reed its exact costs are not known. Seaham was the last work of Chapman, involved for so long in the coal industry and its engineering needs. The success had been due to his involvement with Buddle, but neither could have done anything without Londonderry who, "single-handed, had sponsored and brought into being a harbour and a town, leaving an ineradicable imprint upon the geography of the north-east coal-field and its coast-line."[45]

3.8. Summary

The period 1815-1830 began with a vision on the part of the merchants of Newcastle that the defeat of Napoleon would again open continental ports and so stimulate trade and it ended with their influence having led to a reduction, in 1831, in the duties imposed upon coal, so providing the opportunity for the North-East, as a whole, to compete more easily in European trade.

After 1815 the region's coal output and shipments had increased although not so rapidly as national output.[1] The increase had been due to three principal factors: increasing demand, both domestic and industrial; improvements in mining techniques and transport; and the steps taken by the region's river conservators, the Tyne excluded, to undertake river improvement works. Concomitant with these developments were two of even greater potential importance, the winning of the Hetton colliery and the completion of the S&DR; together they were to change the old established

pattern of the North-East's coal industry.

Increased demand for coal was due to industrial growth and the continuing development and spread of the use of steam power. Improvements in mining techniques included better haulage systems, more effective mine ventilation and the introduction of safety lamps, but perhaps the most important development was in the use of bolted cast-iron tubbing, the lining of the mine shaft to exclude water and soft strata. This development, in part, led to the successful sinking of the shaft at Hetton, completed in 1822, so proving the existence of coal beneath the east Durham magnesian limestone.[2] The winning of this colliery was the initial step in the development of the Durham coalfield and led, later, to the establishment of the ports of Seaham and Hartlepool and to dock developments on the Wear.

Not only was the physical winning of Hetton significant; so was the establishment of the company. It was principally composed of men who were not landowners, financed in part from London, and was described by Londonderry as "a pack of madmen...with swords in their hands...ruthless of (the) consequences"[3] of freeing coal prices. The company was not a member of the Durham and Northumberland Coal Owners Association, established in 1805 to control output and maintain prices. Buddle was the Association's Secretary from 1806 and it had operated in a difficult period during which disputes had taken place between the Lambton and Londonderry interests, and suggestions had been made to build both canals and public railways, moves which so disturbed the Association, based on the Tyne and Wear, that the region's M.P.s, Ridley and Vane-Tempest, were retained by it to promote its interests.[4]

The importance within the region of the formation of the S&DR can not be exaggerated; as the first of the region's public Parliamentary lines it was the object of opposition by the longer-established colliery interests on the Tyne, fearful that its formation would enable the Tees

to compete unfairly with the northern trade where coal was wholly transported on waggonways subjected to the annual way-leave charges made by the owners of land over which the tracks ran. Its successful formation was to be one of the principal factors in the future evolution of the region, if for no reason other than the change which it made to the pattern of development. So far as the region's rivers are concerned, their throughput of coal continued to increase with the rise being most rapid on the Wear with a compound increase of 3% p.a., compared with an equivalent figure of 2% for both Tyne and Blyth. Continuing a trend of more than a century, the North East's share of production fell from 24.2 to 22.8% in 15 years although shipments rose by one million tons p.a.; the greatest increase,in percentage terms, lay in the coal exported abroad.

Coal Output and Shipments, 1815-1830[5]

Coal 000 tons	1815	1830
U. K. Output N.E. Output	22265 5395	30375 6915
NE/UK %	24.2	22.8
NE Shipments NE Exports	2988 150	4000 340
Exports %	5	8.5

Within the region the number of ports shipping coal increased to four with the completion of the S&DR; as a result coal was shipped from the Tees from 1826 at Stockton and from 1830 at Middlesbrough. Tonnages from both Blyth and the Tees were insignificant. The greatest rate of increase in throughput was achieved on the Wear where by 1830 its share had risen from 32 to 34%.

Shipments of Coal from North East Ports, 1815-1830[6]

Shipments	1815		1830	
	000 tons	%	000 tons	%
Tyne	1833	65	2465	60
Wear	898	32	1387	34
Tees	-	-	100(est)	2.5
Blyth	100	3	140(est)	3.5

Note: The total for 1830 of 4·092m tons differs from that of 4m given by Flinn. The discrepancy is not significant.

The period 1815-1830 witnessed little activity at Blyth and Hartlepool. At the former, coal shipments rose slightly; at the latter, trade stagnated. Although few physical improvements were made to the rivers Tyne and Wear, nevertheless their expansion was substantial principally because of the efforts of the colliery owners and their viewers. On the Tyne, the opening up of new collieries - also the re-opening of older ones - led to the building of additional waggonways, three of the most extensive being those from Fawdon and Springwelland the line from the Cramlington colliery, begun in 1824, and, unusually, conveying coal to the Tyne rather than to the Blyth, a nearer river. The effect of these waggonways was principally to transfer the loading of coal to points nearer its mouth, a process which had the dual effort of reducing the numbers of keels in the river and in strengthening the voice of the shipowners of North and South Shields for some involvement in the government of the river, entrenched firmly in the hands of Newcastle Corporation.

On the Wear a similar situation had arisen, perhaps more marked. Waggonways from Newbottle and from Hetton had been built to carry coal from the south side of the river direct into Sunderland, so obviating completely the use of keels by the Lambton and Hetton interests over a length of some eight miles of the river. On the Newbottle line a locomotive

had been tried and the Hetton line was the first to be designed for locomotive use, an improvement over the horse-drawn and rope-haulage systems up till then adopted. The success of the Hetton colliery sinking led to the development of other deeper mines, for example Monkwearmouth, begun in 1826 and sunk to a depth of 1,758 feet by 1834.[7]

Improvements were also made in the methods of transferring coal from land to water. Foremost among them was the use of the coal drop and the introduction on the Wear of the use of tubs, loaded into keels. These innovations improved the handling of coal on both rivers and led to a diminution in traffic. Little was done to improve the rivers themselves during this period. Still firmly under the control of Newcastle the Tyne remained virtually untouched but such was its natural flow that, even so, it was able to accept ships of size similar to those using the Wear. In spite of Rennie's 1814 report nothing had been done, with the result that it had become congested and of such inadequate depth that its navigation was difficult, if not dangerous. Whereas the Tyne, with c 11750 ships sailing each year and employing 300 keels upon it in 1828 had a surface area, at high water, of c 1,350 acres in its navigable length, the Wear, with c 7,500 sailings and 200 keels measured only 80 acres. As a result, the Wear, unlike the Tyne, had by 1830 been the subject of much discussion regarding the provision of docks, although by that date, no such works had been undertaken. Similar suggestions had been made earlier concerning the Tyne but the several projected sites remained undeveloped.

On the Tyne, dredging was minimal but under the RWC an extensive programme of straightening and deepening had been undertaken to the river's benefit; with increased coal production - principally by the Lambton and Londonderry collieries - this had led to a rate of increase in coal shipments greater than on the Tyne. What had ameliorated the problem so far as the Tyne was concerned was the introduction in 1818 of the use of steam tug-boats, so enabling shipping to navigate more easily the river

as far upstream as Newcastle. On the Tees the same change had been brought about by the S&DR in 1824. It can only be supposed that the state of the two rivers was such as to force upon shipowners the necessity of adopting these measures, although it must be noted that the TNC had in 1828 obtained an Act for a further improvement to the river, the forming of the Portrack Cut, completed in 1831.

In the southern part of the region two events, the winning of Hetton Colliery and the formation of the S&DR, were most to affect development. The former was to have an immediate effect upon the region, the formation of Seaham Harbour and the shipment of coal from it in 1831 while the latter, having as its immediate effects the birth of Middlesbrough was ultimately to lead to the formation of another port complex at West Hartlepool. By 1830 the pattern for the future development of the North East's ports had been formed.

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21. J. Rennie, letter to Londonderry, (10 October 1823) (DCRO:D/Lo/E 593 (7))
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23. Correspondence, 12 October - 6 November 1823 (DCRO: D/Lo/E 593)
24. J. Buddle, letter to T. Telford (DCRO: D/Lo/E 594 (20))
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26. 9 Geo IV, Cap 43, (25 July 1828)
27. R.W.Sturgess, op cit, p 61.
28. B. Thompson, letter, 1 February 1823 (DCRO: D/Lo/E 594 (4))
29. C.E. Hiskey, op cit, p 162.
30. A Contract or Proposal to the Marquis of Londonderry by Shakespeare Reed Esq, to make an Iron Railroad (28 November 1828) (DCRO: D/Lo/B 366 (1))
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32. J. Buddle, letter to Londonderry (7 September 1828) (DCRO: D/Lo/F 1045)
33. Seaham and Seaham Harbour, 1828 - 1928, (Seaham, 1928) p 18.
34. Londonderry, letter to J. Dobson, 22 October 1828 (DCRO: D/Lo/E 610)
35, C.E. Hiskey, op cit, p 155.
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37. Sir John Rennie, The Theory, Formation and Construction of British and Foreign Harbours (1854) p 190.
38. W. Chapman, letter to Londonderry,15 November 1828 (DCRO:/Lo/E 610)
39. D. Logan, Report, (DCRO: D/Lo/E 593 (13))
40. W. Chapman, Description of the Port of Seaham in explanation of the Plans. (1830)
41. R.W. Sturgess, op cit, p 66, 67.
42. A Plan of Seaham Harbour.. W. Chapman & J. Dobson, (DCRO:D/Lo/E 596 (5))
43. W. Chapman Report on the Rise, Progress, Present State and Projected Extension of the Harbour of Seaham (Newcastle, 1832)
44. Paybills, 1828-1833 (DCRO: D/Lo/B 329 (10))
45. R.W. Sturgess, op cit, p 76.

Summary

1. M.W. Flinn, op.cit. p 26.
2. S. Middlebrook,Newcastle upon Tyne: Its Growth and Achievement (Newcastle upon Tyne,1950) p 186.
3. Letter from Marquis of Londonderry, 5 June 18 , (DCRO: D/Lo/C T42)
4. M.W. Flinn, op. cit, p 264.
5. Ibid, pp 27,35.
6. See Appendix,
7. Wm. Fordyce, A History of Coal, Coke... in Northern England, (1860) p 73.

4. PORTS IN THE YEARS OF THE EARLY RAILWAYS, 1830-1854

4.1 Introduction

The development of the north-east ports in the period 1830-1854 needs to be considered against four significant factors: the removal of the Duke of Richmond's Shilling from Tyne shipments, so permitting all ports to compete on an equal footing; the prospect of a significant expansion of the Durham coalfield, begun by the successful sinking of Hetton colliery; the formation of the Stockton and Darlington Railway, which both threatened the northern collieries and presaged the surface transport of coal from one port to another; and the Rainhill trials of 1829, whereby the future use of steam locomotion became assured, initially on the Liverpool and Manchester Railway and later throughout the railway system.

The Duke of Richmond's Shilling was a tax imposed only on coal leaving the Tyne; as its name implies a shilling was charged on each chaldron (2.65 tons). First imposed in Elizabethan times it was described in 1830 by Brandling as "a very grievous tax upon the river Tyne, and is one of the great grievances complained of by the coalowners and shipowners"[1] of that river, principally because of its discriminatory nature. It was ended in March 1831[2], having by then been a government impost for some 30 years and, prior to that, a tax accruing to the Duke of Richmond. Its removal gave the Tyne an ability to compete with other rivers; the almost simultaneous reduction in export duties, noted earlier, enabled foreign shipments to be increased. Two further changes were to take place in the period here considered, the end of the Regulation of the Vend - the restriction on output agreed by the majority of the Tyne and Wear coalowners - in 1845[3] and the total repeal of the duty in seaborne coal in 1850.[4]

The winning of Hetton colliery was to bring significant changes to the North East. It both proved reserves and caused the principal colliery developments to be located in the eastern part of the county where, although the expense of sinking was greater, subsequent transport

Map 7: The North-East, c 1835

costs to the Durham coast were lower. Its success led directly to the founding of Seaham Harbour, the later expansion of Sunderland and the establishment of Hartlepool.

The opening of the Stockton and Darlington Railway (S&DR) was of significance on two counts. It was the first Parliamentary line and, as such, reduced its running costs by obviating the sometimes high annual wayleave charges imposed by landowners. It was also a railway which opened up an area around Bishop Auckland where mines were shallow and pithead costs low and was able to carry cheap coal for shipment on the river Tees, until then not a coal-exporting river. It was to lead, indirectly, to the formation of the port of West Hartlepool. Promoted largely by Darlington Quakers, the S&DR, together with the exploitation by the Pease family of the coal and ironstone deposits at its head, was to have a far-reaching effect on the pattern of development in the North East.[5]

The completion of the S&DR in 1825, together with - in the same year - a trial of locomotives at Killingworth and Hetton[6], marked the beginning of the region's railway system but the major change did not come for four years when, at Rainhill, steam locomotion showed itself to have been perfected sufficiently to bring it later into universal use. Waggonways had over the years developed from being totally horse powered to using a combination of horse haulage and rope-operated machines. As the use of steam developed so stationary steam engines were brought into use followed by early instances in the use of locomotives at Newbottle, Killingworth, Wylam and Hetton. These composite railways, using combinations of motive power, later gave way to railways operated solely by steam locomotion.

The period 1830-1854 witnessed the formation and demise of some 20 railway companies whose operations affected the region's ports. The establishment of railways after 1825 was much influenced by George Hudson (1800-1871) who foresaw the formation, through amalgamations, of the North Eastern Railway - it occurred in 1854 - although by that time his influence

in railway affairs had ended. Expansion occurred over a period of only some 25 years - the formation of the network of waggonways had taken four or five times as long - and even by 1840 there were some twelve railways in operation in the region. What is of importance is that whereas the waggonway system had been aligned on a generally north/south axis, that of the railways ran from west to east, in effect supplementing the rivers themselves. In the later part of the period a further re-alignment took place when London was linked, perhaps somewhat circuitously, with Gateshead in 1844 and with Edinburgh in 1850.

The impact of the railways on the region's ports was considerable. No longer could each one be considered as the single outlet for a particular mining area; efficient and cheap transport was able to carry coal to the most suitable shipping place, whether on account of its lower shipping charges or a greater water depth. These new conditions brought change. Although the Tyne was only marginally improved, as was the Blyth, Amble and West Hartlepool were established as coal exporting centres and docks were built at each of the ports of the Durham coast, where expansion was to lead to the establishment of new towns, the prime examples being Middlesbrough and West Hartlepool.

The improvements made to region's ports were the result primarily of the numbers of ships using them, especially so far as the Tyne and Wear were concerned, but constant efforts were needed to up-date them in line with the increasing size of ships, partly a result of the change-over from wood to iron construction which began to take place, together with the change from sail to steam as a means of propulsion, a change which did not immediately affect the colliers. It is difficult to establish with certainty the size of ships using the ports but taking figures for the import of coal into London alone it would seem that, for 1833, the cargoes averaged 312 tons from the Tyne, 281 from the Wear, 220 from the Tees and 275 tons from Blyth.[7] Several references have been noted at

this time of ships of 200 tons register, a figure which correlates well with the deadweight figures and a size which appears to have been common throughout the region. Ship sizes increased markedly during the period 1830-1854, not the least of the factors which led to continuous port improvement.

4.2 River Tyne

At the 1829 Select Committee hearing into the coal trade, the numbers of collieries then working on the Tyne was given as 36 by coal-owner Robert William Brandling (1774-1848) and as 41 by John Buddle, 23 to the north of the river and 18 to the south, slightly more than double the Wear's figures.[1] The Tyne collieries' average output amounted to c 53,000 tons p.a. with Percy Main, Burradon and Killingworth producing c 92,000 tons p.a.; in contrast, the largest of the Wear coal-owners, Lord Durham, produced 334,000 tons p.a. [2] albeit from several mines. Although the Wear collieries had a higher average output than those of the Tyne, the Vend had, that year, been regulated in the ratio 3:2 in favour of the Tyne. In spite of deeper collieries having been recently won in the Tyne area, production had not risen appreciably and Buddle commented that the same collieries could, with the same plant, but perhaps more men, easily double the output; in his view, only demand would stimulate production.

The following year another Select Committee investigated the trade and, obviously unhappy regarding the Regulation, it commented that the trade "had better be left to the control of that competition which appears already to have affected it";[3] the competition was seen as coming from the Tees, Brandling viewing it "entirely as a rival trade, the same as Wales".[4] The coal-owners on Tyne and Wear, if rivals, did at least communicate, although the opposing concerns went their own ways; only eminent viewers like Buddle and Nicholas Wood appear to have straddled the boundary.

To bring coal from colliery to river, still the only means for exit from the region, a network of waggonways had been built; only a very few private lines were to be constructed after 1830, principally those

of the new collieries at Seghill and Cramlington[5] and the Stanhope and Tyne Railway (S&TR) from west Durham to South Shields. On the Tyne there had been a tendency to provide waggonway outlets at down-river locations on both banks of the river although staiths stretched up-river from the sea for a distance of 14 miles. The reasons for the later development were three-fold: the unimproved river was easily navigable only in its lower reaches; the restriction of the bridge at Newcastle was avoided; the use of keels, with high transhipment costs, was obviated. As a result the numbers of keels in the river was declining and, from a peak of c.400 - estimates as high as 1,000 have been noted - the number had fallen to 300 by 1828.[6] The number of sailings from the river at this time was c 11,750, causing very serious congestion along certain of the reaches, especially where colliers were awaiting their turn to be loaded. During the previous 20 years the use of drops had increased markedly, and in 1828 it was estimated by Thomas Elliot Harrison (1808-1888) that some 75% of the region's coal shipments was loaded by this means, perhaps 4m tons.[7]

By 1830 the rivers had been little improved and the coal-owners, expecting little of the Corporation, were forced into extending their staiths to deeper water. In 1831 Killingworth colliery sought an extension of 118 ft at Willington Quay with a drop projecting a further 36 ft.[8] Similarly, the Cramlington Coal Company sought to lengthen its gears at Howdon Pans; other companies with longer staiths were said to be causing silting in the river.[9] Similar instances were numerous.

Although reluctant to improve the river, nevertheless, the Corporation was anxious to secure trade for the Tyne and to approve, where it could, facilities sought by the new railway companies. In 1831 the council agreed to form a committee concerning the building of a railway between Monkwearmouth and South Shields "from the coal districts in County Durham".[10] It reported favourably on this proposal as it would "lend to the increase of the coal trade of the River Tyne and consequently of the Revenues of

of the Corporation."[11] There was no mention that the traffic could be reversed - as had happened - and the Corporation was recommended to subscribe for 50 £50 shares. A year later the Brandlings sought approval for the erection of new drops at the west end of South Shields to secure their colliery there and a similar request was made in 1835, this time resulting from the passing of an Act of Parliament[12] for the formation of the Brandling Junction Railway (BJR), a line from Gateshead to South Shields and to Monkwearmouth; the engineers were George Stephenson and Nicholas Wood.[13] Capital was subscribed for by the Corporation.

At this time the Corporation became involved in other railway matters: the Newcastle and Carlisle Railway (N&CR) sought a quay at Skinnerburn, which was refused without qualifying reasons, and in an effort to eliminate or reduce, competition the Corportion unsuccesfully petitioned against the Bill promoted by the Hartlepool Dock and Railway Company in 1832, on the grounds that it would give to another port "an undue advantage over the River Tyne, long the principal Port for the export of coals."[14] Stephenson's advice was sought by the promoters of this railway and the following year the Corporation investigated the possibility of itself promoting a new railway from the Durham collieries, those which were intended to feed to Hartlepool. It was suggested that a railway, to become the Durham Junction Railway (DJR), be built from the terminus of the Hartlepool railway, passing through the Durham coalfield to join the S&TR and so discharge coals at South Shields. It was noted that Buddle was involved in the proposals and negotiations had been opened with the Earl of Durham and the Marquis of Londonderry, appointed a Freeman of Newcastle in 1827. The line would cost £72,000, would transport c ½m tons p.a. and bring a dividend of 11½%, in addition to the duties payable to the Corporation of £1,667 p.a.[15] While the negotiations were proceeding the S&TR sought approval for a wet dock at South Shields with eight berths and gears 50 to 60 ft long, with spouts; the Corporation naturally agreed.

Two years later the S&TR again approached the Corporation: the docks had

not been built, a fact regretted by the Corporation, and the quay with its three berths had proved inadequate.[16] Two drops were now proposed to increase the shipping capability of the railway terminus and a further three were applied for in 1838.[17]

By 1835, with municipal reform imminent and the Wearmouth dock under construction at Sunderland, the question of the Tyne's condition appears to have become somewhat more pressing. The Revenue Committee proposed that a wet dock should be provided in Newcastle and following a request for a quay at Hebburn in accordance with Rennie's 1816 improvement line the Council sought the advice of Francis Giles, who had been involved with the river in 1815. The Corporation had already considered the provision of new river facilities, a new quay in Newcastle and a wet dock, perhaps at the mouth of the Ouseburn,[18] a mile down-river from the bridge. Six months later plans for a new quay were submitted by John Dobson and the newly reformed Council found them to be "worthy of...(its) immediate consideration. The cost of the mason work has been ascertained, and it is suggested that the cost of the modern mode of forming quays by iron plates should be compared,"[19] presumably a reference to the Brunswick Wharf, designed by Walker and Burgess, on the Thames and begun in 1832.[20]

In 1832 a book had been written by John Macgregor, a naval surveyor, addressed to the coal owners of the district. He noted that improvements to the Tyne were not being undertaken, to the benefit of the Wear and Tees, and criticised Rennie's report as having been too limited in its scope; the Corporation was also castigated regarding its attitude on river maintenance. He propounded the view that steam dredging was essential and was in fact used on the Thames, at Hull and at Sunderland; even harrowing the sandbanks and then allowing scouring to take place would be an improvement. Macgregor foresaw that the Tyne would soon be lined with factories and so recommended building full-height river walls as a quay and he was further critical of Rennie for planning to build only half-tide walls

and for envisaging a new quay at Newcastle, already the narrowest section of the river. In short, Rennie's plan was "without system, desultory and incongruous (with)...isolated measures which have no natural dependence on each other, and therefore cannot form a consistent whole."[21] A river wall was also proposed between Clifford's Fort and Spanish Battery on the north bank - in effect, Dodds proposal of 1769 - and the provision of a pier, also suggested by Rennie, to the south.

Perhaps stimulated by Macgregor the Council, in 1834, commissioned a report from Joshua Richardson (1799-1866), following discussions between councillors and Newcastle merchants.[22] Richardson was optimistic that the river's navigable depth would be increased and the sandbanks removed; in general he approved of Rennie's plan to constrain the river between walls as this would obviate one of the principal problems, the collapse of the river banks and, in places, of ballast heaps into the river, so widening it and causing further silting. Richardson thought that Rennie had over-estimated the cost of the works but considered that the river walls should be built to full height and the land reclaimed. He urged the conservators to remove obstructions such as Bill Point and to undertake extensive dredging, where possible in association with land reclamation.

A further report was produced by the River Improvement Sub-Committee, to which he had reported; it also approved Rennie's river line and suggested that a wholesale policy of quay re-alignment should be undertaken, recommending that "the several landowners on those parts of the river should have every reasonable inducement and facility afforded for undertaking the building of such quays themselves" [23] and that extensive machine dredging of the many shoals and sandbanks should be proceeded with. The matter was also reported upon by the River Jury, responsible for investigating all nuisances perpetrated within the river's navigable length. It reported that "the channels of the river are now as good as they have been within the memory

of any man living"[24] but nevertheless the river could be greatly improved. The Jury further approved of Rennie's line, agreed strongly with the protection of the river banks and with the removal of obstructions typified by Bill Point; it also agreed that the Newcastle Quay should be extended to the Ouseburn but recommended that the Common Council should take the opinion of some eminent engineer before proceeding.

* * * * *

The government of Newcastle was reformed in 1836. One of the first decisions made by the new conservators was the formation of a River Committee, its remit to improve the river to accommodate 400 ton, rather 150 ton ships;[25] some three months later it was agreed that Rennie's river line, proposed twenty years earlier, should be adopted. Whereas in the years following Rennie's report little had been done to the river, the twenty-year period which now began saw greater activity and in order to clarify matters, the river will be treated chronologically under four principal headings: negotiations with colliery companies; river improvements; railways and docks; and other matters.

4.2.1 Negotiations with Colliery Owners.

As earlier, the Corporation's dealings were principally regarding the provision of new staiths or the improvement of those already in use. Between 1836-50 some 20 applications were made, half of them on the north bank of the lower river, where on the site of what was to become the Northumberland Dock the number of shipping places increased from two in 1815 to 11.*

* Between 1830 and 1850 applications made for the provision or extension of staiths were as follows:-

1838: Seghill Colliery
1839: Cramlington Colliery; Seaton Colliery.
1840: Percy Main Colliery; Whitley Colliery; Heaton Colliery.
1842: Spital Tongues Colliery at Victoria Tunnel; Elswick Colliery
Marley Hill Colliery; Gateshead (Oakwellgate).
1843: ElswickColliery.
1844: Killingworth, Wallsend, Walbottle Collieries.
1845: Willington Colliery; Hebburn Colliery.
1848: Blyth; Wylam Colliery at Scotswood.

Ref: Proc N.C., 1838-1848.

Staith extensions had become necessary on two counts; the need for facilities for somewhat bigger ships and the silting taking place as a result of illegal ballast dumping and natural river deposition. In some instances, for example at Willington in 1842, it was found that the river was as shallow as two feet at low water and in 1839 the owners of the Wallsend spouts, and others, presented a petition to the Corporation on this account. It was followed by a memorial from George Johnson, Wood and Buddle on behalf of the owners of the Wallsend, Heaton, Kenton, Burradon and Killingworth collieries and led to the Corporation's engineer William D. Anderson (1809-1842), appointed in 1838 and a former pupil of Telford, reporting that the jetties there were in fact beneficial and it was anticipated that they would reduce the river's width from 2,000 to 1,000 feet.[26] In a report which had been submitted by William Cubitt (1785-1861) - details of it follow - the forming of groynes by filling in the bases of the timber gearings had been advocated.[27] This was now, in the 1840's, being done and many of the applications made for staiths were sanctioned on the condition that provision would be so made; in certain instances the Corporation met part of the costs of so doing, as for example, at the Killingworth staiths where £750, half of the total, was paid by the Corporation.[28]

In 1838 the Corporation approved of the plans of the lessees of Spital Tongues colliery to construct a tunnel under the town, reaching to the Tyne at the Ouseburn. The colliery, a mile north-west of the town, was not able to obtain a surface route for its output and was so forced into the construction of the tunnel, two miles long; at its lower end, spouts were approved in 1842.[29] The permission given for a shipping place virtually on the town's quayside is understandable in view of the fact that the Corporation was the lessor of the colliery. Across the river, in Gateshead, the small Oakwellgate colliery, near to the river, sought permission to erect spouts in 1842. The numbers of keels on the river was still in decline but the construction of the High Level Bridge brought

the operators of the 20 keels transporting coal from Wylam colliery into conflict with the Corporation. Although the new bridge's spans were of 125 ft., the construction of it had reduced the navigable width to 40 ft, thought insufficient for the 22 ft wide keels.[30]

4.2.2 River Improvements

The reformed Council soon agreed to obtain an iron boat with a 10 H.P. dredger from Fenton Murray & Co., for a total sum of £2,600, to encourage riparian owners to build quays and to coerce staithowners into boarding the gearing to form groynes where needed.[31] It was also agreed that the Newcastle quay should be extended but first some eminent civil engineer should be appointed as consultant; Cubitt was approached, his first task being to report upon the quay proposal recently prepared by Dobson. It was approved but Cubitt suggested quay walls six feet thick with counter-forts at 18 ft centres, the face to have a curved batter: it should be built inside cofferdams in 100 ft lengths. Cubitt also advocated the use of Walker's iron sheet piling, giving a low-water depth of six to ten feet: the cost of 4,000 ft of quay would be £60 - 100,000.[32] Cubitt recommended the removal of Friars Goose Point and Bill Point, where work would seem to have begun and, like Rennie, he envisaged the forming of groynes and then filling between them with dredged material. He also recommended that the river channel should be dredged and suggested that a weekly expenditure of £50 would enable 2,000 tons to be removed, 100,000 tons p.a. Following Anderson's appointment tenders were sought for the removal of Bill Point, the spur causing the greatest restriction to the river's width in its navigable length.

The Corporation, however, remained reluctant to embark on major river works, in 1839 instructing the River Committee that not more than £4,000 was to be spent during the year, a decision reached following a memorial presented by the town's tradesmen, concerned at the small proportion of the river's revenue being spent on its maintenance.[33] They indicated

that of the past three years gross revenues of £79,575, only £35,168 had been used for river purposes, the balance having been appropriated for town improvement. In the debate which ensued it was noted that Cubitt had proposed an expenditure of £2,500 for dredging, £2,500 for groynes and £5,000 for the quay and contingencies; it was not disclosed what the actual proportion of costs was. It was also stated, perhaps erroneously, that Sunderland already spent £30,000 p.a. on improvements; its revenue was half that sum. Matters did not quickly change and in 1841 the revenue from the river was £24,463 - £5,639 of it from ballast - while expenditure totalled £7,209.[34]

For the following year the River Committee estimated that its expenditure would be £6,170; a ballast engine £510; Willington groynes £520; berths £1,240; Walker groynes £400; dredging £500; new dredging plant £2,600.[35] A further dredger was purchased from Fenton Murray & Co. of Leeds for £1,500, four hopper craft being ordered separately. The report presented by the River Committee for 1841 indicated that a total of 84,000 tons of ballast etc had been dredged from the river and that the dredger had on occasions worked for hire. In addition, almost 100 ft of Bill Point had been removed. Due to ill health, Anderson resigned in July 1841 and a year later was succeded by Brooks, previously engineer to the Tees Navigation Company. Before his resignation, Anderson had listed the River Committee's expenditure during its first four years and had shown what had been achieved. New dredging plant had been purchased, the greater part of the £5,200 capital expenditure, while revenue expenditure totalled £510 before Anderson's appointment and £14,051 afterwards. Included was some £3,000 each for dredging, for works at Walker and for Bill Point removal.[36]

The year before his appointment Brooks had written on the improvement of rivers,[37] expressing major differences vis à vis Rennie's observations, especially as to the value of Jarrow Slake which Brooks considered to be

inessential to the river's well-being. The philosophy of improvement of the Tyne, as he saw it, was the construction of groynes to restrict laterally the main flow so that the "natural power of the stream (should) do the work of deepening the channel".[38] Noting that the improvements undertaken during Anderson's employment consisted mainly of the establishment of ballast depots at Willington and Walker, together with the removal of 150,000 tons of material from Bill Point, Brooks laid down his first proposals, only partly in accordance with Rennie's, and foresaw the formation of groynes to reclaim land and deepen the channel. The cost of the projected works would be c £17,000.[39]

By 1843 Brooks was experiencing some antagonism from the Corporation. In a dispute between it and T. & W. Smith regarding their ship yard at Dents Hole, Brooks had suggested a river line to them, a move deprecated by the Corporation. As the dispute progressed, Smiths threatened to take their business from Newcastle, a move which the Corporation attempted to avoid by promising improved facilities and although the matter dragged on for some time it was inevitable that Smiths should later migrate down-river. Chapman had earlier expressed surprise at Smiths building large ships above Bill Point;[40] the river 330 ft wide at the Low Light was reduced to 132 ft at Bill Point. The matter was eventually fully investigated and Brooks found himself interrogated by the full Council and although he was not called upon to resign, nevertheless, his reputation was somewhat impugned and he was henceforth viewed with mistrust by Council members, to the extent of James Walker (1781-1862) being called in to report on the Dents Hole problem, not settled until 1845. Distrust of Brooks also caused two inspections of parts of the river, Willington and Friars Goose, to be made by John Murray (1804-1882), engineer to the River Wear Commission, in 1844 and 1845, although both of his reports were generally supportive of Brooks.

In 1845 Brooks congratulated himself on the work he had accomplished, including the formation of the longest groyne, 800 ft, proposed by Rennie

at Wallsend and forming the deepwater channel in the bight there. His views were not, however, reflected by the report of the Commissioners for Tidal Harbours which in 1846 commented that the Tyne

> has coasted upwards of two millions of tons of coal per annum for the last quarter of a century. Her foreign trade has risen to half-a-million tons yearly; and the revenue derived from the river, and paid to the City Corporation, by charter, as conservators of the port, amounts to £19,000. a-year; exclusive of 6000l. annually levied by the Trinity Board for primeage, buoyage, etc. Where all seems so prosperous, it is an ungrateful task to point out that such a state of things may be deceitful; yet so it certainly will prove to be in the Tyne, if the river be much longer abandoned to itself, as, generally speaking, it has been till within the last few years. The improvements proposed by Mr. Rennie, 30 years since, have, with the exception of a quay at Newcastle been left unexecuted. The width of the river remains extremely irregular, in some places the channel being only 60 yards wide; sharp angles increase the difficulty of nagivation; upwards of ten acres of sand-bank, dry at low water, still disfigure the bed of the stream; Newcastle bridge, with its nine narrow arches, heavy piers, and additional starlings, acts almost as a mill-dam; a loss of 5 feet range of tide, in the distance of about twice as many miles, takes place between Tynemouth bar and Newcastle quay; coal staiths are projected irregularly into the stream; and no dock accommodation has been provided, while Shields harbour, the daily resort of hundreds of colliers, is so inconveniently crowded that damage frequently occurs. 41

The Commissioners were not exaggerating the problems of river congestion. With some 19,000[42] sailings from the river in a year and with perhaps 100 to 150[43] keels in daily use it is understandable that, exceptionally, some 1,500 ships could be in the river at any one time.[44]

Soon after the above report, the Council received two memorials from coal-owners, the first seeking improved facilities at Low Lights staiths, the other from those shipping coal from Hay Hole where the river was deteriorating due to silting: formerly at low water there had been 12 to 14 ft depth; soon the staiths would be blocked. At Hay Hole there were now 14 shipping places, loading 900,000 tons of coal p.a. into 3,000 ships and the principal cause of complaint was the Willington groyne, recently completed by Brooks and now causing "the fatal increase of sand"[45] at the staiths. That the memorialists were justified is borne out by levels taken in 1850 when depths of water were shown to range from 7 ft

to 15'3" at low water;[46] it was this outcry which was to lead, eventually, to the construction of a dock at Hay Hole.

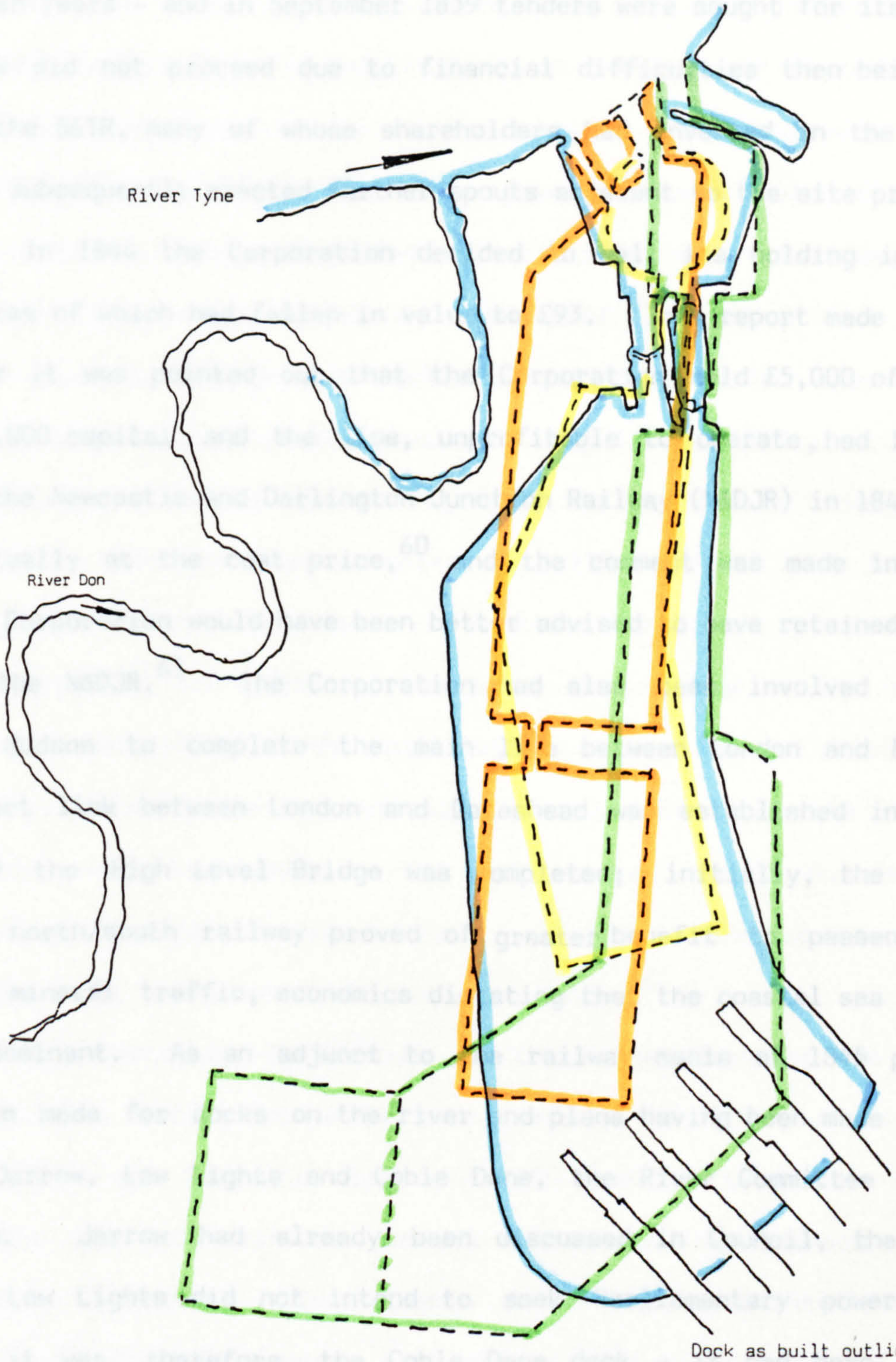
4.2.3 Railways and Docks

Docks had earlier been proposed at the Ouseburn, at Coble Dene and at South Shields, both at the Mill Dam and also at the terminus of the S&TR. Nothing further had been done so far as the first two were concerned and at Mill Dam it was later claimed that Newcastle Corporation had "filled it up with ballast for fear of any improvement to Shields."[47] Somewhat different, however, was the S&TR dock where Harrison proposed to provide eight berths but owing to its estimated cost, some £25,000,and the opposition of two directors it was not built.[48] The Corporation regretted that this had occurred as the dock was to have provided the outlet not only for the S&TR, but also for the D J R , which the Corporation had promoted in conjunction with William Harrison, one of the most influential of the S&TR directors.[49]

The first of the railway companies to deal with the new Corporation were the N&CR and the Newcastle and North Shields (N&NSR). The former, under its 1835 Act,was empowered to extend its line to Redheugh and sought to erect staiths there, informing the Corporation that c 250,000 tons of coal p.a. could be expected;[50] the Corporation - as it did with the D J R - held shares in the railway company. The latter, the N&NSR, was in effect precluded from mineral traffic under the terms of its Act, the principal landowner, the Duke of Northumberland, having enforced way-leave imposts on coal carried in an effort to protect his own mining interests;[51] nevertheless, in 1836 the N&NSR sought riverside facilities at North Shields, a quay at the terminus of its branch to the river.[52] The engineer for these works was Robert Nicholson (1808-1855) and he was responsible, too,for the abortive Morpeth and North Shields railway which in 1837 sought staiths at North Shields.[53]

In 1837 a pamphlet written by John Richardson drew attention to

the need for docks in the Tyne. It advocated a series of them at North Shields with a railway at a higher elevation, so permitting the discharge of coal to the spouts. It was also suggested that a river wall be built from Jarrow to South Shields with two sets of dock gates provided so as to lead into Jarrow Slake, 350 acres in extent. Once this had been done, a dock could be formed on the land reclaimed. As traffic on the river increased so the need for docks became of greater importance as it was only by their provision that congestion in the lower reaches of the river would be ameliorated.[54] A year later a prospectus was issued for the Tyne Dock Company,[55] having as a member of its provisional committee the mayor of Newcastle; the engineer was to be Harrison with Cubitt as consultant. The prospectus noted that no better site for a dock existed in the river as the S&TR already carried 400,000 tons p.a. of coal to South Shields; it was expected that a branch line would soon bring a further similar quantity from Weardale. In addition, the DJR, which supported the construction of the dock, was almost complete[56] and the BJR, with the N&CR, would be well placed to transport a further 400,000 tons from the south and west of Newcastle, now shipped by keels. Surprisingly, the prospectus was totally uncritical of the river and played upon the fact that the benefits would accrue from simpler handling and the ability of ships to remain afloat. The docks, the site of which had been first proposed in 1835,[57] would have an area of 20 acres, would cost £200,000, and would achieve a profit of £25,000 p.a. assuming that 1m tons of coal were to be shipped. It was reported upon by Anderson who considered that it would be "of great advantage to the port and navigation of the Tyne"[58] especially if the requirements of the dock company and the B J.R could be concerted, the latter seeking drops at the same site; their construction would impede access to the dock. The Corporation duly gave consideration to investing in the Dock Company, the Finance Committee having suggested a sum of £1,000. An Act[59] for the dock's construction was duly obtained - the authorised



Dock as built outlined in blue

Proposals: 1837 orange
1838 yellow
1839 green
1845 green (reduced size)

Map 8: River Tyne; Jarrow (or Tyne) Dock, 1837-1859

capital was reduced to £120,000 and the works were to be completed within seven years - and in September 1839 tenders were sought for its construction. Work did not proceed due to financial difficulties then being experienced by the S&TR, many of whose shareholders had invested in the dock, and the BJR subsequently erected further spouts adjacent to the site proposed.

In 1844 the Corporation decided to sell its holding in the DJR, the shares of which had fallen in value to £93. In a report made the following year it was pointed out that the Corporation held £5,000 of the company's £80,000 capital and the line, unprofitable to operate, had been purchased by the Newcastle and Darlington Junction Railway (N&DJR) in 1843 for £88,500, virtually at the cost price,[60] and the comment was made in debate that the Corporation would have been better advised to have retained its investment in the N&DJR.[61] The Corporation had also been involved in the plans of Hudson to complete the main line between London and Edinburgh. A direct link between London and Gateshead was established in 1844 and in 1849 the High Level Bridge was completed; initially, the completion of the north/south railway proved of greater benefit to passengers than to the mineral traffic, economics dictating that the coastal sea trade remained predominant. As an adjunct to the railway mania of 1845 proposals were again made for docks on the river and plans having been made for enclosures at Jarrow, Low Lights and Coble Dene, the River Committee reported upon them. Jarrow had already been discussed in Council, the promoters of the Low Lights did not intend to seek Parliamentary powers immediately and it was, therefore, the Coble Dene dock - it had been first proposed in 1796 - which received most attention.[62] The new dock company was to have a share capital of £100,000 and had as its chairman, Hudson, with Robert Stephenson (1803-1859) and Nicholson engineers and amongst its directors were several directors of the region's railways.[63] The prospectus began with the comment that it "has long been a Matter of Surprise that the Port of Newcastle ... should have no Dock of any description for the

accommodation of Shipping"[64] and it was therefore planned to build a dock* of some 20 acres with rail connections and port facilities such as to enable a higher class of ship to trade in the Tyne and to provide an outlet from the collieries to the north, Seghill, Cramlington and Seaton Delaval, some without shipping points. The prospectus also noted that "the System which has hitherto prevailed of constructing the Railway, and Shipping Places, Staiths and Drops, by individual Enterprise and Capital, must give way to the greater facilities afforded by the proposed Dock..."[65] which, it was hoped, would immediately ship the 600,000 tons p.a. presently loaded at Whitehill Point, adjacent; the prospectus claimed that total shipments from the river amounted to 2.725m tons of coal but no forecast of profit from it was made. The River Committee, in general agreement, suggested that an additional entrance be provided at the docks west end and also that 270 ft of Whitehill Port be removed to meet Rennie's proposals. To this latter matter the dock company could not agree and the Corporation withdrew the requirement. No work ensued, due to the fact that Hudson found it impossible to proceed with forming a feeder network of railways to the dock; they remained in private hands.[66]

The Newcastle Corporation at this time discussed the advantages of rival lines seeking access to the Tyne via the valley of the river Team, the York and Newcastle Railway (Y&NR) and the Leeds and Thirsk Railway (L&TR), the latter-in the general enthusiasm for expansion at that time-seeking to extend its influence to Newcastle. The debate in Council became somewhat acrimonious with the opinion being voiced that Hartlepool would become the outlet for Yorkshire trade if Newcastle did not favour the L&TR. Lockey Harle expressed a lack of faith - Phillipson was described as his "paid agent"- while Brandling,[67] with Hudson already established and controlling the S&TR staiths, but not yet Jarrow dock,. thought that competition could do nothing but good. The Corporation decided, eventually and narrowly, to petition in favour of the L&TR, principally on the grounds that a railway monopoly would adversely affect the trade of the district;

*See Map 19

on the other hand, it was pointed out, if the High Level Bridge had not been built by Hudson, the town would have had to wait another century; his presence should be encouraged.

Independent of Hudson, a proposal was made in the depressed year of 1848 that a dock should be built on the north bank of the river, at Low Lights. Again a symptom of the enthusiasm for dock and railway projects at the time, a dock had been projected here by Brooks in 1845[68] when a wet dock some 2,500 ft in length with three spur quays had been planned, immediately down-river of Cliffords Fort, a feature being that its excavation would provide materials for the formation of a north pier, some 2,000 feet in length. Brooks claimed that he had been the first to have envisaged the construction of the pier but that credit for it had subsequently been taken from him.[69] The suggestion for a dock now came from the owners of the Cowpen, Blyth, Bedlington and Netherton steam coal collieries and they memorialised the Corporation to the effect that whereas their coals had previously been shipped "in the river of Blyth, at considerable cost and sacrifice"[70] they now sought a place of shipment on the Tyne where bigger and more economical ships could be used. The promoters sought "to erect a sheet pile dam or open dock"[71] and, with only some 5½ miles of railway to be built, the scheme should prove economical. In 1849 Brooks stated that the dock was to have had its entrance to the north of Cliffords Fort but he had, with the assent of James Simpson (1799-1869), presumably acting for the coal-owners, redesigned the dock to provide an entrance from the west.[72] Brooks also stated a preference for the Low Lights vis à vis Coble Dene dock - Hudson's Northumberland Dock - commenting that he had in 1848 produced plans for docks on both sides of the river.[73] The north dock was a redesigned version - it had a locked entrance - of the 1845 proposal and had, again, an area of 30 acres. Opposite to it he had planned a 38 acre dock which was to incorporate staiths for the S&TR but he noted, realistically, that it would not be

required should the Jarrow dock proceed.

In 1851, after the formation of the Tyne Improvement Commission, a dock, again at Low Lights, was proposed in conjunction with a railway from Cowpen, Bedlington and Netherton, so enabling steam coal to be shipped on the Tyne. The plans,[74] prepared by Joseph Locke (1805-1860), indicated that the dock was to be of seven acres and it was noted that 3¼ miles of railway would enable a connection to be made to the existing rail network, so permitting 300,000 tons p.a. to be shipped in the new dock. It would seem that this proposal was influenced by developments on the Wear:

> The great argument, we understand in favour of docks on the Tyne and one which has had considerable weight with the Projectors of the present undertaking, is the success which has attended the splendid docks at Sunderland. At that place it is said that many Parties although possessed of private shipping places on the Wear, and branch railways leading to them, have abandoned both, and now ship their coal exclusively in the Dock, owing to the superior facilities which are offered. 75

The promoters of the scheme claimed that "if dock accommodation was not forthwith provided, first-class ships would cease to frequent the river, and exclusively visit those ports on the East coast which were provided with such accommodation";[76] such facilities had earlier been provided at Seaham, Hartlepool and the Tees. Three years later the same site was again considered for a 30 acre enclosed dock with a seven acre tidal basin;[77] the same site had been suggested by Brooks in 1845. He had amended the design so that no part of the dock was within the line of fire from Cliffords Fort while the eastern sea wall would form both a line of defence and a shelter for the ships lying in the dock. The Blyth and Tyne Railway (B&TR) shareholders approved the scheme, noting that the lack of docks on the Tyne was resulting in ships seeking cargoes elsewhere.[78]

Perhaps contemporaneously, a further proposal for docks was promulgated seemingly independent of railways. It too was made by Brooks and was a scheme for three independent docks, of 52, 31 and 42 acres respectively,

situated on the coast between Tynemouth and Cullercoats, all with gates, and for the construction of a tidal harbour forming an extension of the old harbour of Cullercoats.[79] A feature of this complex was a cut from the south dock to the river, joining it immediately up-river from Cliffords Fort, its advantage, in Brooks's eyes, being the provision of an entrance to the river other than by the bar which would not be kept clear by the inadequate piers proposed by Walker.

Of the foregoing proposals, only the docks at Coble Dene and Jarrow* came to be built.

4.2.4 Other Matters.

The 1833 Enquiry into the affairs of the Newcastle Corporation revealed that not only was the method "of choosing this select body...very complicated; but it is, in effect, self elected".[80] The sums appropriated for use by the Corporation from the income it received for the river were variously given, one estimate maintaining that in eleven years, £217,000 had been shared amongst the members of "this close and self-elected body."[81] After reform, the Corporation continued to use much of the river's income on town improvements, especially on the construction of an extensive new quay in Newcastle. Originally designed by Dobson the drawings of it were sent to Cubitt for his approval and tenders were received in 1837, the lowest being that of £18,128 from William Brown.[82] On Cubitt's advice the design was changed from a piled structure to a solid masonry one, founded at 12 ft below low water, and a revised price of £19,120 was accepted for the 1,000 ft length; it was not until 1838 that work should begin.[83] In the construction of the quay the Corporation had originally sought facilities for ships of 16 ft draught at all times in an effort to attract the East India and China traders but this requirement, thought to be too costly with ten miles of the river to improve, was temporarily abandoned and the reduced depth adopted. The new quay was to extend from the Broad Chare to the Swirle with the possibility of an extension when circumstances so demanded.

* See Map 10

Although the new section of quay in Newcastle was to be built some 20 ft in front of the old one,[84] when Gateshead came to apply for a new quay, in conjunction with the B J R , the Corporation had no inhibitions in opposing the application on the grounds that the contraction of the river was unacceptable because of its 30 ft projection.[85] A report by Anderson, however, proved favourable to the Gateshead proposal whereupon the decision was reversed. Disputes in Newcastle Council had delayed the execution of the quay contract and Anderson again reported to it his revised proposals, namely that the quay should be in only ten feet of water as many of the ships using it would draw between nine and twelve feet; it would be cheaper to build on a solid base rather than to pile. In debate two views were expressed: first, that it was ill-advised to provide only 10ft of water when 12 ft would cost only £2,000 more; second, why provide as much as ten when the channel depth in places was only half that figure? Realism prevailed, the greater depth was initially adopted - it was later reduced - work began, the contractor was soon in financial difficulties and the Council sanctioned a masonry quay built on piles which, due to the fact that a cofferdam would not be needed, would be cheaper.[86] At the same time the length of the masonry quay was reduced from 1,000 to 400 ft. The official opening by the mayor took place on 25 August 1840, the directors of the several railway companies having been especially invited; almost two acres of land had been reclaimed.

In 1844 the Corporation, prompted by its Trade Committee, sought a railway to the quayside, estimating that some 20,000 tons of goods were normally transferred from river to rail, and plans for it were prepared by Nicholson. Later, William George Armstrong (1810-1900), as part of his scheme for providing hydraulic cranes on the quay, stressed the need for a link with the York Newcastle and Berwick Railway (YN&BR). In 1849 the railway company sought to reverse its 1845 decision to build its line but the Corporation petitioned against the company's Bill then in Parliament:[87]

the petition was unssuccessful and it was not until 1870 that the link to the Quayside was formed.

* * * * *

In 1854, 3.696m tons of coal were shipped from the river Tyne, some 1m tons from the Hay Hole staiths and ¾m tons from above bridge, slightly more from the north bank than the south. Since 1830 the coastal coal traffic had risen only from 2.168 to 2.185m tons but the increase in overseas trade had been dramatic; from 197,000 tons it had risen to 1.511m tons. In the same period the number of sailings had increased from c 14,000 to c 20,000 with, at the earlier date 89% of them being coast-wise and at the later 59%. To ship the growing tonnage of coal new railways had been built - the Corporation had invested in those which were potentially of the greatest benefit to it - and the several companies had successsively amalgamated in an effort to reduce both competition and costs. With the colliery companies they had built staiths at their own expense whereas, except for relatively minor items of work, the river's conservators had done little to improve the Tyne.

Municipal reform had brought some changes to the Corporation's attitude towards the river and whereas between 1815 and 1835 the average sum spent on it had been £2,381 p.a., after 1835 it had risen to £4,125 p.a., although it would seem that these figures were for maintenance only. After 1835 river improvements were undertaken in an effort to maintain navigation, still limited to ships of c 400 tons, and figures presented to the 1850 Inquiry indicate that, over the 12-year period beginning in 1835, £53,336 had been so spent.[88] At the same time it was stated that in the years prior to 1835 the river's improvement had cost only £2,943 in total.[89] The statement of the Corporation is not perhaps to be fully trusted in relation to its capital spending as it may have been inflated in defence of its conservatorship. Whether the figures are accurate or not is immaterial. Newcastle had abused its powers relating to the river and the allegation that between 1815 and 1850 it had misappropriated, or at best not used

to the river's advantage, some £500,000 was never challenged.

The attitude of the Corporation towards the Tyne was somewhat ambivalent. On the one hand it looked to it as a source of revenue by virtue of its coal exporting capabilities, at the same time seeing it simply as a canal leading to Newcastle where the river's principal quay was located, and on the other the Corporation was unwilling to undertake any improvement work, to the extent of denying itself adequate water depth at the Newcastle quay; to have made provision at the quay would have involved the Corporation in unacceptable expense in relation to the river's channel.

Superimposed upon the river's principal function as a main artery for the shipment of coal was the industry which, during this period, became more significant. By 1854 industrial developments were considerable, principally chemical manufacture, engineering and ship-building. None of them was new; ship-building in wood was of long standing, the engineering industry dated from the early years of the century and the chemical trade since the late 18th century.

What took place between 1830 and 1854 was a rapid expansion in each industry. From its effective beginning at Walker the manufacture of alkali, the Tyne's principal manufactured chemical, increased and the south bank of the Tyne from Gateshead to Jarrow witnessed the establishment of major manufacturing works, all dependent upon the river, especially for the importation of raw materials, normally brought into the Tyne as ballast. Similarly, the engineering industry expanded too. From the early works of Crowley it had seen, by 1800, the formation of the concerns of Abbot and of Hawks Crawshay and by 1854 the factories of Hawthorn, Stephenson and Armstrong had been established. Their founding had been due to the inception of steam power in the case of the first two - Hawthorns were concerned initially in the manufacturing of stationary and marine engines while Stephensons specialised in locomotives - and the rediscovery of the concept of hydraulic power in the case of Armstrong.

Shipbuilding on the Tyne was of long standing but the introduction of steam motive power and the change to iron hulls initiated a great expansion in this industry. Although ships which traded from the river reached, in general, some 400 tons, those built on the Tyne were of a greater size, Smiths at St. Peter's having built Indiamen at their up-river yard. By 1840 an iron ship of 800 tons was first seen in the river and the same year the Archimedes, the first screw steamer, made an appearance; in 1846 a ship of 1,300 tons was launched and in 1848 one of 1,500 tons.[90] It was, however, the John Bowes, a ship of 600 tons built by Charles Mark Palmer (1822-1907) in 1852, which was to have the greatest influence on the coal trade of the Tyne, and indeed of the North East. The ship was an iron-hulled steam-powered screw collier and although these principles had all been adopted by Brunel for his Great Britain of 1843[91], a much bigger ship, the combination of them in collier construction led to a ship of such speed, capacity and reliability that sailing colliers were rendered uneconomic, if not obsolete. It was to accommodate such ships that rendered so vital the river's improvement.

4.3 River Wear

In 1830 the shipments of coal from the river Wear totalled 1.387m tons, of which c 7% was exported. This tonnage was carried in some 7,000 ships, the average cargo less than the comparable figure for the Tyne. Despite rising shipments the river Wear was under threat. Five years earlier the S&DR had begun the shipment of coal from the Tees, in 1828 an Act of Parliament had been obtained for the construction of the Clarence Railway and in 1829 the Marquis of Londonderry had begun the construction of his private port of Seaham Harbour, together with the railway leading coal to it. All projects were likely to compete with the Wear for the shipment of coal from the expanding Durham coalfield.

It was against this background that the River Wear Commission (RWC) decided to ask Sir John Rennie to report upon the harbour as an entity.

He recommended that the north pier be extended, parallel to the south, and also advocated that deeper foundations, as already provided by Milton, be adopted to obviate the undermining of the piers by the scouring effect which would result from lengthening them.[1] Nevertheless, the greatest shortcoming was the lack of docks, necessary because of the river's limited area and the numbers of ships using it. With an average width of only 350 ft and an area of some 80 acres it was noted that into the river had "been crowded, besides coal keels and steam-tugs, between 600 and 700 vessels, many of them coal laden."[2] In spite of having earlier decided that the construction of docks should be by bodies other than the RWC, nevertheless in 1831 a committee was formed under the chairmanship of Cuthbert Sharp to reconsider this matter and within two months, after discussion with shipowners and merchants, it was resolved that "the increasing trade and commerce...require more accommodation than the river can afford (leading to the necessity)... of having docks to communicate with the River so as to increase and facilitate"[3] its growing business.

The reversal of the RWC policy had perhaps been influenced by a prospectus issued by John Hartforth in January 1831 which sought to promote the construction of a dock to the south of the pier. It foresaw that without one, trade could not increase although "the undertaking, indeed, is a gigantic one for an individual; but for a body of public spirited men it will be light and easy (and)...when completed, will cause Sunderland to rise in commercial adventure and prosperity in a greater yearly proportion than has ever yet been witnessed".[4] That docks were a requisite for the Wear was confirmed in September 1831 when a notice pointed out that powers for a railway between Tyne and Wear - it was supported by Newcastle Corporation - were about to be sought, "so that even the produce of the Monkwearmouth colliery which is now forming within a stonesthrow of your Bridge and your River may actually be shipped in the Tyne."[5] Under the pressure of competition from other ports, the actual location of docks

on the Wear became a matter of controversy, Miller, in a detailed study, noting that opposition to the south dock proposal had become evident at least from October 1831[6] when Sir Hedworth Williamson (1779-1861), the owner of most of the north bank of the lower river, received a report from Brunel regarding a dock at the base of the north pier with a railway from it, crossing the river in the vicinity of the Hetton staiths. Brunel's dock was to have its principal entrance adjacent to the pier and a lock at its upstream end connecting to a tidal basin;[7] the bridge crossing the Wear would seem to have been, somewhat innovatively, of a two deck suspension form of construction.[8] Construction would necessitate the removal of part of the north pier.

At this time also the RWC received drawings from Francis Giles showing his proposals for a dock on the south shore, providing accommodation for 300-400 ships.[9] The promoters had received estimates from Giles of £150,000 and looked to receipts of some £15,000 from dues levied by the RWC for that purpose; the capital sum would be borrowed "on security of the proposed rates by Commissioners to be named in the Act"[10] and the RWC had themselves agreed than an imposition of 2d per ch. should be made on coal, a figure agreed with all exporters other than the Hetton colliery,[11] which already having shipment facilities in the river considered any dock to be irrelevant to its needs. Proposals for both north and south schemes were submitted to Parliament and the merits of the opposing designs vigorously publicised by their respective proponents.

The advantages of a south dock were stated as being that the site was publicly owned, some 80% of the river's coal originated there and approximately 75% of the Wear's shipping was owned by Sunderland, the principal centre of population. The principal advantage of the north dock, as seen by its supporters, was that it was the site favoured by Rennie,[12] his view being that it was better placed for ships putting to sea and that its construction costs would be much less than on the south bank,

mainly on account of less expensive excavation operations; conversely, the sea wall of the South Dock would be too exposed and ships entering the river would be endangered. Consideration of dock facilities became entwined with a proposal to build a railway between Monkwearmouth and South Shields, now considered as the possible terminus of the N&CR; the two railways would have the effect of stimulating the growth of South Shields at the expense of the Wear. The opponents of the railway held that its main object was to detach "the coal trade from the port of Sunderland"[13] and it was to counteract this possibility that Williamson promoted the dock and opposed the railway, a view confirmed by a pamphlet comparing north and south proposals which commented that "the North Dock may be desirable to prevent (Wear coal) being carried to the Tyne."[14]

In the 1832 Parliamentary Session, Bills were introduced for the three schemes noted above, the South Shields to Monkwearmouth railway, the south dock and the north dock; none passed through Parliament. The railway Bill was defeated, principally by the several landowners, headed by Bryan Abbs, whose property would be affected.[15] Abbs had been instrumental in promoting the north dock, later involving Williamson, and his firm later became solictors to the north dock company. The RWC had given no views on the railway, only expressing concern regarding those clauses seen as likely to affect its authority."[16] The Bill for the south dock was defeated in committee, opposition to it having been made by Sir William Russell and Williamson, both M.P.'s for the county. Mismanagement was also a factor, the Bill having been altered four times, and Giles was criticised for having misjudged the quality of stone to be excavated, assuming that it would be suitable for building.[17] The south dock Bill was also opposed by the Hetton Coal Company, which had recently improved its river staiths,[18] although it was supported by the Newcastle Member, John Hodgson, in preference to the north which was likely to affect the Tyne to a greater extent.

In July 1832 Parliament heard evidence regarding the proposal to build the north dock. Several witnesses advocated such provision, principally on account of the volume of shipping using the river and its inadequate state; the depth of water on the bar was 15 ft maximum, some 300-400 ships could leave the river together, 100 per tide, and the river's depth was, in places, inadequate, forcing shipping to lie aground; ships could only moor five or six abreast. Fears were also expressed concerning the loss of trade to other rivers. Most ships using the river were of c 200 tons but, although vessels of 350 tons could berth in the Wear, they could not be fully loaded or unloaded there due to lack of water at the loading berths forcing the ships to ground; they must use the Tyne. Engineering evidence was presented by Brunel who, admitting that he had no dock experience, stated that he had been in communication with Chapman. The dock which he proposed was to be 12 acres in extent - he had proposed plans for 26, 18 and 12 acre docks - would hold c 150 ships, give a depth to 21 ft and would cost £66,000, of which £21,000 was for excavation. The suspension bridge and its connecting railway would cost £27,000 and Brunel, in spite of the problems recently experienced with the S&DR's suspension bridge at Middlebrough, foresaw no problems in transporting 3m tons p.a. across the Wear. In spite of his advocacy the Bill was rejected, much to the satisfaction of the south dock promoters who, after rejection of their own Bill, had fought a rear-guard action to thwart developments on the north bank and had pressed the RWC to "consider the early Constructiion of Wet Docks on the South Side of the River as essential to the future Prosperity of the Port."[19] Opposition to the north dock Bill had come from both Hodgson and from the Marquis of Londonderry; he and the Newcastle Corporation had been described as the "sworn foes of Sunderland"[20] but in fact Londonderry, far from being so, had pledged himself to support a south dock. From press comments it would seem that the north dock promoters had initiated it partly on the basis of its being

for asylum purposes, a concept expressed in Committee, but its opponents noted, rightly, that if the bridge were to be built the dock would soon need to serve "the whole trade of the Port; for, be it remembered, no shipowner will even think of loading or unloading his ship in the river, after a place is made for his accommodation..."[21]

In March 1832 John Murray was appointed engineer to the RWC in succession to Milton and within six months, following the rejection of both dock schemes, he produced a report suggesting that the river itself be converted into a wet dock, a concept earlier proposed by Stevenson; Murray's scheme was much restricted in scale in that, whereas the earlier floating harbour was to be virtually bisected by the bridge, the later scheme was to be entirely down-river of it and the dock would be by-passed by a channel rather than by Stevenson's tunnel. The total area to be enclosed would be 24 acres, including two tide basins - two acres downstream and three acres upstream - with a lock separating basin from dock. Murray envisaged the dock as coal-handling and planned the colliery railways to pass between the barracks and fort and thence to the quays. He also suggested that the harbour would be improved by the new straight channel increasing the river's velocity and hence its scouring power; dredging would not need to be so extensive. The total cost of the works would be £200,000.[22]

At the request of the commissioners, a report was submitted by James Walker regarding docks on both north and south banks. He suggested that they be initially of six and eight acres respectively but that land be purchased and provision made for their extension to 13 and 20 acres; the entrances and half-tide basins would serve both sizes of dock, the locks of which would be 32 ft wide and the entrances 50 ft. Walker recommended docks on each side of the river so as to facilitate egress from the river with varying winds and realistically he noted that if the town indulged

> in bickering as to the advantages and disadvantages of the north and south sides and the exact manner in which shipping or property is to be rated, while your enterprising neighbours at Seaham and Hartlepool are in full activity...(then) it

requires no power of divination to foresee the consequences. (He concluded by commenting that the poor state of the river and the lack of docks contributed) a serious drawback on the local advantages of the port in reference to the coal fields...yet.. Sunderland has become one of the principal sea ports in the Kingdom, because there was no port or communication with a port from which the same coal could so conveniently be shipped. But is this state of things likely to continue if Sunderland be not improved? Seaham, Hartlepool, the railways of the Tees and those projected to Shields on the one side and to Hartlepool on the other, answer the question; and if the answer does not create a spurt of activity as well as unanimity among those concerned in the trade of the Wear, they must view their interest very differently from what I do. 23

Walker estimated that his docks would initially cost £185,000 and a further £164,000 would be needed to extend them; it would take £332,000 to build the larger size immediately. George Rennie (1791-1866), in general approving of Walker's scheme, disagreed with his estimates without publishing his own.[24]

The RWC decided to seek Parliamentary powers but the proposal was soon dropped, largely on account of an injunction obtained by the Hetton Coal Company and others, concerned that the RWC, not legally empowered to do so, should use its funds for dock purposes. As this move was probably supported by the Monkwearmouth and Lambton colliery interests it is understandable that the RWC should have retracted, especially as it could not expect unanimous support from its members. So the south dock scheme foundered in spite of a somewhat desultory move by a group of shipowners to form a joint-stock company.[25] Opposition to the south dock proposal had not come from Londonderry although he had been urged to oppose it by the Hetton Coal Company, the latter suggesting that they would both be affected "in consequence of the large outlay of capital at Seaham Harbour which has relieved Sunderland from so great a redundancy of shipping and which obviates the necessity of a dock or docks at all."[26] It was also suggested that the North Docks promoters did not intend openly to oppose the Bill as they felt that the traders were not taxed unduly. Londonderry responded by informing Buddle that he wished to remain aloof from the dispute, considering that the traders

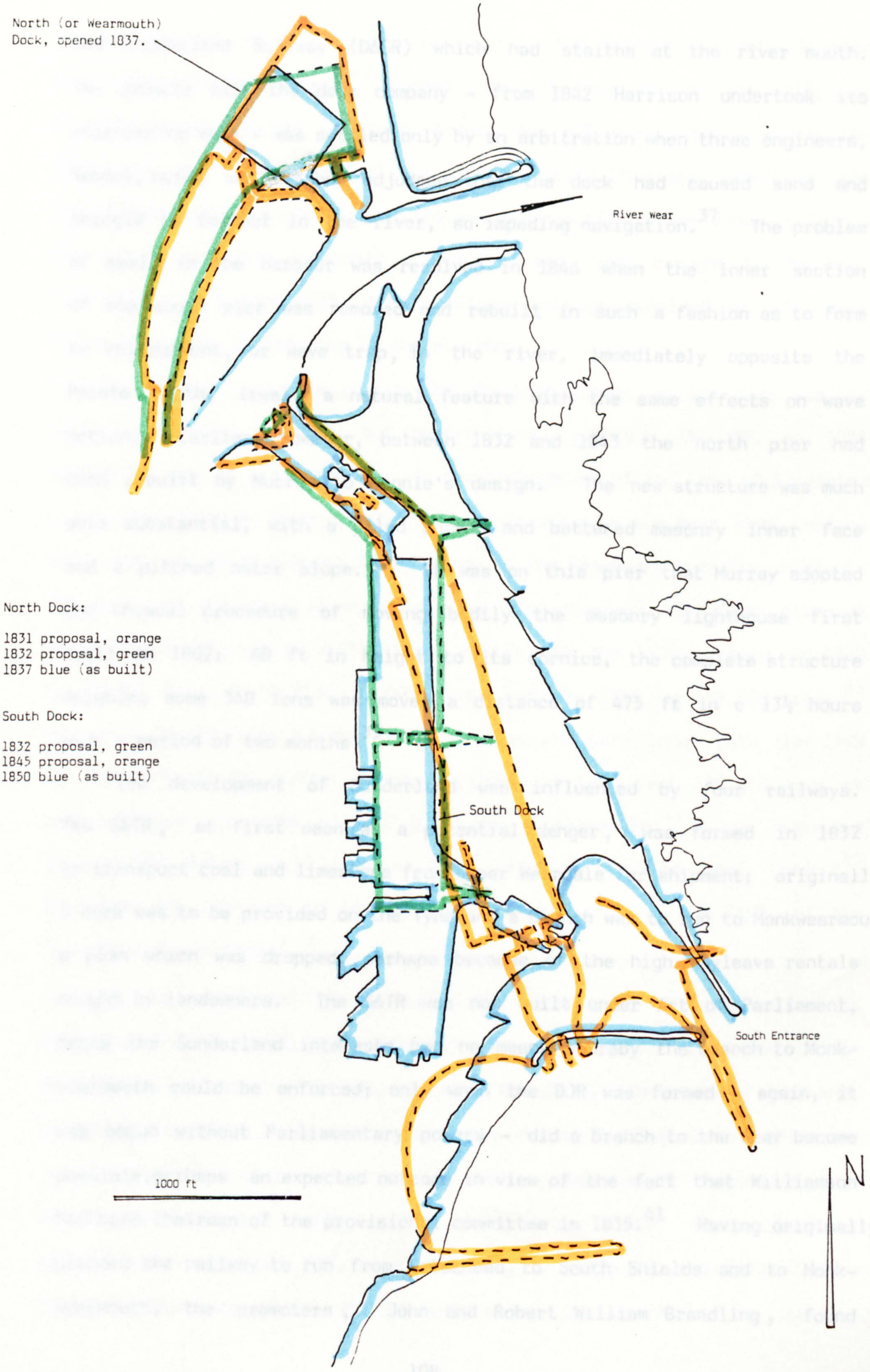
should be taxed, rather than the coal-owners. As he hoped to ship the major part of his coal from Seaham, he therefore thought that it "behoves Lord Durham and the Hetton Company to look to (the river duty) unless they are speculating on Hartlepool which, by the by, the Dock Bill may much impede."[27] It is perhaps ironic that the South Dock was opposed by, amongst others, the coal-owners whose royalties lay to the south of the river.

In 1833 two proposals were made for a north dock, the first envisaging the construction of a 14 acre enclosure, capable of holding 200 ships, with an upstream entrance and a down-stream exit - the plan produced by Brunel - and capable of shipping both coal and general goods; it would give a depth of water two feet greater than was then available and would cost £70,000. The prospectus noted that the river was now crowded, that berths for loaded ships were insufficient, that the S&TR was proposing to bring coal from the southern parts of Durham to the north bank of the Wear via the BJR and that the new Monkwearmouth colliery was being opened up within a mile of the dock. The immediate revenue was estimated at £9,000 p.a. but "the prospect that it ultimately affords, is incalculable."[28] The second prospectus was for a dock of nine acres but with provision for its future enlargement. For its building £30,000 capital would be required and the dock was expected to generate a revenue of £4,500 p.a.; a contract with the landowner was already arranged.[29] In April 1834 a Deed of Covenant was completed listing the directors, among them Williamson, and in July 1834 a Royal Charter was obtained and the Wearmouth Dock Company established. The dock was constructed with a water area of six acres and a tidal basin of 1½ acres,[30] Williamson, with his brother, raising the initial £60,000. It was opened in November 1837 and had reputedly cost £120,000,[31] perhaps because of problems encountered during construction, among them a collapsed wall;[32] it was was built without the railway and bridge which had formed a vital element

in the original scheme, the result of opposition which considered that Sunderland was likely to lose trade to the Tyne should it be built. The RWC made it a condition that all drawings were to be approved by Rennie and in 1835, in accordance with his recommendations, the RWC agreed to a wider entrance being provided.[33] The cutting through of the north pier became necessary to form it and the dock company was instructed to rebuild in accordance with Rennie's specification; it was not allowed to provide for sluicing the dock, presumably as this operation would be likely to cause silting at the river's mouth.[34]

As the forming of the north dock began, yet another proposal was made, in pamphlet form, by William Bell. After referring to earlier suggestions he put forward, again, a scheme for docks to both north and south of the river, of 20 and 35 acres respectively, with a diagonal loading berth in each to increase jetty length with respect to dock area., then in the North-East a novel concept. Bell considered the Tyne, especially through the S&TR, and Hartlepool to be the Wear's competitors and prophesied that Hartlepool would founder if Sunderland built adequate docks. Seaham was thought to be inconsiderable and would collapse if Sunderland did.[35]

In the years leading up to the next bout of dock activity the RWC was involved in two principal, inter-connected, activities, namely the maintenance of the river and negotiations with the railway companies which served it. The principal traffic in the river was confined to the lower two miles, to the Hetton and Durham staiths, and in the ten years following 1834 extensive dredging and the removal of rock from the river's bed was undertaken, the latter involving the use of diving bell and caisson; from 100,000 to 150,000 tons of material was removed annually.[36] Problems were encountered at the mouth of the river regarding the swell experienced at certain times, complaints being received from both the Wearmouth Dock Company and the Durham and



Map 9: River Wear Docks, 1830-1850

and Sunderland Railway (D&SR) which had staiths at the river mouth. The dispute with the dock company - from 1842 Harrison undertook its engineering work - was settled only by an arbitration when three engineers, Rendel, Mylne and Leather adjudged that the dock had caused sand and shingle to collect in the river, so impeding navigation.[37] The problem of swell in the harbour was resolved in 1846 when the inner section of the south pier was removed and rebuilt in such a fashion as to form an enlargement, or wave trap, in the river, immediately opposite the Potato Garth, itself a natural feature with the same effects on wave action. Earlier, however, between 1832 and 1843 the north pier had been rebuilt by Murray to Rennie's design. The new structure was much more substantial, with a piled curved and battered masonry inner face and a pitched outer slope.[38] It was on this pier that Murray adopted the unusual procedure of moving bodily the masonry lighthouse first built in 1802; 60 ft in height to its cornice, the complete structure weighing some 340 tons was moved a distance of 475 ft in c 13½ hours over a period of two months.[39]

The development of Sunderland was influenced by four railways. The S&TR, at first seen as a potential danger, was formed in 1832 to transport coal and limestone from upper Weardale for shipment; originally a dock was to be provided on the Tyne and a branch was to run to Monkwearmouth,[40] a plan which was dropped, perhaps because of the high wayleave rentals sought by landowners. The S&TR was not built under Act of Parliament, hence the Sunderland interests had no means whereby the branch to Monk-wearmouth could be enforced; only when the BJR was formed - again, it was begun without Parliamentary powers - did a branch to the Wear become possible,perhaps an expected outcome in view of the fact that Williamson had been chairman of the provisional committee in 1835.[41] Having originally planned the railway to run from Gateshead to South Shields and to Monk-wearmouth, the promoters, John and Robert William Brandling, found

the eastern end of their line paralleled by the Gateshead, South Shields and Monkwearmouth Railway,[42] formed under the auspices of the S&TR, but in 1835 an arrangement was made whereby the BJR built its line to the Wear and used the tracks of the S&TR to South Shields; begun in 1836 the railway was constructed under the supervision of Nicholas Wood, criticised for his conflicting interests, and coal was first brought to the Wear-mouth Dock in August 1839, a self-acting incline provided by the dock company carrying the waggons to the staiths.

The railway seen as posing the greatest threat to the Wear was the DJR. The threat was real but nevertheless, although the RWC in 1834 petitioned against its formation at the instigation of the town of Sunderland, it was presumably by means of its Victoria bridge over the Wear that London-derry coal was later brought from Penshaw to the Wearmouth Dock for shipment. The dock had not been as successful as its promoters had hoped although in 1839 it shipped c 40,000 tons, mainly via the S&TR, rising in 1842 to 58,000 tons, in 1843 to 83,000 tons and in 1845 to 95,000 tons.[43] In 1843, 76,000 tons of the coal exported was carried by both the S&TR and the BJR and the latter company shipped in that year 110,000 tons at South Shields compared with 81,000 tons at Wearmouth,[44] later described by Sir John Rennie as " inconveniently situated for the coal trade."[45] The dock was improved in 1847 by the installation, by the Y&NR, of two "cast iron lever drops".[46]

On the south bank of the river the first major development was the formation in 1834 of the D&SR, some 13 miles in length. Its construction began on a wayleave basis but, as with the S&TR, costs proved high and, in spite of problems in raising capital, an Act of Parliament was obtained. It ran from the coal mining area of Hetton and Haswell northwards, via Ryhope, to Sunderland ending at the river where drops, the subject of some dispute with the RWC, were provided.[47] With William Bell, Edward Backhouse and some of the RWC members among its directors the railway

was completed in July 1836 and brought into full use in October: a feature of it was that all haulage was by stationary engine.[48] In the company's early life negotiations took place with the Hetton Coal Company, amenable to disposing of its railway. It was suggested that the D&SR purchase this line, with staiths, and abandon its own proposals but the matter was later dropped.

In spite of the construction of the north dock and the two railways feeding into Sunderland, the shipment of coal in 1845 was almost identical with the figure for 1830, 1.39m tons p.a.,principally due to the rapid increases which had occurred on the Tees, at Hartlepool and at Seaham, all depriving the Wear of trade and all now equal at 600,000 tons p.a.; should their rates of increase continue Sunderland, it was thought, would soon be eclipsed. In these circumstances Murray in 1842 submitted a report to the RWC outlining his plan "for connecting the whole of Sunderland Harbour into a floating Dock."[49] He noted the improvements made to the river in the past 30 years as having enabled the size of the largest ships to increase from 250 tons to 350 tons, the latter drawing 14 ft of water; in spite of improvement the river had a low-water depth of only four feet. He noted also that railways had come into general use, the use of keels had almost been eliminated and the RWC, with the Durham and Hetton interests, had recently expended some £13,200 in widening the river above Rectors Gill. Murray had little to say about the north dock and considered that south docks would prove expensive, both from a construction aspect and due to the coal companies being forced to re-locate their staiths.

Instead of building docks Murray again propounded his view - it differed in certain aspects - that the river should be converted into a single floating harbour of 100 acres, the key to his plan being the construction of a barrier, with two 80 ft wide gates included, at Thornhill's Quay. Where this plan differed from his earlier proposals and from Stevenson's was that now he did not seek to form a new channel as

> it would be very expensive to make any cut for the passage of the waters of the river, in the event of converting the present channel into a dock, either according to the plan of Mr. Stevenson of Edinburgh, or that of my own in 1832, where the cut proposed by me, though much shorter than the other, and not through such high ground, is yet covered with streets and buildings. A better acquaintance with the locality than I had in 1832, causes me to form an opinion that some other plan must be adopted than the formation of any cut through the town of Monkwearmouth. 50

The river itself should be the dock, at least seven feet additional depth being provided by the barrage. Murray did not intend to build locks but planned to form a tidal basin to facilitate traffic movements. The works were expected to cost £60,000, compared with the £200,000 of his earlier proposal, and they were duly approved by the commissioners.

The resultant local opposition to Murray's plans was based on fears as to the river's scouring powers being diminished, that traffic problems would result from the limited access and that costs would be prohibitive, in fact as high as the earlier £200,000.[51] Opposition came from the local newspapers but some, especially as to cost, emanated from Walker, called upon to report as Admiralty engineer in spite of the fact that the RWC did not wish him to do so.

> Through want of capital, and still more, I believe, through want of unanimity among the local interests, combined it was stated with political feelings, (no schemes) with the exception of the Monkwearmouth Dock have been executed...It is ingenious and for a river or harbour of less magnitude, less trade and less exposed to land floods and to ice, might be applicable, but for the river Wear at Sunderland I think the difficulties and dangers have not been sufficiently estimated, and that when fairly viewed they are such as to render the experiment - for such it may be called - inadvisable and dangerous.52

On behalf of the RWC and perhaps to counter Walker's criticism, both William Chadwell Mylne (1781-1863) and James Meadows Rendel (1799-1856), reported upon Murray's dock, the former attempting to allay fears regarding "a scheme upon so large a scale, which has never before been executed in this country, although works corresponding in their object... are in perfect operation on the Continent, under far less favourable circumstances."[53] Murray's project, or something similar, was essential if the Wear were

to compete with other ports. Rendel, in his report,[54] referred to the comments made by Walker and, to counter some of the scheme's shortcomings - in Walker's view - proposed amendments, namely that the harbour be enlarged to twice the existing area, reforming the south pier and excavating in the Potato Garth; the 'float' should be extended downstream to the Wearmouth Dock; and the dam retaining the river in the floating harbour should be relocated downstream. Although the commissioners had earlier agreed to back Murray's proposals with Parliamentary powers their decision was reversed in May 1843, presumably due to Walker's strictures and Rendel's doubts.

In 1845 George Hudson was elected as M.P. for Sunderland in the hope that he would revive the fortunes of both the north dock, not the success which had been hoped for, partly because of its poor access[55], and the D&SR, never profitable due to difficulties in working. He achieved both objectives in the same year, purchasing the former for £85,000 - it had never paid a dividend and had supposedly cost £120,000 - and finalising an agreement with the latter, transferring it to the Newcastle and Darlington Junction Railway (N&DJR), on behalf of which company he also subscribed £75,000 in the newly formed Sunderland Dock Company (SDC).[56] The promoters of the dock company sought capital of £225,000 for a 33 acre dock with a capacity of 350 ships, an important element in the project being a south outlet opening directly to the sea. As had been the case elsewhere in the region the dock was promoted on its utility as a coal dock and, with the South Wear collieries already shipping 1.5m tons, the total "will be very greatly augmented on the formation of a dock, by collieries now existing and afterwards to be opened out, the owners of which will doubtless avail themselves of such improved accommodation"[57] giving a depth of water at the dock's entrance greater than at any other North-East port. Resulting from the involvement of the N&DJR, two of its directors - one of them was Wood - were included in the provisional committee, as were several commissioners;

the engineers were Robert Stephenson and Murray, who had recently resigned from his full time post as engineer to the RWC. He was, however, retained as consultant and Thomas Meik (1812-1896) was appointed in his place.

When the SDC made application for its Act in 1846 the RWC made no objection but as the Bill passed through Parliament, some disquiet was expressed there on account of the protection given to the RWC due to the docks having been designated as part of the river; substitute clauses were drafted and agreed. What concerned the RWC more was the proposed Tidal Harbours Bill which would reduce the powers of the RWC as coal owners and shipowners would be excluded from it. The RWC petitioned against this Bill on account of its longstanding jurisdiction; the scale of revenue, now £12-£16,000 p.a.; its history of continuous improvements; and the dock now authorised. If passed, the Act would vest control of the river in London and destroy the power of the local authorities and whereas these bodies may have been neglectful at other ports, they certainly had not neglected the Wear.[58] Other ports were canvassed as to their views but in the event the Bill was dropped.

The commissioners had taken great exception to the report on the harbour made by the Tidal Harbours Commission in 1846. The Tyne had been the subject of a very severe indictment but the RWC, correctly considering that it had improved the Wear to a much greater extent than had Newcastle the Tyne, felt agrieved at the conclusions:

> Sunderland is indebted less to nature and more to art than the neighbouring port of Newcastle; here extensive stone piers project into the sea, by the aid of which several feet of water over the bar have been obtained, and the enterprise of the coal-owner and ship-builder, and the skill of the engineer, have been rewarded by a revenue of 16,000L a-year, derived from an extensive home-trade in coals, and a rapidly increasing foreign traffic. This port, however, is capable of much improvement; the quays are private property, and much out of order; the moorings were so indifferent, that owing to the pressure of the ice, in the winter of 1841, the whole of the shipping in the harbour broke adrift, and the damage done was estimated at 30,000L; the foundation of a part of the south pier is so insecure that the scouring of the sea has undermined its foot; the entrance of the north docks is far from being well placed;. so heavy a swell ranges along

> the piers, and into the harbour, that the engineer has been obliged to take down a large portion of the middle of the south pier in order to make a beaching place for the swell to expend itself upon; and a general complaint is made of the want of dock accommodation, affording an easy outlet to the southward in north-easterly winds. 59

In reply to this statement the RWC noted that vast improvements had been undertaken from 1717 to such effect that ships carrying up to 350 tons and drawing 14 ft of water could now use the port and they hoped that their defence would "vindicate them from all charges of mismanagement of the funds entrusted to their charge, having by their exertions raised Sunderland from a small Fishing and Coal port to the rank of the fourth as respects the aggregate amount of tonnage of its ships, and it is decidedly now the principal Port for shipbuilding in the Kingdom."[60] The commissioners could only assume that as Murray had been absent from Sunderland, the inspectors had not appraised themselves sufficiently of the port's advantages and virtues. Having received approval from Rendel, who had recommended the inclusion of a half-tide basin and the temporary abandonment of the South Outlet, the SDC began construction work in July 1847 and within two years a 20 acre dock had been constructed, together with a 2½ acre half-tide basin and a 2½ acre tidal basin; expenditure had totalled £182,000.[61] Initial work had not included the south outlet and in 1850, with the dock virtually complete, Murray produced an estimate for a further £60,000 for its construction. By this time expenditure totalled c £220,000 and, in a move which would generate immediate revenue, the SDC agreed with the YN&BR that the coal drops of the former D&SR be re-located in the new dock.[62] In order to obtain further facilities for bringing coal to the dock the SDC viewed with great expectation the proposals of the YN&BR to build a line from Penshaw, along the river's south bank, and its scheme to extend westwards by means of its Bishop Auckland branch; with these branches - they were completed in 1852 and 1856 respectively - the dock's prospects appeared good.

