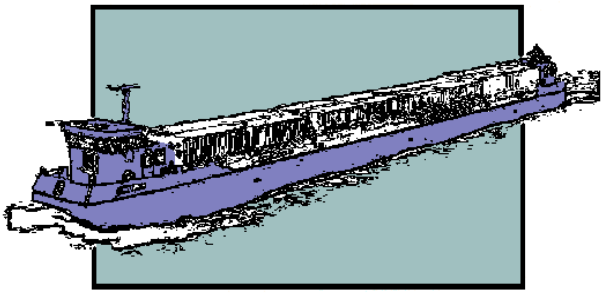

BARGECONSULT

River Trent Water Freight Development Project

December 2009 to July 2010

FINAL REPORT – October 2010

British Waterways

funded by

east midlands development agency

BargeConsult, 49 Hendre Street, Caernarfon, Gwynedd LL55 2HY Tel +44 (0)1286 678571
www.bargeconsult.co.uk

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APPENDICES

Executive Summary

A. British Waterways, with funding from East Midlands Development Agency (*emda*) and EMRA, appointed BargeConsult in December 2009 to undertake a River Trent Water Freight Development Project.

B. The objectives of the study were to put freight transport on the River Trent to encourage a shift to more sustainable modes of transport within the East Midlands Region.

C. After visiting over 40 local companies the River Trent Water Freight Development Project has identified a total of 3,700,000 tons of freight with some potential for transfer to the river.

D. Fifteen companies have been identified that have freight flows with real opportunity for transfer to water in the short term. These flows total 1,900,000 tons per annum

E. Analysis has shown that if all the 1,900,000 tons was transferred from road to water this would result in an annual reduction in pollution of 4,940 tons of CO^2. The total environmental benefit as calculated by the Department for Transport would be £4,850,000 per annum.

F. The first three of these flows are due to start in the near future. Taylor Aggregates from Besthorpe to Hull, J N Bentley in both directions between Besthorpe and Gunthorpe and John Brash between the Humber Ports and Gainsborough.

G. There is currently little freight infrastructure remaining on the River Trent in Nottingham. Every effort should be made to retain all or part of the Trent Lane facility as an Inland Waterway port. This will require Nottingham City Council to take the lead in conjunction with British Waterways.

H. The restrictive covenant relating to Colwick dredging wharf is a long standing and significant constraint that was not identified in the 2008 report. A robust solution to this constraint should be a priority.

I. The strategic value of the British Sugar wharf and surrounding land at Newark must not be underestimated. A regional initiative should ensure that this is fully investigated and recognised.

J. Restrictions on the availability of wharves can in part be traced to a one-sided application of the planning processes. There are many planning policy guidelines and those dealing with housing are often applied more rigorously than those dealing with water transport.

K. Despite the publication of the January 2009 report this scarce resource has continued to disappear. It is strongly recommended that action is taken to safeguard the remaining River Trent wharves between Keadby and Nottingham for commercial use.

L. Logistical flows of domestic waste are organised council by council and, except in isolated cases, completely ignore the needs of neighbouring councils even where a shared facility could be more cost effective. During one meeting it was explained that this is partly due to the need to obtain the greatest Carbon Benefit for the council which requires the facilities to be built in the area producing the waste. This system should be challenged at regional level.

M. It is very easy for companies to take the 'easy' or established option when planning transport to new infrastructure. It is important that where appropriate that this is challenged at the planning stage to ensure all options are fully investigated. Once building commences it is usually too expensive to make changes.

N. Though there is a limited supply of barges immediately available, it is apparent that more can be returned to active use when cargoes are available. This, along with other factors, means that starting new flows is often a long process even though barge owners are ready and eager to explore new opportunities.

O. The cost of barge operation is directly related to carrying capacity. The restriction in waterway dimensions in Newark is a significant factor in reducing the use of the river. This produces a quoted increase in rates of over 80% a substantial difference which will, in many cases, be the difference between an economic and uneconomic operation.

P. Container operations on the river require the construction of an inland terminal at Newark or the opportunity to take large barges to Nottingham to be economic.

Q. A significant rise in the price of fuel will improve the economic viability of moving freight by water. The specific fuel consumption required for moving freight by road is double that required for moving freight by water measured per ton/km.

R. Actions/Next Steps

- Ensure the restrictive covenant relating to Colwick dredging wharf is amended to permit its use for all freight transhipment.
- Develop direct contacts with relevant Local Government Authorities and other Agencies to ensure that the River Trent continues to be available for transporting freight with reference to sustainable transport and development.
- Ensure ongoing contact with companies identified as having freight that can be moved on the river and assist any new contacts to obtain full and correct information in the future..
- Develop firm options for a Newark Bypass and outline costings

1. Introduction

A synopsis of the situation on the River Trent at the end of August 2010

1.1 The commercial section of the River Trent extends from the Humber estuary to the Nottingham area. The northern 81 km of the river is tidal, between the junction with the Humber at Trent Falls and Cromwell Lock just North of Newark. From Cromwell Lock navigation extends a further 33 km through 6 locks to the city of Nottingham. North of Gainsborough Bridge, the navigation authority is Associated British Ports, whilst South of Gainsborough navigation is under the jurisdiction of British Waterways

1.2 The size and therefore the carrying capacity of vessels that navigate the River are constrained by the dimensions of the locks and by air draft under bridges. The major constraints are the bends in the tidal section between Newark and Gainsborough and the section through the centre of Newark.

1.3 The River Trent is an under-used transport artery within the East Midlands region. Freight traffic is currently limited on the British Waterways section of the river, with the main traffics being the movement of aggregates from wharves between Newark and Gainsborough to Humberside and West Yorkshire. Over 200,000 tonnes was transported in 2006-07. There are also occasional heavy lift movements associated with power station developments along the river.

1.4 The potential for more extensive use of the river is recognised in East Midlands Development Agency's Regional Economic Strategy and through the East Midlands Regional Assembly Regional Freight Strategy, particularly for traffics linking the Humber ports with a possible inland port to be developed near Nottingham. Increased use of the River for freight would also contribute to the aspirations of the Department of Transport White Paper "The Future of Transport" (2004), which outlines Government policy to "encourage transfer of freight from road to sea and inland waterways".

1.5 In 2007, a study was commissioned from Peter Brett Associates to investigate opportunities for freight traffic on the river. The study found that there was potential for up to 1 million tonnes of goods per annum to be moved by water transport in the medium to long-term. Particular opportunities exist for traffics such as aggregates, waste & recyclates and energy-related commodities, such as bio fuels.

1.6 The study also recommended that there is a need to work with local businesses to promote water freight and take forward the opportunities identified in the study. Consequently the aim of this project is to undertake this follow-up activity by working with businesses to promote and take forward identified opportunities.

1.7 The project is managed by British Waterways on behalf of a Steering Group representing public and private organisations in the Region with an interest in developing freight transport on the River (see Appendix A). Financial support for the project comes from the East Midlands Regional Assembly and East Midlands Development Agency.

Study Objectives & Approach

1.8 The key aim of the project is to put freight transport on the River Trent to encourage a shift to more sustainable modes of transport within the East Midlands Region and, in particular, secure a reduction in CO_2 emissions through this transfer.

1.9 Objectives of the project are to:-

1 Follow-up opportunities and contacts identified in the River Trent Freight Feasibility Study to develop a process and timescales for converting potential freight opportunities to actual shipments, particularly in relation to aggregates, waste & recyclables and bio fuels.

2 Follow-up any further contacts identified during the course of the work which have potential to generate freight traffic on the River.

3 Investigate in detail both short and long-term opportunities for waste shipments in particular, in consultation with the public sector waste authorities.

4 Support any immediately identified customers / traffics to implement the opportunities identified, particularly in terms of funding support / advice.

5 Identify the obstacles to water freight as perceived by potential customers and develop processes to overcome these obstacles. This would include an assessment of how funding support is working in practice and how this might be improved.