The construction of the dock, completed in 1850, had reclaimed, by

means of groynes, some 20 acres from the sea and the sill of the entrance was two feet lower than the river's bar which depth "could not be increased without a large expense in prolonging the piers into the deep water of the bar."[63] The means for shipping coal was discussed by Wood, Murray and Harrison, and they agreed to provide 13 drops, additional to those of the D&SR.[64] The question of shipping coal in the south dock was also discussed with the Londonderry interests in 1850, exports from Seaham having reached what was to prove a peak by this time, some 700,000 tons p.a., no doubt due to the inability of the port to increase throughput without a large expenditure.[65] It was, perhaps, with the knowledge that Londonderry coal would reach the dock - a junction between the Seaham Railway and the D&SR was made in 1852 to permit this to take place - that the decision was made in August 1850 to extend the dock southwards and to form the south outlet, part of the work deferred until trade had developed.[66] Admiralty approval was obtained, the port was reported upon by James Leslie (1801-1889), work began in mid 1851 and was substantially completed by the beginning of 1856.[67] The extension had added 13 acres to the dock, enlarging it to 32 acres and the new outlet, with conduits for scouring incorporated, provided much deeper water for loaded ships passing to sea, "a superiority of depth over the bar...of at least six feet;"[68] the forming of the extension had reclaimed a further 40 acres of land from the sea and, as a whole, the dock served to protect the town from erosion, in 1832 stated by George Rennie as being "at least 100 ft over a period of 13 years."[69]

In its first year of operation, the dock's revenue totalled c £9,700 and 374,000 tons of coal were exported through the drops located on its west side where advantage was taken of the natural high ground and where Murray, in a move to obtain additional berthage in the dock, adopted gearing at right angles to the quay, an adaptation of Bell's earlier diagonal quay.[70] In 1851 the SDC formed a committee to promote the advantage

of the dock to both the YN&BR. and to the Leeds Northern Railway and Hudson took it upon himself to meet the Earl of Durham and the owners of the Hetton Coal Company to persuade them to ship at the dock,[71] it was also resolved to publicise to all relevant coalowners the opening of the Penshaw branch railway. These moves proved successful: an agreement was made with the Hetton company and Londonderry in 1854, following the completion of his Londonderry Railway, sought to transport up to 450,000 tons p.a. to the dock. Immediately the dock opened it began to ship all the coal of the YN&BR, initially thought to be c 357,000 tons, and with capacity of c 1m tons at its 15 drops felt well able to meet any challenge. In 1854, 633,000 tons of coal were exported in 3,389 ships but, nevertheless, the directors were somewhat disappointed by the coal revenue, £22,600, which, due to the still incomplete south outlet, had not risen so quickly as had been hoped. Some 20 collieries were now using the dock and the rail dues had been "so regulated as to place (Sunderland) on the same footing as Newcastle, Hartlepool and other ports on the East Coast;"[72] the capital expended to date had been £470,000.

In 1851 the SDC had decided to provide a graving dock in its complex as ships using the dock were larger than the existing Wear dock could accommodate. The dock agreed was to be 300 ft long and so would induce ships "from other Ports to come to Sunderland to be repaired and subsequently to load coals in the Dock, thus augmenting the revenue of the Company;"[73] it was not until 1854 that the SDC decided to seek an Act to undertake that work. In 1853 ship building and repairing were referred to by Meik who noted that the Wear, through the commissioners, should seek to attract iron shipbuilding and that "unless immediate facilities are given to this new trade of ship building on an extensive scale, Sunderland must lose her pre-eminence as the first ship building port in the world."[74] He also indicated that rapid improvements to docks and their entrances had been made at Grimsby and Hartlepool while new docks were planned at

Stockton and on the Tyne, of 31 and 50 acres respectively. Meik's report was investigated by consulting engineers D. & .T. Stevenson* who agreed with its suggestion that Rennie's 1819 river line should be amended; they also commented on the lower harbour where the swell caused problems to both dock entrances and noted that they knew of no other harbour entrance with masonry piers exposed to the sea which, while producing a scouring effect on the bar, aggravated the swell.[75]

Since the formation of the SDC the RWC had been somewhat inactive, except for undertaking repairs to the piers and carrying out dredging. After a decline, coal exports began to revive from 1840 and whereas the completion of the Wearmouth Dock had little effect, the building of the south dock stimulated trade to the extent that by 1854 coal exports reached 1.891m tons, from 1.387m tons in 1830. In the same period the number of ships clearing the river rose from c 7,500 to 9,440 and shipbuilding too expanded from 99 ships (25,000 tons) in 1834 to 151 ships (67,000 tons) in 1854.[76] Between 1830 and 1854 the pattern of the Wear's coal shipments had altered dramatically: in 1830, all coal was shipped in the river, much of it from keels; in 1854, although 62% was still shipped in the river, 30% passed through the South Dock and 8% through the Wearmouth Dock. In the same period foreign shipments rose from 7% to 23% of the total. In a period of fluctuating fortunes the formation of the Sunderland Dock Company had succeeded in attracting further trade to the river.

4.4 River Tees

Subsequent to the completion of the S&DR in 1825 three Acts of Parliament had been passed in 1828, all relating to the river Tees. Of these the works authorised for the S&DR to extend its operations to Middlesbrough were completed in 1830, those relating to the formation of the Clarence Railway were begun in 1829 but not completed until 1833, and those of the Tees Navigation Company (TNC) - the formation of the Portrack Cut

* David Stevenson (1815-1866) and Thomas Stevenson (1818-1887)

- were terminated in 1831. Delays on the Clarence Railway had been due to doubts as to whether the best line had been chosen; when giving evidence on the S&DR Bill, Thomas Storey had pointed out that Samphire Batts, to become Port Clarence, would provide a better shipping place than would Haverton Hill, the terminus chosen.[1] The Clarence Railway asked George Leather to report upon its proposals and his findings led to a further Act, amending its line and providing for a branch to Durham city;[2] only then did construction work begin under the engineer Edward Steel and his superintendent, James Stephenson.[3]

As noted, the S&DR began the shipment of coal at Stockton in January 1826;[4] by the end of its accounting year, June, 35,600 tons had been transported for landsale and 7,290 tons for shipment. By June 1830 the comparable figures were 68,000 and 79,000 tons, the first time shipments exceeded landsales. The coal traffic for the year brought to the S&DR a revenue of £20,951, in addition to income of £797 from limestone, £1,227 for merchandise and £413 from coach traffic;[5] virtually 90% of the company's income was due to coal traffic and the figure of 80,000 tons p.a. estimated by Pease as being the railways potential revenue earner had been exceeded in the second year of its operation.[6] As noted by Barton,[7] problems exist in the correlation of coal export statistics relating to the Tees. Partly the result of varying year-ends the figures from 1828-30 may be summarised as follows:

Year	S&DR (ref 5)	TNC (ref 8)	Barton (ref 7.p130)
1828	54290	35444	66051
1829	46216	43738	39351
1830	79434	44589	120130

It is possible, if not probable, that the figures recorded by the TNC[8] relate to register tonnage rather than to deadweight, the tonnage actually carried, and the years 1828 and 1830 would appear to confirm this fact;

for 1829, however, there is no agreement; neither is there enlightenment from the TNC revenue statistics, £1,943, 2,061 and £1,967 respectively.[9] The income derived by the TNC since 1812, the first full year after the completion of the Mandale Cut, had virtually doubled.

The use of the river by the S&DR brought the TNC to undertake further improvements to it, although already the two cuts had shortened the channel by 2½ miles and ¾ mile respectively. In 1828 the TNC purchased a dredging machine - it was sold in 1837 - then in use at Cork and two barges for it were ordered to be built at Stockton.[10] In spite of its improvements the TNC, concluding that trade on the river was suffering as a result of inefficient moorings and insufficient berthing and depth of water, called for a report from Brooks, resident engineer under Price.

Reporting in 1831 Brooks noted that the new cut had a depth of five feet at low water but it could be increased to eight by dredging and he pointed out that the river's current had proved effective in scouring its own channel through the new cut - Chapman had suggested that the first cut be so formed - and a bed of peat, up to three feet thick, had "been completely broken up, floated away, and lodged in the eddies or unnavigable part of the River; and this without any detriment to the side slopes or banks of the New Channel.".[11] Brooks also reported that the two jetties which had "been recently constructed in Newport Bight have already been the means of driving away the shoals which previously were serious impediments in that part of the sailing course of the River Tees".[12] Only Billingham Reach now required improving but, even so, ships could leave Stockton at spring tides when drawing 13 ft.

A summary of the monies expended on the 'New Channel Account' was enclosed. It showed that the total for the new channel amounted to £18,316, exclusive of dredging, but including the piling for protecting the slopes and for facing them. Dredging had cost a further £2,750 and had been undertaken mainly in the old channel; this comment, together with

a note concerning a dam across the 1810 cut, would seem to confirm that the old cutting had been, partially at least, realigned - it was so shown on the deposited plans - and deepened. Jetties had been built for improving the coal staiths at Stockton, in Stockton Reach, at Newport, at the Blue House, and at Billingham while a tantalisingly short note refers to a 'floating breakwater.' The total cost of the new cut was £26,053.

The TNC was not without its critics and in 1828 under the pseudonym 'Examiner' the Durham Chronicle complained of excessive port dues, showing that the Tees was much more expensive than was the Tyne; ships loading in the Tees were subjected to dues of 1/- per ton register while on the Tyne the figure was 2d per chaldron, c 1d per ton. The complaint was also made that all ships were forced to pay for the river improvements, whether or not they entered the cut and the TNC was contrasted unfavourably with the S&DR which did not and could not charge for goods not carried by it. The writer claimed, correctly, that an increase in revenue had resulted from the railway and criticised Stockton "for the supposition that (it would) profit by the trade of the port being confined to the present wharfs...it would be just as reasonable for...Durham (to impose) a duty on all vessels entering the Wear, to make and improve the navigation to Durham."[13] The TNC was also criticised for executing the Portrack Cut, a later engineer, Joseph Taylor, noting that the shortening of the river was immaterial especially as "steam tugs were...generally employed in towing the vesels between Stockton and the sea."[14] In addition, a good reach of the river was destroyed, the old channel became a swamp, silted up and so deprived the river of its reservoir of tidal water, considered by Chapman as being vital to its well being.

Soon after the completion of the Portrack Cut the TNC put in hand further improvements to the river, the construction of jetties at right angles to the banks to narrow the channel, increase scour and so deepen the river. Built by Brooks, under the direction of Price, between 1831

and 1848 24 jetties were formed on the north side of the river and 29 on the south, their lengths ranging from 26ft to 2,170ft.[15] Their construction was later criticised in that when the first of them had been built near Stockton the effect had been to increase the river's velocity, only to have it reduced downstream where silt was deposited and sandbanks formed. Progressively, further groynes were built downstream. The groynes also caused the silting up, in 1835, of the staiths of the S&DR, built in 1830 at Middlesbrough, resulting in a report by Storey, acting for the S&DR, but when it was presented to the TNC the reply was "that he proposed such a departure from the general principles hitherto acted upon, that his plans could not be listened to."[16] Later a scheme acceptable to both parties was proposed by Price; its cost of £5,000 was partly covered by Pease offering £2,000 at 5% and the TNC seeking the balance in loans from colliery owners using the Tees.[17] Although groynes, both here and on other rivers, were much criticised, Taylor later noted that they had partly achieved their purpose in advancing the foreshore to their extremities but had had the effect of reducing the tidal storage and hence reducing the scouring action.

The completion of the S&DR staiths at Middlesbrough led to a doubling of the quantity of coal shipped, from 79,434 - the S&DR figure - to 151,262 tons; subsequently a figure of 558,117 tons was recorded in 1840, with checks only in 1834 and 1837.[18] The staiths at Middlesbrough, described in 1835 by Head,[19] were designed by Timothy Hackworth (1786-1850), locomotive superintendent to the S&DR and were of a much more sophisticated and complicated design than were those at Stockton, where side-opening waggons had simply discharged onto a canted platform. It was an argument concerning the opening doors of the waggons which led to a disagreement between George Stephenson and Hackworth and later resulted in the S&DR dispensing with Stephenson's services.[20]

The works of the Clarence Railway were sufficiently completed

by 1833 for staiths to be built at Stockton and the following year at Haverton Hill. The railway's committee of management included Christopher Tennant, to become involved at Hartlepool, and Ralph Ward Jackson (1806-1890), later to initiate the formation of West Hartlepool.[21] In an effort to reach deeper water, the Clarence Railway in 1833 sought powers to extend its lines to Port Clarence, where initially a single coal drop, designed by Leather, lowered waggons vertically to the waiting ship.[22] The early years of the railway were difficult, due partly to an apparent conflict between engineers and management and partly to the scale of its indebtedness to the Public Works Loan Commissioners, in 1832 owed £100,000.[23] Financial problems led to the company holding its meetings in both London and Stockton, Steel attending both places.

Initially Price had been appointed consulting engineer but he was superceded by Thomas King in 1833 and Thomas Rhodes (1789-1868) in 1834, by which time the company was firmly in the hands of the London committee, in July 1834 it having been proposed

> that in the present state of affairs of Clarence Railway it is not in the power of the Company to bring the undertaking to a sucessful issue... (and) under these circumstances it is the deliberate opinion of the proprietors... that the Commissioners for the Issue of Exchequer Bills should be applied to take control. 24.

The Commissioners agreed to this proposal and a new London committee was elected.

The completion of the railway was not accompanied by profitability, the Commissioners being informed that "so far coal pits (have) hitherto been opened which no doubt has been occasioned by the depressed state of the trade."[25] Nevertheless, by 1835, a second coal drop had been erected at Port Clarence and Rhodes then reported that ships of 300-400 tons could be accommodated there; the ballast crane at Haverton Hill had ben moved down-river.[26]

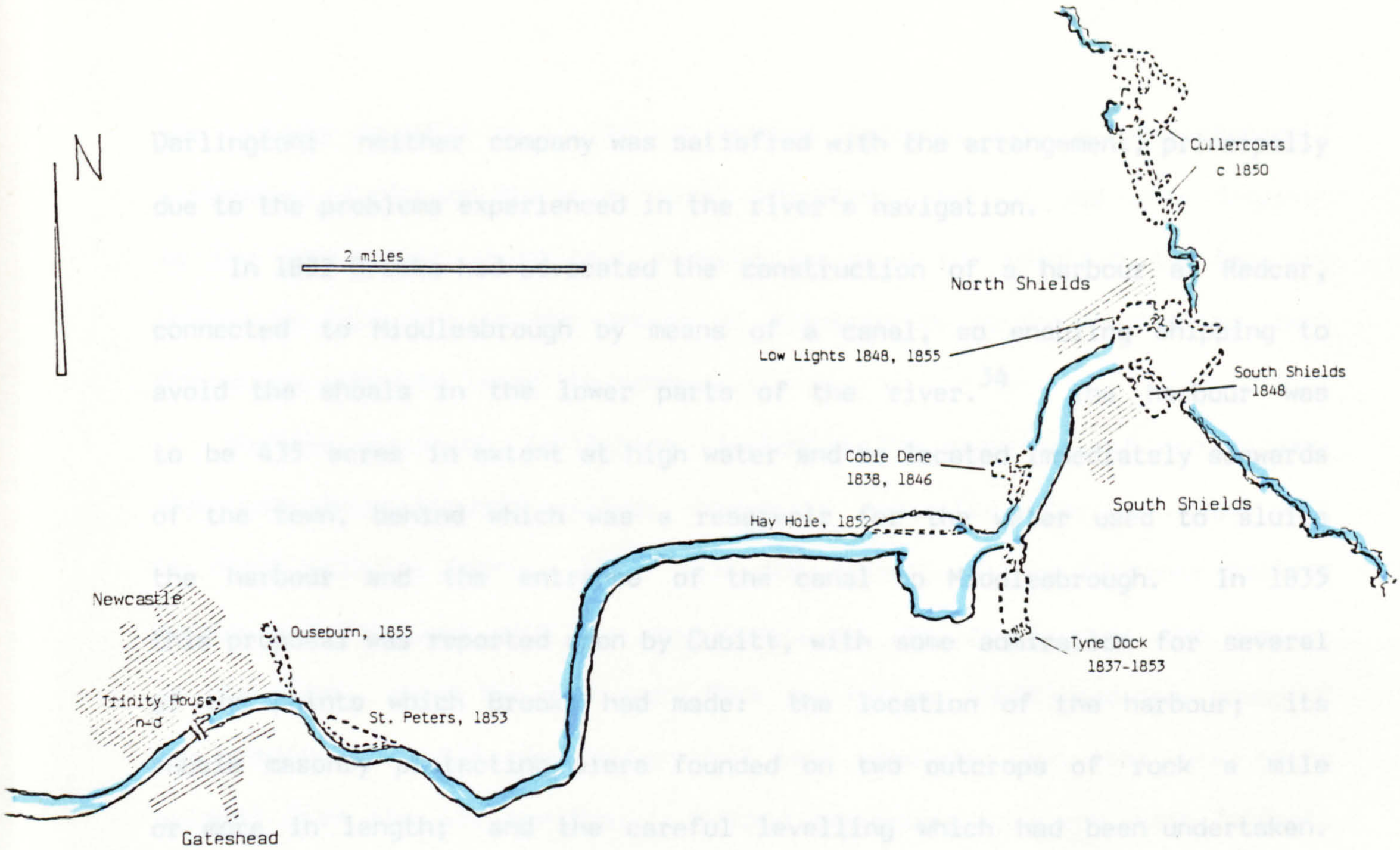
Initially, the Clarence Railway was undecided as to railway traction, horse or locomotive. In 1835, however, negotiations with Hackworth led

to his demonstrating a locomotive at Simpasture, the junction with the S&DR, to such effect that it was purchased for use on the line[27] and proved so successful that others followed. In an effort to attract further trade, Tennant, in the same year, urged the company to extend its lines into the Auckland area and its reluctance to do so led him to inform the company that he himself "should endeavour to form a company to connect the Auckland Valley by a railway to the Chilton branch,"[28] a proposal not greeted with enthusiasm by the company.

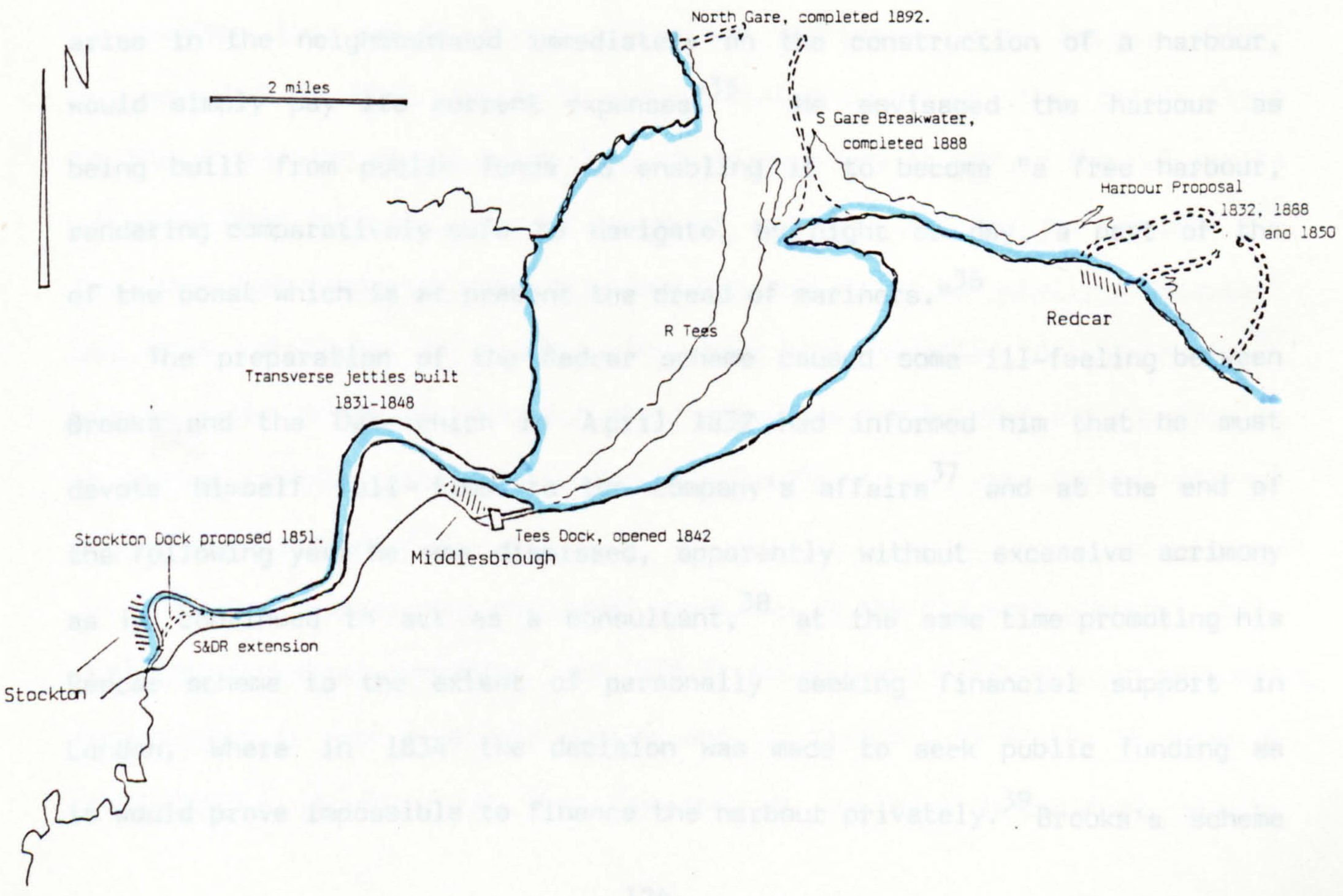
The fact that Clarence Railway traffic was forced to use the line of the S&DR led to problems as the latter charged dues at landsale rates, so rendering much more expensive the coal shipped on the north bank of the Tees.[29] In contrast with the S&DR - its first year's revenue was £7,984 from coal alone - the initial year's receipts totalled only £2,206 although coal exports from the Clarence staiths increased rapidly, the figures being 43,600, 57,000, 117,000 and 180,000 tons p.a. between 1834 and 1837.[30] For 1835 and 1836, revenue was £3,504 and £5,622* and the committee, in the latter year, commented that the company's prospects were good; from the collieries served by the railway an output of c½m tons could be expected, increasing revenue to c £25,000 p.a.: four staiths were in operation at Port Clarence.[31]

The Clarence Railway had brought the S&DR to defend its position, against both it and the northern collieries. In 1826, perhaps under pressure from the S&DR, the TNC had agreed to charge shipping dues at only half the maximum rate and in 1833 the matter was again raised by the S&DR "to enable the Coalowners on the Tees to maintain the present competition with those on the Tyne and Wear."[32] The TNC was unwilling to make any reduction, but on being prevailed upon further, it agreed, subject to Joseph Pease guaranteeing any loss.[33] By 1834 both the Clarence Railway and the S&DR were shipping coal from their own staiths, the former on the north bank at Port Clarence and the latter on the south at Port

* In 1840, the figures were recorded as £1,141 and £4,571.



Map 10: River Tyne Dock Proposals, 1830-1855



Map11: River Tees Improvements and Proposals, 1830-1854

Darlington; neither company was satisfied with the arrangement, principally due to the problems experienced in the river's navigation.

In 1832 Brooks had advocated the construction of a harbour at Redcar, connected to Middlesbrough by means of a canal, so enabling shipping to avoid the shoals in the lower parts of the river.[34] The harbour was to be 435 acres in extent at high water and be located immediately seawards of the town, behind which was a reservoir for the water used to sluice the harbour and the entrance of the canal to Middlesbrough. In 1835 this proposal was reported upon by Cubitt, with some admiration for several of the points which Brooks had made: the location of the harbour; its rubble masonry protecting piers founded on two outcrops of rock a mile or more in length; and the careful levelling which had been undertaken. As an asylum harbour it would be well placed, especially as it had adjoining beaches and Cubitt likened it to Kingstown harbour, of the same form, which had cost c £.½m. He estimated that Brooks's Port William would cost not more than £300,000, although he was not confident about its usefulness; nevertheless "there is no doubt that the trade which would arise in the neighbourhood immediately on the construction of a harbour, would simply pay its current expenses."[35] He envisaged the harbour as being built from public funds so enabling it to become "a free harbour, rendering comparatively safe to navigate, by night or day, a part of the of the coast which is at present the dread of mariners."[36]

The preparation of the Redcar scheme caused some ill-feeling between Brooks and the TNC, which in April 1832 had informed him that he must devote himself full-time to the company's affairs[37] and at the end of the following year he was dismissed, apparently without excessive acrimony as he continued to act as a consultant,[38] at the same time promoting his Redcar scheme to the extent of personally seeking financial support in London, where in 1834 the decision was made to seek public funding as it would prove impossible to finance the harbour privately.[39] Brooks's scheme

was revived in 1838 as an asylum harbour together with a naval station[40] - harbours of 510 and 914 acres were indicated - but it was soon dropped. As its development would have reduced the need to maintain the Tees and would so have led to the demise of Stockton it is not surprising that Brooks was asked to leave the company.

Further shipping facilities, including the provision of docks, were also considered by both railway companies and, for clarity, they will be dealt with in turn. After 1838 the affairs of the Clarence Railway became much involved with the development of Hartlepool, at the expense of the Tees, where the Hartlepool Dock and Railway (HD&R) had been promoted by Tennant; by 1835 the railway had been completed and coal was being shipped from the new staiths. Jackson had become involved, with Tennant, in the Clarence Railway and

> he at once saw that an improved shipping place was desirable. It had been found that the shipment of coals in the tideway of a rapid river was exposed to great inconveniences and that it was essential to obtain the security of dock accommodation... (and instead) of suggesting a dock at Port Clarence, with an entrance from the Tees...(he) proposed that...a railway...should be made into the bay at Hartlepool...41

To further this object the Stockton and Hartlepool Union Railway (S&HR) was promoted in 1838, the Bill noting that because of "the difficulties in the navigation of the river Tees it is necessary to afford the collieries (of south-west Durham)...further means of export than they now possess."[42] The projected measures were considered by the TNC to be "wholly unnecessary and...not calculated to produce any essential benefit to the public"[43] but in spite of this opposition the railway was built under the supervision of George Leather and John Fowler (1817-1898); it was formed without an Act of Parliament.[44]

The new railway had not gone unnoticed by the Clarence company, still suffering financial problems. In 1838 it experienced difficulty in persuading shareholders to meet a call on capital and in London - 15 of the 18 directors lived there[45] - it was noted that "several of the most influential gentle-

men and coal proprietors have made an overture to your committee to join with them in a plan for uniting the Clarence Railway with the harbour of Hartlepool, which port can be entered by vessels in almost any weather";[46] conversely, in Stockton, the London committee was criticised on account of its remoteness and "the utter impossibility of a party of gentlemen living in London ever directing with advantage the management of a railway 240 miles from them."[47]

By 1840 the fortunes of the Clarence Railway had improved, revenue rising from £1,141 in 1835 to £4,571, £10,048, £15,429, £20,211 and finally to £22,418 in 1840.[48] Suggestions had been made earlier that the company should amalgamate with the S&DR, a move not adopted. The completion of the S&HR was viewed as a threat to the Clarence Railway and "the unfavourable position in which...(it) is now placed...(makes it) highly expedient that active measures be adopted to render the management of the affairs more economical and efficient..."[49] and, to that end, it was suggested that all management should be based in Stockton, a move which led to a bitter dispute between the two factions. By this time the total capital of the Clarence Railway was £584,145 of which only £235,000 was in paid-up shares; the Loan Commissioners, involved in the company virtually from its inception, were owed £111,000 and by 1843 this sum was noted as being £144,054;[50] by then revenue had increased to £27,600 and the company had been able to pay dividends of £1,981, seemingly its first. In 1842 the Loan Commissioners sought to sell the railway in an effort to recoup the monies owed,[51] a move which was countered by loans raised privately, so enabling the company to repay £65,000 to the Loan Commissioners and so prevent its sequestration. The Clarence Railway still owed the Commissioners £70,243 and the matter was finally resolved by an Act of Parliament, passed in 1843, whereby capital was authorised to repay the loan, a special class of "Government Loan Shares"[52] being created.

Developments on the south bank of the river were in the hands of

the Darlington Quaker interests, described as being "the soul of every great undertaking."[53] The S&DR noted with some sadness in 1834 the antagonism of the northern coalowners and the injurious completion of the Clarence Railway:

> Your Committee have no occasion to conceal the fact that hopes were entertained that by obstinate perserverance in a line of policy so at variance with sound principles and even so injurious to themselves the Coal Proprietors of the North would prove successful in crushing the energies of your Company and the Coal-owners connected with your Undertaking - for otherwise has been the result - it has served to convince the most sceptical that the confidence ever entertained by your Committee is based upon the best foundation...The interference of a rival Company in the landsale department has also tended to reduce your revenue...54

That the S&DR was in some dispute with the TNC was evidenced in 1836, when the railway company noted that the TNC had undertaken work to remedy the lack of water at the staiths and downstream of them, though the management committee "regret to add that in their arrangements with that Company the cooperation of an expensive character became necessary on your part; they rely, however, upon receiving benefits of the utmost value and return."[55] The river's shortcomings led to the two companies meeting jointly and to a report from Storey, on behalf of the S&DR, in which he was at pains to note that the suggested works "will not...be injurious to the shipping place at Port Clarence, this subject having been referred to at the conference..."[56] In view of his comments the TNC agreed that any proposal should be approved by Leather, acting for the Clarence company; with Brooks having left the TNC, the works were executed under John Murray, of Sunderland.

In 1836 a prospectus had been issued by Tennant for the formation of the S&HR, its object ostensibly being "to give the collieries using the Clarence and Stockton and Darlington Railways, and shipping in the River Tees, the opportunity of using Hartlepool as an auxiliary port,"[57] especially in the winter months. In addition, it had been noted that Middlesbrough was now virtually dry at low water and the Clarence staiths

could suffer the same fate. The formation of the railway should lead to Hartlepool benefitting by £5,625 and the Clarence Railway by £6,875 p.a., "a reciprocity of advantage to both sides."[58] Tennant's proposal did not escape "the observation of the watchful and astute men who guided the affairs"[59] of the S&DR and in the following year the shareholders were informed that tenders were about to be sought for the construction of a dock at Middlesbrough.

> The expediency, if not necessity, of giving greater facilities for the shipment of coals at Middlesbrough has obtained the continued serious attention of your Committee. The proposition to construct docks has already been brought before you and the opinion of your Committee strongly expressed that the greatest possible advantages would result to your undertaking from their formation. 60

Plans for the work had been prepared by Cubitt but in 1838 an arrangement was made between the S&DR and Thomas Richardson that the Middlesbrough Owners would finance the dock construction if the S&DR would relinquish to them all coals shipped beyond Stockton. The offer was accepted on the understanding that the dock would be later transferred to the S&DR and by 1840 work was in progress - a branch railway to the S&DR was included[61] - and the railway shareholders were informed that as

> the Middlesbrough Dock proprietors have received all the assistance from your Company which they will require, the undertaking promises to be of essential use, especially in counteracting any present or future attempts to draw your export trade into other channels; nothing hitherto devised for that object has succeeded... 62

The dock was of 9 acres in extent, approached by a channel of 1,200 ft long , to be kept open by sluicing from the lock gates and adjacent culverts. The entrance was 30 ft in width and a depth of 19 ft was provided at high water; 15 acres of siding provided accommodation forl,200 loaded wagons. The total cost, including ten coal drops based on designs used by the Clarence Railway, was £122,000.[63] The dock at Middlesbrough was opened to traffic in May 1842, the S&DR shareholders having been informed, as it reached completion, that

> the Middlesbrough Company have proceeded vigorously with the construction of the Docks, which it is confidently expected will be opened before the end of the present year. That

> the great bulk of the coal coming down your line will be eventually shipped in the basin in preference to the ships being allowed to beat about in a tidal river seems obvious.64

Two years later it was reported - justifiably - that the new facilities were unrivalled and that the costs of shipment had been considerably reduced, a claim virtually impossible to substantiate.

The S&DR directors were correct in anticipating that the greater part of the coal shipped would be through the dock. In the four twelve-month periods which ended in June 1845 it amounted to 392,000, 370,000, 317,000 and 505,000 tons respectively; the total S&DR traffic in the first three of these years has not been ascertained but in 1845 it was 563,000 tons,[65] indicating that 90% passed through the dock. The figure for coal shipments given by the TNC for the same year was 481,000 tons, presumably a register tonnage and so indicating c 675,000 tons shipped.[66] Although it has been stated that the dock at Middlesbrough was financed by the S&DR[67] this was not, at first, strictly true as in 1842 it was reported that the S&DR had agreed to pay off the dock construction on a rental basis and in 1844 the sum paid was £5,760.[68]

In 1842 the S&DR reported that it had not been greatly affected by the completion of the S&HR but nevertheless revenue from coal traffic fell almost continuously until 1846 when it totalled only £62,974 compared with £88,277 in 1841.[69] In 1845, however, coal traffic totalled 908,000 tons, an increase of almost 50% on the previous year. That year also saw two events which affected the port: an end came to the limitation of the vend of coal and the S&DR arranged with the TNC to lease its coal dues whereby "a very wise step has been taken and the trade of the River has been placed on vantage ground."[70] The arrangement was that the railway company, through Joseph Pease, Thomas Meynell and John Hopkins, would lease the river dues, paying to the TNC an annual sum of £6,900 p.a. to the general fund and £1,300 for lights.[71] As a result it was envisaged that the Tees, almost completely dependent upon the coal trade,

would become free of dues and hence attract shipping. From 9,692 ships using the river in 1844 the totals for the succeeding three years rose to 12,190, 10,898 and 11,974 before falling to 8,176 by 1850.[72] The Clarence Railway was not a party to the leasing arrangement and it was later explained that "why the parties on the Clarence side of the river were not 'free' was solely because they had declined to come in on equal terms, as they were entitled to do under the lease",[73] perhaps due to the fact that Port Clarence shipped only a quarter of the river's total.

The Clarence Railway's reluctance to tie itself to the Tees is understandable. The S&HR had obtained an Act regularising its position in 1842 and in that year it was decided that a separate dock be built at Hartlepool[74] where relations with the H&DR were strained and the working agreement between the two parties was not operating satisfactorily. Through the incorporation of a separate company, the Act for the dock was passed in 1844 at which time the S&HR finalised the leasing of the Clarence Railway, a proposal having been so made by the latter company.[75] In 1842 the revenue of the S&HR was given as £9,275[76] but, surprisingly, more than half of this sum originated from passenger traffic. By 1844 revenue had fallen slightly but then increased dramatically in 1845 to no less than £32,156 for coal alone;[77] the corresponding revenue for the Clarence Railway was £33,279.[78] The opening of the first of the docks at West Hartlepool in 1847 signalled an effective end to the use of the Tees by the Clarence Railway.

Since the completion of the Portrack Cut the works undertaken by the TNC had been not inconsiderable, 53 jetties or groynes involving a total length of 3.85 miles having been built; additionally, spurious channels opened up by the river's flow had been closed. The works of the TNC had not included the embanking of the river but in 1840 Pease asked the company for its approval to the Middlesbrough Owners protecting their property by this means,[79] stating that they had, at some expense

carried out work considered to be the responsibility of the TNC. The owners now sought a definite river line to which they could work and so avoid needless expense. It was finally agreed that a line delineated by Leather and Price should be worked to, Brooks and George Turnbull (1809-1889), engineer to the dock owners, being responsible for adherence to it.[80] The subsequent reclamation of land was to be carried out by depositing ballast provided by the TNC. In all, the TNC expended £69,009 on river improvements between 1829 and 1850, in addition to the £25,996 spent on the Portrack Cut. The source of the funds was "the surplus balances of the Company's annual income after paying their shareholders 10 per cent."[81]

By 1845 the situation of the interested parties on the Tees had polarised. The Clarence Railway had been extended, through its leasing by the S&HR in 1844, to Hartlepool where the new dock at West Hartlepool, promoted by Jackson, was under construction. On the other hand, the S&DR had consolidated its position by leasing the Tees dues, so freeing the port and, in addition, was leasing the Middlesbrough Dock from its owners, the S&DR so having been freed from capital spending. The TNC had exceeded its authorised capital and, due to maintaining its first charge 10% dividend, had not been able to spend revenue on river improvements.

In 1846 Brooks again reported on the river Tees. He had been asked by the TNC to recommend improvements to the river's estuary and, recounting its history, noted that the river had been at its worst in the 1830 s; since then the channel had improved. Again, to direct the flow, Brooks proposed the use of groynes, sheet piling and piles protected by a deposit of chalk rubbish - presumably imported ballast - beaten into a trench on each side of the groyne. These structures, to a level of five feet above low water, would cause silting, following which wharfs would be formed at their ends and then gradually extended to form a continuous longitudinal embankment. Brooks considered forming a breakwater on the

north side of the estuary but considered it somewhat premature to proceed with such and expensive item, although potentially beneficial. Referring to the works already completed he commented that

> the confidence which your committee have obtained by experience, that by a right direction of the current the most important changes may be effected at a small expense, give me the assurance that the plan now placed before them for the general improvement of the estuary, will be considered in its proper light, viz., as of works which, great in themselves, were they to be executed by manual labour alone, are nevertheless of easy accomplishment when a powerful stream is brought into action to assist the hand of man.
>
> That small causes may in some cases produce great results is nowhere more evident than in the mutations which have taken place in the estuary of the Tees within the last century; and as it is my desire to recover for the trade of the port the advantages which a former condition of the estuary produced, I shall proceed to show what has been the nature and extent of those changes. 82

They were sentiments expressed forty years earlier by Chapman.

The state of the river was not considered so satisfactory by the Tidal Harbours Commission, which heard evidence concerning the Tees in Stockton and was there made aware of its actual state, principally as to its lack of depth and its bar, problems caused principally by narrowing the upper reaches but neglecting the estuary. The section of the report concerning the river Tees read:

> Stockton-on-Tees, including Middlesbrough, is one of the most thriving of our coal ports. The channel of the river has been contracted and deepened; the approaches are admirably lighted; a floating dock of nine acres has recently been opened at Middlesbrough; the traffic and revenue of the port have doubled within these few years and in 1845 the Darlington Railway Company leased the whole of the harbour dues and declared it a free port. All is bustle and activity, and all seems to prosper. Yet even here, on a closer inspection, the want of some control is manifest - the quays are nearly all private, and are falling into the river; the piers of the bridge are only supported by the loads of stone thrown down at their foot; rocks of whinstone impede the upper navigation, and cause damage to the barges; the entrance of the dock at Middlesbrough, completed but five years since is only thirty feet wide; while about 2000 acres of the estuary have been enclosed and the corresponding tidal water excluded... Great complaints also are made of the want of a harbour of refuge in the neighbourhood, and of a beacon on Redcar Rock, upon which vessels are annually wrecked. 83

Although Brooks had been criticised and was to be criticised later, the lack of the harbour of refuge could not be blamed on his lack of enthusiasm.

The leasing of the port dues by the S&DR did not bring the prosperity expected, principally due to the formation of docks at West Hartlepool. By 1841, the S&DR had carried a total of 4.5m tons of coal compared with the 1.25m tons on the Clarence Railway; in that year the proportion was 460,000:190,000 tons.[84] Of the latter total a quantity was taken to Hartlepool and the S&DR later admitted that its lease of the Tees coal dues "worked well until the Coals shipped at Port Clarence, were abstracted to Hartlepool",[85] so causing the S&DR to attempt to relinquish its lease which by 1850 brought in receipts of only £30 and £23 in successive quarters.[86] The Tees was also affected by the expansion of the region's rail network; no longer were railways to supply only individual ports. By 1849 some 25% of the coal carried by the S&DR was transferred to the YN&BR at Darlington, and hence lost to the Tees.[87]

Having subsumed some of the responsibilities of the TNC, the S&DR, in 1846, sought some voice in the operation of the port and suggested that a Central Board be set up to take over the river's management: the TNC could not assent to this suggestion.[88] To strengthen its position further the S&DR in 1849 took over the Middlesbrough dock entirely - it involved the transfer of 62 acres of land[89] - although the railway company itself was not then financially sound, having leased two lines at rates which absorbed more than its revenue. As a result, Edward Pease, then 82, noted that S&DR shares "once deemed worth £360 have been sold at £30."[90] and blamed the fall on a "malicious attack on the safety, soundness and solvency"[91] of the company.

In addition to its having been affected by the formation of the YN&BR, the Tees also became the subject of an approach from the L&TR, extending its line northwards. In spite of its revenue from the S&HR, nevertheless the Clarence Railway had resolved in 1846 that the L&TR "take the Clarence Railway at a sum of £450,000 of which £214,000 to be paid in money, within a reasonable

time from the passing of an amalgamation Act"[92] - duly sought, but lost - and in the following year the shareholders of the S&HR were informed that their railway, too, might become part of the L&TR,[93] another move which did not materialise. The capital of the S&HR was given as £240,000 but the stated revenue had fallen dramatically; landsale coal £120, shipments £2,738: for the Clarence Railway the figures were £3,970 and £20,368 respectively.[94] Coal traffic amounted to 232,000 tons. The breakdown of negotiations did not deter the L&TR and in 1847 it asked the TNC to sanction the construction of its bridge at Yarm as a two-span structure, not the single span authorised by Parliament, a request which was agreed. Two years later, with the railway approaching completion, the TNC queried the "intended traffic on the line coming to the Tees (and offered)...every facility in the power of (the TNC)...towards accomplishing that object"[95] and offered to meet a deputation from the railway to discuss the development of port facilities.

By 1850 the export of coal from the Tees was in decline, a matter of concern to TNC, S&DR and Clarence Railway alike, the two first-named on account of the dues arrangement and the latter because of a loss of revenue

> to the extent of £2,756.17.9. which the Committee much regret because the greatest part of the deficiency is to be attributed to the diversion of nearly the whole of the coal traffic from off the Clarence line at Billingham with the Stockton and Hartlepool line leading to the west docks at West Hartlepool by which the Clarence Company not only lose the revenue on 3¼ miles of distance from Billingham to Port Clarence but likewise that arising from shipping dues and other sources.[96]

The quantity of coal lost to West Hartlepool amounted to 525,597 tons in 1850,[97] while S&DR shipments had fallen from 558,000 tons in 1840[98] to 355,000 tons in 1849,[99] a decrease due to rail competition.

What was not in decline, however, were the towns of Teesside. Between 1821 and 1851 both Stockton and Darlington doubled in size, the former to 10,172 and the latter to 11,582. Yarm's population had not changed but Middlesbrough, with a population of 154 recorded in 1831 had already

reached 7,631;[100] within ten years it was to exceed both Darlington and Stockton, a factor which was to pay a large part in the future development of the river, intimately tied to the discovery - rediscovery is perhaps more accurate - of ironstone deposits in the immediate vicinity.

The existence of ironstone in the Cleveland district had been recognised almost from the beginning of the 19th century and trials involving its use had several times been made. Whitby ore had been brought to the Tyne in 1810 for use at Lemmington and in 1830 it was used by the Birtley Iron Company, having been transported by sea to the Tyne and then by the Pelaw Main waggonway. It was not until the main seam of ironstone was exploited that the character of the Tees trade was to undergo a change in direction, Fordyce noting in 1860 that

> nothing has been discovered within the last twenty years, having so direct an influence on the landed, railway, and mineral wealth in the north of England, on the South Durham Coal-field, and on the iron trade generally, as the discovery and application of the large Ironstone deposit of the district. 101

It is not within the scope of this study to detail the developments which subsequently ensued other than to note that the river Tees, unlike the other rivers of the North-East, came to lose its role of a major exporter of coal, although shipments did continue to be made.

4.5 River Blyth

Documentary evidence relating to the trade and development of the river Blyth is lacking for the period here considered, perhaps largely due to the fact that the river was, in effect, in the private ownership of the Ridley family. Trade figures, too, are complicated by the inclusion of Hartley, or Seaton Sluice, but for 1826 the tonnage of coal shipped was given as 140,000 tons,[1] a figure which includes Hartley; perhaps 120,000 tons was from the Blyth alone. Between 1830 and 1854 new collieries were opened at Bebside and Horton, both near Blyth; at Bedlington, Netherton and Bomarsund; and at Ashington.[2] The natural outlet for their produce was Blyth and to that end a new waggonway was built in 1832, running east-

wards from the Netherton collieries to Bedlington and hence to the north bank of the river Blyth.[3] From a quay built by the Bedlington ironworks coal from Bedlington was shipped into keels which carried it for trans-shipment either at Blyth or, in favourable weather, on the Tyne. In spite of the railway being later extended down-river, the situation was still unsatisfactory and the Bedlington Coal Company in 1841 built the Bedlington, a steamship of iron construction which was able to carry 40 chaldron waggons containing c 110 tons of coal, the waggons being lifted by steam derrick.[4] Built in South Shields the ship was one of only 16 iron vessels registered at that time and one of the eight steam powered. The quantity of coal which it transferred to the Tyne increased to 11,000 tons in 1844 but subsequently the Bedlington owners were enabled to bridge the river Blyth and so gain a rail link with the Tyne in 1850.

To overcome the problems caused by inadequate shipping facilities at Blyth, Messrs Jobling and Partners commissioned Robert Nicholson to report on the shipment of coal from their Cowpen and Hartley collieries. Although committed under the terms of their lease to shipping some 50,000 tons p.a at Blyth[5] the lessees sought other outlets and Nicholson suggested that coal from these collieries, together with the output of Netherton and Bedlington, be shipped at the Low Lights, at North Shields. This scheme did not materialise in full; whereas the railway had been intended to run the full distance it was curtailed and built only to link with the line from Seghill to the Tyne, opened in 1840. Completed in 1847 the new railway extended the northern steam coal area to the Hay Hole staiths on the Tyne.[6] Formed as the Blyth and Tyne Junction Railway the company took over part of the Cowpen colliery line into Blyth and in 1849 built new staiths on the quay. Running parallel with the river, a feature not much in evidence in the northern part of the coalfield at that time, the staiths were some 20 ft in height and provided seven berths, each with a spout or drop.[7]

To appreciate fully the situation in which the river Blyth users found themselves, and the factors which led to the changes in the river's conservatorship, it is necessary to proceed further with the railway developments in the area between Tyne and Blyth. The Tyne was attracting much trade to the Hay Hole and Whitehill Point areas and it was here that the Blyth and Tyne Railway (B&TR) - it was incorporated as such in 1852 - discharged coal. At its incorporation, however, it was threatened by another projected company, seeking a line from Morpeth to North Shields with a dock at Low Lights, a revival of the earlier plan. The battle between the two factions brought victory to the B&TR, by then supported by land owners and by the Tyne Improvement Commission, recently formed and seeking powers to build its own dock at Hay Hole, the Northumberland Dock.[8]

In addition to the colliery waggonways and the B&TR, another threat, or potential threat, to Blyth developed in 1847 with the completion of the Newcastle and Berwick Railway (N&BR), soon to merge with the York and Newcastle Railway. The completion of the High Level Bridge in 1849 created the opportunity for coal from Blyth to be shipped on either the Tyne or the Wear and by 1851 a link, shown on a contemporary plan,[9] had been established between the collieries north of the river Blyth and the recently formed YN&BR at Netherton. A line from Bedlington to Blyth was also shown, connecting with the B&TR.

Despite the threats, the river Blyth was able to ship 177,000 tons in 1852, a substantial increase on its 1830 throughput but a figure seemingly below that for 1847,[10] presumably due to competition from the Tyne. Between 1847 and 1852 the number of ships clearing the river fell from 1,417 to 1,148 and assuming all left carrying coal the average cargoes were 162 and 154 tons respectively, significantly less than those of the Tyne and Wear. In addition to the export of coal, shipbuilding was carried out on the river, five ships averaging 400 tons being built in 1853;

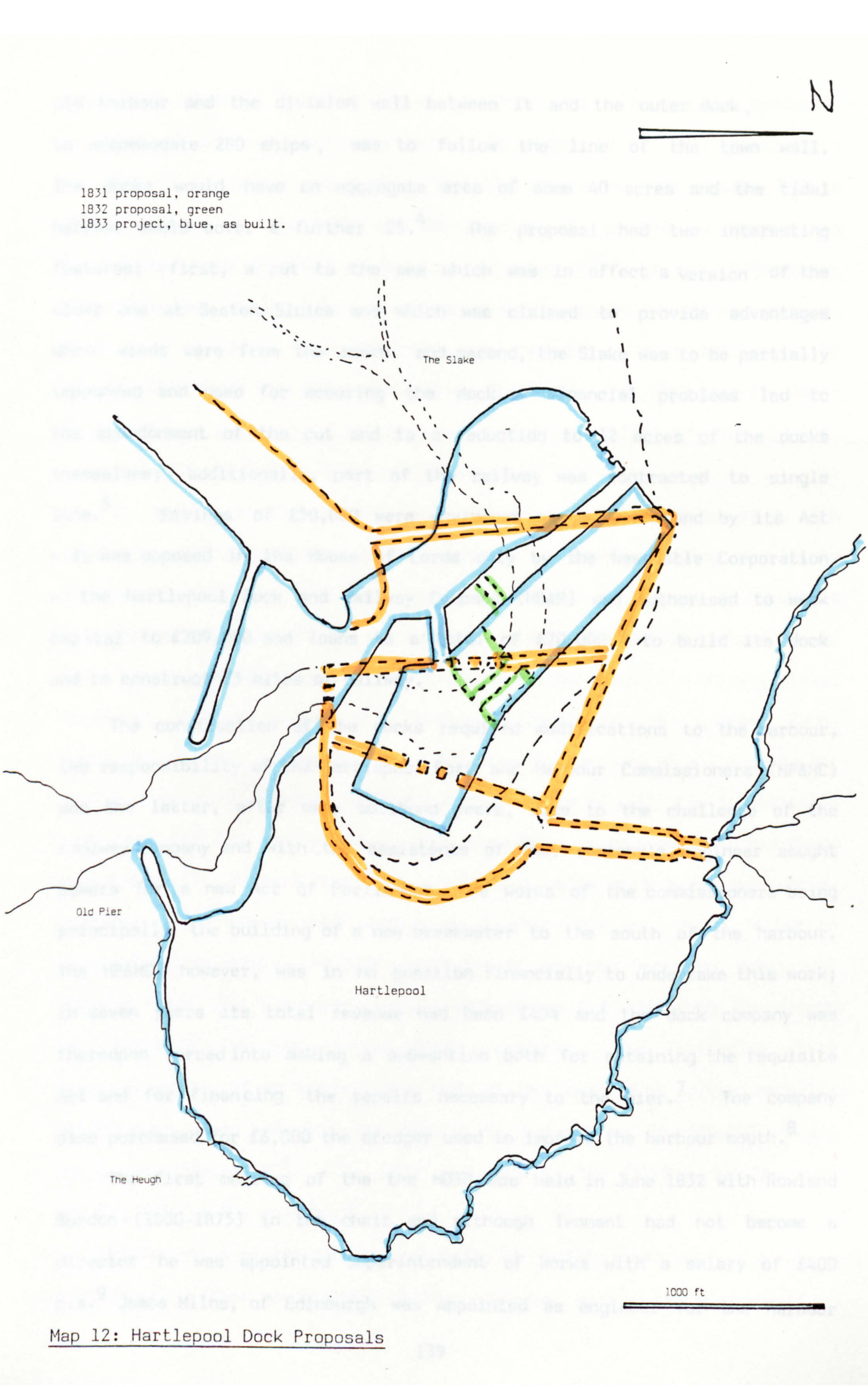
as on the Tyne and Wear the ships built in the river were of a tonnage greater than those shipping coal from it.

The changing pattern of coal production and transport had not brought about any significant change in the river and, indeed, the colliery interests would seem to have avoided using it whenever possible. No improvements are recorded as having been made and the depth at the bar varied at high tide between eight and sixteen feet,[11] no different from the water depth available in 1788.[12] It was against this background that the Blyth Harbour and Dock Company was formed in 1854.

4.6 The Hartlepools

Hartlepool had been suggested as an outlet for coals from the Hetton and Haswell area as early as 1823, when it was proposed that a railway be formed to it from the Durham coalfield. Drops were to be provided near to the Old Pier and a timber viaduct built across the Slake, or tidal inlet. With only 12 ft of water at spring tides and six at neaps and with the harbour in a state of disrepair, the scheme would have proved impracticable and so was abandoned.[1] Perhaps inspired by it, another proposal, in form similar, was made in 1831 by Christopher Tennant, in 1817 responsible for commissioning a survey by George Leather for a canal from the Tees to the Durham coalfield, Tennant being then of the opinion that the Tees could well become a competitor to the Tyne and Wear in the export of coal ;[2] he was responsible also for the formation in 1828 of the Clarence Railway. A native of Yarm, Tennant had settled in Hartlepool and in 1831 he published a prospectus for the formation of a company to construct both railway and dock. Capital of £200,000 was sought for the initial works and the engineers were to be Sir John Rennie and Thomas Milton for the harbour and George Stephenson for the railway,[3] which would carry coal from collieries at Moorsley, Elemore, Haswell and Castle Eden. At Hartlepool two docks would hold, in all, 350 ships and a tidal harbour would be provided. The inner dock was to be formed on the site of the

1831 proposal, orange
1832 proposal, green
1833 project, blue, as built.



Map 12: Hartlepool Dock Proposals

old harbour and the division wall between it and the outer dock, to accommodate 280 ships, was to follow the line of the town wall. The docks would have on aggregate area of some 40 acres and the tidal harbour would cover a further 25.[4] The proposal had two interesting features; first, a cut to the sea which was in effect a version of the older one at Seaton Sluice and which was claimed to provide advantages when winds were from the south and,second, the Slake was to be partially impounded and used for scouring the dock. Financial problems led to the abandonment of the cut and to a reduction to 12 acres of the docks themselves; additionally, part of the railway was contracted to single line.[5] Savings of £50,000 were envisaged as a result and by its Act - it was opposed in the House of Lords only by the Newcastle Corporation - the Hartlepool Dock and Railway Company (HD&R) was authorised to seek capital to £209,000 and loans to a total of £70,000,[6] to build its dock and to construct 23 miles of railway.

The construction of the docks required modifications to the harbour, the responsibility of the Hartlepool Port and Harbour Commissioners (HP&HC) and the latter, after many moribund years, rose to the challenge of the railway company and with the assistance of that company's engineer sought powers for a new Act of Parliament, the works of the commissioners being principally the building of a new breakwater to the south of the harbour. The HP&HC, however, was in no position financially to undertake this work; in seven years its total revenue had been £434 and the dock company was thereupon forced into making a subvention both for obtaining the requisite Act and for financing the repairs necessary to the pier.[7] The company also purchased for £6,000 the dredger used to improve the harbour mouth.[8]

The first meeting of the the HD&R was held in June 1832 with Rowland Burdon (1800-1875) in the chair and although Tennant had not become a director he was appointed Superintendent of Works with a salary of £400 p.a.[9] James Milne, of Edinburgh was appointed as engineer for the harbour

works and although detailed plans of them were subsequently produced, disagreement regarding both the dock - he suggested two smaller wet docks in place of the larger one built - and the method of construction led to his dismissal as the HD&R did not consider it "prudent to require him to execute works contrary to his own judgement."[10] He was replaced by James Brown who, however, was to act under Rennie, again consulting engineer. There were problems, too, concerning the railway. When the scope of the Act had been initially contracted, Stephenson had felt himself unable to continue as engineer and his resignation had been followed by the appointment, in 1833, of Stephen Robinson (1794-1881)[11]

To enable work to proceed the HD&R had sought the approval of the HP&HC to place a cofferdam in the harbour, a work entailing no little expense. Once in place the company considered it prudent to build to a bigger scale, but not to its original proposals, and so proceeded to construct a 16 acre dock with a 25 acre tidal basin. Unfortunately, financial problems ensued and, somewhat ironically, the company found that its shares, having been at a 20% premium, were now at a 20% discount; on the other hand, whereas it had not been possible to fill the subscription list when the Act was sought - hence its reduction in scope - it had since been filled.[12] As work continued, successive calls were made upon shareholders. The shares were paid-up by October 1834 and having failed to obtain loans privately, the HD&R was forced to seek the necessary additional funding from the Exchequer Loan Commissioners but "although the scheme was reported favourably of by their engineer, the obstacles they threw in the way of an advance, were only at last removed by private security... being given... to complete the works, if their loan of £30,000 should prove insufficient."[13] The HD&R had applied for £32,000 for the dock and £10,000 for the railway.[14]

Construction of the dock proved difficult, mainly on account of ground conditions. After construction of the cofferdam, work on the dock itself

began but soon it was found that foundation level coincided with a bed of peat, resulting in piling being resorted to; in turn, this was found not to be the appropriate solution and a masonry foundation was adopted. In the eastern part of the dock, fissured limestone was encountered and the siting of the dock itself was amended so as to avoid it.[15] It was at this critical period that Rennie was called in to report and differences between him and Milne, principally because the latter wished to use rubble walling as opposed to ashlar, led to the latter's dismissal. Problems were also experienced with the ingress of water, mainly through the limestone. In 1835 work was suspended due to flooding of the harbour having dislodged the dock gates and, whereas in the previous year 800 men had been employed, the site had been deserted; the dock was approaching completion, a set of staiths, two drops and the three pairs of sluice gates for scouring the harbour having been installed.[16]

Despite the problems, construction of the tidal harbour was completed by the end of 1835, the Hetton Coal Company then being informed that the harbour with a depth of 23 ft at high water could receive ships "of the largest burthen employed in the coal trade".[17] Unfortunately the Commissioners - the HD&R later purchased a dredger for their use - had not yet been able to deepen the channel leading to the harbour with the result that only ships of less than 400 tons capacity were able to use the port.[18] The proposal to complete the outer harbour first had been made by Rennie so that the company could benefit from its revenue while continuing construction of the dock, a consideration of some importance in view of the financial problems. Rennie considered that the sluices were vital to the scheme and concluded his report by commenting that "there is every prospect of making an excellent Port, at a comparatively modest expense, and in a short period of time."[19]

By the end of 1835 the port was handling coal from South Hetton colliery at the rate of 120,000 tons p.a., a rate estimated to generate income

of £7,000 p.a. but what was perhaps of greater satisfaction to the shareholders was the fact that a company, the South Durham Railway, had been recently formed "to connect the extensive Coal, Lead and Lime Districts of the south west parts of the county with Hartlepool."[20] Amongst its promoters were several Durham coalowners and also George Hudson, the former seeking an outlet for their coals and the latter attempting to secure shipping facilities.[21] The Bill for the railway encountered severe opposition from the colliery interests on the Tyne and Wear, their output subject to regulation. Their objections were due to the fact that the Durham railways, the S&DR, the Clarence and the HD&R, had been built under Acts of Parliament rather than by wayleave agreements and the view held by the northern interests, including the Marquis of Londonderry, was that this created an unfair advantage in that, for example, the South Durham Railway would obtain the necessary land by purchase for some £11,000, or by interest charges £5-600 p.a., whereas if wayleaves had been enforced the costs would have totalled c £3,000 p.a. It was on this basis that the coal-owners petitioned against the railways to the Tees as "they considered it then, and now consider it, an interference with Private Property to allow Coals to pass at a reduced expense for transit."[22] The Bill was defeated.

During 1836 the new harbour shipped 175,000 tons of coal and received an income of £12,600; railway construction had cost £174,500 and the harbour, to date, £115,400. Following the defeat of the South Durham railway, another line connecting with Hartlepool was proposed which, joining with the Clarence Railway, would open to Hartlepool the coalfield now exporting principally to the Tees; "avoiding the Hartlepool Railway altogether...(it was) characterised by an absolute disregard for the safety of the Harbour...",[23] now claimed as one of the best on the coast. Two plans for a railway, the Clarence and Hartlepool Union railway, were deposited during 1836, both indicating a railway from the south terminating at the

Dock proposed 1838, in red
Dock proposed 1842, in orange
'Great Float' proposed 1854, in green

Map 13: The Hartlepools, 1830-1854

tidal harbour.[24] This line was again originated by Tennant and, later to change its name to the Stockton and Hartlepool Railway (S&HR), it was built under way-leave agreements to circumvent opposition and was completed in 1840 under the superintendence of George Leather with John Fowler as his assistant.[25]

The genesis of this railway was not simple, especially where it was in contact with the port of Hartlepool. The 1836 drawings show the line as terminating at the newly-built harbour after skirting the Slake on its seaward side. By 1838, however, it had been proposed that a separate dock should be built by the S&HR to the south of the Slake. Two entrances were proposed, one alongside a suggested new pier immediately opposite the Old Pier and the other opening, via a channel, into the mouth of the tidal harbour; it was presumably this proposal which was adversely commented upon - justifiably - by the HD&R.[26] The following year the dock proposal was abandoned and the railway directed towards the harbours upper end[27] while in the next year the line was planned to skirt the harbour and approach the dock itself, by then completed.[28]

The change in plan had been caused by the uneasy relationships which developed following the S&HR's first proposal. In 1837, the year in which the HP&HC was first informed of the interests of the S&HR, the commission was again in financial difficulties and unable to deepen the harbour to as great an extent as was necessary.[29] In addition a new pier was needed as the tide did not run as before and, to enable it to be built and to improve its finances, a new Act was sought whereby dues, totalling only £305 in 1836, could be increased. By it, the Admiralty became empowered to appoint five of its nominees as commissioners.[30] At this time the Clarence Railway was not prospering and it was in an effort to counter-act this situation that Tennant had suggested the eight mile railway to Hartlepool although his proposal to form a dock there had met with opposition from the HD&R which thereupon purchased the Middleton estate so as to

pre-empt dock construction by the S&HR.[31]

A contemporary pamphlet claimed that the HD&R works were built to a much higher standard than had earlier been thought possible and the dock, originally to have been seven acres, was now ten with 25 acres of tidal harbour; the dock would at all times have 22 to 25 ft of water and its cost was anticipated as being £160,000. As a result of its up-grading, harbour dues had become inadequate although those on the railway had been increased, a situation noticed by Tennant who sought, by forming his own railway, to use the cheap harbour. At that time the HD&R carried c¼m tons of coal p.a. and with greater tonnages expected the HD&R's harbour would not be able to handle any additional traffic generated by the S&HR. To prevent itself from being faced with a loss in revenue due to competition, the HD&R, "in a position in which no reasonable man would wish to see a public company placed",[32] had made an arrangement hoped to be acceptable to both parties: the S&HR would not build its own dock and the HD&R would ship coal transported by any other railway, on the condition that it became responsible for the raising of the coal from quay level to the drops, some 14 ft higher. The HD&R which in 1831 had complained of objections to its Bill being "opposed to Competition, the grand reformer of abuses"[33] found itself threatened by that same competition, causing it to complete its dock, the building of which had been suspended. In 1838 the engineer was instructed to have all work, including the lock, completed within 12 months,[34] the arrangement with the S&HR was ratified in 1839, the contractors were encouraged by financial rewards to expedite work, four additional coal drops were ordered and the dock, the Victoria Dock, was opened in December 1840 by which time six drops were in use and a further eight were envisaged. During that year total shipments of coal totalled 461,000 tons.

The HD&R did not expect the S&HR to oppose the Bill to make legal the arrangement and it was somewhat surprised when opposition, to delay

work for three months, was experienced. The HD&R did not obtain the revenue expected from its agreement with the S&HR, opened in 1841, and the following year it was reported that in fact there had been no benefit during the half-year,* although shipments of coal had grossed 669,000 tons for the year, a marked increase.[35] By 1843 the traffic in coal along the S&HR had been reduced to 25,000 tons for the year and the total shipments had risen only very slightly; these factors and the refusal of the S&HR to renew its three year agreement - it had not maintained the traffic promised - led the HD&R to oppose a Bill promoted in 1843 for the construction of docks at what was to become West Hartlepool, a measure put forward by the S&HR and its promoter and one-time solicitor, Ralph Ward Jackson.

In an atmosphere of rivalry, the Quaker interests had in 1842 opened their docks at Middlesbrough and, with the prospect of attracting trade both from it and from the HD&R, Jackson now proposed a dock at West Hartlepool. He had been associated with the S&HR from 1836 when, rather than build a dock on the Tees at Port Clarence he had in effect, carried the Clarence Railway to Hartlepool.[36] In his earlier dealings regarding the S&HR Jackson had antagonised both the port commissioners and the HD&R and as a promoter of and Solicitor to the new company - Henry Vansittart was its chairman - Jackson now sought again to build an independent dock at Hartlepool; some five acres in extent and, with an earth mound for wagon standage, it would be provided with a locked entrance to the tidal harbour of the HD&R,[37] by this time 17½ acres in area and with eight coal drops and a ballast crane.[38]

After the failure of the initial Bill the Hartlepool West Harbour and Dock Company (HWH&D) an offshoot of the S&HR sought another, this time projecting a dock on the Stranton estate, south of its earlier site.

*For the half-year, shipments of coal from the several collieries served were as follows:- Thornley, 86,500 tons; South Hetton, 20,000; East Hetton, 65,000; Cassop Main, 7,000; Cassop, 35,000; Crow Trees, 22,000; West Hetton, 11,000; Bowburn, 3,500; Wingate, 61,000; Haswell, 6,500; S&HR, 33,000; a total of 351,000 tons.

Designed by James Simpson and John Fowler it was to be of seven acres opening directly to the sea and, to protect its entrance, a tidal harbour with curved breakwaters was envisaged, an approach channel formed through it.[39] The HP&HC had earlier been concerned as to the effect on the scouring of the harbour which the dock might have but now in 1843 it resolved "to oppose by every means (within its power)... the adverse interests (of those)... who have not given the slightest notices to the Board of their intentions..."[40] Naturally the HD&R, which perhaps had some influence on the HP&HC, also petitioned against the Bill, as it had done against the earlier one, on the grounds that as it opened into the tidal harbour, danger and congestion were likely due to the already heavy shipping traffic there.[41] The concern of the HD&R is evidenced by the attempts to secure leading engineers to act for it in the disputes with the Jackson interest, at times attempting to secure Brunel, Cubitt and McNeil.

In 1844, John Murray, engineer to the River Wear Commission, reported that the HD&R was suffering financial problems in spite of its trade and this fact was later commented upon by Jackson when as Clerk to the S&HR he noted that the HD&R's main problem was due to "the circuitous and complicated mode, which they themselves planned and adopted without any consultation with the Company to lead and ship the coal from the railway, (having) been so expensive as not to allow (that company)...a sufficient remuneration."[42] So far as the dock itself was concerned, Murray stated that the sluices appeared to have proved effective but he expressed grave doubts as to whether the Slake could provide adequate water for scouring both the HD&R and the HWH&D docks.[43]

In 1844 the press commented upon the fact that HD&R shares were now at an 80% premium and the company, a prosperous monopoly, was maintaining the dues at too high a level in the depressed state of the coal trade; new outlets for coal shipment were heeded.[44] To reinforce further its finances the HD&R in 1845 opened negotiations with the Leeds and Thirsk

Railway (L&TR) regarding its proposed extension towards Hartlepool[45] but the matter did not reach a conclusion and the HD&R later petitioned against the L&TR's Bill to extend its line northwards. The following year talks took place with the N&DJR with a view to its leasing the dock and in 1848 the necessary Act was obtained for the leasing of the HD&R to what had become the YN&BR, under the auspices of Hudson.*

When the HP&HC had been re-constituted in 1837 powers had been granted to the Admiralty to make nominations to it. In 1845, three of the commissioners so appointed, directors of the HWH&D - one of them was Jackson - applied to Parliament for a further Act with the object of increasing the dues which the commission could impose and altering again its constitution, "the chief reason alleged for incurring this expense (being) the preponderating influence of the old dock company in the trust";[46] independent members were to be preferred. What was unusual, if typical of Jackson, was that he had not consulted, or even informed, the HP&HC as to his intentions and naturally, it presented a petition against his Bill.[47] Nevertheless, the Act was passed and the old and new dock companies were enabled to nominate four members each to the 22 strong commission.[48] Since 1837 the commission's income had risen from £560 to £2,680 and now with its borrowing power raised to £50,000 it was considered that harbour improvements could be undertaken. Subsequently Sir John McNeil (1793-1880) reported that the principal requirement was a light house on the Heugh headland;[49] agreement was reached regarding its joint funding; W.O. Mossman was appointed as engineer; its construction began in 1846 and was completed the following year.

In 1845 the Tidal Harbours Commission heard evidence relating to Hartlepool, principally from Thomas Wood, secretary to the HD&R and Jackson, both of them commissioners. Jackson evidenced some bitterness that the commission,

* In 1857 the HD&R became part of the North Eastern Railway.

with an income of c £2,000p.a. should have spent £900 in opposing the Bill of the HWH&D but this was defended by Wood on the grounds that the new dock would have adversely affected the harbour. Jackson displayed some inconsistency in his evidence in that, although it had been he who had agitated for a revision of the constitution of the HP&HC, he now complained of the fact that the disinterested members he had sought lived up to 40 miles away and so were unable to mediate between the two antagonistic parties. The sense of antipathy between the two dock companies was reflected in the Report:

> Hartlepool owes its rapid rise chiefly to its southern outlet, the want of which is so much felt at Sunderland. This fortunate position has been in some measure seconded by the Dock and Railway Company, who have now a floating dock of 20 acres, where they can load 5000 tons of coal a-day; while the entrance is allowed to be one of the most easily accessible of any tidal harbours along this coast. The success of this port has induced the formation of a Hartlepool West Harbour Dock, about half a mile to the westward, the works of which are in an advanced state. But as it is hardly to be expected that two rival companies in the same port should agree upon any general plan for improvement, some independent control, free from local bias, seems to be absolutely essential. Complaints are made of ballast and stone being thrown over the cliff, and washed into the harbour; that the bight of the bay is filling up with mud and silt, caused by sluicing out of the Slake, and the fishermen with one voice declare their fishing ground has been thereby destroyed. 50

The Commission was correct in its conclusions.

The first meeting of the HWH&D was held in July 1844 and Jackson subsequently confirmed the purchase of the Stranton estate for £15,000.[51] It was soon announced that the company was working in close liaison with the S&HR and the HD&R was referred to as "the great, though unsuccessful opponent"[52] of the new company which already had the support of 23 collieries. The S&HR had already leased the Clarence Railway and these lines were anticipated as bringing satisfactory profits to the company; with only 14 collieries served by it the HD&R had managed to ship 600,000 tons in 1844.

The Act[53] for the incorporation of the HWH&D had legislated for the con-

struction of a dock and while the Bill was in Parliament Jackson was authorised

> to arrange with Mr. John Stephenson of Derby for his guaranteeing in Parliament the formation of the Hartlepool West Harbour and Dock at his estimate of £48,700 according to his Schedule of Prices - on the understanding that if the work ultimately go on, they shall be first offered to him for execution without public competition.54

It was later reported, however, that this figure had been increased to £52,400 and that Stephenson had estimated that the work could be completed within 18 months[55] but for no recorded reason, the contract was later awarded to Thomas Hutchinson* of Ferryhill at a price of £45,170.[56] Some changes were made to the plans for the dock: the entrance was increased to a width of 42 ft and it was decided to build two of the dock walls in masonry rather than as an embankment, a change leading to an increase in area but at a greater cost, some £7,000.

Negotiations with the L&TR, which sought an extension to Hartlepool so that the products of the West Riding could be shipped there,proceeded well. The intention of the L&TR had been to circle the town to the west before terminating on the east side of the HD&R's Victoria Dock[57] and this arrangement is confirmed by a drawing dated 1846 which shows, however, a differing form of dock extension. The drawing notes that the port, after extension, would be able to accommodate 250 ships of 500 tons register; it was noted, too, that a 740 ton ship (500 tons register) would incur port charges of £28 at Newcastle, £23 at Hartlepool and £19 at West Hartlepol.[58]

The first of the HWH&D's docks,the Coal Dock, was opened in June 1847 by which time a further Act [59] had authorised the provision of a second dock, the Jackson Dock of 14 acres. The first had proved a success: in 15 months 1,243 ships had cleared from it and 166,273 tons of coal had been shipped; from the old harbour the comparable figures had been, according to the directors, 880 and 155,628 when it first began operating.[60] The HP&HC recorded that in 1848 the number of ships clearing the port

* Hutchinson also constructed the S&HR.

from the old docks was 5088, carrying perhaps ¾ m tons of coal.[61] The dock authorised by the 1847 Act[62] - it was completed in June 1852 - had not been begun before a third Act was sought this one to improve the harbour and its protective breakwaters by means of building a new south pier to allow for the expansion of waves and the consequent reduction in their height to take place within the harbour.[63] These additions too were completed in 1852 and, designed initially by Simpson, the piers were later to be remodelled by Thomas Casebourne (1797-1864), engineer at the west docks, certainly from 1849, and the methods adopted by him, and perhaps by Jackson, in the somewhat arbitrary but effective design of the piers was outlined at the time of Jackson's death. The problems encountered had been

> due to the variable currents, winds, and storms, on the east coast of England, and in the Tees bay in particular. Though the new harbour was within the port of Hartlepool, it was carried into a much more exposed part of the bay, on account of the works of the old company; two simple north and south piers of Mr. Simpson had to be remodelled; and it was inevitable that success could only be attained by experience and experiment of a costly description. In all these matters Mr. Jackson, under the advice of the late Mr. Thomas Casebourne, M.Inst. C.E., was ceaseless in his industry and indomitable in his energy. In the end, the harbour was enabled to be kept clear of sand with scarcely any dredging; and by a series of inner piers, designed by Mr. Jackson, which formed a unique system of "wave traps" in the outer harbour, the sea was so broken that the lock gates, though only about 400 yards in a direct line from the pier head, were enabled to be worked with ease and safety at all times. The ultimate expense was greatly reduced by all the piers being, in the first instance, made of timber. These were, with little cost, altered as experience proved necessary; and, finally, were filled in and encased with permanent masonry. 64

To improve the harbour with respect to the difficulties noted above the commissioners in 1851 obtained a further Act, this time to build a very much more substantial pier or breakwater at the Heugh, a structure which would give much greater protection to the harbour and, in fact, play a great part in the suggestion made in later years for the provision of a vast harbour of refuge in the bay.[65]

The last of the moves made within the period considered was the

amalgamation of Jackson's interests into one. Since the formation of the HWH&D the docks had prospered in that in 1849 coal exports were 331,000 tons; in 1850, 533,000 tons; in 1851, 579,000 tons; and 1852, 630,000 tons: by 1852, the capital expended totalled £432,000 and revenue was some £15-16,000 p.a. What was a foretaste of the future was that in that last year some 1,600 tons of iron was exported and some 600 tons imported. To effect the change an Act[66] was obtained in 1852 to unite the HWH&D and the S&HR with the provision to lease or purchase the Clarence Railway, the new company being entitled the West Hartlepool Harbour and Railway (WHH&R). Before the change in title became effective the new Jackson Dock was opened, together with the extended harbour of 44 acres and a graving dock 320 ft long, the first publicly owned repair dock in the North-East. Some 25,000 people attended the ceremonies which celebrated also the fact that the Leeds Northern Railway (LNR), formerly the L&TR, had completed its line to Hartlepool and immediately afterwards the wind "brought up to the bay of Hartlepool several hundreds of vessels that had been detained (in East Anglian ports and)...no less than 200 vessels entered the docks where they found ample accommodation for loading and unloading their cargoes."[67] The two major railways of the North-East, the LNR and the YN&BR, had both achieved a foothold in Hartlepool although the former had failed in its major objective, to reach Newcastle.

In 20 years much had been achieved at the Hartlepools. Two rival undertakings had been formed, each with its own docks and railways and by 1854 coal exports had risen to 1.631m tons, 935,000 from the docks of the HD&R and 696,000 tons for the WHH&R. By 1851 capital had been expended to a total of £615,000 by the HD&R, £346,000 on the docks;[68] while the Jackson enterprises had reached a much higher figure: the capital of the Clarence Railway had reached some £600,000[69] - it had offered itself to the L&TR for £450,000- although a substantial sum was still owed to the Loan Commissioners; the capital of the S&HR, was £205,000[70]

and the total expended on the HWH&D had risen to £346,000.[71] After the amalgamation, the new company was capitalised at £1.994m[72] although in 1854 it was recorded that only £1.563m had been raised.[73] In view of what was to follow it is of interest to note Jackson's diversification, following the amalgamation,into the winning of coal:

> Having taken into consideration Mr. N. Wood's proposition for opening out the Merrinton coalfield, Resolved: that this Company agrees to advance the sum of £5,000 towards opening out and winning the above coalfield. The amount to be repaid by annual instalments of £500 each...the coals to be confined to the Clarence and Stockton and Hartlepool railways for exportation. 74

This entry would seem to be the only one relating to the monopoly which Jackson sought to achieve.

What was perhaps the most significant aspect of the development of West Hartlepool was the fact that Tennant's initial proposal, and Jackson's development of it, was the first in the region to intercept successfully coal from one outlet and transfer it to another for shipment; only the Durham Junction and the Brandling Junction railways had been similar in concept although not so effective as was the WHH&R.

4.7 Seaham Harbour

Seaham Harbour was little affected by the early public railways. For almost a quarter of a century from the opening of the harbour to traffic the only lines serving it were the Marquis of Londonderry's own railway from Rainton and Pittington and the South Hetton colliery railway, brought into operation in 1833. In spite of the apparent lack of railways in the vicinity of Seaham, Londonderry was active in his opposition to those which he saw as a threat and he opposed the formation of the Clarence, the Great North of England and the South Durham railways, the latter, as noted, on the grounds that as a parliamentary line it would not be subjected to high wayleave expenses and hence would compete unfairly with others.

Although both harbour and railway had been brought into operation

in July 1831 the construction of the harbour had not been completed. In that year its current state and its intended extensions were described by Chapman:

> The Inner Harbour, by Means of a Gate falling Inwards with the rising Tide, will not, at low Water, have less than seven Feet Depth; so that laden Vessels will be so far Water-borne; exclusive of which, its Bottom is either a hard Clay, or strong Harle, on which the general Run of Coal Vessels might have laid with Safety, as they do in many Coal Ports. Its Extent is not nearly what it is designed to be by its Noble Proprietor, the Marquis of Londonderry, and its Englargement will be progressively dependent on the Consumption of the Excavation that will be necessary to supply the very extensive Limekilns North of the Inner Harbour, and the internal Filling of the Piers, Tongues and Breakwaters, inclosing and forming the Harbours. The Breakwater, inclosing the Northernmost of those Harbours, is now in Progress of Construction, and each Face of the Tongues and of the North and South Quays, will not contain less than 8 Coal Shipping Places: the Intervals, whenever found expedient, may each of them be inclosed by an East Wall, with Gates, to form them into Half Tide Basins. The Gates, similar to that of the Inner Harbour, will contain Sluices, and be closed when the Tide falls to the required Level.
>
> The Height of the Breakwaters will be 6 Feet above ordinary Spring Tides, and each of their transverse Lines will have two Cross Walls, at 40 Feet asunder, to admit of an Opening being made through it, whenever an additional Harbour to the South may be formed, which may extend as far as the Ridge of Rocks run parallel to the Shore, or beyond that Limit, whenever expedient.
>
> The Progression of these extensive Works will, evidently, depend on the Quantity of Coals, from more or less adjacent Collieries, that may be brought to this Harbour; which, inclusive of Blyth, has a better Outlet to the South than any Harbour on the Coast; and in a good Offing to clear the Yorkshire Coast, in the long prevalent Winds from the E. and N.E. 1

Chapman envisaged the south harbour being built in stages with the falling gates subdividing it into three parts, extensions taking place as trade developed; the piers or tongues projecting from the land side of the dock were to provide more extensive berthing.

Ten ships loaded coals at Seaham in July 1831 and 101 in October; in all, 388 ships cleared the port in six months, the largest of them 271 tons register. By the following year the plans for the harbour's extension were again changed by Chapman proposing to form a harbour for light ships - it formed the north end of the earlier south harbour - to contain within it a smaller wet dock. With this extension there would be eight loading

berths which would be capable, extrapolating the tonnages already shipped, of dealing with up to 875,000 tons p.a., three quarters of the Wear exports.[2] Completion should adhere to this plan.

In 1832 a statement of the capital expended on the harbour showed that labour had amounted to £87,579, materials £7,881 and materials supplied by the collieries £22,963, including £12,457 for stone from Penshaw, a total of £118,424.[3] To complete the works a further £31,172 would be required.[4] On its first-stage completion the harbour was able to accommodate only 26 ships but nevertheless in the twelve-month period which ended in August 1832, 213,000 tons of coal were shipped, all presumably from Londonderry's mines and to the detriment of Sunderland where coal shipments from his collieries began to decline, so having the effect of reducing total coal shipments there from 1.256m tons in 1831 to 1.089m tons in 1835. Expenditure on the harbour had fallen; from £29,083, only for labour, it had dropped to £10,223 in 1832 and to £2,392[5] and without further finance becoming available completion was likely to be many years away.

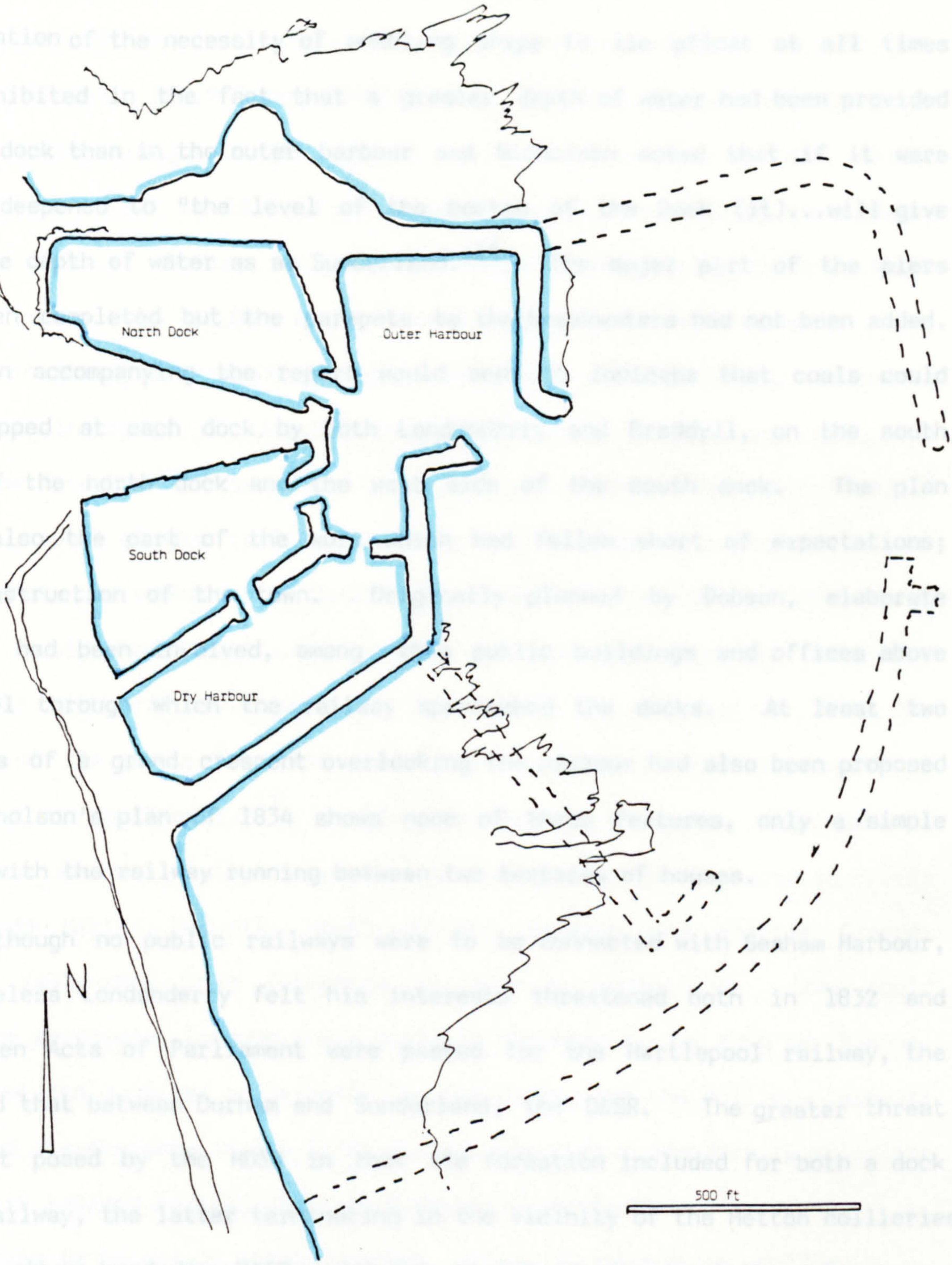
The necessity for enlarging the harbour was brought about principally by the developments which resulted from the successful sinking of the South Hetton colliery, some four miles south west of Seaham, by Braddyll, earlier interested in Seaham. In August 1833 the colliery, with its link to Seaham, was opened and in 1835 the railway was extended to a further colliery at Haswell.[6] The need for extended facilities at Seaham had been foreseen by Buddle, who at the end of 1832 had made enquiries as to the possibility of an Exchequer Loan. Telford was asked by the Loan Commission to report upon the harbour[7] although viewed with some suspicion by Londonderry who, considering that private finance was preferable, nevertheless admitted that Telford's assistance "may produce some if not the best relief."[8] Perhaps to ease relations between Londonderry and the Exchequer Loan Commissioners, Telford was informed that Londonderry wished to avail himself

of his "superior judgement and experience (and to appoint Telford)... as his consulting engineer in the further prosecution of the works,"[9] by this time the death of Chapman having resulted in Buddle's assuming full engineering control through the resident engineer, Thomas Nicholson.

Buddle, doubtful as to the outcome of expansion at Seaham, sought Telford's views on the possibility of bridging the river Wear so as to link the Durham collieries to the Tyne at South Shields. Telford sought further information from Buddle and was informed that expansion was vital as the harbour could at present ship only 240,000 tons p.a., a quantity barely sufficient for Londonderry's own output. As it was to be called upon to handle a further 410,000 tons from Braddyll's colliery at South Hetton a loan would provide the means of achieving its expansion.[10]

In reply Telford anticipated that he would need to obtain still further information from Buddle but had "such confidence in (his) judgement, experience and integrity, that it is more than probable, that from the information you will furnish and my knowledge of the localities, I shall be enabled to make a report"[11] to the Commissioners without undertaking a visit to Seaham; the sooner the application was made, the better. Telford estimated that a sum of £44,849 should be borrowed but in 1833 a loan of only £35,000[12] was granted, so enabling work to proceed; in fact a further sum of £42,414 was expended up to 1835.[13]

In that year Nicholson reported upon the harbour, then approaching completion. In the four years which had elapsed since it was brought into service construction had continued at a slower pace. After Chapman's death in 1832 Telford had been appointed as consultant but he had died in 1833 leaving the engineering work to Buddle. In spite of these setbacks the harbour had been completed to the reduced plan proposed by Chapman. The north harbour, although in use, was still incomplete in that drops were provided only on its south side; the north side remained to be excavated from the limestone headland. The wet dock, with three loading berths,



Pier proposals made by Nicholson in 1835

Map 14: Seaham Harbour

had been brought into use in July 1835 although it too was not yet complete. Appreciation of the necessity of enabling ships to lie afloat at all times was exhibited in the fact that a greater depth of water had been provided in the dock than in the outer harbour and Nicholson noted that if it were to be deepened to "the level of the bottom of the Dock (it)...will give the same depth of water as at Sunderland."[14] The major part of the piers had been completed but the parapets to the breakwaters had not been added. The plan accompanying the report would seem to indicate that coals could be shipped at each dock by both Londonderry and Braddyll, on the south side of the north dock and the west side of the south dock. The plan shows also the part of the work which had fallen short of expectations; the construction of the town. Originally planned by Dobson, elaborate schemes had been involved, among them public buildings and offices above a tunnel through which the railway approached the docks. At least two variants of a grand crescent overlooking the harbour had also been proposed but Nicholson's plan of 1834 shows none of these features, only a simple layout with the railway running between two terraces of houses.

Although no public railways were to be connected with Seaham Harbour, nevertheless Londonderry felt his interests threatened both in 1832 and 1834 when Acts of Parliament were passed for the Hartlepool railway, the HD&R and that between Durham and Sunderland, the D&SR. The greater threat was that posed by the HD&R in that its formation included for both a dock and a railway, the latter terminating in the vicinity of the Hetton collieries. On the other hand the D&SR, although having at its head the same area, did not feed directly to a dock system but only to the town of Sunderland, albeit with staiths on the river. What could pose a bigger threat was the Durham Junction Railway (DJR) with its bridge across the Wear enabling coal to be carried from the Durham collieries, either to the Wearmouth dock on the river's north bank or to the Tyne. The HD&R opened in 1835, the D&SR in 1836 and the DJR in 1838; through them, the source of Seaham's

potential trade was open to Tyne, Wear and Hartlepool.

Between 1831 and 1835 the total quantities of coal shipped were 93,000, 234,000, 275,000, 273,000 and 286,000 tons.[15] The opening of the South Hetton colliery brought 16,000 tons of its coal to Seaham in 1833, 75,000 in 1834 and 98,000 in 1835, figures apparently indicating that Londonderry shipments fell at Seaham but were presumably maintained on the Wear; in that year, too, 26,000 tons of coal was shipped from Haswell. The opening of the HD&R brought a change in that although total shipments at Seaham increased to 342,000 and 374,000 tons in 1836 and 1837, the quantities from South Hetton fell to 66,000 and 53,000 tons respectively[16] a direct result of that colliery shipping from Hartlepool. This situation, too, did not pass unnoticed by Buddle who in 1836 pointed out to Londonderry that "it would seem (his)...best policy to open his harbour to the public to compete with and participate in the benefit to be derived from the shipment of the coals from the coal-field in question with the ports of Sunderland and Hartlepool."[17] Buddle considered that Seaham would benefit due to the shorter haulage possible, the collieries best placed to profit being South Hetton, Haswell, North Hetton, Belmont and Whittle Grange, the two last-named then intending to ship at Sunderland. They could perhaps be persuaded, through cheap wayleave agreements, to ship at Seaham. Buddle saw the problem principally as one concerning the colliery lessees; one of the shareholders in the D&SR, Gregson, was also Londonderry's solicitor. Londonderry replied realistically to Buddle's suggestion:

> There is no use in a good harbour, unless it is made as profitable as possible. The more trade that is brought to Seaham the more the Estate and Town will receive and the larger the income that is obtained by shipment of the coals of others the more chance there will be that the very large expenditure on Seaham Harbour will be rapidly repaid. 18

Londonderry approved Buddle's suggestion that Gregson should be persuaded to ship at Seaham - he was not sanguine as to the outcome - and he extended Buddle's suggestion by proposing that efforts should be made to attract coal from the Bishop Auckland area; by so doing "it would give the go-

by to Hartlepool and the Clarence."[19] Perhaps without realising the diminution which was taking place in the South Hetton shipments, Londonderry suggested also that work should proceed with the building of an extension to the south harbour, part of Chapman's plan.

To permit completion of the harbour to be undertaken a second Exchequer Loan of £10,000 was received in 1836 for the purpose "of building two jetty piers to give further protection in easterly gales to the southern part of the South Harbour where light vessels lay before entering the dock"[20] and, on this work being completed, construction gave way to maintenance. By 1840 the cost of the harbour had totalled £158,178 for labour alone, the capital expended on it annually for the years 1834-9 having been £17,138, £11,156, £3,984, £6,022, £4,217 and £2,821;[21] revenue had amounted to £62,574.[22] By this time, too, Braddyll's loan had been repaid, as had the bulk of the Exchequer Loans, and it had also been possible, by exercising the option incorporated into the original agreement, to purchase from Shakespeare Reed the railway from Rainton and Pittington. In 1840 the line was valued at £13,950 for the railway works* and £8,771 for the buildings; the agreement made with Reed brought the railway under Londonderry's control.

The substantial completion of the harbour brought several changes: the harbour suffered in the 1840-1843 commercial depression - coal shipments fell to 209,000 tons in 1842[23] - which was exacerbated by involvement in Regulation matters; Londonderry's hands were severely tied by the Trustees appointed to manage his estates in 1834; in 1843 John Buddle died and was succeeded by Neville Hindhaugh. At Buddle's death the harbour's capital cost stood at £180,000 and an annual rate of return of 2½% had been achieved. Revenue had been used to pay off all but £21,000 of debt and the growing trade through the port - imports were virtually limited to timber - had caused the profits to average £3,471 between 1830 and 1844; between 1845 and 1852 they were to average £7,910.[24] Both the

* The valuation, by John Blackmore, included c £3,300 for winding engines.

involvement of Trustees and the events which led to the collapse of the Regulation in 1844 have been described by Burgess and need not be investigated again. What should be stated, however, is that between 1845 and 1854 the throughput of coal at Seaham amounted to 6-700,000 tons p.a., by 1854 standing at 735,000 tons, the figures corresponding with the profits generated in the comparable period. The harbour extensions and the facilities provided - the north dock was enlarged and further coal drops provided in 1845 - would seem to have imposed a limit of some ¾m tons p.a., on the quantity of coal which could be shipped at Seaham and it was this constraint which between 1850 and 1854 caused Londonderry, perhaps now influenced by George Elliott (1815-1894) from 1851 successor to Hindhaugh as Agent, to consider the options open to him.

The output of the collieries both of Londonderry and of the South Hetton company had been increased since Seaham Harbour was first used. Londonderry had opened new collieries at Broomside, 1835; Seaton, 1845, and Seaham, 1852 while the South Hetton concern had opened Haswell in 1835 and Murton in 1843.[25] To ship these coals three ports were available: Sunderland, where the South Dock had been opened by Hudson in 1850; Seaham, where extensions would be necessary; and Hartlepool, at which place an agreement would perhaps have been difficult in the light of past relationships. It is possible that the engineer's estimates in relation to Seaham deterred Londonderry from putting its extensions in hand, preferring to lay a cheaper railway - the cost would also be more predictable - to an established dock some six miles distant, a dock which had obviated the problems previously experienced when shipping from the Wear. It is possible, but not so recorded, that he entertained fears as to rival railway companies extending their lines to Seaham, so serving its mineral traffic, reducing its revenue and rendering worthless any improvement made to the harbour. It is understandable that the railway to Sunderland was the favoured course of action. Work began in 1853 and the railway was brought into operation in August

1854, permitting coal to be carried to the docks at Sunderland without the necessity of using the line of the D&SR, which had been utilised for the same purpose since 1852; the new railway cost c £50,000.[26]

Londonderry died in March 1854, before the railway between Seaham and Sunderland was opened. His involvement in the affairs of the North East coal trade was considerable both on a personal level and, perhaps more significantly, through the involvement of Buddle, his Agent from 1819. The two men together, in addition to their many other financial interests, had, almost single-handed, created the port of Seaham with two railways each six miles in length, opened quarries and kilns for lime production, operated eleven pits and built the town of Seaham. After the death of Chapman, ubiquitous in the North-East, much of the engineering work had devolved upon Buddle who, with perhaps some assistance from Telford for a short period, saw to it that construction progressed. By the time of Buddle's death in 1843 the ports throughput was c½m tons p.a.; by Londonderry's death it had risen to c¾m tons. The rise in the tonnage of coal passing through Seaham was spectacular as it was at both Hartlepool and on the Tees. Like these ports Seaham too was affected by the growth in coal shipments which occurred at Sunderland following the construction of the South Dock there although a part of the Sunderland Dock Company's success must be attributed to Londonderry's decision to ship his coal there, rather than at Seaham.

4.8 Warkworth Harbour, Amble.

Amble, at the mouth of the river Coquet, lies some 24 miles to the north of the Tyne, at the northern point of the coalfield. In the late 18th century the harbour had been used for the shipment of materials to and from a foundry at Acklington but by 1836 it was virtually disused.[1] Coal from Togston had been shipped on a small scale in the unimproved river from 1826 - it could have been very much earlier from other collieries - and in the same year further developments took place at Hauxley and

Radcliffe,[2] within two miles of Amble. Remote from any developed shipping point, colliery output remained low and it was not until 1832 that the harbour was reported upon by Hamilton Fulton, an engineer presumably acting for the owner or lessee of Togston colliery.

Fulton stated that at little expense provision could be made for exporting coal in ships with a draught not greater than nine or ten feet and suggested that a wharf be formed at Gibbon's staith, confirming shipments before this date. He recommended, however, the forming of a tidal harbour "immediately to the southward of the mouth of the Coquet..."[3] at Pan Haven, one of the advantages of providing facilities on the coast being that a greater tidal range would be experienced; the range on the coast was 14 ft and at Gibbon's staith 8 ft. Fulton further envisaged that the harbour would be sheltered partly by a rock outcrop and partly by Coquet Island, a mile distant from the shore. Piers should be built to protect the harbour's mouth. Fulton also noted that at Togston, the coal reserves were such that there should be afforded an ample profit on the capital invested, a sum which he estimated as being £15,000 for the harbour and £2,000 for the railway.

In 1835 the Radcliffe leases were taken over by Robert Kingscote and Thomas Browne who opened a new colliery and provided some impetus to the development of the area's mining and to the provision of a harbour.[4] A prospectus was issued putting forward the case for "the opening out of this valuable Coal-field...(and) the construction of a Harbour of Refuge for all vessels passing this dangerous coast."[5] Capital of £25,000 was sought and the harbour's net revenue was anticipated as being £6,500 p.a.; it was stated that the river had again been reported upon, this time by Robert Nicholson.

By June 1837 an Act of Parliament had been obtained for the establishment of the harbour but, rather than forming a company, it legislated for the formation of a commission, among its members being the Earl of Newbrough, two Radcliffe colliery lessees, Kingscote, Col.John Grey, Hugh

Taylor, agent to the Duke of Northumberland,and Richard Spoor of Sunderland.[6] The works were to be completed within a period of five years and protection was afforded to the fishing interests of the Duke of Northumberland (1785-1847), a requirement which was to have serious consequences. The Act laid down the maximum dues which could be levied - coal was to be 4d per ton - but stipulated that no tolls could be exacted until £3,500 had been expended on the harbour; borrowing was limited to £100,000, a sum very different from the capital originally envisaged.

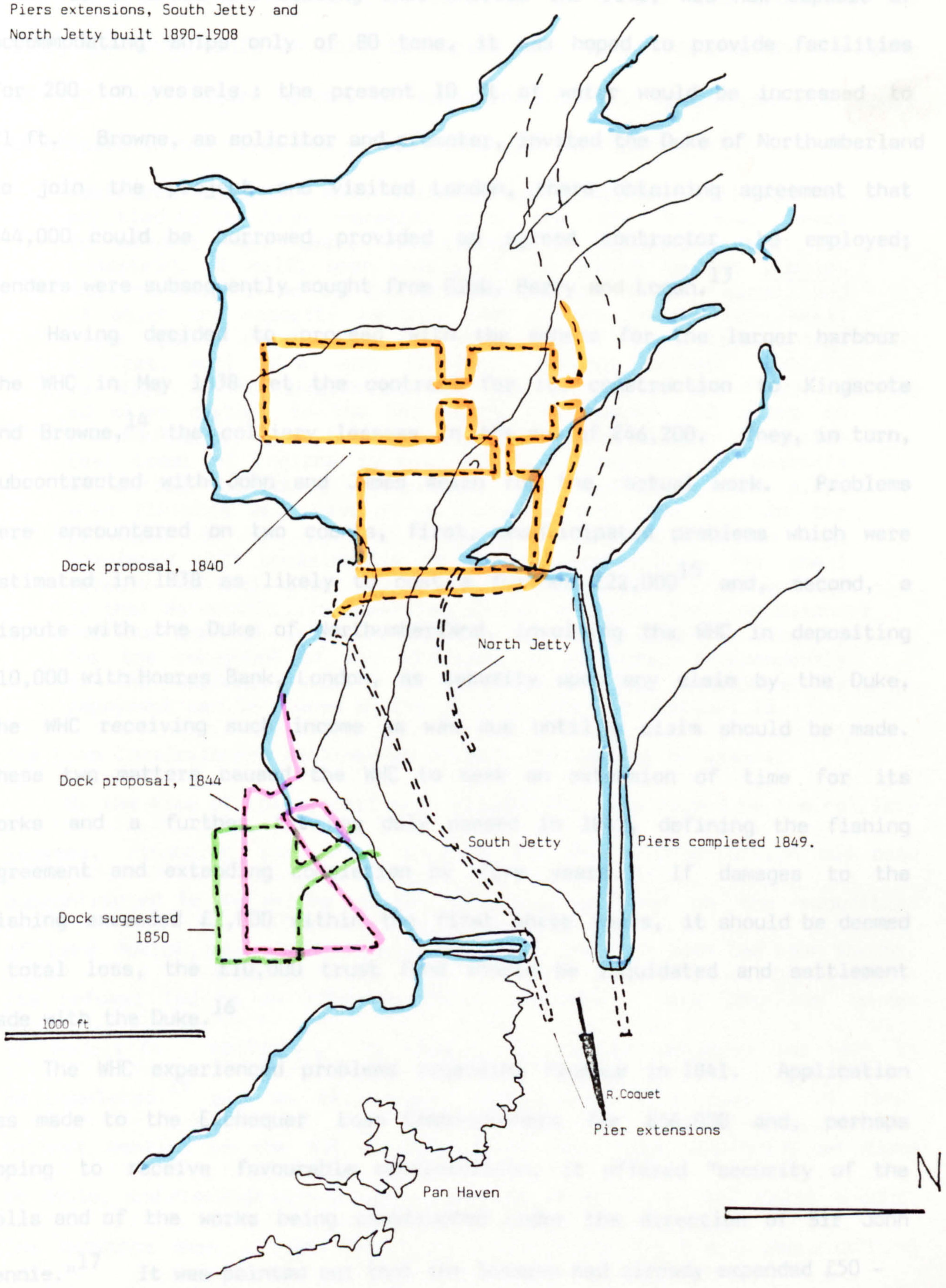
The first meeting of the Warkworth Harbour Commissioners (WHC), was held in August 1837 when Fulton's report was read, as was that of Nicholson. He proposed that a new channel be formed to the south of Pan rocks where a small haven would be protected by breakwaters founded on the rock outcrop, a scheme very similar to that suggested earlier at Blyth. The new shipping channel could be as narrow as 60 ft, but if funds permittted it would be better with a width of 120 ft. Nicholson envisaged the harbour as being of paramount importance as "without a means of shipment the coal must remain valueless and shut up for centuries to come, as there is no other port within 20 miles to which it can be taken."[7] His two schemes would cost £12,310 or £23,356.

John Murray was asked to give his opinion on the suggestion of Fulton and Nicholson; he was not encouraging. Murray thought that Nicholson's proposal to form a new channel would involve too great an expense as much of the excavation, in rock, must be undertaken below low water. If the channel were ever to be widened another considerable expense would be involved and these circumstances "compel me to give an unfavourable opinion to a project which appears theoretically to be good but in practice difficult to be attained."[8] Murray suggested that a jetty be formed to permit the river to scour a channel, following which a permanent staith could be built in deep water; this, together with a pier built of timber carcassing, would cost c £18,000 and if trade were to increase a further improvement

could be made by building a more permanent pier of rocks. Before work could proceed he suggested that the WHC "call in the eminent abilities of Sir John Rennie who has had more experience on harbours than any engineer of the present day."[9]

Before Rennie could report, James Leslie did, presumably called upon to give his views on the reports already received. He was critical of Murray's plan, especially as it took the river to the north whereas it was in the south that it should be deepest, it being there that trade would develop. Leslie put forward two schemes, in concept similar but in scale different. Each had a shorter south pier with a much longer one built to the north of the river to protect its mouth; the bigger scheme with the north breakwater 2,300ft long would cost £23,410 and the smaller, having the north breakwater 1,200 ft long, would cost £12,185. He did not approve, either, of Nicholson's idea of a river entrance at Pan Haven although a harbour there independent of the river would be acceptable.[10]

The last of the pre-construction reports was submitted by Sir John Rennie in 1838. In the course of a very exhaustive investigation he had tested the tidal range throughout the river's lower reaches, had taken trial borings and had investigated past storms and their attendant toll upon shipping, as well as reading the reports already submitted. Rennie thought that Nicholson's plan was impracticable in that considerable expense would provide only a small harbour; Fulton's plan, on the other hand, attracted him initially although he expressed grave doubts as to its silting up and thought that wharfage must be insufficient. Rennie considered Murray's plan to be good although some modification to it would be required but Leslie's proposals, a modified version of Murray's, were not thought appropriate as, having been excavated through rock, the river would not then be capable of deepening itself by its own scouring properties. After his rather severe strictures regarding Leslie's proposals, Rennie nevertheless adopted his pier suggestions but, instead of using the southern



Map 15: Warkworth Harbour, Amble, 1830-1854

line of channel, proposed one to the north, removed from the staiths;[11] the final form adopted was a compromise solution.

The WHC also wrote to Capt. Beaufort, Admiralty Hydrographer, showing what was intended and stating that whereas the river was now capable of accommodating ships only of 80 tons, it was hoped to provide facilities for 200 ton vessels : the present 10 ft of water would be increased to 21 ft. Browne, as solicitor and promoter, invited the Duke of Northumberland to join the project and visited London, there obtaining agreement that £44,000 could be borrowed provided an agreed contractor be employed; tenders were subsequently sought from Gibb, Barry and Logan.[13]

Having decided to proceed with the scheme for the larger harbour. the WHC in May 1838 let the contract for its construction to Kingscote and Browne,[14] the colliery lessees, in the sum of £46,200. They, in turn, subcontracted with John and James Welch for the actual work. Problems were encountered on two counts, first, unanticipated problems which were estimated in 1838 as likely to cost a further £22,000[15] and, second, a dispute with the Duke of Northumberland, involving the WHC in depositing £10,000 with Hoares Bank, London, as security upon any claim by the Duke, the WHC receiving such income as was due until a claim should be made. These two matters caused the WHC to seek an extension of time for its works and a further Act was duly passed in 1842, defining the fishing agreement and extending completion by five years. If damages to the fishing exceeded £1,000 within the first three years, it should be deemed a total loss, the £10,000 trust fund should be liquidated and settlement made with the Duke.[16]

The WHC experienced problems regarding finance in 1841. Application was made to the Exchequer Loan Commissioners for £36,000 and, perhaps hoping to receive favourable consideration, it offered "security of the tolls and of the works being constructed under the direction of Sir John Rennie."[17] It was pointed out that the lessees had already expended £50 -

60,000 in developing Radcliffe colliery and expected ultimately to produce from it c½m tons p.a.; other collieries were being exploited in the vicinity. With shipments of 200,000 tons p.a. revenue should be c £10,000. The Loan Commissioners insisted that the harbour be inspected by James Walker, who duly reported that whereas ships of up to 600 tons could use the Tyne, Warkworth would be able to accept only small vessels and in spite of the high figure given, he suggested that only 50,000 tons p.a. would be shipped in the first two years. His view was that

> Warkworth Harbour, when finished as proposed, will not be entitled to the high character which the word 'National' seems to convey; but that, nevertheless in connection with the roadstead, it will, when completed, be useful to the public. The harbour, of which the entrance is dry at low water, and of which the capacity is only what is due to the very small river upon a coast where the average lift of the tide is only 12 feet, must be a very imperfect harbour refuge; but it is also to be remembered that the estuary of the Forth is 60 miles distant to the Northward, the Humber 150 miles to the Southward; and the importance of harbours upon the North-East coast of England is well known....Warkworth can scarcely be called a harbour at present, but its break-water piers when finished will give it a claim to the name and on the principle of 'any port in a storm' I think the harbour when completed will occasionally be useful, particularly for small vessels running into it, when the tide is in...My opinion is that Warkworth...is deserving of the notice of the Commissioners for the Loan of Exchequer Bills; supposing always a security for the repayment of any advances, to be good, independently of the harbour; for I do not consider that dependence for repayment can be placed on the returns from the harbour. 18

The Loan Commissioners declined to advance the capital necessary.

By the time of this report only £10,000 had been raised by the colliery lessees, financing the works through the WHC. Construction had been subcontracted to the Welchs for £41,500 and it had been on the suggestion of Lord Howick, owner of Broomhill Colliery, that the loan had been sought. Its refusal led to an offer by Robert Ladbroke, from 1841 the lessee of Radcliffe colliery„ to advance all monies necessary for work to be completed [19] and on this basis construction continued. In 1840, without mention in the WHC records, plans were made to provide wet docks at Amble, and drawings were prepared., perhaps prior to an Act being sought. The drawings show a tidal basin of 3 acres with two 8 acre docks opening from it, all situated on the south side of the river.[20] By this time

the forming of the north breakwater, 2,300 ft long, was proceeding, a works railway leading from the quarry at Pan Haven and crossing the river to the north shore. Under the supervision of Rennie and Murray the pier was of masonry with slopes of 1 in 2 on the outer face and 1 in 1½ on the inner; it was to be raised only to a height of two feet above high water.

In their deliberations the Loan Commissioners had asked for a report on the colliery. It was duly inspected by John Buddle although his findings were not made known to the WHC until after the loan's refusal. He noted that the coal was of a quality similar to that at Blyth and although when shipped it would be 1/- p. ton cheaper than on the Tyne there should be no problems as only smaller ships could use Amble. Harbour and colliery, he thought, were "mutually indispensible."[22]

The unusual nature of the contract was almost certain to lead to problems: two of the colliery's former lessees - one of them its solicitor - were acting as contractors, under Rennie and Murray, for the construction of a harbour built, in effect, at the present lessees expense through a harbour commission; in turn, the construction work had been let to a sub-contractor with the major part of the materials, stone, being supplied to him by the main contractor! It is not surprising that Welch abandoned his contract in 1842, when others were sought to complete the work. The ensuing dispute involved all parties and in June Edward Western, solicitor to Ladbroke, wrote to Rennie regarding contractual matters, noting that the work was to have been executed under Rennie's supervision and be completed by 1 June 1842. Welch's men had not worked for some weeks; were they guilty of delay? Had all work been to Rennie's satisfaction? Would Rennie recommend that Kingscote and Browne seek the services of another contractor?[23]

Rennie's reply was judicious, if not evasive:

> As I am situated in the Contract being Umpire between the Contractors & you I think you will see the impropriety of my answering your questions until some arrangements be made as to the present disputes with the Contractors upon which I wrote to you yesterday. I shall be glad to explain this more fully when you call. 24

The outcome would seem to have been that a lawsuit ensued, much of the evidence relating to the site supervision provided under Rennie, at first by Robert Gibney and then by George Remington. The piers had been both re-aligned and re-specified but on their part, the contractors had not expeditiously proceeded with their contract.[25] The result is not clear but it was not until 1849 that Rennie certified the works as complete. The north pier had cost £101,239 and the south £15,746; of these sums £78,785 was for extras.[26]

In May 1844, with problems continuing regarding the design and construction of the piers, the WHC agreed to the formation of a Warkworth Harbour Joint Stock Company with a capital of £100,000 and borrowing powers of £50,000; already debentures totalling £60,000 had been issued. The prospectus pointed out that adjoining the harbour there was "a most extensive virgin Coal Field amounting to more than 100 square miles and by making docks and other improvements it is calculated that the whole, when opened out, will be shipped from this port."[27] If Hartlepool were taken as an example, the return on capital would be large. It was noted that Radcliffe, a mile distant, was connected to Amble by rail and was able to ship 150,000 tons p.a. Plans for a dock - it was not proceeded with - triangular in shape and 750 ft by 350 ft were prepared by Rennie;[28] it was to be sited on the south side of the river, virtually at its mouth. In form simpler than Murray's 1840 proposal it acknowledged the fact that the river would remain in its southern channel and not as he had earlier suggested. An added spur to expansion was provided in 1846 when the Newcastle and Berwick Railway (N&BR) informed the WHC that a branch to Amble was planned. Understandably, the commissioners resolved to petition in favour of the forthcoming Bill, "a measure so fraught with benefit to the revenue of the harbour".[29]

In 1844, 5,700 tons of coal were shipped; in 1845, 32,800 tons: revenues were £90 and £488.[30] Although shipments had not nearly approached

Walker's projection of 1841 and as the proposals to form a company had foundered, the WHC decided in 1846 to seek a further Act of Parliament, principally to increase its capital and to extend the time of completion of its works. Remmington prepared estimates showing that although almost £100,000 had been spent on the harbour, a further £44,500 would be needed to complete piers, jetties and wharfs, the extra costs having arisen principally because of the soft stone which had been used and because the foundations of the north pier had spread, involving much greater quantities of stone being required.

The 1847 Act [31] embraced two new general Acts, the Harbour, Docks and Piers Clauses Act, 1847 and the Commissioners Clauses Act, 1847 and it amended slightly the constitutionof the commission in that three nominees of the Duke of Northumberland were included, as were Felix Ladbroke, Edmond Calvert and representatives of the Broomhill colliery owned by the Grey family. It was to serve this undertaking that the N&BR had formed its railway to Amble.[32] The works were to be completed within five years and powers were given for raising capital and loans totalling £200,000.

After 1847 problems regarding depth of water in the harbour become apparent, also some disillusion regarding Rennie. Three years earlier he had been instructed to present quarterly statements of work done and in 1848 when a new jetty was being considered in relation to the Radcliffe staiths it was decided to seek advice from Leslie, involved earlier. Rennie and Leslie at once disagreed on the measures necessary and Rennie again propounded his view that a dock was needed to accommodate "the increased traffic which will, I trust, be shortly developed,"[34] two sites being envisaged, one at the river's mouth and the other further upstream. Some damage to the piers was occasioned at this time and to effect repairs and improve the harbour Rennie and Leslie agreed that the north pier be extended by 200 ft while they were both of the opinion that a dock should be constructed "in the space enclosed near the present staith and

that the cost of making the dock with a half entrance and a single pair of gates will amount to the sum of £32,500."[35] Rennie later changed his opinion as to the site of the dock, envisaging it on the site of the quarry opened to build the pier where excavation was half completed and where a three acre dock could be built for £30,000.

Due to the financial problems experienced by the colliery lessees in building the harbour and winning the colliery it was proposed by Ladbroke that a company be formed to build and operate the dock. The WHC resolved to give every support to the project and the prospectus, recording that £150,000 had already been spent on the harbour, sought a further £100,000 for the dock but noted that only two collieries were in production, shipping c 80,000 tons p.a.; this figure could rise to 400,000 tons and bring to subscribers an income of almost £9,000 p.a. With the Hartlepool and Sunderland docks in operation "it cannot be doubted that in a new coal district like that adjoining the Warkworth Harbour seeing how much the consumption of steam coal increased the foregoing estimates must be more than realised in a very short time."[36] Rennie and Leslie were to be joint engineers and plans were prepared by Remmington for a two acre dock near the river mouth.[37] An Act[38] was obtained but capital was not forthcoming and a proposal was made to amalgamate the dock company with the WHC, a move opposed by the latter, leading to its seeking to withdraw, at least temporarily, from the arrangement. Nevertheless it agreed that the contractors should be allowed to proceed, a contract for the work having been awarded by the dock company to Messrs. Rigby.[39]

The WHC was at this juncture informed by Western, Ladbroke's solicitor, that the latter - he had financed the whole of the project - was unable, or unwilling, to continue his outlay and had contracted to sell his debentures to the dock company. This crisis raised a query from the Duke of Northumberland (1792 -1865) regarding the amalgamation, which was about to become inoperative due to the shares not having been subscribed for within the requisite time. A further Deed of Amalgamation was submitted for

his approval and, although he agreed, the dock did not proceed.[40]

By 1854 the harbour had been completed and the output of the Radcliffe and Broomhill collieries was being shipped at the rate of 78,000 tons p.a.; serving only two collieries the port was completely dependent upon them and was not to increase the throughput of coal for some years. The capital expended on the harbour itself had been £125,000 and in 1841 it was estimated that Radcliffe colliery winning - 2,000 acres were originally leased for 42 years in 1839 - had cost c £60,000.[41] A railway from Radcliffe to the south of the harbour had been built and riverside staiths provided while the N&BR, by 1854 the NER, branch line five miles long brought coal from Broomhill; staiths had been provided by the WHC at a cost of £3,000[42] and had been leased to Broomhill colliery at £200 p.a. It is possible that a small quantity of coal was being shipped from the older staiths as in 1843 the owner of Old Togston colliery intimated that he may soon be shipping a greater tonnage at Amble.[43] The harbour by 1854 had not proved profitable; as the coal shipments had not been as great as expected revenue in that year was only £1,262[44] and the capital expenditure then given was £183,800, almost £60,000 above the initial construction expenditure. The involvement of the Duke of Northumberland in the WHC had proved difficult, Compensation for his fishery loss was not easily afforded and he had caused a delay at the beginning of the project by taking out an injunction against the WHC, so causing a stoppage in work: on the other hand, although there were three of his nominees on the commission he had not interfered in its management. It was not until 1847 that Walker was instructed by the Duke to report upon the feasibility of providing breakwaters to link Coquet Island with the mainland, so to form a harbour of refuge but, even so, no request was made regarding the harbour itself.[45]

The formation of the harbour at Warkworth had proved both difficult and expensive, in part due to the contorted construction procedures and to the conflicting engineering opinions. In addition, geological problems had limited the output of Broomhill colliery and, perhaps, of Radcliffe

also; it was only a change of ownership in 1854, when it was taken over by Joseph and John Harrison, which improved its working, so resulting in a better quality of coal being produced.[46] The change in ownership led also to the earlier preponderance of coastal shipments being reversed, and between 1854 and 1859 the percentage shipped abroad was to rise from 17% to 92%.

4.9 Summary

The quickening industrialisation of the country, especially developments in the North-East, brought with it an increasing demand for coal and whereas before 1830 the national coal output had risen at a compound rate of 2% p.a., after that date it increased at a rate of 3% p.a. What was of greater importance for the region was that its output of coal had increased from a rate of 1.6% p.a. before 1830 to 3.25% p.a. afterwards, leading to the North-East again achieving the 24% share of national production which it had possessed in 1815. A significant change, however, was in exports, increased eight-fold in 25 years, where a compound increase of 9% p.a. had been brought about by, amongst other things, the reduction of duties, so enabling U.K. coal to compete much more effectively in continental markets.

Coal Output and Shipments. 1830-1855[1]

	1830 (000 T)	1855 (000T)	1830-55 % p.a.
UK Output	30,375	64,448	3
NE Output	6,915	15,431	3.25
NE/UK %	22.8	24	-
NE Shipments	4,092	8,271	2.7
NE Exports	340	2,839	9
Exports %	8.5	34	-

In the North-East, demand for coal was met by the opening of two mining areas: in the north, collieries near Seghill developed outlets

on the Tyne for shipping their steam coal while in the Durham coalfield the main emphasis was on the exploitation of the deeper deposits in the eastern part of the county, a development which led to high-output collieries and the formation not only of improved shipping facilities but the building of new ports. This transformation had not taken place solely at the behest of the port authorities; much of it had been due to colliery interests and much was the result of railway development, in turn stimulated by mining.

Improved shipping facilities were most apparent in Durham where the two main factors were the mining of deeper seams and the aftermath of, first, the growing use of Parliamentary powers for the construction of public railways and, second, the introduction prior to 1830 of steam traction and later its development and universal use. The first of the composite railways, using locomotive traction in part, had been those carrying coal into Sunderland while the S&DR was the first of the railways proper although initially a composite line. It was the building of this railway which resulted in coal being shipped from the Tees; similarly, Londonderry's harbour at Seaham was dependent upon its railway and the port and railway at Hartlepool were conceived as a single entity. Significantly, it was the formation and, in effect, extension of the Clarence Railway which led to the establishment of West Hartlepool.

Shipments of coal from the North East Ports, 1830-1855[2]

Shipments	1830		1855	
	000 Tons	%	000 tons	%
Tyne	2465	60	3663	43
Wear	1387	34	1891	22
Tees	100(est)	2.5	298	4
Blyth	140(est)	3.5	196	2
Hartlepool	-	-	1612	19
Seaham	-	-	735	9
Amble	-	-	59	1

The development of the new ports affected dramatically the pattern of coal shipments. Within 25 years the share of the trade taken by Tyne and Wear had fallen from 94% to 65%, although each had increased its throughput; of the new outlets the most prominent was Hartlepool, where the total shipment of the two ports had grown so as to command 19% of the region's trade.

Change had not affected the Tyne and the Wear alike. To some extent isolated from the Durham coalfield , although still with its network of waggonways and colliery railways on the south bank of the river, the Tyne maintained a near-constant rate of increase over the period, albeit assisted by the shipment of coal from the Blyth area. To the south, the formation of Seaham Harbour had the effect of inducing a decline in the Wear's shipments, a trend which was not arrested for some six years; it was only the building of dock facilities at Sunderland which enabled the Wear to achieve new growth and again compete with the Tyne. The initial rates of growth of the Durham ports were dramatic, a figure of almost 10% p.a. being reached at Hartlepool; it was not to continue and although the Tees and Hartlepool both maintained their importance in the economy their peaks, so far as the shipment of coal was concerned, occurred in c 1840 and c 1860 respectively.

Coal Statistics: annual percentage increase (compound); 1830-1855

	Dates	%	
Tyne	1830 - 1855	1.6	
Wear	1830 - 1844	-2)	1.25 (av)
	1844 - 1855	5.5)	
Tees	1830 - 1840		
Blyth	1830 - 1855	1.3	
Hartlepool	1840 - 1855	9.5	
Seaham Harbour	1832 - 1855	5.5	
Amble	1845 - 1855	6	

The Wear suffered from the competition of Seaham Harbour and Hartlepool; both Londonderry and the HD&R drew coal from areas which the Wear would

formerly have exploited. More doubtful are the areas served by West Hartlepool and the Tees, perhaps too distant to have affected the Wear's growth. In 1845, each of the three ports shipped some 600,000 tons of coal, half of which would formerly have accrued to the Wear.

As railways developed in the region, to a large extent complementing the older waggonways, so the transport of minerals from one area to another became possible, an example being the shipment of Northumberland coal at Sunderland. In the period the influence of individuals on the early railway system became apparent: the Carrs, responsible for the B&TR; the Harrisons, involved in the S&TR; and, later, Londonderry, Tennant and Jackson who were able to undertake developments on a larger scale. It was, however, the advent of Hudson which was to produce the greatest impact on the region. His development of the YN&BR had a unifying effect upon the region's system and its completion, with links to the Midlands and to London, provided the North-East with a further outlet for its products. From the 1840's onwards it became possible for coal destined for London to leave the region by rail as well as by sea.

The North-East ports were saved by the economics of transport. Although rail transport had ousted road, the carriage of coal by sea remained economical in comparison with rail and as a result the railways continued to act as feeders to the ports in spite of forming an outlet in themselves. Even the formation of the North Eastern Railway in 1854 was not to change matters and it, like its predecessors, engaged in the building and management of dock and harbour facilities. The region's three principal rivers remained under the control of Corporation, commission and company. On the Tyne, the Corporation of Newcastle had undertaken little improvement, although greater efforts had been made subsequent to the Municipal Corporations Act of 1835. The Corporation, however, was not averse to others providing the facilities needed and its approval was given to several proposals put before it for dock construction, whether

by company formed for the purpose or by railway interests. None, however, was built before 1854, not even that proposed by Hudson. Failure would seem to have been due principally to lack of available capital, in part, a result of continuing railway development. There was perhaps the fear that dock facilities would not be complemented by river improvements and in spite of the many proposals made, the Tyne was forced to rely on private colliery facilities for its trade, the Corporation itself having, in spite of the changes brought about, settled down to "a regime of parsimony, inaction, laissez faire and great complacency."[3]

The Wear, in contrast, fared better. The several suggestions made for docks eventually resulted in the construction of the private venture of Sir Hedworth Williamson on the north bank and the dock of the Sunderland Dock Company, backed by Hudson, on the south; his intervention later brought under his control the Wearmouth dock and the D&SR. The need for dock facilities on the Wear was vital; not only was its waterway inferior to the Tyne but its trade had suffered especially as a result of Seaham Harbour. Hudson, and the dock company, transformed the port and from a decline of 2% p.a. a 5.5% p.a. increase was achieved between 1844 and 1855. Over the period 1830-1854 as a whole it had lagged behind the Tyne. On neither river had the conservators seen themselves as responsible for dock construction, perceiving their role only as that of river improvement. This view was taken also by the TNC, responsible for navigation on the Tees.

The conditions governing the development of both Tyne and Tees were similar; each had its principal town, where was based the river government, a considerable distance upstream and each saw its role as one of maintaining a navigable channel only to that town. Relatively, the Tees was more progressive than was the Tyne in that it made itself responsible for two major projects of river improvement but, again, it left the construction of a dock - it was the only one built - to the Pease interests,

to be later taken into the S&DR. The Tees suffered, too, from the conflicting interests of its towns - to be detailed later - but nevertheless it was enabled to become a major river in the region, ironically at the expense of Stockton, formerly the principal town. From 1850 the nature of the trade of the Tees began to change due to the discovery and working of nearby ironstone deposits and, although this trade prospered, coal exports fell from this time, principally due to the marked increase in the use of coal in the burgeoning iron industry.

The three remaining ports on the Durham coast, Seaham, Hartlepool and West Hartlepool, were with Amble different in character; in effect, each was the outlet for a single railway carrying coal for shipment. As such, they were subjected to no outside constraints other than the raising of capital, their sole purpose being to meet the need of the trade. Under the influence of Londonderry, Tennant and Jackson they prospered with the combined Hartlepools achieving a growth rate of 9.5% p.a. over a 15 year period; the comparable figures were 5.5 for Seaham Harbour and 6 for Amble, all significantly higher than those for the established ports.

The construction of docks at the Durham ports marks clearly the improvements made at the behest of the region's colliery interests. What is somewhat nebulous, however, is the magnitude of the changes made in the rivers themselves. The construction of piers and quays is self-evident but conditions in the rivers' channels are less clear due to the increasing use of steamboats for towing colliers up-river and to sea. Joseph Price, credited with being the first to use steam power for this purpose, claimed that whereas ships exceeding 240 tons register had been unable to reach Newcastle, "after the introduction of the towing system, vessels of 400 tons register were brought up..."[4] and as a result the potential usefulness of a ship had been raised substantially. Dredging was undertaken on all rivers, spurs projecting into the rivers were removed

and loading facilities improved, the latter at private expense. In 1833, cargoes from the region to London averaged some 300 tons but the end of the period, after the introduction of iron ships, saw steamships carry c 9,500 tons to London in 17 cargoes, an average of 558 tons. Emphasising the disparity between cargoes to London and other ports, by 1855 the average cargo leaving the Tyne - assuming that 90% were of coal - was 225 tons, and from the Wear 215 tons but other evidence relating to ship sizes is inconclusive and in some cases subjective and biased. Ship sizes had increased but nevertheless the river works undertaken had provided accommodation for them; between 1812 and 1842 the maximum tonnage of ships able to use the Wear had risen from 250 to 350 tons. At Seaham Harbour, in the early years, the biggest ship to use it was of 271 tons. On the Tees in 1847, 11,974 ships took from the river 317,000 tons of coal; again using a 90% load factor the average cargo amounted to 294 tons. The only conclusion must be that ship sizes were generally similar throughout the region. It is probable that shipowners extolled the virtues of particular ports; it is possible that ships' dimensions could influence the choice of port, the relationship between draught and beam governing especially the utilisation of dock entrances; and it is certain that port dues related to ship configuration, so rendering difficult the comparison of port charges.

Personalities were significant in the development of the North-East. The most prominent have been noted and it was through them that the Durham ports were founded and the railway system built up, before being subjected to leasings and amalgamations. By 1854 the system had polarised into the North Eastern Railway - its formation will later be detailed - and four smaller ones, the S&DR, the B&TR, the N&CR and the H&DR. The railways' impact had been profound and of the engineers involved, Thompson, Wood and Buddle made notable contributions to railway construction while little need be said of the two Stephensons through

whom the locomotive had been brought into universal use. In the field of river engineering, most prominent were the Rennies and locally, Brooks and Murray, employed on the Tyne and Wear respectively but undertaking consultancy work also. In spite of their efforts, development and improvement had been sporadic - except perhaps on the Wear - but the responsibility for this must be attributed to the governing authorities, although by 1850 great changes were beginning to take place.

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45. Coquet Island Harbour: Report of James Walker, Civil Engineer, addressed to His Grace, the Duke of Northumberland. (28 January 1847) (NCRO:ZHE 23/4)
46. W. Fordyce, op cit, p 86.

Summary

1. W. Fordyce, A History of Coal... op cit, p 106.
   (See also Appendix)
2. See Appendix.
3. M. Callcott,"The Challenge of Cholera: The Last Epidemics at Newcastle upon Tyne" Northern History, vol xx, 1984, p 168.
4. D. Dougan, The History of North East Shipbuilding (Newcastle, 1967) p 28.

5. CHANGES IN RIVER GOVERNMENT, 1850-1859.

5.1 Introduction.

Before 1850 the development of the North-East had been concentrated on the winning of coal and its transport by rail to the region's ports where improvements had been, with certain exceptions, relatively small in scale and privately financed; the only public authorities were the River Wear Commission and the Newcastle Corporation, the latter having done little. After 1850 the nature of the ports changed, a transformation brought about by the creation of river commissions on the Tyne and the Tees, the rationalisation of interests on the Wear and the establishment of a company at Blyth. These events were not directly connected but nevertheless they were inter-related.

Change came first to the river Tyne, a result of the long-standing rivalry between the towns of Shields and Newcastle, the former seeking a measure of control in the river's affairs and also its improvement. Perhaps intensified by the growing shipment of coal from the Durham ports, pressures resulted in the formation of the Tyne Improvement Commission, later to undertake improvements of a magnitude not until then experienced. Somewhat analogous were the developments which occurred on the Tees where Stockton, earlier dominant, in the 1850s became threatened by Middlesbrough in terms of population and overshadowed by it in terms of trade. It was the rivalry between Stockton, embodied in the Tees Navigation Company, and Middlesbrough, as the Stockton and Darlington Railway and the Pease family, which was to lead to the formation of the Tees Conservancy Commission.

On the Tyne, change was political; on the Tees it was demographic. On the Wear, however, events were the result of economics, brought about by the uneasy relationship existing between the long-standing commission and the Sunderland Dock Company, which sought links with both the Commission and the NER. Until 1854 the river Blyth had been, in effect, the property of the Ridley family. As new mining areas began production, it became

obvious that the river was inadequate and the colliery interests went to some lengths to ship coal on the Tyne, rather than at Blyth where inadequacies were emphasised following the formation of the Tyne Improvement Commission, it then becoming apparent that substantial river improvements there would be to the detriment of Blyth. In an effort to inject additional capital into the port the Blyth Harbour and Dock Company was formed.

No less important was the formation of the NER in 1854, to be a major factor in the future of the region, not only because of the facility it offered for the movement of minerals but also because it was independent of the coal producers, many of whom had originally been instrumental in promoting and constructing railways to secure their own needs. These major reorganisations were to change the scale of the improvements made to the region's ports.

5.2 River Tyne

The dispute between Newcastle and the down-river towns of North and South Shields was of long standing. As early as 1655 Ralph Gardiner (or Gardner) had published a book registering his complaints as to the iniquities endured at the hands of Newcastle Corporation by the merchants of North Shields, of which group he was a member. His principal complaint was that ships should not be forced to travel to Newcastle only to unload ballast when their intention was to load cargoes at Shields; the ports should be severed and "the trust of the river of Tyne be put into faithful commissioners hands; the mayor and aldermen and commissioners of Newcastle having betrayed the trust reposed in them for conservancy thereof."[1] Contemporaneously, Gardiner petitioned Cromwell[2] as to the state of the river but, again, he achieved nothing; neither did the shipowners of Shields when in 1800 they unsuccessfully attempted to form a commission to administer the river. By 1832 competition from other ports had become evident. Change was necessary but to achieve it "petty jealousy of sister towns must be laid aside, and their just influence in the confederation heartily acknowledged."[3] Only by so doing, it was said, could the two towns of

Shields flourish and Newcastle retain its pre-eminence as a provincial capital. The principal catalyst was the passing of the Reform Act of 1832 by which Parliamentary representation for Northumberland and Durham was increased from 10 to 18. Newcastle retained its two representatives and new constituences were created in Sunderland, Gateshead, South Shields and Tynemouth. Newcastle lost its supremacy and its electorate increased from some 3,000 freemen to c 5,000.[4] In 1835 the passing of the Municipal Corporations Act, with the opportunity for new Council members to be elected in place of the long-standing oligarchy, provided a further stimulus for change in river government, control of the river becoming the responsibility of a River Committee.*

In relation to this later Act, an Inquiry had been held in 1833 regarding the operations of the Corporation. It showed that of some 1,000 ships owned on the Tyne, one third each was owned in North and South Shields, the Tyne being the second port in the U.K. so far as tonnage was concerned. It also revealed that the river was still largely unimproved with only two of the 20 items suggested by Rennie completed. It confirmed, too, the river's reliance on the coal trade; of 11,726 ships leaving the Tyne, 10,322 - 88% - carried coal, 9,740 of them coast-wise.[5] As the Inquiry proceeded representations were made for the ballast dues received by Newcastle to be distributed to the towns of Shields, as Newcastle's trade was "now infinitely multiplied by the inhabitants of South and North Shields..."[6] The Inquiry showed that in a period of ten years the income received by Newcastle from the river had been £137,319, of which only £5,133# had been spent on improving its bed.[7]

The resulting municipal reform did improve the attitude of the Corporation towards its river. Expenditure increased, groynes were built, the Newcastle quay was improved and a start was made to the removal of Bill Point. What was referred to as work of "a fitful and partial character"[8] in reality

* At first comprising 26 members it was later reduced to 20.
# The earlier quoted figure included maintenance and salaries, as well as capital expenditure.

referred to lack of effective dredging; little of the work undertaken by Anderson and Brooks was later modified. The attitude of Newcastle Corporation did not change towards the towns of Shields and Gateshead where it opposed almost any improvement suggested by them. Objections had been made to Gateshead's proposal for quay improvements in 1838; at South Shields, Mill Dam had been filled; and when North Shields in 1840 sought to build a quay the Newcastle Corporation declined to commit itself in any way.[9] North Shields became incorporated in 1847 and South Shields the following year.

Shipping had so increased by 1844 that the Trade and Commerce Committee recommended that attempts should be made to increase the standing of the river by seeking its classification as a first-class port, as it was now, in terms of registered tonnage, second only to the Thames and its revenue was nearly equal to that of Glasgow, already a first-class port. The Treasury did not agree to the reclassification but six months later the Corporation was informed that an Act was being sought, its object to form a Commission to provide both a river police force and improved mooring facilities. Initiated by Shields shipowners, as had been the 1833 representations, the resulting Newcastle upon Tyne Port Act, 1845 was funded by dues on all ships using the port. The promoters had contended that the Corporation should defray the costs from its own receipts but "true to its ancient character, (it) refused, and the shipowners, rather than lose (the advantages gained)...agreed to the imposition."[10] After acrimonious discussion with the Corporation it was finally agreed that the Committee should comprise 12 Newcastle councillors with four North and four South Shields shipowners.[11]

Newcastle and Shields again came into conflict in 1846 when the down-river shipowners complained of the state of the river's bar, maintaining that it had perhaps worsened since the time of Rennie's report; later figures showed that whereas in 1841 a depth of 9' -2" was available, by

1847 it had decreased to 6' - 1".[12] In 1848 the ports of Newcastle and Shields - from a Customs point of view - were severed, a move initiated by the two towns of Shields which, independently, had memorialised the Treasury to the effect that 100,000 tons of shipping was registered in North Shields and 99,000 in South Shields, the latter shipping 1½m tons of coal p.a. from 16 staiths. Newcastle responded by itself memorialising the Treasury as to its predominance on the river and, pointing out that similar applications which had been made in 1816 and 1830 had been rejected,[13] admitted that facilities could be provided at Shields without dismembering the port. There was also the view of Newcastle merchants that the granting of a Custom House to Shields could mean the withdrawal of facilities from Newcastle.[14] With proposals having been already made for docks at Coble Dene and at Jarrow, both sites within what was to be the Port of Shields, it is understandable that this view should have been taken. In spite of the Corporation entreating Earl Grey to intervene on its behalf the decision was made that a Custom House be established in North Shields, the division between the two ports running between Jarrow Quay and Whitehill Point.

The North Shields merchants, however, were still not satisfied and in July 1848, while congratulating themselves on the fact that the custom house had collected duties at a rate similar to Sunderland's £77,000 p.a., they drew attention to the inconvenience of the boundary line and to "the unprecedented regulations by which the political influence of the town of Newcastle has for the present been enabled to fetter the independent action of the port of Shields."[15] Six months later, a meeting was held in North Shields "to take into consideration measures for the Conservancy of the Tyne,"[16] the first item discussed being the financial state of Newcastle Corporation; river expenditure had totalled £10,824 while the sum appropriated for town improvements amounted to £17,172. The next day a similar meeting was held in South Shields but its main thrust was

directed towards the unsatisfactory and dangerous condition of the river. Within a month a Conservancy Bill had been prepared and an Admiralty preliminary inquiry was under way in North Shields.[17]

The Bill was debated in the Newcastle Council, its main opponent being Lockey Harle who after commenting on "certain mysterious advertisements"[18] which had recently appeared, shielding the Bill's promoters, attacked the towns of Shields firstly for having mistakenly obtained their separate custom house and secondly for criticising Newcastle for its inadequate conservatorship. Harle asked whether "so much had been done on any given water as on the Tyne"[19] without an increase in taxation, and pointed to the construction of almost 15,000 feet of new quays,* some 6,500 ft of protective river walls and some 3,500 ft of groynes. Harle also commented that Newcastle had promoted the well-being of South Shields by supporting the dock# there and stated that the principal problems were the jealousies of the two towns of Shields; what was done to further one would antagonise the other. His attack ended with a plea that all the river's boroughs should oppose the Bill, "erroneous in principle, unjust in detail."[20] His proposal was agreed to, unanimously, with the exception of William Henry Brockett (1804-1867), proprietor of the Gateshead Observer, who tabled an amendment to the effect that as Shields and Gateshead were now of relatively greater importance, some form of Conservancy should be adopted following negotiations with all interests.

The Preliminary Inquiry was conducted by Captain John Washington R.N. (1801-1863) and the promoters represented by their barrister, Thomas Leitch, and the opposition, Newcastle Corporation, by its Town Clerk, John Clayton (1792-1890). Much of the evidence concerned the navigation of the river and the problems associated with the handling of ballast. It was maintained that the river had actually deteriorated over the years, principally due to a lack of dredging, although steps had been taken to remove certain of the more serious obstructions. Ballast caused problems

* Predominantly, they had been financed privately.
# In fact, a dock at Shields would render it less necessary for Newcastle to improve the river.

on three counts: if cast at sea it rendered difficult and dangerous the bringing of ships into port; when off-loaded in the river its handling was the subject of many abuses related to careless or wilful casting overboard; the dues payable in respect of ballast were, on the Tyne, exorbitant, several times the cost imposed on the Tees. The Tyne was also compared unfavourably with the Wear and with most other ports, and one witness, George Straker, often in dispute with the Newcastle Council when a member of it, rightly claimed that it was now declining in importance.

For the Corporation, Clayton listed the improvements which had been made to the river, noting that nothing at all had taken place until 1787 when John Fryer had suggested the removal of stones from the river bed. Since 1816, however, improvements had taken place at an increasing pace and Clayton cited the several surveys made as an indication of the Corporation's desire for improvement. He also propounded the view that shipowners should not be appointed as commissioners - they could remove their trade to other ports - but coalowners were much more suitable; his view, though, was that the Corporation of Newcastle, with its 56 members, was much better suited than the proposed commission with its six members from Newcastle and Gateshead balanced by the three each from North and South Shields.

From an engineering aspect, evidence was given by Nicholson, Simpson and Brooks. Nicholson's main criticisms concerned the deposition of ballast in the river and its entrance and the river banks themselves, where slippage was in evidence and loose material was being washed into the river, as it was from the ballast heaps. Simpson advocated the provision of free tidal movement in the river, best achieved by removing Newcastle bridge, and the provision of additional dredging, noting that only two machines* were in use whereas on the Clyde five were employed when necessary. The Corporation's engineer, Brooks, was probingly questioned by Washington as to his past employment and his work on the Tyne. Formerly engineer to the Tees Navigation Company, Brooks stated that he had spent £60,000

* One dredger had been borrowed from Hartlepool.

on river improvement within a period of five years and his system of groynes there had substantially improved that river but he admitted that the Corporation had done little to improve the Tyne east of Jarrow. In making a case for the promoters, Leitch deplored the lack of river improvement, compared it unfavourably with the Wear and noted that it "is manifest that the Corporation have shown the grossest partiality towards Newcastle, not to speak of the circumstance of 63,000L...having been expended on the extension of Newcastle Quay, whilst not a shilling had been spent on similar works at Gateshead, and...at North and South Shields."[21] He found it impossible to ascertain how the river revenues had been mis-appropriated but emphasised that c £½m had been lost to the river since 1809. It was now imperative that a Commission be established.

Washington's report, published in May 1849, was a scathing indictment of the Newcastle Corporation on all counts, financial, operational and engineering. Favourable comment concerned only the Newcastle quay and its cranes, the Bill Reach improvements, graving docks at North Shields and the use of steam tug-boats and it concluded that it

> must be manifest that the several duties usually attached to the conservancy of a harbour have not been attended to on the Tyne; that the most ordinary duties of river engineering, such as regulating and deepening the channel, cutting off projecting points, dredging away or otherwise removing the shoals, so as to produce a uniform bed of the river, have all but been entirely omitted; that sufficient quay accommodation for the traffic has not been provided; that no attempt has been made to improve the bar, or to get rid of the obstruction to the tide by the piers and starlings of Tyne Bridge; that the casting of ballast close to the entrance, and to a large extent in Shields harbour, had not been prevented...22

The subsequent Parliamentary Committee recommended that the Bill be amended so as to give additional representation to Newcastle and Gateshead and, with that provision, it was brought to both Commons and Lords, only to be withdrawn through lack of available time.

As the Bill was to suffer some amendments it is apposite to list the membership of the Commission which resulted from the several proposals.

	Conservancy Bill, February 1849	H of C Committee June 1849	Conservaancy Bill, 1850	Navigation Bill,1850	Tyne Improvement Act, May 1850
Newcastle upon Tyne	4	6	3	9	6
Gateshead	2	2	1	2	2
North Shields	3	2	3	2	3
South Shields	3	2	3	2	3
Admiralty	-	5	5	-	4*
Trinity House	-	-	-	2	-

With the prospect of impending defeat, the Newcastle Corporation, critical of Washington's "unfair and partial report,"[23] delegated its River Committee to suggest means of improving the river. Its deliberations led to Cubitt and Rendel preparing plans for piers at Shields which together with the removal of the several river projections, were estimated as costing £100,000, a figure which certain members of the Council found it hard to accept, thinking that some £½m, the estimate made by Rennie in 1816, would be needed.[24] Nevertheless it was decided that the Corporation should promote its own Tyne Navigation Bill, suggesting that Newcastle should have nine representatives with, in addition, two nominees from Trinity House, responsible for navigational matters. As the Tyne Conservancy Bill was to be re-introduced, the Corporation again petitioned against it on the grounds that it was "desirous of further improvement of the river, and of putting an end to the disputes which have arisen..."[25] and with both Bills in Parliament a further Admiralty Inquiry was held, conducted by Edward Lawes and James Abernethy (1814-1896).

As before, evidence was somewhat inconclusive. Due to the use of steam tugs on the river, it was stated, vessels of 400 tons capacity could now load at Heaton spouts whereas formerly they had to be loaded from keels, as few as 100 keels remaining in use. Clayton was reminded that

* Two Admiralty nominees would not subsequently be replaced.

although he had earlier stated that the removal of Bill Point "would destroy one of the finest natural docks in the world and would do incalculable mischief to the trade of Newcastle"[26] this had not been so and ships could now travel to Newcastle within the day, a considerable improvement. It was noted that Sunderland dock was almost complete, that Wearmouth dock was not well used and that the Netherton colliery, now shipping at Blyth, was planning to ship its coals at Sunderland, rather than on the Tyne. Ralph Park Phillipson (1799-1879), a Newcastle councillor with colliery interests on both Tyne and Wear, stated that although the Tyne was cheaper, the two rivers were physically comparable but the River Wear Commissioners were more active in river improvement than were the Tyne's conservators.

Engineering evidence was conflicting. Speaking on behalf of the promoters of the Navigation Bill, Brooks was critical of Rennie's plans and claimed that his own proposals were such as to render wet docks unnecessary, the Tyne now being "superior to any port in the kingdom, or in any country; large fleets may even now leave at half an hours notice, provided they have steam-boats to take them away."[27] He also explained that Rendel and he proposed further river works above Newcastle so as to open up a large expanse of land for industry. Further support was given by Rendel's assistant, Alexander Comrie who had designed the proposed piers. In his opinion the river had been improved, a view disputed by Edward Kinlick Calver (1813-1892) who commented that he had "never seen the banks of a river in such a state as they are here."[28] Nicholson,* also in opposition, considered that not nearly enough had been done to fulfil Rennie's plan but recommended the partial enclosure of Jarrow Slake, combined with extensive dredging. He also disagreed with Brooks concerning his estimates; the works above bridge would cost £117,500 while those below would cost £313,420,#

A new development in the Inquiry was the evidence given by Joseph Cowen

* Nicholson stated that most of the river staiths, up to 300 ft long, had been built between 1826 and 1840.

Brooks had given figures of £9,266 and £133,984.

(1800-1873) who asked that the towns up-river of Newcastle be represented on any commission. Industrialists with up-river interests had concluded that the Tyne Navigation Bill would benefit them most and they intended to support it. He listed the several industries involved - chemicals, coal, iron and glass - and stated that some 150 craft were at present employed on the upper reaches of the Tyne. Further opposition was also expressed by Leitch, proponent of the Conservancy Bill, who congratulated Newcastle on having, 34 years previously, asked Rennie to report on the river. He had produced an invaluable report whereas the Corporation now had only "an ill-digested scheme of river works (designed by Brooks with)...the object of making the river a better ship canal to Newcastle."[29] Little mention was made of shipbuilding, although reference was made to the fact that whereas Smiths built ships of up to 1,500 tons, once in use they were unable to return to the Tyne; if the river had been improved in 1840 it could have had a share in the India trade.

Lawes and Abernethy duly reported their findings. The river should be governed by an independent board; the membership should be divided equally between Newcastle and Gateshead vis à vis Shields; there should be Admiralty representation in view of the river's importance as the principal coal-port in the country; separate representation for the area above Newcastle was not appropriate; and the question of river improvements should be postponed until the new Commission had been formed. The most important clause, so far as Newcastle was concerned, was that regarding membership, "inasmuch as of the 17 members of whom the proposed Board would consist, 13 represent that part of the river in the immediate locality of...Newcastle; nine being members of the Town Council..."[30] In general Lawes and Abernethy, favoured Rennie's proposals and were saddened by their remaining unfulfilled. They were also sceptical concerning the effectiveness of the newly-proposed river works, due largely to the imperfect state of the deposited plans, and the absence of the necessary data, perhaps

leading to excessive costs.

In its subsequent report to Parliament the Admiralty relied heavily on that of the inspectors and similarly it declined to recommend representation; nevertheless, a separate Commission was considered essential. The Admiralty concurred that the river had deteriorated over the years, in that improvements "have not been carried out to the extent and efficiency which the interests of so great a shipping port so powerfully demand"[31] and the report led to the proving of the Bill's preamble and with both Bills in this state, agreement of the rival parties was sought. Failure to agree on representation led to its being decided by the House of Commons, each party in the dispute choosing two life commissioners; on this basis the Tyne Navigation Bill became the Tyne Improvement Act, 1850. Meanwhile agreement had been reached between the two parties concerning the Act's financial aspects and whereas the North Shields group wished Newcastle to give up all rights to its coal dues, the Corporation would consent to relinquishing only one quarter. Agreement was reached on the basis of the Corporation giving up 3/8 of these dues and the new Tyne Improvement Commission (TIC) took over the £67,000 debt of the Corporation, incurred on its quay extensions. "The year which registered the meridian of the nineteenth century marked the turning point in the Tyne's career."[32]

5.3 River Wear.

Somewhat different were the events which led to the amalgamation in 1859 of the Sunderland Dock Company (SDC) with the River Wear Commission (RWC). Here changes were initiated by the SDC's financial problems, by friction between the two bodies and by the relationships between the SDC and the railways serving its dock. Before detailing the amalgamation's preliminaries it is, however, necessary to outline the progression of the SDC.

The first phase of dock construction ended in mid 1856 with the opening of the South Outlet and the dock extension, bringing the total water area

to 32 acres. Not only did the new outlet provide six feet of water more than the river, it also extended from four to ten hours per tide the period during which the gates were open.[1] By this time a grain warehouse had been built, hydraulic power was in use throughout the dock system, railways served both sides of the docks and 18 coal drops and three spouts were in operation;[2] the total capital cost had been £702,000, 1.158m tons of coal passed through the dock in 1858 and revenue totalled £43,000.

The half-yearly meetings of the SDC were invariably under the chairmanship of George Hudson and the directors included men with colliery and shipping interests, some of them commissioners. When the dock had been extended southwards the SDC had been led to expect that by the end of 1854 the Londonderry collieries would ship at Sunderland an additional 200,000 tons p.a., carried by the recently completed coastal railway. This quantity did not materialise, possibly due to the shipment of coal from the South Hetton area at Hartlepool, so enabling additional Londonderry coal to be shipped through Seaham Harbour. The SDC provided the necessary drops but Lady Londonderry (1800-1865)* did not approve them and, threatening to involve the SDC in a court action, was awarded damages of £20,000. The drops were found to be excessive for the comparatively small quantity of coal shipped and instead of the Seaham collieries having exclusive use of them, some were cross-connected to the NER system.[3] During the dispute Hudson had accused Lady Londonderry of wishing to monopolise the Sunderland dock[4] but she disputed this view, stating that the SDC was "becoming compromised by the influence of a rival interest"[5] and it was to combat this threat of monopoly by the NER that the railway had been built. She also pointed out that she shipped 124,000 tons via four drops while the NER shipped 329,000 tons via 13 drops, a lower rate. There is little doubt that the dispute proved expensive to the SDC, deprived of anticipated revenue and forced to provide the settlement of £20,000.

As early as 1851 the SDC had experienced financial problems. The

* The third Marquis of Londonderry died in 1854.

York Newcastle and Berwick Railway (YN&BR) held 3,000 £25 shares,[6] Hudson a further 2,345;* calls on capital were in arrears; money was borrowed on mortgage; construction costs had exceeded estimates and income had not developed as had been hoped. In 1851 Hudson had asked that 1,000 of the 2,345 shares held for him but not yet paid for be made available in partly paid up form at £2 each; the remaining 1,345 would be held by the Company as security. Two years later, the shares had not been paid for and it was feared that the company would be called upon to pay for discounting them as Hudson was financially embarrassed. Parliamentary powers granted in 1849, 1853 and 1855 had enabled the SDC to issue capital totalling £600,000 with permitted borrowings of £150,000 but the SDC still experienced problems, in 1856 seeking to postpone re-payment of a bank loan of £45,000. Further loans were sought to repay it and a year later the SDC mortgaged 6,200 preference shares of £12½ each to raise £50,000, at the same time proposing to seek an Act which would enable the RWC to contribute funds towards the SDC's cost of providing the South Outlet and for the NER to subscribe to the SDC.[7]

Due to the fact that the YN&BR had a financial involvement in the SDC, three railway directors had been appointed to the board in 1853.[8] When discussions had taken place regarding the raising of further capital. George Leeman (1809-1882), to become chairman of the NER, objected to the plan of action proposed by the SDC directors and, perhaps uniquely in its history, the SDC minutes record the votes cast, including those of proxies. Leeman's move had been defeated by 5,749 votes to 3,227[9] but it had been an obvious attack upon the SDC management and had led to the appointment of the railway directors, a move publicly stated as being to promote a closer union.[10] In 1858 the NER requested that the next vacancy on the SDC board be filled by a further railway director.[11]

The most serious threat to the SDC came in 1854, although then perhaps not fully appreciated; in that year the YN&BR revived the project for

* Purchased on behalf of the YN&BR without authority the shares had become Hudson's responsibility in 1850.

building docks on the Tyne at Jarrow, so providing an outlet for Durham coals. Rightly perceiving this move as a threat to the SDC, Hudson, at the half-yearly meeting, referred to the YN&BR's proposal but "wished they had waited a little till they saw...completed"[12] the dock at Sunderland. Differences again surfaced in 1857 when the SDC attempted to encourage the NER to accept higher charges and in 1859 Hudson himself stated that the SDC had erred in not charging higher rates in its early days.[13] Although Hudson had been favourably disposed towards the Londonderry interests when the railway link to Sunderland was first made, his views changed over the years and it was perhaps his antipathy towards Lady Londonderry which encouraged him to remark in 1857 that relations between the SDC and the NER were good, a statement not altogether borne out by the facts. He did, however, note ruefully that the NER had not perceived the advantages of the Sunderland dock[14] and the fact that the dock had been built without being associated with a railway company was noted at a public meeting held to discuss the SDC's proposed Bill. It was remarked that Sunderland itself had rejected Hudson's proposals and one speaker, Joseph Watson, commented: "In his better days, Mr. Hudson said 'We will make you a dock'; but 'no' it was answered, 'we want a local management,'"[15] a view which had led to an independent dock company being formed; if the YN&BR had consulted its shareholders, he continued, Sunderland would have benefited rather than the Tyne.

It is difficult to see why the NER did not purchase the dock at Sunderland rather than build at Jarrow. There was little to choose between the two locations - Jarrow perhaps had more space for standage - and both had adequate rail links. The lack of desire to rescue the dock company, over-extended financially and unable to pay a dividend, may have been simply because of the fact that Hudson was its chairman. In the period which followed his downfall in 1849, the shareholders and directors of the YN&BR had little cause for gratitude in view of the fact that their

dividends had rapidly fallen from 9% to nil and in fact "actions were brought against Hudson to recover from him the profits he had realised on certain of his transactions in railway shares;"[16] he paid out more than £200,000. Following the formation of the NER, which brought to its board members of the former Leeds Northern Railway (LNR), there can have been little sympathy for Hudson's business interests from his former rivals, the LNR having several times sought an entry to the North-East only to be defeated by Hudson. There was also friction between Hudson and Leeman, Tomlinson noting that Leeman, coming "to the front in the troubled period of 1849...had assisted in the deposition of the Railway King (and later)...his influence made itself felt at every crisis in the history of the Company.[17] Can it be that it was only Hudson's history* and personality which led to the virtual abandonment of the Wear by the NER? Or was it the antipathy between the NER and Lady Londonderry?

The SDC first came into serious conflict with the RWC in 1855 at which time the dock company, with the new south outlet about to be brought into use, sought a new Act which would exempt dock users from RWC dues, thought logical in view of the fact that ships would be able to use the dock without entering the river. This move was naturally opposed by the RWC which formed a committee under Hedworth Williamson to confer with the dock company and attempt to safeguard the commission's interests.[18] The SDC sought exemption from RWC dues but at the same time it wished to avert any hostility as company and Commission had "only one common object, the improvement of the trade and port of Sunderland."[19]

The discussions which then took place between the two bodies centred on the wish of the SDC to have ships using only the dock exempt from river dues; the desire of the RWC to maintain its income; the aversion of the SDC to provide a rising income, based on increasing coal exports, to the RWC. Agreement proved impossible and, as would be expected, the dispute became the subject of press comment, the Sunderland Times noting that

* He owed the NER £123,000 in 1859.

having failed to reach agreement by so close a margin, £220, this could prove to be "the most suicidal act the parties could commit."[20] A public meeting was held to discuss the matter and whereas one side congratulated the SDC on having again brought Londonderry coal to Sunderland, the other upheld the RWC. Doubts were also expressed concerning the constitution of the RWC, its members now "representing only the interests of landed proprietors,"[21] but the opposite view was also voiced, namely that the RWC should not be deprived of revenue, otherwise "the river will dwindle to its natural proportions, and Sunderland will be in the hands of the Dock proprietors."[22] Opposed by shipowners and by the RWC the Bill went to Parliament where it received the Royal Assent in July 1855.

The final dispute between the SDC and the RWC began in 1857 when the SDC, in financial difficulties, sought to obtain further revenue from the commissioners, its argument being - understandably - that as the dock had attracted trade to the Wear the company should receive some benefit, perhaps half the increased revenue.[23] The SDC resolved to accept not less than £2,500 p.a. from the RWC and, later, when the RWC offered £2,000 it was refused.[24] The company then decided to obtain an Act to authorise additional capital, to exempt ships using the south outlet from RWC dues, to arrange dues with the RWC regarding ships using the dock and to enable the NER to subscribe to the SDC.[25] Agreement was later reached whereby the RWC would pay £2,000 p.a. if the SDC maintained a depth of seven feet at the outlet and, should shipments exceed 2.4 m tons p.a., additional payments would be made, to an upper limit of £3,000. Conversely, if shipments were less than 1.6 m tons, payments would cease.[26] Agreement with the NER was reached, the SDC anticipating borrowing £50,000 from it. The Bill went into Committee when the only objection came from Lady Londonderry, not only to those clauses affecting her interests "but also those Clauses by which it was proposed to carry out the arrangement"[27] between commission and company; the Committee, too, did not approve of the arrangements and the Bill was withdrawn.

Following this failure the RWC suggested that the two bodies should merge and both sides discussed the matter, apparently amicably. During negotiations, a deputation from the town of Sunderland sought to be a party to any agreement but both the SDC and RWC agreed that any enlargement "would be likely to prejudice...the negotiations now in progress,"[28] the local press noting that such exclusion would "effectively preserve the management of the River from the obnoxious and officious interference of the Corporation of Sunderland."[29] Discussion led to agreement and the Act which brought together the SDC and the RWC was passed in August 1859 by which time the capital expended by the two bodies was £724,000 and £231,000 respectively.[30] The reconstructed commission was very different from those of the Tyne and Tees. They were formed almost exclusively of representatives of the towns bordering the rivers; in contrast the new RWC was dominated by the coalowners, holding 21 of the 52 seats. The town's shipowners elected 15 members, the landowners nine, the traders three; one commissioner was appointed by the Admiralty, one was the Collector of Customs, one was elected by the owners of the Wearmouth Dock and only one was elected by Sunderland borough,[31] perhaps indicative of the dichotomy between port and town.

5.4 River Tees

The second phase of the development of the river Tees had principally been due to the Stockton and Darlington Railway (S&DR) seeking an outlet for coal from the south-west Durham coal-field, first at Stockton and then at Middlesbrough. By 1850 the town was expanding rapidly and it had been provided with dock facilities, by this time in possession of the S&DR. Due to the formation of the Stockton and Hartlepool Railway (S&HR),* a proportion of the river's trade had been diverted from the Tees to Hartlepool and, later, to West Hartlepool. To ship its coals more cheaply the S&DR had in 1845 leased the Tees port dues from the Tees Navigation Company (TNC), only to find that the revenue expected from

* It was in effect an extension of the Clarence Railway.

the Clarence Railway was not forthcoming. Superimposed upon this situation was, from 1850, the exploitation of the nearby ironstone deposits, initiated by Henry Bolckow (1806-1878) and John Vaughan (1799-1868), the first to establish ironworks at Middlesbrough.

In 1840, the quantity of coal shipped from the Tees by the S&DR had totalled 558,000 tons[1] but the figure had subsequently fallen and by 1849 it amounted only to 355,000 tons.[2] The reduction in coal traffic in 1848 led Edward and Joseph Pease to confer with the Marquis of Londonderry with the object of inducing "the Marquis to enter into some regulations to avert the ruinous consequences of the coal trade...(an) effort not crowned with success."[3] To increase shipments, the S&DR later approached its suppliers and offered to ship any coal in quantity greater than the previous years figure at ¼d per ton, provided that the colliery owners paid, as a guarantee, the previous years dues; the result was an increase to 491,000 tons.[4]

For some time, relations between the S&DR and the TNC had been somewhat strained, the former company wishing to exert some pressure on the TNC to improve the river, still showing signs of inadequate capital spending. In 1850 the TNC became aware of two developments, both of which could act to its detriment[5] and it was agreed to oppose both measures, one of which would "dissolve the Tees Navigation Company."[6] Two Bills were projected, the Victoria (Redcar) Harbour and Docks and the Tees River Conservancy, both promoted by the S&DR, a fact not confirmed until later. The proposal for the harbour at Redcar was another version of the earlier schemes of 1832 and 1838 with two docks,* of 18 and eight acres, located within a 510 acre refuge harbour,[7] a railway connecting with the Middlesbrough and Redcar Railway, completed in 1846. The second Bill was to form a body better suited to the river's conservatorship than was the TNC; as before, its limits were to be only from Stockton bridge to the sea [8]

* See Map 11

and its powers were to be similar.*

The Admiralty commissioned a report from David Stevenson (1815-1886) and an inquiry was subsequently held in Stockton. Great interest in both Bills was shown by the Gateshead Observer which in February and March devoted much space to the dispute; principally that concerning the conservancy. The paper was generally antagonistic towards the S&DR, noting that it was not "the state of the river that pinches the railway directors:- it is the withdrawal of coals from the Clarence staiths on the Tees to the West (Hartlepool) Docks, by which their lease of the Tees is not so good a bargain by £3,000 or £4,000 per annum"[9] and it pointed out that there was then a greater depth of water in the river than ever before. The paper was critical of the S&DR regarding its attempt to wrest the river's control from the TNC, but nevertheless commented:

> There can be no question that with the Tees, as with the Tyne - or indeed with any other navigable river - it is most desirable that the management and improvement...ought to be entrusted to such a body of persons as shall most fairly, and fully, and competently represent those interests whose protection and promotion depend upon the conservation and improvement of the whole navigable stream.10

It went on to note that relations between Stockton and the S&DR left much to be desired and, perhaps forgetting that Stockton had taken over the role of Yarm on the Tees, continued by stating that the Redcar harbour project ors, establishing a railway terminus "cannot be supposed to feel any interest in...the improvement of the more inland stream of the Tees, which they would never use, and which...would be a competitor... with their own railway."[11]

The Redcar proposal brought into the discussions the Leeds and Thirsk Railway (L&TR), approached the previous year by the TNC. So important was the scheme thought to be that the L&TR called a special meeting to discuss it, the Secretary then stating that "the formation of a deep water harbour, and accessible to ships of the largest burden in all states of the tide, renders the project important."[12] Itsaw the scheme as providing

* Perhaps conincidently, moves were made at Hartlepool to improve the harbour there, resulting in the 1851 Act.

the only capacious low-water harbour on the east coast and that, coupled with the area's mineral wealth, the easy route to Leeds and the accessibility of the manufacturing districts to the west, led it to recommend that the harbour proposal be supported. The L&TR directors proposed that interest payments should be guaranteed to a sum not exceeding £2,000 p.a. on the understanding that "the requisite capital is to be advanced by Government at a low rate of interest"[13] and this suggestion was carried. Jackson, attending the meeting, rejected the proposal outright as "it would not be worth one shilling...without an inner Harbour and Docks"[#14] and it would prove of much greater value to shipping and trade to provide a harbour of refuge at Hartlepool. With a dock there already, a sum of one-tenth of the envisaged Redcar expenditure would prove adequate. The Leeds Northern Railway (LNR)* withdrew its support from the Redcar project - perhaps at Jackson's instigation - and at a meeting of the Hartlepool West Harbour and Dock Company (HWH&D) it was noted that the LNR was extending its lines to West Hartlepool, arrangements having been made "for the accommodation of their passenger, merchandise and general traffic, which will succeed the opening ...of the remainder of their direct line from Leeds to West Hartlepool."[15]

The Admiralty Inquiry into the Tees Conservancy Bill began in Middlesbrough on 10 March 1851 under William Bald. The TNC was represented by Scurfield Grey, the Middlesbrough Owners by Lockey Harle of Newcastle and the S&DR by its barrister, Edmund Plumer Price. Discussion centred on two main points: had the TNC served the river's users well and was the representation of the suggested commission satisfactory? The TNC was depicted by the promoters as being without money - as was the S&DR by the opposition - and without a resident engineer.** That the river's depth had not been materially increased since the formation of the TNC was evidenced by James Johnston (d 1854), superintendent of works, who stated that recent soundings had

A dock was,in fact, included.
* Formerly the Leeds and Thirsk Railway; the name was changed in 1851.
** Brooks acted as consultant.

indicated only 2½ft and 18 ins low-water depths in the north and south channels respectively; however Joseph Laing, active in the TNC, pointed out that the size of ship trading between London and the Tees had increased from 127 to 160 tons within a period of some 30 years and the real reason for the decline in trade was the recent opening of docks at West Hartlepool, not the state of the Tees; in fact steamboats were provided free of charge to tow colliers from the Tees to that port.

It was recorded that ships of 100 tons were now trading in agricultural produce to Yarm and, considering only coal, the number of vessels using the river had risen between 1812 and 1850 from 452 to 3,550, the tonnage from 49,900 to 452,200 and the average tonnage from 95 to 128. The recent growth of Middlesbrough was referred to by William Fallows;* already there was there an ironworks, a patent fuel manufactory, a chain-making works, three shipyards and a locomotive maker. He explained also that the S&DR carried 75% of the coal shipped on the Tees and pointed out "that why the parties on the Clarence side of the river were not 'free' was solely because they declined to come in on equal terms, as they were entitled to do, under the lease."[16]

The S&DR's case was summed up by Price, pointing out that of the ½m tons of coal shipped from the river, 90% passed through Middlesbrough its population now some 10,000. The S&DR "appeared in no spirit of hostility to the Tees Navigation Company - a body of gentlemen who, however willing to perform their duties as conservators - were utterly unable to discharge them with justice to the town of Stockton;"[17] neither was it antagonistic towards the other Teesside towns. In his view the new commission proposed by the S&DR would be much better fitted to undertake the task. In opposition, Grey suggested that the S&DR was not likely to be at all interested in the upper river and its sole purpose in promoting the Bill was that "as much as £4,000 per year had been received by (the S&DR)...but the trade had left Port Clarence and it was to destroy and get rid of the lease

* S&DR shipping agent at Middlesbrough.

that the promoters of the Bill had brought them all to Middlesbrough that day."

The most interested of the local newspapers was the Gateshead Observer which, noting that a preponderence of S&DR members was suggested, quoted the recently-formed Tyne Improvement Commission as a satisfactorily constituted body. The paper did not regret the anticipated demise of the TNC; "they have done good service in their day...but another and a different day has dawned, and demands another and a different form of government"[19] and it suggested that, as the Tyne had been taken from the hands of the Newcastle Corporation, so should the Tees be taken from the TNC. In an editorial, it noted that the Tyne, with coal shipments eight times as great as those of the Tees, nevertheless had no direct coal or rail interests among its members; they were all elected by the river's towns.

In the views expressed, the editor, James Clephan (1804-1888) showed great knowledge and insight, writing later that the inclusion of coalowners or railway proprietors

> will find no favour with the Crown. The coal owners may pass away tomorrow; their mines may be exhausted, or their produce may be shipped elsewhere; we have seen such a revolution on the Tees within the space of the last four years; but, in all human probability, the towns that exist upon the banks of the navigable river will endure for centuries; and in the hands of their inhabitants the conservancy of the stream should be vested.20

The paper's editor, or perhaps its owner, Brockett, was blessed with the power of prophecy. With the coal trade declining and the ironstone deposits so recently discovered it is difficult to believe that his vision for Middlesbrough was otherwise:

> The town occupies an admirable situation for commerce; and the river...is naturally superior to the Clyde. All that the Tees requires is men - men like to those of Glasgow, who in little more than half a century have swelled an annual revenue of £170 into one of £70,000....The people of Stockton and Middlesbrough have only to will it, and it shall be done. They have before them one of the most improvable rivers in the world.21

The men attracted to Middlesbrough, the ironmasters, were to have a dramatic effect upon the town's development.

With West Hartlepool and the almost-completed L&TR viewed as a threat to the Tees a public meeting in Stockton resolved to join with the TNC in opposing the Conservancy Bill, at the same time ensuring that Stockton would be fairly represented.[22] As a result, the S&DR agreed to amend the commission's constitution to include Stockton shipowners, the Clarence Railway, the S&DR, the TNC and the two towns.

Bald reported his findings to the Admiralty. The TNC "had been animated with a true spirit to improve the river Tees Navigation"[23] and although it had at first taken sound professional advice, nevertheless it had not been as successful in improving the lower river as it had the upper. A total of £14,995 had been expended between 1808 and 1828 and £95,005 between 1828 and 1851 but the higher rate of expenditure had resulted only in the forming of groynes, injurious to navigation. It was now "an admitted Aphorism that all public navigable Rivers"[24] should be placed under the jurisdiction of commissioners and he recommended that the Tees should be so treated. The quays at Stockton should be improved, a floating basin should be provided there, some 7,500 acres should be reclaimed from the sea and an asylum harbour of some 50 acres in area should be formed, paid for by government funds. He suggested, too, that the debt of £29,500 which carried interest at 10% should be redeemed and 4% stock substituted.

Bald considered that the river was capable of improvement. A channel could be formed 15 to 18 ft deep at low water immediately up-river of the bar, 12 ft deep to Cargo Fleet and ten feet to Stockton but straight channels should be avoided, the aim being "to hold fast to that which exists in being good and useful, and to assist Nature by Works of Art."[25] Bald thought the S&DR's interest in the lower river to be natural as it had recently spent £160,000* on a wet dock. Paying the lease of the coal dues, the S&DR had earlier received £4,716 p.a. from the Clarence Railway - their shipments then were similar - but its proportion of the dues had now been completely eliminated. The report included statistics

* In addition, coal waggons were capitalised at £90,000.

produced by witnesses, Fallows having stated that coal exports in 1850 had totalled 318,000 tons coastwise and 60,000 tons foreign; goods exported amounted only to 68,000 tons.# It was also shown that there were ten staiths or drops in use in the Middlesbrough dock, six at Port Clarence, five at Stockton owned by the S&DR and two there operated by the Clarence Railway; of the total shipping using the river, 80% traded to and from Middlesbrough.

So comprehensive was Bald's report that the Admiralty recommended that it be laid before Parliament in its entirety, expressing the view that the down-river problems were due to the groynes built from 1831 onwards. They had "created more Mischief than Good, by impeding the Influx and Reflux of the Tide, and causing Eddies; so that longitudinal Guide Walls, as in the Clyde...have been found to be much preferable."[26] The Tees was seen to be in a backward and defective state, it was recommended that alterations be made to the river's management, the jurisdiction of any commission should extend to Yarm and the fact that the Bill's promoters had not sought finance for river improvements was deplored. Investigated by a House of Commons Committee, presumably greatly influenced by Bald's comprehensive report, the Bill's preamble was found not proved but nevertheless the committee considered that a Bill was "absolutely required"[27] for the conservancy of the river Tees and in 1851 Parliament confirmed this view.

The Bill for the Victoria harbour had been withdrawn as its promoters did "not appear...to have subscribed, or proposed to subscribe any portion"[28] of the required capital. It had been criticised, too, as ostensibly being promoted as a harbour of refuge but in reality being for the export of coal, the first a public measure and the second private; the two uses were seen as incompatible. It was also suggested that if the Admiralty were minded to defer the project, the bay and estuary of the Tees should be surveyed; could not "the improvement of an entrance to the Tees...be adopted at a less expense, and prove as advantageous as the proposed plan."[29]

All register tonnage.

With some 8,000 acres available the river itself could form an equally good refuge. Other than the S&DR, all parties shunned the Redcar proposal; had it been adopted, both Stockton and Middlesbrough might have suffered.

When conducting the Inquiry into the S&DR proposals Bald had agreed, perhaps unprofessionally, to inspect and report upon works undertaken by the TNC downstream of Cargo Fleet, where groynes had been formed under the direction of Brooks. Bald recommended their removal and suggested that, instead, longitudinal banks should be built parallel to the river. The groynes had decreased the depth of water available and he strongly criticised the TNC for expecting such devices to work satisfactorily where the river was so wide; at 3,300 ft it was three times wider than the Thames at Waterloo Bridge.[30] Armed with a report from Bald and with Parliamentary encouragement the TNC decided in June 1851 to promote its own Bill in the forthcoming Session.[31] The Bill sought approval for the river's improvement, a basin at Stockton and river dredging and re-alignment for easier access to both Stockton and Middlesbrough dock. Additionally, and the converse of the proposal for a harbour of refuge, it was intended "to embank in 7 or 8 thousand acres from the Sea"[32] and to reclaim the land.

The deposited plans were prepared by Bald and showed a 20 acre dock* formed at Stockton by cutting off the sharp bend in the river by means of a new channel, itself with wharfs. With a locked entrance at its lower end it would contain the existing quays at Stockton and the S&DR staiths.[33] A breakwater, one mile in length was proposed at the North Gare, the river's mouth. The TNC's Bill favoured Stockton more than had done the S&DR's proposals: the river was to be rendered more easily navigable; Stockton was to be provided with a dock at public expense; its representation on the commission was to be greatly enhanced.