Methodology

1.10 An initial fact finding stage was required to enable meaningful discussions to take place with prospective customers. Main issues requiring confirmation were provision of accurate information on navigational restraints, wharf availability and suitability and barge availability. Further topics requiring discussion and confirmation were outline rate and logistical issues with barge operators, wharf and port operators and the navigation authorities

1.11 Initial meetings were arranged with prospective customers, wharf operators / owners, barge operators and local councils. Follow up work involved email and telephone contact as well as further meetings.

1.12 Concurrently all possible contact information were extracted from the 2007 Study, including the originators of the traffic flows identified and current wharf owners/operators. Initial exploratory meetings were held with the thirteen prospective customers identified. The opportunity will also be taken to seek information on further possible traffic flows.

1.13 This was followed by further work involving the customers / traffics identified as presenting opportunities in the short term. This included confirming the tonnages involved, the particular logistical requirements of the customer and material, availability of wharfage, barges and handling equipment and prospective timescales. Information was also given about the availability of further advice and funding / grant support.

1.14 Parallel to this, customers identified as having longer term opportunities including those relating to waste shipments from public sector waste authorities, their contractors and private waste handling companies.

1.15 Continuation of work started in stages 1 and 2 with the addition of further work on the possibilities for multimodal or trimodal logistics sites at Nottingham or Newark.

1.16 A record was kept of each meeting to enable a final analysis to be made of the development project. Due to the commercially sensitive nature of the information there is a need for some details to be kept confidential. This will not preclude a full and in depth analysis to be made. This analysis will include all headings required by the Management Group including such topics as an assessment of how funding and grant support is working in practice and both real and perceived obstacles to water freight by potential customers and possible processes to overcome these obstacles

2 Wharves – suitability and availability

Any movement of freight by barge requires some way to move the cargo between the barge and the land. This can simply be two mooring dolphins and a pipe for unloading a liquid cargo, or with the addition of a conveyor a similar installation can load sand and gravel. General wharves suitable to load or unload any cargo are significantly more expensive to build, requiring a solid waterfront wall longer than any barge expected, sufficient water depth for the barge to float, a solid area for the crane and lorries and a flat area to store the cargo. A simple 60m general cargo canal wharf would cost £0.5M for construction costs alone, whilst for a river wharf with land purchase and all permissions a basic wharf could not be built for less than £1m. It is therefore difficult commercially to justify such an investment except where high volumes or a long lifespan exist. The use of existing wharves is therefore the only realistic option in many cases and urgent action is required by to ensure their continued availability for commercial use.

Overview:

2.1 The river can be split into three sections. The northern section between the confluence with the River Humber and Keadby has six active wharves with berths for up to 14 ships at any time. These wharves are mainly used for import and export using coasters. They rarely tranship into barges but most have indicated that they would be happy to do so at little or no extra cost.

2.2 The middle section contains wharves at West Stockwith and Gainsborough. None are currently in active use and do not currently have suitable equipment. Two wharf owners have indicated a willingness to load/unload barges but are reluctant to invest until definite cargoes are offered over the medium term. The lack of loading/unloading equipment means that short term, low volume or intermittent traffic can not be handled.

2.3 The southern section between Torksey and Nottingham includes the non tidal river section south of Cromwell lock with many wharves. These are quite diverse in character, only one is in current use though another three have been used in the recent past. The problems include the current lack of a wharf available to transfer 3rd party cargoes (those not belonging to the wharf owner) and the availability of a wharf operator. These are examined in detail below.

2.4 **Meadow Lane Nottingham:**

2.4.1 The whole site is still owned by BW with the intention to sell for residential use in the future. Due to the current downturn the wharf is still available for commercial use. Warehouse 3 is currently empty and the land next to it is the only available wharf frontage.

2.4.2 It is estimated that only approximately 40m of wharf is currently useable due to the presence of the new floating landing stage for the lock. It will be possible to unload a full length vessel here though the site area is restricted. Bollards and ladders are still in place.

2.5 **Trent Lane Nottingham:**
This is the largest inland river basin in the UK.

2.5.1 Outline planning permission was granted in 2007 for a mixed use development scheme, though the surrounding area is currently overwhelmingly commercial and light industrial.

2.5.2 The Trent Lane Inland Port is still owned by Nottingham City Council and British Waterways and represents the single biggest river transport asset on the River Trent. Even in its present condition it is suitable for use as an inland port for Nottingham. Its replacement on a new site will require considerable investment out of all proportion to its value as development land of £5-10m

2.5.3 Isis Waterside Regeneration / Innes England are responsible for Warehouse 4 and the small area of land immediately surrounding it. This land is riverside and available for

use as a wharf though it is a very constricted site.

2.5.4 The Homes and Communities Agency control most of the area which is earmarked for housing development. Initial contacts indicate that they would be extremely reluctant to allow any form of commercial use of the wharf even in the short term as they believe this would lead to a presumption of future need for such a facility.

2.5.5 The overall commitment for future use depends on pressure from the members of the Nottingham Waterside Limited, a partnership of Nottingham Regeneration Limited and British Waterways.

2.5.6 The HCA believes that any action to return this facility to commercial use as an Inland Port must be lead by British Waterways and Nottingham City Council.

2.6 **Biffa Wharf Colwick:**

2.6.1 This wharf is owned by Biffa Waste a commercial waste recycling company and is approximately 60m long. The site is used for sorting commercial waste which is then sent by road for re-use. All lifting on site is currently handled by forklift.

2.6.2 The wharf could be put into use immediately but has restricted access which is blocked by the current storage area. The owners have indicated that the wharf would not be readily available for others to use as this would make their current operation impossible.

2.6.3 If Biffa Waste were relocated this site would be a better facility than the Colwick dredging wharf – this may be cheaper than building a new wharf.

2.7 **Dredging Wharf Colwick:**

2.7.1 This wharf is owned by British Waterways and was purpose built by Nottinghamshire County Council for unloading dredgings. It has some drawbacks due to its short length, lack of water depth and poor access for road vehicles across the flood bank.

2.7.2 Initially it was assumed that this wharf would be available for any trial movements, but further investigation revealed that due to a restrictive covenant only internal British Waterways dredgings are allowed to be handled here.

2.7.3 Unfortunately despite identifying this significant hurdle early in this project it has been difficult to make progress towards removing or renegotiating this covenant. It has recently been agreed that rather than removing the covenant completely a simpler solution will be to vary the conditions to allow any cargoes to be handled while still preventing any sale or development for commercial gain. Nottingham County Council has indicated their willingness to find a solution and it is hoped that British Waterways will be able to agree this change in the near future.

2.7.4 A recent study for *emda* has identified Colwick as a possible site for a multi-modal rail served distribution and with a suitable wharf would provide a true tri-modal facility.

2.8 **Gunthorpe Dredging Wharf:**

This wharf, at the tail of Gunthorpe lock, is used for handling and processing aggregates dredged from the river or from small scale local extraction. It is available for use, but has no permitted road access to handle other cargoes.

2.9 **White House Wharf, Newark:**

2.9.1 This wharf was identified in the original report as a **strategically important freight wharf site.**

2.9.2 *Wharf is disused but comprises a hard surface and a warehouse like building, which is occupied. Has poor access for goods vehicles, but possible alternative could be on open land to the south of the site. Main drawback is residential property bordering the site although appears well screened by trees.*

2.9.3 Unfortunately despite this, British Waterways has recently sold the wharf for housing and though the new owner has indicated that it is currently available for use, this can only be in the short term.

2.10 **British Sugar, Newark:**

2.10.1 This concrete wharf was originally constructed to unload sugar beet and is situated just north of, and alongside, Newark Nether Lock. Access is currently only possible through the British Sugar plant by what is effectively a farm track not suitable for lorries without improvement.

2.10.2 This is currently the most important strategic water served site in the Newark area, the wharf and the land next to it will be an excellent site for a future inland port. It is situated at the most southerly point that large (approximately 800t) barges can reach from the Humber ports, including those able to carry up to 48 containers. The main site is a 'brown field' area with access by water, road and rail available.