In January 1852, a public meeting in Stockton was reminded that Bald had suggested that,like the Tyne, the full tidal length of the river should

* Brooks had suggested a dock at Stockton in 1805 (NYCRO: QDP 51)

be within the jurisdiction of the commission and those attending were informed that the Bill's clauses concerning representation were likely to be disputed as they provided for five Stockton members, with three from Middlesbrough and two from Yarm. What was unusual was the fact that the Stockton dock was to be the responsibility of only the Stockton members. Bald, attending the meeting, envisaged a prosperous future for the river, but only if it could be improved.[34] At a similar meeting in Middlesbrough the proposals were not so well regarded. Bolckow - in the chair - was unhappy that Yarm would be so well represented and he thought that Middlesbrough should at least have "perfect equality with Stockton;"[35] the dock should be the responsibility of the whole commission. Naturally, Yarm favoured the plan.

Although a Commons Committee had recommended that the Tees be the subject of a conservancy, the passage of the Bill through Parliament was not uneventful and it was in May 1852 brought before a Select Committee of the House of Commons. Petitions against it had been presented by the S&DR, the colliery owners and lessees, Middlesbrough Improvement Commissioners, the merchants of Middlesbrough, the S&HR, the Clarence Railway and the merchants of Stockton. Much of the evidence was similar to that submitted the previous year but Joseph Laing commented that the Tees traffic had declined since the previous hearing and whereas Port Clarence had formerly contributed half the river dues levied under the lease, this income had ended as some 40% of the coal trade had been transferred to West Hartlepool;* there was now taking place an increase in trade "in consequence of the iron ore largely found in the Yorkshire hills and being imported extensively."[36] Differences in the trading patterns of Stockton and Middlesbrough were revealed. In 1851 Stockton had dealt with 94,186 tons of shipping, inwards and outwards, while for Middlesbrough the figure was 334,670 tons; in terms of value, however, cargoes handled in Stockton totalled £1 m and in Middlesbrough £245,000. Stockton imports amounted to £660,000 while

* The Durham Advertizer, 3 October 1851, noted that coal shipments from West Hartlepool had risen over the past four years from 133,000 to 579,000 tons p.a., greater than the coal exports from the river Tees.

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the Middlesbrough figure was a mere £33,000.

Following the Select Committee hearing the Admiralty requested that provision be made for a breakwater at the river's mouth, should it be considered necessary. Changes were also made regarding finance and with these amendements the Act was granted Royal Assent in June.[37] It defined the constitution of the commission, with Stockton and Middlesbrough electing five members each, compared with two from Yarm; the Admiralty was to nominate three members. In tabular form the several proposals made for the membership of the commission are as follows:

	S&DR (1)	S&DR (2)	TNC (1)	TNC (2) (M'bro)	TCC Act
Stockton	7	4 (+4)	5	4	5
Middlesbrough	7	4	3	4	5
Yarm	-	-	2	1	2
Admiralty	4	2	3	3	3
S&DR	10	4	-	-	-
TNC	-	4	-	-	-
Clarence R	-	2	-	-	-
	28	24	15	12	15

Noting that the TNC had exceeded its borrowing powers, the Act sanctioned the issue of stock to recompense the TNC shareholders and further authorised the borrowing by mortgage of £207,000 for the Tees Conservancy Fund and £80,000 for the Stockton Dock. Soon after the Act had been passed, however, Stockton became dissatisfied with the provisions regarding the dock. It was agreed to mortgage its prospective dues and also a 1/- in the pound rate on town property for the sum of £70,000, so bringing its control into the town's hands[38], but a Parliamentary Bill to sanction this arrangement was rejected by a committee of the House of Commons, in spite of the TCC having petitioned in favour of it. The jurisdiction of the Tees Conservancy Commission (TCC) was to extend over the tidal reach of the river, to some three miles upstream of Yarm.

5.5 River Blyth

The opening of new collieries in the vicinity of Blyth brought to the town the promise of an increased prosperity; conversely, the recently formed Tyne Improvement Commission, with the certainty of its making marked improvements to that river, posed a threat to the port of Blyth, in effect in private hands. On the Tyne, proposals had been made from 1845 onwards for the construction of docks to serve the steam coal area between Tyne and Blyth and in 1848 the owners of collieries at Cowpen, Blyth, Bedlington and Netherton had asked for shipping facilities on the Tyne as Blyth was used by them only at considerable expense and inconvenience.[1] So real was the threat of trade being diverted to the Tyne that a meeting of those interested in the commerce of the port was held in April 1852 when a resolution was passed in favour of forming a company to build a dock on the river.[2] At a later meeting, in December 1853, it was stated that the town would benefit should the harbour be improved and a provisional committee was formed to oversee the establishment of a company; the chairman was Matthew White Ridley (1778-1864).

The provisional committee included several local coal-owners of whom five were directors of the Blyth and Tyne Railway (B&TR), then recently incorporated. The engineer for the proposed company was James Abernethy and his views on the suitability of the port made up a significant part of the prospectus. Abernethy saw the harbour as having great natural advantages over others in the North-East, largely on account of its being sheltered on the east side by the rock outcrop and the North Dyke. He estimated that his proposals for a seven acre half-tide basin and a 19 acre dock,* together with breakwaters and jetties, would cost £150,000 and enable ships of up to 1,500 tons burthen to use the harbour, 22 ft deep at high tide.[3]

The prospectus noted that vessels trading from the port were of only moderate size and such was the state of the harbour that it was often

* See Map 5

necessary to load by keels; as a result, coal mined in the Blyth area was often transported to the Tyne for shipment, involving higher rail transport costs for the additional ten miles. The prospectus anticipated, optimistically, that ¾ m tons of coal would be shipped through the port, so bringing to the shareholders a return of £12,421, or 8%. The involvement of Ridley in the company was to be not inconsiderable; he, as the area's principal landowner, was to give "absolutely to the Company the land required for the docks... agreeing to grant all reasonable facilities for the undertaking as circumstances arise... (and) support it to the extent of £10,000..."[4] The anticipated profits were calculated on coal alone but there would be other revenue from general shipping dues and from ship building and repairing.

Parliamentary powers were duly sought and plans for the works deposited,[5] delineating two docks with a graving dock opening from the half-tide basin. The dock complex, with its associated rail link, was to be located to the south of the town, its entrance close to the sea, and partially on the area over which Rennie had proposed the building of groynes. The river's mouth was to be protected by a new eastern breakwater and a half-tide western breakwater. The projected railways included a line to the harbour at Hartley and one from Cramlington to Blyth, but problems arose regarding their provision in that agreement could not be reached with Lord Hastings, owner of Hartley; their provision was abandoned. The press commented that the proposals would prove of great benefit to the town, now with a population of c 7,000, and the fact that a new refuge for shipping was to be provided was applauded; there was a notable lack of such facilities on the north-east coast although planned works on the Tyne and at Warkworth would improve the situation considerably.[6] So uncontroversial were the powers sought by the new company that a local inquiry was considered unnecessary and seemingly without the Bill having been discussed by Parliamentary committee[7] it was accorded the Royal Assent

in July 1854. The Act named only Ridley as a director but he was enabled to nominate a further director and, unlike the others, his office was not conditional upon his holding shares. The Act[8] obtained by the Blyth Harbour and the Dock Company authorised the raising of £150,000 and a time of completion of five years.* Powers for a railway to the dock were not sanctioned but the new company was granted jurisdiction of the river Blyth upstream to Bucks Hill Mill, the tidal limit.

5.6 Summary

Between 1831 and 1851 the population of Durham County had risen at an annual compound rate of 2.49% p.a., twice that of Northumberland. Of the region's several ports, those on the Durham coastline were expanding much faster, the extreme being the c 20% p.a. reached by Seaham Harbour; in adjoining Yorkshire Middlesbrough achieved the same increase. With Sunderland, the Northumberland ports showed a rate of increase higher than that of the county as a whole but nevertheless they were seriously outpaced in population, as they were in trade, by those on the Durham coast.

The differences between the old-established northern ports and those further south had been brought about by the expansion of Durham coal output, the abilities of men such as Tennant, Londonderry, Jackson and the Pease family and the introduction of the public Parliamentary railway. Success had principally been due to the enterprise of the Durham coal industry, as opposed to the inactive oligarchy controlling the Tyne, the cumbersome commission of the Wear and the shortage of capital at Blyth.

It was the success of the Durham ports and especially the incorporation of the Sunderland Dock Company which spurred the towns of North and South Shields to seek the establishment of a controlling body to improve the Tyne and so attract trade. Changes in shipbuilding technology, although only on a small scale, had brought about the use of iron for ships' hulls and the adoption of steam power for propulsion; shipbuilding was seen

* The Bill had sought a seven year period.

as a trade which would require improved river facilities as, already, ships built in the region were generally of a tonnage greater than those trading from it. The move for a Tyne commission was also stimulated to a great extent by the financial mis-management of the river by the Newcastle Corporation and it is not surprising that Washington's report of 1849 was critical of Newcastle. The eventual representation of the commission was fair: the membership suggested by the Shields Conservancy Bill was weighted unfairly against Newcastle, the premier town; the Navigation Bill's suggestions sought extremely unequal representation, to Newcastle's benefit. The compromise arrangement acknowledged the supremacy of Newcastle but deprived it of an overall majority.

Like the Tyne, the government of the river Tees came to change, its inter-community struggle in the guise of a dispute between the TNC and the S&DR, exacerbated by the diversion of trade to West Hartlepool. For some years relations between the TNC and S&DR had been uneasy, the railway company responsible for the removal down-river of its coaling staiths and the establishment of the town of Middlesbrough itself. Within months of the formation of the TIC the S&DR promoted two Bills, one to reform the conservancy of the Tees and the other to provide even further down-river, at Redcar, extensive shipping facilities and docks. Due to competition from Hartlepool the trade of the Tees was beginning to decline and the measures put forward by the S&DR were seen as providing alternative methods for its stimulation: one Bill would improve the river; the other would by-pass it. The Redcar Bill was abandoned and the Conservancy Bill defeated. In rejecting it Parliament stressed the necessity for such a body and to avoid the risk of further battle, the TNC - as Newcastle had done earlier - sought its own conservancy Bill, perhaps the outcome hoped for by the S&DR. The TCC was established in 1852 with jurisdiction over the river's tidal length. The constitution of the TCC like that of the TIC, had been the subject of much discussion but the final outcome

North East Ports: Population 1811-1851*

	1811	1831	1851	Increase 1831-51 % p.a.(compound)
Amble	155	247	1040	2.45
Blyth	2861	4125	6976	2.66
Newcastle	33723	54991	89156	2.44
Gateshead	8782	15177	24805	2.48
North Shields	19042	22778	30524	1.47
South Shields	20068	24427	35790	1.93
Others	10847	17547	23795	1.53
Tyne total	92462	134920	204070	2.09
Sunderland	27346	42664	70576	2.54
Seaham and Seaham Harbour	121	1152	4267	19
Hartlepool	1047	1330	9503	10.3
West Hartlepool	350	381	4008	12.5
Hartlepools total	1397	1711	13511	10.9
Stockton	4229	7763	10172	1.4
Yarm	1431	1636	1647	-
Middlesbrough	35	154	7631	22
Tees total	5695	9553	19450	3.6
Northumberland	183269	236959	303568	1.25
Durham County	165293	239256	390997	2.49

* See Census of Population, 1851

was realistic. As on the Tyne, Admiralty nominations were included although a major difference between the two bodies was the legislation for a dock at Stockton, its operation envisaged as being the responsibility of only the Stockton members; fortunately its provision was abandoned as it was a situation which could have led to continuing internal unrest.

The next of the region's ports to undergo change was Blyth, concerned that the newly-formed TIC would adversely affect its trade. To enable capital to be raised, a new company was formed under the aegis of Ridley. Seeking capital of £150,000 its enabling Act, passed in 1854, provided for the improvement of the river to enable ships of 1,500 tons to use it, the building of breakwaters and the forming of a dock. The granting of the Act brought about no conflict.

The provision of docks had been the subject of much discussion in the North-East. At Seaham, the Hartlepools and at Middlesbrough, as at Sunderland, they had been financed privately. The Tyne's earlier conservators had never sought powers for such work and the RWC considered that its responsibilities were restricted solely to river improvements. By 1859, however, two docks had been built on the Tyne, one was planned at Blyth, extensions had been considered at Seaham Harbour and additional dock space had been provided at the Hartlepools. To compete with other ports the SDC would seem to have maintained its charges at too low a level, and by 1859 was financially strained, ironical in that it was the SDC which had revived the Wear coal trade. The dock company sought an arrangement with the RWC on the basis that the dock, with its own outlet to the sea, provided a better exit than did the river and hence recompense should be made to the SDC. Opposed by Lady Londonderry, the three-cornered dispute led to the RWC itself promoting a Bill for the amalgamation of the two bodies, a surprising volte-face from its previously held view. The Act which resulted gave to the RWC the complete control of the river.

By 1860 the transformation of the pattern of government of the rivers

of the North-East was complete and was to survive almost unchanged* up to, and beyond, 1914. Change had also been brought to the region's railways, the process of continuous amalgamation culminating in 1854 with the formation of the NER. The final amalgamation involving the YN&BR, the LNR and the York and North Midland Railway had been brought about by the invasion of the North-East by the LNR which sought port facilities, first at Redcar and then at West Hartlepool. The threat of LNR co-operation, first, with the S&DR and then with Jackson brought the YN&BR to seek amalgamation with it. At first not possessing monopolistic powers the NER competed, in part, with the S&DR and with the WHH&R but by 1865 both of these railways were to fall into its hands, so forming a monopoly not enjoyed by any other railway company in Britain. With the reformed ports it was to be a major force in the economy of the North-East.

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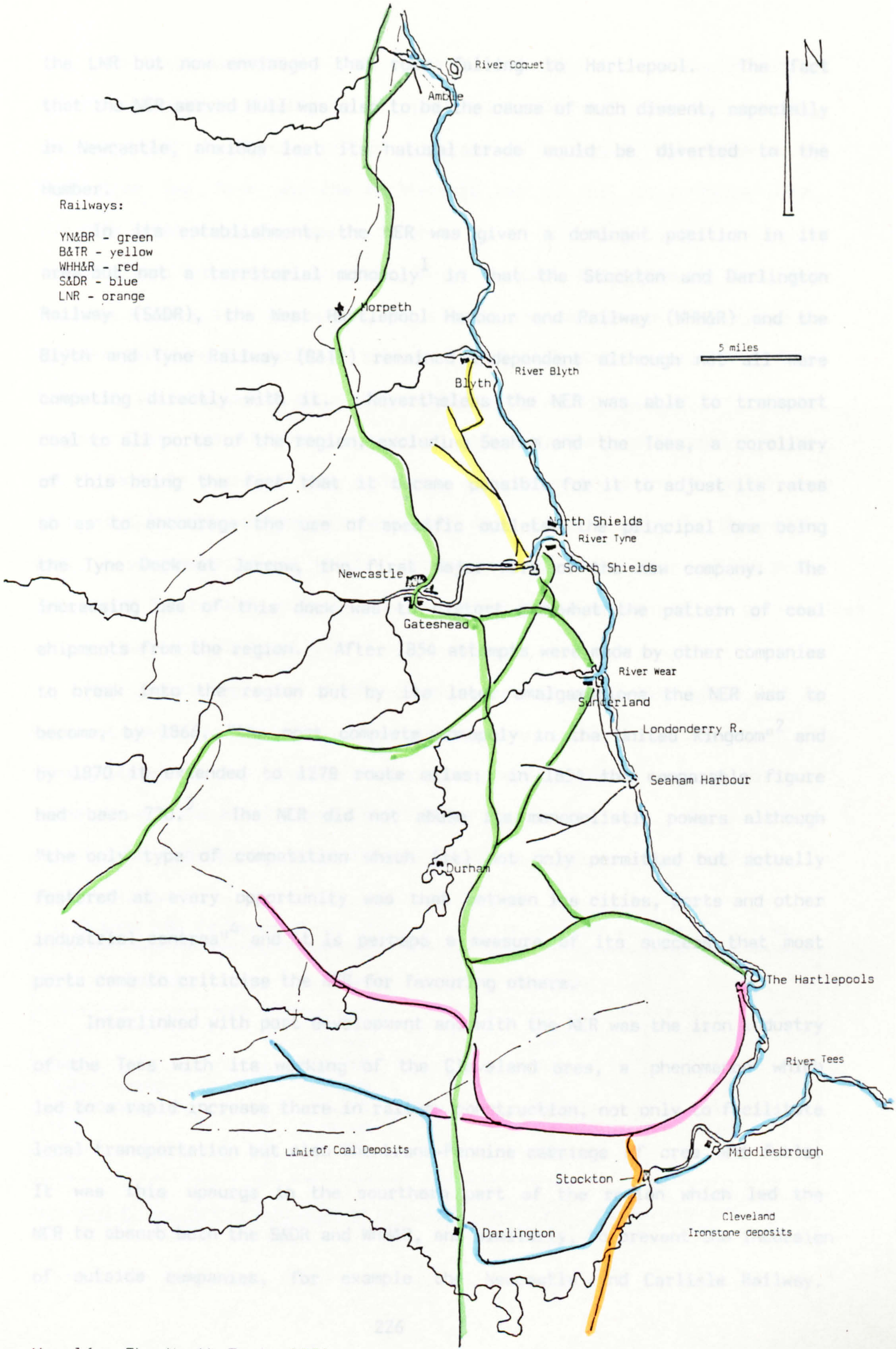
6. PORT DEVELOPMENTS AND THE INFLUENCE OF THE NORTH EASTERN RAILWAY, 1854-1885.

6.1 Introduction

The four factors which most influenced the further development of the region's ports during the 30-year period which began in 1854 were the reorganisation of river government - already noted - the formation of the North Eastern Railway (NER), the exploitation of the Cleveland iron ore deposits and the changes brought to shipping by the adoption of iron for hull construction and of steam for propulsion.

Within a ten-year period the Tyne, Wear and Tees, in 1855 their combined throughput of coal amounting to 69% of the region's shipments, came to be governed by commissions representing riparian and trading interests; Blyth and the Hartlepools were in the hands of companies; and Amble and Seaham, together accounting for 10% of the shipments were, in effect, privately owned. Such were the advantages of unified control which accrued to the commissions that their share of coal shipments rose from 69 to 84% by 1885, mainly at the expense of Seaham and the Hartlepools. Ostensibly, the reason was simple. Unified control, however internally convoluted, enabled greater expenditure on improvements to take place, in turn generating higher revenue resulting from the improved facilities provided.

This simple view was however, complicated by the development of the region's railways. Under the influence of George Hudson, railways had been promoted and, from 1844, amalgamated but it was not until 1854 that the principal change was made, the formation of the NER, its constituent members being the York, Newcastle and Berwick, the Leeds Northern (LNR) and the York and North Midland companies. Of the two last-named, only the LNR had earlier sought a foothold in the region, seeking to reach Newcastle but being able to establish itself only as far north as Hartlepool. The formation of the NER had not been without acrimony in the North-East, not least at Stockton which had hoped to become the principal port of



Map 16: The North-East, 1854

the LNR but now envisaged that role falling to Hartlepool. The fact that the NER served Hull was also to be the cause of much dissent, especially in Newcastle, anxious lest its natural trade would be diverted to the Humber.

In its establishment, the NER was given a dominant position in its area but not a territorial monopoly[1] in that the Stockton and Darlington Railway (S&DR), the West Hartlepool Harbour and Railway (WHH&R) and the Blyth and Tyne Railway (B&TR) remained independent although not all were competing directly with it. Nevertheless the NER was able to transport coal to all ports of the region, excluding Seaham and the Tees, a corollary of this being the fact that it became possible for it to adjust its rates so as to encourage the use of specific outlets, the principal one being the Tyne Dock at Jarrow, the first major work of the new company. The increasing use of this dock was to distort somewhat the pattern of coal shipments from the region. After 1854 attempts were made by other companies to break into the region but by its later amalgamations the NER was to become, by 1866, "the most complete monopoly in the United Kingdom"[2] and by 1870 it extended to 1278 route miles; in 1854 the comparable figure had been 720.[3] The NER did not abuse its monopolistic powers although "the only type of competition which (it) not only permitted but actually fostered at every opportunity was that between its cities, ports and other industrial centres"[4] and it is perhaps a measure of its success that most ports came to criticise the NER for favouring others.

Interlinked with port development and with the NER was the iron industry of the Tees with its working of the Cleveland ores, a phenomenon which led to a rapid increase there in railway construction, not only to facilitate local transportation but also the trans-Pennine carriage of ores and fuels. It was this upsurge in the sourthern part of the region which led the NER to absorb both the S&DR and WHH&R, and similarly, to prevent the incursion of outside companies, for example the Newcastle and Carlisle Railway.

The iron trade transformed the nature of the Tees from a coal-exporting river to a centre drawing to it, principally by rail, the raw materials necessary for the manufacture of iron and as a result the shipment of coal from the Tees and the Hartlepools was to fall in absolute terms, the only ports where this was to occur.

The iron industry on Teesside, which by 1885 was producing more than 2m tons of pig iron per annum, led also to an expansion in the engineering and ship-building industries, able to use locally-made materials. Ship-building in iron led to ships of greater tonnage being built on the region's rivers, their use of steam propulsion expanding the area's engine works. The technology available was such that the ships built in the region were of a significantly greater tonnage than were those trading to the North-East, a phenomenon due initially to the restricted facilities of the ports into which the coastal colliers traded, rather than a measure of the capabilities of the rivers of the North-East.*

The increasing size of the ships using the north-east ports led to constant improvements becoming necessary, principally the deepening and straightening of the rivers' channels to enable shipping to reach up-river towns and staiths and for newly-built ships to gain the sea. To a certain extent, the contemporary view of river improvement was confused with dock construction.

* In December 1853 the imports of coal into London from the north-east ports were as follows:

Port of Departure	Tons	No of Ships	T/Ship
Tyne	137,000	428	320
Wear	65,000	213	305
Seaham Harbour	21,000	95	221
Hartlepools	64,000	235	272
Tees	13,000	54	240
Blyth	4,000	19	210

Ref; Coal Market: Monthly Importation of Coal, Coke and Cinders, December 1853 (DCRo:D/Lo/B331)

Prior to the advent of iron screw colliers the need for dock accommodation was vital, first to enlarge the area of water available for loading and mooring, second to protect the comparatively small vessels and third, to permit them to load without grounding, liable to cause damage. As ship dimensions increased, protection became less necessary and the maintenance of constant water levels in docks less vital. Increasing size led to fewer vessels and to less congestion while improvements in coal-handling facilities brought about the more rapid turn-around of shipping, again reducing the numbers of vessels in port. To deal with ships of greater tonnage three solutions presented themselves: the deepening of the docks in use, with expensive alterations to their entrances; the construction of new docks able to accept bigger ships; and the provision of high-capacity loading equipment at deep-water river berths. All three options came to be adopted, although on the north-east coast the necessity for providing dock accommodation was marginal, even in 1850. With a mean tidal range of only some 12 to 15 ft - in South Wales the range was doubled[5] - problems regarding the loading of ships were not insuperable; the greatest benefits came from the increased water surface made available.

The principal need was for dredging in the rivers and it was the development and perfection of efficient dredging plant which made possible the vast improvement which ensued. On the Tyne, dredging was on an enormous scale, on the other rivers less so, but it was the increase, by dredging, of the rivers' tidal capacities which was both to deepen the channels and to remove the bars from the entrances, themselves greatly improved, especially those of the rivers Tyne and Tees, by the construction of protecting piers, expensive but of great value both in affording protection and in reducing wave action.

In spite of the move towards port management by bigger authorities the role of the individual remained important. The Londonderry and Ridley families exercised their powers at Seaham and Blyth, the Dukes of Northumber-

land on the Tyne. On Tyne, Tees and Wear, prominent industrialists brought their influence, partisan at times, to bear in the deliberations of the commissions while the NER, on a broader basis, was served by men who represented all of the region's industries and areas. Of the engineers involved, all ports continued to seek the services of prominent consultants while the Tyne and Wear commissioners employed full-time engineers of calibre, the other ports, men of perhaps lesser ability. Pre-eminent in the area was the engineer of the NER, Thomas Elliot Harrison, his opinions respected and his advice widely sought. Employers and engineers alike were to undertake in this period the greatest of the region's port improvements, changes which were to re-establish the supremacy of the Tyne and, in conjunction with the new iron trade, establish the Tees as a major river. In no small measure it was NER policy which was to bring change.

6.2 River Tyne.

The Tyne Improvement Commission (TIC) had been established in 1850, its membership comprising representatives of the four principal towns on the river with, in addition, four life commissioners, two representing the interests of each of the two factions which had fought so bitterly in the Parliamentary contest. The enabling Act[1] had provided the towns of North and South Shields with a voice in the management of the river while, at the same time, giving Newcastle "an important if restricted authority over the river it had so long controlled"[2]. It legislated, too, for the collection of dues, stipulated that the TIC was to be responsible for dredging and ballast disposal and provided protection to the Duke of Northumberland, Trinity House and the Dean and Chapter of Durham, all previously involved in the river's management. Wisely, it did not authorise any river works or improvements; they were to be left to the commissioners appointed.

In its first year of office the TIC would seem to have faced problems similar to those of the Newcastle Corporation, principally encroachments

and complaints by the owners of staiths as to the river's condition. It was also hampered by a lack of funds. At its formation the TIC appointed as its Clerk John Clayton, Town Clerk to Newcastle, and as its Engineer William Alexander Brooks, formerly employed by the Corporation. To give an opinion on the river the TIC sought the services of James Meadows Rendel and he and Brooks each, in 1851, submitted reports.[3] In principle similar, they differed in detail, mainly in Brooks's advocacy of the use of transverse jetties, used by him earlier on the Tees.

Rendel's report began by drawing the attention of the commissioners to

> the development of the railway system, and its tendency to encroach on that important branch of the shipping interest engaged in the coasting trade. Further, that the competition thus commenced is giving rise to a struggle amongst the several ports in your neighbourhood, not only to meet the new and common rival, but also with each other for supremacy.
>
> Many who have directed their attention to these questions, hold that the result will be a great increase in the size of vessels used in the coasting trade, and its concentration in those ports which can be made to offer the greatest facilities for the largest class of such vessels. I so far adopt these views myself, that I should not be prepared to recommend any large expenditure on the Tyne, if I did not consider its natural advantages such as, with suitable works, would insure its superiority over all the neighbouring ports, in regard to depth of water, ease of access, extent of harbour room, and length of inland navigation. 4

To attain his objectives Rendel sought a minimum depth of water on the bar of ten feet with a channel seven feet deep to the principal shipping places at Hayhole, navigation being improved by the removal of all promontaries projecting into the river. The river itself should be restrained by training walls, its channel deepened and its mouth protected by piers. Rendel recommended that the bridge at Newcastle be replaced by a swing bridge, with two 45 ft wide openings, so making feasible the improvement of the river above Newcastle, where the river's course was tortuous to the extent of being analagous to the Tees prior to its earlier improvement.

Like Rendel, Brooks advocated the removal of the Newcastle bridge but envisaged its replacement as a fixed structure with spans similar

to those of the railway bridge but he differed in wishing to retain the projecting points; without them the river's depth would be reduced.[5] The reports* brought Rendel and Brooks into immediate conflict, Brooks informing the commissioners that the idea of a dock at Hayhole had been originated by him although in 1845 he had concluded that the Low Lights would be a better site.# Rendel took issue with Brooks in the latters's temerity in proposing to amend his plans, writing that "it would be inconsistent with the economy of the river to adopt any of the alterations he proposes"[6]. He was critical of Brooks's pier proposals as being too ambitious for the commission's funds and, similarly , criticised his complicated entrance to Hayhole dock. The involvement of Rendel in the matter of the dock had been brought about as a result of a deputation of shippers, and the Duke of Northumberland (1792-1865), meeting the commissioners regarding improvements to coaling facilities. The TIC was not willing to provide staiths - these the Duke could build "as his own adventure"[7] - but it was willing to form a dock and it was on this basis that it was agreed to seek Parliamentary powers for its construction. The decision to form the dock was, in effect, forced upon the TIC by the groynes built into the river by Brooks; one of them, 330 ft long, had caused silting at the Hayhole staiths and the owners pressed the TIC to extend the staiths into deeper water at a cost of £64,000. The TIC, as the inheritor of the Corporation's liabilities, found its only escape in the formation of a dock, financed by borrowing and likely to bring future income to

* The proposals of Rendel and Brooks may be summarised as follows:

Rendel:-	Brooks:-
Use training walls, remove all projecting points in river.	Use groynes to train river. Maintain projecting points.
Inner piers 1,400 and 1,200 ft	Piers 2,244 and 4,290 ft long
Outer piers 2,450 and 1,320 ft.	Total cost £213,000, including £169,000 for piers.
Half-tide dock at Hayhole, 18 ft water	Hayhole Dock to be full-tide with basin and lock.
Total cost £570,000, including £359,000 for Hayhole dock.	

Brooks's earlier report was dated 9 October 1845.

the commission[8], for the TIC a satisfactory outcome.

The commissioners agreed in 1851 to include the formation of protective piers in the Bill presented to Parliament and to seek Government funding for their building, looking upon the formation of a harbour of refuge as a national responsibility. The views of Brooks were accepted by the commissioners in respect of the piers, the deposited plans showing two straight piers at the river's mouth, some 2,000 and 4,000 ft long respectively;[9] the Hayhole dock, now officially the Northumberland Dock, was shown with entrance lock and basin at its eastern end. As passed, the Act[10] provided for both dock and piers to be completed within seven years, the former without impeding the use of the coal staiths, and stipulated that no works were to project into the river beyond Rennie's line of 1813. Funds totalling £150,000 were granted for the dock and £180,000 for the piers; the Act provided also for river channel improvements. For the sake of clarity, each of these three major items will be discussed in turn, prior to a return to general matters.

* * *

6.2.1 River Channel Improvements.

The need for improvements to the river's navigable channel was acute. In his report of 1848 Washington had noted that up to 300 ships had arrived in or cleared the river on a single tide while the harbour at Shields, 146 acres at low tide, had in 1847 held no fewer than 778 ships,[11] perhaps half the total in the river. Under its 1850 Act responsible for dredging and ballast disposal, the TIC in 1852 became responsible also for river moorings. Such was the congestion in the river that ships were forced to lie in the tideway in tiers of perhaps six or eight and more safely to effect their mooring the commissioners agreed to install screw moorings.*

Soon after the formation of the TIC, friction became apparent between certain of the commissioners and Brooks, censured for allowing the staiths of the John Bowes partnership at Jarrow to be built without consent.

*Patented in 1833 by Alexander Mitchell (1780-1868)

Since the passing of the 1852 Act the TIC had split into two factions, the Newcastle representatives favouring the proposals of Brooks and the Shields members supporting Rendel.[12] In 1854, however, six of the commissioners wrote to the Admiralty, ostensibly to prevent the passing of the NER's Bill for a dock at Jarrow, but in reality to criticise severely the operations of the TIC: the river had been narrowed without being deepened; encroachments had been permitted; the depth had deteriorated; dredging had cost three times as much as at Sunderland; and ballast continued to be deposited in the river. The dissident commissioners, all Shields representatives, deplored "the unsound and ruinous system of engineering which has been practised"[13] and drew the attention of the Admiralty to the disastrous effect which would result from the construction of the NER dock, depriving the river of a considerable storage capacity and henceforth reducing its scouring capabilities. Not only, they maintained, had the river been neglected, it had been ruined by injudicious systems of improvement.

These allegations were refuted in a letter to the Admiralty from Joseph Cowen, since 1853 chairman of the TIC, who ascribed the motives of the dissidents asbeing simply the prevention of the dock's construction and he pointed out that the dock, now sanctioned, would, "in the opinion of the most eminent engineers...benefit the navigation of the river".[14] Cowen's statements were, in turn, refuted by the minority party of the TIC which memorialised the Admiralty in an effort to rectify matters; "the importance of the crisis demands the fullest inquiry".[15] A Royal Commission ensued with Brunel one of its five members.

As had happened earlier, evidence was conflicting and contradictory. In its report the Commission was ambivalent, ascribing some of the apparent improvements to steam navigation but nevertheless it was concluded "that very little change has upon the whole taken place during the period of upwards of 40 years in the actual navigable capabilities of the river."[16] The principle of the piers was approved, as was the formation of full-

tide river walls, virtually as proposed by Rennie in 1813; the use of groynes was not recommended; the removal of the several natural projections into the river should be undertaken in conjunction with training walls. The report concluded with the hope

> that the differences and disputes which have hitherto prevailed in the Tyne Improvement Commission, and so much interfered with its usefulness, may from henceforth cease to exist; that all its members may be induced to believe that the interests and prosperity of Newcastle and Shields are identical and inseparable, and to bury in oblivion those local jealousies and animosities which can only prejudice the community to which they belong.17

Guthrie, writing in 1880, recorded that after 1855 "a determination to effect some real and practical improvement of the river began unmistakably to display itself"[18] but he expressed regret that Brooks did not command universal repect amongst the commissioners, this animosity having in part led toJames Walker and John Plews having been appointed as engineers for the pier and dock works respectively. In 1856 Brooks was again censured by the commissioners, who stipulated that his employment was to be full-time, and in 1858 matters came to a head, Brooks then having complained to the members that if their resources were "to be devoted nearly altogether to Shields Harbour and Northumberland Dock the trade to Newcastle must submit to the present inconvenience".[19] Stung by his comments - a riposte was made that his groynes were to the "amusement of scientific men who saw them"[20] - the commissioners unanimously dispensed with his services.[21] No reasons were officially expressed but Brooks subsequently wrote to the TIC on its decision, "injurious to me as a professional man".[22] He was replaced by John Francis Ure (1820-1880) of Glasgow who had given evidence to the Royal Commission of 1855.

Within a year of his appointment Ure produced a report on the improvement of the river's channel. He propounded the view that dredging "on a very extensive scale... is the only means by which the improvements...can be attained"[23] and, rightly, he proposed to dredge initially only to the entrance of the two recently-completed docks, providing a channel with a depth

of some 15 ft at low water. He suggested that the work be undertaken by a new machine which, with the necessary hoppers, would involve expenditure of £40,000, would cost £8,000 p.a. to operate and would work at a rate of ¾m tons p.a. The commissioners reduced the scale of the plant suggested by Ure - the dredger was to have two rows of buckets instead of four[24] - and the vessel was ordered in 1860 by which time another report had been prepared on the more general improvement of the river.

Ure began his report by noting that coal shipments had increased three-fold since 1800 and no river, other than the Thames and Mersey, carried a greater tonnage than did the Tyne. Aware of the TIC's plans to improve the river above Newcastle, Ure commented on the fact that c 1m tons of goods passed under the bridge, compared with the 4m tons of coal shipped from the river. He divided the river into sections, from sea to docks, from docks to Newcastle and above Newcastle. He proposed river depths from these lengths of 29,26 and 23 ft respectively, at spring tides, the corresponding low-water depths being 15,12 and 10 ft. He recommended the removal of the projecting natural points and, having analysed the dimensions of the ships using the river, reiterated his views on the importance of dredging, "a greatly improved navigation can be accomplished and maintained by no other means."[25] Ure's analysis of ships arriving at Newcastle showed, surprisingly, that their average draught had changed little over a period of 12 years, proof to him that the river's improvement had been minimal. The bridge at Newcastle was found by Ure to be a severe problem and he recommended that it be replaced by a high-level suspension bridge; if this were not possible, an opening two-span low-level bridge should be provided, together with a similar structure replacing the timber railway bridge at Scotswood. The costs of undertaking the improvements of the three sections were put at £120,000, £369,000 and £384,000 respectively but, nevertheless, trade and commerce would so increase that revenue must greatly outweigh expenditure.

Ure's proposals were accepted by the commissioners, their adoption moved by James Cochrane Stevenson (1825-1905), one of the earlier dissident members, but opposed by the representatives of South Shields, wishing to restrict development only as far up-river as the docks.[26] Stevenson's views prevailed, Parliamentary powers were sought, including for a dock at Low Lights, and opposition was at least temporarily assuaged. The Act legislated for the river's improvement,[27] the dock and the removal of the Newcastle bridge and its replacement, on the same site, by a swinging structure, the mechanism to be the responsibility of the TIC and the bridge deck and approaches of the Newcastle Corporation.[28] In 1862 the commissioners purchased two further dredgers, a move perhaps made in response to the up-river interests which had earlier memorialised the TIC on the hindrance to navigation caused by the bridge. From this time dredging proceeded apace.

During these years some improvements were undertaken to the river quays, both privately and at public expense. Privately, quay frontages were formed both by manufacturers, such as Allhusen and Cowen, and by shipbuilders while, of the publicly - financed projects powers for quays were sought by the corporations of North Shields in 1851, Gateshead in 1855* and Newcastle in the same year. To all three proposals the TIC objected in a somewhat desultory manner and at North Shields little improvement resulted. At Gateshead, construction work did proceed and, although to a lesser extent than had been first hoped for, the quay, under the powers of a second Act of 1859, was connected to the NER by a rope-hauled incline in 1862.[29]

In Newcastle, quay works were projected to a larger scale. An Act authorised an extension downstream to the Ouseburn[30] but it was not until 1862 that the Chamber of Commerce approached the Corporation with a plan for the provision of a rail link to the quay.[31] The NER was prevailed upon to build the line needed - it was opened in 1870 - so spurring the Corporation into building a new quay, beginning in 1866 under the direction of the

* A quay there was first suggested by Allhusen.

Borough Engineer, John Lamb. Initially the new quay was to provide 12 ft of water at low tide but the decision of the TIC to deepen the approach to Newcastle led to this depth being increased to 20 ft. Problems encountered during construction, including collapse, led to Abernethy and Harrison[32] being consulted and it was not until 1879 that completion was achieved. The cost of the 3357 ft long quay had amounted to £239,323.[33]

Beginning in 1860, the TIC became much involved in three of the bridges crossing the Tyne, the bridge of the Newcastle and Carlisle Railway (N&CR) at Scotswood, the Tyne bridge in Newcastle and the Redheugh bridge, a new project. The Bill for the amalgamation of the N&CR with the NER included for the replacement of the timber bridge built in 1837.* It had been reported upon by Ure who noted its decrepit state, its ability to accommodate only single-line traffic and the possibility that it could easily take fire.[34] The NER was well aware of its condition and it was, in fact, destroyed by fire in 1860 when actually being tested to assess its load-bearing capacity.[35] A temporary bridge was built within two months on the original, mis-aligned,[36] piers and it was not until 1868 that the NER sought TIC approval for a new bridge. The commissioners insisted that the bridge must be capable of being swung open to permit ships to pass, that its foundations must be deep enough to permit dredging and it should have as few piers as possible.[27] Not willing to concede to the first demand the NER erected a fixed multi-span hog-backed wrought iron girder bridge in 1870.[38]

The next bridge to be discussed was that at Redheugh, projected by a company formed in 1866 and having amongst its shareholders the water and gas companies, both seeking river crossings for their main pipes.[39] Initially the bridge was to be of a stayed-girder design with a central span of 345 ft and end spans of 217 ft[40] but it was subsequently amended to comprise two spans of 252 ft and two of 170 ft; its designer, Thomas Bouch, when re-submitting his design, was requested to carry its foundations

* The bridge had later been strengthened by means of a laminated timber arch.

to a 10 ft greater depth so as to permit future dredging.[41] Providing headroom for shipping of 85 ft the bridge was opened in June 1871.

The last of the three bridge works was the building of the Swing Bridge, a replacement for the multi-arch masonry structure, a hindrance to navigation and the subject of discussion regarding its renewal. A bridge of this type had first been suggested by Rendel and a swing bridge, mechanically operated, was proposed by Thomas Bryson (1805-1867), Borough Engineer, in 1864,[42] when the TIC, under the powers of its 1861 Act, began acquiring the necessary properties and lands. A temporary bridge was first built so as to enable the new structure to occupy the old alignment. Richard Cail (1812-1893), later a commissioner, at this juncture suggested to the TIC that it would be better to build the new bridge slightly to the west, so enabling the old one to be maintained during construction.[43] His proposal was rejected and the commissioners in 1866 completed the temporary timber bridge and demolished the old. In June 1868 the tender submitted by Sir W.G. Armstrong for a hydraulically-operated opening bridge was accepted and an immediate start was made to the sinking of iron cylinders as foundations for the masonry island and abutments. Designs were not finally agreed until 1873 and Armstrong then undertook to supply the bridge structure within two years at a cost of £100,825.[44] Delays ensued and it was June 1876 before it was brought into use, its two opening spans being 110 ft wide.

As the construction of bridges and quays continued, Ure pursued his task of improving the river's channel, more than 5 m tons of material being removed in the peak year.* Concomitant with this programme of dredging was the removal of other hazards, such as Bill Point which obstructed both visibility and navigation; its removal involved c 2 m tons of material of which 380,000 tons was rock, blasted under water and dumped at sea. By 1885 the average size of ship using the river was 305 tons, double the size of 1850, but what was of greater significance was the fact that

*In 1861, dredging totalled c ¾ m tons, in 1863, 2.47 m tons, in 1864, 4.18 m tons, in 1866, 5.25 m tons, in 1872, c 4 m tons and in 1885 c 2.5 m tons.

the improvements had opened up the river to such an extent that it had become possible to build ships of up to c 10,000 tons and feasible to ship coal economically, without trans-shipment into keels, from the upper reaches of the river, even in 1872 its depth there increased from 3 to 13 ft.[45]

6.2.2 Piers: design and construction.

The construction of piers at the river's mouth was authorised by the 1852 Act but discussions and proposals were of long standing. A pier on the south shore had been first proposed by Rennie in 1813 and, later, by Rendel, Brooks, Washington, Vetch, Calver, Turner, Taylor, Murray and William Purdo, to become one of the life commissioners.[46] In 1853 the TIC sought the requisite Admiralty approval for the construction of the piers, only to experience the latter's rejection on the grounds that they "could not be safely reckoned upon as adequate to fulfil the object proposed".[47] On behalf of the commissioners, Clayton wrote to the effect that no better design could be produced and in reply to this letter, the Admiralty mentioned that its powers were limited only to the approval or rejection of plans submitted by the TIC. To break the deadlock Clayton suggested that the plans be viewed by James Walker, the Admiralty's inspector, prior to official submission, a move accepted with some alacrity by the Admiralty which had "long felt the necessity of placing the entire responsibility of the plans for the works at the entrance of the Tyne with an eminent engineer, in whom (all parties)... might place confidence."[48] Walker was empowered to assess the plans submitted and "to select or modify any proposed plan, or to originate any other one...(deemed proper for) so grave a question."[49] In June 1853 the TIC was informed that Walker was to review the evidence previously taken by Washington, Calver and Vetch and the commissioners then formally assented to the Admiralty's request.

Walker heard evidence in London, Tynemouth and Newcastle and, referring to the several proposals made, noted that each had its merits. He was

concerned by the river's bar and recommended its immediate removal by dredging, at the same time setting out the philosophy of his pier design: to allow waves to spread and so reduce in height; to maintain beaching facilities; to protect ships from the dangers of a lee shore; to shelter ships clearing the river until deeper water prevailed; and to enable steam tug-boats to assist ships more easily. He proposed to provide an entrance 1,100 feet wide between the two piers, the north 2,100 ft long and the south 4,200 ft, their lines similar to those projected by Brooks and, at the same time, gave credit to him, and to Rendel, for the designs which each had evolved.[50]

Walker's plans were duly submitted to the Admiralty Hydrographer, Admiral Beaufort, to whom was later attributed the comment that "if an angel from heaven were to suggest better piers, he might, but that he himself as Hydrographer could not suggest anything superior to Mr. Walker's."[51] The Admiralty, however, sought further details, working drawings and estimates and requested that borings be taken to ascertain ground conditions. Differences in opinion between Walker and Brooks became apparent in 1854, and in January 1855 the Admiralty complained to the commissioners that drawings submitted had not been in accordance with Walker's plans. Walker had originally produced outlines of the two piers and the Admiralty had sanctioned construction of the north pier masonry and the south pier hearting. Now, however, the Admiralty noted that the plan of the north pier, left at the Admiralty for assent, presumably by Brooks, was "not in conformity with the profile of Mr. Walker, and that the cross sections of the South Pier do not show merely the core of that breakwater, but a finished section of the work...".[52] The Admiralty expressed extreme displeasure and the commissioners, in effect censuring Brooks, recorded that he and Walker must work in unison. At the same time Clayton pointed out to the Admiralty that Walker's duties were legally confined to the approval of plans but, regardless, the TIC would be pleased to avail itself

of his services, a move agreed by the Admiralty, and in May 1855 Walker was formally appointed consulting engineer for the construction of the piers with Brooks supervising work and preparing the necessary drawings.[53] In the hope that the piers would be built at Government expense by convict labour, the TIC began work on the north pier in October 1855 and on the south in March the following year, the tender of Benjamin Lawton having been accepted. Involved already in the winning of stone for the piers' construction and for the building of a railway from quarry to south pier, Lawton submitted prices of £117,300 and £47,700 for the north - masonry - and south - rubble - structures respectively#, their lengths of 1,400 and 2,800 ft having been reduced at the Admiralty's request in an effort to diminish expenditure.[54]

The transfer of responsibility for the pier works brought, in place of Brooks, Phillip John Messent (1830-1897) to the Tyne as resident engineer under Walker* and it was under his day-to-day superintendence that work was carried out. The actual building of the piers has been well described by Porter[55] and it is here necessary only to summarise the events which occurred over the 30 years which followed. As designed the north pier was of two separate masonry walls connected at 25 ft intervals by cross walls, the whole founded upon a mound of rubble stone and filled with loose quarry debris. Formed to a height of 20 ft above high water with upper and lower surfaces 10½ and 13½ ft wide respectively the pier's masonry foundations were one foot below low water. The south pier took the form of a rubble embankment faced with masonry three feet thick forming a walkway 27 feet wide at 10 ft above high water.

Initially it had been the commissioners' intention to provide 15 ft of water at the pier's entrance but it soon became obvious that a greater depth was necessary and Walker accordingly prepared schemes for terminating the piers in depths of 25, 30 and 36 feet , plans for the second scheme

The highest tender was £463,000

* Messent had earlier worked under Walker in London.

being presented to the Admiralty in 1859;[56] the piers were delineated as being of sinuous form and to a greater length.[57] A further Act of Parliament was sought by the TIC and, successful in its application, it was granted powers to extend the time of completion for the piers by ten years and to borrow additional funds. The Act noted that the TIC had been promised £¼m by the Commission on Harbours and Refuge on the understanding that the commissioners raised a similar sum.[58]

By this time Lawton was experiencing financial problems and progress would seem to have been somewhat retarded as a consequence. To expedite matters, the TIC sought to supply suitable materials, finding a certain amount of ironworks slag available, a material much used on the Tees. With the original contract approaching completion, the Commissioners took over Lawton's plant in 1863, an arbitration* determining its value as c £13,300. Rather than employ another contractor, the TIC resolved to proceed with construction work using direct labour under Messent but to simplify matters a labour-only contract was arranged with Oldroyd and Marshall.[59]

Walker died in 1862 but his partners continued as engineers, in 1863 submitting the drawings for the new pier extension, in character more substantial than the old. In place of masonry facing, concrete blocks of much greater weight were to be used and mass concrete replaced the less strong material used for hearting but what was of even greater importance was the fact that foundations were taken down to a maximum of 23½ ft below low water. North and south piers were now to be 2,900 and 5,400 ft long respectively. Although some storm damage had been incurred in 1861 it was not until 1867 that major damage was sustained, undermining of the foundations of the north pier causing some 280 ft of the sea wall to fail. Similar damage occurred to the south pier, where 370 ft of the later vertical walling collapsed. At this time some 475 men were employed on the work but the delay enforced by the damage led to the TIC terminating the labour-

* The arbitrators were George Parker Bidder and James Leslie.

only contract and taking all aspects of the work into the hands of Messent.[60] Repair of the damaged sections involved the rebuilding of the foundations at a greater depth and led to a delay in progress of seven years, it being considered inadvisable to continue seawards and so risk further damage.

In 1876 Cail, earlier a substantial civil engineering contractor, was appointed chairman of the Piers Committee, soon followed by a letter from him on account of "the slow progress made in building the piers by the present process and according to the plans made by Messrs. Walker and Burgess near a quarter of a century ago";[61] as staging was expensive and vulnerable would it not be better to work from hoppers? He was asked to submit details and did so, by report, in January 1877. Cail did not claim to be the originator of his proposals, the placing of concrete in bags having been adopted elsewhere, but where he did claim originality was in the "tipping cradle"[62] which would lower the concrete-filled jute bags to the required depth and Cail offered his patent on the device to the TIC. He also suggested modifications to the south pier, to make it safer to use, and concluded by asking that his report be read by Messent and, if thought advisable, by other engineers. Cail's views were commented upon in two reports by Ure and Messent in March. After reviewing the history of the construction of the piers, they saw no reason to alter procedures either by using the barges suggested by Cail or by using an overhanging crane, another suggestion which had been made; "the plan of works recommended in our report of 1868...has hitherto proved so successful."[63] In view of the fact that virtually no progress had been made for ten years and that it had been minuted that work should "for the present be contracted within the smallest limits consistent with safety to the works "[64] Cail's apprehension is understandable. Cail disagreed, in a further report,[65] with their comments, so resulting in a meeting which involved Sir John Coode (1816-1892), James Guthrie (1827-1880)*, Cail and Messent. Coode, reporting

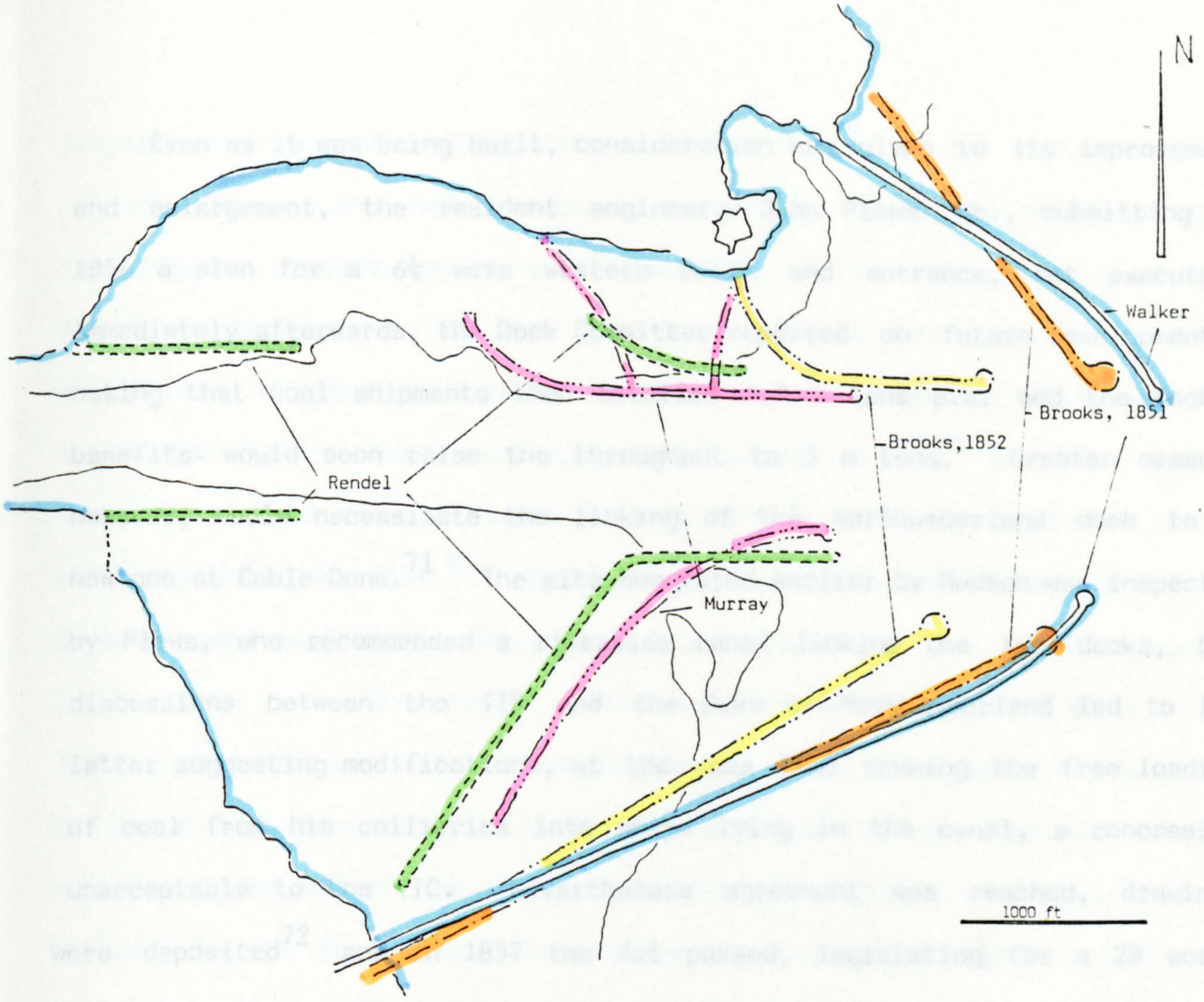
* Guthrie had been appointed as Secretary to the TIC in 1861.

soon afterwards, admitted some merit in Cail's proposals but nevertheless sided firmly with Messent, especially in his preference for construction by blockwork, able to be cast in adverse weather conditions, rather than by concrete in bags. Coode was unable to recommend Cail's design for the piers' foundations - they must be 15 to 18 ft below low water - but nevertheless, "in a position fully to appreciate Mr. Cail's desire to aid in accomplishing these important objects (he) should...have been pleased to have concurred with him in his proposals had (he) found substantial ground for doing so."[66]

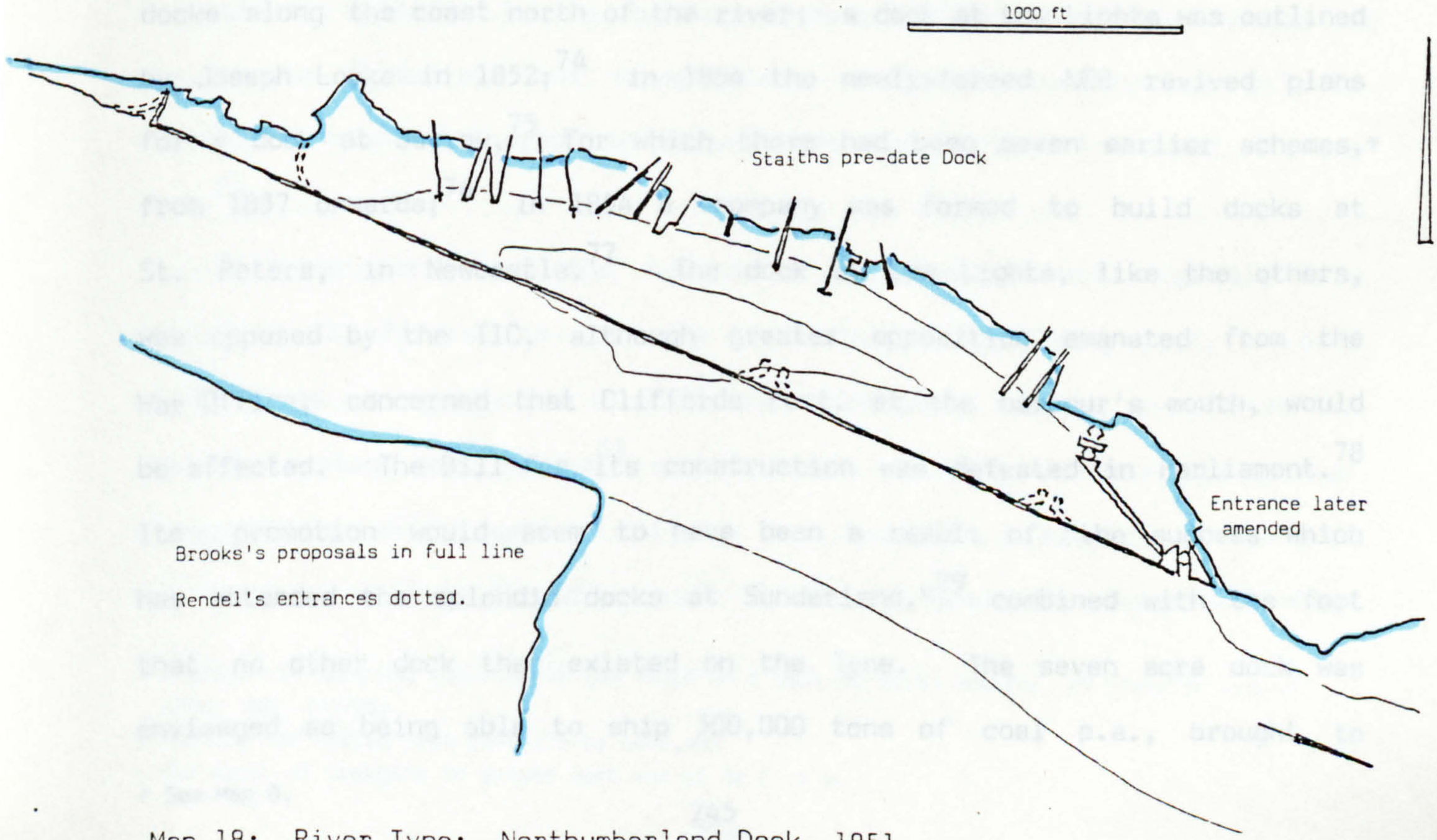
Pier construction was subsequently resumed, only to be halted again in 1879 due to Messent wishing to provide a stronger structure. He proposed that the blocks should be increased to 45 tons but, as the changes involved both the re-design of the piers necessitating Admiralty approval, and the design by Messent of the substantial cranes it was not until 1883 and 1885 that the north and south cranes were completed,[67] so enabling work to continue, the piers by this time having been turned inwards, a prelude to completion.

6.2.3 Docks: proposals and construction

The Northumberland Dock, the first to be built on the river, was sanctioned by the TIC's Act of 1852, its design having led to some acrimony between Rendel[68] and Brooks[69], the latter's proposals having been chosen and put before Parliament. Within six months, however, Brooks, so far as the dock was concerned, had been superseded by John Plews (1795-1861) recently involved in similar work at Cardiff.[70] Tenders for the dock were sought in 1853 and that of David Thornbury, for £133,788, was accepted. Work began immediately and, seemingly without major problems the 51 acre dock was formally opened by the Duke of Northumberland in October 1857. During construction the staiths had remained in use continuously, the the western end of the dock being closed only when the eastern basin had been completed.



Map 17: River Tyne Pier Proposals, 1850-1855



Map 18: River Tyne: Northumberland Dock, 1851

Even as it was being built, consideration was given to its improvement and enlargement, the resident engineer, John Plews Jnr., submitting in 1856 a plan for a 6¾ acre western basin and entrance, not executed. Immediately afterwards, the Dock Committee reported on future developments, noting that coal shipments then totalled 1.3 m tons p.a. and the dock's benefits would soon raise the throughput to 3 m tons. Greater demand, however, would necessitate the linking of the Northumberland dock to a new one at Coble Dene.[71] The site suggested earlier by Hudson was inspected by Plews, who recommended a riverside canal linking the two docks, but discussions between the TIC and the Duke of Northumberland led to the latter suggesting modifications, at the same time seeking the free loading of coal from his collieries into ships lying in the canal, a concession unacceptable to the TIC. Nevertheless agreement was reached, drawings were deposited[72] and in 1857 the Act passed, legislating for a 28 acre dock, a basin and 75 ft wide gates. Additional borrowing powers were approved.[73]

The forming of docks on the river was sought by bodies other than the TIC: Brooks put forward a proposal, already noted, for a series of docks along the coast north of the river; a dock at Low Lights was outlined by Joseph Locke in 1852;[74] in 1854 the newly-formed NER revived plans for a dock at Jarrow,[75] for which there had been seven earlier schemes,* from 1837 onwards;[76] in 1854 a company was formed to build docks at St. Peters, in Newcastle.[77] The dock at Low Lights, like the others, was opposed by the TIC, although greater opposition emanated from the War Office, concerned that Cliffords Fort, at the harbour's mouth, would be affected. The Bill for its construction was defeated in Parliament.[78] Its promotion would seem to have been a result of "the success which has attended the splendid docks at Sunderland,"[79] combined with the fact that no other dock then existed on the Tyne. The seven acre dock was envisaged as being able to ship 300,000 tons of coal p.a., brought to

* See Map 8.

it via some three miles of railway.

At Jarrow, the NER continued its efforts to secure an outlet for the shipment, predominantly, of Durham coal, so continuing the policies of its predecessors.* On the Tyne its sole rail competitor was the B&TR serving only the north bank of the river at Hayhole. The Act which finally legislated for the dock's construction was passed in 1854[80] and construction by Jackson, Bean and Gow began in June 1855;[81] a false start had been made, by Cail, in 1849.[82] By March 1859 work had been completed at a cost of some £440,000#. With a basin of 9½ acres, the dock, designed by Harrison, was 50 acres in extent with an entrance 80 ft wide. At Jarrow, Harrison returned to the loading of coal by spout, rather than by drops and two jetties - a further two could be accommodated - were provided at one end of the dock, each with ten shipping places, a marked contrast to the Northumberland dock where the existing spouts and drops, privately-owned, continued to operate, the TIC having no desire to "become the proprietors of shipping staiths."[83] The passage of the NER Bill had not been easy, objections having been raised by the Admiralty, anxious that the reduction in volume of the Slake would damage the river. It was somewhat mollified by the opinions of Harrison and Cubitt, both supporting the dock's formation, but nevertheless sanctioned construction only on the understanding that dredging+ be undertaken to replace the tidal storage lost.[84]

As construction of the two docks continued, other proposals were made: at St. Peters, on the site of Smiths' shipbuilding yard, a dock of 35 acres was projected in 1853 and although a company was formed for its construction and an Act[85] was obtained, nothing further transpired; a suggestion, which came to nothing, was made for a complex of docks in the Ouseburn valley, the down-river limit of Newcastle Quayside, where

* Harrison in 1851 had reported to the YN&BR on a dock at South Shields, 40 acres in extent (PRo: RAIL 772/25)
# Tenders had varied from £344,475 to £446,400
+ The ratio of dredging to volume lost was to be 1 to 4.

an elongated dock, entered through a basin was to extend for more than half a mile along the burn, providing an area of water of some 20 acres;[86] in 1855 an application was made to Parliament for the North Shields and Tynemouth dock to be known as the Low Lights dock;* and in 1857 Palmer sought to build a dock at Jarrow, a move which, again, came to nothing in spite of the commissioners' acquiescence.

The proposal to form a dock at Low Lights was to be the cause of much conflict, bitterness and indecision, involving both the TIC and others. Its promotion led immediately to a further dispute between TIC and Brooks, on account of the latter's involvement. One of the commissioners, Christian Allhusen (1806-1890) had earlier proposed that a record be kept as to how Brooks spent his time[87] but it was a letter from him to the TIC which led to further ill-will. In November 1855 Brooks wrote that he had modified his 1845 proposal for a dock on this site and now envisaged there a 30 acre dock with a seven acre basin, the excavated material being absorbed by the pier construction and the dock wall serving to train the river's flow. He expressed the hope that the TIC would "unanimously give its sanction to a measure (to)...increase the accommodation to shipping."[88] Instead of providing support, the commissioners censured Brooks for his involvement, in that he had "thought fit without (TIC) sanction to place himself in the inconsistent and conflicting position of projecting work as Engineer to another Body"[89] and gave him eight days to decide where his loyalties lay; he resigned from the Low Lights dock concern. The TIC had been urged by the river's shipowners to support the Bill for the dock's construction but it found itself unable to do so, in spite of representations by four of its members, two of them from North Shields. The drawings [90] for the dock were lodged - no engineers name was given - but the Bill was subsequently withdrawn, the TIC then giving an undertaking that it would inquire into the possibility of itself building a dock at Coble Dene, already noted.

* See Map 10

Within the TIC the dock proposed at Coble Dene had led to much dissent, Stevenson suggesting at one period that the Bill should be withdrawn, a move which found little support.[91] There were doubts, too, on the utility of the canal joining it to the Northumberland dock but the amended Bill was finally passed. The principal reasons for its having been suggested were that deeper enclosed water was required and the dock would provide the TIC with facilities for the handling of general cargoes, then lacking. The passing of the 1857 Act was not immediately followed by dock construction and in 1859 the Steam Coal Owners, mining the area between the rivers Tyne and Blyth, again sought a dock at Low Lights, a deputation urging its construction upon the TIC. The dock was also backed by the Tynemouth Corporation, ostensibly on the grounds that it would be better placed than was Coble Dene and, with the forming of the piers, would be better protected from the sea than earlier;[92] delay would lead to loss of trade. Similar views were expressed by the river's shipowners who stressed that the unimproved state of the river necessitated the construction of a dock at its mouth, so attracting to the Tyne the natural trade of Blyth.[93]

Ure, by this time successor to Brooks, reported that the Northumberland dock, almost complete, would be capable of holding 200 ships and he then compared the advantages of Coble Dene and Low Lights, pointing out that the three inquiries regarding the latter site - 1848, 1852 and 1856 - had all decided against it. He noted that the dock entrance must face seawards for easy navigation, although susceptible to storm action, but nevertheless after much deliberation he stated a preference for the Low Lights site, not least on the grounds of cost; a 61 acre dock at Coble Dene connected to the Northumberland dock, would cost £716,900 and a 41 acre dock, plus a seven acre basin, at Low Lights, £432,500.[94] By 12 votes to six - those against comprised three South Shields members, two Newcastle and one life commissioner - the TIC agreed to seek Parliamentary powers for the new dock at Low Lights.[95] The Act including for the construction

of the dock was passed in 1861, stipulating that work was to begin within three years and be completed within ten. It led Brooks again to write to the TIC, complaining that the dock had brought him no recompense, although to his design and, critical of Ure's plan for dredging the river and the bar, he reminded him to "take it for granted that it will be as practicable to drain the sea as to get rid of the bar of the Tyne by dredging."[96]

The TIC'S reluctance to begin work was questioned by both the North Shields Chamber of Commerce and by the Newcastle Corporation. The former stated that a letter had been received from Joseph Laycock (1798-1881), chairman of the B&TR, to the effect that lines had been built in anticipation and agreement had been reached with the Duke of Northumberland to connect to his shipping places. So strongly did the B&TR feel that it had commissioned John Furness Tone (1822-1881) to prepare plans for a 22 acre dock to cost c £220,000,[97] a project opposed by Tynemouth Corporation, against construction by a private company but unable to fund the project itself. Further pressure by shipowners and coalowners led to the TIC instructing Ure to prepare drawings, providing an additional entrance at the west end of the dock.[98] In the Newcastle Council, note was taken of the threat to the Tyne posed by docks projected at Blyth "which would necessarily divert trade from the Tyne"[99] and so reduce the revenue of the Corporation, which maintained that funds for dock construction should come from Tynemouth, landowners, coalowners and the B&TR, then seeking to subscribe £100,000 to the Blyth dock project.[100]

Heeding the criticism, the TIC sought estimates, a figure of £294,500 being given by Ure. A sub-committee met with all interested bodies and it was resolved to adopt Ure's Parliamentary plan. The estimate of cost was revised to £325,000 of which the Duke would guarantee £75,000. Similarly the B&TR, the Steam Coal Owners and the Corporations of Newcastle and Tynemouth agreed to guarantee £50,000 each. What was of great significance, too, was the discovery that the Blyth Dock Bill would be withdrawn if the Low Light dock were to proceed and the sub-committee ended its report

with the hope that "by the construction of the Tynemouth Dock a harmony of feeling and interests in the Tyne will, we think, be secured,"[101] enabling the Tyne to retain unopposed its position as the leading port on the north-east coast. The TIC confirmed this recommendation, but not unanimously, and with much ceremony, and only four days short of the expiry of the Parliamentary powers, the foundation stone of the Tynemouth dock was laid on 23 June 1864, the Northern Daily Express noting somewhat sourly that it would be the third dock in the river "and let us hope the most successful!"[102] Within the TIC the debate had led Cowen to view a dock at Blyth "attracting from the Tyne a large proportion of its trade",[103] analagous to Seaham Harbour; the Marquis of Londonderry had sought facilities on the Tyne, had been refused and had subsequently built Seaham and provided assistance to Sunderland.

Criticism was levelled at the actual design of the dock, as it was at the financial involvement of the TIC itself, especially as the dock, like that at Jarrow, would be likely to prove unprofitable. A further fear was expressed that Hartlepool and Sunderland would continue to threaten the Tyne and attention was drawn to a new danger; if the commissioners "took the statistics at Cardiff, they would see how much that port had advanced upon the Tyne, and it was all through its docks."[104] Later, Laycock admitted that Blyth "was not so suitable a place as the Tyne"[105] and its abandonment was solely due to the TIC's decision to build at Low Lights.

The ceremonial inauguration of the dock's construction did not lead to further progress although the need for further accommodation was acute and in 1862 had led to a revival of the earlier Ouseburn scheme, again without result.[106] The TIC, meanwhile, continued its preparatory work for the Low Lights dock and to regularise the position, a further Act of Parliament was obtained in 1865. Ure's latest version included an additional western entrance[107] to the dock which would be "accessible

to the largest Class of Vessels which can enter the River."[108] The Act confirmed the financial involvement of the B&TR, the Duke of Northumberland and Lord Hastings, like the Duke possessing substantial mining royalties.

In 1866 Ure produced two reports on docks and shipping places. In the first he pointed out that, although the Northumberland dock had been developed to its capacity, he now considered it unsafe to build the Low Lights dock as the piers' progress had not been sufficient to provide protection to it. Analysing the trade of the Northumberland dock, Ure had found that during its life coal shipments had risen from 1.35 to 2.06 m tons p.a.* of which the tonnage carried in steamships had risen from 36,000 tons to 363,000 tons p.a. He now suggested extending the dock and providing river staiths at Whitehill Point, the spur between the Northumberland and proposed Coble Dene docks. This arrangement "would give facilities to the Screw Colliers for loading in the River, provide additional deep water accommodation for Sailing Ships in the Dock"[109] and also provide for an import trade. The dock extension would be 18 acres and the complete scheme would cost £¼m. The second report considered the several options available for dock additions, principally so that the TIC could reserve for development such lands as it thought necessary. Ure was concerned that it could be seven or eight years before the Low Lights dock could proceed as the Board of Ordnance was proving difficult regarding Cliffords Fort replacement and he put forward in substitution two versions, 38 and 20 acres, of the Coble Dene dock and also outlined again his Northumberland dock extension. The larger version would cost £650,000 and the smaller £550,000, both in addition to the extension dock, connected by canal to Coble Dean. Such was trade increasing that, in his opinion, land should be reserved for a merchandise dock at Coble Dene.[101]

Ure's reports resulted in a further Act being obtained to set back the river line at Whitehill Point and to build coal spouts there[111] but this proposal, too, led to dissent within the TIC. The view was expressed

* By 1866 the throughput of the NER's Tyne Dock amounted to c 2¼ m tons p.a.

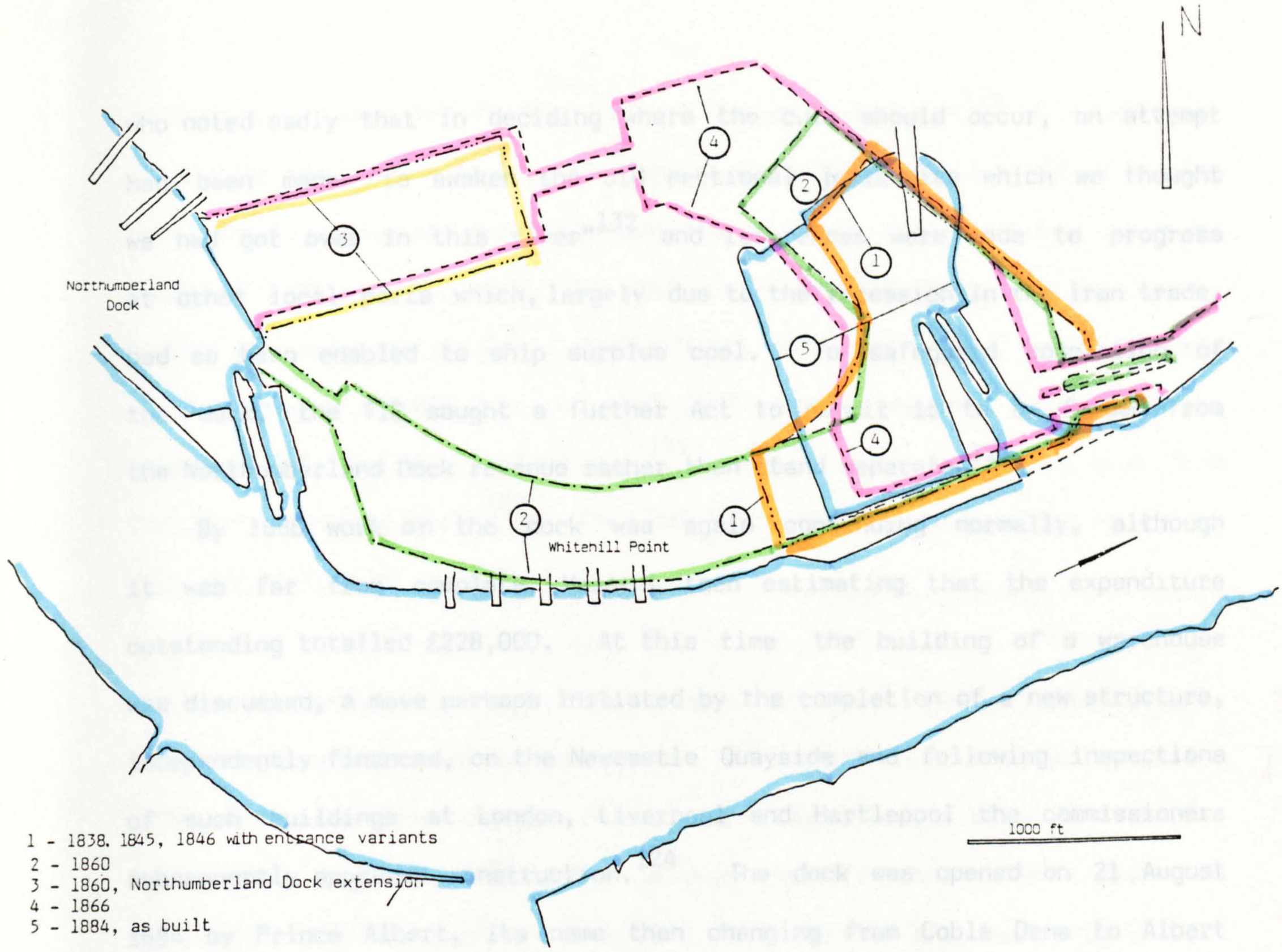
that the Whitehill Point scheme be dropped and a dock built at Coble Dene instead, a suggestion soon followed by an enquiry from Tynemouth as to whether or not the TIC intended to build a dock at all.[112] Subsequently a deputation of coal-owners met the TIC, which then resolved to proceed at Whitehill Point. Meanwhile, however, a further deputation, including the former promoters of the Low Lights dock, asked whether the TIC, at best luke-warm to the idea, would permit the private building of the dock,[113] a request which was refused.

In 1870 Ure relinquished his position as engineer, although continuing to act as consultant, and in the same year two further proposals for docks were made. The first of them was proposed by the Scotswood, Newburn and Wylam Railway and Dock Company amongst its promoters William Haswell Stephenson (1836-1918), to become a commissioner. The dock was to be only seven acres in extent,[114] located on the north shore of the river immediately downstream of Scotswood suspension bridge but it, like others, was duly abandoned in 1876 because of its construction becoming "useless by reason of the river Tyne not having been dredged upwards to such a distance as to allow of access thereto."[115] The second proposal was a revival of Lock and Errington's 1853 version of Low Lights, this time proposed by Bell and Miller. Ure reported upon it, his opinion being that construction of the 17 acre dock, in two parts, should be delayed, principally on account of the slow progress on the pier construction.[116]

The exposed location of the Low Lights site, exacerbated by the slowness of pier construction, and the lessening necessity for dock provision at all brought about a cessation in the demands for a dock near the river mouth. Nevertheless Tynemouth Corporation continued to press for a further dock on the river, in spite of the Whitehill Point work proceeding, as did the South Shields Trade and Commerce Committee, and in October 1871 a report on the feasibility of constructing a dock at Coble Dene was made by Ure. He again stressed the changing requirements brought about by steam propulsion. Such ships were not so dependent upon docks and he

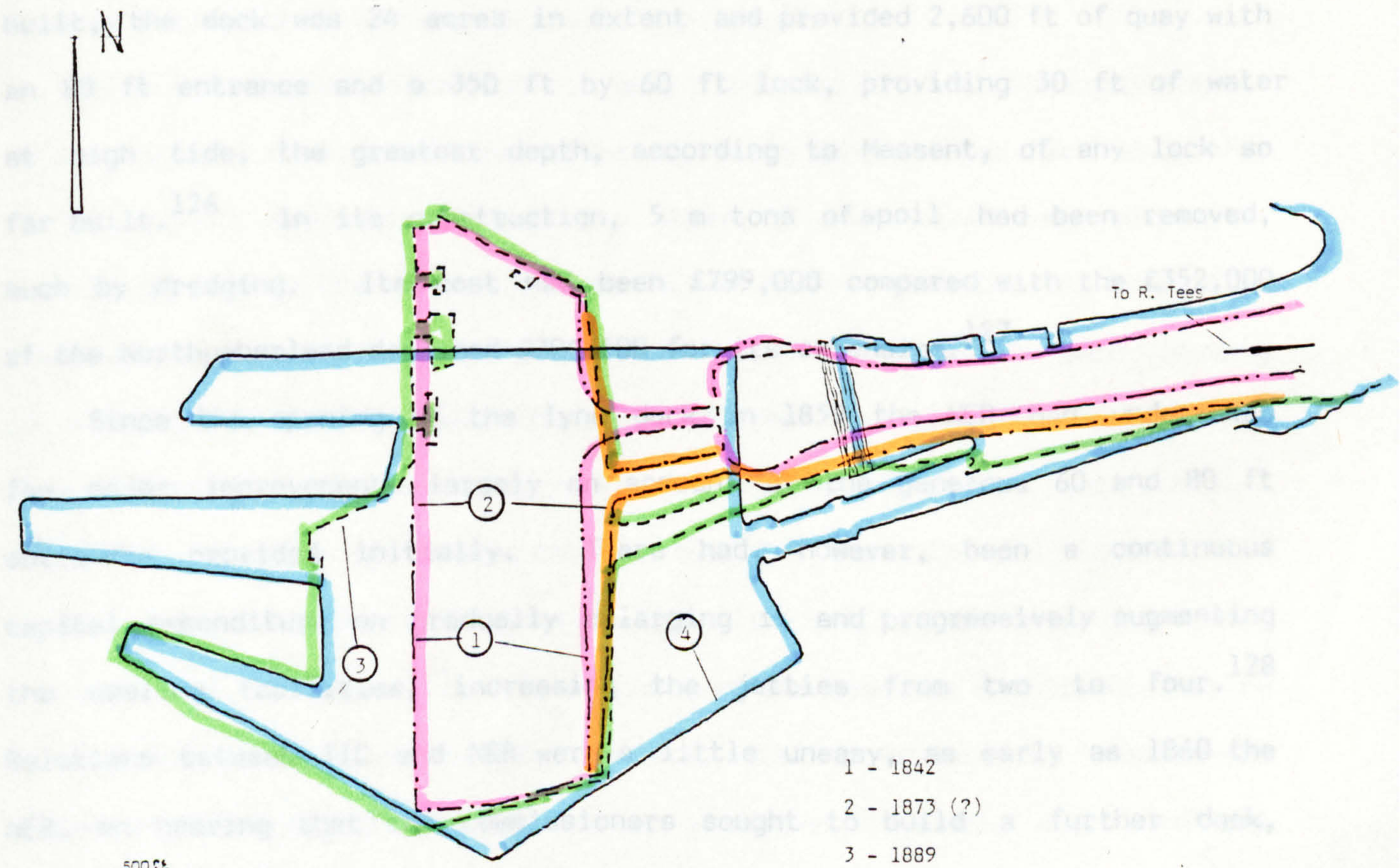
envisaged a reduction in shipping costs should a new import dock be built contiguous with the Northumberland dock rather than distant from it. He was critical of the older entrance and also the lack of deep water in the Northumberland dock and planned a 46 acre dock, a 16 acre passage to the older structure, and a 4½ acre tidal basin with an entrance 100 ft wide; high water depth would be 30 ft.[117] A disadvantage of the scheme, Ure noted, was that the coal-owners would be forced to provide new staiths in order to benefit. A warehouse was envisaged as part of the development and Ure estimated that the whole scheme, which could be built in four sections, would cost £1.182m of which £243,000 was for the canal, in his view a vital element.[118] The TIC accepted Ure's report, negotiations were undertaken with the Duke of Northumberland (1810-1899) regarding land acquisition, drawings were deposited[119] and a Bill presented to Parliament, as might be expected leading to a revival of the conflict between Newcastle and North Shields, in this instance centred principally on the funding of the work and the programming of construction. Nevertheless, the Act was sanctioned.[120]

The river wall at Whitehill Point was completed in 1872, borings to ascertain ground conditions relating to Coble Dene were made in 1873 and excavation began the following year[121] to a plan revised as a result of the site investigation. The beginning of this work was marked by significant changes in the TIC; in 1873 Cowen died and was replaced as chairman by Thomas Ridley (1804-1885); John Clayton, Clerk since 1850 resigned in the same year and was succeeded by Guthrie; Ure reduced his obligations to the commissioners and Messent took over more of his work. So far as Coble Dene was concerned, its building did not continue smoothly and in 1876 work was restricted for a period of some 18 months, 1,600 of the 3,000 strong workforce being laid off. TIC dock income had fallen as a result of reduced trade and in an effort to reduce expenditure the commissioners, after some disagreement, decided that dock works must bear the brunt of the reductions. Some disappointment was expressed by Stevenson



1 - 1838. 1845, 1846 with entrance variants
2 - 1860
3 - 1860, Northumberland Dock extension
4 - 1866
5 - 1884, as built

Map 19: River Tyne; Coble Dene Proposals



1 - 1842
2 - 1873 (?)
3 - 1889
4 - 1904

Map 20: Middlesbrough Dock Development

who noted sadly that in deciding where the cuts should occur, an attempt had been made "to awaken the old sectional jealousies which we thought we had got over in this river"[132] and references were made to progress at other local ports which, largely due to the recession in the iron trade, had so been enabled to ship surplus coal. To safeguard completion of the dock, the TIC sought a further Act to permit it to be funded from the Northumberland Dock revenue rather than stand separate.[123]

By 1880 work on the dock was again continuing normally, although it was far from complete, Messent then estimating that the expenditure outstanding totalled £228,000. At this time the building of a warehouse was discussed, a move perhaps initiated by the completion of a new structure, independently financed, on the Newcastle Quayside and following inspections of such buildings at London, Liverpool and Hartlepool the commissioners subsequently approved construction.[124] The dock was opened on 21 August 1884 by Prince Albert, its name then changing from Coble Dene to Albert Edward;[125] the warehouse was completed some three months later. As built, the dock was 24 acres in extent and provided 2,600 ft of quay with an 80 ft entrance and a 350 ft by 60 ft lock, providing 30 ft of water at high tide, the greatest depth, according to Messent, of any lock so far built.[126] In its construction, 5 m tons of spoil had been removed, much by dredging. Its cost had been £799,000 compared with the £352,000 of the Northumberland dock and £206,500 for its extension.[127]

Since the opening of the Tyne dock in 1859 the NER had undertaken few major improvements largely on account of the generous 60 and 80 ft entrances provided initially. There had, however, been a continuous capital expenditure on gradually enlarging it and progressively augmenting the coaling facilities, increasing the jetties from two to four.[128] Relations between TIC and NER were a little uneasy, as early as 1860 the NER, on hearing that the commissioners sought to build a further dock, expressed the view that they "should instead...direct their attention

to deepening the water on the bar and in the river..."[129] In 1869, by which time the capital cost of the Tyne dock totalled £¾m, the NER, answering criticism regarding its expense, countered with the statement that shipment totalled 2.38 m tons, more than double the quantity shipped by the company before its construction.[130] Expenditure continued at a variable rate - it averaged £15,000 p.a. - until 1883 when it ceased. At that time shipments totalled c 5 m tons p.a.[131] compared with the 1.8 m tons from the Northumberland dock.[132] The Tyne dock had proved a valuable outlet for the traffic of the NER.

* * *

In order fully to cover the affairs of the TIC, three further strands of its development must be considered. From the year of its formation, 1850, the commission engaged in much discussion - and dissent - amongst its members regarding first, the revenue paid to Newcastle Corporation on account of its having in the 1850 Act retained the income of 5/8 of coal shipped; second, the representation of the commission; and third, finance related both to revenue and to capital.