2.10.3 British Sugar has reacted positively to an initial approach and would appreciate the involvement of *emda* in any discussions aimed at identifying its future development. Though British Sugar would not wish to be the lead partner for such a development they have indicated that, subject to economic factors, they would be pleased to route their coal and limestone via the wharf. This currently totals 90,000t per annum.

2.10.4 This wharf currently requires significant maintenance and upgraded access before it could be commercially used.

2.10.5 This wharf has been in the recent AECOM Strategic Distribution Site Assessment Study for *emda* as having potential as a tri-modal distribution site.

2.11 **Cromwell Gravel Wharf:**

2.11.1 This wharf is situated 1.2km North of Cromwell Lock on the West bank and can only be accessed through the Lafarge quarry/ready mix plant along what is effectively a quarry haul road. It is not known whether standard road lorries could operate along it on a regular basis. Due to its situation on the river bank, ownership and access rights need to be confirmed.

2.11.2 This steel piled but unsurfaced wharf was originally a wharf for unloading dredgings. It appears to be long enough to accept the largest barges currently able to navigate this section of the river, though there are currently no mooring facilities.

2.12 **Besthorpe Gravel Wharf:**
This is the only wharf currently operating on the southern section of the river. It is owned by Lafarge who use it to load sand and gravel, by conveyor, into barges for delivery to West Yorkshire and Humberside.

2.13 Further wharf sites have been investigated and have proved either not too exist or like the 'wharf' at the tail of Cromwell lock are not useable even with moderate investment.

2.14 The other wharf sites identified in the January 2009 sites at Trent Concrete, and Tarmac Recycling, Colwick do not actually exist and due to the expense of building such a facility they have not been investigated further.

2.15 **Wharf operators:**
Several companies currently operating wharves on the northern section of the River Trent have indicated their interest in operating a wharf on the southern section. They have indicated a willingness to invest in long term projects.

2.16 **Strategic Distribution Site Assessment Study for the Three Cities Sub-Area of the East Midlands**
This study was completed in May 2010 for *emda*. Though its aim was solely at rail served sites, it also commented on the possibilities presented at two sites with both water and rail potential.

2.16.1 **Site 35 Newark:** This site is outside this study area's remit for this project but the location deserves some comment. This site could be used for a tri-modal terminal on the west bank of the River Trent where there is a disused wharf that could be brought back into use. It is understood that this wharf is currently accessible by barges able to carry about 600 tonnes and likely flows might include aggregates, agricultural products and even containers.

2.16.2 The land is owned by British Sugar who are still active in processing sugar beet into sugars for human consumption and pulps (much of which is used for animal feed). There is the route of an old siding into the plant which is south west facing towards Nottingham off the Nottingham to Lincoln line. The site would need a new road out to the A616 enabling easy access to the A46 Newark bypass.

2.16.3 Although Newark is a relatively small town and the location would not be well placed to serve Derby or Leicester it is reasonably located to serve Lincoln and Nottingham. Newark has recently been chosen as a site by the A1 for new Distribution Centres for retailers such as the Currys/Dixon Group.

2.16.4 In the view of the study team there is a reasonable prospect of a trimodal terminal where rail could play a supporting role to water and road freight companies for niche traffic flows. The wider prospects for this promising location are the subject of another *emda* sponsored study currently looking at the freight potential of the River Trent.

2.16.5 **Site 9 - Colwick**, Nottingham
Small and awkwardly-shaped fifteen hectare former Great Northern railway yards, located immediately north of where the W8 Nottingham-Grantham rail route crosses the River Trent. Access to the M1 is achieved in around 30 minutes by passing through or around Nottingham.
However, this site might have a potential as a tri-modal interchange serving the Nottingham area.

2.17 **Summary:**
There are currently no wharves, with a confirmed medium term life span, available for immediate use anywhere on the non-tidal River Trent.

2.18 The opportunity currently exists to ensure that this scarce resource continues to be available at minimal cost, but this may not be true for much longer.

2.19 **The most important sites requiring further urgent input to enable future use are:-**

Trent Lane, Nottingham
Dredging Wharf, Colwick
British Sugar, Newark

3 Barge Availability

3.1 All existing carriers in the area have been contacted and the availability of their barges assessed. These fall into three categories. Barges currently operating, those not operating but available at short notice and those requiring overhaul before use. The three tables below detail these vessels and assess their suitability for use on the River Trent. These lists are not definitive but are intended to demonstrate the range of vessels available.

Fig 3.1 Dry cargo barges currently believed to be operating

Owner	Vessel	Tonnage	Length	Width	Suitability
Acaster Water Transport	Easedale	400	41,3m	5.4m	To Nottingham
Acaster Water Transport	River Star	500	46.0m	5.8m	To Newark
Branford Barge Owners	Farndale H	500	55.4m	5.6m	To Newark
Branford Barge Owners	Fossdale H	500	55.4m	5.6m	To Newark
Branford Barge Owners	Humber Renown	500	55.4m	5.6m	To Newark
Hornshaw Water Transport	Heater Rose H	350	47.2m	5.3m	To Nottingham
Humber Barges	Fusedale H	480	55.4m	5.6m	To Newark
D. Taylor	Joyce Hawksley	300	38.1m	5.33m	To Nottingham
E. V. Waddington	Confidence	450	44.2m	5.9m	To Newark
E. V. Waddington	Resilience	460	48.1m	6.1m	To Newark
Robert Wynn and Sons	Humber Navigator	300	44.4m	6.1m	To Nottingham

Fig 3.2 Dry cargo barges available but not currently operating

Owner	Vessel	Tonnage	Length	Width	Suitability
Hargreaves Services	CH1 to CH 20*	170	17m	5.33m	To Nottingham
Hewitts Marine Services	Seagull	340	47.5m	5.33m	To Nottingham
E. V. Waddington	Various**	200 - 300			To Nottingham

* Exact number available not certain due to scrapping program

** Exact number available not certain due to uncertainty about condition

Fig 3.3 Dry cargo barges requiring refurbishment before use

Owner	Vessel	Tonnage	Length	Width	Suitability
T. Bedford	Grovedale	400	47.5m	6.6m	To Newark
Dunkerleys	Selby Michael	250	30.1m	5.8m	To Nottingham
H_2O Transport	Humber Monarch	400	43.3m	6.7m	To Newark
Humber Barges	Humber Enterprise	480	55.4m	5.6m	To Newark
ICTT Ltd	Bacat/HS*	140	16.7m	4.6m	To Nottingham
D. Taylor	Spurn Light	350	5.3m	41.1m	To Nottingham

* Believed currently 6 available

Fig 3.4 Tanker barges currently operating

Owner	Vessel	Tonnage	Length	Width	Suitability
Rix Shipping	Rix Eagle	460	54m	6m	To Cromwell
Rix Shipping	Rix Owl	600	58m	6m	To Cromwell
Rix Shipping	Rix Phoenix	600	59m	6m	To Cromwell
Whitaker Tankers	Humber Progress	620	61m	6.1m	To Newark
Whitaker Tankers	Humber Pride	620	61m	6.1m	To Newark
Whitaker Tankers	Humber Princess	620	61m	6.1m	To Newark

3.2 Though there is a limited supply of barges immediately available, it is apparent that more can be returned to active use when cargoes are available.

3.3 In the event that this supply is not sufficient or not suitable for a particular cargo then it will be possible to bring further barges from other areas of the UK ort indeed from the continent. Though in many cases such barges may need modification before use.

4 Barriers and Obstacles:

4.1 Structural failures resulting from waste regulations:

4.1.1 Following discussions with several of the more significant local councils in the area, including Nottingham City, Nottinghamshire and Lincolnshire, a clearer understanding of the processes involved in organising domestic waste logistics has been obtained.

4.1.2 Domestic waste operations are characterised by very long term contracts between the local authority and a private sector waste operator. The logistics are exclusively road based and are organised to deliver the collected waste to transfer stations from where it is taken to be sorted, recycled and incinerated. The length of these contracts makes any immediate change to the logistical flows difficult. Decisions based on the current system means that they are likely to remain wholly road based unless efforts are made to plan the system in such a way as not to exclude other modes in the future if changes in costs make road transport less cost effective.

4.1.3 Planning is exclusively locally orientated with no cross boundary planning even within the *emda* area. Plants are sized to cope with all indigenous waste even if another plant may have spare capacity. Nottinghamshire County is in the process of pulling together a new waste core strategy. There should be some waterway input into this.

4.1.4 It is overwhelmingly clear that the logistical flows are organised to suit the council concerned and, except in isolated cases, completely ignore the needs of neighbouring councils.

4.1.5 This means that each local authority will build its own incinerator or CHP plant even where a shared facility could be more cost effective. The exception to this is London Road facility in Nottingham. During one meeting it was explained that this is due to the need to obtain the greatest Carbon Benefit for the council which requires the facility to be built in the area producing the waste.

4.1.6 The River Trent flows almost exclusively between local authority areas flows are generally organised away from the river towards the middle of the authority area. It is therefore difficult to project any meaningful use of the river for waste transport unless this parochial approach is changed. The exception being where recyclates and biomass are sorted near to the river and could therefore be loaded onto a barge.

4.2 Planning and wharf availability:

4.2.1 The current situation is covered in more detail in section 2.

4.2.2 Almost all of the wharves on the southern River Trent have restrictions on their availability or use. In part this can be traced to a one-sided application of the planning processes. There are many planning policy guidelines and those dealing with housing are often applied more rigorously than those dealing with transport. Despite the publication of the January 2009 report this scarce resource has continued to disappear.

4.2.3 Other areas with commercial waterways, including London, West Yorkshire and Manchester, have shown what can be done at little cost. Once lost to housing development wharves are expensive, difficult or impossible to replace.

4.2.4 There are currently significant difficulties operating barges on the southern section of the River Trent due to the difficulties finding useable wharves.

4.2.5 In the Nottingham area four wharves are in existence suitable for modern use.

- Both Trent Lane and Meadow Lane are earmarked for redevelopment under the Nottingham Riverside Partnerships and are therefore 'out of bounds' for external investment for cargo operations in the long term.
- The wharf at Colwick owned by Biffa can be used but due to the restrictions caused by their internal site logistics it is not available for use by any other company.
- The British Waterways dredging wharf at Colwick is subject to a restrictive covenant and until this is amended or removed it is not available for any commercial traffic.

4.2.6 In the Newark area the last commercial wharf was unfortunately recently sold by British Waterways for housing development.

4.3 **Information and Advice:**

4.3.1 Most companies contacted knew that the River Trent had been used for freight transport in the past. A few of these had also tried to obtain information on using the river themselves but without being able to find any meaningful or commercially useful information.

4.3.2 On three occasions the companies had investigated using the river but had been told by their consultants that it was either not possible or much too expensive. One report we were shown covered the whole subject in one paragraph with no justification for the conclusion reached.

4.3.3 It is apparent that several large general consultancies have little knowledge of inland waterway transport and are using outdated information or are estimating very high costings to ensure that this option is excluded at an early stage. This can have a significant impact on modal shift.

4.4 **Waterway dimensions:**

4.4.1 It is now well established that the dimensional restraints in Newark have a major influence on the viability of the waterway as a whole for freight transport.

4.4.2 The current maximum capacity through Newark is 250t whilst the locks could handle barges carrying over 550t, more than double the existing capacity.

4.4.3 The cost of barge operation is directly related to carrying capacity. The quoted rate from Hull Docks to Nottingham for a bulk cargo would be in the region of £5.50/t for a 250t barge whilst only £3.00/t would be charged for a 550t barge. This substantial difference will, in many cases, be the difference between an economic and uneconomic operation.

4.4.4 The exact current dimensions of the waterway and the maximum size of barge that is permitted to navigate along the separate sections has been difficult to identify. This is especially true for the constrictions in Newark, but is also true for the tidal section between Gainsborough and Cromwell. All published maximum dimensions for the River Trent should be treated with caution despite this information being critical for economic utilisation of the waterway.

4.5 **Barge availability and finance:**

4.5.1 There are currently only a limited number of barges actively in service, more vessels are laid up and can be returned to service if trading conditions improve, though they are not available for trial loads due to the costs involved.

4.5.2 There are only a limited number of vessels able to use the maximum capacity of the River Trent and any substantial increase in traffic may well require more vessels to be purchased possibly from continental Europe.

4.5.3 Unfortunately even before the current restrictions on the availability of finance it was difficult to obtain funding from banks. Though larger companies have been able to obtain finance, this has only been in a general way and the barges themselves are not seen as acceptable as security for any loan. The possibility of leasing barges is also limited due to the absence of an active after market and the lack of understanding of the value of this type of long life asset.

4.6 **Grants:**

4.6.1 The UK government currently provides two grants aimed at supporting the transfer of more freight onto Inland Waterways.

4.6.2 The Mode Shift Revenue Support scheme provides a start up grant based on the freight tonnage transferred from road to water. This grant is often seen as complicated to apply even though the rail freight industry has recently made many successful applications for revenue support.

4.6.3 New applications for the other scheme, the Freight Facilities Grant, are currently suspended until the review of spending is completed in October 2010.

4.6.4 The European based Marco Polo scheme is only applicable to traffics that cross European borders and is therefore difficult to apply to purely UK based flows. Even if the flow has its origin or destination in an applicable company the need to prove the transhipment and the total flow significantly complicates the application process.

5 Traffic Opportunities

5.1 The primary objectives of this study was to increase the quantity of freight transported on the River Trent and other waterways in the East Midlands area, to encourage a shift to more sustainable modes of transport within the East Midlands Region and, in particular, secure a reduction in CO_2 emissions through this transfer.

5.2 In total over 50 businesses have been contacted with more than 40 of these visited to ascertain their freight flows and their viability to transfer to water freight. In total over 3,700,000 tons per annum of freight was identified with some potential for transfer to the river, with 1,900,000tons per annum providing real opportunities for transfer in the short to medium term.

5.3 For those companies which showed an interest in the possibilities further investigations were carried out to identify possible loading and unloading wharves, potential barge operators and freight rates and the availability of grants.
The most significant cargoes include aggregates, grain, timber and recycled material.

5.4 The details of the cargoes identified as showing short term potential are covered in the figures below with a complete listing in Appendix B

5.5 In depth work has targeted the commodities with the largest tonnages and which show a short term potential for modal shift.

5.6 **Aggregates**

5.6.1 The Trent valley is a major producer of aggregates and historically this area has shipped a significant tonnage by water, with each of the major companies having their own riverside production site and loading wharf. The main target for this project is the conglomeration of aggregate production alongside the River Trent in the area between Torksey and Gunthorpe. All of the major and several smaller local aggregates producers have been visited together with distributors and users near to the River Trent and associated waterways.

5.6.2 In recent years several pits have exhausted their stocks and when moving to a new site the availability of water transport has not been taken into account. Currently only Lafarge has such a facility at its Besthorpe site.

5.6.3 Following meetings it has become clear that at least one other company with an existing operation is seriously interested in building a loading facility but is hampered by not owning the land between their facility and the river. Two companies are expecting to open new quarries within 2 years and both see water transport as an integrated part of their schemes.

5.6.4 Development in recent years has mostly ignored water transport so that aggregate distributors and users are often not situated waterside or have even sold off their access to the water. This is especially apparent at the Colwick Industrial Estate to the North of Nottingham which is seen as one of the major riverside destinations for aggregates in the area.