With the Northumberland Dock in operation, the TIC took the understandable view that commission expenditure was being appropriated for the benefit of the town of Newcastle through its share of income from coal shipments. A move, opposed by the Newcastle members, was made to purchase the Corporation's share and agreement was reached between the two bodies, in turn leading to a deputation meeting with the Board of Trade to regularise the position. It was reported to the commissioners that the board had proved "inexorable... (but) did not seem to understand the question and its own interests... It is a great happiness to know that the Tyne and its destinies are beyond the powers of such men."[133] The proposal to purchase was withdrawn, only to be resurrected three years later by Ure, seeking revenue to enable the needed capital projects to be funded, a suggestion which, again, was not taken up.[134] In 1868 the TIC revived the matter, a deputation

meeting the Corporation and offering to purchase the dues for ten times the annual revenue.[135] The Corporation's Finance Committee, headed by Isaac Lowthian Bell (1816-1904), was unable to recommend the sale of the dues, declared Newcastle's rights as inviolable and declined to have the price fixed by an outside body; it did, however, offer to discuss the matter further, "well aware of the importance of cultivating and maintaining an amicable understanding"[136] with the TIC. In view of the fact that the dues were a significant source of the town's income the committee's views were logical and Bell, explaining the report, stated that the inhabitants of Newcastle would be reluctant to put their interests into the hands of North and South Shields. The view of the TIC was that as the Corporation had contributed nothing to the river's well-being, it should not benefit from the commissioners' management. Stalemate led to the TIC deciding to obtain Parliamentary powers, a move again opposed by the Newcastle members, but with the Bill in Parliament, accommodation was reached with the Corporation and a sum of £130,000 agreed*, the Corporation having rejected an earlier offer £5,000 less.[137]

The constitution of the TIC had been the subject of much controversy at its inception and sporadic outbursts on this matter occurred during the early years. In 1869, however, an attack was made upon it by Tynemouth, principally regarding the works undertaken by the commission, but also deploring the constitution, "never...acceptable to the public"[138] and favouring Newcastle, a view refuted by the TIC. In 1871, representation was requested by Jarrow and, soon afterwards, a Bill was presented to Parliament to amend the TIC's constitution by the addition of 13 members.[139] It was opposed by the commissioners on the grounds that the TIC had proved a success and that to amend it would raise earlier-expressed antagonisms, especially those involving Newcastle and Shields. The Bill was subsequently withdrawn only for a similar one to be presented in 1874, this time with such promoters as Palmer, Bell, Andrew Leslie and Tone;[140] it sought

* The Corporation's share of the dues had risen between 1851 and 1870 from £6,382 to £16,480 p.a.

an increase of 15 members, to be shipowners, coal-owners and traders. Reflecting the growth of industry which had taken place along the river between Shields and Newcastle, largely due to men such as Palmer and Leslie, the Bill was opposed by the TIC, jealous of its position as the appointed conservator. Following discussions, the Bill's promoters offered to withdraw it, subject to the TIC making certain concessions, namely the introduction immediately of a similar Bill by the TIC, the principle of representation of the payers of dues, the increase to 24 of the membership and a moratorium on the increasing of river dues for a short period.[141] Discussion led to agreement, with modifications, and a Bill was presented by the TIC itself, largely in accordance with the suggested principles but involving the addition of only six members, two each representing shipowners, coalowners and traders. On this basis an Act was sanctioned, the election of the new members, serving for three years, to be operative from September 1875.[142]

The finances of the TIC did not prove easy in spite of the fact that between 1850 and 1885 revenue rose from c £20,000 to c £265,000. Expenditure had been substantial due to the work undertaken having been to a scale greater than originally envisaged and borrowing rose to almost £4 m by 1885. The principal problems involved the piers which although originally estimated at £180,000, had cost c £1m plus £½m accumulated interest. Similarly, the Northumberland dock, estimated at £150,000 had cost £352,000. Some problems had been due to the fact that several separate and distinct funds were originally operated, River Improvemment, Piers and Northumberland Dock, and difficulties were experienced in borrowing on individual securities. It was due to the acumen of Guthrie that the funds were "consolidated into one Trust fund for borrowing purposes,"[143] a move of vital significance in the commission's operations; Parliamentary powers for this reorganisation were incorporated in the Act of 1872. A further alteration to the structure of the dues payable was achieved by 1877 Act when the long-standing Town

and Quay dues were replaced by River Dues and the opportunity was taken of imposing a duty on ships passing the newly-completed Swing Bridge, the passage for ships of less than 100 tons being at half the rate charged for bigger vessels.[144]

That the Tyne, in the nature of its trade, was different from many other rivers was recognised early and in 1876 James Craig, newly appointed, commented that the commissioners could not shut their eyes to the fact that all their trade was "based on the simple article of coal and that when the coal is worked out, however many manufactories there may be on the Tyne, many will then no longer be able to work as at present. Men will find cheaper coal..."[145] and trade would move to it. Between 1850 and 1885, coal shipments rose from 3.36 to 9.6 m tons but of the other trades on the Tyne, fortunes were mixed. Shipbuilding in iron had prospered, largely due to men such as Leslie and Palmer,and by 1883 new tonnage built had reached a figure of 217,000 tons.[146] What is of interest in this regard is the relationship between the size of ships using the river and those built upon it. Since 1850 the average size of vessel clearing the river had risen from 150 to 428 tons - the largest was 4,000 tons - but[147] the size of ship built had risen to c 10,000 tons, admittedly an extreme example. Nevertheless the river was able adequately to accommodate both the large numbers of ships using it - 14,253 in 1885 - and the increasing tonnage of the ships built upon it. In line with shipbuilding, an engineering industry flourished in Newcastle and Gateshead due principally to railway expansion and the growing use of steam-powered ships; by 1885 more than half of the ships using the river were steamers.[148] Engineering had also expanded at Elswick where the factory established by Armstrong in 1847 had grown and diversified, to the extent of building warships there. This move had been made possible only by the replacement of the Tyne bridge and in 1883 the TIC was informed of Armstrong's intention of building at Elswick ships "of the greatest dimensions which can safely be passed

through the bridges".[149]

The Tyne industry which was not prospering was that of chemical manufacture, Stevenson and Allhusen being among the proprietors. The alkali trade's fortunes had been variable but a combination of the introduction of the Solvay process into England in 1873 and the discovery on Teesside of salt deposits, the trade's raw material, brought about a decline. Ironically it was the three major proprietors, Tennant, Allhusen and Stevenson, who had established salt works on the Tees and had so "prepared the way for their own destruction."[150]

It is difficult to over-emphasize the extent of the bitterness, rancour and jealousies expressed by the representatives of the several towns appointing members to the TIC. The two principal causes were the long-standing quarrels between North Shields and Newcastle, the shipowners of the former constantly seeking river improvements at the expense of the merchants of the latter and the rivalry between the bodies of North and South Shields.

In contrast, Gateshead was little involved. Disputes in this period were legion, many due to the proprietorial attitude of Newcastle towards the river , a feeling present to a lesser extent within the TIC itself. Several examples have been noted but another perhaps typifies the attitude of Newcastle. In 1880, when nominations were sought for chairman of the commission, Cail and Plummer, both of Newcastle, proposed Ridley, also a Newcastle nominee and for six years chairman in succession to Sir Joseph Cowen. Stephenson, however, proposed Stevenson on the grounds that Ridley had, in the past, refused to travel to London on TIC business.[151]

When the election of Council members to the commission next took place Stephenson was severely taken to task for his effrontery in having turned Ridley out of office. The somewhat specious argument was that the TIC chairman had always been, and always must be, a representative of the town of Newcastle![152] Stevenson, one of the original life commissioners was the Liberal member for South Shields, in the eyes of many Newcastle

councillors a severe disability.

In contrast with the histories of other ports, disputes between the TIC and the railways serving it were of little significance. After 1854 a growing proportion of the river's coal trade was handled by the NER, and, to a lesser extent, the B&TR. So far as the latter was concerned, relations between company and commission were amicable, in spite of the fact that it was the B&TR which had attempted to spur the TIC into building a dock at Tynemouth by promoting rival facilities at Blyth. It later complained to the TIC that expense had been incurred in the provision of rail links to a non-existent dock. When amalgamation of the B&TR with the NER came about in 1874 the TIC presented opposition but nevertheless the NER succeeded in tightening its hold on the region, its amalgamation with the N&CR having taken place in 1862, at which time some antagonism between NER and TIC is apparent, principally due to the disputes concerning the old Scotswood bridgeand the railway company's refusal to meet the TIC's conditions in replacing it.

In general, relations between NER and TIC were unstrained, perhaps because its operations at Tyne Dock were self-contained and affected very little the operation of the river. It was fortunate, too, that the dock was virtually opposite the commissioners' own dock, in that channel improvement on its behalf benefitted the NER. Following the attainment of its monopolistic position some discord arose due to the NER's rates, a complaint from the TIC receiving the response that the NER was "desirous to avoid drawing away any traffic from the Northumberland to the Tyne Dock, and in fact in the question of rates (it acted) just the same as (it) should do were the Northumberland Dock the property"[153] of the railway. The final step in the NER's progress was the absorbtion in 1883 of the Scotswood Newburn and Wylam Railway and in 1885 the commissioners, still concerned as to its monopoly, recorded their view that the NER, on its formation, had undertaken to give equal rates for long-distance traffic and the move

it was then making to amend this arrangement would lead to traffic being diverted to Hull.[154]

In contrast, relations between the Newcastle Corportion and the NER were less happy, in several debates criticism being directed against it. In 1881 it came under attack regarding its rates, considered to be unfavourable to Tyneside, especially as "the history of the company was interwoven with that of Newcastle."[155] It was noted also that Newcastle's influence had declined, largely the result of the removal of the head office from Newcastle and, with an office in York, the development of the Tees had been promoted. Bell, a member of the Newcastle Council but with commercial interests on the Tees, was also the subject of criticism in that he, a director of the NER, had furthered the interests of Hartlepool and the comment was made that Newcastle had not been sufficiently represented on the company's board. It was pointed out that the NER had done little to provide warehousing facilities; such a provision had been made at Tyne dock only after the Grain Warehousing Company and the TIC had built accommodation at Newcastle and Coble Dene respectively. There was some truth in this allegation but it is difficult now to avoid the conclusion that Newcastle's expenditure, more than £¼ m. on its quay, had been injudicious and the building of the three warehouses had been undertaken too late to attract a trade diverted largely to Hartlepool and Hull. The situation had, however, been somewhat ameliorated by warehouse building, the Warehousing Company claiming in 1882 that it was only its operations, not altogether viable, which had saved the Newcastle Quay development from being a financial disaster.[156]

The 35-year tenure of the river's conservatorship by the TIC had transformed the Tyne into a major shipping artery. Piers were largely built, two docks constructed, the river deepened over the 10½ miles to Newcastle and above the town for 3 miles and ships of up to 4,000 tons register, perhaps 7,500 d wt., were using the river. By its works, Newcastle

had been enabled to build a deep-water quay and the NER to operate its dock. The cost of the works had been considerable. Capital expended on the Tyne's improvement amounted to £2.15 m, on piers, £0.81 m and on docks £1.09 m, a total of 4.1 m.[157] On its part the NER had spent c £900,000 on its own dock and the B&TR, now absorbed, had invested heavily in its facilities on the north bank of the river. The Newcastle Corporation had expended c £¼m on its quay, the other authorities much less. In this period the principal grievance of the TIC was the refusal of Government to grant funds for the piers' construction and it was noted in 1883 that of its borrowings, £3.32 m had been made available privately and only £350,000 by the Public Works Loan Commissioners; it was recorded that the "Royal Commission on Harbours of Refuge, which reported in 1859, recommended a grant of £250,000...No grant has, however, been made".[158] In spite of this disappointment, perhaps even more so because of it, the commissioners could view with pride their transformation of the river.

6.3 River Wear.

In 1854 the improvement of the river Tyne had just begun; on the Wear it had been virtually completed with the most significant improvement having been made by the Sunderland Dock Company (SDC). A dock on the north bank of the river, the Wearmouth dock, had been brought into use in 1837 but had not proved as successful as had been hoped. The SDC, with George Hudson as chairman, had opened its dock, the Hudson dock - as it was named in 1871 - in 1850 and by 1854 the quantity of coal shipped through it reached 641,000 tons p.a. compared with 140,000 tons at Wearmouth. A total of 1.09 m tons was still shipped in the river, principally from the staiths immediately upstream of the bridge.

When Parliamentary powers had been sought for the dock it was envisaged as being 27 acres in extent, opening to both river and sea. Having sought the advice of Rendel the SDC initially decided against forming the sea entrance and instead built a dock of 18½ acres with access only to the

river; as revenue increased the dock system would be extended. Such was the dock's initial success that, with the prospect of the Marquis of Londonderry shipping more coal there, extensions were put in hand in 1853 so as to increase the water area to 32 acres, at the same time continuing with the construction of the sea entrance, begun in 1850. The dock extension was completed in 1855 and the sea entrance in the year following.

The works undertaken by the SDC were substantial. Built by both contract and direct labour the dock had a tidal harbour and a half-tide basin, each of 2½ acres, at its north end - opening onto the river - and a 1½ acre half-tide basin at the sea outlet, leading into a channel broken through the rocks and protected by breakwaters. In turn, these protecting arms, the northern one incorporating groynes, enclosed a tidal harbour providing an area of 18 acres at high water. Originally it had been the intention of the SDC to construct the dock with sloping sides, a form of construction used initially on the Tees and adequate when the provision of projecting gearing was envisaged. Later, in order "to execute the whole, as first-class docks, for the general use of commerce, as well as for the shipment of coals"[1] the walls were formed of near-vertical masonry. As engineer to the SDC, John Murray suggested that in order to provide additional berthing the western side of the dock should include a series of jetties projecting into the dock, with coal drops built on them. By this arrangement four ships could load coal simultaneously at each of the jetties.

When the decision was made to enlarge the Hudson dock the SDC also decided to provide a greater depth of water to accommodate ships of increasing dimensions. In the dock a high-water depth of 24 ft was provided with the north gate cill giving a corresponding depth of 20'-6"; the width of entrances from both river and sea was 60 ft. At the sea entrance, however, built when ship dimensions were seen to be increasing as a result of iron construction, the cill was placed so as to provide 24'-6" at high water, six feet greater than the river's bar. In order to keep open

the southern tidal harbour, sluices were provided so as to allow water from the dock to be used for scouring.* Reflecting technological change, both sluices and dock gates at the sea entrance were operated by an Armstrong hydraulic system. In the dock extension, Murray adopted angled jetties for the loading of coal, so reducing ship handling, and continued the use of the higher west side of the dock for this purpose. By 1855, 15 drops were in use and ten more were planned while, in addition, almost 1½ miles of quay had been made available. The dock complex had cost £650,000 but its formation had by 1856 led to c ¾ m tons of coal passing through it, bringing to the SDC a revenue of £34,103 p.a.[2]

In spite of the apparent success of the dock, the directors in 1855 expressed some disappointment, principally in the lack of revenue generated by the coal trade, in spite of the fact that up to 170 ships, had been seen together in the dock.[3] It was considered, however, that the impending completion of the south outlet would provide a means of increasing revenue by freeing ships from the need to use the river. Could not they be freed from paying dues to the River Wear Commission (RWC)? The SDC was conscious of the fact that some recompense must be made to the RWC and discussions, already detailed, took place in 1855 between the two bodies, leading eventually to the SDC's Act of 1855, whereby increased dues were authorised. Opposition by the RWC was presented being, naturally, that the new dock should be "part and parcel of the port of Sunderland".[4] The Act authorised the SDC to raise additional capital, to build a graving dock and to extend the time within which its authorised works should be completed.[5] It did not, however, exempt shipping using the dock from RWC dues. In 1853 Thomas Meik, engineer to the RWC, had put forward his view that every facility should be provided for the building of iron ships on the river. His views were partially heeded by the SDC in that the drawings deposited in connection with the Act showed a 345 ft long graving dock opening from

* Sluices had earlier been provided at Hartlepool.

the northern tidal harbour and a repairing shipway at the south end of the Hudson dock extension. Realising that opportunity had been given for an import trade, a ten-acre timber dock was also planned.[6]

Additional to a growing timber trade, the SDC, like West Hartlepool, realised that provision should be made to broaden the trade of its dock and a substantial grain warehouse was projected, designs for it being prepared by Dobson, although it became the subject of much discussion concerning its size. The contract, eventually awarded to Cail, was completed during 1857. At this period the works of the RWC were, by comparison, of a minor nature: dredging continued; a wrought-iron lighthouse was erected on the South pier in 1856; screw moorings were laid in the river; and discussions took place with the T I C regarding the proposal to form a harbour of refuge on the north-east coast, the RWC considering that Hendon Bay would make an excellent site. The commissioners sought the assistance of Hudson, as M.P. for Sunderland, to promote the scheme, in spite of the fact that the building of the Tyne piers had actually begun.*

Due to the financial problems of the SDC disputes with the RWC took place vis à vis dock and river dues and they, in turn, led to the presentation of a Parliamentary Bill by the SDC in 1857. As noted, the Bill had been opposed by Lady Londonderry, fearful that any arrangement between company and commission would prejudice her interests and the Bill was subsequently withdrawn. Among its provisions was the further enlargement, southwards, of the dock system with a further deep-water dock in place of the timber dock and a new timber dock further south still.[7] Unusually, and presumably due to the resignation of Murray in 1856, the drawings were prepared by Tone, engineer to the B&TR. Discussions on the Bill had brought into the fray the NER, with £75,000 invested in the SDC. As the Bill progressed it was given qualified approval by the NER,# which put forward the proposal that if the SDC would desist from attaching "a preference to their present

* A rival scheme was put forward by the Hartlepools.

In 1854 the NER had instructed its representatives on the SDC board not to sanction any expenditure which would benefit Lady Londonderry. NER Board Minute Book, 6 October 1854 (PRO: RAIL 527/8)

unissued ordinary shares"[8] the NER would subscribe £25,000 to the dock on condition that the SDC would place £38,750 of the shares in the name of the NER; shares were later issued. The SDC also sought to borrow £50,000 from the NER, security being provided by £75,000 in 4% preference shares. It was after this that the Bill was withdrawn.

The merging of RWC and SDC was revived almost immediately, a proposal to this effect being first made by the RWC in October 1858.[9] The SDC immediately formed a committee to engage in joint discussions, urgent in view of the dock company's problems, both financial and operational. Income was insufficient to meet outgoings and in 1858 it was found necessary to raise dues to the authorised maximum. At the same time the NER asked that the next board vacancy be filled by a railway director, perhaps an indication of its concern as to the SDC's financial standing. Disputes with Lady Londonderry continued and complaints from the NER became evident, principally regarding the lack of water at the northern coal drops, those first built. The NER complained that it was restricted to the use of the staiths in the original dock while the Londonderry interests, for some five years in dispute with the SDC, had available the new staiths in the Hudson dock extension with its superior berths. It sought to have track modifications made so as to permit some interchange.

Negotiations led to drawings being deposited in 1858 and a Bill presented the following year.[10] The drawings, prepared by Meik, indicated works virtually identical with those put forward by Tone the previous year - the dock was slightly enlarged - but the Bill was much different in its principal aspects, the most far-reaching of which was the amalgamation of the two bodies. Discussions as to terms were prolonged and involved the NER, on whom the SDC had, to some extent, been dependent. The railway company was asked to "give equality of terms for the Jarrow and Sunderland Docks",[11] in return for which the RWC would meet dividends at a slightly higher rate of interest. It was not, however, able to guarantee the

rate sought by the SDC as it foresaw a high future expenditure on the dock. Under the terms of the Act, sanctioned in 1859, control of the dock passed to the RWC.

During its nine-year period of trading the SDC had built up its coal throughput to c 1 m tons, its revenue to £40,622 and its capital expenditure to £724,000.[12] The construction of its docks had revived the trade of the Wear where coal shipments rose from 1.519 to 2.606 m tons p.a. in the ten year period ending 1859, an annual compound growth rate of 5.5%. Material success had led to financial difficulties. First, as Hudson later admitted, rates had been set at levels much too low to provide adequate profits;[13] second, the disputes with Lady Londonderry undoubtedly exacerbated the company's problems; third, changes in ship measurement* had led to a reduction in income from tonnage dues[14], impossible to increase without a further Act of Parliament. Conversely, the dock had provided facilities such that ships of 440 tons could now trade to Sunderland, whereas the earlier limit had been 250 tons,[15] and so had brought back to the Wear trade which had left it for Seaham and Hartlepool.

In its relationships with other interests the SDC had been unfortunate. In general, it was opposed by the town of Sunderland which viewed with concern the possibility of a union between it and the NER, a combination which would form an"arbitrary and tyrannical spirit which would then govern the trade of Sunderland."[16] It was also in prolonged dispute with Lady Londonderry who, in the opinion of the SDC - and in fact - had not brought to the dock the trade promised, although by 1858 she shipped 156,000 tons of her own coal at Sunderland,[17] the Londonderry Railway, completed in 1854, transporting a total of 419,000 tons to the dock.[18] In its relations with the NER it would seem to have been more successful in that the railway company maintained its earlier investment in the SDC, provided additional funding and pressed for representation on the board. It did not, however,

* For example, a 650 ton ship was reclassified as of 500 tons.

seek to take control of the SDC or to resolve completely its financial problems, perhaps, as noted, because of the antipathy of the NER towards Hudson or perhaps because of the fact that much of the coal shipped through the dock, c 40%, was carried by the Londonderry Railway and hence was not assured. It is of interest to note that the demise of the SDC coincided with the opening of the Tyne Dock, built by the NER. 'A Shipowner', in 1858 had put forward the view that soon the Wear must " compete with the Tyne and its improvements and the Jarrow Docks which must soon be opened...fostered by the powerful Company of the North Eastern Railway"[19] which would divert half of the Wear coal shipments to the Tyne. Coal from both north of the river and from the south, via the Victoria bridge, could be so taken to Tyne Dock. It is interesting to speculate as to how much longer the SDC could have survived independently.

The most persistent of the SDC's disputes was with the RWC, jealous of its position as conservator of the river and, later, of the docks themselves. The attitude of the RWC was somewhat ambivalent. It had benefited in that the docks attracted a better class of ship and so increased revenue but, on the other hand, it had lost much of the potential revenue from coal. Between 1849 and 1859, shipping dues rose from £2,677 to £6,530 while coal dues rose only from £8,496 to £13,954; they had, however, been as high as £13,200 in 1846.[20] The RWC still received a substantial income from coal shipments, more than half of the port's throughput continuing to be shipped from the privately-owned staiths of the Lambton, Hetton and Wearmouth collieries. In its 1858 Bill the SDC had included for contributions of between £2,000 and £3,000 p.a. from the RWC, dependent upon coal shipments, and the company, in return for this recompense towards the forming of the south entrance, would maintain the high-water depth at not less than 21 ft and, additionally, would reduce dues on ships merely passing through the dock to reach the river. The principal objection to the Bill was that a private trading company was not justified in seeking

public funds although in a report presented to the Admiralty by its inspector, Thomas Webster, it was noted that, in his opinion,

> a work of the magnitude and novelty undertaken by the Company, of reclaiming so large a tract from the sea and making the Southern Outlet, would not in all probability have been undertaken by the River Wear Commissioners; and that the Company would not have prosecuted the Southern Outlet to completion except in anticipation of sooner or later obtaining some pecuniary assistance from, or abatement of the rates received by the Commissioners on coals shipped or delivered in, and vessels using the works of the Dock Company. 21

In retrospect, it was inevitable that the two bodies should become united as without the ownership, or at least the backing, of a railway the SDC could not compete with the railway company's own dock.

The Act which in 1859 legislated for the amalgamation of the SDC and the RWC laid down, for the first time, the representation of the reformed commission, ostensibly much smaller than the earlier body. Under the Act of 1830 the number of commissioners had been 170 but wastage, without replacement, had brought membership down to 56.[22] The new commission 52 strong, represented principally coalowners, shipowners and landowners[23] and was very different in character from the commissions governing the Tyne and the Tees, both of them much smaller, and its first act was to form a committee of management with 15 members,[24] among them Nicholas Wood. Indicative of the perceived need for additional coal-handling facilities it was decided immediately that further drops should be provided but Meik, after visiting Hartlepool, suggested that a hydraulic hoist should be provided instead[25], a move resisted by the commissioners. Discussions took place with both the NER and Lady Londonderry, the result of which was that the RWC undertook to provide a further five drops in the dock extension where the NER, expecting to ship more coal, sought deep-water berths. In return, Lady Londonderry was allowed to use one of the railway company's drops. In spite of the prospect of improved coal shipments, the commissioners expressed concern regarding other trade, especially the "import trade of the Dock (which) continues small"[26] and

which must be protected against unfair competition.

The new management of the docks would appear to have stimulated both the Londonderry interests and the NER into increasing throughput but nevertheless the dock did not produce a profit although it was hoped that purchase would "be a profitable speculation irrespective of all other advantages".[27] Completion of the new drops led to eight of them in the dock extension being allocated to Lady Londonderry and four to the NER, the commissioners then resolving to pursue a policy of offering "any inducement to that portion of the Coal Trade which is so equally balanced between the Tyne and the Wear to come to our Docks."[28] Whether or not due to this competitive outlook, coal shipments rose from 2.52 m tons in 1859 to 2.88 m tons in 1860 and to 2.98 m tons in 1861,[29] by which time the port was importing grain and exporting iron.

A spirit of protection led the RWC to protest against the 1861 Bill of the West Hartlepool company, especially to "the most objectionable clauses empowering that Company to become Traders as Steam Boat and Ship Owners and in conjunction with powerful Railway Companies to carry on a Sea and Land Traffic at one charge to be apportioned as it suits their purpose and convenience."[30] In a like manner the spirit of competition led the RWC to anticipate that the completion of the trans-Pennine South Durham and Lancashire Union Railway (SD&LUR) in 1861, taken over by the S&DR the following year, would, combined with the unparalleled deep-water docks at Sunderland, attract further trade to the town. To accommodate the additional traffic expected it was resolved to extend further the dock system and later to ask Harrison, engineer to the NER, for his views.

Harrison's recommendations - damage to the south entrance had brought about his involvement - led Meik, with Abernethy's concurrence, to prepare plans for the necessary extensions. When the Hudson dock had been enlarged a timber dock had been provided at its south end and Meik now proposed that it be converted into a separate 20 acre dock with an independent

access to the south harbour, additional to that to the Hudson dock. A further graving dock was incorporated and powers were sought, too, for another dock, further south, the construction of which would lengthen the dock complex to c 7,000 ft.[31] To put the projected work in hand the RWC sought assistance from the Public Works Loan Commissioners, who having had the port inspected by Coode, granted loans of £100,000 at 3½% and £50,000 at 5%.

The RWC sought tenders for the works in three sections; the Hendon dock and entrance, the forming of a north-east pier at the south entrance and the graving dock, located at the northern half-tide basin. For the dock, tenders ranged from £161,000 to £239,000 and were rejected as too expensive, the works being undertaken by direct labour; those for the pier varied from £19,500 to £48,000 and consideration was deferred; prices for the graving dock extended from £14,000 to £32,000 and its construction was let to the lowest tenderer. Meik later revised his pier design and the contract was awarded in the sum of £12,000 to Walter Scott, already building a new grain warehouse adjacent to the earlier one. As work progressed the RWC undertook improvement of the river Wear upstream of the bridge, converted some drops to spouts to deal with the larger coal waggons adopted in place of the chaldrons and agreed to purchase a new and bigger dredger.

By 1865, having expended the £100,000 loan, the RWC sought approval for a further £50,000. Presumably due to the extent of the works and to the manner in which they were being executed the Loan Commissioners immediately reduced the loan interest payable from 5% to 3½% at the same time instructing Coode to report again on the port. Noting that Hendon dock was almost complete, he stated that, to date, c £123,000 had been expended, compared with the original estimate of £148,000. Approvingly, he reported that the dock "is well devised (and) its enlargement will not only provide for additional vessels of the largest class"[32] but would

ease traffic to the Hudson dock. Coode reported also on the entrance to the river and referred to a report made by D. & T. Stevenson in 1858. They had recommended that the river mouth be protected by two breakwaters, the northern 2,610 ft long and the southern 2,250 ft with their pier heads, at low tide, in 13 and 11 ft of water; the sea opening was to be 900 ft wide. Their report had been somewhat dismissive of the existing piers, in that they did not propose "to take the present piers...as the types for future extension, but (would) adopt a style of work in the form of a rude but massive breakwater, which, while not nearly so expensive as the existing works"[33] would serve its purpose equally well. The cost of the breakwaters would be £180,000. Coode approved of the earlier proposals, especially if the entrance were to be deepened, and he considered further the works in hand and projected, recording that in his opinion a further £104,000 was needed, a total which did not include the breakwaters. A sum of £100,000 was duly granted.

The Hendon dock had cost some £300,000 and, 11 acres in extent it was, with its 80 ft wide gate to the sea, opened in 1868, bringing to an end the major dock developments at Sunderland.* From 1861 coal shipments had remained at c 3m tons p.a., in no small measure due to the opening of the Jarrow dock. Revenue, too, had remained almost static after the surge which followed the 1859 amalgamation. The principal change which had taken place had been in the pattern of shipments with 55% of the coal passing through the south dock and only 2% through the north dock. A small import trade had developed with c 100,000 tons of timber and some grain passing through the port.

The completion of the RWC's major works was followed by a period of relative inactivity on its part and by several years of virtual stagnation in trade. The dock working was improved by the extension of the hydraulic power system and several of the drops were replaced by spouts, in some instances with greater height so as to accommodate larger ships. It

* See Map 24

was decided to provide a third warehouse, on the eastern side of the Hudson dock entrance, to provide facilities for general trade; completion was achieved in 1874. In the river itself, an extensive dredging programme was undertaken, involving both the deepening of the berths at the private staiths and also of the channel generally where the low water depth of 10 ft in 1868 had by 1873 been increased by some eight feet. Henry Hay Wake (1844-1911), resident engineer in succession to Meik, who had resigned in 1868, reported in 1873 that c 1 m tons of material had, that year, been removed but much more was required. Dredging had benefited the river to the extent that the tidal gain was c ¼ m cubic yards as a result of which scouring had been improved .[34] The cost of this work was some £15,000 and this level of removal was to continue for some years.

The RWC had in 1859 inherited the SDC's problems at the Hudson dock where the Londonderry and North Eastern railways competed for facilities. The conflict had been temporarily resolved after the amalgamation but the succession to the title of the 5th Marquis of Londonderry (1821-1884) in 1872 brought to the North-East a new interest in his affairs. The year following he asked the RWC to provide two new drops, on the basis that the 1855 Act of the SDC had stipulated that should the average throughput per drop reach 25,000 chaldrons (66,250 tons) p.a. the port must provide additional accommodation.[35] On its part the RWC was reluctant to accede to this request and sought instead a judgement on the part of the Board of Trade, outlining to it the history of the port and the background to the dispute. By 1859 the NER had been allocated 14 drops in the Hudson dock while the Londonderry Railway led coal to three drops there and two in the deeper dock extension. Subsequently the RWC had built seven more drops, all capable of accepting 4 ton waggons. All were assigned to Londonderry who gave up three of the older drops. One drop, suitable for loading especially large ships was intended to be used by both railways but the Londonderry interests had "ever since exercised,

and still exercises, the exclusive right of shipping in all the deep water berths in the Sunderland Docks."[36]

The RWC pointed out, too, that when the agreement was made, waggons had been of 2.65 tons, but capacity had since risen to 4 tons, so reducing the number of wagons needed. In addition, the change from drops to spouts had increased loading rates dramatically in that by the latter means it was possible to discharge three waggons simultaneously and, at the same time, avoid the relatively slow handling time at the drop. Such were the advantages of spouts that 12 of the original 17 drops had been so converted. The changes had resulted in spouts having a recorded capacity of c ¼ m tons p.a., much in excess of the agreed earlier figure. It was also noted that whereas all NER waggon handling was undertaken at the docks by the RWC the Londonderry interests carried out all working. Now the RWC sought to change this procedure and carry out dock working itself, also providing the means for either railway to discharge to any spout. That the effect on traffic was considerable was confirmed by the fact that much coal had recently been brought into Sunderland by the Londonderry Railway in preference to the NER simply because of the former company's access to deep water.

The last vital matter put to the Board of Trade related to the new Hendon dock where additional drops were to be placed. Again, access was controlled by the Londonderry interests and negotiations had failed to resolve the problems leading the RWC to take the view that any future measures would "sooner or later have secured to his lordship a monopoly of the proposed deep water shipping berths in the Hendon Dock,"[37] facilities which had been paid for from public funds on the authority of the Board of Trade. Agreement was subsequently reached; Harrison, engineer to the NER, was appointed as arbitrator; Londonderry and the NER were both given access to deep water; the RWC was not to be called upon to provide new staiths. Nevertheless, a new Act was sought by the RWC, its principal object being the control by the commissioners of the approaches to the dock.[38]

In discussions which had earlier taken place amongst the commissioners, Hugh Taylor, referring to Londonderry, had commented that the RWC "had a great property lying useless because of one member of the Commission - he did not say who it was because he was a lord"[39] and he continued by remarking that Londonderry had not assisted Sunderland in any way. In spite of a committee having been formed to resolve the problem, nothing had been achieved; only an Act of Parliament would suffice. The matter was, however, discussed with Londonderry and agreement was reached by virtue of the RWC agreeing to pay him £6,000,[40] in return for which his opposition to the Bill would be withdrawn.[41] By its Act the RWC obtained powers for the purchase of a section of the foreshore - £3,000 was paid for it - and so ensured that it would be possible, at a later date, to extend the docks southwards.

The works of the RWC were reported upon by Coode in 1876. He proposed that a greater depth should be provided in the river to improve both access and scouring but his major proposals concerned the protection of the port's two entrances. First projected by the Stevensons in 1858, two piers at the river's entrance were suggested, the north., 2,100 ft long at Roker and the south, 1,710 ft long, an extension of the existing pier; a 55 acre harbour would be so formed. To the south, Coode envisaged a 140 acre harbour with a north breakwater extending 1,800 ft from that existing and a new detached breakwater also 1,800 ft long, to the south. This harbour could be further extended. Coode's proposals would provide a low-water depth of 16 ft at the junction with the river and 20 ft at the south entrance and he put forward his view that the piers' foundations should be "formed of large bags of concrete deposited in a plastic condition, so as to conform to the inequalities in the bottom, and arranged to produce a solid and compact mass"[42] upon which a masonry superstructure would be placed. The river piers were estimated at £261,667, the south outlet breakwaters at £375,490 and dredging at £40,510. The commissioners did

not immediately accept Coode's seaworks proposals but they agreed with his views on dredging as the river's improvement was thought to be more important. They also agreed to improve the south entrance to the Hudson dock where problems had resulted from damage to one of the gates, resolving immediately to convert the southern half-tide basin into a lock*, incorporating entrances 65 ft wide with low-water depths of 12 ft.[43]

In 1880 the docks were again reported upon by Coode, who noted with approval the conversion of the basin into a lock, necessary due to the growing use of steamships "in which the bulk of the Trade of Sunderland, in common with the other northern Coal Ports, is now carried on".[49] He was most sanguine as to the port's future trade, envisaging that the lock would permit access at all states of the tide but nevertheless, in view of the increasing dimensions of ships, he recommended that the tongue of land between the two sections of the Hudson dock should be removed, work which the RWC put in hand immediately.

Two major decisions were made in 1881 by the RWC, by this time with James Laing (1823-1901) as its chairman.# Due to long-standing problems regarding wave action in the harbour the RWC met with the NER to discuss the provision of a wave trap, a suggestion turned down by the NER as land in its possession would be required. The Works Committee of the RWC thereupon turned its attention to the future of the dock complex as a whole, agreeing to take steps for its sale "to the North Eastern or any other Railway Company."[45] Doubts as to the wisdom of this suggestion were soon apparent and, a month later, the motion was withdrawn. All commissioners were not in agreement but, regardless, no further action was taken due to a lack of interest on the part of the NER which had at that time recently completed a major redevelopment of the Hartlepool docks.

The other major decision was that to undertake "the proposed North Pier at the Harbour Entrance as recommended by Sir John Coode"[46] in 1876.

* With a length of 480 ft it was opened by Lord Durham in 1880.

Between 1859 and 1868, when Laing was appointed, there had been three chairmen; Joseph Simpson, Sir Hedworth Williamson and Christopher Maling Webster.

A report was prepared by Wake, setting out his suggestions as to the form and dimensions of the pier. It would be 35 ft wide at the top, 38 to 65 ft wide at the base and, in line with Coode's proposals, would be founded on concrete bags weighing between 65 and 100 tons. The pier head, founded at a low-water depth of 20 ft would be of 50 ft diameter and would incorporate a lighthouse; construction would comprise the building of an iron or timber caisson, floated out and filled with concrete. Wake estimated that the north pier would cost £167,166 and the south - if built, it could be of a lighter construction - a further £125,000.[47] His plans* were adopted, the Board of Trade approved them, land on the foreshore at Roker was purchased and work began in January 1884.[48] Powers for the pier's construction had been generally granted by the 1877 Act and this fact, together with the works affecting only the Admiralty, rendered it unnecessary to deposit the usual Parliamentary plans.

The 25-year period which ran from the amalgamation of the RWC and the SDC up to the beginning of the north pier's construction in 1884 had led only to a slow growth in prosperity, in spite of the substantial civil engineering works which had been undertaken. Coal shipments had increased from 2.98 to 3.96 m tons p.a., the corresponding figures for the river being 1.51 and 1.86 m tons, for the south docks 1.38 and 2.08 m tons, and for the north dock, still under the control of the NER, 90,500 and 19,400 tons.[49] The pattern of carriage into the south dock system had also changed and whereas in 1870 the NER brought in 1.03 m tons and the Londonderry Railway 0.73 m tons, by 1879 the figures were virtually reversed to 0.66 m tons and 1.02 m tons respectively.[50] Of the coal shipped from the river in 1879 almost half was from the Lambton concerns and the remainder from the Hetton and Wearmouth collieries; of the coal carried by the Londonderry Railway, a third was from South Hetton; and of the coal shipped in the south docks the greatest producer was the Ryhope colliery with c 400,000 tons. The revenue of the RWC had increased slowly from £77,800

* See Map 24

to £139,200 in 1883 with a sudden surge in 1871. Capital expenditure was modest compared with the earlier spending of the SDC. In 1859 the capital of the reformed RWC was listed as £724,000 for the SDC and £231,000 on its own behalf. By 1880 the total capital expenditure was £1.676m the increase divided almost equally between new works and the south harbour.[51]

The registered tonnage of shipping using the port had remained almost steady at some 2 m tons p.a. in spite of increasing trade. This apparent paradox is accounted for partly by changes in ship measurement and partly by the growing number of steamships in use and measured differently. In the port as a whole, 7,858 ships cleared from it in 1880. Of this number no fewer than 3,191 were of less than 150 tons and only 103 of more than 1,000 tons and it is indicative of the dock's advantages, or the river's shortcomings, that of the 103, 97 used the docks. For ships of 500 to 1,000 tons the corresponding figures were 1,050 and 793. The growth of steam propulsion is also shown by the figures: 5,959 ships cleared in the coasting trade, 1,769 to Europe and 130 beyond; of these totals the figures for steamers were 2,149, 902 and 32; the average ship tonnage at the three classes of trade were 232, 403 and 689 respectively.[52] Concomitant with the shipping trade was that of shipbuilding, the only one apposite to this study. Between 1854 and 1885 the tonnage launched on the Wear varied between 37,000 tons in 1859 and 135,000 tons in 1872, roughly comparable with the output of the Tyne.[53] Unlike the Tyne, however, the change from wood to iron had been at a slower rate and it was not until 1868 that iron-hulled ships predominated, so far as construction was concerned. The year in which the balance changed on a national basis was 1862.[54] Of the iron ships launched in 1862 the total tonnages were for the Tyne 32,200, for the Wear 15,600 ton and for the Tees 9,700 tons. Shipbuilding on the Wear was not easy due to the narrowness of the river, the steep banks and the lack of sufficient flat ground, the maximum river width available being no more than 400 ft.[55] This configuration led to angled berths being adopted as the dimensions of ships increased.

The needs of Sunderland had been governed by the narrowness of the Wear and hence a lack of berthing facilities. This restriction had, in turn, led to the provision "of floating accommodation on an extensive scale for the shipping of coal in the docks according to the most improved modern systems"[56] and this philosophy had brought about major capital expenditure - at times unprofitable - by both the SDC and the RWC. The RWC was in 1883 accused, without proof being given, of having used river revenue for maintaining the docks, in effect subsidising them, but even this procedure had not led to the vastly increased trade which might have been expected after the dock's initial success. In this light it is understandable that the NER, in turn, was criticised for attempting to kill Sunderland by diverting the major part of its coal traffic to Tyne Dock and Hartlepool,[57] in the case of the latter port an unjust accusation.

6.4 River Tees

The first meeting of the Tees Conservancy Commission (TCC) was held in Stockton on 22 November 1852. In accordance with its enabling Act, the commission comprised three Admiralty nominees, one of them Joseph Pease, together with five members each from Stockton and Middlesbrough, the latter town's members including Henry Bolckow and John Vaughan; Yarm was represented by two members.[1] Charles Trotter (1798-1877) of Stockton was appointed chairman and two committees, Finance and Works,were constituted to undertake more expeditiously the commission's work. Bolckow and Vaughan were their respective chairmen.[2]

The Admiralty had earlier confirmed the intention of the promoters to build breakwaters at the mouth of the Tees and the commissioners, in the same year, noted that the Admiralty, through Edward Calver, intended to survey the estuary. In its plans to improve the river the TCC enthusiastically endorsed the earlier suggestion and in 1853 asked Pease, when in London, to attempt to secure funds for the construction of the two breakwaters.[3] In anticipation of future major works William Bald (1789-

1857), who had reported upon the river in 1851, was appointed as engineer with James Johnson as superintendent of works. After his death in 1854, Johnson was replaced by John James Fowler (1824-1888).[4] The TCC perceived rightly that dredging was one of the principal factors in the river's improvement and by 1854 a new machine had been purchased.

In spite of these early moves, the initial years of the TCC were not easy, principally on account of a lack of revenue, the result of competition from the Hartlepools and also paradoxically, the discovery and exploitation of the Cleveland ironstone deposits. The development of West Hartlepool and the partial migration of the coal trade from the Tees to the dock built by Ralph Ward Jackson is outlined elsewhere but it was the iron industry which was most to affect the river's development.

The presence of ironstone deposits in the area had been known since 1822 and subsequently the Tyne Iron Company "had collected nodular ironstone on the beach, and shipped it to their works during the summer months";[5] later, it had been shipped to the Birtley Iron Company's works. A small rolling mill had been first established in Middlesbrough by Bolckow and Vaughan in 1840, without it being realised that iron deposits lay adjacent, and they had built furnaces at Witton, at the head of the S&DR, to use local ores and fuel. It was Vaughan who, with John Marley, first traced fully the presence of ironstone deposits in north Yorkshire in 1850 and from that time the mining of ironstone expanded rapidly, furnaces were established in Middlesbrough and the production of pig-iron began. Although the new industry was to have a dramatic effect upon the economy of the area it militated against the TCC in that the ironworks themselves became the major fuel users while their product, pig-iron, was largely used by the area's industries and, as such, the commission derived little benefit from the growing prosperity. It was the S&DR which derived the greater revenue from the transport of increasing tonnages of ironstone, coal and limestone, the latter extensively used in the iron's production.

Such were the financial problems that the TCC rather than use its dredging plant, was forced to rent it to other authorities and in 1853 moves had been made to modify the original Act which stipulated that the first call upon revenue should be payment of interest on the original company shares. The 1854 Act[6] placed operational expenses first, then the interest on the capital sums of £107,000 and £32,000. At the same time the TCC gave consideration to again leasing the port dues to the S&DR, a procedure which would have repeated the earlier arrangement, due to end, which had been made with the Tees Navigation Company (TNC). The S&DR, however, proved unwilling to renew, a move sensible in view of falling shipments, and the TCC found its income from dues reduced from £6,900 to £4,800. Total revenue in 1854 was £7,333 and in 1855, £4,825. To bolster income the commissioners in 1858 sought to purchase anchorage and plankage dues from Stockton and the Ecclesiastical Commission, paying £4,700 and £2,400 to the two bodies.[8]

In spite of a low income, used almost exclusively to pay the interest on the TNC's shares, the commissioners were able to spend a modest amount on capital works, made possible by individual commissioners, Pease, Bolckow and Vaughan, guaranteeing the loans.[9] Delays in receiving Admiralty approval for down-river works was used as an excuse to dismiss Bald in 1854 and although work on the river's improvement began the following year it was not until 1857 that the Admiralty sanctioned the next stage of the work, from the dock to the Ninth Buoy, midway between Middlesbrough and the sea. With this consent the TCC sought a further Act, passed in 1858, its major provisions being those regarding the reclamation of land, finance, the involvement of the S&DR, the Stockton dues and the power of the Admiralty "to lay down lines for depositing slag and other materials below high water"[10] to form training walls.

When the 1852 Bill had been in Parliament, the promoters had estimated that revenue, assuming a 25% increase in traffic, would amount to £10,988

p.a.[11] but the reduction in coal exports had caused income to fall in 1855, although a subsequent increase had been experienced. The TCC had been empowered to raise £80,000 on mortgage but a debt of almost £40,000 had been inherited and it was to rectify this situation that the 1858 Act was gained, enabling the TCC to borrow £40,000 from the S&DR "much interested in the Preservation and Improvement of the Navigation"[12] and the principal source of revenue. Another aspect was the reclamation of land, a matter in which the TCC was unique in the North-East. The configuration of the river Tees was such that, unlike the Tyne and Wear, it possessed an expansive estuary and the river itself meandered through low-lying country. The improvements begun by the TNC had tended to reduce the river's width, leading to the possibility of land reclamation, principally for industrial use. The Act stipulated how the revenue from the sale of these areas was to be distributed; half to the TCC, a quarter to the landowners and a quarter to the "Commissioners of Her Majesty's Woods, Forests and Land Revenues".[13] Land retrieval and river improvement were inter-related in that whereas river works under the TNC had comprised the forming of groynes at right-angles to the river's flow, the new proposals were for longitudinal training walls, initially to half or third-tide height but later to full height. Even without these walls the groynes had proved effective and had advanced "the foreshore of the river to the extremities of the groynes, thereby reducing, in some parts the width of the original channel"[14] by half.

The TCC had, in 1854, opposed the formation of the NER on the grounds that it would be "prejudicial to the Port of Stockton."[15] The same view was strongly held by Stockton itself, fearful that it would be deprived of the benefit of competing railways, an opinion misconceived as Stockton was the town - Seaham Harbour excepted - likely to be least affected by amalgamation; it was also served by the S&DR and the WHH&R. As the Bill progressed through Parliament the Stockton representatives there reported that "some protection was necessary to save Stockton and other

places where the amalgamated railway companies had no interest besides their railway - from the tyranny of railway directors - this protection is given in the strongest manner the deputation were able to obtain"[16] mainly by persuading the NER to charge in a manner which would favour the town.

Similarly, the TCC opposed the 1855 Act of the Hartlepool Port and Harbour Commission, the Bills promoted by the S&DR for railways in north Yorkshire, the Durham and Cleveland Union Railway Bill and the Middlesbrough Extension Bill; only the Darlington and Boroughbridge branch railway was supported. In the years following 1850 railway activity in the Cleveland area was the result of the exploitation of the iron ore deposits. Many lines, both private and public, were built and, not to be detailed here, they have been well described by Tomlinson and others. The mining of of ore developed rapidly and by 1858 output had reached 1.367 m tons, almost all of it brought by rail to Middlesbrough where furnaces had been established by Bolckow-Vaughan in 1852, by Gilkes Wilson and Leatham in the same year, by Innes-Hopkins in 1853, and by Cochrane in 1854.[17] On the north bank of the river, Isaac Lowthian Bell had established blast furnaces at Port Clarence on land made available by Jackson. Bell, one of the few industrialists of the North-East to have interests on Tyne, Wear and Tees was in 1862 appointed a director of the WHH&R and on its demise in 1865 became a director of the NER, a position which he maintained until his death, almost 40 years later.

The formation of new railways in the area brought the TCC into conflict with their promoters. In 1857 two proposals were put forward, one by the S&DR and the other, on behalf of the Durham and Cleveland Railway, by the WHH&R. The TCC's involvement concerned the river crossings; that proposed by the S&DR comprised a swing bridge with two 90 ft spans located downstream of Stockton[18] and the other a pair of piers, with a ferry, downstream of Middlesbrough dock.[19] The case of the two railways came before Parliament in 1858, the inquiry on their rival merits lasting for

20 days. Paraphrasing Tomlinson, the conflicts were complicated: Stockton opposed the bridge as affecting navigation; Middlesbrough opposed the ferry as it was intending to operate such a service itself; the TCC opposed both schemes; the landowners, in general, opposed the S&DR.[19] Opposition polarised into a personal struggle between Jackson and Joseph Pease but neither party was victorious. No river crossing was approved, only part of the Durham and Cleveland line was to be built and the S&DR was empowered only to extend its lines to Saltburn. Under the title of the Cleveland Railway - Bell and Jackson were later directors of it - an Act[21] was granted which authorised the building of some 11 miles of track between Guisbrough and Skinningrove. The S&DR, unsuccessful in its attempt to prevent the incursion of the WHH&R into Cleveland attempted later to make itself the link between Cleveland and the WHH&R but the latter, through Jackson's Upsall, Normanby and Ormsby Railway, sought to circumvent the S&DR monopoly.

It was the location of Bell's furnaces on the north bank of the Tees, placed there to provide a convenient access for south Durham coal and limestone, which in 1860 brought about, indirectly, a further conflict between Jackson and the TCC. Jackson, who had already discussed the matter with the NER,[22] in that year introduced a Bill for the construction of the railway, including a jetty projecting into the Tees at Cargo Fleet, downstream of Middlesbrough dock. From the jetty iron ore could be shipped by barge to Bell's furnaces at Port Clarence or despatched elsewhere. The S&DR, considering that its rights to the foreshore of the Normanby estate would be infringed, opposed Jackson's Bill and Parliament, in its consideration of the matter, brought about its defeat but at the same time upheld Jackson's rights to the foreshore. In 1859 a further dispute occurred in relation to the Cleveland Railway seeking to dredge its shipping place, considered by the TCC to be its responsibility.[23] The TCC's view had been that it "did not think that there was any evidence to show that (the shipment of iron ore was) likely to be of any importance"[24] and considered

that the dock should suffice for any shipment required. When Jackson's Upsall project became known the TCC determined to oppose it* and Thomas Meik was retained to investigate and report. The promoters of the railway were, with Jackson, John and Lowthian Bell and, displeased by the fact that work had begun, the TCC applied for an injuction to prevent further work on the jetty, intended to project 1,000 ft into the river from the high-water line. The TCC's move was unsuccessful and Fowler was instructed " to take such steps as will prevent any further erection"[25] of the jetty, a move which led to the 'battle of the Tees' in which Jackson's employees were physically obstructed, by barges, from undertaking their work and, in riposte, Jackson cast the vessels adrift and then protected the pier works with chains, a move which subsequently led to a hand-to-hand battle with Jackson and Fowler commanding the opposing forces.[26] Late in 1860 Jackson re vived his plans for the jetty and, perhaps in emulation of earlier events at Blyth, suggested that from it loaded waggons of ironstone would be transported across the river "in open barges sufficiently large to take twenty-four waggons each".[27] This scheme too, was opposed by the TCC but nevertheless was sanctioned.[28]

The last of the new railways which was to affect the Tees was the trans-Pennine SD&LUR, its formation opposed by the NER, which had earlier rejected involvement in it. It was built to meet the needs of the iron industry, and its promotion was a result of the foresight of the S&DR. Jackson, too, had been invited to be party to the railway's formation and use but had declined in what was "one of the worst decisions"[29] of his career in that it could have provided him with useful connections to the west coast. Transporting the higher grade iron ore, haematite, from the west coast and in the reverse direction, carrying coal and limestone, the SD&LUR was, in effect, an extension of the S&DR, running westwards for 44 miles via Barnard Castle and Kirkby Stephen to Tebay. Amongst its directors were members of the Pease family and other Teesside industrialists.[30]

* In 1858 Jackson had been in personal dispute with the TCC, resulting from his involvement with the Royal Commission on Harbours of Refuge.

Completed in 1861 the line became part of the S&DR the following year.

Railway competition in the Cleveland and south Durham areas ended within a short period. Relations among the three companies had been amicable but competitive and although a somewhat desultory move had been made in 1860 to combine the two smaller undertakings, nothing had transpired;[31] neither had talks involving the NER, the S&DR and the WHH&R brought results.[32] In 1863, however, the NER sought to amalgamate with the S&DR. The proposal was initially objected to by both Stockton and the WHH&R[33] but arrangements made with both bodies resulted in the Bill being unopposed in both Houses and receiving the Royal Assent in 1863. The NER gained 200 route miles and, through the Middlesbrough dock, was brought into direct contact, for the first time, with the TCC.

In 1860 the capital of the S&DR had totalled £3 m, having risen from c £1 m in 1852. In the same period coal revenue had increased from £48,000 to £78,000 p.a. and for limestone the figures were £28,000 and £59,000; merchandise receipts had doubled to £31,000 and passenger income had increased likewise, to £16,000.[34] Of its capital, the S&DR had spent £295,000 on its track, £162,000 on the Middlesbrough dock, c £½m on rolling stock and c £25,000 on shipping places. Before having been absorbed into the NER it had grown even further, to a capital value of c £3.5m.[35] Two years later the amalgamation of the NER with the WHH&R brought the north bank of the Tees under the control of the same company. By these two moves the NER had achieved, with the exception of the Blyth and Tyne and the Londonderry railways, a territorial monopoly over the coalfield with docks on Tyne, Wear and Tees, and at Hartlepool.

The achievements of the TCC had matched neither those of the S&DR nor the WHH&R in that by 1862 its revenue had recovered only to little above the figure for 1853. Until 1860 the amount spent on capital had averaged c £10,000 p.a. but subsequently it increased to £35,000 in 1864.[36] In concept the projected civil engineering works were simple and at the

formation of the TCC consisted of the Stockton dock, river training walls and the construction of breakwaters at the river's mouth. The dock had been envisaged as similar to Bristol's 'floating harbour', the conversion of the river's course into a dock with gates at each end, the flow of the river being accommodated by a new channel formed in the south-facing bend of the river immediately downstream of Stockton bridge.[37] To effect its formation the 1852 Act had included for a Stockton Dock Committee to be established but the town, fearful that if Middlesbrough should come to dominate Stockton the dock would not be built, in the same year sought to free the dock from the TCC's control and build it from the town's rates.[38] A Bill was prepared in 1853 but although the TCC petitioned in favour of the change it was rejected by the House of Lords, principally on the grounds that rate support was unprecedented; a sum of £70,000 had been envisaged.

During 1859 and 1860 discussions took place between the TCC and the Admiralty regarding the line of channel to be formed through the Tees estuary, a subject of much discussion in the port, and at the same time the commissioners entered into negotiations with the ironmasters and the S&DR regarding the supply of slag for use in the training walls.[39] Claimed - and disputed - as the first use of this material it was true to say that never before had it been used on the scale now envisaged, a use which brought advantages both to the commissioners and to the ironmasters, and revenue to the S&DR, to be responsible for its transport.

Breakwaters had been envisaged at the mouth of the Tees since 1852. In 1855 they had been reported upon by Rendel who had estimated their cost at £300,000;*[40] and they had been shown on a plan submitted to the Harbours of Refuge Select Committee in 1857 by Fowler.[41] After some pressure the Admiralty sanctioned the construction of both breakwaters in 1861 and the commissioners resolved to seek the loan of £100,000 needed for their construction.# Due reflection reduced this figure to £10,000

* This sum has been given elsewhere as £600,000.
# Under the powers of the Harbours and Passing Tolls Act, 1861

p.a. for three years and Henry Pease and the Earl of Zetland were asked to negotiate with the Public Works Loan Commissioners on behalf of the commissioners.[42] It was agreed that the southern breakwater should be built first, in view of the availability of materials an understandable decision.

The establishment of the iron industry had led to growing quantities of slag, the furnace waste;. becoming available and difficult to dispose of. The formation of the Tees improvement works, especially the breakwater, provided an ideal opportunity for its disposal and negotiations between the TCC and the ironmasters resulted in slag being made available, in two to three ton blocks, by Bolckow-Vaughan, Gilkes-Wilson and Cochrane; the ironmasters were to pay 1½d per ton to the TCC while it in turn paid ¼d per ton to the S&DR. The cross-section of the breakwater varied but was principally of slag blocks, cast for the purpose, and faced on the seaward side with a mass concrete wall. The extremity of the breakwater was to be protected by 30 to 40 ton concrete blocks, placed in a random manner. In 1857, John Dunning (1826-1895), engineer to the Middlesbrough Owners, had advocated the use of slag blocks of comparable tonnage for the whole of breakwaters of a much larger harbour of refuge then considered [43] but the use of blocks of this size would have created transport problems and it is significant that the TCC, for the pier head protection, used concrete.

The beginning of the breakwater construction* virtually coincided with two significant changes within the TCC; Joseph Whitwell Pease (1828-1903) was appointed as member in place of his father and Isaac Wilson (1822-1899) was appointed chairman in place of Trotter.# It was possibly these changes which led the TCC in 1862 to present a further Bill to Parliament, among its provisions being the raising of dues on shipping - vital if the improvement of the river were to take place - and the enforcement

* The South Gare breakwater was officially inaugurated in November 1863.
# Trotter was chairman 1852-1860; Wilson 1860-1884.

by the TCC of wharf maintenance by owners, indicative of the growing development of industry on the river's banks. Royal Assent was given in July 1863.[44] In its effects the Act was successful. Between 1864 and 1870, gross receipts rose from £10,545 to £19,146 and so enabled the TCC, through its contractor, John Anderson, to pursue the works necessary.[45]

The prospect of improving finances led the TCC to purchase a new dredger in 1864 and to continue its policy of land reclamation, some of the area so treated being sold for £400 p. acre.* The expansion of industry and of the town of Middlesbrough itself, led the TCC in 1865 to ask the NER to consider additional dock and warehouse facilities. Lack of response led the commissioners to proceed with a further Act, a move which revived the controversy regarding a dock at Stockton. The Chamber of Commerce of that town suggested to the TCC that in addition to its continuing works, for which £150,000 additional borrowing was sought, a dock was essential for the efficient use of the river by shipping. The committee appointed by the TCC concluded that no dock construction should be undertaken "out of the ordinary funds of the Commission and that it must rest with the parties locally interested to provide the needful funds" [46] and noted that the proposed Tynemouth dock was to be financed by the B&TR, land and colliery-owners, municipalities and the TIC, thought likely to create a precedent. The TCC could not agree to provide a dock at Stockton as it considered that the wharfs there had been too long neglected but it suggested that the NER could perhaps improve its communications to the town. On its part, Stockton put forward the view that no river improvement proposal should omit the removal of the old bridge and suggested also that the length of the river within the town boundary should be placed under municipal control. The drawings deposited prior to the Act showed only a graving dock at Middlesbrough, down-river from the dock, and a branch railway from the former Clarence Railway to Stockton quay;[47] the Act, however, sanctioned construction of the North Gare breakwater and

* This value was, later, to rise substantially.

the widening of the river downstream of the Old Cut.[48]

Dissatisfied by the earlier response of the NER to the river's needs the TCC again attempted to persuade it to improve its docks, this time with some success. The NER* noted that the matter had

> again been brought before the Directors by influential deputations from mercantile bodies connected with commerce at Middlesbrough and the surrounding districts, who represented the trade of the locality as being placed under great disadvantages, and seriously curtailed in consequence of the present inadequate dock accommodation (but)...as Cleveland has now become one of the largest iron producing districts in the Kingdom, and possessing at the same time the requesite elements of further extension, the Directors, after carefully considering this case, have felt that they could not, in justice either to the important trade in question, or the the Company's own interests, refuse to bring this matter forward... 49

Although perhaps the decision was not directly due to the TCC, nevertheless in 1869 modifications to the dock were put in hand under the direction of Harrison.# At a cost of c £128,000 a river entrance was provided, 55ft wide in place of the previous inadequate 30 ft, and the dock was enlarged from nine to 12 acres, vertical walling being formed in place of the earlier embankments.[50] The reluctance on the part of the TCC to put works in hand could be explained by the relative finanaces of the two undertakings: the revenue of the NER in 1867 was £3.84 m and of the TCC £14,060; capital stood at £28.4m and c £½m respectively.

Due to problems in its construction , work on the South Gare breakwater was suspended in 1869 and the TCC called in Harrison to report upon it. A bed of quicksand had been encountered in one of the river channels and its thickness, 30 to 40 ft, was such as to lead to a three-year cessation of work, principally on financial grounds.[51] Harrison also conferred with the TCC regarding the construction of a railway bridge - of swinging form - between Newport and Middlesbrough and suggested that the commissioners visit Goole to see the similar bridge there; he would provide "a train for the purpose of the proposed visit,"[52] the first of many such

* The NER informed a deputation for Middlesbrough that expansion of dock would be accompanied by higher rates, in line with those on Tyne and Wear. NER:Board Minute Book, vol 6.,(24 July 1868) (PRo: RAIL 527/12)

See Map 20

favours. Still dissatisfied, the TCC agreed to oppose the NER Bill, in spite of its assurance that rail traffic would be subordinate to shipping. Undeterred, the NER in 1873 made known its intention of forming a tunnel under the river at Port Clarence[53] and, in spite of Fowler's only condition being that the river must be capable of being deepened to provide 20 ft of water at low tide, the commissioners again opposed the railway company. Despite the Act having been obtained the NER did not build the tunnel and, similarly, the Bill presented earlier by the Hartlepool and Cleveland Junction Railway, which envisaged a similar tunnel, was withdrawn.[54]

By the time the Middlesbrough dock extensions had been completed in 1873 (or 1874) the nature of the trade of the river Tees had been transformed. Since 1850 it had changed from being a coal-exporting river to an iron producing district, its output of 2m tons p.a. of pig iron being one third of the U.K. total. Writing in 1872 Bell recorded that this output required 5 m tons of ironstone, 5 m tons of coal or coke, 1½m tons of limestone, so "there must be put in motion, for the yearly production of this quantity of crude iron, something more than 12 millions of tons of raw material."[55] He estimated that the manufacture of the iron employed 6,000, ironstone mining 10,000, coal extraction and coking 20,000, limestone quarrying 2,000, in total, 40,000. To keep pace with this output of iron the coal industry had doubled its capacity to 28 m tons p.a. and its price had risen correspondingly; in 1850 it had been "a drug in the market".[56] Much of the iron, both cast and malleable, was used locally but a proportion was carried from the river, where coal shipments had fallen from c ½m tons in 1850 to c 100,000 tons. In view of Bell's comments it is perhaps surprising that the NER, in its dock extension, had provided for improved coal handling plant..

The stimulus to trade provided by the iron industry spurred the river's industrialists to greater efforts. In 1872 plans were prepared for a dock and timber pond on the south bank of the river downstream of Middlesbrough

and two years later the TCC proposed that two timber ponds be formed at Greatham Fleet, on the north bank of the estuary.[57] Neither proposal materialised. The earlier suggestion was for a wet dock of some 27 acres, with a timber pond of similar size, connected by rail to the NER line from Middlesbrough to Redcar.[58] A Bill for its construction was promoted by, amongst others, Joseph Dodds, Henry Bolckow, Jeremiah Head, Thomas Vaughan, John Gjers and George Neesham, all active in the iron trade. The capital of the company was to be £275,000 and its formation, in combination with the NER dock, was seen as being likely to make "the Ironopolis of the North one of the largest shipping ports in the Kingdom".[59] The TCC found itself in a difficult position in that Dodds, solicitor, prominent industrialist and M.P. for Stockton, was Clerk to the Commissioners while Bolckow, soon to become M.P. for Middlesbrough, was a commissioner and chairman of the Finance Committee. In spite of their involvement the TCC decided to oppose the Bill which, introduced into the House of Commons in February 1873, was reported upon the following month as having been withdrawn, for reasons unspecified.[60]

The TCC, although opposing the Tees Dock and Railway Company, was not a verse to further docks being built on the river and in May offered the town of Stockton the chance of building a dock in Portrack Slake;[61] if it were not to be built, the TCC would reclaim the land.Proposals were duly submitted by Sir John Hawkshaw (1811-1891), acting for Stockton, and they indicated a re-adoption of the scheme suggested a quarter of a century earlier, the construction of a new cutting, approximately half a mile long, to permit the river itself to enjoy a constant water level.[62] In spite of having negotiated with the Stockton authorities concerning the new dock there, the TCC nevertheless opposed the Bill, later withdrawn. The last of the dock proposals in this period was that for a dry dock, sanctioned by the 1867 Acts. In 1873 land was acquired for it from the Middlesbrough Owners, a contract for its construction was placed in April

1874 and it was opened in November 1876, so obviating the need for shipowners to use other ports to repair their ships, with the concomitant loss of revenue.

In 1874 a new survey of the Tees was undertaken by Calver, who had reported upon the river in 1853. This report revealed the extent of the commissioners' efforts. On all counts, width, depth and straightness, the improvements had been marked. Training walls had been formed and a depth of six feet at low water had been provided to Stockton. The greatest improvement, however, was in the estuary where "the substitution of a direct and wide channel for the two narrow and tortuous passages which formerly existed"[63] had provided the port with a greatly improved access. In twenty years, though the amount of dredging undertaken had amounted only to c 4 m tons, "a quantity less than that which has at times been removed from the bed of the Tyne in a single year",[64] the improvement had, nevertheless, been of great value and Calver drew the conclusion that the TCC should, by the results achieved, be encouraged to continue its efforts.

The growth of the iron industry had led to the greatest population increase taking place in Middlesbrough and its proportion of trade had increased accordingly. As a result it was natural that in 1870 a proposal, not taken up by the commissioners, had been made to amend the constitution of the TCC and a Bill to that effect had sought representation for the payers of port dues. Four of the promoters were members of the TCC but the Bill failed in Parliament. In 1874, however, the Middlesbrough Corporation resolved that "no extended Parliamentary powers should be granted (to the TCC) without the constitution being reformed so as to give proper representation to all interested on the river"[65] and suggested that the river's importers, exporters, shipowners and wharfingers should be included, as should the new towns. The matter had been the subject of much debate in the Middlesbrough Council meetings and it led to an interchange of

letters between Bolckow and Dunning, a prominent member.

Bolckow suggested that shipowners, importers and exporters should each elect two members to the TCC while Middlesbrough should elect four, its present number. He continued by advising "that no attempt should be made to claim any preponderance in the Commission for Middlesbrough as (he) had a strong impression that such an attempt would fail before the Committee in the House of Commons".[66] His views were treated by Dunning with surprise.

> I am utterly astonished at gentlemen like yourself Mr. Wilson and Mr. Dodds who may be said to take a prominent part as Liberal politicians throwing overboard one of their most notable arguments, namely that representation should follow taxation, and propose that Middlesbrough and the works lower down the river which produce 8/10 of the dues should only have equal representation with the remaining 2/10. 67

Dunning, at the same time, voiced his disquiet as to the fact that the TCC was about to contribute £10,000 to the rebuilding of Stockton bridge; 80% of that sum had originated in Middlesbrough. Proposals for amending the constitution of the TCC came from three sources, as follows:

	1852 Act	M'bro Corpn.	Chamber of Commerce	TCC
Admiralty	3	3	3	3
Stockton Corporation	5	5	4	4
Middlesbrough Corporation	5	5	4	4
Yarm	2	2	1	2
Shipowners: Stockton		5	4	2
M'bro				2
Traders: Stockton		5	5	2
M'bro				2
Landowners		2	2	2
Wharfingers		5		
South Stockton		1		
Eston		1		
Port Clarence		1		
Docks and Railways		3		
Total	15	38	23	23

The proposals which had been put forward by the Chamber of Commerce, the chairman of which was Bell, were more realistic than were those of Middlesbrough, which, while ostensibly maintaining parity between Middlesbrough and Stockton, was in fact attempting - understandably - to favour the down-river interests. The Chamber of Commerce sought - rightly - a much smaller body with parity virtually maintained while the suggestions of the TCC were much nearer to the views of the Chamber of Commerce than to Middlesbrough, envisaging the same total membership of 23 but, with scrupulous fairness, insisting that shipowners and traders be evenly matched between the two towns. The TCC did not wish itself to be seen as favouring Middlesbrough and so leading to the dominance of the town in the affairs of the river but it did amend its proposals in one regard, the landowners, a body for long represented on the Wear. The TCC Bill excluded them completely and their opposition was assuaged only when the TCC promised that no further land reclamation would be undertaken without Parliamentary powers being sought.[68] The Act was duly passed in accordance with the TCC proposals.[69]

Stockton Corporation had pleaded in 1866 that the TCC should undertake replacement of the bridge there on the grounds that, as at Newcastle, it impeded navigation and restricted the development of the river above it. In July 1876, a month after the opening of the Newcastle Swing Bridge, a committee was formed to investigate the matter [70] but it was not until 1880 that the TCC offered to contribute £5,000 towards the cost of bridge and to dredge the river. Later, the contribution was increased to £6,000, finance was offered by the roads authorities on both banks of the river and in 1881, considering the costs involved to be high for Stockton to bear alone, the TCC was requested to increase its contribution, perhaps to £10,000. About to do so, the TCC was informed by Middlesbrough, by the shipowners and by the Chamber of Commerce that they objected strongly to being called upon to subsidise Stockton, whereupon the offer was withdrawn.[74] An Act of Parliament was obtained for the bridge's construction in 1881

- it sanctioned borrowings of £120,000 - and work began the following year.

The NER again came into conflict with the TCC in 1876 when it, too, wished to construct a bridge at Stockton to replace the one built in substitution for the original suspension bridge. Harrison submitted details but the TCC considered that the bridge, like that at Goole, should be capable of being opened. The NER view prevailed and fixed spans were adopted.[72] Stockton did not relent in its desire to improve its shipping facilities and, having been unable to provide a dock, sought instead a new town quay, some 500 feet in length.[73] To the design of Hawkshaw the quay was sanctioned in the Corporation's Act of 1878.[74]

During the years following 1870 the TCC again found its revenue insufficient. In both 1871 and 1876 income was c£19,000, rising between those dates only to c £20,000. In 1875 the commissioners astutely asked Sir Stafford Northcote, Chancellor of the Exchequer, to lay the foundation stone of the new graving dock and in 1877 having unsuccessfully sought a grant for the breakwater, Pease, Dodds and Fallows met with the Chancellor, following which application was made for a £50,000 loan.[75] The same year the TCC sought a further Act, principally to increase dues so as to reduce debt.* Meanwhile, to restrict expenditure the north railway was abandoned and the North Gare breakwater was postponed; dredging, however, continued. These temporary restrictions, the TCC hoped, would obviate the raising of dues, a measure applauded by the ironmasters and the Chamber of Commerce, both of which nevertheless urged the commissioners to reduce borrowings. Apparently without controversy the necessary Act[76] was passed, with the result that by 1880 revenue had been raised to £53,000 p.a., an increase possible, perhaps, only on the Tees, without a competitor in the North-East.

Although municipal prosperity increased, the TCC received little benefit and between 1880 and 1885 the numbers of ships using the river, but not

* Debt was charged as £540,000 to capital and £137,000 to breakwaters.

their tonnage, fell.[77] Revenue remained almost static, averaging only some £55,800 over a six-year period. In these circumstances the TCC continued to press for a grant and sought further loans, both for dredging and for the breakwaters, the first of which was now approaching completion. In an effort to bolster trade the commissioners sought of the NER a reduction in rates, a move which was rebuffed by the railway company,[78] suffering to the same extent as the TCC; in the six years noted its revenue, too, was virtually static, averaging c £6.5 m p.a.[79] Again in an effort to further its interests, the TCC requested the Board of Trade to present the statistics of the separate ports as a single entity, a move made also on the Tyne. Although each town of both the rivers was jealous of its rights, nevertheless, in adversity or competition they were forced to combine.[80]

In the 30-year period which had followed its establishment the TCC had continued its programme of river improvement. The South Gare breakwater had been largely built, the North Gare breakwater begun in 1882.* The river had been dredged to the extent that 18.56 m tons of material had been removed and a total length of 20 miles of slag training walls had been built. A graving dock had been formed and was operated by the commission. Problems however, continued. In 1883 shipowners trading with grain to Stockton complained as to the river's inadequate depth, a deficiency which, they claimed, was leading to trade leaving the Tees for Hartlepool; additionally, Stockton was "the dearest port in the Kingdom."[81] In response the TCC made proposals to extend the port limits, a move which led to some conflict with Hartlepool, recently in concert with the TCC concerning plans for a harbour of refuge in the Tees Bay. At the same time, the TCC sought additional dock accommodation and coal-loading facilities,[84] the NER having been requested earlier to restore its plant at Port Clarence; it was a"great disadvantage...not having any coal drop at Middlesbrough"[83] which could be used without entering the dock. In this instance the NER had

* See Map 11

moved ahead of the TCC, reporting to its shareholders in 1883 that

> the traffic at the Middlesbrough Dock has, during the last few years, so largely increased that, in the opinion of the directors, the time has come when additions should be made to the accommodation at present provided, and accordingly, it is intended to deepen and extend the dock, and to enlarge and improve the entrance from the river Tees, the estimated cost of the works contemplated being about £250,000. 84

The TCC, formulating its plans for port extension, asked the NER to delay its works, with the result that it was not until the TCC had obtained a new Act[85] that work began.

The initial development of the river Tees had been due to coal but the second phase had been the result of the locally-mined iron ore. From its first mining in 1850, iron ore production had risen to a peak of 6.756 m tons in 1883[86] with a corresponding production, in 1881, of 1.792 m tons of pig iron in Middlesbrough and Thornaby alone and a further quantity north of the river, a proportion of the 800,000 tons made in Durham county.[87] In that year, of a total of 116 furnaces in blast in the region, no fewer than 99 were on Teesside, inferring a total production there of c 2¼ m tons. The principal beneficiary of this industry had been the NER, successor of the S&DR and WHH&R with their extensive mineral traffic. In 1860 the S&DR conveyed 1.529 m tons of ironstone and 310,000 tons of limestone in addition to 2.045 m tons of coal.[88] Under the NER these figures were to rise substantially with c 12 m tons p.a. of raw materials being brought to Teesside.

The production of iron in the region was one of the spurs for the transformation of the Tees shipbuilding industry. Wooden ships had been built at Yarm and Stockton in the 18th century but whereas at the former town shipbuilding ceased in 1844 - in fact Yarm ceased as a port from 1860[89] - at the latter it continued with the change-over from wood to iron for hull construction, rising between 1854 and 1866 to 14,000 registered tons and to 34,000 in 1885; of this latter total only 8,000 tons was credited to Middlesbrough.[90] Output reached a peak of 82,000 tons, perhaps

50 ships, in 1883, a figure not to be exceeded until 1889.[91] Also associated with the iron industry was the establishment of heavy engineering works at Darlington, Stockton, Middlesbrough and Hartlepool. Their output included bridges, marine and stationary engines, iron-making plant, iron girders and rail sections and the labour drawn to Teesside led to the populations of Middlesbrough and Stockton, between 1851 and 1881, rising respectively from 7,631 to 55,373 and from 10,172 to 51,209.

Considerable financial problems had been experienced by the TCC in its conservatorship. Shipping had not increased as might have been anticipated, grants for the harbour were not forthcoming, revenue was often inadequate. Conversely, the iron industry had provided cheap waste slag for the river works, no less than £56,671 having been paid by the ironmasters to the TCC for its disposal, reducing the cost of the south breakwater to £212,650.[92] Additionally, by 1875 the TCC had expended almost £200,000 on dredging, £50,000 on the river training walls and £79,000 on the reclamation of c 1100 acres valued at £215,500. With the £110,000 of inherited capital the TCC had spend £723,000 on the river. Borrowings of £734,000 had been granted but not fully used, mortgages totalling £314,000 had been arranged and the Public Work Loan Commissioners had lent £175,000.[95]

6.5 River Blyth

The Blyth Harbour and Dock Company (BH&DC) held its inaugural meeting in July 1854.[1] As noted earlier the company had initially intended to include within its scope the formation of railways to Hartley and to Cramlington but, due to opposition, these provisions were withdrawn. An earlier proposal for a railway to Blyth had been made by the Newcastle and Berwick Railway in 1846[2] but the town, after the passing of the BH&DC Act,[3] continued to rely on the Blyth and Tyne Railway's link to the south. James Abernethy, responsible for the initial proposals, was duly instructed by the directors to prepare detailed plans and specifications for harbour improvements, generally in accordance with the new company's Parliamentary

powers. Abernethy suggested that the authorised works be undertaken in three stages: harbour improvement and the formation of an effective breakwater; the construction of the half-tide basin and the "trumpet entrance;"[4] and lastly the forming of the principal dock, with its locked entrance and bridge.[5] The directors resolved to proceed immediately with the first stage, to undertake the second when funds became available and to defer the third. Plans were approved by the Admiralty, arrangements made to provide a dredger for the use of the contractor and the tender submitted by Michael Scott, in total £27,956, was accepted.

From its inception the BH&DC was hampered by a lack of funds, a problem which beset both Tyne and Tees. The Parliamentary plans had originally shown a 25 acre dock with a seven acre half-tide basin - another version showed them as 19 and seven acres[6] - but by the time a prospectus was issued the areas had been reduced to 16 and 4½ acres respectively. Situated to the east of the town and its staiths, the docks would have "the great advantage of being so situated that vessels from sea will gain immediate access to them on entering the harbour."[7] The £150,000 authorised capital would appear to have been difficult to raise and in 1855 a further prospectus was issued. It noted that it was still necessary to ship coals via keels, that the state of the river was such as to force ships to make for the Tyne in bad weather, and that coal owners were so compelled to ship much of the area's coal on the Tyne; nevertheless, the ports throughput was 250,000 tons.[8] It was noted, too, that ships of up to 600 tons register were built at Blyth, in the prospectus claimed as being an area favourable for building in iron.

Regarding finances, the prospectus noted that the completion of the eastern breakwater would permit the company to begin to charge pier dues on ships using the harbour, so generating revenue and, anticipating coal shipments of 750,000 tons p.a.,* total revenue of £16,562 was foreseen, with working costs of £4,140 p.a. The projected returns would amply

* The corresponding register tonnage would be 562,500.

justify investment. Financial restrictions were eased somewhat by Sir Matthew White Ridley, chairman of the BH&D C gifting to it the foreshore, a move approved by the Commissioners of Woods and Forests. By it, the company was given possession of the land needed for the formation of the western training wall to the estuary.

As construction of the first stage of the work continued the directors turned their attention to the best means of acquiring "a due share of the coal traffic of the district."[9] It was agreed that this could be best achieved by building a branch line to connect with the NER at Cramlington. A survey of the line was undertaken by Abernethy but Harrison, engineer to the NER,* opposed this proposal whereupon the engineer to the B&TR, Tone, sought a meeting with the BH&DC, a move which led to the B&TR deciding to extend its line at Blyth. Disagreements ensued as a result of the BH&DC attempting to safe-guard its rights but an agreement was eventually made whereby the B&TR was to be encouraged to extend to the dock area while the dock company would expedite the provision of shipping facilities.[10] Nothing further transpired.

The need for the new company to attract traffic, and revenue, was acute. Due to earlier arrangements, the harbour itself formed part of a lease made between Charles Carr, the lessee, and Ridley. The BH&DC, anxious to improve the harbour, sought to purchase the lease and agreement was eventually reached in the sum of £9,000.[11] Perhaps due to reluctance on the part of investors to subscribe, the company was forced to seek loans from its principals and in 1857 £10,000 was approved "on the personal security of the Directors,"[12] four individuals, later, each lending £5,000; in the following year mortgage bonds totalling £6,000 were issued. The dilemma facing the company was serious. With the prospect of an insufficient return, capital could not be raised to construct the works needed to attract trade while conversely, the coalowners and railway companies were reluctant

* In 1854 Harrison had discussed the transport of coal from Ashington, five miles north of Blyth, for shipment at South Shields or Wearmouth dock. (PRo: RAIL 527/8)

to invest in Blyth as the Tyne, now with the docks of both NER and TIC in operation, offered facilities of a much higher standard.

With few other options available it was decided to seek a further Act, principally to extend the time by which the several works should be completed. In 1853, the company had proposed a seven-year period but the Act had reduced it to five years; now, the 1858 Act sanctioned an extension, the outer works to 1859, the basin to 1862 and the dock to 1865.[13] Capital remained at £150,000. The preamble to the Act noted that only £32,313 had been expended and although it claimed that the harbour was much safer, nevertheless some £50,000 remained unissued. Construction could not proceed until the financial position improved.

The work undertaken had been virtually limited to building a new, eastern, breakwater and to dredging the channel for ships of 15 ft draught. Initially the breakwater was built in masonry but after 1,800 ft had been constructed the stone was found to be unsuitable and the remaining length was formed from timber frames placed at ten foot intervals, tied together by wallings and open planking on both faces, the interior being filled with rubble. The length of this part of the breakwater was 4,000 ft.[14] The cheap and rapid method of construction was criticised by other engineers but Brooks, well acquainted with the site, later defended the principles adopted in that the breakwater was not exposed so much as were others in the region. The outer part of the rock outcrop on which it was based offered protection, reinforced by the much earlier artificial dyke.[15]

By 1856 the timber breakwater was almost complete and work was in progress on the forming of a timber-faced wharf to direct the river's flow into a proper channel and also to provide facilities for coal handling until such time as the dock should be built. The work had cost £18,808, of which £3,181 was for dredging.[16] From this time the extension of the eastern breakwater was sanctioned in comparatively short lengths, presumably as funds became available, and it was completed in 1859.

As work proceeded, it was agreed to build a matching western breakwater, to half-tide height and 4,000 ft long, but its completion virtually coincided with its being breached, an event which led to some disenchantment regarding Abernethy.* The works had, by this time, cost a total of £67,320.

The BH&DC did not cease in its efforts to expand its trade. In 1859 negotiations were completed for the shipment of coal from Cambois, to the north, and from Bebside, recently opened, to the west, moves logical in view of the fact that the collieries to the south traded to the Tyne at Hayhole. The agreement led to the Cambois Coal Company investing £10,000 in the BH&DC and Joseph Straker, one of its owners, becoming a director. The BH&DC agreed to build the necessary wharf and the colliery the drops or spouts to be sited on the north side of the river, the first development there.

In 1860 the BH&DC obtained a further Act of Parliament, financial in character.[17] By its powers the company was authorised to levy additional tolls and rates and also to extend again the time of completion of works and in 1862 a magistrate's certificate enabled it to begin charging dues, its first-stage works having been completed. No decision regarding the forming of docks would seem to have been made by the BH&DC but in 1862 conflict with the B&TR is apparent in that the railway company gave notice of its intention to extend its operations so as to form a 45-acre dock[18] with a new south breakwater on a site to the south of that earlier put forward by the BH&DC. The notice was followed in 1864 by two Bills being presented in Parliament, the first by the B&TR itself and the second by a client company, some if its promoters directors of the B&TR, seeking the formation of a separate dock company, a situation analagous to that which had occurred on the Tees.

That there were opposing factions in the port of Blyth is made apparent

* Abernethy's appointment was terminated in 1862, although he remained as a consultant.

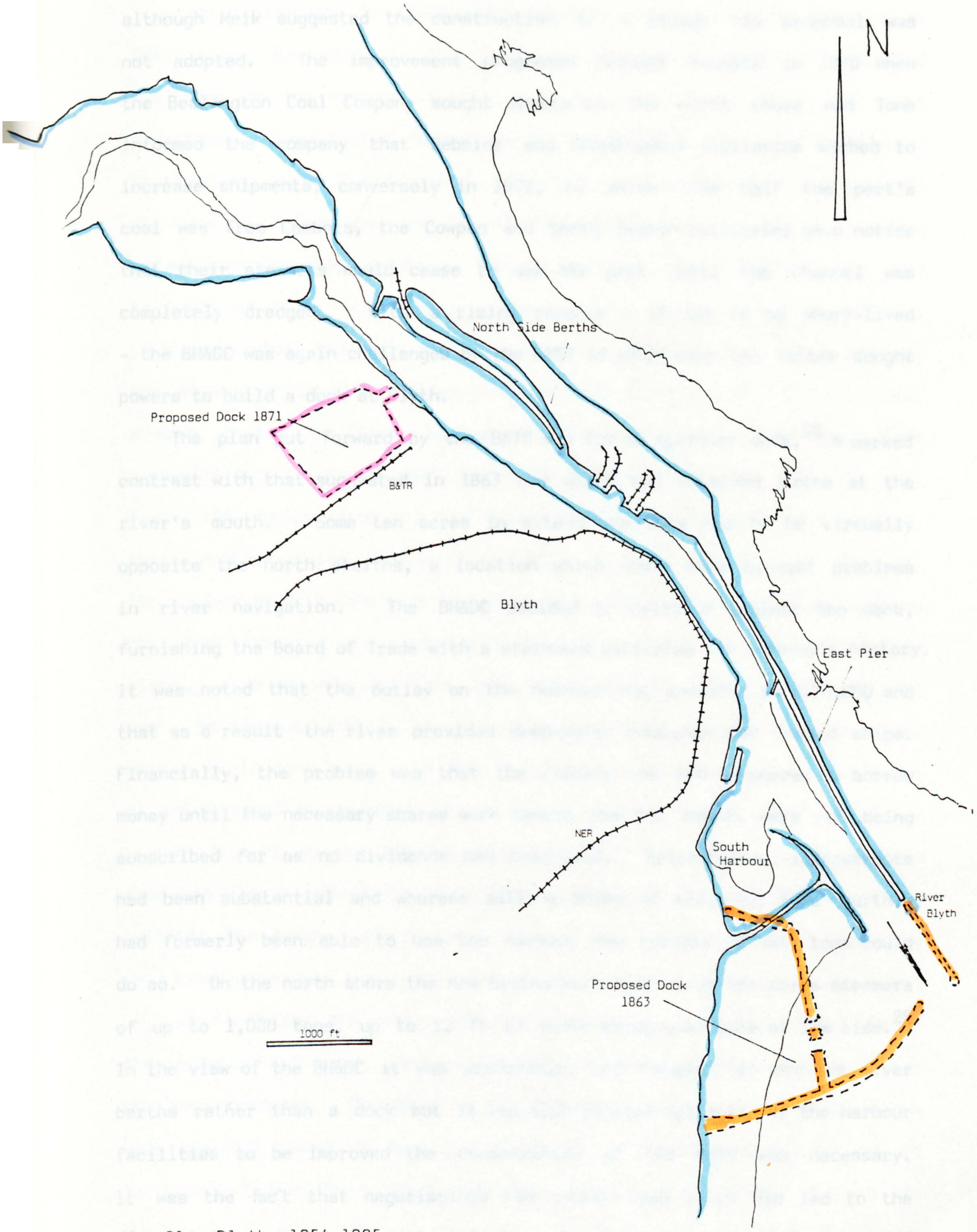
by the events of 1863. The publication of notices concerning the Act sought by the B&TR was followed immediately by a deputation - un-named but presumably members of the BH&DC - meeting the directors of the NER. The deputation asked the NER to give consideration to building a line from either Dudley or Cramlington to Blyth and to build docks there for the shipment of coal. The accommodation at present provided "by the Blyth and Tyne Company was inadequate for the trade of Blyth and...the inhabitants were dissatisfied with the manner in which their requirements were met by that Company"[19] but, what was of greater interest, signifying some lack of prosperity, was the fact that the deputation considered that the shareholders of the present company could be "acquired on easy terms."[20] The NER, resolving to await the plans of the B&TR, took no further action in the matter.

The B&TR's Bill noted that the dock proposed by the BH&DC in its 1854 Act had not materialised and the railway company now sought powers to abandon its intended branch to it and to substitute "a railway to an intended dock near to the mouth of the river Blyth, for powers to construct which dock application is made in the present Session..."[21] The second Bill had among its promoters Joseph Laycock and Joseph Davidson, directors of the B&TR, with Straker, of the Cambois Coal Company. The promoters sought capital of £400,000, anticipated that construction could be completed withing five years and envisaged the purchase of the BH&DC.[22] Opposed by the BH&DC, neither Bill proceeded and, although not recorded elsewhere, it is noted in a letter written by Dees, solicitor to the company, that the BH&DC were to sell the undertaking for £120,000.[23] That doubts existed as to the viability of the port of Blyth is evident in a report to Dees: "I feel...assured that any plea that some day or other the Blyth Harbour will be a formidable competitor with the Tyne or that the Blyth and Tyne Railway would themselves seek relief by the construction of Docks there would fly in the face of facts..."[24]

The moves made by the B&TR spurred the BH&DC into improving both its coal handling equipment and the port's berthing arrangements, in spite of coal throughput remaining at a low level; shipments had "not increased in proportion to the Improvement in the Harbour."[25] Limited standage for loaded waggons caused congestion of shipping and the loading cycle, often over two tides, caused the larger colliers to ground and incur damage. In addition, the breakwaters suffered intermittent damage and the harbour was prone to problems of swell, necessitating the breaching of the western breakwater to alleviate them. It was against this background and against the increasing competition from the Tyne through the growing use of screw colliers there that the BH&DC sought the views of Thomas Meik, engineer at Sunderland.