5.6.5 The only useable aggregate wharf in the Colwick estate is still covered by a restricted covenant preventing its use by anyone other by British Waterways; until this covenant is renegotiated or removed it is difficult to see how significant tonnages can be delivered to the Colwick area. In the short term this is likely to mean that this will mean that most aggregates will continue to be delivered to the Yorkshire and Humberside areas where unloading wharves are available. It is expected that a new flow identified by this study will commence later this year transporting aggregates from Besthorpe to Hull.

5.6.6 The construction of small scale hydroelectric schemes alongside the lock weirs is expected to start along the River Trent in the near future. This work will require the delivery of substantial quantities of aggregates and the removal of greater quantities of spoil that will require processing for re-use. Negotiations are currently in hand for a substantial percentage to be transported by barge.

5.6.7 The other significant flow is crushed slag from Corus at Scunthorpe to the Nottingham area for the production of tarmac. This appeared to be a relatively easy win subject to sorting out the difficulties with the Colwick wharf. The economics of the operation are seriously affected by having to transport the slag 5 miles by road from the steel works to a wharf added to a short road haul at the Nottingham end. During the course of discussion the current road haulage system was optimised so that the slag was carried as a back load, reducing the customers costs by 40% and resulting in the water option being uneconomic. It is interesting that this reorganisation occurred when discussions were in progress.

5.7 **Timber**

5.7.1 Due to the proximity of the Baltic countries, several of the ports in the Humber area are significant importers of timber, especially Hull, Goole and the Trent wharves. Significant quantities were also imported by coaster direct to Gainsborough until the cost of using small coasters became prohibitive, since then deliveries have been by road from the larger wharves and ports.

5.7.2 Due to the significant quantities involved and relatively constant requirement for year round delivery this is seen as a realistic opportunity for re-starting delivery by water. Initial discussions centred on the use of the original wharf in Gainsborough very near

to the customer, but despite several meetings it did not prove possible to reach an economic solution despite the wharf not currently being used. Further discussion has resulted in an alternative wharf being identified that, due to the availability of storage land, will integrate well into the supply chain.

5.7.3 Due to the size and weight of the timber packs it has been decided that it would be advantageous to carry out a short period of trials to ensure that the most cost effective method of operation has been identified before investing fully in new equipment. Meetings have been held with wharf and barge owners together with the receiver with the intention of initial trial operation occurring this autumn.

5.8 **Grain**

5.8.1 The pattern of grain transport in this country has changed radically and repeatedly over the years influenced by local shortages but also by agricultural taxes and policy. Traditionally large tonnages of all types of grain were exported and yet further tonnages were imported especially for bread making where 'harder' Canadian and French wheat was required. Many flour mills were situated on rivers to enable barges to deliver direct to the mill.

5.8.2 The most recent change has been the push towards the production of bio-ethanol as an alternative to petrol and diesel as a green fuel. This process requires large quantities of grains to be delivered to a single point all year round. There are plans to site such a plant in the Humber area and due to the tonnages involved delivery by barge would be advantageous. The proposal involves barges loading at several places between Nottingham and Gainsborough on a continuous shuttle system enabling farmers to store the grain locally rather than paying for a separate storage facility. The plant would also produce a significant amount of animal feed as a by-product for which a market has been identified accessible by barge.

5.8.3 The most significant requirement is to identify sufficient loading points to minimise the haulage distance for the famer. The grain can be loaded by mobile conveyor direct from road transport so no large silos will generally be required, but both good barge and road access is a priority due to the intensive operation required.

5.9 **Power Stations**

5.9.1 Thermal power stations are still a major part of the infrastructure in the River Trent valley. They were initially sited here to take advantage of the river for cooling purposes and yet still be close to the coal mines in the Nottinghamshire coal field. They were all designed to be fed solely by coal delivered by merry-go-round freight train.

5.9.2 Contact was made with all of the companies concerned but in all cases where bulk coal is still burnt they had decided to continue using the existing infrastructure to import their coal due in part to any change to water requiring investment in infrastructure.

5.9.3 New biofuel and power from waste plants may also be built alongside the river. These appear to be planned to use only road and rail to receive fuel often without fully exploring the real possibility of using the river. It often apparent that no real effort has been made to examine the possibility of a modern high capacity water borne delivery system.

5.9.4 New power stations are being built in the valley but they are in the main gas powered stations as this is currently the cheapest option with the most flexibility. They will all receive the gas by pipeline with some backup oil being stored on site in case the gas supply is interrupted.

5.9.5 During the construction phase or at periods of major maintenance all these sites require extremely large and heavy equipment to be delivered. These Abnormal Indivisible Loads have often been delivered direct to the power station by barge in the past and this, best practice, option should be the mode of choice in the future.

5.9.6 Many of the contractors do not look at the water option at all, rather preferring to take the 'easy' option of transporting unsuitable loads by road impacting badly on those that live locally. In many cases the water option is discounted by the contractors as too expensive and too difficult due in part to using consultants with no specialised knowledge that only guesstimate the costs. The option of using the river to deliver this type of AIL should be examined thoroughly at the planning stage.

5.10 Current Progress

5.10.1 Though there has been significant progress no new substantive traffic has started by the end of July 2010. There are three new flows that are currently being negotiated to start in the near future.

5.10.2 Taylor Aggregates have agreed with Lafarge Aggregates at Besthorpe to buy both sand and gravel at an as loaded price. Following discussions with barge operators they have decided to operate their own dedicated barge. The operation commenced in October 2010 with the intention of carrying 30,000 tons in the first year from Besthorpe Quarry to the Taylor Aggregates Wharf on the River Hull.

5.10.3 Following advice provided by BargeConsult to J N Bentley and Lafarge the option of supplying aggregates by water to the site of the new hydroelectric plant at Gunthorpe weir and the removal of as-dug material for processing is being fully costed. Even

though the work site is difficult to access and is of course on a commercial waterway, the use of barges to move materials had not initially been considered. Following several meetings, J N Bentley have begun discussing costings with barge operators and Lafarge for transporting material in both directions. This will be sand and gravel from Besthorpe Quarry to Gunthorpe and as-dug material from Gunthorpe to Lafarge at Cromwell for processing. It is expected that work will commence in 2011 and total 30,000 tons for this site.
Further sites are expected to be developed in 2011 which are likely to include Sawley just to the south of Nottingham and Linton on the River Ouse. Further sites are likely to be developed on the River Trent in the following years.

5.10.4 John Brash Timber at Gainsborough continue to be keen to re-organise their supply chain to include the delivery of imported packs of timber to Gainsborough by water. Due to the size of the packs and the bulk density it has been difficult to identify a suitable barge for this traffic and this has been one of the factors delaying the start of the operation. Following extended discussion agreement has been reached to use the wharf at West Stockwith to unload the timber where it will be stockpiled for delivery to Gainsborough as required, this site is already used by John Brash for this purpose. As it has not been possible to identify a suitable barge so far it has been decided to operate for a trial period with existing barges to iron out any bugs before embarking on any substantial investment. Currently discussions are in hand with the timber importers/agents and their stevedores to identify all the hidden costs in the current road based delivery system.