Meik presented the directors with his proposals in June 1866. For added protection the pier should be extended while, to attract shipping, further dredging should be undertaken. He envisaged a cost of £50,000 being involved, whereupon the directors resolved to attempt to persuade the port's coalowners to subscribe £20,000, at the same time the BH&DC borrowing £30,000 from the Public Works Loan Commissioners. Meik was instructed to put in hand only the forming of a wave trap, a minor work, but new dredging plant was purchased. The trap proved successful but Meik expressed concern in 1867 at the meagre sums being spent on port maintenence,[26] a measure forced upon the directors by the continuing low throughput of the port. Still conscious of the need to attract trade the directors considered that only dredging would suffice, even if all revenue were to be so absorbed; a "large increase to the shipments will necessarily follow."[27]

The new north berth proved satisfactorily and the Cambois colliery began to ship coal from it in 1867 although construction was not completed until the following year. Still restricted by lack of revenue the BH&DC concentrated its efforts on the new north staiths, a move which led to



Map 21: Blyth, 1854-1885

complaints from users as to the state of those on the south shore and although Meik suggested the construction of a bridge his proposal was not adopted. The improvement programme brought results in 1870 when the Bedlington Coal Company sought spouts on the north shore and Tone informed the company that Bebside and Choppington collieries wished to increase shipments; conversely in 1872, by which time half the port's coal was from Cambois, the Cowpen and North Seaton collieries gave notice that their steamers would cease to use the port until the channel was completely dredged. With a rising revenue - it was to be short-lived - the BH&DC was again challenged by the B&TR in 1872 when the latter sought powers to build a dock at Blyth.

The plan put forward by the B&TR was for an up-river dock,[28] a marked contrast with that suggested in 1863 and which had involved a site at the river's mouth. Some ten acres in extent the dock was to be virtually opposite the north staiths, a location which would have brought problems in river navigation. The BH&DC decided to petition against the dock, furnishing the Board of Trade with a statement outlining the company's history. It was noted that the outlay on the harbour now amounted to £120,000 and that as a result the river provided deep-water moorings for loaded ships. Financially, the problem was that the company was not empowered to borrow money until the necessary shares were issued and the shares were not being subscribed for as no dividends had been paid. Nevertheless, improvements had been substantial and whereas sailing ships of only 300 tons burthen had formerly been able to use the harbour now vessels of 600 tons could do so. On the north shore the new berths were able to accept screw steamers of up to 1,000 tons, up to 12 ft of water being available at low tide.[29] In the view of the BH&DC it was preferable, and cheaper, to provide river berths rather than a dock but it was also pointed out that for the harbour facilities to be improved the co-operation of the B&TR was necessary. It was the fact that negotiations had broken down which had led to the proposal for a dock and a railway to it. The Bill, the last to be promoted

by the B&TR, did not proceed.*

The improvement in trade which began in 1870 ended within five years. Decline was due partly to the depression in the coal trade but it was due also to the harbour itself, still inadequate in spite of the works undertaken. Unsolicited, Meik reported to the directors on the harbours shortcomings and on its future. It had been found necessary to restrict the use of the dredger and to offer it for hire, as a result of which expenditure had been reduced. Other ports, too, had suffered but none so badly as Blyth, forcing Meik to observe "that there is something peculiar to the case which has made the depression so...marked."[30] He recommended the company to provide further coal-handling facilities and to raise dues, a move pressing as "Blyth is now at a crisis in its history and unless a move is made forward it must inevitably go back."[32]

In 1867 Ridley died and his place as chairman was taken by his son, again Matthew White Ridley (1842-1904), to become the 1st Viscount. The concern of Meik soon came to be shared by Ridley. In 1879 Meik reported that the harbour could accommodate ships only of 1,000 tons but if the piers were to be extended this limit could be raised to 2,000 tons. The port, he thought, had "a prosperous future...if capital can be found to enable it to keep pace with the time."[31] He considered that the loading of ships could be improved by the use of hoists, rather than spouts - a view logical in the light of the flatness of the area - but the greatest need was for a railway to North Blyth, the site he envisaged as being suitable for further development. Ridley duly wrote to the NER regarding rail communications, a move to prove of some significance to the port.

At first the NER proved reluctant to discuss the matter but later the question of rail connections was fully deliberated and the several options considered. The BH&DC at first sought a line to connect Ashington with the NER branch to Newbiggin, a curve at Sleekburn enabling coal to be brought to the North Shore staiths. Later it was thought that a new

* The B&TR was amalgamated with the NER in 1874.

line from the NER at Longhirst should link with Ashington but a further discussion involving Tennant and Harrison brought a conclusion: the NER would extend its rails to the south shore at Blyth if the BH&DC would improve wharf facilities and provide water of sufficient depth for 2,000 ton ships.[34] Harrison suggested that 15 ft depth at low water should be provided. The BH&DC accepted the offer of the NER and suggested that double spouts be provided at three new staiths. The quay walls would be to the approval of the NER and were estimated to cost £14,000. Success in negotiations was matched by a personal achievement by Ridley; in May 1881 he was appointed a director of the NER.[35]

The agreement brought a report from Meik, long concerned by the harbour's finances. The BH&DC quay and the NER staiths together would make more apparent the need for a greater depth of water, obtainable by further dredging and extending the piers. Meik suggested that the company was not well placed to borrow money publicly, neither had it found it easy to raise money privately. The solution, as he saw it, was to dissolve the company and form a "Public Harbour Trust or Commission consisting of representatives of the different interests involved."[36] Suggestions were also made concerning the Trust's constitution, principally Ridley, Cambois colliery, other coalowners and shipowners; only by taking such a step could the future of the port be assured. The directors agreed with Meik's suggestions and it was resolved to form the Commission suggested, at the same time continuing the construction of the works resulting from the NER agreement. Some dispute, however, took place regarding the new spouts. Originally the NER had wished to provide six but the BH&DC suggested that two berths, each with two spouts, would provide for an additional 600,000 tons of coal p.a., an increase which would suffice for several years. For once, the BH&DC erred on the side of pessimism, understandable in the light of its somewhat unhappy existence. Up to 1880 it had expended capital to a total of £131,400, an expenditure which had not been matched by an increase in trade.[37] Broadly the throughput

of coal had remained static at 250,000 tons p.a. and as a result revenue had not increased, so making the payment of a dividend a rarity.

6.6 The Hartlepools

The establishment and subsequent expansion of harbour facilities at both Hartlepool and West Hartlepool had led to the reconstitution of the harbour commission, responsible for the maintenance of the port. In 1851 a new Act of Parliament was obtained, legislating for the construction of a pier from the Heugh to protect the haven. It provided, too, for a governing body of 16 members, six original commissioners, three members from the west docks and three from the east docks - since 1849 under the control of the York, Newcastle and Berwick Railway - the Collector of Customs at Hartlepool, the mayor and two others. The commissioners, however, were responsible only for the old harbour and the channel leading into it; both sets of docks remained the sole responsibility of their owners.[1]

The interests of the west docks and the Stockton and Hartlepool Railway were merged in 1852 when the two companies became the West Hartlepool Harbour and Railway[2] with powers to lease, or purchase the Clarence Railway, earlier the subject of offers of purchase by both Hudson and the Leeds and Thirsk Railway.[3] Under the management of Ralph Ward Jackson the amalgamation brought into being a strong competitor to the Stockton and Darlington Railway, both undertakings seeking trade in the same area. Although the formation of the WHH&R* pre-dated the founding of the North Eastern Railway, it was, nevertheless, a result of the events leading to the later large-scale amalgamation. As early as 1849 discussions had taken place between the Leeds Northern Railway and the YN&BR regarding the former company's plans to seek a line to Newcastle and although no progress was then made further meetings took place in March and July 1852 when a jointresolution in favour of an amalgamation resulted in the formal

* It was capitalised at £1.994 m.

agreement of 1854.[4] The prospect of the amalgamation alarmed Jackson as he had been "developing the facilities and accommodation at West Hartlepool in the expectation that it would become the chief port of the Leeds Northern and a major exporter of West Riding and East Lancashire goods."[5] From the NER's formation he did, however, extract the acknowledgement that the WHH&R would receive special consideration regarding rates should it be found that West Hartlepool suffered vis à vis Hull. Jackson later attributed to this arrangement the fact that West Hartlepool had enjoyed a decade of remarkably swift expansion. It was against this background of railway reorganisation and competition that the Hartlepools, the twin ports of the NER and the WHH&R, were to develop.

As noted earlier, Jackson's relationship with the Hartlepool Port and Harbour Commission (HP&HC), of which body he was a member, had been somewhat less than felicitous. The HP&HC's Act of 1851 again brought conflict between Jackson and what he saw as the controlling east dock interests. The commissioners had employed James Walker to report upon port improvements and, after discussions with Jackson and Casebourne, he had recommended the pier at the Heugh. When the Bill was first introduced into Parliament it was opposed by Jackson, who called in James Meadows Rendel to give evidence against it and, even after the Act had become law, he still maintained that Rendel should be consulted, a view with which the commissioners could not concur.[6] Jackson thereupon objected to the form of the pier, stating that it should be of near-vertical ashlar walling, and costing some £134,000, as opposed to the rubble masonry battered-wall structure estimated at £52,000 by Robinson.* The dispute came before the Admiralty, which initially rejected Robinson's plan. A compromise design was then adopted - concrete blocks were used for the inner face of the pier - tenders were received, construction began in 1853 and by 1855 the pier's length had reached 720 ft., when having cost

* Robinson was engineer to the HP&HC.

£15,384 its construction was suspended.[7]

In September 1853 Jackson stated that co-operation with the LNR had not brought the benefits expected - it was anticipating amalgamation - but nevertheless almost ¾m tons of coal had been shipped from the port in 4,394 ships; in addition the railways had carried a further 306,000 tons of coal for landsale.[8] What was significant was the fact that the directors of the company were at this time urged by Jackson to make provision for a timber trade and to meet this request it was agreed that a third dock should be built, with a timber pond.[9] It was from this date that the character of trade began to change from almost exclusively coal to, additionally, timber, grain and cotton.[10]

Although the WHH&R had put in hand further extensions to its docks, the NER appeared content to operate its Hartlepool dock in its initial form, in spite of that fact that insufficient water led the owners to consider using lighters to load the colliers.[11] It is probable that the NER's involvement at other ports was such that expansion at Hartlepool, while it provided competition with West Hartlepool, was not considered economical, especially as the NER retained an investment in the docks at Sunderland and had begun construction of its major new dock at Jarrow, on the Tyne. Additionally, the NER continued to face competition from the S&DR, operating to the Tees, and also the Londonderry Railway, running between Seaham and Sunderland. As a result of NER policy, coal shipments at (east) Hartlepool remained virtually static at 1 m tons p.a. over the period 1850 to 1865 but with the completion of the 14 acre Jackson dock in 1852, again with coaling facilities, throughput of coal at West Hartlepool amounted to 696 ,000 tons in 1854.

In 1854 the HP&HC, perhaps at Jackson's insistance, brought in Rendel "to report on the capabilities of Hartlepool as a Harbour of Refuge,"[12] a move which was later noted approvingly by the WHH&R in that it would appear that a harbour of some 800 acres could be formed. Presumably acting for the HP&HC, a proposal for a harbour of this scale had earlier

been made by Abernethy and Meik and they had suggested, in addition, that an 80 acre wet dock, the 'Great Float';* should be formed within the much larger Slake, the natural feature.[13] To obtain the fullest benefit from the dock it was to be connected to the sea both at the tidal harbour of the eastern docks and at the harbour of the western docks; a line from the NER's Hartlepool branch would lead to 14 loading staiths along its western side. Rendel's plan did not amend the wet dock but he proposed a very much larger harbour of refuge, formed by extending a north pier from that at the Heugh and a south pier from a rock outcrop, the Long Scar; the piers were to be some 5,000 and 8,000 ft long respectively.[14] The subsequent Act legislated only for the construction of the harbour but it included also for a reconstitution of the membership of the HP&HC; it was to include three members each from the western docks, the eastern docks and the shipowners, together with one representative each from Hartlepool and West Hartlepool, with three others.[15]

Although the 1855 Act had authorised the construction of a harbour of refuge by the HP&HC, lack of funds precluded a start being made, although work re-commenced on the Heugh pier. As noted, no further work was carried out at the eastern docks while at West Hartlepool the completion of the Swainson dock in June 1856 brought to an end the first phase of the work of the WHH&R: perhaps it also marked the zenith of the career of Jackson, to whom the port owed its creation.[16] Since its formation the ports enlargement had been dramatic: the tidal harbour had been enlarged from its original 13 to 44 acres; the Coal, Jackson and Swainson docks, the last handling only merchandise, were of 8,14 and 10 acres respectively; a 10 acre timber dock had been formed; two graving docks had been built; and the length of quay totalled 10,500 ft. In addition the population of West Hartlepool had risen from 400 to 8,000.[17]

At this time of relative inactivity the original Hartlepool Dock and Railway Company in 1855 sought an amalgamation with the NER,[18] to which company the works had been leased since 1849. In turn this proposal

* See Map 13

brought about discussions between the NER and the WHH&R as to a formal association, the latter company giving notice in 1856 of a Bill to achieve this object.* The advantage of such a move would be "that two sets of docks in the same area would then come under one management,"[19] an event not to take place for several years. The Bill - wherein the WHH&R sought £450,000 for "additional docks, shipping staiths, wharfs, warehouses, piers, harbour and sea works"[20] - was lost due to the fall of Palmerston's government in March 1857, at which time it was referred to as a proposal "from the North Eastern Railway Company for a permanent union..." [21] and was resuscitated, again without result, in 1859; the Act for the amalgamation of the original company and the NER was passed in 1857.[22]

In 1857 the Select Committee on Harbours of Refuge published its report. Evidence had been presented to it on the part of the HP&HC by Jackson and George Leeman, representing the two major interests. Naturally all the ports of the region had made representation to be considered, including the Tyne where work was actually in progress on the forming of a refuge harbour. Jackson noted that Rendel had estimated his proposals at c £½ m and mentioned that no better location than Hartlepool could be found. He recorded also that whereas the trade of Hartlepool was static, that at West Hartlepool was flourishing, a comment perhaps not quite accurate. Jackson attempted to portray West Hartlepool as having a trade greater than the Tyne's and, to do so, compared the declared Customs values of shipments of merchandise from the Tyne with those of West Hartlepool. His figures indicated that West Hartlepool's trade "was within £83,000 of the total merchandise exports of the ports of Newcastle, Sunderland and the Tees,"[23] a comparison which, if true as to value, was incorrect in terms of shipping if figures presented to the Committee were to be believed. They showed that 15,400 ships cleared the Tyne, 12,500 Sunderland, and 6,600 Hartlepool.[24] In spite of the Hartlepool Bay proposal being supported by Calver no firm conclusion was reached.

* The NER Board Minute Book (PRO:RAIL 527/9) records in November 1856 an approach from Jackson concerning amalgamation. Following objections from coal-owners, and others, the union, at Jackson's instigation, was dropped.

Two years later the subject was re-introduced, this time by a peripetetic Commission, hearing evidence at North Shields, Blyth, Sunderland, Hartlepool, Redcar and London. As before, a case was made on behalf of each port, Hartlepool with Jackson as its main proponent. Again Jackson misinterpreted the port's traffic figures, claiming that its trade, together with the Tees, was greater than that of all other north-east ports together, an argument specious in view of the fact that the provision of a harbour of refuge should be principally related to numbers and size of ship together with mode of propulsion. Jackson claimed, wrongly, that 10,406 ships had used the port in 1856 and forecast that the port's coal trade would continue its rapid increase as "this district really and truly is in its infancy"[25] although he admitted that there had been a down-turn in shipments; he commented that the area's collieries were exploiting deeper seams and looked to a recently-opened coalfield to the west and south-west of Hartlepool as being likely to bring greater trade, ignoring the fact that the NER was in a position to ship coal at any rival port. The proposed harbour, Jackson thought, would cost between £2¼ and 2½m, depending on which of the variants was chosen and would provide 1,526 acres with a depth of 18 ft and 1,400 with a depth of 24 ft. The breakwaters would total 8,400 ft in length. In all, four designs for the harbour were analysed in the subsequent report, by Rendel, Mossman, Washington and Jackson.

In this instance the Commission was more forthcoming than had been the earlier body and recommended that a harbour of refuge should be built at Hartlepool, perhaps anticipating that its recent rapid expansion would continue. The comments concerning funds were not so optimistic in that the Commission could not

> hesitate to recommend its construction; but after a careful consideration of the relative amounts of national and local benefit to be derived from it, being of opinion that they are equal, we submit, that a Grant not exceeding 500,000l should be made in aid of the construction of a harbour, partly national and partly local, at Hartlepool, on condition that an equal amount is raised in the locality to be applied to the same purpose.26

The Commissioners found themselves unable to recommend any one proposal for Hartlepool and instead delineated on a chart the suggested limits of the harbour; any engineering works within this area must be such as not to preclude its further use. After giving evidence in London, Jackson returned home to a hero's welcome, acclaimed as "the person to whose untiring and indefatigable efforts this happy event is due."[27] As would be expected it was not found possible to raise the capital necessary and, in addition, the change from sail to steam propulsion and ever-increasing ship sizes made less vital the need for such a harbour.

Between 1857 and 1859 the trade of West Hartlepool was depressed, the revenue of the WHH&R being c £177,000 in each year, against a capital of c £2¼m. Jackson had made great claims for the growing merchandise trade of the company but in 1859 it was reported that of the total revenue of £178,497, £97,499 was for coal, £40,721 for merchandise and £21,986 for port dues.[28] A significant proportion of the coal traffic was for landsale, 504,000 tons as against the 839,000 tons shipped, partly a result of the growing use of coal in the burgeoning Teesside iron trade.

With the port of West Hartlepool relatively moribund some irregularities in the operations of the WHH&R were made public. In February 1859, at the meeting of shareholders, it was reported that "certain attacks (had) been publicly made upon your Chairman and Directors...by parties having an interest adverse to the prosperity of this undertaking"[29] but stated that an investigation had revealed no irregularities. The attack had been made by Benjamin Coleman a member of the London Stock Exchange who, having purchased a single share in the WHH&R, proceeded to pursue an investigation into its affairs. This attack was directed almost exclusively against Jackson and the motives behind it were never fully made clear although Jackson held the view that Leeman, vice-chairman of the NER,*

* In 1856 Harrison, and other officers, had been instructed by the NER board to undertake an investigation into the financial affairs of the WHH&R.

was responsible, a view uncorroborated;[30] there were perhaps other personal reasons, involving Jackson's brother.[31] A "Committee of Assistance",[32] headed by Thomas Sturge, a shareholder, was formed to investigate the allegations and the report which resulted noted the improvements made to the port but brought to light the fact that Jackson had purchased coal royalties on behalf of the company, to the extent of 9,000 acres; shipping interests had also been promoted. The committee exonerated Jackson from fraudulent intent and a vote of confidence in him was expressed, Jackson being thanked publicly by Nicholas Wood, a member of the committee.

The investigation into the company's affairs did not deter Jackson from promoting its interests further, both concerning local matters and those of a more far-reaching nature. As noted, the WHH&R had, in opposition to the S&DR and through the Cleveland Railway, been involved in the formation of the Upsall, Normanby and Ormesby Railway, bringing iron ore from North Yorkshire to the rapidly proliferating furnaces of Middlesbrough, in which venture Jackson was brought into conflict with the Tees Conservancy Commission.[32] The second matter concerned Jackson's negotiations with the London and North Western Railway (LNWR), in 1861 seeking alink with the north-east ports. The WHH&R supported the LNWR in its plans to form a railway through the Pennines which would link with the SD&LUR - promoted by the S&DR and approaching completion - and so enable traffic to reach West Hartlepool; the aim of the company should always be "to encourage the most free and wide-spread interchange of traffic in all directions and with all companies"[34] and it was accordingly agreed to provide full facilities for the outside company's use of the port.

In order to make the necessary provisions, the WHH&R promoted a Bill which would enable the LNWR to purchase land from the promoters and to build warehouses, at the same time authorising it to subscribe to the WHH&R to the extent of a quarter of its share capital. In the expectation that an Act would result, the LNWR purchased dockside accommodation and

warehouses for the sum of £100,000[35] but, on the Bill being rejected, the arrangement was rescinded and the WHH&R was called upon to return to the LNWR the purchase price; to do this a further Act was sought so as to permit the raising of the additional capital [36] but, in fact, it was not until 1865 that the NER repaid to the LNWR its investment of £100,000.[37]

At this time the authorised capital amounted to £2.014 m, half raised since the merging of the three Jackson interests; only a further £86,000 was sanctioned. The cost of providing further warehousing was met by Sturge to the extent of some £30,000. Although it is difficult to believe that the trade of West Hartlepool expanded to the extent claimed by Jackson, nevertheless it was proposed in 1861 that the two timber ponds, formed as an adjunct to the Swainson dock, be converted into two docks each of some 12 acres in area,[38] a move which came to nothing, perhaps the result of the company's delicate financial state.

The struggle between Jackson and Coleman has been detailed elsewhere but, as an explanation for the future of the WHH&R, an outline must be given. The Committee of Assistance reporting in 1859 had found that Jackson had invested in both collieries and shipping - for the company's benefit - although neither investment had been disclosed and both exceeded the Parliamentary powers granted. In addition, capital expenditure exceeded by £½m that authorised. The committee, without criticising Jackson personally, noted that there had been errors of judgement, especially as to future prospects, and advised caution "against leading any to expect that such prosperity will be more rapid than the ordinary increase in mercantile advancement."[39] The report led to consideration of the advisability of disposing of the coal royalties and shipping and it led also to a further investigation by accountants Quilter Ball & Co., and to a legal case in Chancery, instigated by Coleman, who had claimed that Sturge had grossly underestimated the overspending of capital and that the figure should be c £1m.[40] Coleman was also extremely sceptical as to Jackson's trade

figures for the port, maintaining that the timber trade had been drawn from Hull by subsidising it and claiming that colliery receipts were fictitious, in that 75% of the coal traffic revenue was notional, from collieries owned by the company and which did not pay for railway and port use.

The dispute continued with the investigation into the company's finances by the accountants, acting on behalf of the holders of debentures. Naturally, it was again shown that the company's financial state was unsound but this later inquiry had the effect of causing Jackson to resign from the chairmanship, suggesting that his successor should be Henry Robertson Sandbach, already a director.[41] Jackson's resignation had been suggested at the company's annual meeting in February when Wilkinson, Coleman's solicitor, had taken issue with Jackson as to the state of the finances, especially as concerning claims by debenture holders exceeding, in total, £600,000.[42] The report produced by Quilter Ball & Co., showed that capital borrowing had exceeded authorisation by £933,393, an event made more serious by the fact that the company's share capital had not been fully subscribed. Debentures had been issued instead of shares and "the excess over the arbitrarily assumed limit of one-third borrowing power is no less than £2744686".[43] Assets, however, were substantial but the company's ships and collieries should be sold, although it was pointed out that merchandise revenue had been largely the result of the WHH&R owning its own ships.

When resigning, Jackson had written to Sandbach to the effect that the docks themselves had

> absorbed the greater portion of the (later) outlay and capital, and I fearlessly assent that nothing of the kind has been produced in this Kingdom equal to them at so low a cost, now combining, for their extent, the like general adaptation, capabilities and economy of construction (and he continued by noting that) capital expended so rapidly...cannot be expected to produce an adequate amount of revenue from such works alone, without more time for development. 44.

Jackson's falsifying of accounts had grossly overestimated profits and in 1862 it was noted that whereas receipts were £216,600, Jackson had given working expenses as £151,142; however, "after deducting the losses

on the steamboats, collieries and other items, there was a net deficiency in the revenue account for the year of £153,596".[45] It was also made known at this time that "the interests and dividends of every class...have to a very large extent, been paid out of capital."[46]

Jackson's resignation brought to an end the first phase of the development of West Hartlepool, a change perhaps signified by the ship Ward Jackson being re-named Ocean Queen.[47] A settlement between Coleman and the former directors of the company was finalised, the new directors having found, when taking office, that Jackson had instituted proceedings against the WHH&R with respect to the repayment of his debenture, then due. To prevent him receiving priority over the other holders the directors had executed an assignment of all the company's property, a move which had resulted in a receiver being appointed. When the company's operations had been in Jackson's hands, little documentation had resulted: board meetings comprised only two or three members; the receipt of tenders and their letting were not recorded; agreements with other undertakings were not noted; the purchase of ships and collieries was concealed, as were the arrangements whereby colliery owners were allowed rebates on dues arising from railway use. After Jackson's departure, at which time Casebourne was dismissed,[48] records improved but still did not indicate the decision to apply for a further Act of Parliament, to rationalise - and to legalise - the WHH&R finances.

The application to Parliament resulted in yet another investigation, by House of Lords Select Committee. It was somewhat critical of Sturge's findings, especially in the conclusion that no fraud had been discovered, and, noting all irregularities, found itself unable to recommend that the Bill should proceed but, nevertheless, proposed that the relevant information should be given to the House. The Committee's main concerns were the exceeding of borrowing powers, the use of capital for unauthorised purposes and the "continued and systematic publication of false accounts"[49]

The Committee noted that whereas the total sum raised amounted to £3.73 m, expenditure upon docks and railways totalled only £2.57 m; the balance had been illegally expended. The operation of a shipping line had cost the WHH&R £118,000 and its collieries £311,000 while it was doubtful as to whether the LNWR had powers to hold property in the WHH&R. With amazement evident, it was recorded that the witnesses examined

> have deposed to a series of transactions of so extraordinary and unprecedented a character that the Committee consider it a duty to lay the facts of the case before the House, with the view that the House may, if it think proper, take steps for the prosecution and punishment of the guilty parties, and that some measure may be adopted by Parliament to prevent the recurrence of similar frauds and illegalities. 50

The Act, which increased the company's capital limit to £3.949m, was later passed, contingent upon the sale of the collieries. It was noted that the revenue of the WHH&R was insufficient to cover dividend payments.[51]

The malpractices unearthed in the running of the WHH&R were referred to in a leading article in The Times. The findings of the Lords' Committee were applauded and, criticising the over-issue of debentures it was stated that, although legal limits may, in the past, have been exceeded elsewhere, "a deliberate and permanent excess of debt is not known,"[52] except at West Hartlepool. The transfer of power within the company led to rationalisation. Ships were sold to Pile Spence & Co and the collieries advertised for sale by tender. The prices offered for them were so low, however, that they were temporarily retained, although it was found possible to reduce the losses on their operation from £31,000 to £8,800 for the half-year.[53]

After the completion of the Swainson dock in 1856, engineering works at West Hartlepool had been of a relatively minor nature, being confined to the formation of two timber ponds and the building of the four warehouses needed for the general merchandise trade which had begun in 1853. At the eastern docks, now under the direct control of the NER, no further work had been undertaken, other than routine dredging by the HP&HC. In 1863, however, a report was submitted to the directors of the WHH&R

by Murray, now acting in place of Casebourne. A section of wall in the Swainson dock had collapsed but, in addition, storms had damaged the piers sheltering the harbour. It was suggested that the restoration of the south outer pier, originally of timber, should be in masonry, the views of James William Brunlees (1816-1892) being sought prior to the work being put in hand. At the old port the commissioners were concerned by two matters, the improvement of the port and their inability to undertake the construction of the harbour of refuge authorised in 1855. Coode, one of the commissioners investigating refuge harbours, was requested to comment on proposals made both by Robinson and Casebourne. Coode considered that it would be injudicious to attempt to effect improvements to the entrance of either dock complex before improving the harbour, especially as works of similar scale were already in progress on the Tyne; "it would appear that the time has arrived when some further advance in the same direction should be made at Hartlepool."[54] Robinson had proposed to extend the Heugh breakwater, a move approved by Coode, and to form a detached breakwater in the bay, thought by Coode to be a potential threat to any large-scale development of the harbour. Instead he suggested a rubble mound breakwater with a squared masonry block wall on it to run as a virtual extension - but with a 1,000 ft gap - to the Heugh pier. In line with Coode's suggestions, estimated at £117,900, Robinson prepared the drawings necessary for Parliamentary approval[55] but no Act resulted.

In 1863 the amalgamation of the NER with the S&DR was noted by the WHH&R but no opposition was presented to the Bill. The following year it was agreed that the Cleveland Railway should be sold to the NER, the WHH&R having exceeded by some 50% its authorised investment of £60,000. The resignation of Jackson had brought in as director Isaac Lowthian Bell, active in industry on both Tyne and Tees,but after a short period he resigned as he wished to purchase certain collieries of the WHH&R. In 1864, however, he was re-elected to the board* and in the following year discussions

*A general manager was appointed, for the first time, in 1864.

took place with the NER, the latter company offering to pay 4% p.a. on all WHH&R stock. The board agreed to the terms, a decision, however, "not arrived at until...resources and prospects in every direction and under every contingency"[56] had been considered. In view of the fact that any future call for capital would prove impossible, it was later agreed that amalgamation should proceed and with an annual revenue of c £¼m the WHH&R became part of the NER in July 1865,[57] the Act then recording that the capital invested in the West Hartlepool undertaking stood at £4.249m.[58]

Gaining control of the two dock systems at Hartlepool did not lead the NER to formulate immediate plans for their development on a major scale. In 1865, however, plans for timber dock in the Slake, still undeveloped, were submitted by Harrison, on behalf of the NER, to the HP&HC for approval, followed by extended discussions between commission and company as to future port development. It was eventually agreed that Harrison would prepare the plans necessary and in 1868 his proposals for a large outer harbour were agreed, the HP&HC later submitting the scheme for Parliamentary approval under the name of its new engineer Thomas Dyke (1834-1906), appointed only six months earlier.[59] The drawings showed a sea wall between the two Hartlepools with two new piers to protect the entrance to the old harbour; a detached breakwater - concave on its sea-face - was located opposite to the entrance. The Act which resulted noted that the commissioners had been unable to finance their earlier grandiose scheme and sanctioned only the smaller piers and the sea wall. With the subsuming of dock control by the NER, it became entitled to have five representatives on the HP&HC.[60] The port of Hartlepool was subjected to much competition, intensified by the consolidation of railways and the formation of the NER. The S&DR shipped coal from Middlesbrough, although the growing iron trade had reduced the quantity available for shipment; facilities were available at Sunderland, where the NER had invested in the dock;

and the Tyne dock was completed in 1859. The result of this competition was a reduction in the throughput of coal at the Hartlepools from 2.032m tons in 1861 to 1.584 in 1865 and 1.491 in 1870; the number of ships using West Hartlepool alone fell from 5,964 in 1861 to 4,139 in 1870.[61] This situation caused the NER to seek means whereby trade could be stimulated but meanwhile the HP&HC sought a loan of £50,000 to enable work to proceed, appointed John Howkins (1839-1906) as engineer, received £30,000 from the Public Works Loan Commissioners and, from c 1870 appears to have lost the presence of Jackson at meetings.

The NER had, in 1865, put forward plans for a timber dock in the Slake [62] although work on it did not proceed and it was not until 1871 that the NER and the HP&HC met in York to discuss additional deepwater dock accommodation.[63] In Harrison's view, the depth of water in the docks was insufficient and had already been the cause of the import of iron ore being undertaken elsewhere. It was agreed that the entrance should be dredged by the NER, which was urged to improve both its docks and the entrances, now inferior to the channel. The NER anticipated that the entrance to the Jackson dock would soon be closed for improvement and Harrison propounded his scheme of development whereby the two sets of docks would be connected, enabling ships to enter at one end and leave from the other. He concluded his plan by noting that the principal entrance must be through the old harbour; "the difficulty of maintaining that deep water channel would always be much less than that attending similar efforts at the entrance to the West Harbour,"[64] an indictment of Jackson's plans. Concerned that Harrison's proposals for new docks would deprive the harbour of water for its sluicing, the HP&HC called upon Howkins who duly reported that the sluice gates had been kept closed for a year while the NER was carrying out dock works and, as a result, it had been proved "conclusively that the scour from the Slake is not necessary to keep open the access to the harbour."[65]

1. Hartlepool Basin, opened 1835
2. Victoria Dock, 1840
3. Coal Dock, 1847
4. Jackson Dock, 1852
5. Swainson Dock, 1856.
6. Timber Dock, 1864.
7. Union Dock, 1880
8. Central Dock, 1880
9. North Basin, 1880.

N

Timber Ponds

Dock Proposed 1904

West Harbour

1000 ft

Old Pier

Hartlepool

Map 22: The Hartlepools, 1835-1880

By 1873 the HP&HC had expended on its works the £50,000 authorised and so sought from the Board of Trade approval to levy dues. Agreement was reached with the NER regarding its dock enlargement and that company duly obtained an Act, although the planned dock works were not delineated on any deposited Parliamentary plan.[66] Acting under Harrison, William George Laws (1836-1904), later City Engineer in Newcastle, was probably responsible for the design work[67] but details of this major dock enlargement are scant: under the direction of Charles Augustus Harrison (1848-1916) the work was executed by Walter Scott, responsible for many railway contracts.[68] Begun in 1875 the three docks of 3, 13 and 12½ acres respectively were opened on 6 July 1880 without ceremony, having cost c £480,000.[69] The HP&HC had suggested that they be inaugurated by the Prince of Wales.

The opening of the new docks - they were viewed as being capable of materially changing the condition of the port for the better, and of affecting to a very considerable degree the trade of the North-East [70] - brought the major development of Hartlepool to an end. To the east the 19 acre Victoria dock, the Old Harbour and the recently-formed Commissioners harbour were in use, principally for coaling and the landing of timber, while to the south the dock areas totalled 65 acres and the West Harbour was of 44 acres; in addition, timber ponds had been formed.[71] As at other ports of the region, the principal cause of improvement was dredging, carried out continuously and to such extent that by 1877 a depth of more than 11 ft was available at the lowest of tides.[72] In common with the other ports, a shipbuilding industry had been established at Hartlepool - with no tradition of building in wood - where the WHH&R had built graving docks and leased them to shipbuilding engineers. The NER continued this practice. In spite of the early success of the twin ports, founded by Tennant and Jackson, their coal trade, which never rose appreciably above 1 m tons from either concern, showed evidence of decline from the 1860 s and under the NER it declined even further. The fall was counterbalanced by a

growing import trade, principally in timber, for which the Hartlepools had become the region's premier centre; in 1870 almost 250,000 loads were imported and 357,000 in 1880.[73]

6.7 Seaham Harbour

The death of the Marquis of Londonderry in 1854 and his succession by the son of his first marriage brought the management of the Seaham properties to his widow, Frances Anne, whose family had been responsible in part, for their original development. The completion of the railway to Sunderland had brought her into dispute with the Sunderland Dock Company under the chairmanship of George Hudson. As a result of the disagreements which ensued, the quantities of coal shipped by the Londonderry collieries at Sunderland did not nearly reach those which had been guaranteed earlier, George Elliot, successor to Buddle, having indicated that the throughput in 1855 would be some 450,000 tons p.a.[1] although in that year the total amounted only to some 71,000 tons.[2] The differences between Hudson and Lady Londonderry - a mutual antipathy - would seem to have led her to have had made a re-assessment of the capabilities of Seaham Harbour, a move perhaps accelerated by the growth of the transport of coal by steamship.

In 1845 the harbour had been the subject of an investigation by Brooks and he had then suggested that a new, bigger, dock should be formed to the south of the existing complex. Without gates it was to open directly into a large refuge, encircled by protecting piers and the entrance between them would give a depth at high water of 16'-6"; in the dock the depth was to be 18'-0".[3] Although no further works resulted from Brooks's plan it is possible that its scale was such as to induce Londonderry to build instead his railway to Sunderland. Nevertheless, the proposed expansion of Seaham was again considered in 1855 when reports were received from several consulting engineers.

The scheme submitted by the Edinburgh consultants, D. & T. Stevenson, was in form very similar to that put forward earlier by Brooks, the main

difference being the provision of gates to the projected inner dock. Stevensons considered that the main requirement was that of increased depth, the present shortcomings leading, at times, to 30 or 40 vessels lying off-shore, a phenomenon which led ships to seek other ports. They also anticipated that the "recent introduction of screw colliers is calculated to effect a great change in the coal trade"[4] and propounded the view "that by far the safest as well as the most advantageous course is to seek extension in a southern direction,"[5] providing the new dock with two sets of gates leading into the protected harbour. One of the advantages of their proposals would be that the new facilities could be built without affecting the existing traffic. The operation of the Londonderry quarries at Penshaw, and the railway from them, would reduce costs to an estimated £76,500.

John Murray, from Sunderland, also submitted a report. In contrast, he suggested only that the existing piers be lengthened to give a greater harbour area but be also proposed, in contrast to Stevensons, that the principal development should be to the north where a four-acre tidal harbour and a five-acre dock could be provided. Adopting principles used at Hartlepool, he suggested that sluicing of the dock entrance be adopted with, if necessary, the opening up of the adjoining Daldon Dean "and thus permit the tidal water to flow up it to some extent, which, if retained and aided by the waters of the brook would give additional scouring power;"[6] his proposals would cost £68,000.

The third of the engineers to report at this time was Brooks who put forward proposals for extensions to both north and south. The scale of the works was somewhat greater than had been the proposals of Stevenson and Murray. Brooks envisaged a north dock of 18 acres, with a seven acre harbour, having two 60 ft entrances; the dock would be 1,400 ft long and would cost £180,466. Conversely, if a dock were to be formed to the south it could be 23 acres in extent and would cost, if built as an addition, a further £142,357. Flatteringly, but perhaps erroneously,

Brooks concluded his report by noting that "the creation of Seaham Harbour is a noble instance of private enterprise...(and it) need fear no competition from the neighbouring dock at Sunderland where the charges must be higher than will be necessary to be levied at Seaham."[7]

The three reports were duly considered by Elliot who in turn commented on them to Lady Londonderry. His views were confined only to engineering matters, not " the Propriety of the Outlay in a commercial point of View".[8] He was somewhat dismissive of the Stevensons' proposals, mistrusting both the cost and the benefits; Murray, he thought, had underestimated the finances available and had envisaged too little depth of water; Brooks's scheme he thought expensive but satisfactory, in that it embraced deep-water access and docks. The views of Lady Londonderry are not recorded but subsequently Brooks's report was sent to Stevensons for their comments. Surprised by the extent of the scheme put forward, the Stevensons noted that they did not envisage any

> such outlay on a Private Harbour but if your Ladyship is still desirous to have our material views on a scheme embracing a depth of not less than 9 or 10 ft we shall be glad to have the honour of considering the subject in that light and submitting our opinion thereon. 9

They were more than doubtful as to the expediency of providing such a depth of water - Sunderland had only some four to six feet at low water and the Tyne 6½ ft - and questioned the expenditure of £¼m on a private enterprise. Considering the matter further they recommended that the expansion of the port should be limited and suggested only the formation of a 4½ acre dock to accommodate 11 ships together with a 1½ acre tidal harbour, both of them to the south of the port. If completed as a single contract - some criticism of past practice is here implied - the work would be completed within two years at a cost of £66,000.

The differing opinions led to Robert Stephenson being consulted. His conclusions were unlike those of his colleagues, whose reports he had perused. He reported that during his short visit to Seaham "several hundred vessels passed the Harbour...of which I was informed a large number

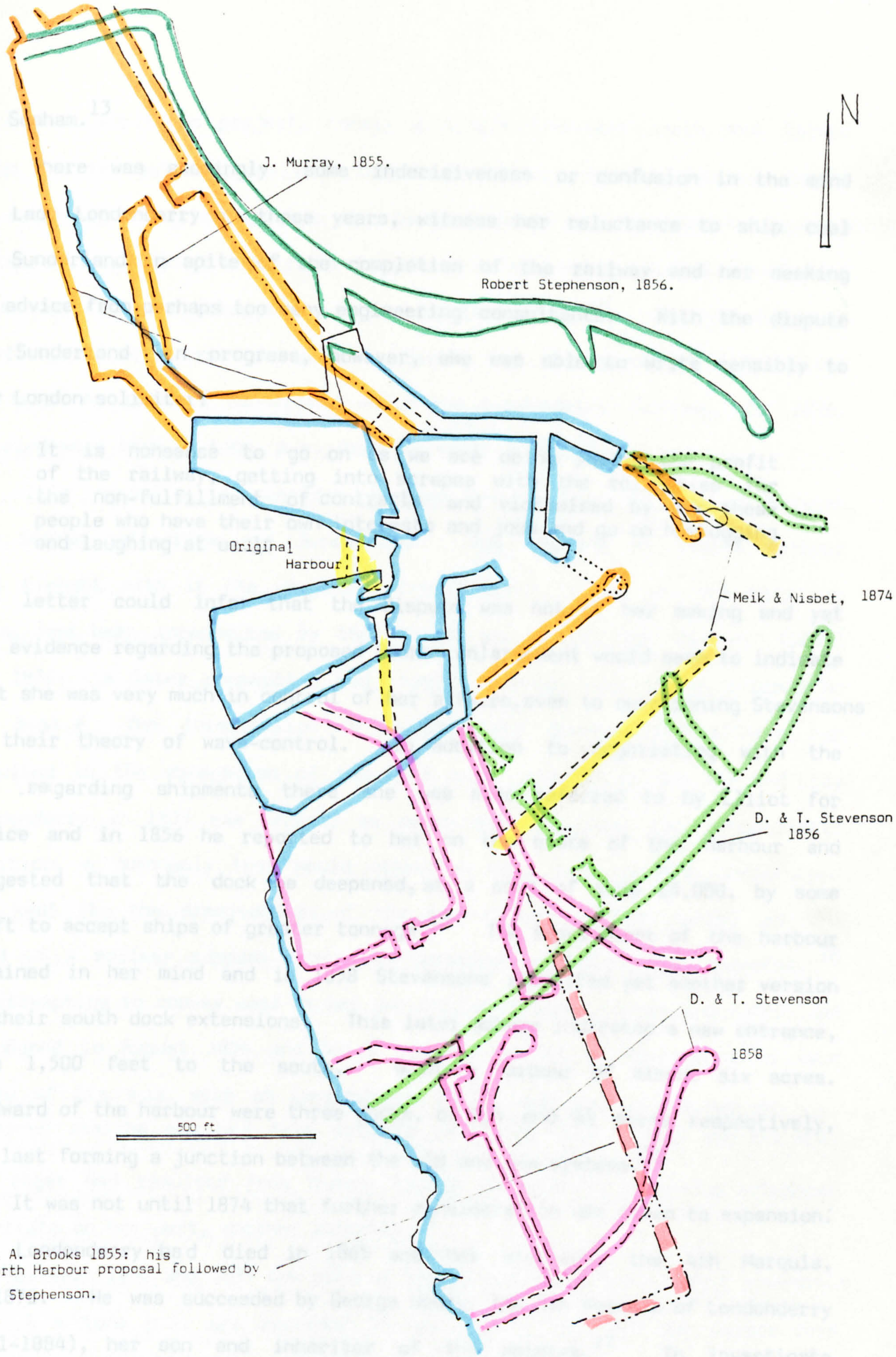
would have made it, if practicable, while at the same time the docks were full of loaded vessels, none of which could put to sea."[10] To him, the answer was obvious; provide an entirely new entrance, additional accommodation for shipping and a method of construction whereby traffic would not be impeded. His solution was to build a new dock to the north of the port and he recommended that it should be not less than ten acres in extent with an outer harbour of six acres. The new harbour would be entirely separate from the old, the only connection being a 65' wide waterway between the two docks. His works would cost £130,000.

Still indecisive, Lady Londonderry sent Stephenson's report to the Stevensons. They were critical of it, especially his methods of wave suppression, and considered that a five foot depth of water would be sufficient. They pointed out that the requirements of Seaham were different from those of the Tyne and Wear as it was dependent upon only one trade, the export of coal. They suggested that the north dock would be unsuitable and instead put forward a 7¾ acre dock to the south with berths for screw colliers and a 4¼ acre basin for light vessels, to be made into a dock later if needed. Still unhappy as to the costs involved, they concurred

> in Mr. Stephenson's views as to the heavy responsibilty of recommending so bold an undertaking, for although we were not restricted as to the amount of estimate, still we understand it is to be your Ladyship's desire not to embark on too large or doubtful a project as such a course seemed more suited for a public company than for private enterprise.11

It was presumably the final comment from the Stevensons which brought to Lady Londonderry the realisation that port improvements at Seaham would incur too high an expense for the economical shipment of coal by larger vessels; it would be better to reach agreement with the SDC and ship more coal there.* Following this policy, shipments from Sunderland were increased rapidly from 71,000 tons in 1855[12] to 133,000 two years later and to c ¼m tons in 1863. In this later year 295,000 tons of coal were shipped

* Between 1852 and 1856 Londonderry coal was shipped at three outlets: Sunderland dock, 62,000 - 69,000; Tyne, 30,000 - 62,000; Seaham Harbour, 304,000 - 373,000 tons p.a. Shipments totalled 503,000 tons in 1852 and 432,500 tons in 1856.



Map 23: Seaham Harbour Proposals.1855-1874

at Seaham.[13]

There was seemingly some indecisiveness or confusion in the mind of Lady Londonderry in these years, witness her reluctance to ship coal at Sunderland in spite of the completion of the railway and her seeking of advice from perhaps too many engineering consultants. With the dispute at Sunderland in progress, however, she was able to write sensibly to her London solicitor:

> It is nonsense to go on as we are doing losing the profit of the railway, getting into scrapes with the collieries for the non-fulfillment of contracts and victimised by all these people who have their own interests and jobs and go on humbugging and laughing at us.14

The letter could infer that the dispute was not of her making and yet the evidence regarding the proposed Seaham enlargement would seem to indicate that she was very much in control of her affairs, even to questioning Stevensons on their theory of wave-control. In addition to negotiating with the SDC regarding shipments there she was also referred to by Elliot for advice and in 1856 he reported to her on the state of the harbour and suggested that the dock be deepened, at a cost of some £4,000, by some 2½ ft to accept ships of greater tonnage.[15] The improvement of the harbour remained in her mind and in 1858 Stevensons submitted yet another version of their south dock extensions. This later scheme indicated a new entrance, some 1,500 feet to the south, with a harbour of almost six acres. Landward of the harbour were three docks, of 8,4 and 4½ acres respectively, the last forming a junction between the old and new systems.[16]

It was not until 1874 that further consideration was given to expansion: Lady Londonderry had died in 1865 and her step-son, the 4th Marquis, in 1872. He was succeeded by George Henry, the 5th Marquis of Londonderry (1821-1884), her son and inheritor of the estates.[17] To investigate the port's potential the engineers Meik and Nisbet,# involved on the Wear and at Blyth, were consulted. All earlier schemes for improvement were laid before them; all were rejected. In their place was suggested a

William David Nisbet (1837-1897)

much less ambitious project, namely a single five-acre south dock formed from the two existing small enclosures,* with a protected harbour formed by extending the existing north pier by some 400 ft and providing a corresponding detached south pier 800 ft in length. A deep-water channel would lead from the entrance between the piers to the docks.[18] As had happened earlier, no work was undertaken at Seaham but increased colliery output was taken by rail to Sunderland where the Londonderry Railway, by 1876, carried more than 1m tons, p.a. into the south docks.[19]

Itis apposite to consider further the railway commuication between the Seaham collieries and Sunderland. The opening of Seaham Harbour had brought with it the waggonway from Rainton to the sea and this, in turn, had been intersected by the Durham and Sunderland Railway (D&SR) in 1836; a later connection had enabled Rainton coal to be shipped on the Wear.# The intervention of Hudson into Sunderland's affairs had resulted in the absorbtion of the D&SR into, eventually, the NER and Lady Londonderry in 1857 saw herself as being able to break its monopolistic position, a "monopoly that would otherwise have been created, undisturbed and kept (to the disadvantage of the coal-owners of the north) in the hand of a railway company every day becoming more alarmingly powerful."[20] By attempting to convey coal by her own railway between Seaham and Sunderland - opened in August 1854 and built without an Act of Parliament as four miles of its six were on Londonderry land[21] - and load it via her own reserved staiths she had felt able to challenge both Hudson and the NER. Her anger had resulted from Hudson having accused her of having attempted to create, on her part, another monopoly.

Between 1854 and 1885 the port of Seaham stagnated and although shipments of c ¾ m tons p.a. are recorded in the 1850s, they did not exceed this figure by 1885 and, in fact, for several years in the 1870s they were less than ½ m tons. Virtually no capital had been injected into the

* The original docks were 2 and 2½ acres in extent.
# In 1852, 83,000 tons of coal was so routed.

harbour the only item of work undertaken being a short spur breakwater, perhaps the start of a new north pier, its building seemingly unrecorded.[22] The neglect is due to several reasons: the building of the Londonderry Railway in 1854, its subsequent improvement leading to increased shipments at Sunderland rather than at Seaham; the death of Lady Londonderry in 1865 and an apparent lack of interest, or perhaps available capital, on the part of the 5th Marquis; and the rapid increase in the use of steam ships, their tonnages rising at a rate whereby any port improvement would need to be substantial to be worthwhile. The doubts of the Stevensons were justified: such capital as was required could be obtained only from public sources.

6.8 Warkworth Harbour, Amble.

In 1854 coal was shipped from Amble at a rate of 78,000 tons p.a., the harbour then having been in operation for ten years. Its finances had been very closely interlinked with those of Radcliffe colliery and in 1854 the colliery again changed owners,coming under the control of John and Joseph Harrison, of Newcastle. John Harrison was appointed to the Warkworth Harbour Commission (WHC) in April 1855[1] although as recently as a month earlier he had been in contact with the Sunderland Dock Company regarding arrangements for Warkworth coal to be shipped at Sunderland, spouts being provided there by the dock company,[2] an arrangement which can only have been due to a wish to ship into larger colliers than could use Amble or to the lack of shipping facilities there. Harrison immediately requested the WHC to provide a new berth, a piled quay 300 ft long, but the commission was reluctant to undertake the work due to lack of funds; Robert Ladbroke - the holder of the major debenture - however, was able to offer £600 for the work to proceed, a sum later increased to £870.[3]

In 1856 the Blyth and Tyne Railway sought to obtain powers for a branch line between Bedlington and Amble, the railway approaching from the south and connecting with the existing river staiths.[4] The following

year Harrison, conscious of the need for a dock, produced to the WHC a plan and estimate "prepared by Messrs John Green of Newcastle, Architect and T.W. Bell, Civil Engineer for making a Dock behind the South Jetty and present shipping staiths at an expense of £17,798."[5] The WHC agreed to implement the scheme if finance were made available. The report produced by John Green (1787-1852) suggested that the dock should be at the extremity of the NER branch and noted that the termini of both colliery railways, Radcliffe and Broomhill, were located there. The dock would be 4¼ acres in extent, would hold 50 ships of up to 400 ton capacity and would provide a depth of water of 20 ft at high tide. Due to the fact that the dock would be built in an area predominantly of rock, Green suggested that dock walls would not be required "on about two thirds of the circumference of the dock "[6], so reducing its cost, while in addition the excavated material could be used to reclaim some 12 acres of the south foreshore. An additional dock of 2½ acres could be formed in the quarry site to seaward and connected by canal with the larger work. No construction operations followed.

The following year the commissioners noted that a Parliamentary Committee was then considering the question of Harbours of Refuge and it was agreed that representation be made concerning the feasibility of such a provision at Coquet Island, a harbour which would have the advantage of being built by public funds but at the same time rendering more favourable the river at Amble. The WHC presented a memorial, noting that several smaller harbours on the north-east coast would be better than a single large refuge. At the same time and as part of the scheme, proposals were made to extend by 900 feet the north pier , a move partly made necessary by the fact that its seaward end was deteriorating badly and had been inspected by James Leslie, involved earlier.[7] The south pier, too, suffered damage but such was the lack of money that only minor repairs were put in hand.

By 1860 the quantity of coal shipped totalled 88,000 tons, generating

revenue of £1,022 from port dues and £376 from staith rents. Against this small income was set £825 as loan interest and £171 as salaries, the former sum providing a negligible return on the £184,800 borrowed for the construction of the harbour.[8] Although the low throughput of the port could be partly explained by a colliery qutput lower than anticipated, nevertheless it was also due to some inadequacies, borne out by a memorial prepared by shipowners. They complained of a lack of water at the staiths, especially those of the Radcliffe colliery, and a committee was formed to investigate, Harrison amongst its members. The committee suggested that new berths for loading should be provided between the gears of the two collieries at a cost of some £3,000 and recouped by the levy of an additional ½d on dues, bringing to the WHC an increase of £105 p.a., if based on 1858 shipments. It was noted that "if such facilities were made the existing collieries would be enabled to ship the whole of their produce at the harbour."[9] Without funds, the commissioners again approached Ladbroke, thinking of abandoning the harbour, but found him unable to raise the capital necessary whereupon Browne asked the NER whether it was "disposed to purchase the harbour at Warkworth which he (thought) may be had at present for £15,000,"[10] an offer which the NER refused immediately. Meanwhile further attempts were made to improve facilities, Harrison in 1862 producing plans for a new quay and, the following year, a new dredger was reported as being at work.

Harrison, from 1863 Treasurer to the WHC, died in 1866 being then credited as having "accomplished great things as regarded improvements"[11] at Amble*. Some doubts exist as to the port's financial arrangements. It is recorded that the harbour debentures had been sold - the date is not known - for £8,000 to the Radcliffe colliery owners,[12] presumably Ladbroke but perhaps Harrison. In turn they were sold to Hugh Andrews in 1869, the NER having been asked by "the executors of the late James

* A Newcastle Councillor, Harrison was proposed as a member of the TIC but was not elected.

Harrison of Newcastle, if the Company will purchase their interests in the harbour at Warkworth,"[13] a request which was refused. Andrews, a Belfast merchant, became involved with the W H C in 1870 and a partner in the Broomhill colliery# the following year.[14]

The condition of the harbour, combined with improved rail transport and dock accommodation elsewhere, resulted in coal shipments falling to 42,000 tons in 1869, a trend which caused the commissioners to appoint Meik and Nesbit, consulting engineers, to put improvements in hand. Meik was appointed as a commissioner and an extensive dredging operation was later undertaken, the intention being to provide eight feet of water at low tide. In 1878 Meik had been able to report that, even then, "a great and most beneficial change has been effected in the harbour. Formerly the tidal water from the river channel leading to the harbour berths impinged on the quays"[15] and so caused their silting, but this had been obviated. The results of the harbour improvement were most marked and by 1880 the colliery companies were shipping 187,000 tons of coal. The improvement of the river's channel, at times providing 20 ft of water at the pier head, enabled ships drawing up to 16 ft of water to use the port. Improvement had been almost solely the result of dredging, 258,000 tons of material having been removed during the year*. 763 ships, 346 of them steamships registered at U.K. ports had used the harbour. Although a dock had been suggested earlier no work had ensued but nevertheless the need for some enclosed basin had continued and in 1881 Meik reported that "the Tidal Basin, or Fish Dock, in the upper part of the Harbour is nearly completed and will afford increased accommodation to the fish and general trade of the Port."[16] It was of only a small area but it, and the extension of the south quay, had brought about significant improvements.

In 1863 Warkworth harbour was reported upon by Meik, an investigation seemingly undertaken for Andrews in connection with a claim being made

The colliery, too changed hands in 1869.
* In 1877, dredging had totalled 90,000 tons.

for the establishment there of a harbour of refuge. In his report Meik referred to the two types of harbour envisaged, "a National Harbour, available at once as a Harbour of Refuge and as a Military or Strategic Harbour"[17] or the latter only. Noting that the 1859 Commission on the subject had not seriously considered Warkworth and, although piers had been built at the Tyne entrance, without Government funds, he now propounded the view that an extensive harbour, a version of the earlier proposals, could be formed so as to embrace Coquet Island. The cost would be £1.5m, or £1.25m if convict labour, housed on the island, were to be employed. Alternatively, a smaller harbour could be formed by extending the north pier and building a new south pier. With dredging and extending the existing berths, the total cost would be £120,000 for a depth of 12 ft at low water. If it were found necessary to provide a depth of 20 ft, the piers would need to be extended still further at a total cost of £180,000.

At the hearing by a Select Committee of the House of Commons, Meik again put forward his view that Warkworth should be built as a national harbour[18] but the scheme did not find universal approval and the publication Engineering, noting that the merits of Warkworth were such as to make it the best choice, nevertheless recommended "that the matter should be allowed to drop altogether".[19]

So far as Warkworth was concerned the sole result of the inquiry was that it was decided to seek Parliamentary powers for a harbour improvement. Drawings by Meik were deposited in November 1883; they showed proposals very similar to those put to the Committee,[20] a north pier extended by 960 feet and a new south pier 1380 feet in length. A Bill was duly prepared and, in addition to the proposed works, it sought additional capital in view of the fact that the harbour, "owing to the increased size of modern vessels...is insufficient to accommodate"[21] them. In spite of its being recommended to proceed to Committee stage, the Bill was withdrawn by its promoters in March 1884.[22]

In the years before 1885 the port of Amble was in scale much smaller than any in the region so far as its coal shipments were concerned, in no small measure due to its isolated geographical location and the fact that it served only a small detached coalfield. As had occurred elsewhere, coal shipments increased when capital, principally expended on dredging, was injected but Amble was an example, too, of a port which had initially failed in spite of high capital expenditure; in this case almost £200,000 had been spent by 1854 when coal shipments were averaging only some 70-80,000 tons. By 1884, shipments reached 226,000 tons, an increase of no less than 40,000 tons over the previous year.[22] The number of ships used in this trade was 691, 361 steam powered, U.K. registered and 184 U.K. registered sail; their draught was between 16 and 18 ft. The increase in shipments had a marked effect on the W H C finances. Revenue in 1884 was £5,111 and after expenses a balance of £3,840 remained, sufficient to allocate £1,400 towards quay extensions. The two collieries had by this time improved their harbour works; Radcliffe, now owned by the Radcliffe Coal Company improved its staiths and the Broomhill Coal Company sought to deepen to 10 ft at low water its berth so as to enable continuous loading to take place. On its part, the WHC had continued dredging so as to improve the shipping channel between staiths and sea. Negotiations with the NER had led to its being connected to the quay and modifications had been made regarding the working of the staiths, so enabling them to operate by gravity alone. Served by its two railways, the NER from Broomhill and the colliery line from Radcliffe, the port had trebled its throughput between 1854 and 1885; during that period it was the most rapid rate of increase in the region.

6.9 Summary

Between 1854 and 1885 the output of coal in the North-East, three quarters of it from Durham, had continued to increase steadily, although at a rate less than the figure for the United Kingdom as a whole. Compared

with the previous quarter-century the annual compound rate of increase was significantly lower, 2.8% compared with 3.25%; in addition the North-East's share of output had fallen from 24%. The annual rate of increase of

Coal Output and Shipments, 1855-1885.[1]

	1855 (000 ton)	1885 (000 ton)	1855-1885 % p.a.
U.K. output	64448	159351	3.1
N.E. output	15431	35091	2.8
NE/UK%	24	22	-
NE shipments	8271	16773	2.4
NE exports	2839	c9407	4.1
Exports %	34	56	-

shipments of coal had also fallen but the greatest change had taken place in the quantity of coal exported, increasing from 34% to 56% and reflecting the growing demand from foreign markets as industrialisation there developed. The increasing size of ships, and their better construction, made safer the exportation of coal over greater distances.

So far as the North-East was concerned the changes in coal shipments were marked. Whereas in the earlier period it had been the south Durham ports which had expanded at the expense of the Tyne and the Wear, now it was principally the Tyne which had benefited, while the share of the Wear remained almost static.

Shipments of Coal from the North East, 1855-1885[2]

	1855		1885	
	000 tons	%	000 tons	%
Tyne	3663	43	9877	59
Wear	1891	22	3981	24
Tees	298	4	126	1
Blyth	196	2	533	3
Hartlepools	1612	19	1215	7
Seaham	735	9	788	4.5
Amble	59	1	253	1.5

There were two reasons for the change. The first, and perhaps the more important, was the development of the Teesside iron industry, increasing to such magnitude that it absorbed the output of its captive collieries and brought coal to Teesside from further afield. The manufacture of 2m tons of pig-iron alone was said in 1872 to require 5 m tons of coal. The combined throughput of Hartlepool and the Tees was reduced in absolute terms but, proportionally, their decline was much more severe, falling from 23% to 8% of the North-East's shipments. The other factor was the enormous improvement which was made to the river Tyne by the Tyne Improvement Commission aided to a great extent by the building by the North Eastern Railway of its dock at Jarrow, its effect significant upon the Wear. There, the formation of the Sunderland Dock Company had arrested an earlier decline and the annual growth rate which had resulted from it had increased to 9½ % p.a. by 1860. However, coinciding with the opening of the NER's dock on the Tyne, this figure fell to only 1.2%. On the river Tyne, the increase over the 30 year period remained fairly constant, averaging 3.4%.

Coal Statistics: annual percentage increase (compound); 1855-1885.

	Dates	% Compound p.a.
Tyne	1855-1885	3.4
Wear	1855-1860	9.5) 2.5 av.
	1860-1885	1.2)
Tees	1855-1885	-3
Blyth	1855-1885	1
Hartlepool	1855-1885	-1
Seaham	1855-1885	-
Amble	1855-1885	5

The contemporary view was that by the efforts of the TIC "the Tyne (had) regained its supremacy in the North";[3] it was perhaps more due to the fact that its development occurred so much later than at other ports* and so was of greater magnitude. In the previous period the expenditure

* The Tyne's throughput of coal had never been overtaken by any of the other ports.

of capital on dock facilities at Seaham, Hartlepool, Middlesbrough and Sunderland had resulted in increased trade and likewise, on the Tyne, the building of Tyne Dock produced the same effect.

On the Tyne the NER proved successful in its developments, the TIC less so. The commissioners had been responsible for the Northumberland Dock, the river's first, serving the collieries of Northumberland via the Blyth and Tyne Railway. In its relations with both coal-owners and railway the TIC allowed itself to be persuaded that further dock accommodation was required, leading to, first, the aborted Low Lights proposal and later the Coble Dene, or Albert Edward, dock, designed to provide both import and coal-handling facilities for ships of a tonnage greater than could use the Northumberland dock. Built at a time when ship sizes were increasing to such an extent that docks were becoming less necessary, if not actually a hindrance, it is understandable that many reservations were held as to its utility. This dock's building had been, in effect, the result of blackmail on the part of the Northumberland coal owners and the TIC had submitted to the threat of losing a proportion of its trade to that port. It was not until the B&TR became part of the NER that improvements were made at Blyth - at the instigation of the NER - to accommodate the Northumberland coal trade.

South of the Tyne, the Wear was affected to an extent such that it was claimed that the NER was "attempting to kill Sunderland" [4] by shipping all its Durham coal at Jarrow. The problem on the Wear, however, predated the opening of Tyne Dock. In spite of its early success the SDC had not prospered and it had been taken over by the River Wear Commission, later accused of subsidising the dock from river revenue. The situation at Sunderland was further complicated by the proximity of Seaham and the antipathy of Lady Londonderry towards both Hudson and to the NER. It was possibly this hostility which led the NER not to develop the docks at Sunderland where the small Wearmouth dock had been in railway ownership

for many years and where the NER had a large investment in the SDC. Its reluctance to invest further was perhaps due to the fact that much coal was transported to Sunderland via the Londonderry Railway, both from Londonderry collieries and from others, some a protest at the monopoly of the NER. Had further port development at Seaham been undertaken the picture may have been different in that it would have increased its throughput, traffic on the Londonderry Railway would have declined and the NER could have exercised its near-monopoly at Sunderland.

Further south, the developments at the Hartlepools and the Tees were interlinked, a result of the formation of the West Hartlepool Harbour and Railway by Jackson and the subsequent migration of trade from the Tees. Here, events were complicated by the iron industry. A fall-off in coal shipments was more than balanced by an increased inland trade, a diversification into grain and timber importation at Hartlepool and, later, an import trade in iron ore at both Hartlepool and the Tees. It was the growing internal trade, and the need to exclude rival companies, which led the NER to take over the Stockton and Darlington Railway and the WHH&R, so tightening its grip on the economy of the North-East. By these takeovers, the NER became possessed of further docks making possible an extension of its facilities both at Hartlepool and at the Middlesbrough dock, formerly belonging to the S&DR. Although the (east) Hartlepool dock had been railway property for some time, the fall-off in coal shipped on Teesside had precluded enlargement there. Absolute control, dating from 1865, changed the railway's position in south Durham. By 1874, with the region firmly in its control the NER was able to develop its outlets at Blyth, increase its facilities on the Tyne, augment the Hartlepools and improve Middlesbrough; after 1859 the Sunderland dock had come under the control of the RWC and the NER could do little, as to ship there would deprive it of the profits from its own docks.

The combination of NER power and the rationalisation of port control brought about the greatest changes to the Tyne and Tees where river straight-

ening and deepening were undertaken with great benefits. The Tyne was improved to an extent such that Newcastle was able to put in hand extensive quay improvements and the replacement of the bridge there opened up the river above it, so permitting industry to expand and enabling the NER, later, to take further advantage of the work of the TIC. The railway company did not, however, seek to build a further dock, neither did it seek to improve the shipping points in the inadequate docks of the TIC, preferring instead to ship its coal at Blyth. On the Tees, the commissioners there undertook considerable works, improving the river to Stockton so as to enable that town, like Newcastle, to put quay works in hand. The mouths of both Tyne and Tees were protected by piers, the latter with some expediency in conjunction with the ironmasters by the use of their waste products.

Relative to these two rivers the Wear declined. The RWC extended its docks, in spite of problems experienced with the sea outlet to the south of the river's mouth, but their trade was so restricted that in 1881 the RWC considered selling them to the NER, a move later reconsidered. Like the Tyne, much of the coal shipped was loaded at privately-owned river staiths and constant improvements were made to the river berths to permit larger ships to use them.

Of the ports to the south, Seaham remained in private hands and, with the construction of the railway to Sunderland and the provision of staiths there no port modifications were undertaken, the understandable result being a complete lack of increase in the port's throughput. At Hartlepool, however, from 1865 totally in the ownership of the NER, major extensions were completed in 1880 when three new docks were formed, to link the two earlier systems. At Hartlepool, as at Sunderland, problems were experienced with the entrance to the south docks and it was Harrison who had recommended that the two systems be connected, the south entrance closed and access provided only at the north end, a dredged channel being

maintained by the port commissioners, a body much less powerful than its counterparts on the region's rivers. In spite of the diminution of coal exports, the Tees maintained a significant trade, principally in iron ore, pig iron and engineering products. To meet this trade, and to enable bigger ships to use the dock, the NER both increased its capacity and improved its entrance, work being completed in 1873.

The dock improvements undertaken in the region were paralleled by the rather more prosaic execution of dredging, universal in application and varying only in extent. On the Tyne, 70 m tons of material had been removed from the river by 1883, on the Wear in that year 1½m tons was removed while on the Tees almost 9 m tons had been dredged, 1½m tons in the past year. It was only the removal of materials on this scale which had enabled the rivers to become capable of receiving ships of increasing tonnage; it was the resultant increase in river capacity which enabled them to keep clear the entrances. Improvements to this scale had been made possible only by the continuous development of dredging equipment, some of it designed by the engineers themselves. The management of the plant was a major task; by the end of the period the Tyne employed six dredgers, 13 screw hoppers, ten tugboats and 70 hoppers, continuously employed in removing material and depositing it at sea. [5]

Throughout the period the port authorities strove to keep abreast of - or ahead of - increasing ship dimensions. Figures have already been given but, as an example, it should be noted that for the Tyne between 1854 and 1885 the average size of ship clearing the river rose from 149 to 428 tons register[6] but what was really indicative of the improvements brought by the TIC was the fact that in 1885 Armstrong could consider the building of a 10,500 ton battleship at his works above Newcastle. Although to a smaller scale the Tees and Wear had been improved proportionally. In hand with shipping had gone shipbuilding, revolutionised since 1852 when Palmer had built the John Bowes. Again, statistics have been given

but so cyclical was the trade, that is is difficult to show trends; it is perhaps enough to give Tyne and Wear, by 1885, as producing c 200,000 tons p.a., Hartlepool and the Tees perhaps half that figure. By this time Palmer's works was it its zenith, building 57,000 tons of shipping,[7] Armstrong merged with Mitchell in 1883 and Hawthorn with Leslie two years later; ships built averaged c 2,000 tons although it should be pointed out that Leslie, in 1854 had built a ship of 1,000 tons.[8]

Although this period witnessed the eclipse of men such as Hudson and Jackson, nevertheless it is impossible not to consider some of the individuals involved in the region's further development. Of the three commissions, those of the Tyne and Tees were the most progressive, both including industrialists of stature. For much of the period the chairman of the TIC was Cowen, involved in its establishment, with Stevenson one of the 'life commissioners' and later chairman also. Their task was complicated by the internal dissent amongst members, principally between the rival factions representing Newcastle and Shields, each group striving for advantage. The Newcastle members evidenced some conflict in their loyalties, commission or council, and to a certain extent they reflected the negative attitude ofen expressed in council discussions, especially in their antipathy to the NER. Dissatisfied by its monopolistic powers the council, unsuccessfully, sought competition to it and it was written that they were "a standing disgrace...as a mercantile community...(and) richly deserved to have the chains of monopoly rivetted about their necks were it not that others would suffer along with them."[9] The member most critical of his colleagues was Cail, striving always to expedite the TIC's civil engineering works and, although not specifically recorded, his views were often at variance with those of the engineers, Ure and Messent.

The Tees Conservancy Commission included amongst its members several of the men through whom the river, and especially Middlesbrough, was developed, Bolckow and Vaughan included. They sought to further the interests of Middlesbrough in opposition to Stockton but it was through their efforts

that the breakwaters came to be constructed so economically. The Pease family, its interests far-reaching, were also of great influence and, as on the Tyne, it is surprising that so much was achieved. Somewhat different was the RWC, its members not of the stature of the other two bodies. It was hampered by its size, more than double that of the others. At first in conflict with the dock company it later brought to the Wear a more professional approach, seemingly through its chairman, Laing, in office from 1868 until 1900. Its engineers, Murray and Meik, were eminent in their profession, undertaking consultancy work also, as on occasions did Messent.

Little development took place at Blyth and Seaham, in effect owned by the Ridley and Londonderry families and at the Hartlepools, following the ousting of Jackson, the NER operated the port under the guidance of Harrison, in many ways the spiritual successor of Robert Stephenson, and consulted throughout the region.

Although employing their own engineers the several port authorities found it necessary at times to seek the views of consultants: the Tyne sought the advice of Walker, Rendel and Coode; the Wear , Coode; the Tees, Bald and Rendel; Blyth, Abernethy; Seaham, the Stevensons Robert Stephenson and Murray; and Hartlepool, Coode. All of these engineers were known nationally and all contributed to the extensive developments which took place, an expansion of the region's ports through, in part, what later became known as the "great depression"[10] which lasted from 1873 until 1896. As it moved upwards from its trough of 1879 the economy, and especially that of the Tees, began to revive in response to a growing demand for steel in place of wrought iron.

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7. THE EFFECTS ON PORT DEVELOPMENT OF THE MONOPOLISTIC POSITION OF THE NORTH EASTERN RAILWAY, 1885-1914.

7.1 Introduction

In 1900 the North Eastern Railway (NER) achieved by further amalgamation, a policy pursued since its inception, a complete monopoly of public rail transport in the region, so forming the principal link* between the coal producers and the places of shipment, several of them owned by the railway company itself.

Between 1885 and 1914 coal production in the region continued its upward trend with a tendency towards larger units with higher production, the principal evidence being the development of the large coastal collieries, winning coal from under the sea, extending from north of Blyth to Horden. Their development was to lead especially to the later expansion of Blyth and Seaham Harbour. In 1889, some 100,000 men were employed in coal mining in the North-East, threequarters of them in Durham, producing one quarter of the total for England and Wales.[1] By this time collieries extended to a depth of 1,800 ft in Durham and 1,200 ft in Northumberland. Of the coal mined in the North-East in 1887, shipments to London totalled 3.74m tons, other coastal destinations 3.9m and exports 6.9m; a total of 8.7m tons was used locally or despatched from the region by rail.[2] By 1913, London[#] alone received 9m tons of coal [3] a substantial part the result of the policy of the London Gas Light and Coke Company in chartering ships to convey coal by contract to the Thames, such contracts involving as much as 100,000 tons each. Later, special vessels, "flat-irons," [4] were built to pass under the Thames bridges and, eventually, the Swing Bridge when loading at the Dunston staiths, on the Tyne.

So far as other industries were concerned, the chemical trade had contracted to an extent such that only two of the many earlier works remained in production but "marine, locomotive and general engineering (held) in conjunction with its sister trade of shipbuilding"[5] a position second

* Many private colliery lines continued to operate.
# Not all this coal was from the North-East.

only to the coal trade. In shipbuilding, the region had maintained its supremacy and, building now in steel, the rivers of the North-East in 1888 produced more than half the United Kingdom total of 903,687 tons.[6] What was to be of great significance, also, was the fact that an electrical industry had been founded on the Tyne, its pioneers Swan, Parsons and Merz, and it was their foresight which was to bring to the North-East the most effective of the nation's electricity supply undertakings, enabling power to be applied more conveniently to the ports' coal handling appliances.

Although by 1885 extensive, the NER suffered competition from one railway, the Londonderry, running between Seaham and Sunderland. Its aquisition in 1900, together with its extension southwards, enabled the NER to increase coal shipments at Hartlepool, in the same way that its purchase of the Blyth and Tyne Railway had opened the way to the development of Blyth. The NER, unlike others, remained predominantly a mineral railway and between 1885 and 1914 minerals contributed some 60% of the company's revenue;[7] some three quarters of this traffic was in coal and coke.[8] To meet the demands of the coal trade the railway network had been increased from 720 route miles in 1854, to 1,278 in 1870 and to 1,730 in 1913, by which time it carried annually 54m tons of minerals.[9]

Greatly dependent upon the iron and steel industry the NER had been affected by the 'Great Depression' but, from 1885 it began an economic climb out of it, a result of the change from iron to steel-making which had then but recently been made. The recession in the industry had led to the adoption in 1881 of the "Cleveland Sliding Scale"[10] whereby rail charges became dependent upon prices ruling in the iron and steel industry and other bodies sought agreements similar to that involving the steel manufacturers. Links between the railway and ironmasters were strengthened with research, financed by the NER at the instigation of Isaac Lowthian Bell, into freeing Cleveland ores from phosphorus so as to compete with the Cumberland haematite.[11]

To meet the demands of the coal-owners and of the NER, port expansion continued, albeit different in character. By 1885, except for Blyth and Seaham, the initiative of the port authorities had largely been subsumed by the NER. The earlier, major, developments had been either completed or were in progress and the era of dock construction had ended, in effect, with the opening of the Albert Edward dock in that year; subsequent development was to be principally at the behest of the railway company. The period witnessed also two final changes in port ownership, at Blyth and Seaham. They were the first since mid-century and brought all ports other than Hartlepool and Seaham into public ownership.*

In an attempt to assess the relationships between the ports and the NER it is instructive to compare their relative sizes. Of the ports, revenue in the early years of the 20th century amounted, approximately, to £480,000 for the Tyne, £150,000 for the Wear, £70,000 at Blyth and £130,000 for the Tees, in all less than £1m. In contrast, the NER, with some 50,000 staff, enjoyed revenues of c £10m p.a. and Tyne Dock alone was credited as generating revenue approaching £½m p.a. and Dunston of almost £200,000, figures including haulage.[12] The strength of the NER was evident, too, in its general manager, George Stegman Gibb (1850-1925), appointed in 1891 as successor to Henry Tennent (1823-1910), who, in turn, had followed Harrison. Under Gibb, management was reformed and it is understandable that the railway came to dominate the region's ports and affect so markedly their future development.

7.2 River Tyne

With the completion of the Swing bridge in 1876 and the Albert Edward dock in 1884 the Tyne Improvement Commission (TIC) was able to concentrate its efforts on the improvement of the river above Newcastle and the completion of the piers. Dredging of the upper river had been undertaken on a large scale immediately the bridge could be opened to permit dredgers to pass up-river; it was a move long-awaited by those with riverside interests.

* Hartlepool was administered jointly by the NER and the port commissioners; Seaham was operated by a limited company.

In 1860, Ure, engineer to the TIC, had suggested that from Newcastle to the limit of the commissioners' jurisdiction a depth of some ten feet at low water should be made available while the river itself should be shortened and straightened by means of two cuts. As the river's development had continued it had been decided that the depth should be increased to 15 ft but, naturally, this move had involved a greater expense, so much so that the improvements above bridge had already cost twice Ure's original estimate but in 1890 still required a further £163,000; some £400,000 had been expended upon it.[1]

By 1885 a depth of 22 ft had been provided to Newcastle and 18 to Armstrong's works at Elswick, enabling the 10,500 ton H.M.S. Victoria to be launched there in 1887; up-river, deepening continued. Shortening of the river, to a scale smaller than originally envisaged, had been undertaken only at Blaydon Haugh. These improvements were thought by several industrialists to be insufficient and in 1890 they presented a petition to the TIC to that effect.[2] Led by Joseph Cowen Jnr., they sought further deepening of the river to give 23 ft at high water, principally for the benefit of the owners of staiths on that section of the river, so enabling them to compete with the NER, then providing a new outlet for its coal traffic on the deepened river opposite Elswick. A further move towards opening up the river was made in 1886 when the West Durham and Tyne Railway was promoted with the intention of shipping gas coal from west Durham through new staiths at Dunston, so avoiding the complicated and expensive rail journey to Tyne Dock.[3] Opposed by the TIC, the subsequent Bill was rejected by the House of Lords, but on the understanding that the NER would itself promote a similar Bill. The NER duly prepared plans for a rail link to a three-berth staith and, having received Parliamentary assent, work was completed in 1893, following which within a year, the shipment of coal from Dunston increased from 20,000 to 130,000 tons per month.[4]

Further moves to attract industry to the upper reaches of the river were made when the Newburn Bridge Company, the Duke of Northumberland indirectly involved in its promotion, sought powers for a new bridge, completed in 1893. At the time of its promotion in 1886 it was recorded that large tracts of ducal land at Newburn could be developed and, at the same time, attention was drawn to "the extraordinary collapse of the alkali trade in Tyneside and its probable removal to the Tees",[5] an event which could provide further sites for riverside industry. Consideration of the upper river's future led the TIC to investigate the matter fully and it was reported in 1892 that dredging and other works above Newcastle should "be gradually carried out to completion,"[6] a decision reflecting perhaps the concern of the TIC regarding further expansion at a time of depression in trade.

As noted, the Tyne piers were, in relative terms, approaching completion in 1885. Cranes had been built to place more easily the much bigger concrete blocks, now 45 tons, used in the construction of the seaward ends of the piers and in 1887 Messent, successor to Ure, reported to the commissioners his proposals for terminating the piers, a matter of some earlier discussion. Originally they were to finish in 13 ft of water but Walker had recommended that this depth be increased to 36 ft, later reduced to 30 ft. Walker had also proposed an opening of 1,100 ft between the pier heads and Coode, reporting in 1884, had suggested 1,200 ft. Messent now drew attention to the fact that the dredging of the river had increased its tidal capacity and hence the flow between the piers, resulting in his recommendation that 1,300 ft be adopted.[7] Agreed to by the commissioners the piers were extended a further 159 and 137 ft, the rubble mound foundation being partly of ironworks slag from Teesside.[8] Violent storms in 1893 and 1894 washed the cranes into the sea and severely damaged the north pier, although its construction later continued and the roundheads of both piers, and their lighthouses, were completed in 1895.[9]

The steady rise in the tonnage of coal shipped from Tyne Dock led the NER in 1890 to improve facilities there, the directors reporting that "an additional jetty is being constructed...(and) a new and deeper entrance"[10] was being planned. The new staiths were operational by July 1891 but it was not until 1894 that the new entrance was completed. Improvement at Jarrow had cost £130,000, compared with the £210,000 spent at Dunston.[11] The new 70 ft entrance, its gates hydraulic, provided at high water a minimum depth of 27 ft over the sill.

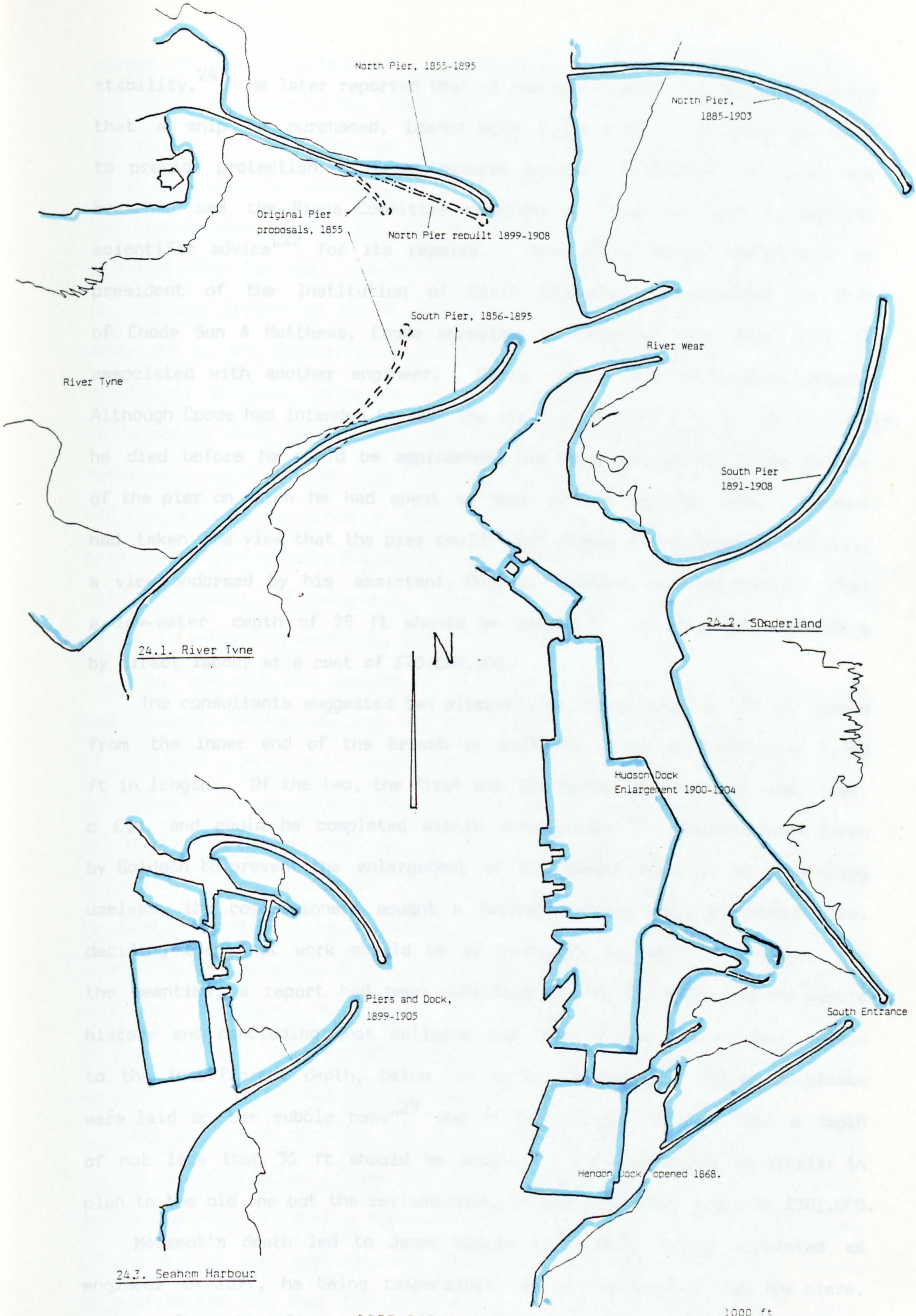
The improvements, noted earlier, made to the river had caused Newcastle Corporation to extend its quayside facilities and to permit the building, by private capital, of warehouses. Between 1866 and 1879 some 3,300 ft of quay wall had been built at a cost of c £¼m but in 1886 a slip occurred in an older section, leading to Messent and William George Laws, city engineer, producing a joint report upon its rebuilding. They noted that some 1,200 ft remained unimproved and they strongly recommended that it be rebuilt to give a minimum depth of water of 18 ft. They were doubtful as the efficacy of the last-completed mode of construction, noting that cast iron caissons were costly, and they recommended the sinking of "monolithic concrete blocks of large size",[12] the total cost of which would be £60,900. Naturally, the debate in Council brought to light conflicting views, the opinion being expressed that expenditure on the quay had been of doubtful value while the opposite view was that the quay, and its grain warehouse, had been such a success that the TIC works had been quoted "as an argument in favour of the Manchester Canal."[13] Nevertheless, figures given during the debate claimed that the Quay brought to the town revenue of only £8,000 p.a. on its £¼m cost., a gross return of only 3%. Unwilling to spend the total sought, the Corporation sanctioned only £8,000, although between 1888 and 1893 some 300 ft of quay wall was replaced at a cost of some £18,000.[14]

The debate concerning the quayside led to further recrimination,

the wisdom of the grain warehouse's having been built becoming the subject of discussion. It was claimed that £84,000 had been invested in it but the shareholders had received a return, in total, of only 10% on their investment, while Newcastle had received £9,955 in rents and £9,220 in additional dues. The NER had given consideration to purchasing the warehouse, a move abhorent to the Council, to be deprived of £2,000 p.a. should the railway company close the warehouse and concentrate its trade at Jarrow.[15] The TIC was also criticised for its expenditure of £1m on the Albert Edward dock, worked at a loss, but the commissioners were defended by Cail, who stated that "the work of the Commissioners, together with the railways, had had more to do with making Newcastle prosperous than any other thing".[16] The Corporation was critical, too, of the NER, principally of the fact that its dues were such as to encourage the use of Tyne Dock, and even to make it economical for coal to be shipped at ports other than Newcastle, a result of the NER's efforts to arrange "equal privileges...to all shippers at any port on the north-east coast."[17] A deputation later met directors of the NER to discuss Newcastle's problems, principally the falling import trade. Such would appear to have been the lack of sympathy on the part of the NER that Stephenson, later TIC chairman, expressed the view that another railway to Newcastle was required to break its monopoly and when such a line, from Manchester, was proposed the Corporation petitioned in favour of it.[18] The policy of the NER in appointing directors was also questioned although its success was in no small part due to them, their interests bound to it. In 1890 its board included Sir Joseph Pease, Sir Isaac Lowthian Bell, Viscount Ridley, Earl Grey, Sir David Dale - of the Consett Iron Company - and Sir William Gray, of Hartlepool,[19] causing one of the Newcastle councillors to comment that only "a country man or somebody interested in some great industry in the County of Durham"[20] was likely to be considered. There appears, at this time, to have been little ill-feeling between TIC and NER.

Within the TIC, however, animosity was still apparent, principally a result of the lack of success of the Albert Edward dock, in 1886 exporting only 87,000tons of coal compared with the 1.79m tons from the Northumberland[21] and the c 5 m from the Tyne dock. Fears were expressed regarding competition from Blyth, Yorkshire and South Wales and it was noted by Shields members that Newcastle appeared to have benefited most from the endeavours of the TIC. In spite of dissatisfaction the commissioners decided to build further staiths at Whitehill Point, between their two docks, at the same time removing the projection into the river, said to be dangerous to shipping. As had happened earlier the question of undertaking the work by contract or direct labour was raised. Cail, as a contractor himself, favoured the former method but the decision was made to carry out the works by direct labour. During construction the wisdom of undertaking the work at all was questioned several times, principally on the grounds of the lack of use of the Albert Edward dock and the fact that the new staiths wereto be used only by the Backworth collieries, bringing little revenue to the TIC. The staiths were begun in 1888 and completed in 1891.[22] Shipments of coal from the TIC staiths in 1892 comprised 1.765m tons from the Northumberland dock, 273,000 tons from the Albert Edward and 349,000 tons from Whitehill Point, but the commissioners, and other interests, still considered that the NER was controlling trade to an extent greater than was desirable, especially as the Dunston staiths would soon come with use. In fact, their commissioning brought about a great increase in river traffic, to the extent that the Swing Bridge, earlier looked upon as an ill-advised investment, brought an increasing revenue to the TIC; in 1894, 1.289 m tons of coal was shipped from Dunston in 1,037 vessels.[23]

In 1896, the problems regarding docks were over-shadowed by the discovery of the extent of the damage incurred by the north pier during earlier storms, Messent reporting that another violent storm would endanger its



Map 24: Protective Piers, 1855-1908

stability.[24] He later reported that it had been undermined and recommended that a ship be purchased, loaded with 1,800 tons of concrete and sunk to provide protection. These measures proved ineffective, the pier was breached and the Piers Committee resolved to "seek the best independent scientific advice"[25] for its repairs. John Wolfe Barry (1836-1918) as president of the Institution of Civil Engineers, recommended the firm of Coode Son & Matthews, Coode agreeing to undertake the work only if associated with another engineer. Barry himself was the eventual choice. Although Coode had intended to seek the views of Messent this proved impossible; he died before he could be approached, his death attributed to the failure of the pier on which he had spent so much of his working life. Messent had taken the view that the pier could, with deeper foundations, be rebuilt, a view endorsed by his assistant, Charles Goldson, who recommended that a low-water depth of 28 ft should be sought.[27] He envisaged rebuilding by direct labour at a cost of £70-£80,000.

The consultants suggested two alternatives, rebuilding a 750 ft length from the inner end of the breach or building a new straight pier 1,500 ft in length. Of the two, the first was preferred as it would cost less, c £¼m, and could be completed within three years.[28] Measures were taken by Goldson to prevent the enlargement of the breach but, on their proving useless, the commissioners sought a further meeting with the consultants, deciding then that work should be by contract, to Barry's designs. In the meantime, a report had been submitted to the TIC, outlining the pier's history and concluding that collapse was "due to one cause only, viz:- to the insufficient depth, below low water, at which the foundation blocks were laid on the rubble base"[29] and it propounded the view that a depth of not less than 35 ft should be sought. The pier would be similar in plan to the old one but the revised cost, it was suggested, would be £302,000.

Messent's death led to James Walker (1853-1910) being appointed as engineer in 1897, he being responsible for all work other than the piers, matters concerning which were not resolved without difficulty. It was

agreed to seek a further Act of Parliament to enable the works to proceed and Utrick Alexander Ritson (1842-1932), another former contractor, assumed the mantle of Cail, who had died in 1893, in pressing for reconstruction to be undertaken by contract. In discussion, it was stated that £37,000 had already been spent on the necessary repairs but John Lawson, of Tynemouth, proposed that the pier should be built to a new line, within the old, so enabling protection to be obtained, a sensible suggestion.[30] Problems arose due to the inability of the commissioners to appreciate contractual procedure, pressing Barry to provide a specification for the work but anticipating that supervision would be undertaken by others. Barry, naturally, would not do this, neither would he state his terms until the TIC had resolved the matter of supervision. The niceties of the situation were appreciated only by Ritson and Stephenson and it was at their instigation, with John Lucas, of Gateshead, that it was finally agreed, by 13 votes to 10, to rebuild by contract, under the direction of Barry.[31]

The contract was awarded to Sir John Jackson Ltd. and, again, the commissioners became involved in an immediate dispute, seeking sureties of £10,000, a move with which Jackson, as a reputable contractor, could not agree. He maintained his position and the TIC thereupon agreed to retain £10,000 until that sum had been expended on the works, a procedure to which Jackson assented.[32] Jackson's tender for the pier amounted to £404,950 and work began during 1899, continuing until 1908, seemingly without major mishap but at a slightly higher cost, c £450,000. Additional work was undertaken by Jackson, the repairing of both the inner length of the north pier and the south, damaged in 1898. Further repairs became necessary in 1909 and all work was completed by 1915.[33]

The Act which provided for the rebuilding of the pier included also for the reconstitution of the commission itself. In the Act[34] of 1886, Jarrow had been granted a representative but it was not until 1897 that it was put to the commissioners that the upper-river interests should be represented and that the large-scale cuttings should be made.[35] Some

months later, representation again was discussed, the result of a Bill introduced "by certain dues payers in Newcastle"[36] to make municipal representation a minority by the appointment of six additional members elected by the payers of dues. Stephenson, to become chairman in 1900 following the retirement of Stevenson, strongly maintained that Newcastle must remain adequately represented, the town and its mercantile interests having "spent some millions in improving their quays."[37] A meeting was subsequently held with the promoters of the Bill, Lucas stating that the payers of dues were already adequately represented by the municipal members. Nevertheless, the TIC agreed to increase representation by one member for each class but the Act, when passed, provided powers for each class to increase from two to five.[38]

Although the rate of change on the Tyne had slackened considerably, improvements were undertaken by bodies other than the TIC. In 1901 the Redheugh bridge[39] was replaced due to its having become unsafe and in 1898 the NER sought powers to build a new river crossing,[40] what was to become the King Edward bridge, completed in 1906. In 1901 a proposal was made for a transporter bridge between North and South Shields,[41] the span of 850 ft and headroom of 200 ft providing unimpeded navigation on the river; regardless of this fact, its construction was successfully opposed by the commissioners. Such had been the success of the Dunston staiths that in 1898 the NER sought powers to duplicate them,[42] at the same time forming a 9-acre tidal basin for the retention of shipping, a move to which the commissioners were not averse and in 1898 the Consett Iron Company sought to build staiths at Derwenthaugh, by 1900 brought into operation. The Dunston extension was commissioned in 1903, having cost £165,000.

The TIC remained concerned about its docks and coaling facilities, giving consideration to deepening the Northumberland dock and dispensing with its gates. Reporting in 1899 Walker commended this scheme as permitting ships "to approach and leave the Staiths and Dock at all states of the tide"[43] rather than at restricted periods. He later developed his plans

further, putting forward a suggestion that river staiths should be built by the commissioners, so eliminating docking problems and permitting ships of up to 600 ft long to load. In 1901 the TIC decided not to undertake any further dock works but to concentrate on its river staiths. Much discussion and research then took place into two aspects of their operation, anti-breakage measures and the ability to handle the much larger waggons, up to 23 tons gross, recently introduced by the NER.* Modifications to all five staiths at Whitehill Point were put in hand, provision being made for hydraulic hoists, spouts and travelling-band conveyors, the last-named for use only when tides were of such a height as to preclude normal loading. This work was completed in 1907.[44]

Such had been the success of the two up-river staiths - in 1907 Dunston shipped 3.24 m tons and Derwenthaugh 442,000 tons - that the NER in 1908 put forward a proposal for a further staith at Derwenthaugh, Walker intending then to provide an 18 ft channel to that point and to dredge a berth 25 ft deep. The move was later opposed by the TIC, concerned as to encroachments, but in 1911 the Consett Iron Company sought to extend its staiths while the NER approached the TIC regarding staiths at West Dunston, sanctioned in its 1909 Act; six spouts were to be provided with berths 25 ft deep.[45] The town of Newcastle had, in that later period, undertaken both repairs and extensions to its quay, the former beginning in 1895,[46] while in 1898 Stephenson, as chairman of the town's finance committee, put forward a report which sought c £¼m for improvement; the expenditure would be phased.[47] The report led to long and involved discussion in Council, impossible to detail here, and the matter was resolved only in 1902 when it was decided not to proceed with further extensions. In 1905, however, the matter was revived although it was noted at the time that the quay revenue was insecure and the Grain Warehousing Company, of which Stephenson was a director, had been forced to write down its capital from £71,690 to £35,845.[48] In spite of this, a decision was made in 1906 to extend

* The 23 ton waggons did not find universal approval, the TIC taking the view that the NER was attempting to impose its policy by force and was in a position to divert coal traffic to its own docks.

the quay eastwards from the Ouseburn and Cyril Kirkpatrick (1872-1957), successor to Laws, envisaged building a length of 360 ft for c £60,000. The Corporation agreed to his proposals, and also to a suggestion to build storage sheds, and the TIC was approached regarding the work. Like the earlier quay it was to be formed of concrete monoliths some 40 ft in depth topped with an ashlar-faced concrete wall; now to be 445 ft in length the wall's foundations were to be 36 ft below low water.[49] By 1911 the Corporation had completed the works sanctioned by its 1904 Act, £185,000 having been spent on rebuilding quay walls, providing railway tracks, extending the quay eastwards, building sheds and providing electric cranes. Interest charges were given as £9,000 p.a. but income was expected to be only £6,200 p.a. In the customary debate it was pointed out, in defence, that Newcastle had suffered under the NER whereas Hull, its development feared by Newcastle, was fortunate in "having three railway companies at its disposal."[50]

In spite of the earlier momentum of expansion having been lost, the Tyne, in the 30 years preceeding 1914, continued its growth. Coal shipments between 1885 and 1913 rose from 9.84m to 20.3m tons, 62% and 77% being the respective proportions of exports. In the same period the corresponding figures for the Northumberland dock were 1.417 and 1.695m tons, for the Albert Edward dock 41,000 and 835,000 tons, for Whitehill Point 385,000 and 1.813m tons.[51] On its part the NER had increased the throughput of its Tyne Dock from c 5m to 7.14 m tons while at Dunston shipments had risen to 3.042 m tons by 1913. West Dunston staiths had not begun to ship coal but Derwenthaugh was, in the same year, supplied with 425,000 tons of coal by the NER.[52]

Of the other industries on the river shipbuilding, now principally in steel, remained cyclical with output varying between 83,000 tons in 1886, a figure untypically low, to 413,000 tons in 1911.[53] The engineering industry, too, had prospered, the prime example of its success being the

works of Armstrong, from 1882 merged with Charles Mitchell and building warships at Elswick together with merchant ships at Walker. In 1895 some 12,000 men were employed by the Armstrong concerns and by 1914 this figure had increased to more than 20,000. Unlike the river's other industries, the chemical trade was in decline and in 1890 the companies still in business were merged to form the United Alkali Company, following which all but two of the works, Tennant's and Allhusen's,were closed.[54]

The TIC could look back with much satisfaction to the works it had undertaken since its formation, especially those of the earlier period. The improvements made to the river had been such that ships of 10,000 tons could reach Newcastle, and above, and the Tyne piers, completed after much travail, have been described as "an outstanding example of the adoption of converging piers with internal spending beaches"[55] to reduce wave action. The TIC had not been free from controversy, much of it from within its membership, and it is perhaps remarkable that in view of the many pressures imposed upon it, it managed to achieve so much.

7.3 River Wear.

The construction of the north, or Roker, pier at the mouth of the river Wear was officially inaugurated on 30 September 1885 when a commemorative stone was laid by the chairman of the River Wear Commission (RWC), James Laing.[1] The work of building the 2,800 ft long pier, first projected some 25 years earlier, was carried out by direct labour rather than by contract and was under the direction of Wake, since 1868 the RWC's engineer. The pier was designed to have a foundation of concrete in bags, surmounted by a substantial masonry structure, the blocks of which were to be of concrete, faced with Aberdeen granite. Preparatory work began early in 1884; tenders were sought for the crane needed for placing the 45 ton concrete blocks but, on prices proving too high, the RWC itself undertook the building of the crane. It was completed in time to lift, by hydraulic power, the concrete block placed by the chairman.

In order to clarify the narrative of this last period relating to the Wear, the construction of the Roker pier is best dealt with in its entirety as it was un-related to river or dock improvements. The pier foundation was formed by first excavating by means of a suction dredger the sand overlying the rock formation to a depth of up to 16 ft. On the base so formed were placed "long, flat 56 ton and 116 ton bags of concrete"[2] and their upper surface was levelled prior to the concrete block masonry being laid upon it. Built as two separate walls the space between the inner and outer faces was filled with concrete blocks. The seaward extremity of the pier, the round-head, was executed as Wake had envisaged it initially, by constructing a steel caïsson 101 ft long and 66 ft wide, floating it into position when partially filled with concrete and then sinking it into place using more concrete as ballast. Clad in granite-faced blocks the round-head contained some 23,000 tons of material and supported a masonry lighthouse.

The construction of the Roker pier continued steadily and uneventfully and by 1896 it had been formed to the point when a decision needed to be made as to its final completion. Wake reported to the RWC that the pier could be slightly shortened and an opening of 600 ft obtained,[3] rather than the 500 ft planned initially. This suggestion was agreed to, the design and construction of the caisson was put in hand and it was sunk into position on 2 August 1901 when Laing, with some pride, claimed it as "something new in engineering (and was) a feather in Mr. Wake's cap."[4] Final completion was achieved in 1903 when Lord Durham laid another commemorative stone on 23 September; the pier had cost £287,229.[5]

Competition from other ports in the region, where the Hartlepool extensions had been completed in 1880 and the Albert Edward dock on the Tyne in 1885, was presumably responsible for the suggestion made in 1886 that the northern part of the Hudson dock should be deepened by some five feet at a cost of £23,000.[6] This suggestion led to a further reconsideration

of this dock and it was decided to reconstruct the gates leading into its north end so as to give a width of 65 ft and a maximum depth of 27 ft. Both works were thereupon put in hand and were completed in August 1889. Consideration had already been given to improving the dock system further by converting coal drops to higher capacity spouts but such was their usage that the RWC did not feel able to suspend operations so as to permit reconstruction and the necessary deepening of the berths.

In 1888 the Traffic Committee rightly perceived that the key to reconstruction lay in No.19 berth which should be equipped with two spouts, each with a lateral movement of 20 ft.[7] At the same time a new berth 385 ft long should be formed and the resulting facilities used jointly by the NER and the Londonderry interests; the higher capacity so obtained would then permit further work to proceed. Improvement was vital as ships were being forced to complete loading in the Hendon dock due to lack of water in the Hudson; to accommodate the bigger ships using the port it was agreed also to provide greater height at the new berth. All work was completed in 1890 when the staith was used to load 5,600 tons of coal into a single ship.[8]

In 1891 the decision was made to deepen the Hudson dock over an area of 10½ acres, four of which would be 28ft and two to 26 ft., at the same time forming a goods wharf at its southern end. As the work continued modifications to coaling plant were put in hand: No.21 berth was rebuilt to give a greater elevation and the railway companies' lines were modified so as to permit either of them to discharge at any of three high-capacity staiths.[9] Concurrent with this work was the improvement of the South Outlet where a greater depth of water was provided by dredging the approach channel to a low-water depth of 14 ft over a 160 ft width.

Although the Sunderland docks were seemingly well used, nevertheless the commissioners looked to improving trade in the port. Timber imports were increasing but the grain trade was in decline. Exports were still principally coal and in 1893 dues on coal totalled £25,070 whereas on

other goods they totalled only £4,995.[10] In 1894 the commissioners looked closely into the rates imposed by other ports and noted that, with minor exceptions, the rates at all ports - Tyne, Wear, Seaham and Hartlepool - were similar.[11] In 1897 Wake, as one of the region's leading river engineers, was asked by Londonderry if he could undertake designs for the improvement of Seaham Harbour, then stagnating. Uncertain as to his reply, Wake sought the advice of the commissioners who, realistically, advised him to accept, noting that if he declined, the work would still be undertaken.[12] The fact that the works were designed by Wake did not preclude the RWC from petitioning against the resultant Bill, seeking both to form a much more substantial harbour and to form a company to control it. The RWC, which had spent considerable capital in improving facilities for the shipment of Londonderry coal, naturally was concerned by the prospective fall in revenue which would occur if Seaham expanded; additionally, it was not immediately clear how the Hendon dock could be made available to any company other than Londonderry's. The petition claimed that it was Sunderland's superior facilities which had drawn to it the Londonderry and South Hetton trade and the RWC foresaw disaster should Seaham be built, a situation similar to that of 1830. The RWC also noted the fact that the new Seaham docks would "enable the Marquis and his new Company to intercept at Seaham new traffic from time to time arising from the opening of new coal pits and the opening of new railways and other works southward of Seaham"[13] and which the RWC - perhaps disregarding Hartlepool - envisaged as being the natural perquisite of Sunderland. The RWC expressed some dismay that the proposed new dock company would later be able to embrace both coal and railway interests and, as virtually a private body, challenge the RWC. The existing situation was, in fact, no different.

The immediate reaction of the RWC to the passing of the Seaham Harbour Act[14] was to review the dock facilities at Sunderland. The Traffic Committee suggested that the Hudson dock be enlarged by setting back the east quay

wall and deepened to give 30 ft of water*, together with the reconstruction of the north gate to 70 ft width, improvements for goods handling at the warehouse and a new coaling berth and staith; the work would cost £261,697.[15] An earlier report made jointly by Wake and the general manager, Charles Henry Dodds (1835?-1921), had noted the increased tonnage of coal brought to Sunderland by the NER's Penshaw branch, a fact which precluded the use of the Hendon dock and so emphasised the need for futher facilities in the Hudson; the new jetty would be accessible from both west and south. It was this report, too, which had first suggested the dock enlargement and its deepening.[16] The work envisaged by the committee was begun in 1900 when contracts for the 8 acre dock enlargement and the entrance improvement were awarded to Sir John Jackson in the sums of £94,444 and £31,736# respectively.[17]

Work began immediately; a dredger was hired to the contractor by the RWC, a concrete cofferdam was used at the north entrance in order to reduce the space sterilised by construction work and the dock walls were built to the new line.** By 1904 Jackson had completed his work, the dock having cost £105,800 and the gate improvement £39,000,[18] whereupon the RWC immediately began the construction of the new staith, No.22. Built at a cost of c £25,000, it was brought into operation in October 1905 but the RWC was then forced to review its operations due to a falling revenue, the result of the opening, in that year, of the new harbour at Seaham. From £151,200 in 1905, revenue fell to £135,385 in 1906; the RWC had been justified in its fears.

The Hudson dock had, by 1905, been deepened to 28 ft over half its area. In spite of this phase of the work being still uncompleted Wake put forward his views concerning the further development necessary "to meet the requirements of the larger class of vessels now in use and also to enable the Port to successfully compete with the neighbouring Ports

* A depth of 27'-6" was envisaged at Seaham Harbour.
# The highest tender total was £380,000
** See Map 24

for trade".[19] He also outlined what had been achieved, not least the ability of the new staith to ship more than ¼m tons p.a. Problems with the protecting breakwaters of the South Outlet had been experienced, principally due to their age and inferior construction: the northern, built in 1852 had been breached and its flimsy construction should be strengthened; the southern, dating from 1865, had occasioned damage to its round-head which, due to wave action, had suffered from the drawing-out of the hearting.

The financial constraints placed upon the RWC had led to a review of its works. It had proved impossible to undertake simultaneously the improvement of both river and dock and, similarly, it had been found necessary to suspend for a time the construction of the south pier, outlined later. In the river, dredging was undertaken for the Lambton, Hetton and Wearmouth collieries, the costs being shared equally by commission and companies. As the river bed was of rock, deepening proved expensive but nevertheless was undertaken in 1906, following which William Simpson (1871?-1933), successor to Wake, put forward his recommendations for further river works.

Simpson noted that the tides tended to cause silting in the docks while, conversely, the progressive improvement of the river had increased its tidal range and reduced silting. In 1901 Wake had proposed a 20 ft low-water depth to the bridge, 15 ft to Ravens Wheel, 10 ft to the Tile Quay and 6 ft to Hylton.* Simpson considered Wake's proposals to be still adequate,except that the 20 ft depth should extend above bridge, to the Hetton staiths. Ironicallythis length of the river, perhaps the most critical, was the narrowest and the river there was "lined on both sides with Coal Staiths,"[20] still shipping c 2.5.m tons p.a. In the lower harbour silting amounted to ¼m tons p.a. and in the upper, 418,000 tons p.a. Simpson's concern in the river continued with his production of an extremely full report in 1910, suggesting that, in addition to enlarging the channel through the bridge, the river should be further deepened and

* Hylton is three miles upstream of the bridge.

and a swinging basin formed.[21] Deepening the river- c lm tons of material was removed each year - had the effect of causing the colliery companies to improve their shipping berths; in 1911 improvements were made to the Lambton quay where 20 ft of water was available and in 1913 the Lambton and Hetton collieries provided new staiths at the Hetton berth: it had been with much justification that Simpson was able to claim in 1910 that "the operations of the last three years have converted the River Wear as far as the Hetton Staiths into a third dock,"[22] enabling it to be used by 6,000 ton ships.

As the dock improvements had progressed the RWC had put in hand its last major work, the building of the South Pier.* In his report of 1876 Coode had put forward the idea of building an enlarged south pier as a continuation of the old one, but he had suggested as an alternative a new pier 990 ft south of the existing.[23] In 1890 Wake reported on the matter again, now giving three options: the extension of the old pier to form a 69-acre harbour at a cost of £180,000; a pier 990 ft to the south of the old one, enclosing 109 acres and costing £168,000; and a pier 1,500 feet south of the existing which would enclose 125 acres at a cost of £172,000. Wake preferred either of the second or third versions but made no firm proposal.[24] The matter was reported upon again by Coode in 1891 and he recommended firmly that the third of Wake's schemes should be built but the line of it should be slightly modified so as to give an entrance 500 ft wide, although this was a matter best left until the pier had been built to a length of 2,700 ft. Coode pressed the RWC to begin work as soon as possible as the north, or Roker pier, although protecting the river and south outlet from the north-east, was acting to its detriment with south-east winds.[25] Heeding Coode's advice the construction of the pier began in July 1891, at which time the Roker pier had been built to a length of some 2,250 ft. Both piers were built under the powers of the 1877 Act.[26]

Wake reported upon the piers in 1896, when the south had scarcely

* See Map 24

progressed and the north was almost 1,500 ft long. He now envisaged the entrance as being 600 ft wide and proposed that the south pier be amended slightly to conform and in what was perhaps a response to the damage recently incurred by the Tyne piers he suggested that the pier's width be increased from 35 to 41 ft at coping level. Construction of the pier continued from this time, the mode of operations being similar to the north pier, and by 1903 only 540 ft of its length was outstanding. Although Wake resigned from full-time employment with the RWC, his responsibility for the south pier continued and in 1908 he pressed the commissioners to expedite its completion as he considered it susceptible to damage otherwise. Although its revenue was then somewhat reduced the RWC dredged the site for the pier's roundhead in 1908 but then ordered postponement and it was not until 1912 that Simpson advocated stopping the pier at its existing length and completing its terminal point, again by caisson.[27] Work recommenced, the 60 ft diameter steel caisson was built by Doxfords shipbuilding works and in August 1914 it was ready for sinking, only for work to be "temporarily stopped owing to the outbreak of War."[28] It did not seriously resume.*

The effective completion of the piers was of vital importance to the RWC as problems were being experienced with the South Outlet where on more than one occasion heavy seas breached the protecting pier. In addition, the old piers at the river's entrance were deteriorating badly. Repairs to both defective areas were undertaken, reinforced concrete piles being used to replace the deteriorating timbers. Problems were also encountered with the many sets of lock gates, several of them old, and it is difficult to avoid the conclusion that the maintenance of the port had been allowed to lapse during Wake's tenure as engineer, understandable in view of the extent of new work undertaken, the lack of finance and the vast expense, c £550,000, of the new piers. The problems concerning the South Outlet did not induce the RWC to reconstruct it, presumably

* In 1931 the caisson was still docked in the river.

because of the cost which would be involved and also the fact that the river itself was now able to accept much bigger ships and permit their entrance to the docks from the north, a situation similar to that at Hartlepool. Of the commission's income of £131,461 in 1910, interest payments on the piers consumed c £25,000 and the RWC in that year obtained a further Act to increase its dues.[29]

The RWC claimed that the rates extant were such as to result in a loss to the commission through ships discharging in the improved river while such was "the ingenuity of the shipbuilder in so manipulating the measurement of new ships that they now carried a much larger quantity of cargo per net register ton",[30] a figure which had risen from 1½ tons per ton register to 3 tons. The RWC sought to levy dues on ships clearing the port but, conscious of competition, sought no increase on coal shipped. The negotiations prior to the Act's sanction brought a request from the town of Sunderland that it be represented on the commission but the move was resisted by the RWC on the grounds that its Bill was financial only and, in any case, the 52-strong commission was the largest such body in the U.K.[31]

Since 1885 the works undertaken on the river Wear had been substantial: two piers had been built; the Hudson dock had been enlarged and new staiths provided; access between river and dock had been vastly improved; the river itself had been deepened and widened in vital locations; and dredging, both for deepening and for maintenance, had been continuous. Such had been the improvement that a ship carrying 8,200 tons of coal had made the sea; with a draught of 24½ ft it was 400 ft in length and of 52 ft beam. Both the collieries and the RWC had improved their staiths although all were not yet capable of handling the 10-ton waggons used generally by the NER; certain drops, handling individual waggons, had been converted to much more effective spouts.

The quantity of coal shipped from the Wear had risen from 3.98 m

tons in 1885 to 4.86 m tons in 1915, an increase not commensurate with the capital expended, some £1m. Similarly, although revenue had increased from c £120,000 to c £151,000, the latter figure had already been achieved in 1904. The subsequent decline had been caused by the revitalisation of Seaham. What had thrived in this period was shipbuilding and, although by nature cyclical, it had increased substantially: in 1885 the Wear built some 62,000 tons; in 1913, 78 ships totalling almost 300,000 tons were launched.[32] The RWC had improved the river to an extent such that it had capacity sufficient for its shipbuilders.

7.4 River Tees

By 1885 the character of industry on the Tees had again been the subject of change. The manufacture of steel had been developed to such an extent that its cost vis à vis iron had led to its supplanting the earlier material. In addition, the first steps had been taken towards the establishment of a trade new to the river, salt extraction. Neither development in itself required special physical improvement in the river but both led to changes in its commerce, the importation of foreign iron ores to supplement local supplies and the export of salt and other chemicals. The requirement to import foreign iron ore affected the revenue of the Tees Conservancy Commission (TCC) more than did any other factor.

The manufacture of steel on Teesside was a natural development of the earlier iron industry, which in part continued. Bessemer's steel -manufacturing process had been developed in 1855 but it was not able to use the high-phosphorus Cleveland ores and it was not until the introduction of the Thomas and Gilchrist process in 1879 that Teesside was able to begin steel making on a large scale.[1] Before this, however, Bolckow-Vaughan had made steel at a new works at Eston using the Bessemer process with iron manufactured from Spanish ore.[2] The production of pig-iron had been concentrated in Middlesbrough whereas the manufacture of wrought iron had been shared between Middlesbrough and Stockton, the latter pre-

dominating. In the 1870 s the demand for wrought iron rails - steel was little more expensive - had fallen to an extent such that by 1880 only half of the finishing works had been in operation, an event which had made it incumbent upon the Tees industry to broaden its base and enter the steel- making business.[3] One effect which the new process was to have on the district was the relocation down-river of the new steelworks so as to render more easy the importation of the richer foreign ores.; their growing use, supplanting the transport of Furness ores by rail, necessitated the provision of riverside facilities by the iron manufacturers. In the decade beginning in 1881 the production of steel on Teesside rose from 277,000 to 897,000 tons.[4]

Salt deposits, a bed of rock salt 100 ft thick at a depth of 1,300 ft, had been first located by Bolkhow-Vaughan in 1863 when drilling at South Bank, and in 1874 its presence was confirmed on the north side of the river by Isaac Lowthian Bell. It was not until 1884, however, that the Allhusens, owners of one of the largest of the Tyne's alkali works, sought permission from the TCC to drill for salt.[5] From 3,000 tons in 1883, output was to rise to c 300,000 tons in 1890s, two thirds of it for use on the Tyne.[6]

Of the works of the TCC, of which body Joseph Whitwell Pease was appointed chairman in 1884, construction of the South Gare breakwater was approaching completion - it was finished in 1888 - and the North Gare was being formed in a similar manner, by using waste slag from the ironworks.* The building of training walls in the river was a continuing process, as was the dredging needed both to provide and maintain an increased depth of water in the river. Land reclamation continued but in 1885 the legality of the arrangements made earlier regarding the apportioning of the benefit was questioned by the TCC. Counsel's opinion was that the proceeds should be disposed of to the Crown and to the commissioners on an equal basis but the TCC determined to press for full ownership,

* See Map 11

a matter now of much greater importance as a result of the presence of mineral deposits and the realisation that their working could be the basis of an alkali trade on the Tees.[7] Seeking Parliamentary powers, the TCC became involved in both a lawsuit and an arbitration. In the former, the TCC appeared as the defendent and was gratified by hearing judgement in its favour, the most important finding being that "the expression 'reclaimed lands'...includes all mines and minerals under such lands."[8] The arbitration involved, on the one hand, the TCC and the Crown and, on the other, the frontagers or claimants to the land reclaimed. On behalf of the TCC, evidence was presented by Fowler and Messent but delays in both law-suit and arbitration - the award was made in March 1887 - had led Pease to meet the Secretary to the Treasury, Jackson, to discuss with him the problems relating to reclamation. Pease informed him that as a result of the TCC's operations the Crown would receive more than £100,000 "without having used the slightest exertion to obtain it;"[9] on its part the TCC had spent £88,574 and had been reimbursed only to the sum of £96,205 and it was only the possible future sales of land which would bring significant profit. Propounding the view that the "Commission, working gratuitously, has rendered great and lasting National Service",[10] for which no grant had been received, he sought Treasury good-will towards the Bill envisaged by the TCC.

In 1881 Stockton Corporation had obtained an Act for the replacement of the century-old multi-arch masonry bridge by a three-span steel structure, thought necessary both on account of increased road traffic and as an improvement to the navigation of the river in that it would benefit above-bridge development. The new bridge was completed in 1887. at which time the old one was dismantled and the town of Stockton looked to the TCC for further river improvements, principally in the form of an additional two feet of water as down-river dredging had depressed the low-water river level at Stockton. This request brought about dissent, both within and without the TCC. Pease, seeking an overall view, suggested that a report

be sought from Alexander Meadows Rendel (1829-1918), a move which was then defeated, and the TCC decided to expend £10,000 to undertake the work.[11] Some months later, however, Hugh Bell (1804-1931) in July 1888 sought to have the decision rescinded but was defeated by 14 votes to five, whereupon the town of Middlesbrough, for some years concerned by its lack of representation - or perhaps power - on the TCC, instructed its Town Clerk to obtain "an injuction against the Commissioners expending additional money on the upper reaches of the river, also upon the question of obtaining power to elect additional representatives for Middlesbrough."[12] Meetings with shipowners and payers of dues followed but nothing further appears to have taken place.

On its part, Stockton Corporation put in hand improvements to its public quay which had, over the past five years, been operating unprofitably; with expenditure between £5,102 and £5,702 p.a., revenue had varied from £2,891 in 1881 to £4,373 in 1884.[13] Plans were prepared by the surveyor to the Corporation, scrutinised by Fowler on behalf of the TCC and further subjected to the inspection of Messent. In his report Fowler approved the use of bearing piles, rather than the newer method of sinking iron cylinders, principally on the grounds that they would resist "forward pressure better than cylinders"[14] and he calculated that the new quay would cost £17,500. Messent expressed greater caution than had Fowler. He was concerned as to the factors which had led to the failure of the earlier quay and commissioned boreholes to ascertain ground conditions. Satisfied that the "cause of the land slips (had been) the sliding of the artificial or made ground"[15] he recommended the use of land ties to prevent the future movement of the wall. The quay was some 600 ft long and was intended to provide 15 ft of water at low tide. The tender of Nelson and Strachan, for £16,498, was duly accepted and the work was completed by 1890.[16] Within three years the wall had begun to move into the river, a direct consequence of the TCC having formed, by dredging, a deepwater

berth, a move made in response to Stockton's initiative.

The completion of the South Gare breakwater was commemorated in October 1888, bringing about a virtual end to the major works of the TCC. The breakwater, in which c 5m tons of slag had been used, had been built to a length of 2½ miles while its net cost had amounted to £219,158. The North Gare breakwater had, at a cost of £57,642, by this time absorbed some ¾m tons of slag and was of a similar construction. River improvements had been effected by the formation of 20 miles of training walls and the river had been continuously dredged, to the extent that the removal of material amounted to 22.7 m tons with more than 2m tons dredged in 1887 alone. Land reclamation totalled c 2,000 acres of which half remained in the hands of the commissioners and this work had comprised the building of 14 miles of embankment.[17] The greater part of the work had been undertaken under the direction of Fowler but his death in 1888 resulted, after a short interval, in the appointment of George James Clarke (1852-1920) as engineer.[18]

Problems with the breakwaters soon became apparent. Even before its completion, the south breakwater had been breached in 1880 although the repairs undertaken, using concrete in bags, would appear to have proved effective. To prevent further damage, 30 to 40 ton concrete blocks were placed round the head of the breakwater, crowned by an iron light-house. Immediately after its inauguration the pier suffered further storm damage and Messent, again reporting, suggested the use of chains to break the force of the wave action.[19] A further inspection was undertaken by Messent and Rendel and their report was submitted in July 1889, at which time also the Finance Committee of the TCC sanctioned the expenditure of £4,664 on the repairs necessary.[20] Two years later another report was submitted by the same engineers, principally regarding the north breakwater. Concern had been expressed in 1889 as to the effect the tipping of clay was likely to have on the soft sands which were to be crossed and two years later

disappointment was expressed at the little work undertaken. Nevertheless, the two men were confident that the cessation of the breakwater short of its planned termination would have no adverse effect upon its planned utility and they recommended that it should be "stopped about 340 feet short of the point to which, under the present contract, it is to be carried"[21] at a length of 3,330 ft. It was recommended, too, that the river training wall on the north bank should be extended down-river to Greatham Creek. Their comments, somewhat critical of Clarke,* were replied to by him the following month and he pursued further the value of the concrete blocks in protecting the breakwaters, expressing a preference for the use of concrete in bags, 50 to 60 tons each. He asked the commissioners to note that the south breakwater had been further protected by these means, pointing out that undermining to a depth of five feet had taken place and the concrete blocks had subsequently been "bound together by concrete in situ; had this not been done... a serious breach would again have been made in the Breakwater".[22] The commissioners in 1892 decided to suspend the formation of the north breakwater, at which time the contractor, George Dawson, requested that the TCC take over his plant, now un-needed.[23]

In 1883 the NER had begun the improvement of its dock at Middlesbrough and the work was completed in 1889 at a cost of £176,000.[24] The dock had been enlarged from 12 to 15¼ acres and the entrance to it deepened from 23 to 28 ft.; the total length of quay provided was now more than 3,000 ft.[25] Nevertheless, no further facilities had been provided for the shipping of coal, an item thought by the several authorities to be vital to the river's trade. In 1892, a result of the NER's Bill seeking to take over the Hull docks, the railway company discussed again with the TCC the question of staiths at Port Clarence, formerly the property of the West Hartlepool company and not used since 1872.[26] It was noted at that time that, other than in the dock, the only staiths on the river were those of the NER at Stockton, little used, and privately-owned installations

* Clarke had earlier worked under Rendel.

at Portrack and Newport. The NER was said to have contributed nothing to the improvement of the Tees, a matter of some concern as half the ships bringing iron ore into the river were forced to leave it for other ports to load coal;[27] the only alternative was to use the dock and so incur full dues.[28]

The question of staiths again brought Stockton into conflict with the TCC, deploring the lack of improvement to the river and seeking deeper berths and a turning basin at Stockton.[29] Criticism came also from within the TCC, Pease commenting that further dredging, costing some £50,000, was needed to maintain the river's standing; an order for a ship of 7,000 tons had recently been placed in Hartlepool and 4,000 ton ships were now using the Tyne.[30] Stockton was still concerned by the fact that its importance on the river was declining and it was concerned also by the facilities which the town itself provided. Earlier, the TCC had been unable to dredge at Stockton for fear of quay collapse and dissent within the Stockton Council became apparent in 1892, when the wisdom of maintaining port facilities was questioned. The wharf had already cost £54,000 and a further £25,300 was now required to restrain it from moving. Traffic was in decline and the quay loss was £4,300 in 1891.[31] Stockton's problems were given greater emphasis in 1893 when Thomas Wrightson (1839-1921), M.P. for Stockton, revived the earlier scheme for an extensive dock to be formed in the river, with its flow carried by a new cut.[32] The principle had been first propounded by Brooks in 1845 but Wrightson sought to enlarge the dock to 56 acres by increasing the length of the new cutting to some 9,000 feet, by-passing Thornaby as well as Stockton. Wrightson, his views endorsed by Alfred Giles (1816-1895), estimated that the work would cost £400,000 but envisaged it, somewhat inexplicably, as being undertaken by the TCC and NER together. In his view, expansion of the port of Stockton, losing trade to Middlesbrough and Hartlepool, was much more important than was the NER's incursion at Hull.[33] Wrightson's plan* did not proceed,

* His initial scheme had been modified; it was now to be a half-tide basin.

perhaps due to the perception of others that it was not viable; the economics of providing extensive up-river improvements were questionable. In addition, the Stockton quay exhibited further problems and Rendel again reported upon it, suggesting that it be tied back to provide added stability, a procedure later to lead to its failure.[34] Stockton had originally sought the services of Clarke to undertake the quay repairs but the TCC could not agree to this procedure, so leading to Rendel becoming responsible for the modifications.[35] Although certain Stockton representatives had questioned the wisdom of maintaining the town as a port, it is ironic that it was that subject which led to the resignation of Sir Raylton Dixon (1838-1901) from the TCC in 1895. As a representative for Middlesbrough, Dixon had nevertheless advocated a policy of whole-river development, believing that no one town should benefit. Disturbed by his apparent championship of Stockton, Middlesbrough called him to order, inferring a vote of no confidence and so forced his resignation.[36]

The revenue received from Stockton shipping by the TCC remained virtually static at c £9,500 between 1894 and 1900; for Middlesbrough the figure was c £60,000. Nevertheless, the TCC put in hand river improvements to provide a greater depth to Stockton, a move instigated by Hugh Bell.[37] Some widening of the river was also undertaken and the improvements so made led to the many private wharfowners being called upon to strengthen their property. Further quays, financed privately, were built as iron ore imports rose from a trickle in the 1860 s to c 1.9 m tons in 1900[38] and this traffic, with the export of finished iron and steel, made up the greater part of the Tees trade. By the end of the century both grain imports and coal exports had ceased, to a certain extent counterbalanced by the exploitation of the area's salt deposits.[39] River improvement was sought, somewhat improbably, above Stockton in 1896. The Works Committee duly reported that some 20 miles of river bank would require protection, absorbing c 300,000 tons of slag, then being disposed of to the south

east of the south breakwater. In 1899 representatives of Yarm sought deep water to that town but the TCC, pledging itself only to continue the improvement of the river, gave no assurances.[40] Press comment was to the effect that any scheme of this type was unworkable and too late; development should be at the river's mouth.[41]

The merchants of Middlesbrough, too, werenot inactive. In 1896, the Corporation there asked the NER to modify the dock to accept ships of greater tonnage,[42] perhaps in response to a meeting, held a few days earlier, of the town's shipowners and merchants. Dixon, no longer a commissioner, suggested that the Middlesbrough dock should be "increased or extended by taking in the present dock cut and thus allowing for larger gates at the entrance and for increased area."[43] Immediately following the meeting a deputation met directors of the NER in York and pointed out that Middlesbrough's trade had now outgrown the dock, a request to which the NER proved sympathetic, perhaps because of the fact that Pease was now chairman of both the TCC and the NER.

In 1896, the NER deposited plans [44] for a major extension of the dock, increasing its area from 16 to 26 acres, its entrance width from 55 to 80 ft and its depth from 28 to 33 ft.[45] The proposal was given qualified approval by the press which noted that it was "a fair response to the representations made by the great captains of industry and trade in the Cleveland district"[46] and an Act was sanctioned in 1897;[47] work was put in hand the following year and this entrance was completed in 1904.* The outstanding work was finished in 1906, by which time £757,000 had been expended.[48] Concurrently, efforts had been made by the TCC to persuade the NER to provide a railway on the north bank of the river, a facility which the TCC considered essential for the development of land in its ownership. The NER was reluctant to make a move as "for many years to come any traffic there might be on the line would be so small as to be uneconomical;"[49] it could go ahead only if the TCC provided the land and made a contribution of £6,000. Pressed further, the NER

* See Map 20

agreed to build a line from Port Clarence to Greatham and later, from Haverton Hill to Stockton although this section became the subject of some contention in that the NER in 1900 sought to suspend its formation, although pressed by the Office for Woods and Forests to complete it and so open up for development lands owned by the Crown.[50] The railway to Greatham was opened in 1901, the NER then informing the TCC that it was "in the unique position of being a railway without any traffic, because apparently there is none to carry"[51] and pointing out that the onus was upon the TCC, which had asked for double tracks, to stimulate trade.

In 1901 the reality of the increasing dominance of Middlesbrough in relation to Stockton was made manifest when the new TCC headquarters was opened in Middlesbrough. A move had been first suggested in 1896 and some argument had later become apparent. In debate it was recorded that the Stockton members were "jealous of any of their own institutions being snatched from them to the detriment of the town's importance"[53] and it had been only the fact that Yarm, with two other individuals, had deserted the cause that had led to the move to Middlesbrough being agreed; the result had been decided only by the chairman's casting vote.[53] With the increasing size of ships* using the river rendering impossible their use of Stockton and the vast improvements made to the dock, Middlesbrough had become pre-eminent on the river.

By the end of the century the revenues of the TCC had been almost static for five years and in 1901 they suffered a further fall to £75,960, from the average of c £88,000. Pease, in a review of the year's results, indicated that revenue from imports, iron ore, timber and grain, had fallen as had income from exports, principally pig iron, finished iron and steel goods; although national figures showed reductions, the Tees had suffered disproportionately. He noted the fact that whereas the average size of ship using the river was 438 tons, the maximum size was 8,050 tons dwt., slightly bigger than the largest built there. In the last ten-

* Ships of 8,000 tons dwt could enter the river.

year period dredging had cost almost £200,000, only £33,000 of it being charged to capital. Pease also noted that the fortunes of land reclamation had changed from being a debit balance to a credit; costs totalled £139,000, revenue £161,000. Some 850 acres remained in hand with the reclamation of a further 200 acres continuing. He pointed with some pride to the fact that the TCC had spent £25,283 on roads and railways on the north bank, the Crown repaying a quarter, "the first sum they have paid towards the cost of improving the district."[54]

The early years of the 20th century were marked by three major events concerning the TCC: they were the resignation, due to the financial failure of other enterprises, of Pease and his replacement in 1903 as chairman by Hugh Bell, who similarly became a director of the NER; the construction, after much discussion, of new staiths; and the construction of a bridge between Middlesbrough and Port Clarence, replacing the earlier ferry.

As the iron trade had prospered, the export of coal from the Tees had fallen, and virtually ceased. In a report on the trade of Stockton, written in 1900, it was stated by the quay manager, Cowburn, that he had "commenced the Coal Trade...in the year 1896 and (was) happy to state this business has been most successful, last year our shipments exceeded 15,000 tons."[55] In Middlesbrough, agitation for coal-handling facilities had been incessant, it being considered that the Tees, with the assistance of the NER, should attempt to compete in the export of coal with the other ports of the region, especially Hartlepool. Not only was an export trade sought; bunkering facilities were of even greater importance as much trade was lost due to ships leaving the river for bunker coal and, additionally, repairs. In 1893 it had been noted that with c 10,000 tons of coal per month needed for motive power, staiths were of prime importance and the "Tyne, Wear and the Hartlepools (had been) fattened at the expense of the poor neglected Tees."[56] Both the TCC and the Chamber of Commerce had discussed the matter with the NER, without result. In 1898 drops

at Port Clarence were suggested in order to enable ships to coal without using the NER dock, the lack of staiths being an example of the river's shortcomings, but "when it is pointed out that the North Eastern Railway Company's interests and the river interests are not identical, that the railway company have means of representation on the Board, the eyes are opened!"[57] By 1905 nothing further had happened although the NER, having enlarged its dock to accommodate bigger ships, sought the assistance of the TCC regarding dredging. A channel 500 ft wide and 15 ft deep, from the sea to the dock, had been formed the previous year. The following year Middlesbrough expressed its concern that the NER had not taken the matter further, a concern understandable in view of the fact that it was claimed by the TCC that of 2,189 ships entering with cargo, 1,077 had left light to load cargoes elsewhere, 783 at other north-east ports. Surmising that this would not have happened had bunkers been available on the Tees three sites were suggested, Haverton Hill, opposite Cargo Fleet and at Greatham Creek. That the NER should make provision was imperative as it had spent nothing on the river while "the increased revenue which the company has gained through the extended facilities afforded to trade must have been great."[58] By this time the TCC had expended more than £1m on the river.

The NER in 1907 informed the TCC that it was not able to finance new staiths, estimated at c £75,000, but should the latter provide them, the railway company would assist with rail links.[59] Meanwhile the TCC conferred with all coal-owners likely to use the staiths but it was not until 1910, with some prompting by the Middlesbrough borough engineer as to the most suitable site, that the NER itself suggested a conveyor system, able to load at 150 tons per hour, located at the entrance channel to the dock.[60] The loading system, an electric belt conveyor, was put in hand immediately and was completed during 1913,[61] at which time a similar device was provided to supplement the hydraulic coal hoist installed

in the dock in 1906.[62]

The last of the TCC's major involvements with outside bodies concerned the bridging of the river. In 1905, approval was sought from the TCC for a light railway and transporter bridge, crossing from Middlesbrough to Port Clarence.[63] The company,* seeking capital of £200,000, proposed to build a bridge with a clearance of 120 ft butthe commissioners, knowing that ships requiring 171 ft had been built on the Tees, objected to the scheme, in principle similar to one emanating from Hartlepool in 1873.[64] The TCC considered that the bridge would present a threat to navigation but, in any case, sought headroom of 175 ft, quoting heights of 177 ft at Runcorn and 210 ft for the bridge suggested - but rejected - on the Tyne. The bridge was opposed, also, by Bolkhow-Vaughan and the Middlesbrough Owners, as landowners, and by Middlesbrough itself, although by the latter in a manner somewhat ambivalent; after a long discussion in Council it was agreed that Middlesbrough should oppose the scheme but, if the Bill were to be rejected, the town would itself promote a similar scheme.[65] The TCC withdrew its opposition on the understanding that headroom of 160 ft would be provided over a width of 300 ft; the Bill was withdrawn, only for Middlesbrough to undertake construction of the bridge. An Act was obtained in 1907[66] and the bridge# with a clear span of 570 ft and headroom of 160 ft, was opened in October 1911. Its opening was a matter of some importance to the TCC, interested in the development of land to the north of the river, an area for long somewhat neglected. Earlier it had pressed the NER for rail links and had also provided roads on a small scale but the completion of the bridge caused the commissioners to seek Parliamentary powers for "the construction...of a direct road on the north bank of the river between Port Clarence and the Hartlepools"[67] and the sanctioning of its Act[68] led the TCC, the following year, to seek

* The engineers involved were Charles Watson and Charles Edward Straker.
# Designed by Cleveland Bridge and Engineering Company; erected by Sir Wm. Arroll & Co.

tenders to a value of c £55,000.[69]

In spite of the fact that the revenue received from trade at Middlesbrough assumed a greater proportion of the TCC's annual income, nevertheless, revenue on behalf of Stockton continued to increase slowly. In 1904, when it was reported that at Stockton bridge the water was only 4'-3" deep at low tide, the TCC asked its Works Committee to investigate the provision of 15 ft of water to the dock and 9 ft to Stockton. Reporting back, it noted that the cost would be £49,000 while to deepen a further 2 ft would entail another £42,000.[70] By 1910 the commissioners had completed dredging to these greater depths, the process having involved the removal of c ¾m cu. yds. of material annually. They had, in addition, undertaken river widening projects, both to permit shipping to reach Stockton more easily and on behalf of shipbuilders, an industry established both at Middlesbrough and Stockton.

Following the founding of a steel industry on the Tees the use of this material in shipbuilding superseded iron, as it did elsewhere, and in 1891, of the 71 ships built on the Tees, 49 were of steel. With two building yards at Middlesbrough and three at Stockton, the river in that year produced 120,000 tons of shipping,* a slight decrease compared with the previous year but a vastly greater tonnage than the figure of 20,000 tons in 1886.[71] Between 1891 and 1914, shipbuilding on the Tees varied cyclically between 57,200 tons in 1908 and 151,000 tons in 1901.[72] At the time of lowest output, the TCC, concerned that its dry dock was becoming inadequate, held discussions with Smith's Docks, long established on the Tyne, who proposed to build a 600 ft dock at Cargo Fleet.[73] Terms were arranged, the works were designed by John Mitchell Moncrieff (1865-1931), a contract was awarded to John Aird & Co., and the shipbuilding yard opened in 1909, albeit with its dry dock slightly shorter than originally proposed.[74]

* In 1891 the Tyne's output of shipping was 185,000 tons and the Wear's 192,000 tons.

In the 30 years which ended in 1914, when the river was "practically taken over by the Naval and Military Authorities"[75], the works of the TCC had been, in civil engineering terms, pedestrian, in that they had been confined principally to channel improvements, the disposal of slag and land reclamation. The works necessary for the import of iron ore, which reached a total of 2.37 m tons in 1910,[72] were undertaken by the ironmasters themselves and the NER was responsible for dock improvements and the provision there of cargo-handling equipment. Teeside had maintained its earlier pre-eminence in the iron trade and had additionally brought into being a steel-making industry. During this period the output of Cleveland ore was maintained at between 5m and 6 m tons p.a., and the area produced between 2 m and 3 m tons of pig iron; of this latter product 1.75 m tons was shipped in 1907, 1.22 m tons abroad.[77] Due to the needs of the iron trade, shipments of coal declined from 126,000 tons to only 41,000 in 1892, subsequently increasing to 270,000 tons by 1914, largely the result of the staiths recently completed by the NER. During the closing years of the 19th century the extraction of salt, using the brine process, had begun and in 1890, 128,000 tons of it were shipped from the river. Due to land reclamation the TCC had been able to claim ownership and the following year leased the workings on the north bank of the river. Output was to more than double.[78] Other trade on the river was of a relatively minor nature. Grain and timber were imported, the former to Stockton where in the 1870 s it began to decline before ceasing completely. Timber was imported at Middlesbrough, the quantity rising steadily to c ½ m tons in 1913.[79]

To cope with the increasing river traffic the TCC had engaged in operations markedly different from the other ports, principally the construction of its breakwaters and the reclamation, by 1913, of some 2,500 acres of land. Where it had been similar, however, was in the need for dredging, as on the Tyne a continuous operation, both for improvement and for maintenance.

Although the low-water depth at the bar* increased only from 18 ft in 1886 to 20 ft in 1906 the depth in the river had been greatly augmented, if only as far as Middlesbrough.[80] The fact that Stockton had been relatively neglected rankled in that town, claiming that of the £800,000 expended by the TCC, by 1887 only 6% had been spent on the river between Middlesbrough and Stockton, so causing ships of greater tonnage to use Middlesbrough, rather than the up-river port of Stockton.[81] The efforts of the TCC, with those of the NER regarding its dock, led to the port being enabled to accept bigger ships and in 1905 one of 10,000 tons dwt. berthed in the dock which 30 years earlier had been able to accept vessels only one quarter of that size.[82] The maximum size of ship using the river did not give the complete picture. In 1913, the average size was some 700 tons, only 22% of the total clearances being above 1000 tons. Middlesbrough had decisively taken over from Stockton as the dominant port, by the same year generating no less than 92% of the TCC revenue; 5,170 ships berthed at Middlesbrough and 806 at Stockton. By this time the increasing tonnages of ships and the relative inadequacies of the river above Middlesbrough had led to differences in the shipping using the ports. Of ships above 1,000 tons, 1,014 cleared from Middlesbrough while from Stockton they totalled only 69.[83]

Only the rivers Tyne and Tees exhibited rivalry amongst the towns on them but whereas on the Tyne, Newcastle maintained its early dominance, Stockton-in a position very similar - was deprived of its supremacy by Middlesbrough, a transformation partly brought about by the increasing size of ships using the river but, principally, by the expansion of the iron and steel industries.

7.5 River Blyth

The Blyth Harbour Commission (BHC), authorised without opposition, held its first meeting in July 1882 under the chairman-ship of Sir Matthew

* In 1852 it had been only 2½ feet.

White Ridley. The objectives of its Act[1] were the transfer of responsibilities from the earlier company to the B H C , a widening of representation, powers to borrow for capital works and the construction of harbour works, a result of the new co-operation with the NER. Under the regime of the dock company borrowing, related to the capital issued, had been limited to £40,000 but the new Act sought its upward revision to £182,000, necessary to finanace the envisaged works programme.

When seeking the Act, its promoters had considered carefully the constitution of the commission and had studied the membership of bodies such as the Tyne and Tees conservancies. As a result, the BHC comprised Ridley, a nominee appointed by him, one shareholder of the former company, one landowner, three coalowners, two shipowners, one trader,one representative of the town of Blyth and one from Cowpen; a total of 13. The BHC continued to pay dividends - little had been paid earlier - to former company shareholders and provision was made for redeeming the company's capital.

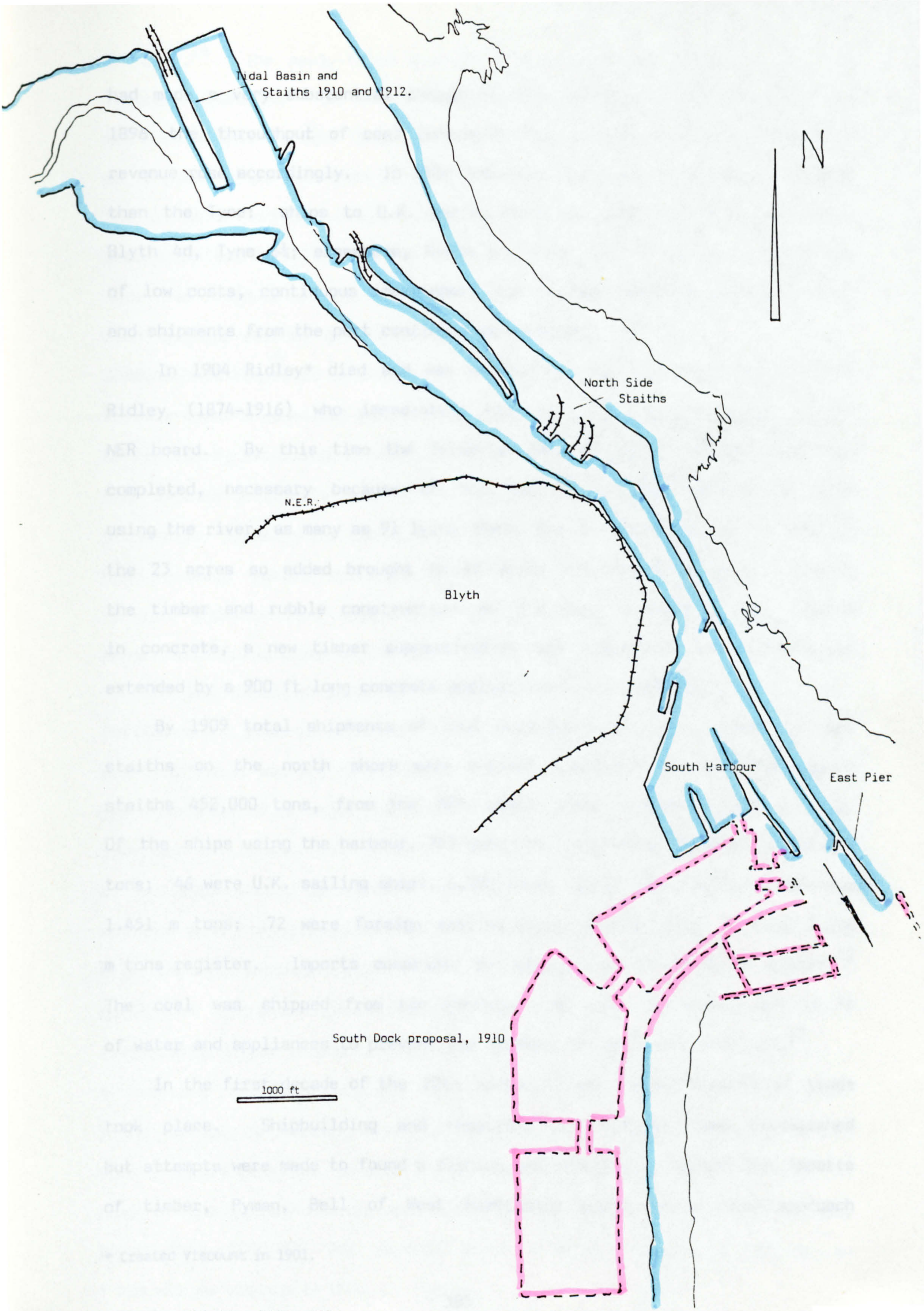
Drawings for the projected works had been prepared by Thomas Meik, now practising from Edinburgh. He proposed a 1,000 ft extension to the east pier and the construction of a new west pier, to a line similar to that of the 1863 proposal and some 2,500 ft in length.[3] Meik's plans were commented upon by James Abernethy, involved earlier, who approved only the extension of the east pier. He did, however, agree with the plans to deepen the channel to give 14 ft of water and suggested that the excavated: material be used to reclaim land to the east - the north bank - which he had "always regarded as the proper site for the shipment of coal."[3] The work would cost £73,000 spread over four years.

The BHC duly decided not to continue using the services of Meik and, looking for an engineer more locally based, retained John Watt Sandeman (1842-1927) of Newcastle to act on its behalf. Sandeman suggested that the two piers be formed as suggested by Meik and that even further dredging be put in hand, sufficient to provide an additional two feet of water.[4] In line with other such bodies in the area the BHC formed a Works and

Finance Committee, empowered to meet more frequently than did the main board and it was this committee which initiated further negotiations with the NER in an effort to persuade it to provide additional coaling points on the north bank of the river. The BHC offered to erect the staiths if the NER would bring coal to the harbour.[5] This suggestion was not acceptable but subsequently the NER undertook to carry out further improvements to the staiths on the south shore, their completion in 1888 forming a complete loop of railway lines to feed the staiths.

Since the formation of the BHC port improvements had comprised principally the forming of new berths and the building of a new quay on the south bank to accommodate the NER staiths. The problems were not inconsiderable, necessitating the blasting of rock from the river bed and the construction of a timber-piled river wall with concrete backing, the upper section tied back to solid ground by chains.[6] The dredging of the harbour had been undertaken partly by the BHC's own plant and partly by equipment hired from Sunderland and Dumbarton. The BHC continued to press the NER to proceed with the construction of the extra staiths on the north shore and in 1892 the NER announced its intention of applying for Parliamentary powers.[7] Agreement between the two interested bodies was finally reached in 1894 and the NER, by then having completed capital works at Dunston, on the Tyne, began the construction of an extension from its Newbiggin branch to the staiths.[8] The new coal-loading facilities were brought into use in July 1896 having cost the NER a total of £78,028 spread over three years; the cost to the BHC has not been ascertained.

Since its formation, the works undertaken by the BHC had been of a much more substantial nature than had been those of its predecessor and they included the construction of the west breakwater 2,470 ft long - but not the west pier - a 300 ft concrete extension to the eastern pier, the dredging already noted and the building of quay walls to form a base for the NER staiths. The combination of BHC finance and NER co-operation



Map 25: Blyth, 1885-1914

had made a very substantial change to the harbour. Between 1883 and 1896 the throughput of coal increased from 150,000 to 2.562 m tons and revenue rose accordingly. In 1884 the port had been shown to be cheaper than the Tyne: ships to U.K. ports, Blyth 3d, Tyne 4d p. ton; to Europe, Blyth 4d, Tyne 6¾; elsewhere, Blyth 6d, Tyne 11¼d p ton..[9] The policy of low costs, continuous improvement and railway backing proved successful and shipments from the port continued to increase.

In 1904 Ridley* died and was succeed by his son, the 2nd Viscount Ridley (1874-1916) who immediately took the place of his father o.n the NER board. By this time the formation of the south harbour had been completed, necessary because of the growing numbers and size of ships using the river, as many as 91 lying there for a 14-day period in 1892;[10] the 23 acres so added brought to 40 acres the deep-water area. In 1907 the timber and rubble construction of the east breakwater was encased in concrete, a new timber superstructure was added and the structure was extended by a 900 ft long concrete addition with a lighthouse.[11]

By 1909 total shipments of coal exceeded 4 m tons. From the NER staiths on the north shore were shipped 2.349 m tons, from the Cowpen staiths 452,000 tons, from the NER south shore staiths 1,213 m tons. Of the ships using the harbour, 757 were U.K. registered steamships, 539,000 tons; 46 were U.K. sailing ships, 6,200 tons; 2,011 were foreign steamships, 1.451 m tons; 72 were foreign sailing ships, 21,000 tons; in total 2.016 m tons register. Imports comprised principally 14,000 loads of timber.[12] The coal was shipped from ten staiths, each with two spouts and 24 ft of water and appliances to prevent the breakage of coal were provided.[13]

In the first decade of the 20th century some diversification of trade took place. Shipbuilding and repairing had earlier been established but attempts were made to found a fishing industry and to expand the imports of timber, Pyman, Bell of West Hartlepool making their first approach

* Created Viscount in 1901.

in 1909.[14] The newly-found success of the port led to plans for its further expansion. In 1907 Sandeman reported that further dredging should not be delayed by more than seven years and it should be undertaken so as to provide not less than 24 ft of water throughout the harbour,* including the bar which was much shallower. He also advocated that the west pier should be set back to provide a better entrance and estimated that, such were the revenues of the port, the cost of £173,400 could be expended from surplus revenue over a period of seven years.[15] Three years later Sandeman was requested to investigate the possibility of making the "Upper Harbour into a non-tidal Basin"[16] but, having briefly considered the matter, he replied by producing a plan for three docks - in total 70 acres - at the extreme southerly end of the port complex,[17] the site of the 1863 proposal. Assuming the docks were needed at all, it would seem to have been a much better solution than that suggested by the commissioners. He also indicated his suggestions for additional staiths, located in the upper part of the river on its north bank.

On the basis of Sandeman's proposals the BHC resolved to seek further Parliamentary powers, principally for the staiths, but no direct move was made and it was the NER, instead, which prepared the drawings necessary.[18] The provision of a major new work caused the commissioners to seek the services of Coode, Son & Matthews, earlier employed on the rebuilding of the Tyne piers, to approve Sandeman's proposals and drawings for the staiths were deposited in 1911.[19] To support its application for the Bill the BHC inquired deeply into its operations and finances. It was noted that with coal exports exceeding 4m tons the gross revenue attributable from that and from an additional expected 1 m tons would be £80,000 p.a., a net sum of £53,000. New trade, however, of a general nature would bring in only a further £4,000 p.a. but nevertheless the surplus monies would enable the BHC to seek total borrowing powers of £1.134 m. The cost of the proposed works was estimated at £770,000, the major items being some £200,000 for various items of dredging and £170,000 for an

* This work was completed by 1912.

extension to the east pier ; the substructure for the proposed NER staiths would cost £35,000.[20] It was agreed to include £85,000 for the purchase of the original shares in the company. Comparisons were made with the Tyne, Wear and Seaham port authorities and it was noted that whereas Blyth, having spent a total of £890,000 on the port, recorded only £100,000 as liability, the Wear with the same throughput had £2.153m, Seaham £579,000 for a throughput of less than 2 m tons and the Tyne £4.278 m for shipments of 20 m tons p.a.[21]

As the BHC was, in 1911, preparing its Bill, another was promoted by the Blyth coalowners in an attempt to alter the constitution of the commission.[22] Concerned by the power of Ridley on the commission, the promoters sought to increase the number of members from 13 to 20, a move opposed both by Ridley and by the BHC itself. The promoters, headed by Thomas Emmerson Forster, himself a member of the commission, proposed that membership should comprise Ridley, his nominee, one NER representative, one landowner, four coalowners, three shipowners, three traders, four Blyth representatives, one from Bedlington and one shareholder, a total of 20. The BHC responded with a proposal that it should itself amend its constitution in its forthcoming Bill, a move perhaps anticipated by the coalowners. The BHC accordingly proposed a body with a membership of 17 together with a representative of the shareholders, but Ridley, stating that the proposals "were not calculated to lead to the development of the various growing industries of the Port,"[23] complained that he would be deprived of long-standing privileges. If the other commissioners would not agree with him he would withdraw from all discussions, so leaving himself free to oppose the BHC's Bill.

Ridley duly petitioned against both Bills but within days of lodging his objections he reported to the BHC that, in order to avoid a Parliamentary contest, he had held discussions with the coal-owners, as a result of which the suggested body was to have 18 members, including six coalowners and four traders.[24] The commissioners amended this agreement slightly

and the Bill received Royal Assent in August 1912, fixing at 19 the membership of the BHC: Ridley and his nominee; one each from the NER, traders. and Bedlington; six coalowners; four shipowners; and three members representing Blyth and one Bedlington.[25] The authorised works comprised principally the tidal basin at the western end of the harbour and a pier extension; to complete them within ten years, the BHC was empowered to borrow up to £800,000. Work soon began: a greenheart timber jetty was provided by the BHC for the NER at the new up-river staiths; further dredging*, was undertaken; the west pier, attacked by worms, was replaced; new offices were opened, reflecting the changed situation within the commission; and consideration was given to erecting a transporter bridge, as used on the Tees, to replace the ferry.

The outbreak of war brought to an end, at least temporarily, the development of the port which by 1913 was shipping 4.73 m tons of coal p.a., almost half of the Northumberland coal shipments.[26] Further improvements were still under consideration, including the forming of a new wet dock at the southern extremity of the port, but nevertheless the commissioners could look with pride on their achievement. During their governance, throughput of coal had risen from 150,000 tons to 4.73m tons p.a. and revenue had increased from £1,000 to £71,000 p.a. In the 30-year life of the dock company £131,000 had been spent to little effect; during a similar period controlled by the commission some £¾m had produced much more impressive results.[27]

7.6 The Hartlepools

When the NER had assumed control of the whole of the port of Hartlepool in 1865 it had been described as "a tempting bait"[1] by Harry Stephen Thompson (1809-1874) the company's chairman.# The view which he had then given is somewhat difficult to justify in that the purchase of the Hartlepool

* In the past five years dredging had totalled 3 m tons.

Although revenue amounted to c £¼m p.a. gross irregularities had earlier been revealed; the company had been operated at a loss.

Dock and Railway had cost the NER £440,000 and of the West Hartlepool Harbour and Railway, £3.918m.[2] Purchase had been succeeded by inactivity on the part of the NER, at that time undertaking work relating to Newcastle quay and then at its dock at Middlesbrough, and it was not until 1872 that capital had been injected into the dock complex at Hartlepool, presumably a result of the NER's intention to build a coastal line through the county. It was then envisaged that the construction of some ten miles of track would suffice "to give Newcastle, South Shields, Sunderland, the Hartlepools, Stockton and Middlesbrough direct and convenient railway communication with each other."[3] To extend the docks, approximately £½m had been expended by 1880, followed by a further £35,000 on the provision of a new dry dock, completed in 1885.[4]

From the viewpoint of the NER, trade had been depressed between 1876 and 1880 and, although not so recorded, it is difficult to believe that the company was not disappointed in its investment: between 1865 and 1885 coal exports had fallen from 1.584 m tons to 1.215 m; general merchandise exports had remained static; the only significant change was in timber imports which had risen from 130,000 to 232,000 tons.[5] Shipbuilding, begun in 1854 with the construction of a dry dock, had become a significant industry, Pile Spence & Co., being established in 1859 and William Gray & Co., in 1871; in 1884, Christopher Furness (1852-1912) began building ships. Between 1880 and 1890, the tonnage of new shipping varied between 30,000 and 128,000 tons,[6] figures comparable with those for the Tees.

On the part of the NER the completion of work at Hartlepool marked a cessation for 20 years in its capital investment there. However, the Hartlepool Port and Harbour Commissioners (HP&HC) continued with the lengthening of the Heugh pier to afford greater protection to the bay and at the same time continued to deepen the channel into the harbour, removing up to ¼ m tons of material each year;[7] by 1912 the low-water channel depth had reached 20 ft.[8] The extension of the pier - it cost £100,000 - continued slowly and it was not until 1902 that it was completed, at which time

the HP&HC was empowered to collect the full dues authorised by earlier legislation. Some indifference to the port's well-being is evident during this period. In 1891 the HP&HC accused the NER of not undertaking its dredging requirements and in 1898 the NER was asked to submit for approval its plan of improvement, the year following being informed that the port was"suffering in consequence of this work being delayed".[9]

By its Act of 1900[10] the NER purchased the Londonderry Railway, running from Seaham to Sunderland, and under the powers of its 1894 Act, began in the same year the building of a railway from Seaham to Hartlepool, first considered in 1871. In effect an extension southwards of the Londonderry Railway, the NER line was planned to transport coal from the large collieries sunk between Seaham and Hartlepool in order to exploit the deeper seams located under both land and sea. Plans for the line had first been deposited in 1892 [11] when a railway, seeking running powers over the Londonderry, had been promoted by Furness, Burdon, Havelock and others, mainly coal-owners in the area, and it was then estimated that 12,000 tons of coal per day would be taken to Hartlepool, at that time looked upon principally as a timber port.[12] In the ensuing Parliamentary Committee, the NER had put forward the view that it should build the line as it "could make it more cheaply and more effectively"[13] than could any new company. This view prevailed; the Bill was rejected after "a few minutes deliberation";[14] drawings were submitted by the NER in preparation for the next Session;[15] and Parliament sanctioned the railway in 1894.[16]

The NER was, however, somewhat frustrated in its efforts by the Londonderry interests and it was not until 1905 that the railway which had cost £338,877 was, in modified form, brought into use.[17] By this time the NER had prepared plans for the construction of a further dock at Hartlepool and it is indicative of the rivalry between Hartlepool and Seaham that at Seaham too, major reconstruction had been put in hand. The intention of the NER at Hartlepool was to form a dock* of some ten acres within the

* See Map 22

Slake, formerly used to sluice the tidal harbour, from which access would be gained;[18] the necessary Act was obtained in 1905.[19]

The NER did not proceed with the authorised dock but instead entered into discussions with the HP&HC regarding alternative plans, namely the widening of the dock entrance and the conversion of the Victoria dock into a tidal basin, maintaining that if this were to be done ships of a greater tonnage could use it. Further dredging would be required, a fish dock would be incorporated and new staiths would be built, the whole of the work costing £125,000. The NER, having decided not to proceed with the new dock[20], later informed the commissioners that it was intended to widen the entrance to the dock complex via the North Basin, completed in 1880, and also to widen the entrance to the former West Docks at a cost of c £75,000.[21]

Between 1880 and 1895 the total capital expenditure of the NER had averaged c £400,000 p.a., a relatively low level. From the latter date, however, it increased to c £1.4m in 1904, before again falling and it was in this decline that the next phase of development at Hartlepool took place:[22] unusually, the costs of the extensive works were not recorded in the NER accounts as capital expenditure and only the estimates for the work were noted. By 1912, a new quay had been provided for the fish dock and the Victoria Dock converted into a 17 acre tidal harbour with a minimum high-water depth of 33 ft and an entrance 200 ft wide in place of the original 45 ft. New coaling facilities had been incorporated. Work on the West Dock entrance had also been put in hand, enlarging it from 42 ft to 65 ft wide,[23] this work being completed in 1910. The completion of the Victoria dock and west gate modifications allowed the widening of other entrances to begin, although work was not to be completed until 1919. In the past, the timber structures at Hartlepool had been severely attacked by marine borers, resulting in considerable expense when replaced by masonry. By the end of the century, however, concrete had become widely used and it was this material which at the Hartlepools, and at

other ports, replaced both timber and masonry.[24] The efforts of the NER led to a resurgance in the dredging of the old harbour and the approach to it, the quantity of material removed increasing from its average of ¼m tons p.a. to 681,000 tons in 1909, the maximum. In turn, dredging led to the undermining of the Old Pier, reputedly the oldest in Britain. Its rebuilding and strengthening was undertaken between 1910 and 1912 when, as had happened at Sunderland a century earlier, the lighthouse was moved 30 ft to seaward.[25]

The effect of the latest capital expenditure was impressive: between 1900 and 1910 coal shipments rose by 50% and by 1913 they had doubled to 2.4 m tons p.a.; in the same way timber imports rose from 774,000 tons in 1910 to 1.14m tons in 1913. The contrast with the 1880 extensions was marked. The former was undertaken in a period of declining coal availability but the latter, coinciding with "the outpouring of coal from the newly opened coastal portion of the Durham coalfield"[26] proved the viability of the work undertaken, a result similar to that experienced at neighbouring Seaham Harbour.

7.7 Seaham Harbour

The succession to the title by Charles Stewart, 6th Marquis of Londonderry (1852-1915) presaged a substantial improvement in the fortunes of Seaham Harbour. Whereas the control of the estates by his father had brought no change to the port, his death in 1884 led to an expansion of the mining interests and improvements to the harbour.

The winning of Hetton colliery had had the effect of stimulating mining in Durham and further improvements in mining techniques and geological investigations led to deeper collieries being worked, especially those bordering the sea. One of the earliest had been Monkwearmouth but the acquisition by Londonderry of rights to mine under the sea in the immediate vicinity of Seaham, a joint arrangement made with the Easington Coal Company, made vital the provision of suitable facilities at the harbour. As would

be expected the prospect of new collieries brought to the scene the NER, until this time not involved in Londonderry affairs, and it is against this background that this phase of the development of Seaham Harbour is viewed.

Over the years the number of collieries worked by Londonderry had diminished from 11 in 1853 to seven in 1871 and was, by the end of the 1914-1918 War, to be reduced to three, albeit of such a scale that some 7,000 miners were in employment.[1] Not only were the Seaham collieries bigger, those established at Easington, Horden and Blackhall were of a comparable size, and it was to serve these coastal collieries that the NER sought to build a railway between Seaham and the Hartlepools, so enabling coal to be shipped at its docks at the latter place. In opposition to this proposal the Marquis of Londonderry sought to expand both the output of coal and the harbour, but rightly, envisaged that his own finances would not be able to absorb all costs. His solution was the formation of a limited company - or companies - to operate the port, the collieries and the railway from Seaham to Sunderland.[2]

The Seaham Harbour Dock Company (SHDC) was established in 1898, its principal purpose being to extend the harbour, "now of insufficient extent and depth to accommodate vessels of the size now ordinarily used in the coal trade."[3] Whereas ships of large tonnage could use the rivers Tyne and Wear, Seaham was limited to colliers of 900 tons, with a length of some 200 ft.[4] Seeking an enlargement of the harbour, the SHDC was authorised to raise £450,000, the dividend payable being not greater than 5%; the works were to be completed within eight years.

The first meeting of the new company was held in York on 28 February 1899. Of the 8,835 shares of £10 to be issued on account of the existing harbour works it was agreed that 7,500 of them should be ordinary shares and the remainder preference; 3,837 were placed in the joint names of Lords Londonderry, Zetland and Farquhar. Significantly, the chairman

of the Easington Coal Company, John S. Barwick of Sunderland, was appointed a director as was Samuel J. Ditchfield, a Seaham shipowner. At this meeting the contract was formalised between the company and S. Pearson & Son Ltd., the contractors for the projected harbour works, designed by Wake and Meik,* a feature of it being that Pearson was expected to take shares in the SHDC as payment.[5]

The works put in hand were to a much bigger scale than had been those of Chapman. Two protective piers were to be built, the north of 1,383 ft and the south of 878 ft., enclosing an area of 25 acres, and the requirements of the larger ships expected to use the harbour were to be met by the construction of a new dock, ten acres in extent and provided with a gate 65 ft in width and giving 27'-6" of water at high tide.[6] Considerable excavation was needed to form the new dock, an additional 12 feet over the site of what had been the former dock. As on the Tyne, the piers were constructed by means of concrete blocks, weighing up to 28 tons and faced with masonry, placed by a Titan crane.[7] To handle the increased quantity of coal, staiths were built along the west, or landward, side of the dock, where, owing to the height of the cliffs, some 50 ft, "it has been possible, as at Tyne Dock and Sunderland, to dispense with the use of engines, and do the work by gravity,"[8] locomotives being used only to return to the railway the empty waggons.

The construction of the harbour began in March 1899 and it was opened by Arthur J. Balfour on 11 November 1905.# Work had proceeded satisfactorily in spite of two major incidents, one in 1901 when the seas broke over the outer wall and, having led to a section of the wall giving way, stopped work, and the other in 1903 when a section of the east wall of the dock, then containing water, collapsed. Some 450 ft of the wall fell into the dock and the two mishaps had resulted in some delay to the contract. As would be expected, the failures led to some recriminations involving client, consultant and contractor. Meik asserted that some of the problems

* Patrick Walter Meik (1851-1910).
# See Map 24

were the result of the old walls being poorer than anticipated[9] but so far as the major collapse was concerned the contractors, rejecting an offer of £5,000, threatened to take the resulting dispute to arbitration.[10]

The value of the contract undertaken by Pearson was inititally £378,000 and the final cost computed at £419,000. With interest and legal costs charged as capital the total expended on the harbour by 1906 was given as £576,000, of which £88,350 was, in effect, for the purchase of the old harbour.[11] The new facilities caused revenue to increase from £5,883, in the first half-year of 1905 to £20,620 in the corresponding period of 1906.[12] The throughput of coal had risen in line with revenue, from 247,000 tons for the half-year ending in 1905 to 705,000 for that of 1906.

The completion of the harbour by the SHDC coincided with the bringing into use of the NER's line from Seaham to Hartlepool. When this line had been first proposed by the NER it had, understandably, met with opposition from Londonderry who viewed it as being able, and likely, to divert coal traffic southwards. The proposed incursion into Londonderry's territory brought about much discussion and led to the making of two important agreements, one relating to the traffic of the Easington Coal Company and the other to the future of the Londonderry Railway, at that time regulated by its 1863 Act. The first of the agreements[13] resulted from Londonderry having withdrawn his opposition to the NER, but only on the condition that not less than 2/3 of the output of the Easington Coal Company was transported by the NER to either Sunderland or Seaham,* a provision which he evidently considered appropriate in that the under-sea royalties were held jointly by the two concerns. The second agreement[14] involved the Londonderry Railway and, again, the NER. As noted, Londonderry had earlier given consideration to providing his interests with limited liability but, so far as the railway was concerned, a more practicable solution was to sell it to the NER; with the completion of the new line, a through coastal route would run the full length of the Durham coast, the scene

* Londonderry capital had been invested in both ports.

of the most recent mining activity. Londonderry offered to transfer his railway to the NER for £400,000 but, in return, the NER was to build, as soon as possible, that length of the proposed Hartlepool and Seaham railway between Easington colliery and Seaham, so enabling the colliery to begin production. The purchase of the Londonderry Railway was effected by the NER's Act of 1900,[15] consolidating its power into a monopoly serving the whole of the coal-producing areas of the North-East.

Although the sinking of the Easington colliery had begun in 1901 it was not opened until 1910, the result of problems in its sinking.[16] In the same way as the dock company had been established, so Londonderry in 1899 formed the Londonderry Collieries Ltd., which took over the Seaham and Silksworth mines in addition to Dawdon, which did not begin production until 1907.[17] Shipments at Seaham for Dawdon coal are not shown but those for Easington are first recorded in 1912, when 21,000 tons were shipped in the half-year; by 1914 this figure had risen to 120,000 tons[18] and the total throughput of the port was 1.067m tons for the six-month period and 2.659 m tons for 1913 as a whole, a record figure.[19]

The completion of the principal civil engineering works would seem to have been followed by some dissention among the directors. Meik had been appointed as engineer following the incorporation of the company but perhaps as a result of the problems experienced it was Wake who was appointed in his place in November 1899, a position held only for a year before it was terminated.[20] The design of the harbour had not been an unqualified success: the piers were extended as work proceeded; the dock gates were found to be vulnerable to heavy seas and to overcome the problem - too small a harbour - Meik suggested building an inner jetty;[21] in spite of considerable dredging, the harbour master reported in 1909 that the water depth was still insufficient; and in 1912 it was found necessary to fit an anti-coal-breakage device to one of the spouts.[22] In spite of the port's shortcomings, the directors were soon pressed to

enlarge the harbour further, especially when in October 1911 the port lost the revenue from 9,000 tons of coal which would have been shipped had the colliers been able to enter it.[23] The directors responded to the call for expansion by appointing an engineer - Meik was aggrieved that he was not so appointed - to report upon the harbour, their choice being Moncrieff, earlier involved on the Tees.* His report voiced concern on two counts, the state of the piers below water level and the lack of water depth, less at the bar than the dock entrance. Puzzled, Moncreiff noted that there should not be a bar as "there is no river or outward-flowing water from the harbour which could cause (one to form and indeed) the shallower depths of water existing between the pier heads appear to be practically those to which the work was carried out."[24] It is not recorded what work was subsequently undertaken but by 1912 a new berth, to give a greater water depth and accommodate ships of 4,000 tons, had been formed within the south dock at a cost of £24,200, so raising the harbour's capital to £646,000.

The capital structure of the company is problematical. When the old harbour was deemed to have been purchased it was valued at £88,350 but subsequent to the company obtaining a second Act of Parliament[25] in 1908 - it authorised the raising of a further £90,000, with £30,000 of debenture stock - this figure was increased to £107,392,[26] more nearly approaching its initial cost. The effects on revenue of the capital expended have been noted although the only certain full-year figure available is that for 1912; it was then £46,847, derived from the shipment of 1.841m tons of coal.

7.8 Warkworth Harbour, Amble.

The rejection of the Bill promoted by the Warkworth Harbour Commission (WHC) in 1884 resulted in the harbour's improvement seemingly being restricted to the execution of dredging, financed by revenue. To enable further works to be undertaken the commissioners obtained a loan of £15,000 from

* In partnership with J.W. Sandeman he had been responsible for the replacement of the Redheugh bridge on the Tyne.

the Public Works Loan Commissioners and it enabled them to improve the river's channel by removing its rock bed, to deepen the loading berths and to provide a new staith giving an extra six feet height. By 1886 the new staith was in operation.[1]

Although both trade and revenue had increased,the latter being £6,159 in 1890, nevertheless the commissioners felt concern regarding the state of the harbour and Meik, having been requested to report, in turn, asked Messent, then engineer to the TIC, to give his opinion. Messent noted that the river's bar had not improved during the 20 years he had been familiar with the harbour and he stated that no improvement could take place until the piers were extended; although they were not in a perfect condition their repair should be on an ad hoc basis rather than a complete rebuilding.[2] His comments led to the north pier being extended in concrete by 120ft. No Parliamentary powers were sought but construction work was later noted by Meik as "already having a beneficial effect on the harbour entrance. Vessels now find the harbour easier to take in rough weather and there is less rough water on the bar."[3] Further dredging, though, was still required as the harbour needed a greater tidal capacity in the upper reaches so as to increase scour.

To raise additional funds the WHC agreed that a further Act of Parliament was required. Before powers were sought, it was recorded that "it was the intention of Mr. Andrews to release the Harbour from all claims for back interest which will amount to a very large sum and also to strike off about £14,000 of his debentures"[4] and, on this undertaking, the Act permitted the WHC to borrow up to £30,000 on the security of the harbour revenue. The Act, providing for the reduction of Andrews's debenture to £170,000, made provision for its repayment within a 60-year period, either by instalments or by the creation of a sinking fund.[5]

At this time the pattern of coal production in the area changed. Originally, the major source of Amble's throughput had been Radcliffe but

over the years Broomhill, through Andrews, increased its share of shipments and geological problems at Radcliffe in 1892 led to its closure and to the sinking of new shafts at Newbrough; a mile distant.[6] Later, in 1900, all collieries came under one management and the Broomhill colliery formed its own railway to connect with the earlier Radcliffe line, so avoiding completely the use of the NER. Production of coal continued to increase and to accommodate the greater shipments the Broomhill quay was extended eastwards, Meik recommending that it should eventually stretch as far as the south pier, its line cutting off the southern part of the estuary and its open structure allowing waves to spend themselves on the beach. At this period, too, the north jetty was extended to almost 900 ft, its construction having had a beneficial effect on both the scouring action of the tidal flow and the dispersion of waves.**

In 1897 coal shipments, for the first time, reached ½m tons, 388,000 tons from Broomhill and 109,000 from Radcliffe, and the increasing trade of the port caused the WHC to convene monthly.* Radcliffe Colliery complained of dredging as being inadequate and to improve the harbour still further it was agreed to seek additional Parliamentary powers. A petition was prepared seeking "to construct New Piers, or Breakwaters, Tidal Dock, and subsidiary work, to Dredge and improve the Harbour (and) to reclaim lands and foreshore."[7] Thomas Meik, active in the ports of the region for many years, had died in 1896 and it was his son# who prepared the drawings of the projected works. The intention of the WHC was to lengthen the north pier by some 1,000 ft and to provide a new south pier, 1,300 ft long, the two together embracing a much greater harbour area. Perhaps the result of port congestion, the drawings also showed a tidal dock situated at the up-river end of the Radcliffe staiths and providing seven acres of water.[8] Introduced into the House of Lords, the Bill was rejected in Committee.