Company	Location	Possible Cargoes	Movement Details	Projected Annual Tonnage	Opportunities	Constraints	Potential
Andy Collins Aggregates	Dinnington, S.Yorks	Aggregates	Besthorpe/Gunthorpe etc to Rotherham	Aggregates 50,000t	Innovative small operator	Price. Availability other than Besthorpe	Short to medium term
AMA Ltd	Rotherham	Aggregates, Scrap	Wharf available for 3rd party cargoes	Aggregates see above Scrap 5,000t	Positive attitude, willing to be flexible and experiment	Depends on others	Wharf available now. Good prices
Axholme Industrial Developments	West Stockwith	Timber. General	Handling timber for Brash. Available to handle any general cargo	Timber - see J.Brash	Keen to develop possibilities	Wharf small for modern barges	Short to medium term
J N Bentley	Skipton	Gunthorpe, Sawley	Hydro plant construction sites Gunthorpe to/from Cromwell area	Aggregates to site 10,000t Spoil removal 20,000t Turbine delivery		Costs due to waterway size through Newark and South of Nottingham. Access to sites	One off construction sites
John Brash Ltd	Gainsborough	Timber In and Out	Humber ports to Gainsborough	60,000t	Wish to take full control of supply chain.	Stowing packs in hold. Low current lorry rate (return load)	Short term. Ongoing planning for trial
J & S	Hull	Grain, Aggregates, Animal Feed	Grain Lincs/Notts to Hull Animal feed Hull to Flixborough Imported grain to Yorkshire Imported aggregates to Yorkshire	Grain 1,000,000t Feed 40,000t Import grain 30,000t Import type 1 50,000t	New development where barges have advantages	Costs due to waterway size through Newark. Wharf to load near Newark etc. Unloading wharves Yorkshire. Current lorry rates	Good. Possible start in 2011 - 2012
Lafarge	Besthorpe, Beeston		Besthorpe - W. Yorkshire Currently assessing viability of further movement by water in Trent area	Current 120,000t Future additional 50,000 - 200,000t	Besthorpe quarry in use loading aggregates to barges	Will not invest in current depressed market and will not 'buy' sales.	Have long term commitment to barge transport
NW Trading	Goole + Hull	Steel, biomass, fertilizer	Involved with ASD trial, will load at discount to barge	None at present	Positive attitude, willing to be flexible and experiment. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Wharf available now. Good prices
PD Ports	Keadby, Hull etc	Large operator, many cargoes + containers	Containers to/from Hull Imported steel and timber	est 1000 containers or 18,000t Timber - see J.Brash	Positive attitude, willing to be flexible. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Facilities available now
RMS Logistics	Flixborough, Gunness, Goole, Hull etc	Large operator, many cargoes + containers	Interested in Inland Ports and happy to work to/from barges. Access to Scunthorpe.	Biomass/RDF see Wastecycle Slag - see Tarmac Animal feed - see J & S	Positive attitude, willing to be flexible. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Facilities available now
Silvaperl/Prince Minerals	Gainsborough	Perlite, vermiculite	Perlite Gunness to Gainsborough	Perlite 5000t	Has own wharf, previously used barges	Importer not keen, only part load is for Gainsborough. Cost of crane	Low volume for amount of input
Tarmac	Langford Quarry, Colwick recycling, readymix and asphalt	Aggregates	Aggregates Langford to Colwick and Yorkshire. Type 1 from Colwick Slag Scunthorpe to Colwick	Aggregates 30 - 200,000t Type 1 100,000t Slag - 50,000t	Keen to integrate in supply chain. Not averse to logistical change	Langford very near to river but no loading facility. No useable wharf at Colwick. Cost due to waterway size through Newark	Good with investment. Tomorrow or medium term
Taylor Aggregates	Hull	Aggregates	Besthorpe / new quarry to Hull	Aggregates 50,000t	Former barge operators	Suitable supply at good price	Short to medium term
Wastecycle	Colwick	Major refuse recyclers	Biomass for power station or export Recyclates for processing or export	Biomass 16,000t RDF 15,000t Recyclates 50,000t	Only 150m from Colwick wharf. Keen to expand business opportunities	Identifying waterside destinations. No useable wharf at Colwick. Cost due to waterway size through Newark	Short to medium term
Wharton Grove Wharf Ltd	Scunthorpe	Steel, coal, fertilizer, scrap, timber	Scrap from Nottingham Timber to Gainsborough - J. Brash	Scrap 80,000t Timber - see J.Brash	Active coaster wharf with all facilities and labour	Scrap not riverside in Nottingham. Cost due to waterway size through Newark	Excellent handling facility for any identified traffic

Fig 5.1. Overview of traffic identified as presenting short term opportunities

6 Containers

6.1 Introduction

The intention of taking a new look at container traffic was to identify potential demand for the use of barge transport for inland distribution services and clarify the barriers to the use of barges, particularly for transportation along the River Trent as far as Nottingham.

6.2 Containers are handled through the Humber ports (Immingham, Killingholme, Goole and Hull) on a number of different services and service types. These are deep sea feeder services, dedicated Intra European services, or carried on RoRo ferry services.

6.3 There are no direct deep sea service calls into the Humber ports and deep sea operators need to make an informed choice, based on timings and costs, on whether to use feeder services from the Continent or to discharge into a UK deep sea port and deliver over a longer distance to the UK destination. Still, however, the majority of containers moving through the Humber ports are carrying intra-European cargo on intra-European container services.

6.4 The Department for Transport Maritime Statistics 2008 indicate that the actual number of containers passing through the Humber ports is in the region of 500,000 units. All of these containers are transported to and from the Humber ports hinterland, stretching in a broad band across the Pennine corridor, by road.

6.5 Cost

To attract business away from road, barge transport has to first prove to be less costly than road transport, even before issues of delivery lead time and potential delay are taken into account. If the barge mode can attract business through cost competitiveness it may attract more deep sea feeder traffic through the Humber as it contributes to an overall reduction in the cost of the feeder option over the direct deep sea call option in the south of England.

6.6 Calculated barge rates are the minimum rates required to provide a barge operator with a 5% return on capital, operating at 75% of capacity. The optimum rate for moving a 40’ container to Nottingham is £220 and the optimum rate for Newark is £100. If the existing constraints in Newark are removed the rate to Nottingham would reduce to £140 (Appendix E).

6.7 The most important additional factor is maximising the inherent advantage of a barge to carry heavy weights within its volume constraints. A truck will normally only be able to carry one container irrespective of its length whilst a barge is most efficient carrying more shorter containers. This means that 20’ containers can be carried at a significantly reduced price. The rate for a 20’ container would be £70 to Newark, £150 to Nottingham and £95 to Nottingham if constraints are removed.

6.8 The total handling cost at the ports and the inland terminals is estimated to be £115 (£40 loaded charge at port / £35 at inland terminal, £20 x 2 empty handling charge). Terminal operators regard the operation of loading to and from barges as a secondary ship-to-shore movement and would intend to charge accordingly. Experience shows that a customer with significant volumes could successfully challenge some of these charges. There will also be a local delivery charge at the inland end which will be at least £50 per container.

Barge size and destination. All to/from Hull	Barge capacity TEU	Return trips per week	Rate / 40' container	Rate / 20' container	TEU load at 75%
To Nottingham existing vessel (Case 1)	12	2	£220	£150	9
To Nottingham special barge to fit current restrictions (Case 2)	18	2.5	£220	£150	13.5
To Nottingham existing locks and Newark bypass built (X)	30	2	£140	£95	22.5
To Newark existing vessel (Case 4a)	28	3	£120	£85	21
To Newark barge built to fit maximum current size (Case 3)	48	3	£100	£70	36

Fig 6.1 Costs for moving containers by barge (details in Appendix E)

Destination	Barge cost 20ft	Barge cost 40ft	Total handling both ends	Price to 'Inland Terminal'	Local haulage	Total
Nottingham by barge	£150		£75	£225	£50	£275
Nottingham by barge		£220	£75	£295	£50	£345
Nottingham by barge with Newark bypass	£95		£75	£170	£50	£220
Nottingham by barge with Newark bypass		£140	£75	£215	£50	£265
Nottingham by lorry				£240		£240
Newark by barge	£70		£75	£145	£50	£195
Newark by barge		£100	£75	£175	£50	£225
Newark by lorry				£210		£210

Fig 6.2 Cost comparisons barge and lorry

6.9 Currently road haulage rates are at a historically very low level, an indicative road haulage cost for a loaded container delivered from Immingham to Nottingham is £240 and £210 to Newark.

Conclusions

6.10 As the table above shows there is a financial case for delivery by barge to an Inland Terminal especially to Newark for 20ft containers. This type of movement maximises the advantages of using the barge where volume rather than weight is the main constraint. Unfortunately there is currently still in general a significant gap between road haulage rates and door-to-door costs involving barge transport between the Humber ports and Nottingham / Newark.

6.11 With each of the container operators contacted the sentiment is towards using the barge mode for inland container distribution, but only if the cost and service is right. The prevailing, cost driven trend for deep sea operators is away from feeder services into the Humber and onto direct deep sea calls into Southampton and Felixstowe.

6.12 Development of the inland terminal concept which becomes the effective origin and destination for the cargo, together with added value services, would be a significant driver to making an overall economic case. The possible sites for such a strategic development should be protected from inappropriate development.

6.13 Current logistical operations indicate that only intra-European container movements are likely to be transhipped in the Humber ports in the short term, due to the unlikely arrival of deep sea direct deliveries and the added cost of feedering.

6.14 Many analysts expect fuel costs to rise substantially in the future which would be expected to have a significant effect on the road haulage costs. Any barging operation is much less fuel dependant and would become more cost effective.

7 Environmental Advantages

7.1 There have been many studies carried out investigating the overall environmental advantages of moving freight by inland waterways. These have been summarised in a paper produced by the Department for Transport (DfT) in 2009 – Mode Shift benefit Values: Technical Report.

7.2 Based on this report the DfT also provide an online Freight Grants - Environmental Benefits Calculator to enable the calculation of the benefit for any traffic movement.

7.3 This information is used to calculate the level of grant aid available for modal shift support.

7.4 **Overview of external cost levels**

These are the costs caused by accidents, noise, pollution, climate change, infrastructure and traffic jams. Inland navigation is by far the best to emerge from a comparison of the average external costs as shown by EC studies. For road transport they are calculated at € 24.12 per 1000 tonne, for the rail they are € 12.30 and for inland waterways they are € 5.

Comparison of external costs between inland waterways - train - road
External costs in € per 1000 tkm

External Cost	**Road**			**Inland Waterways**			**Train**		
	Vito	EC	Planco	Vito	EC	Planco	Vito	EC	Planco
Accident	22,80	5,40	37,80	0,07	0,00	0,30	1,60	1,50	2,30
Noise	4,40	2,10	7,40	<0,1	0,00	0,00	2,80	3,50	12,70
Emissions	9,10	8,70	29,10	5,40	3,00	4,20	0,4-9,46	4,30	3,50
Congestion	5,40	5,50	1,20	n/a	n/a	0,00	n/a	0,20	0,00
Infrastructure	1,90	2,50	0,00	0,70	1,00	0,00	0,20	2,90	0,00
Land take	-	-	1,30	-	-	0,00	-	-	0,40
Land and water pollution	-	-	8,60	-	-	0,00	-	-	0,00
Total	**43,50**	**24,10**	**85,40**	**6,20**	**5,00**	**4,50**	**7,10**	**12,30**	**19,00**
Difference with road	**-**	**-**	**-**	**37,30**	**19,10**	**80,80**	**36,40**	**11,80**	**66,30**
External costs saved by NOT moving 1.000 ton 1 km by road				**37,30**	**19,10**	**80,80**	**36,40**	**11,80**	**66,30**

Fig 7.1 Overview of three recent European environmental studies

7.5 **Carbon emissions**.

The amount of Carbon or CO^2 emitted by any vehicle is affected by many factors including load factor, empty running, speed, congestion and a host of further factors. Though there are several studies that have studied this in depth the figures produced do not seem to relate from one study to another and mainly show that the results depend to a great extent on the assumptions made for the particular study. This is especially related to the size of the truck or barge studied, as shown by this recent study.

Energy factors for various modalities in MJ/tkm

Type of transport	average cargo capacity (tonnes)	primary energy consumption (MJ/tkm)
Road transport		
Lorry	7.3	4.06
Lorry + trailer	19.3	1.82
Truck + trailer	25	1.40
Inland shipping		
International*	1,250	0.43
National*	700	0.48
Rail		
Electric traction*	1,000	0.59
Diesel-electric traction*	650	0.73

Source: CBS, Lehmann

*) value is calculated as the total energy consumption for loaded and unloaded kilometers, divided by the tonne-kilometre performance

Fig 7.2 Energy consumption by mode, size and type

7.6 This shows that for this study using a 700t capacity barge instead of a 38 ton lorry (25t capacity) would produce a CO^2 saving of 65%.

A recent trial operation from the River Trent, under less than ideal conditions, published by the Commercial Boat Operators Association showed a saving of 45% for an operation where the water option was 15% longer than the road (see appendix F)

For calculation purposes the CO^2 emissions from the barge are assumed to be 55% lower those of a lorry and that both the lorry and barge will return empty.

7.7 To enable some comparisons to be made the DfT environmental benefit and the CO^2 savings both per ton and per annum have been calculated for several of the short term prospective flows. In each case no allowance has been made for emissions during the loading and unloading operations. Those for loading would in any case be broadly similar to those for loading a lorry as in most cases a loader shovel would be used possibly in conjunction with an electrically powered conveyor for the barge loading. Any road haulage for delivery to or from a wharf has been shown as a disbenefit unless this would be exactly mirrored by a direct road option.

7.8 **Carbon Dioxide Calculation**

A large truck operator has reported a fuel use of 9 miles/gallon on average with 50% empty running (one way loaded, return empty).

9 miles/gallon = 9 x 1.609 or 14.48 km/gallon = 14.48/4.54 or 3.18 km/l

If carrying 25 tons 1litre = 3.18 x 25 or 79.5 per tkm

Specific Gravity of Diesel 0.84
1kg of diesel = 860g of Carbon = 3150g of CO_2
1l of diesel = 722g of Carbon = 2650g of CO_2

Therefore 1 ton carried 1 km by a 25ton capacity lorry will produce 33g of CO^2 (2650/79.5)

7.9 It is assumed for comparison purposes that the CO^2 emissions from the barge will be 55% lower than for a lorry and that both the lorry and barge will return empty.

7.10 The following table shows the environmental benefits for the largest of the identified short term flows totalling 1,771,000 tons per annum. The single largest benefit is provided by grain transported to Hull due to the large tonnage followed by the various aggregate flows.

7.11 Overall the benefits add up to the saving of 4,940 tons of CO^2 and a total value of environmental benefits of £4,850,000 using the DfT figures.

7.12 Fuel Consumption

Figures from the Road Haulage Association show that 30% - 40% of total lorry costs are fuel, whilst only 12% - 18% for barge transport. If as expected the cost of fuel rises significantly in the near future this will significantly improve the relative costs in favour of a barge operation.

Customer	Commodity	Annual Tonnage	Loaded trips at 25t/trip	From	To	Lorry Distance km	Annual Lorry CO^2 Tons *(Tons x km x 0.066kg)*	Barge Loading wharf	Distance to loading wharf km	Barge Unloading wharf	Distance from unloading wharf km	Barge distance	Total Disbenefit distance km	Total annual disbenefit in CO^2 Tons	Annual Barge CO^2 Tons *(Tons x Km X 0.0297kg)*	CO^2 Saving Tons	DfT Environmental Benefit per lorry movement	Dft Environmental benefit per ton inc empty return	DfT annual benefit	
Taylor Aggregates	Aggregates	50,000	2,000	Besthorpe	Foster Street, Hull	99	327	Besthorpe	0	Foster Street, Hull	0	104	0	0	154.4	172.3	£41.18	£3.29	£164,720	
Andy Collins	Aggregates	50,000	2,000	Besthorpe	Rotherham	67	221	Besthorpe	0	AMA, Rotherham	0	150	0	0	222.8	-1.7	£31.00	£2.48	£124,000	
John Brash	Timber	60,000	2,400	Goole Docks	Old Shipyard, Gainsborough	72	285	Goole Docks	0	West Stockwith	10	50	10	39.6	89.1	156.4	£5.16	£0.41	£24,768	
J & S	Grain	1,000,000	40,000	Nr. Newark	Hull	112	7,392	Cromwell	18	King George Dock, Hull	0	117	18	1188	3,474.9	2,729.1	£38.82	£3.11	£3,105,600	Using Typical farm LN5 0RD
Lafarge	Aggregates	100,000	4,000	Besthorpe	Alexandra Dock, Hull	96	634	Besthorpe	0	Alexandra Dock, Hull	0	114	0	0	338.6	295.0	£39.82	£3.19	£318,560	
Tarmac	Slag	50,000	2,000	Corus, Scunthorpe	Little Tennis Street, Nottingham	132	436	Althorpe	19	Trent Lane, Nottingham	0.6	114	20	66	169.3	200.3	£23.45	£1.88	£93,800	
Tarmac	Aggregates	200,000	8,000	Langford	Colwick	40	528	Langford	0	Colwick	0	39	0	0	231.7	296.3	£19.24	£1.54	£307,840	New loading facility at Langford
Tarmac	Type 1	100,000	4,000	Colwick	Keadby	107	706	Colwick	0	Keadby	0	110	0	0	326.7	379.5	£32.88	£2.63	£263,040	
Wastecycle	Biomass / RDF / Scrap / Recyclates	161,000	6,440	Colwick	Grove Wharf	118	1,254	Colwick	0.5	Grove Wharf	0	112	0.5	5.3	535.6	713.0	£35.06	£2.80	£451,573	
TOTALS		1,771,000														4,940.3			£4,853,901	