** See Map 15

* A new purpose-built office was opened at this time.

Patrick Walter Meik, in partnership with David William Nisbet.

In 1901 Sir Christopher Furness became a member of the W H C , presumably by virtue of his having purchased land at Radcliffe[9] and his views would seem to have carried great influence within the commission, certain items being deferred until such time as he was present. A further extension of the north pier was undertaken and dredging carried out so as to give a water depth of eight feet at low tide, the dredger being purchased from the Hartlepool commissioners for £1,500. Work on the pier was completed in 1903, having cost £4,582 and beenbuilt by direct labour. Problems with the bar were still prevalent, Meik in 1905 reporting that they were due to silt being deposited by the river and sand by the tides. Under Meik and Nisbet dredging had been confined to the river and the increased scour had improved the water at the bar but still it was insufficient and they considered that it would be removed only by further pier extension; an elongation of 600 feet was likely to cost £60,000 and so would perhaps be impracticable. Conversely, further dredging could be undertaken.[10]

The WHC accepted Meik's recommendation concerning dredging and in 1905 Furness suggested that the final length of the south jetty be formed, linking it to the south pier which, in turn, should be extended by 240 ft. The need for these measures was emphasised by the Broomhill Collieries Ltd., and it was agreed to form the jetty immediately provided that the colliery funded the operation;[11] the pier extension, again in concrete, was also sanctioned. The colliery company was asked to guarantee the cost of the work, Board of Trade approval was given, work was put in hand and was completed in 1908 so bringing to an end the port developments undertaken prior to 1914. Their completion also brought about the severance of Meik's involvement and the appointment of John Sanderson as engineer. Dredging, amounting to some 150,000 tons p.a., had improved the harbour and resulted in 7 ft depth being available at low water. Coal shipments had continued to increase and in 1908 amounted to 758,000 tons, 418,000 tons from Broomhill, 325,000 from Newbrough and 15,000 from Shilbottle.

Timber was virtually the port's only import and by this time 6,270 loads were brought in, some 7,000 tons.[12]

From 1905, problems were encountered regarding the north pier, where settlement occurred and cavities appeared. Repairs put in hand comprised the casting of 20 and 30 ton concrete blocks and their somewhat random placing to protect the older work. The concrete wall built to extend the north pier landwards experienced undermining and slag from Hartlepool and Middlesbrough was used to protect it. Its success was such that in 1913 it was recorded that "the blocks and slag deposited on the seaward side of the extension have saved this part of the pier from total destruction."[13]

The dependence of the harbour upon the collieries of the immediate area had been complete and at no other port had the mining interests been so dominant.* At all times, works expenditure had been sanctioned by the collieries and although the 1893 Act had made provision for the repayment of debentures, by 1909 the figure still stood at £170,000. The Broomhill Colliery Ltd., was in addition creditor "for £9,030.19.8. cash advanced for improving the accommodation of the harbour"[14] and the WHC was asked to increase revenue in order to meet its liabilities, the first such request. The solution was to increase from 3d to 4d the rates on both ship tonnage and on coal and it is perhaps significant that these increases, apparently imposed, were followed by a reduction in the throughput of the harbour.

7.9 Summary

The period which spanned the end of the century was especially notable for the development of the port of Blyth, accomplished by the formation of a commission and the co-operation of the NER, and for the relative decline of the Wear as a coal exporting river, principally due to renewed competition from Seaham Harbour. The output of coal both in the United Kingdom and in the North-East had continued to rise, but at a rate lower than before, the relative fall-back on the part of the region evidenced by the annual compound growth rate of 1.8% as compared with the earlier

* Seaham Harbour remained, in part, in a situation similar to Amble.

2.8%. The shipment of coal, however, continued to increase and although exports rose at a somewhat less rapid rate, nevertheless by 1913 they made up 72% of the total.

Coal Output and Shipments, 1885-1913.

	1885[1] 000 tons	1913[2] 000 tons	1885–1913. % p.a.
U.K. output	159351	287411	2.1
N.E. output	35091	58676	1.8
N.E./U.K. %	22	20	-
N.E. Shipments	16773	35204	2.7
N.E. exports	c9407	25473	3.6
Exports %	56	72	-

The proportions of coal shipped from each of the ports changed significantly in the years immediately prior to the 1914-18 war. Shipments from Blyth increased nine-fold, to 4.73 m tons. The Tees and Hartlepool both doubled their throughput but in percentage terms remained steady. The ports to suffer were the Tyne and the Wear. By its take-over of the Blyth and Tyne Railway the NER was able to ship Northumberland coal at Blyth, through its own staiths at river berths, without being forced to use the Northumberland Dock staiths of the earlier B&TR or the TIC staiths adjoining. The deprivation of Northumberland coal was masked by the acquisition of additional Durham supplies, again shipped through the NER's own staiths at Dunston, a process which rapidly proved a success, cheapening transport and to a certain extent relieving the NER from the necessity of enlarging Tyne Dock, by then shipping 7 m tons p.a., more than one-third of the river's total. It was claimed that more coal was, in aggregate, shipped from the Tyne Dock than from any other in Great Britain.[3]

Shipments of Coal from the North-East: 1885-1913.

	1885		1913	
	000 tons	%	000 tons	%
Tyne	9877	59	19699	56
Wear	3981	24	4857	14
Tees	126	1	228	1
Blyth	533	3	4732	13
Hartlepools	1215	7	2400	7
Seaham	788	4.5	2659	7
Amble	253	1.5	629	2

From its inception, the fortunes of Seaham Harbour had been inter-linked with those of Sunderland but it was not until 1900 that the NER took over the Londonderry Railway with the intention of continuing it southwards to Hartlepool, so enabling coal from the recently developed undersea collieries to be shipped through its own docks. In this endeavour it was frustrated by an agreement whereby Easington coal was to be shipped at Seaham and the enlargement of the docks there precluded the NER from taking full advantage of its own port; nevertheless Hartlepool was able to maintain its share of shipments while those of Sunderland fell, diverted either to Seaham or to the Tyne.

Coal Statistics: annual prcentage increase (compound): 1885-1913.

	Period	% compound p.a.,
Tyne	1885-1913	2.5
Wear	1885-1913	0.7
Tees	1885-1899	-2.4) 2.1 av.
	1899-1913	6.2)
Blyth	1885-1913	8
Hartlepools	do	2.5
Seaham	do	4.4
Amble	1885-1899	5.4) 3.3 av.
	1899-1913	1)

Of the several ports, only Blyth, Seaham and Amble exceeded the average

figures of 2.7 % p.a. compound growth rate for shipments of coal from the region, with 8, 4.4 and 3.3% respectively. The figures concealed some irregularities in that at Amble the principal growth occurred before 1900 whereas on the Tees an extremely rapid increase - from a low base - took place after that date; there, the earlier years of the period witnessed a reduction in the tonnage of coal shipped, on the Tees not necessarily a symptom of decline, but, to a certain extent, one of prosperity in that the demand for ironmaking was such that little coal was available for shipment. The relationship between the iron and steel industry and the NER was close and it was ship-building, a major user, which partially brought about a recovery in the profits of the NER between 1886 and 1890, a recovery linked, too, with both iron making and with the shipment of coal, the latter rising by 23% in the five-year period which ended in 1891. This increase "preceeded the general revival of activity and was maintained after the falling-off in shipbuilding and exports removed major expansionary impulses."[4] There is little doubt that the pattern of port development was much influenced by the policies of the NER," before almost everything else, determined to promote prosperity throughout its area and not just (at) an occasional and highly favoured place."[5] Other than at Seaham and Sunderland, it improved its facilities at all ports.

Relatively, the greatest changes and improvements occurred at Blyth and Seaham, the latter virtually untouched for three quarters of a century. Whereas the three major rivers had come under the control of commissions in mid-century, Blyth remained a company and Seaham privately owned; it was not until 1882 that Blyth was operated as a commission and 1898 that Seaham became the responsibility of a company. The changesbrought about major new works and a greatly increased throughput of coal, at Blyth by means of staiths on the river and at Seaham by means of a dock, necessary there on account of its location.

During the period, no other new dock construction was undertaken.

The need to accommodate bigger ships made uneconomical their building and such were the rates of loading now available that it became advantageous for ships not to use them - they could be restrictive - but to lie at deep-water staiths in the river, so facilitating entrance and egress.* In spite of this change the port authorities were not able to abandon their docks, needed still to provide harbour space, and all put in hand programmes for deepening and improvements, the exception being the T I C , its Northumberland dock incapable of improvement and the Albert Edward Dock uneconomical.

The period witnessed, too, further work on the protective piers considered essential for the harbours' operation. Those on the Tyne were rebuilt, those on Wear and Tees were completed and the pier at Blyth was extended. Modifications were also made to the sea entrances at Hartlepool and Sunderland while at Seaham, completely new piers encircled the enlarged dock. Although no longer an era of dock construction, nevertheless capital expenditure remained high. The formation of deeper river berths involved extensive dredging, both to increase the rivers' depth and to maintain it afterwards. Whereas much of the earlier dredging had involved only the removal of sand and silt, more of that undertaken in this period was in rock, incurring considerable effort and expense.

With the decline of the chemical trade and the few demands of the engineering industry it remained shipbuilding and the shipping of coal which placed the greatest demands upon the ports. Shipbuilding - principally in steel - continued to increase, albeit cyclically, with merchant shipping output peaking in 1906 at over one million tons register. The total comprised 334 ships, an average of 3,000 tons. The peaks for the several ports did not coincide but, other than for Hartlepool, follow similar patterns.

* The only completely enclosed dock system was at Seaham.

Shipbuilding: peaks in production.[6]

Year	Port	No.	Tonnage	Av. size g.r.t.
1901	Tees	46	161058	3501
1906	Wear	97	326701	3368
1911	Tyne	117	412959	3529
1913	Hartlepool	33	153071	4638
1906	Total	334	1005148	3009

So far as the use of the rivers was concerned, the average cargo size continued to increase and records indicate that, for the Tyne between 1885 and 1913, average registered tonnage rose from 428 to 783. Assuming that all ships cleared with coal, the corresponding deadweight tonnages would have been 673 and 1,627; ships of up to 10,000 tons dwt used the rivers.

It is apposite to consider the demographic change which had taken place in the region and which provided some impetus to adjustments which were made to the commissions' constitutions. Between 1851 and 1881 the major changes in population took place in Durham, the Tees area - extending into Yorkshire - reaching an annual compound increase of almost 6%. By the succeeding period this figure had fallen to 1.4% but it had established Middlesbrough as the dominant town with a population approaching twice that of Stockton; in 1881 the two towns had been similar in size. The comparative decline of the port of Sunderland is reflected in its population change following 1881, the lowest rate of increase in the region. In Northumberland the position was reversed with the growth rates of both Amble and Blyth accelerating. The changes in the populations of the individual ports is paralleled by the figures for the counties as a whole; the Tyne, a port of both, maintained a constant rise.

The growth of towns other than the four originally forming the TIC was significant and it is understandable that Jarrow should have become

North East Ports: Population 1851-1911[7]

	1851	1881	1911	Compound growth, % p.a.		
				1851-81	1881-1911	1851-1911
Amble	1040	2016	4881	2.2	3	2.6
Blyth	6976	12888	30591	2.1	2.9	2.5
Newcastle	89156	150252	266603			
Gateshead	24805	51304	116917			
North Shields	30524	46364	58816			
South Shields	35790	65480	108647			
Others	23795	68594*	137466#			
Tyne total	204070	381994	688449	2.1	2	2
Sunderland	70576	139288	151157	2.3	0.3	1.3
Seaham & Seaham Harbour	4267	10713	15757	3.1	1.3	2.2
Hartlepool	9503	)				
West Hartlepool	4008	)48613	63923			
Hartlepools total	13511	48613	63923	4.4	1	2.6
Stockton	10172	51209	58521			
Yarm	1647	1485	1617			
Middlesbrough	7631	55373	104767			
Tees total	19450	108067	164905	5.9	1.4	3.6
Northumberland	303568	434086	696893	1.2	1.6	1.4
Durham County	390997	875166	1369860	2.7	1.5	2.1

* Heworth, Jarrow, Wallsend.

Jarrow, Felling, Hebburn,Gosforth, Wallsend.

represented in 1886 and even more so that the dues payers, not necessarily sympathetic towards the municipalities, should take a part in 1898. On the Wear, the RWC suffered under the largest body of commissioners in the region, although at 52 it was only a third of its earlier size. It was the subject of some criticism and was referred to as an example not to be emulated. At Blyth a readjustment was made to the BHC, enforced by the port's users threatening to make changes from without, a ploy earlier used on both Tyne and Tees. The confidence of the commissions brought about the building of new offices, in Newcastle, Sunderland, Blyth and Middlesbrough, a move not unique to the ports and paralleled by the water and gas undertakings on Tyne and Wear.

Relationships between port authorities and municipalities were significant only on the Tyne and Tees, natural in view of their histories and representation. In the 1880 s the exhortations to complete the improvement of the upper reaches of the Tyne were many but the failure of industry to be attracted to the area above Scotswood led to a diminution in outcry. Nevertheless the improvements up to that point proved of inestimable benefit both to Armstrong and to the NER, with its new staiths at Dunston. Newcastle remained somewhat negative in its outlook and perhaps misguidedly undertook still further extensions to the town's quay. The corporation did not enjoy good relations with the NER, as late as 1892 supporting another railway into Newcastle, so hoping to break the NER's monopoly. The corporation was sceptical also of the utility of the Albert Edward dock but, in spite of its own fears, Newcastle was looked upon by the other towns as the one which had benefited most from the works of the TIC.

The TCC experienced similar problems, its municipalities both as members of the commission and otherwise exhibiting conflict. Here,too, the force was demographic, exacerbated by some down-river migration as iron manufacturers sought to build quays to off-load ore imports. Such were the struggles within the commission that one member was forced to resign while in 1888 an injunction was threatened by Middlesbrough to

prevent the TCC from expending further money on the upper river until the town's representation was increased. Stockton suffered, or thought itself to suffer, in the same way as did Newcastle. A dock was suggested there as late as 1893; it did not proceed but quay works did in spite of the fact that Stockton's share of the Tees's trade was diminishing and by the outbreak of war not more than 8% of the river's revenue originated in Stockton, by then used principally by ships of lesser tonnage.

Civic relationships at Sunderland and at Blyth were somewhat different. The river Wear had long been in the hands of a commission and, although now reduced in numbers, it was in effect perpetuating the former body. Amalgamation with the dock company had brought little change, perhaps because of the containment of Sunderland and the fact that its industries other than shipbuilding, were fragmentary. There were there no powerful figures such as on Tyne and Tees and although the town authorities had been critical of the RWC nevertheless, as late as 1909, that representation was still sought. At Blyth, the Ridley family was dominant on the commission, as it had been within the company. Unlike the Tyne and Tees, Blyth paid only lip-service to municipal representation and when reform was sought in 1911 - it led to Ridley threatening to withdraw from the BHC - it was on the grounds of inadequate representation by the river's users, a process seen earlier regarding both the TIC and the TCC; at Blyth, the NER was represented on the commission.

In relation to port development, perhaps the major force in the region was the NER. Its influence increased after its take-over of the B&TR in 1874 and it was its ability to provide shipping outlets at will which governed the region's progress. In its policy of refraining from favouring specific ports the NER was successful; other than at Seaham and, to a lesser extent at Sunderland, it provided considerable capital in providing and improving docks and staiths at all of them. Nevertheless the NER was conscious of economics, both in the transport of coal from the region

and also within it whether by sea or by rail, and it was as a result of this outlook that it had "entered into marine operations not...to diversify out of railways, but for the rational reason that if it had not done so it would have seen important business lost to other ports and railways."[8] By the end of the century Gibb, the NER's general manager, was to write that dock investment was no longer enough to ensure that balanced competitive trade could be held by local ports as "the connection between sea carriage and land carriage is very close."[9] It was this outlook, held by others a century earlier, which resulted in the NER undertaking capital projects at a time of relatively slow growth in revenue. Although the tactics of coal transport and shipment were decided by the several bodies of port commissioners it was the North Eastern Railway which largely dictated the strategy.

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8. CONCLUSION

8.1 General

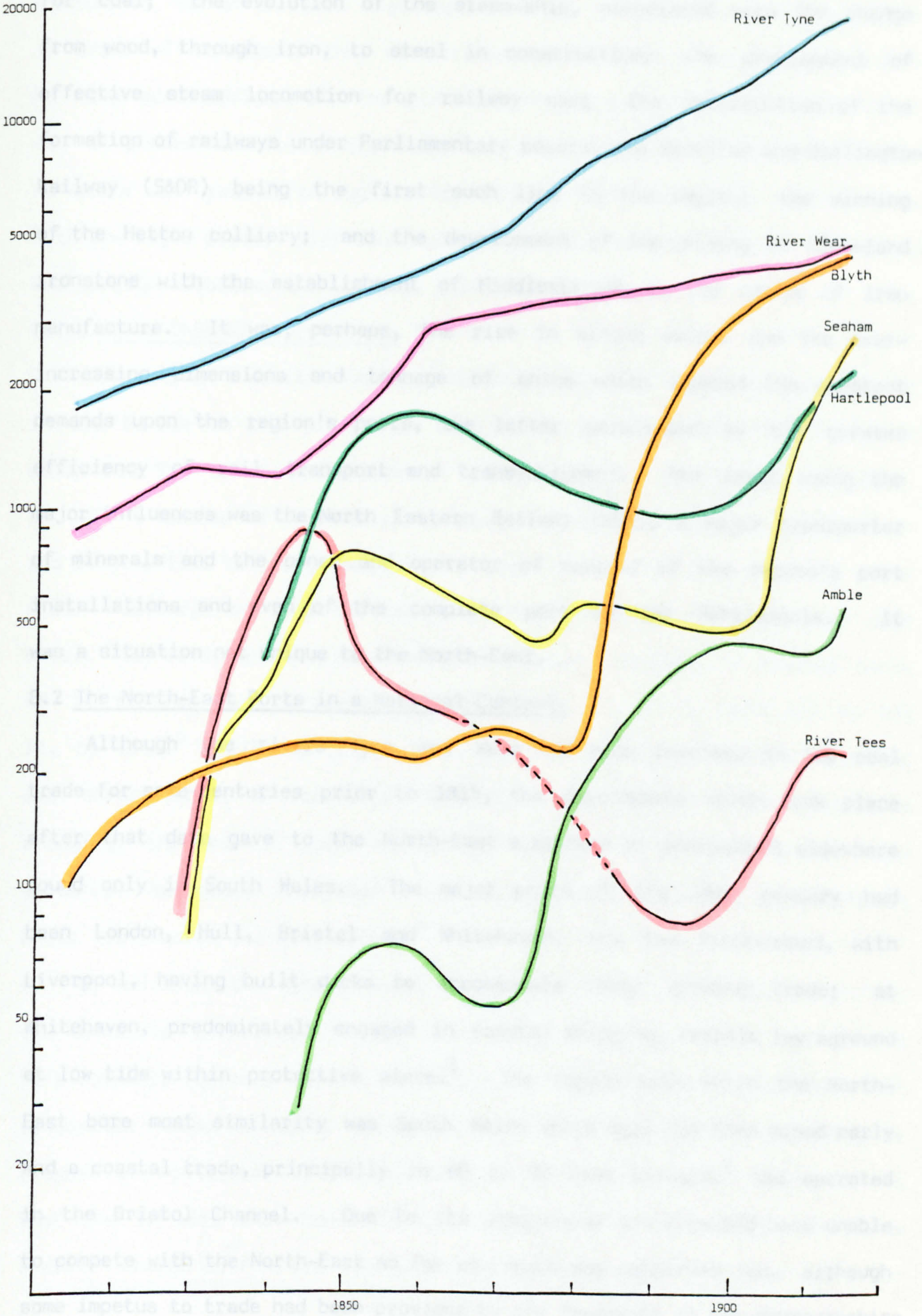
During the period 1815-1914 the North-East was a notable example of "the truism that the continued growth of coastwise shipping was dependent on massive investment in major harbour improvements"[1] on the part of colliery owners, railway companies and river commissions. This general conclusion was, however, not completely true and the Tyne, in the years prior to the 1850 s, had shown that coal shipments could increase with little capital investment on the river - other than by the coalowners themselves - while Amble provided an example of a port on which an inordinate amount of capital was initially expended, with little result.

Although the region as a whole had experienced a continuous growth in both industry and in population, neither had been uniform. From the point of view of coal production, the major influence on the development of the rivers, there were several phases within the century: near to the rivers Tyne, Wear and Blyth; from areas to the south and west of the old-established mines; the expansion of the Northumberland steam-coal area; and the move eastwards of mining in Durham county, culminating in the establishment of the undersea collieries between South Shields and Hartlepool. Each phase had established its own growth pattern but, again, they were influenced by other factors, principally capital expenditure on port facilities and the adequacy, or otherwise, of the rail links to the ports. The north-eastern ports had grown with the coal trade but their fortunes were inter-linked one with another, a relationship shown by the plots of their annual coal shipments. What is not obvious however, is the growth of the ports in the south; the Hartlepools' importance as a coal exporter declined as general trade and engineering increased while the Tees was transformed from a coal-exporting river to one almost wholly dependent upon the iron and later the steel industry.

Growth in the North-East was the result of several major influences

Coal Shipments: 1815-1914

(000 tons per annum)



other than coal production. Difficult to rate, they may be listed as follows: the development of the steam engine with its concomitant demand for coal; the evolution of the steam-ship, associated with the change from wood, through iron, to steel in construction; the development of effective steam locomotion for railway use; the introduction of the formation of railways under Parliamentary powers, the Stockton and Darlington Railway (S&DR) being the first such line in the region; the winning of the Hetton colliery; and the development of the mining of Cleveland ironstone with the establishment of Middlesbrough as the centre of iron manufacture. It was, perhaps, the rise in mining output and the ever-increasing dimensions and tonnage of ships which imposed the greatest demands upon the region's ports, the latter paralleled by the greater efficiency of rail transport and trans-shipment. Not least among the major influences was the North Eastern Railway (NER), a major transporter of minerals and the owner and operator of several of the region's port installations and even of the complete port of the Hartlepools. It was a situation not unique to the North-East.

8.2 The North-East Ports in a National Context.

Although the rivers Tyne and Wear had been involved in the coal trade for some centuries prior to 1815, the development which took place after that date gave to the North-East a pattern of development elsewhere found only in South Wales. The major ports of the 18th century had been London, Hull, Bristol and Whitehaven, the two first-named, with Liverpool, having built docks to accommodate their growing trade; at Whitehaven, predominately engaged in coastal shipping, vessels lay aground at low tide within protective piers.[1] The region with which the North-East bore most similarity was South Wales where coal had been mined early and a coastal trade, principally in 60 to 90 tons vessels,[2] had operated in the Bristol Channel. Due to its remoteness the area had been unable to compete with the North-East so far as London was concerned but, although some impetus to trade had been provided by the formation of the Monmouthshire

canal,[3] the greatest expansion was to follow the establishment of a railway network.

The development of the north-eastern ports comprised three principal components, all of a civil engineering nature. Again difficult to place in order of importance they were river channel improvements, the provision of dock accommodation and the building of protective piers. The first was a phenomenon found elsewhere only on the Clyde; the construction of docks was general throughout the kingdom and comparisons may be made with the major ports; pier construction was more akin to Admiralty undertakings, and foreign harbours, than to U.K. commercial ports.

8.2.1 River Channel Improvements

Glasgow, in a position similar to Newcastle and Stockton, was limited in its access to the sea by the restrictions of the river Clyde, a situation which had led to the establishment downstream of Port Glasgow in 1668. In 1768 a scheme of improvement by transverse jetties had been implemented and longitudinal training walls built under Rennie had improved the river still further; by 1806 the depth had been increased to 8½ ft. at high water. By 1830, solely due to the use of steam dredgers, a maximum depth of 14 ft. had been achieved, to increase to 22 ft. by 1880 and to 26½ ft. by 1900.[4] Although the river channel had been widened, deepened and straightened, a report by Walker in 1840 led to further extensive dredging, the next 25 years witnessing the removal of some 14 m cubic yards of material; by 1880 the total had reached almost 24m, with 1½ m cu. yds removed ina single year.[5]

By contrast the Tyne's early improvement - due to the inactivity of Newcastle Corporation - was greatly retarded, the Tees, administered by a company, less so; on the Wear dredging had begun in 1797, the first systematic steam dredging operation. On the Tees, channel narrowing by groynes was initiated by Brooks and it was not until he transferred to the Tyne in 1842 that Newcastle Corporation put in hand significant works there. Change on Tyne and Tees was accelerated by the formation of river

commissions and in the case of the Tyne the appointment of Ure as engineer in 1858 brought with it a professionalism not earlier witnessed. From 1845 Ure had been employed on the Clyde and under his direction river improvements there had been given some considerable impetus.[6] Similarly, his appointment to the Tyne at the instigation of James Cochrane Stevenson - a commissioner and himself from Glasgow - was to bring to the North-East the same urgency. The improvement of the Tyne was undertaken at a rate even more rapid that the Clyde's. From c ¾m tons in 1861, the annual rate of dredging rose to 5¼m tons* by 1866. The Tees, later and to a smaller scale, sought to emulate the Tyne, increasing its maximum rate of silt removal to some 1 m tons in 1876. On the Wear, too, dredging was undertaken, an advantage there being the fact that carriage to sea was much cheaper than on Tyne and Tees, due to the river's lesser length.

Writing in 1880, Vernon-Harcourt# noted that the north-eastern rivers had been vastly improved throughout their navigable lengths but he warned that all of them had been dredged to an extent greater than their natural tidal capacity and they would, therefore, require continuous dredging to maintain them[7]. He also gave credit to the several engineers involved in the ports, in that their solutions to the problems - transverse groynes, longitudinal training walls and dredging - had all been appropriate to the three rivers at the relevant stages of improvement.

How did the up-river ports seek to retain their viability? Newcastle and Stockton, like Glasgow, were relatively remote from the rivers' mouths and it was only by virtually forcing the commissions to improve the rivers, that they were able to retain their importance. On the Tyne, improvement led to the construction of extensive quays and warehouses at Newcastle, although never profitable. Similarly Stockton was enabled to retain its role as a port for some time although it, too, was overtaken by increases in ship tonnage which in turn led to the major trade of the river taking

* Equivalent to 3½m cu.yds.

Leveson Francis Vernon-Harcourt (1839-1907), professor of civil engineering, University College, London.

place in its lower reaches. The fact that Newcastle remained a supposedly flourishing port was quoted as having been partly instrumental in Manchester's decision to build the ship canal, so establishing that town as a major port.* Viewed with hindsight, the respite given to the up-river ports was only of a temporary nature.

A more important result of river improvement became later apparent on the Tyne. In 1876, the Scotswood Newburn and Wylam Railway abandoned its earlier plans to form a dock at Scotswood on account of the inadequate state of the river but such was its subsequent improvement that by 1893 the NER was enabled to build high-capacity river staiths at Dunston# so as to reduce rail freight charges and circumvent its own dock at Jarrow, working near to its capacity. Such had been the growth in ship tonnage that it had proved cheaper to form deep-water river berths and so avoid delays in entering and leaving docks. The pattern of coal trans-shipment had turned through a complete circle, in principle reverting to the c 1800 system.

8.2.2 Dock Construction

The provision of docks in the North-East, late by national standards, was initiated at Seaham, first operational in 1831. Docks provided three advantages: a constant water depth; the prevention of the grounding of vessels; and the provision of an additional area of water. It was the two last-named which were of the greatest importance as, unlike the Bristol Channel, tidal range was not a particular problem in the North-East; as ships increased in size certain dock gates came to be removed and the docks operated as tidal basins.+

Dock construction in all three of the nation's major ports had begun in or before the 18th century* and by the 1830s the areas of the London, Liverpool and Hull docks totalled approximately 290, 180 and 40 acres

* The Act of Parliament for the canal was obtained in 1885.
# A similar procedure was adopted at Blyth.
+ A gated dock was completed at Seaham in 1905.

respectively, all for general trade. Dock construction provided security, an Act of Parliament passed in 1803[8] having legislated for the holding of certain goods in bonded warehouses; the provision had been extended by a second Act, passed in 1823.[9] Enclosed docks with quayside storage followed at the major ports but with little general trade, no such provision had been made in the North-East. It was the need for a gated dock at Seaham, with no natural protection, which led to the formation there of two small docks, designed predominantly for the export of coal. To the successful sinking of the Hetton colliery can be attributed, too, the beginning of dock construct ion in the region.*

The provision of docks in the North-East did not bring to an end the use of trans-shipment staiths on the river banks. Staiths, and their railways, had been widely used, and financed, by the coal owners and there was a natural reluctance on their part to write off their investment and provide, or pay for, new facilities at the docks. As a result, considerable tonnages of coal continued to be shipped on the Tyne and Wear themselves, clear of the docks, notable exponents of this procedure being the Bowes, Hetton and Lambton undertakings.

Contrasting with the North-East, the Bristol Channel ports were not able to adapt their rivers for such use, a direct result of their vastly greater tidal range.# The first of them to have built docks was Bristol which in 1803 followed William Jessop's recommendations and formed the river itself into a 70 acre gated dock while providing a new channel for the river's flow.[10] The dock was jointly financed, Merchant Venturers and town, suggested by Buchanan as being "a clever device on the part of the old and corrupt corporate bodies to achieve power without responsibility."[11] Expensive to build, its dues relatively high and its access difficult, its form was the model upon which were based two unexecuted improvement schemes, at Sunderland and at Stockton.

* In reality, the first gated dock in the North-East was at Seaton Sluice in 1764. The new channel there had been provided at each end with gates.

The Bristol Channel tidal range was almost double that of the North-East.

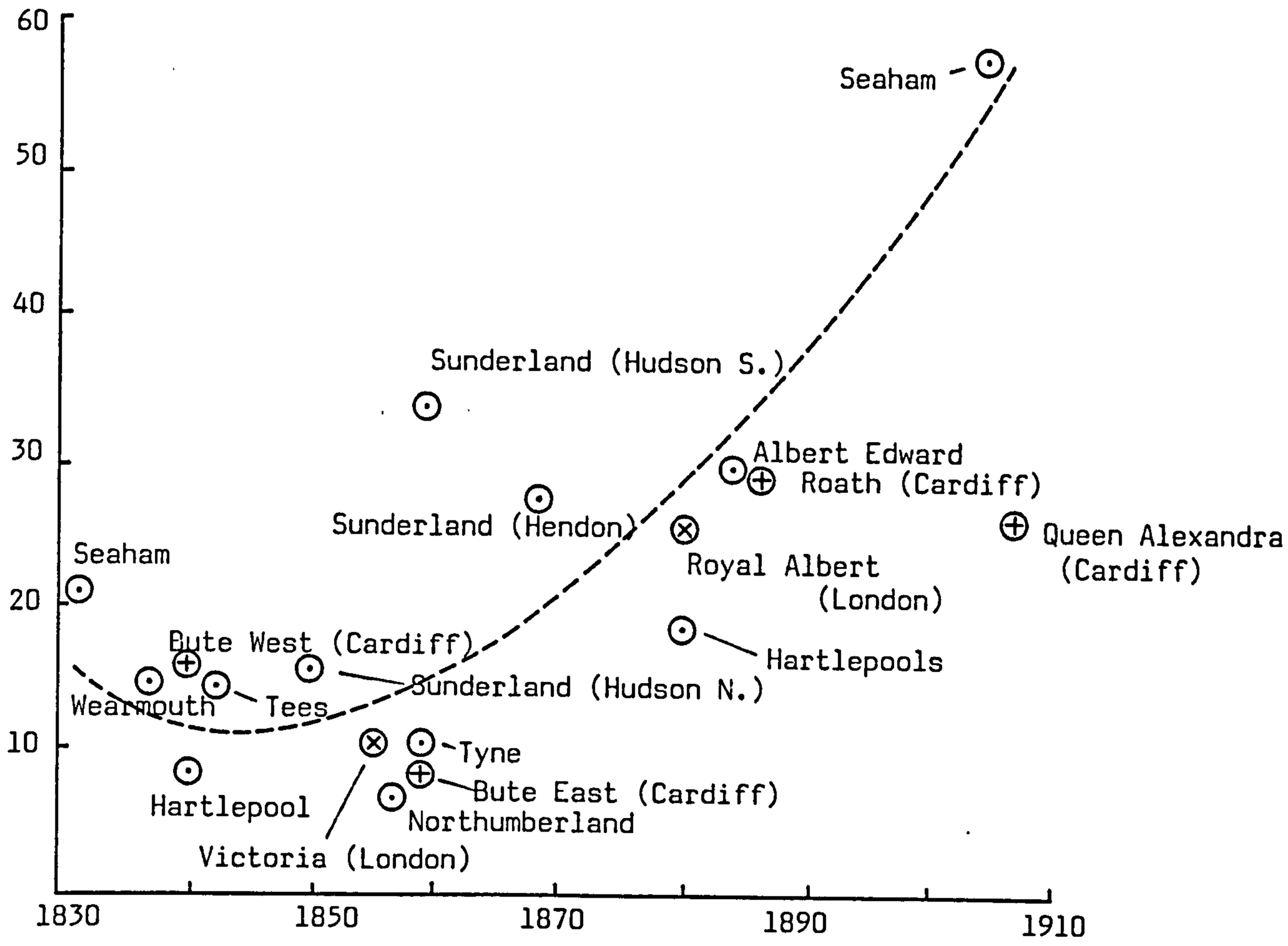
Map 26: U.K. Ports and the North Eastern Railway

The development of the docks of South Wales has been recorded by Jenkins, Chappell, Daunton and John* and although it is not intended to chronicle their history, nevertheless a brief outline is appropriate. Docks were built at Cardiff, the principal coal-shipping port, from 1839 and coal was brought to them by the Taff Vale and, later, the Rhymney railways, completed in 1840 and 1858 respectively. Initiated by the 2nd Marquis of Bute the dock system was later enlarged and by 1907 the total dock area at Cardiff was 163 acres; further docks were built at Penarth and Barry, more accessible from the sea, their construction reducing shipments from Cardiff.[12] Such were the advantages of these later docks that the greatest expansion in coal shipments occurred from 1890 onwards, a marked contrast with the North-East where the most significant later shipping places involved forming deep-water river berths on both Tyne and Blyth.

Docks were built at all north-eastern ports other than Amble and Blyth, although projected at each. Costs, extremely variable, were dependent upon many factors, including area, depth, gate width, locking arrangements, coal-handling plant and the provision of quay walls. With time, gate widths and lock dimensions were increased and similarly greater depths were sought as ships became larger. As a result unit costs tended to increase with time, from a relatively cheap period of building between 1840 and 1860, rising to the later Hendon and Albert Edward docks in the North-East and the Roath Dock at Cardiff. Seaham Harbour's late rebuilding proved the most expensive of all construction, understandable in view of its protective piers and gates, and at Sunderland the outlet to the sea, separate from the river's mouth, inflated unit costs.

* For details, see Bibliography.

Dock Construction: unit costs.



In both coal-producing regions docks were built largely in anticipation of trade, a hope not always fulfilled. Amble, Seaham and Hartlepool were examples of ports built, in effect, on virgin sites, with the two first-named almost private developments, each interdependent with its adjoining mining area. At the other extreme was the Northumberland dock, built almost by accident to enclose a bight already heavily used for trans-shipment. Most dock provision lay somewhere between the two, built to increase and to attract to themselves an existing trade.

8.2.3 Protective Piers

Piers were built at the mouths of the region's rivers for four reasons,

to assist in removing the bar, to afford protection for ships entering port, to dissipate waves and so still the lower reaches of the river, and to form harbours of refuge; for the last three reasons they were built at non-river ports also. Pier harbours were constructed both for trade and for refuge. Such a harbour had been suggested in 1823 for Hartley[13] - but not built - and it was often commented that the north-east coast was poorly served by such harbours, especially necessary for sailing ships. A single pier had been suggested at South Shields by Rennie in 1813, piers had been formed at the entrance to the Wear, a rudimentary pier had been constructed at Blyth but perhaps the best harbour - potentially - was that at Hartlepool, unusually for the region southwards-facing. Such were the havens prior to the building of Seaham Harbour.

After 1831 piers were built at all ports, those of the Tyne, Wear and Tees designed to form refuge harbours, although no public funds were made available. The piers proved of inestimable value in suppressing waves by permitting them to expand after passing through a relatively narrow entrance* and the several pier designers deserve credit for their works. Wake was praised for his work on the Wear[14] and the Tyne was later said by Moncrieff to have the best entrance on the north-east coast; he considered that a dock at Low Lights - its construction narrowly averted - would have destroyed the pier's benefits.[15] All piers achieved their main objectives but as refuges their utility is questionable as ships became safer as the century progressed. Nevertheless it should be noted that a refuge harbour at Peterhead was built as late as the 1890s.[16]

Waves were suppressed at other ports in a manner somewhat different. At Blyth the long north pier was built with internal spurs to deflect through it waves running up the harbour and at West Hartlepool the system of wave reduction - permitting the waves to expand and pass outwards through the piers - was later described by Stevenson as "ingenious and novel."[17] The sea outlets suffered from both wave action and from sand build-up,

* Wave energy was dissipated on spending beaches.

at Hartlepool and at Sunderland sluices being incorporated to scour the basins.*

8.3 The Ports and their Engineers

The trade passing through the north-east ports was of much greater significance if considered on a tonnage basis rather than in terms of value. In 1885 the Tyne ranked third in terms of tonnage, fifth in value of trade.# To render effective the rivers to deal with the great volume of shipping using them a succession of eminent consulting engineers was brought to the North-East, to be followed by the appointment to the several controlling bodies of extremely capable resident engineers.

By 1815, port engineering was no longer a completely new technique. What was new, however, was the scale on which river improvement and pier construction came to be adopted in the North-East. The traditional pattern was the inspection and survey by a consultant, his subsequent report on the work necessary and then its execution - almost invariably by Act of Parliament - under his general control but through the day-to-day supervision of a resident engineer. Invariably, the consultants were men of national standing, many of them quondam presidents of the Institution of Civil Engineers.+ Some lesser works saw the employment of local engineers, nevertheless able men. The consolidation of powers in river government brought to the region men employed as full-time engineers to the several port authorities: on the Tyne were Ure and Messent; on the Wear, Murray and Wake; on the Tees Johnson and Fowler; at Hartlepool, Harrison. Their professionalism was such that they were listened to with respect both regionally and nationally. In spite of their experience, however, mistakes were made and certain schemes - some unexecuted - were defective in concept;

* Later, both sea outlets were closed.

In 1885 Vernon Harcourt ranked the North-East ports as follows: by tonnage; Tyne, 3; Sunderland, 5 = ; Tees, 13 =; Hartlepools, 16: by value; Tyne, 5; Hartlepool, 11 = ; Tees, 13 = ; Sunderland, 17.

+ The Institution of Civil Engineers, founded in 1818, included Telford, Walker, Rennie, Cubitt, Rendel, Simpson, Robert Stephenson, Locke, Bidder, Hawkshaw, Fowler, Vignoles, Harrison, Abernethy, Armstrong, Coode, Alfred Giles, Barry and Matthews amongst its presidents.

others exhibited faults in their detailing. Their major shortcomings were two-fold; an apparent inability to produce accurate estimates of cost and a lack of knowledge of the engineering properties of soils, the former greatly dependent upon the latter. Criticism is easy but unjustified; it is only within the present century that effective site investigation and the study of soil mechanics have rendered less likely - but have not obviated - structural failure and foundation difficulties.

What was new to the region's ports was the development of coal-handling equipment and the automation of dock plant and equipment. From simple staiths developed more efficient drops and spouts, leading later to hydraulic hoists and electrically-driven belt conveyors. This progression was aided by two of the region's major developments, the invention of hydraulic systems by Armstrong and the production in the region of cheap electricity.[1] Hydraulic power was widely used for the operation of dock gates, cranes and warehouse hoists and before the inception of electricity was the almost universal source of power. Such were its benefits that lock and dock gates for example, could be opened in one tenth of the time taken to operate by hand so rendering more expeditious the passage of traffic.[2]

The other aspect of river improvement which was developed in the North-East was river dredging. Skempton has written on the first use at Sunderland of the steam dredger and its subsequent improvement;[3] Riddell has outlined its later history on the Clyde.[4] It was, however, on the Tyne that it reached its zenith with more than five million tons of material being removed in a single year. On the Wear and the Blyth dredging in places proved difficult due to the presence of a rock bed but such was the need for increased depth, principally in the formation of river berths in lieu of docks, that this expensive operation was undertaken by drilling and blasting. The Tyne, its bed alluvium* and its catchment roughly similar to that of the Clyde, was the object of dredging to an extent greater than was the Scottish river, the Thames and Liverpool, ostensibly

* The bed of the Tees was similar.

much more important ports. It was in the improvements made to the rivers' channels that the North-East was pre-eminent.

8.4 The Railways of the North-East Ports.

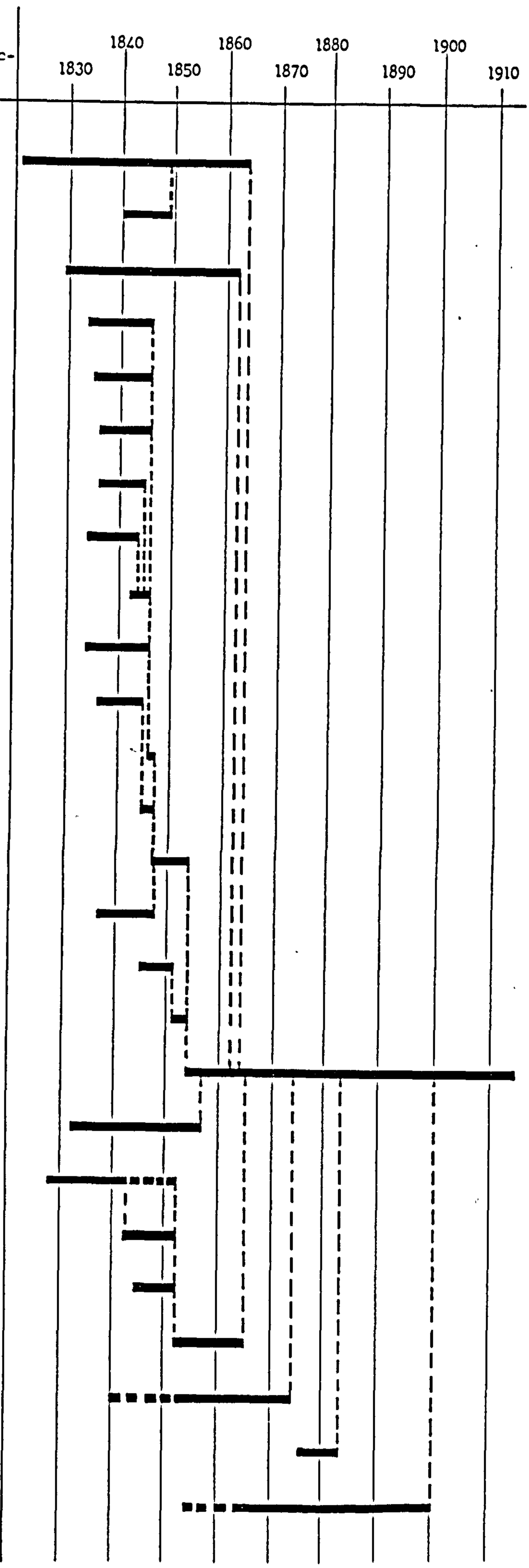
Of South Wales, it has been written that dock construction "facilitated the growth of the mining industry, but such developments would not have been possible but for the enormous wealth stored in the coal measures."[1] This comment applied equally well to the North-East where, again, the link between the two inter-dependent elements was the railway. The early waggonways were converted into, and supplemented by, composite railways and, later, by railways employing only steam locomotive haulage.* Psychologically, though, the principal change occurred in 1825 with the opening of the S&DR, built under Parliamentary powers; others followed. Like the second-stage colliery railways, the new lines ran in a generally west-east direction, using down-river shipping points rather than employing keel transport on the then barely-navigable rivers.

The inter-dependence of railways and trans-shipment facilities was appreciated early, the S&DR, like the Brandling Junction and Stanhope and Tyne railways, providing its own shipping places. A further change was brought about by Hudson's influence, the principal result being the formation of the York Newcastle and Berwick Railway (YN&BR). Hudson, too, appreciated the relationship between rail and sea transport and he sought to control the railways between Tyne and Wear with docks at Jarrow and Wearmouth, a scheme not successfully completed. He also sought to build a Northumberland (Coble Dene) dock, a project frustrated by his being unable to acquire control of the railways to feed it. Hudson also became involved with the Sunderland Dock Company, potentially well-sited in relation to the Durham coalfield but unable to take full advantage of it.

The successful formation of the YN&BR, its major axis in a north-south direction, brought to the North-East a major influence, enabling

* Rope haulage was never completely superceded.

Railway or Dock Company	Date of Act (or construction)
Stockton and Darlington Railway	1821
Middlesbrough Dock	(1840)
Newcastle and Carlisle Railway	1829
Stanhope and Tyne Railway	(1834)
Wearmouth Dock	(1835)
Great North of England Railway	1836
Brandling Junction Railway	1836
Durham Junction Railway	1834
Newcastle and Darlington Junction R'way	1842
Durham and Sunderland Railway	1834
Newcastle and North Shields Railway	1836
York and Newcastle Railway	1846
Newcastle and Berwick Railway	1845
York Newcastle and Berwick Railway	1847
Gt. N of E, Clarence & H.J. Railway	1837
Leeds and Thirsk Railway	1845
Leeds Northern Railway	1851
North Eastern Railway	1854
Hartlepool Dock and Railway	1832
Clarence Railway	1828
Stockton and Hartlepool Railway	(1839) 1842
Hartlepool West Harbour and Dock	1844
West Hartlepool Harbour and Railway	1852
Blyth and Tyne Railway	(1840) 1852
Scotswood Newburn and Wylam Railway	1876
Londonderry Railway	(1854) 1863



Railways serving the ports of the North-East

coal from any source to be shipped, at least in theory, at any port. At first co-existing with the S&DR and with the West Hartlepool Harbour and Railway (WHH&R), the YN&BR later perceived the incursion of the Leeds Northern Railway at West Hartlepool as a threat to its operations, the amalgamation between the two major companies - with the York and North Midland - establishing the North Eastern Railway, its formation by progressive amalgamation shown on the accompanying bar-chart.[2] It was not until 1863 and 1865 respectively that the S&DR and WHH&R were absorbed by the NER, so providing that company with access to all ports, excluding Seaham; it owned docks on Tyne, Wear and Tees, and at the Hartlepools.

Due to its lack of monopoly at Sunderland, the development of the Northumberland steam coal area and the rapidly expanding Cleveland iron industry it was in the north of the region that the NER concentrated its trans-shipment facilities. River staiths were built at Blyth with the co-operation of the harbour commission there and at Dunston, where the improvements made to the river by the Tyne Improvement Commission (TIC) were used advantageously to reduce transport costs and by-pass the down-river docks, the TIC dock inadequate and the NER dock working to capacity. As a result of these moves the NER became possessed of solely-owned facilites able, by 1913, to ship 13.3 m tons of the combined throughput of 25.68 m tons from the two rivers.[3]

On the Wear, the role of the NER was relatively much reduced. Through-put at the Wearmouth dock fell while the Sunderland dock was supplied by both NER and the Londonderry Railway. Coal continued to be shipped at river staiths by the collieries themselves. As a result of what was in effect, the extension southwards of the Londonderry Railway after 1900 and the opening of undersea collieries the NER was able to ship more coal at the Hartlepools which, although NER owned, can not have proved profitable, certainly so far as coal was concerned. The reluctance of the NER to purchase the docks at Sunderland is understandable on two counts; the

ill-feeling between certain NER directors and Hudson, precluding purchase in the 1850s, and the later antipathy between the NER and Lady Londonderry.

What is perhaps less understandable is the reluctance of the NER to purchase Amble and Blyth. In 1860 the NER was asked if it was "disposed to purchase the harbour at Warkworth which (may possibly) be had at present for £15,000"[4] and in 1868 a similar request was made, the NER rejecting both overtures presumably on account of the unprofitability of the harbour and the isolation of its captive coalfield. In view of later developments, somewhat even more inexplicable were the events occurring at Blyth in 1863. The town asked the NER to provide both railway and docks to serve new collieries at Cramlington as the Blyth and Tyne Railway's (B&TR) facilities were "inadequate for the trade... and ... the inhabitants were dissatisfied with the manner in which their requirements were met by that company."[5] It was further pointed out that the shareholders of the harbour company could probably be bought out on easy terms but, again, the NER turned down the proposal, apparently doubtful as to the intentions of the B&TR.

The NER has been well researched by Irvine and by Brooke, the former providing an invaluable analysis of its operations[6] and the latter a detailed description of its amalgamations.[7] Both point to its attempts to serve the region as an entity, a policy which it achieved with some success. Relations between NER and the several port authorities were generally good; with the towns, less so. In dispute with the NER regarding its branch to the Quayside[8] the Newcastle Corporation several times commented that the NER chose to ignore Newcastle and promote the interests of Hull.* This allegation may contain an element of truth in that the NER chose to build its coaling facilities at Jarrow, Dunston and Blyth, rather than on sites which would benefit the Corporation, as a body not noted for its entrepreneurial flair.

The dependence of the north-eastern ports upon their railways was

* Coal shipments from Hull between 1900 and 1913 rose by 120%; the Tyne's increase was 40%.

paralleled in South Wales where the Taff Vale and Rhymney railways served Cardiff, the principal coal-exporting port. There were, however, differences in that the NER, from the 1860s, held a territorial monopoly, its only - but much smaller - competitor the Londonderry Railway. The power of the latter was nevertheless sufficient to keep out the NER from Seaham and to frustrate both its effective use of facilities at Sunderland and Hartlepool and its investment in both ports. In South Wales the situation was somewhat different with Taff Vale, Rhymney, Great Western and Barry railways striving for trade. Other than the Great Western, all South Wales railways were predominantly carriers of minerals as opposed to passengers; goods carriage formed a very small part of the non-passenger traffic. In 1894 the Great Western carried 22.6m tons of minerals, the Taff Vale 13 m, the Rhymney 5.4m and the Barry 5 m tons; by comparison the NER carried 34.9 m tons.[9] Although the Great Western was important in Wales it did not wield such power as did the smaller companies, a reversal of the position in the North-East. In both regions the railway companies had built docks; in both regions, too, the coalowners had been responsible for dock and railway construction.

8.5 The Ports and their Trade.

The trade of the north-eastern ports, at least until mid-century, was principally the outward shipment of coal; imports were restricted. After 1850 the situation changed somewhat in that the growing Cleveland iron industry itself began to consume coal products originating in the southern part of the region, at the same time attracting from the ironstone mines to the Tees the ores used in manufacture. As a result coal shipments there were virtually halted as the railways, principally the S&DR and the WHH&R - and their associated companies - became the main carriers in the district; it was only when foreign ores came to be imported that bulk sea-borne cargoes again flourished. In contrast the more northerly ports continued their expansion, albeit uneven. Development was governed

by three main factors: the increasing demand for coal and hence port throughput; the ever-increasing size of ships; and the changeover which had taken place from sail to steam propulsion. Of these factors the graph noted earlier shows the trend of shipments from each of the region's ports but the accompanying table shows the trend - nationally - in ship dimensions and means of propulsion.

U.K. Registered Ships, 1815-1913.[1]

	Sailing Vessels			Steamships		
Year	Tonnage (000 net)	No	Av.Tonnage	Tonnage (000 net)	No	Av.Tonnage
1815	2477	21861	113	1	8	125
1830	2168	18876	115	30	298	100
1854	3943	25335	156	306	1524	201
1885	3457	17018	203	3973	6644	596
1913	847	8336	102	11273	12602	894

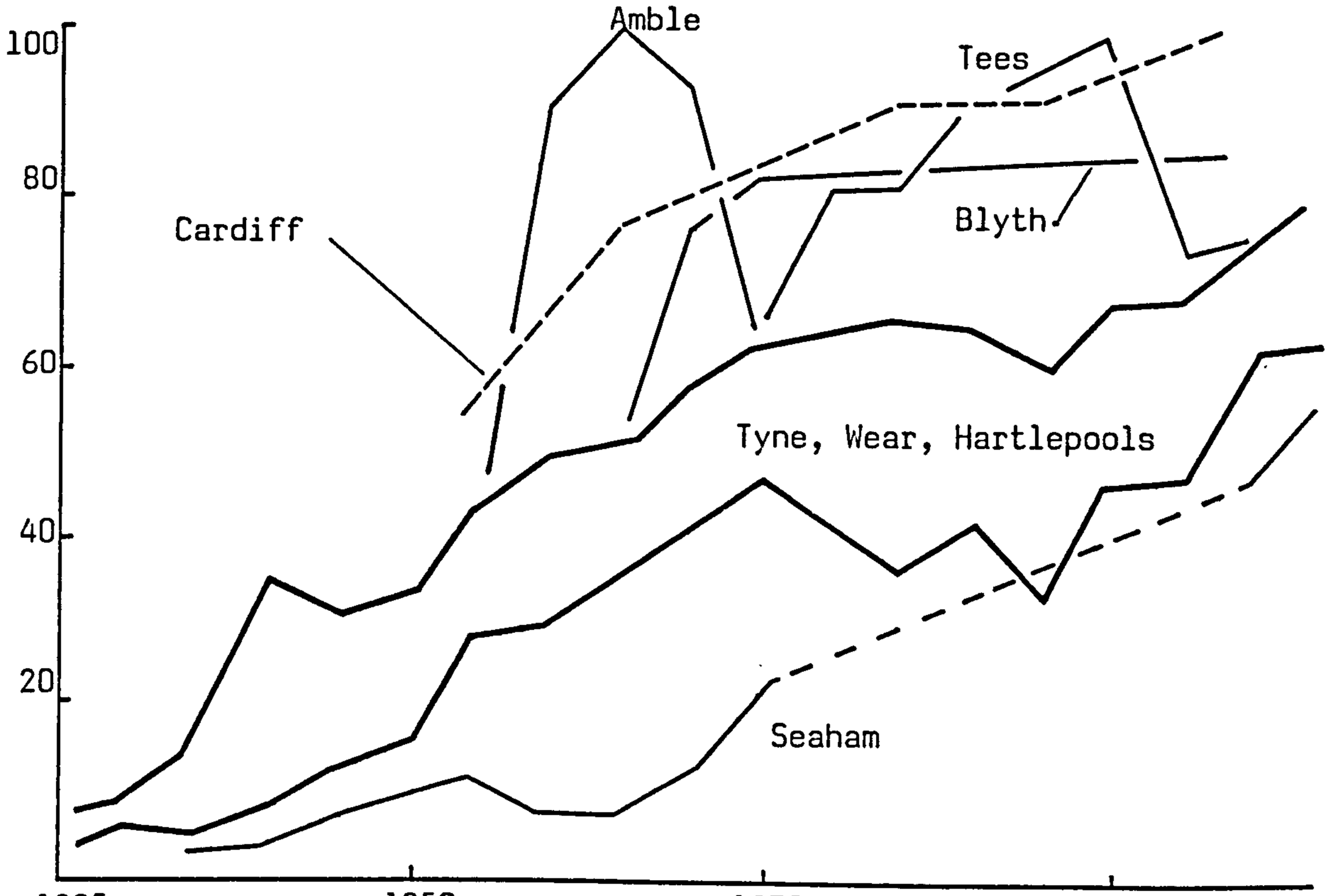
Sailing vessels continued to increase in size until near the end of the century although their average tonnage had only doubled in 70 years. Steamships, however, had undergone a six-fold increase within a hundred years. A further complication was the much superior utilisation factor of the steamship, its benefits being estimated in 1881 as its making four voyages compared with one by a sailing vessel. Taking 1885 as an example, the relative effectiveness of the steamship would not simply be the relative tonnages 3.973 : 3.457 m but 15.892 : 3.457 or 4.6 : 1, a vastly different relationship. It was the necessity of employing fully the more expensive, larger and more efficient steamer that led to the adoption of deep-water river berths in preference to gated docks; it was the limitations of the ports of south-east England, continuing to receive coal by sea from the North-East, which served to restrict the size of coastal colliers. In spite of this, the average size of ship leaving, for example, the Tyne increased at a rate similar to the national average, between 1854 and 1894 from 150 to 485 tons.# Comparisons are not simple as the methods

Mitchell and Dene show the national figures to be 158 and 422 tons.

of ship measurement* varied throughout the century considered and differed vis à vis wood and iron.

In 1815 the vast majority of coal shipments were coastal, principally to London and the South-East. As overseas demand increased so a greater proportion of coal came to be shipped abroad although, in terms of tonnage, coastal shipments continued their upward trend. The proportion of exports was not uniform throughout the region and when shown graphically an envelope may be delineated, embracing the majority of figures. There are some inconsistencies, however, in that Amble and Blyth in the 1870s shipped abroad much higher ratios than did the other ports, perhaps a result of their development having been outside the traditional Tyne and Wear cartels and hence reaching different markets.

North-East Ports: exports/total shipment (%)



The high proportion of Tees exports is understandable. In terms of tonnage the export of coal was insignificant and it is likely that with foreign iron ore being brought into the Tees, coal would be exported in the same

* Notes on measurement are included in the Appendix.

ships. As coal shipments rose at the beginning of the 20th century so the Tees returned to the general pattern. Somewhat different was Seaham Harbour where the proportion of coal exported remained low throughout the port's unimproved period, rising only when major improvements were made and ships of greater tonnage were so enabled to use the port. In South Wales the proportion of coal exported was greater than it was in the North-East and, when plotted, the Welsh figures exceed all those for the North-East, the non-typical ports of origin excepted.

Coal Shipments relative to Output, 1854-1913 (percentages)

	1814	1870	1885	1900	1913
North East	53	42	48	53	60
South Wales	30	59	56	71	79

A further difference between the two regions is in the proportions of coal shipped, relative to production. The reasons for the differences are threefold: the lack of a substantial traditional South Wales coastal trade; the development of the Cleveland ironstone deposits, consuming a significant part of the local output; and the lack of an engineering base in South Wales, so precluding the development of a ship-building industry.[2] The lack of an engineering base did not, however, prevent the establishment of engineering and shipbuilding on Teesside although there the proximity of such industries on Tyne and Wear perhaps brought benefits. It is nevertheless surprising that no similar dissemination of technology became apparent in South Wales where an earlier metal manufacturing industry, receiving its raw materials from Cornwall, had developed into an iron-making trade based on local ores, the production of which exceeded that of Cleveland until 1858. Nonetheless production increased to an extent such that in 1913 Cleveland produced almost 6 m tons of ironstone compared

with only 55,000 tons from South Wales.[3] In terms of output of pig iron the North-East produced 285,000 tons in 1854 and 3.869 m tons in 1913; the comparable figures for South Wales were 750,000 tons and 889,000 tons.[4]

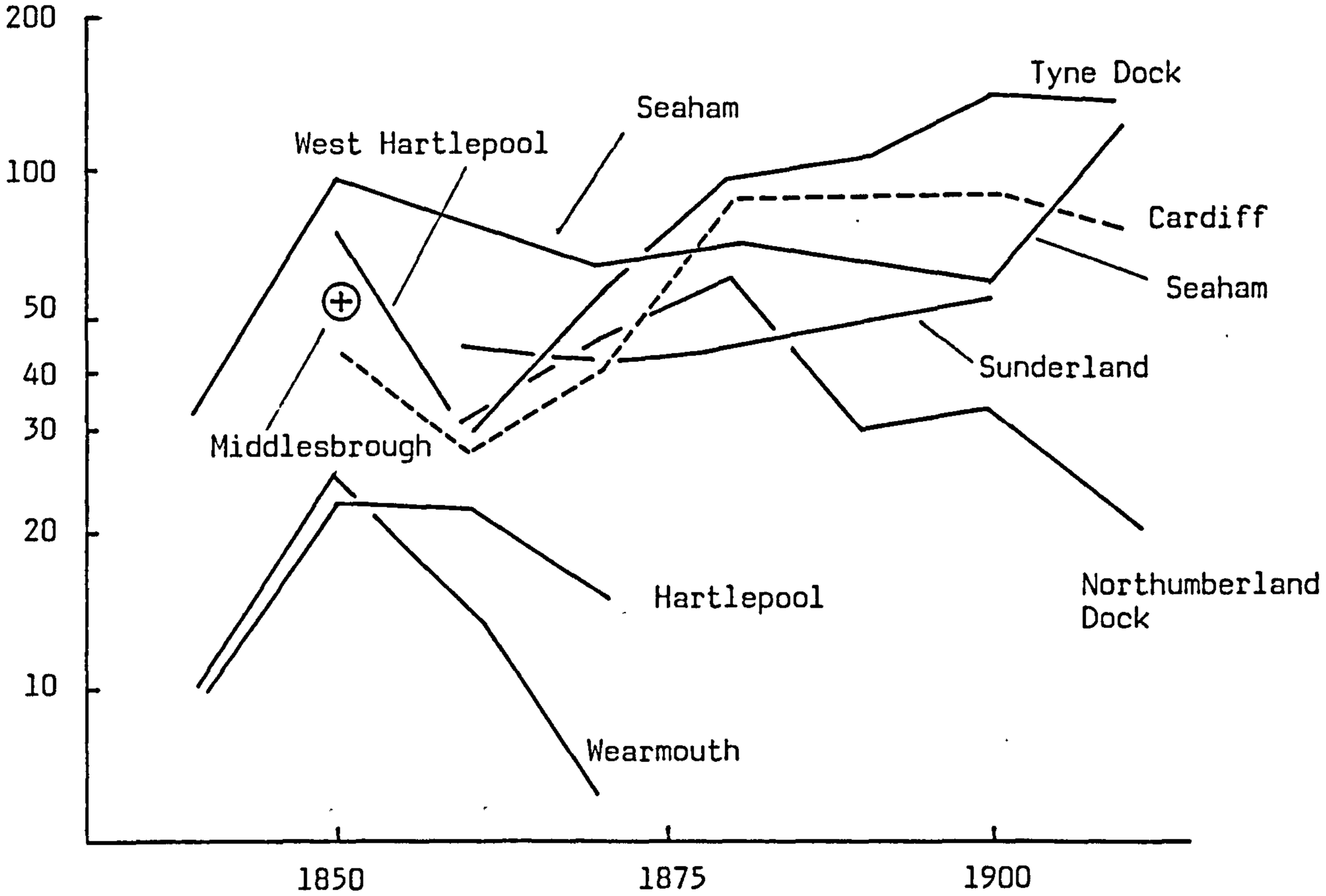
Although the proportion of coal shipped coastwise decreased, the actual tonnage continued to increase, especially from Tyne to Thames where demands for the making of gas, and later electricity, grew. The coastal shipping trade had been affected by the establishment of a rail network from the coal-producing areas to the capital and in 1866 the two major means of transport each brought into London c 3m tons of coal. Thereafter, rail transport predominated and it was not until the late 1890s that sea transport achieved parity, each system then delivering c 7m tons.[5] It was principally bulk contract procedures which had reversed the trend, a combination of the Tyne's up-river Dunston staiths and bulk carriage by sea direct to the point of use.

Figures recorded in the Appendix and produced by Daunton[6] have been used to show graphically, in terms of tonnage per acre, the utilisation of the several docks. Unexpectedly, it was Seaham which most nearly approached the efficiency of Tyne Dock and of Cardiff. Comparing Tyne Dock with Seaham, scaleand size of ships differed enormously but nevertheless each achieved results much superior to other ports. The relatively early demise of the southern docks as coal-handling specialists is also shown but two other points should be emphasised; the steady improvement at Sunderland and the fluctuations in the fortunes of the Northumberland Dock.

Sunderland dock was initially formed without the support of the area's principal coalowners, who continued to ship on the river, and it was only the decision of Londonderry to ship at Sunderland that brought to the docks there a steady trade, albeit a dock under-utilisation compared with others. The unit throughput of the Northumberland dock fluctuated considerably. At first extremely successful the shipments increased

Dock Utilisation: coal shipments

(000 tons per acre)



with the development of the steam-coal mining in the Blyth area, then fell rapidly as a result of the ill-advised building of the Albert Edward dock and the development by the NER of facilities at Blyth. As Tyne Dock improved its efficiency, that of the TIC's Northumberland Dock declined.

It is not easy to relate the efficiency of the coal docks to others although Stevenson,[7] writing in 1874, noted that Tyne Dock recorded a throughput of 40,000 tons per acre compared with the 20,000 for London and Liverpool.* Upon the efficiency of a dock depended the need for its improvement. Again comparing events at Tyne Dock and Seaham it may be seen that completely different methods were adopted. At Tyne Dock

* To correlate with the deadweight tonnage the figures must be net registered tonnage.

the process was one of transforming a large dock by more effective coal-handling; at Seaham it was the virtual replacement of the old docks by new. Both proved the point that the injection of capital into such facilities, providing that trade already existed, brought benefits in trade. Conversely, the formation of the Albert Edward dock, planned to cater for an intangible import trade, brought no benefit to the TIC.

8.6 Port Finance

It is not within the scope of this study to investigate in depth the capital investment in the region's ports, nor to analyse their generated revenues and operating costs. Nevertheless, some general over-view is necessary to provide further indicators as to the success, or otherwise, of the several undertakings. The two authors who have researched this aspect in the greatest depth are Kenwood, who studied capital investment in the north-eastern ports between 1825 and 1850, and Irvine,[1] dealing only with the NER. Kenwood experienced problems in estimating the costs of private developments, a difficulty existing into the period here considered. From the Appendix and from railway company accounts have been taken figures for capital expenditure and revenue and from them unit costs have been calculated for each of the ports, capital on a cumulative basis.

Port Capital Expenditure and Revenue. (per ton of coal)

	1855			1885			1913		
	Capital p	Revenue p	Revenue/ Capital %	Capital p	Revenue p	Revenue/ Capital %	Capital p	Revenue p	Revenue/ Capital %
Amble	312	1.7	0.5	c75	2	2.7	33	1.7	5.1
Blyth	c30	c0.5	1.7	c55	1.9	3.5	25	1.6	6.4
Tyne	5.4	1.1	20	48	2.8	5.8	32	2.3	7.2
Wear	c30	c2.6	8.7	c50	3.2	6.4	52	3.6	7.0
Seaham	c30	-	-	c25	-	-	24	1.9	7.9
H'pools	c100	8	8	-	-	-	-	-	-
Tees	106	6	5.7	-	-	-	-	-	-

The statistics relating to capital investment cannot be considered as accurate. Problems arise due to lack of both financial information

and the relevant records but nevertheless the table - a crude indicator - emphasises both similarities and anomalies amongst the ports: Amble, as noted, proved extremely expensive until fully utilised; the Tyne was under-capitalised but by its scale was able to attract trade. Using Kenwood's figures as a basis, cumulative capital expenditure prior to 1850 produces a unit cost of 23p per ton of coal shipped for the North-East as whole, a figure which emphasises the Tyne's under-investment. It should also be noted that the later considerable capital investment - largely to accommodate bigger ships - so increased throughput that unit costs increased only moderately over a sixty-year period.

In an attempt to assess the cost of using each port, revenues have been used to calculate the income in p per ton of coal shipped. These figures too provide only a rough indicator of the situation and one related only to gross revenue; operating costs and profitability are not taken into account. They show the general trend of costs of shipment and emphasise some anomalies, for example the extremely low revenue derived at Blyth in 1854, its cheapness by 1913 and the rising cost of shipping at Sunderland. Combining the two sets of figures, revenue/capital ratios have been calculated and they show, within fine limits, a general figure of c 7% prevailing by 1913; in 1885 the range had been 2.7 to 6.4%; in 1854 it had been ½ to 20%. At that time the river most profitable to its owners had been the Tyne, the least Amble, grossly over-capitalised.

With few exceptions all port improvement works were undertaken though powers granted by Parliament, amongst them limitations on the raising of capital. Not only were totals stipulated but so was the ratio between stock issued and borrowings. Capital was not always easily raised: proposals for docks and railways foundered due to lack of support; dock construction at Jarrow and Hartlepool was halted due to financial constraints; the formation of the Tyne piers and the construction of the Albert Edward dock were suspended. In the earlier years of the period capital was

raised by private subscription or by borrowing from individuals. Later, as the scale of works increased, loans were at times sought from the Public Works Loan Commission. The TIC, considering the Tyne piers to be works of national importance, sought - and was refused - a government grant, a Royal Commission having reported favourably on the project for a harbour of refuge.* In the absence of a grant, loans totalling £350,000 were later made available. Later still, applications for loans were refused and Johnson, writing in 1895 and reflecting on past grievances, noted sadly that "they lean upon a broken reed who put their faith in Parliament."[2] As the scale of improvement works increased, so the authorities borrowed capital and established sinking funds, financed from revenue, to repay them; as the stability of the authorities became assured, so the raising of capital became easier.

Port revenue originated from three sources: dues on goods, mainly coal; river tonnage dues; and dock dues. The first was simply an impost on each ton of coal, or other commodity, leaving the river and the other two were dependent upon ship tonnage. As an example, the TIC in 1891 received £120,066 from river tonnage dues, £57,748 from dues on coal shipped from the riverside staiths, £22,869 from dock tonnage dues and £20,209 from coal shipped from the Northumberland dock. Dues on goods amounted to £31,570 and the total revenue for the year was £308,732. Interest payments on loans amounted to £166,528 and the surplus revenue was recorded as £41,736.[3] The revenues received do not accurately reflect the tonnages of materials involved; in the year quoted coal shipments from the Tyne totalled c 11m tons, goods 675,000 tons. Except at Hartlepool and on the Tees the same situation applied to all north-eastern ports, as it did too in South Wales, concealing the high tonnages passing through the ports. In terms of value, the relative proportions of the U.K.'s trade handled in 1913 by London, Liverpool, the Tyne and Cardiff were 29.3, 26.4, 1.8 and 1.7%: in terms of tonnage the figures were 15.2, 14.3, 10.9 and 12.7%.[4]

* The Commission also reported favourably upon Hartlepool but the project there was abandoned.

As noted the measured tonnage of ships caused problems for the port authorities. Not only were steamships and sailing vessels measured differently but the rules of measurement were changed more than once. As a result, the ratio between deadweight - the actual tonnage carried - and registered tonnage increased with time, leading to fewer ships being needed to carry the same tonnage of coal. So the ports suffered a reduction in income until such time as the tonnage dues, fixed by Act of Parliament, could be amended. Daunton shows the ratio of deadweight to registered tonnage increasing from 1.34 to 2.1 between 1853 and 1911.[5] The later figure could, in exceptional cases, actually have been higher.

8.7 River Government and Port Control

In 1815 port control had been by private individual, company, corporation and commission; by 1914 all of them, other than Seaham - a company - were operated by commissions, although at the Hartlepools the NER was the port operator with the commissioners responsible only for the harbour approaches. Each port strove to undertake such improvements as would enable it to retain, or even improve, its share of the growing coal trade. Physical improvement demanded capital and as trade expanded and ship dimensions increased so it became vital for the ports to raise the necessary funds, hence the progression towards commissions which, although more easily able to raise capital, suffered one grave defect, exemplified on both Tyne and Tees; inter-constituent rivalry..

The TIC's problems principally involved Newcastle on the one hand and the towns of North and South Shields on the other. Strife was prolonged and it was not until all docks had been built and the river improved beyond Newcastle that dissent was reduced. On the Tees, the struggle was between Stockton and Middlesbrough, the latter - unlike the down-river towns of the Tyne - expanding rapidly and so assuming Stockton's traditional role. Of the other ports, rivalries were early experienced at Hartlepool while on the Wear the antagonism between commission and dock company was

resolved by their amalgamation in 1859. The River Wear Commission (RWC) was little influenced by the town of Sunderland but its non-representative constitution and its large membership were much criticised.

Only on the Tyne and Tees did the supremacy of Newcastle and Stockton respectively lead to expensive river channel improvements, principally to serve those two towns. Newcastle was of such traditional strength that it could not be challenged and Stockton was perhaps unable to believe that Middlesbrough could ever dominate it. As a port, Newcastle does not seem to have been a success but, paradoxically, the NER was able to take great advantage of the TIC's work when its up-river staiths became operational. Although Stockton developed into an important centre for the iron industry, and for shipbuilding, its contribution towards the revenues of the TCC was very limited. There can be little doubt that an easier financial climate would have prevailed on both rivers had the voice of the dominant towns been muted. It is, though, unlikely that any effective river improvements would have taken place if the TIC and TCC had not been formed.

Competition between ports was endemic. Durham coal was sought by all of the region's southern ports; the early Brandling Junction Railway was viewed apprehensively as being able to supply both Tyne and Wear, each concerned as to the others success; the Durham Junction Railway was promoted by Newcastle Corporation, amongst others, in an attempt to rob Hartlepool of its sources of coal; the Clarence Railway partially deprived the Tees of its coal trade, to the benefit of West Hartlepool. Threats could be as effective as action. The TIC was blackmailed into providing further dock accommodation by the threat of the Northumberland steam-coal owners to develop Blyth and it was the threat of Parliamentary Bills, sought by others, which led to the formation, and later amendment , of the TIC and TCC.

The decade of reform which brought change to Tyne, Tees, Wear and

Blyth was more far-reaching in its effects. Although the development of London and Liverpool - and also of Hull - had been principally through the dock companies, unified bodies were instituted contemporaneously at both ports. The Thames Conservancy* was formed in 1858 and unified control came to Liverpool with the formation of the Mersey Docks and Harbour Board in the same year. At Cardiff the situation was somewhat different - but analgous to Seaham - in that the interests of the Marquis of Bute were taken over by the Bute Docks Company in 1887[1] and it was not until 1922 that all docks and railways became part of the Great Western Railway.

Behind the development of the north-eastern ports had stood the early railway companies, several of the dock-building projects, and the provision of staiths, being railway inspired. From 1854 onwards the NER, with its geographical spread and its virtual monopoly from 1865, brought to bear an even greater influence. Compared with the ports themselves, its financial standing was such that it was enabled to dictate the pattern of coal shipments in the region, exemplified in its later facilities at Dunston, Tyne Dock, Blyth, Hartlepool and on the Tees. NER strategy was partially influenced by the improvements made by the TIC, the formation of a commission at Blyth, the lack of monopolistic powers at Seaham and Sunderland and a friendly relationship with the TCC.

The development of the region's ports was the result, perhaps, more of mutual animosity than co-operation. Londonderry had early followed his own path, his widow antagonised Hudson, the RWC and the NER; Hudson was viewed with some disfavour by the NER. Antagonisms are evident between the Newcastle Corporation and both the TIC and the NER, similarly between Sunderland and the RWC. Inter-town disputes were continuous within the TIC and the TCC. In spite of these differences the region prospered, in coal exporting, engineering and ship-building, and it is interesting to record that it was only in 1913 that South Wales, for the first time,

* The Port of London Authority subsumed its powers in 1908.

exceeded in quantity the shipments of coal from the North-East.[2]

The decisions made by the port authorities regarding their policies were not always correct. Facilities were at times over-provided, at other times the converse. Technologically, the region's ports were amongst the nation's leaders but they suffered somewhat due to two problems, the im-balance between imports and exports and the fact that they dealt predominantly in low-cost, bulky commodities. Because of their technology and effective rail links with the proliferating collieries in the region, the ports increased their trade any by 1914 had experienced a century of almost continuous growth in trade and in ship-building. It was this phenomenon of rapid and seemingly endless growth which masked all rivalries and as a result the port authorities "failed to recognise the fine line dividing adequate from excessive accommodation." [3]

The outbreak of war in November 1914 was to herald the approach of a then-unbelievable reversal in the fortunes of the North-East.

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LIST OF APPENDIXES

APPENDIX A

PORT DUES AND SHIP MEASUREMENT

The ports of the North-East, as elsewhere, charged dues upon shipping on two counts, the measured tonnage of the ship and the tonnage of coal, or other material, shipped into or out of the port. Assessment of the dues on cargo, especially coal, was simple in theory but more difficult in practice due to problems in correctly weighing the materials shipped.

The assessment of ships' tonnage was more complicated: not only did the methods of measurement change with time but skilful design could result in the building of ships advantageous to their owners. Additionally, measurement rules were not enforced throughout the period 1815-1914, a situation giving rise to some confusion. The several terms relating to tonnage may be defined as follows.

Burthen: old term to define the carrying capacity of a ship, based on the number of tons (or casks) of wine which could be accommodated. Term used to end of 18 C, and later.

Builders Old Measure: adopted through the Tonnage Act of 1773. Tonnage calculated from

$$\frac{(L - 3/5\ B)\ B \times \frac{1}{2}B^{*}}{94}$$

involving only length and beam.

Remained in use until mid 19 C due to its then having become unsatisfactory for ships with high length/beam ratio.

Deadweight: the actual carrying capacity of a merchant ship, expressed in tons.

Displacement: the weight of water displaced by a loaded ship (the actual weight); normally associated with naval vessels.

Gross Tonnage: measured capacity of a ship's hull in cubic feet, divided by 100. Introduced by Parliamentary legislation in 1836.

* The depth was not measured but was assumed to be half the beam.

Net Tonnage: as above, but adjusted to allow for crews' quarters, engine space, bunkers etc. Provides a more realistic basis for load-carrying than does gross tonnage.

Registered tonnage: both gross and net tonnages entered on certificate of registration but term applied most commonly to net tonnage. Use of gross and net (registered) tonnage enforced in 1855.

The Builders Old Measure proved inadequate following the introduction of bigger iron ships. Additionally, ships were built of greater depth so as to increase cargo space without increasing dues. In the later years of the 19C the ingenuity of ship's designers enabled a higher deadweight/net tonnage ratio to be achieved. The ratio increased from 1.34 in 1853 to as much as 3 by 1911, so depriving the port authorities of anticipated revenue.

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COAL SHIPMENTS: COASTAL AND EXPORTED; 1815-1913 (000 tons)

APPENDIX B

	Amble				Blyth				Tyne				Wear				Seaham Habour				The Hartlepools				Tees			
	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %	Coast	Ex-port	Total	Ex %
1815					98	2	100	2	1722	111	1833	6	896	48	895	5												
1820					144*	4*	148	3	2003	119	2122	6	1116	37	1116	3												
1825					132*	4*	136	3	1820	136	1956	7	1383	42	1330	3												
1830									2168	197	2365	8	1322	65	1387	5			c50								c100	
1835									2261	309	2570	12	929	155	1089	14	270	66	c275	2			c50		678	27	391	4
1840									2281	594	2875	21	868	443	1318	34	306	14	320	4	375	33	408	8	1378?	133?	558	9
1845			33						2444	1070	3514	30	1537#	428#	1414	22			551		726	158	884	15	816	128	c905	14
1850			c80				247		2270	1088	3358	32	2066#	471#	1718	19			819		1232	330	1562	21	485	82	477	15
1855	38	21	59	36	97	101	250	53	2075	1578	3653	43	1354	503	1891	27	594	70	664	11	1139	473	1612	29	142	92	234	40
1860	9	79	88	90	109	114	224	51	2223	2041	4264	48	1822	989	2979	35	603	38	663	6	1332	579	1901	30	218	121	338	36
1865	1	40	41	98	103	144	243	50	2612	2552	5164	49	1737	1150	3036	40	504	32	573	6	1005	574	1584	36	192	146	338	43
1870	4	48	52	92	68	208	276	75	2511	3334	5845	57	1862	1228	3227	40	478	59	549	11	847	641	1491	44	70	58		45
1875	28	43	66	61	43	184	231	81	2778	4140	6918	60	1667	1439	3298	46	325	80	428	20	690	684	1479	50	40	69		63
1880			187				234		2972	5160	8132	63			3573				603		534	594	1249	53	22	86		80
1885			253				533		3441	6160	9601	64	2982#	1546#	3981	35			788		471	563	1215	55	15	113	126	78
1890			361				1756		4061	6668	10729	62	2458#	1603#	3740	40			545		526	353	1042	40	10	82	102	89
1895			441				2485		4781	6570	11351	58	2726#	1717#	4226	39			528		741	334	1277	31	4	64	88	94
1900			476		619	3042	3279	83	5089	9431	14520	65	2428#	2034#	4262	46			510		516	484	1209	48	1	69	104	99
1905			691		685	3386	3755	83	5342	11113	16455	68	2785#	2538#	4924	48			646		666	637	1611	49	27	63	155	70
1910	105	230	446	69	244	3537	4180	84	5028	13326	18354	73	1526	2510	4291	62	922	719	1671	44	452	1086	1888	71	25	70	235	74
1913	72	488	629	87	329	3988	4732	92	4640	15659	20299	77	1497	3058	4857	67	1059?	970?	2659	48	751	1258	2400	63	23	52	228	69

* Average for five year period

\# Seaham shipments apparently included.

APPENDIX C

CAPITAL EXPENDITURE (CUMULATIVE) AND REVENUE (ANNUAL): 1815-1913

	Amble				Blyth				Tyne				Wear				Seaham Harbour				The Hartlepools				Tees			
	Capital		Revenue		Capital		Revenue		Capital		Revenue		Capital		Revenue													
	Cum £000	p/T	p.a £000	p/T	Cum £000	p/T	p.a. £000	p/T	Cum £000	p/T	p.a. £000	p/T	Cum. £000	p/T	p.a. £000	p/T	Cum £000	p/T	p.a £000	p/T	Cum £000	p/T	p.a. £000	p/T	Cum £000	p/T	p.a £000	p/T
1815											24.1	1.3															1.2	
1820											21.1	1															1.3	
1825											24.1	1.2															1.5	
1830											24.4	1					c100	200										
1835											21.4	.8					173	63										
1840									17.6	0.6	29	1					193	60										
1845	68	206	0.4	1.2					36	1	35.3	1																
1850			1	1.2					5.2	1.5		-	-										14	1				
1855	184	312	1	1.7					199	5.4	41.4	1.1											129	8	106		6	
1860			1	1.7	90	40	3	1.3	688	16	73.7	1,7	955	32	77	2.6					1000 (est)	50	224	12	114		7	
1865			1.5	3.6	104	43	3.7	1.5	1414	27	116	2.2			88	2.9									?		9	
1870			1	1.9	119	43	4.4	1.6	2210	38	139	2.4	1395	43	89	2.8									292		16	
1875			2	3	129	56	3.4	1.5	3227	46	179	2.6	1483	45	110	3.3					1156				487		20	
1880			4	2.1	131	56	3.4	1.5	3939	48	253	3.1	1676	47	123	3.4					1469				676		50	
1885			5.2				.10	1.9	4665	48	265	2.8			129	3.2					1528				840		51	
1890	185	51	5.5	1.5					4977	46	305	2.8	2030	54	128	3.4									953		68	
1895	199	45	8	1.8					5182	46	309	2.7			132	3.1									1023		73	
1900	207	43	7	1.5					5133	35	383	2.6			139	3.3	156	31	10?	1.9	1528				1015		72	
1905			10	1.5					5713	35	421	2.6			151	3.1	520	80	12?	1.9	1565				1112		98	
1910			10	2.2	912	22	68	1.6	6035	33	437	2.4	2484	58	135	3.1	623	37	45?	2.7	1948				1186		113	
1913	207	33	11	1.7	1203	25	75	1.6	6539	32	477	2.3	2508	52	175	3.6	646	24	50?	1.9	1970				1283		127	

Not applicable

Not applicable

Not applicable

Not applicable

APPENDIX D

DOCK CONSTRUCTION: AREAS AND COSTS

	Date	Cost (£000)	Cumul-ative Cost (£000)	Area (acres)	Cost per acre (cum) (£000)	Wharf length (feet)	Entrance dimensions (feet)
N'umberland Dock	1857 1880	324	324 558	50+2½ "	6.2 10.6	450 "	70(63)x24 "
Albert Edward Dock	1884	799	799	22+3	36	3000	80(75)x30
Tyne Dock	1859 1870 1883 1895	549 196 129	549 750 946 1075	50 " " "	11 15 18.9 21.5	 11360	{80x24 {60x24 70x32
Wearmouth Dock	1837	120	120	6+1½	16	1800	48x22
Sunderland Dock	1850 1859 1868 1880 1905	295 300 102 168	295 772 1072 1174 1342	19+2 32+3 43+3 43+3 51+3	14 22 23.3 25.5 24.9	4700 7600	60x20(N) 60x24(S) 80x? 65x27(lock) 70x30(N)
M'bro Dock	1842 1874 1880 1904	122 128 176 820	122 250 426 1246	9 12 15 25	13.5 20.8 28.4 49.8	 3550 6842	30x19 55x23 55x28 80x33
Seaham Harbour	1831 1835 1905	118 77 378	118 195 573	{3 {2½ 8½ 13	21.5 23 44		33x17 " 65x25
Hartlepool	1835 1840 1851	115 160	115 275 346	25 42 "	46 6.5(9.4) 8.2(13.6)		25' depth 42x22 "
West H'pool	1847 1852 1852 1856	53(?) 43(?)	53(?) 96(?) 346 500(?)	8 22 " 32	6.6(?) 4.4(?) 15.7 15.6(?)	 10500	42x22 " " 50x22
The H'Pools (NER)	1880 1885	480 "	 1326(?)	{3 {13 {12½ 103	16.8 12.9(?)	 26000	58x22&26 70x27(max)

APPENDIX E

TABLES OF STATISTICS

Notes on Compilation

It has proved difficult - in some cases impossible - to obtain for each port satisfactory figures relating both to coal tonnages and to finances. Correlation is complicated by several factors: the differing sources of statistics; amendments to port limits; the aggregation of shipments from one port with another; and the inclusion of bunker coal within certain runs of statistics. The figures on which the greatest credance may be placed have been used for the totals of shipments while others, perhaps from a different source but comparable one with another, have been used to obtain the export percentages. As a result, inconsistencies become apparent.

Details of finances have, again, been culled from several sources, principally the annual statements of the port authorities. Certain figures for capital expenditure have been taken from the records of the North Eastern Railway and the West Hartlepool Harbour and Railway; both should be treated with caution as the former did not always capitalise its expenditure and the latter company's accounts do not permit an accurate assessment to be made.

Deposited plans, Ordnance Survey plans and others have been used to ascertain dock dimensions. As a basis of comparison the cost per acre of the region's docks has been adopted rather than using wharf length, in the case of coal-exporting docks thought to be inappropriate. The dimensions of the dock entrances and locks are included, depths generally being those obtaining at high-water.

It has not proved possible to obtain figures to complete all tables. Nevertheless, they are sufficient to show the patterns of trade, finance and dock construction which developed in the North-East.

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