Fig 7.3 Carbon Dioxide and Environmental Benefit for specific traffics

8 Outline specification for an alternative Newark Bypass – River Trent

8.1 **Background:**
Currently the River Trent is navigable through the town of Newark with two locks Newark Nether Lock and Newark Town lock with a section of canalised river in between. This section has several constraints preventing the use of full size barges.

- The bend above Newark Nether lock, restricting length to approximately 45m.
- Newark town bridge, a listed structure, the arch restricting width to 6m and the headroom at the sides to less than 3m.
- The bridge above Newark Town lock restricting overall height to 4m.

8.2 Due to the constricted site in the centre of the town it is not possible to simply bypass these structures.

8.3 Most previous studies have looked at using the main river channel as a possible bypass. Though this may superficially be the simplest answer it does have some significant problems. This section of river has never been navigable for barges and is for most of the distance very shallow. It is crossed by two railway bridges, one being the main east coast line and by two road bridges both substantial brick structures.

8.4 To enable sufficient headroom, width and depth all four of these bridges would have to be rebuilt effectively in their present locations – a very expensive operation. To this must be added the cost of two locks together with associated weir structures to enable correct levels to be maintained and not least the environmental problems involved with completely altering the character of the river.

8.5 **Current Proposal:**
To try and minimise some of the costs and environmental issues outlined above a new route has been outlined that can be built through low value land and where most of the structures can be built 'in the dry', only one lock and three bridges will be required, yet the route mainly follows existing flood channels so minimising the environmental impact.

8.6 From the North the route will start from the lock weir bypass at Newark Nether lock and initially parallel the Newark – Nottingham railway line then the A46 bypass. The route will stay as close as practical to them to minimise the land take.

8.7 At the Kelham road roundabout the road will pass under the A616 at a point where there is already a flood relief bridge and then the A617 in quick succession. These are busy roads so the final solution here may not simply be replacing the road by a bridge but re routing one so only one bridge is required.

8.8 The route would then continue to closely follow the A 46 for a period before crossing under the Newark – Nottingham railway near to an existing flood relief bridge. This is the

only bridge that technically must be on the same route as the existing one, though it is a relatively lightly used route.

8.9 It is only after going under the railway the only lock will be built to ensure the maximum possible height advantages under the bridges. It may well be most economic to build the lock immediately to the South of the railway line, this would mean that the bridge could be narrower and only one structure would be needed. The bypass will then join into the existing 'Newark dyke' just North of Averham weir.

Fig 8.1 Possible alternative course for a 'Newark Bypass'

8.10 Though the route has been examined there is no definitive information as yet for the relative levels of all current structures. It is relatively easy to raise the level of a road but much more expensive to do this for a railway.

8.11 The current locks raise the waterway by 2.55m at Newark Nether lock and by 1.90m at Newark Town lock, giving a total of 4.45m and it is apparent that all the roads and the railway are higher than the top level at Averham weir. Unfortunately without a proper survey it is impossible to measure the height of the railway bridge at Averham weir relative to the water level above the weir.

8.12 **The basic parameters of the waterway are recommended to be:**

Bottom width of 'canal' section minimum 40m, preferably 50m
Water depth 3m
Banks would be at 45^{o} protected by loose stone
It is not expected that the bottom will require any protection except where significant scour is expected
Clear headroom – as much as possible, preferably 7m but in any event more than 5m
Lock length 70m
Lock width 9.5m
Lock fall +/- 4.5m and it will need to have extra height gates at the top to prevent floods from overtopping it.

9 Actions/Next Steps

9.1 Ensure the restrictive covenant relating to Colwick dredging wharf is amended to permit its use for all freight transhipment.

9.2 Develop direct contacts with relevant Local Government Authorities and other Agencies to ensure that the River Trent continues to be available for transporting freight with reference to sustainable transport and development.

9.2.1 Nottingham City Council: Use of Meadow Lane and Trent Lane Wharves for ongoing commercial use.

9.2.2 Nottingham County Council and Gedling Borough Council: Use of Colwick Dredging Wharf for all freight transhipment.

9.2.3 Newark and Sherwood District Council: Wharves and development land in the Newark area. No existing wharf available and identification of land for inland port. Newark bypass routes.

9.2.4 Bassetlaw and North Kesteven District Councils: Wharves and development land in the Gainsborough area.

9.3 Ensure ongoing contact with companies identified as having freight that can be moved on the river and assist any new contacts to obtain full and correct information in the future.

9.4 Develop firm options for a Newark Bypass and outline costings

10 Conclusion

10.1 After visiting over 40 local companies the River Trent Water Freight Development Project has identified a total of 3,700,000 tons of freight with some potential for transfer to the river.

10.2 Fifteen companies have been identified that have freight flows with real opportunity for transfer to water in the short term. These flows total 1,900,000 tons per annum

10.3 Analysis has shown that if all the 1,900,000 tons was transferred from road to water this would result in an annual reduction in pollution of 4,940 tons of CO^2. The total environmental benefit as calculated by the Department for Transport would be £4,850,000 per annum.

10.4 The first three of these flows are due to start in the near future. Taylor Aggregates from Besthorpe to Hull, J N Bentley in both directions between Besthorpe and Gunthorpe and John Brash between the Humber Ports and Gainsborough.

10.5 There is currently little freight infrastructure remaining on the River Trent in Nottingham. Every effort should be made to retain all or part of the Trent Lane facility as an Inland Waterway port. This will require Nottingham Council to take the lead in conjunction with British Waterways.

10.6 The restrictive covenant relating to Colwick dredging wharf is a significant constraint that had not previously been identified. A robust solution to this constraint should be a priority.

10.7 The strategic value of the British Sugar wharf and surrounding land at Newark must not be underestimated. A regional initiative should ensure that this is fully investigated and recognised.

10.8 Restrictions on the availability of wharves can in part be traced to a one-sided application of the planning processes. There are many planning policy guidelines and those dealing with housing are often applied more rigorously than those dealing with water transport.

10.9 Despite the publication of the January 2009 report this scarce resource has continued to disappear. It is strongly recommended that action is taken to safeguard the remaining River Trent wharves between Keadby and Nottingham for commercial use.

10.10 Logistical flows of domestic waste are organised council by council and, except in isolated cases, completely ignore the needs of neighbouring councils even where a shared facility could be more cost effective. During one meeting it was explained that this is

partly due to the need to obtain the greatest Carbon Benefit for the council which requires the facilities to be built in the area producing the waste. This system should be challenged at regional level.

10.11 It is very easy for companies to take the 'easy' or established option when planning transport to new infrastructure. It is important that where appropriate that this is challenged at the planning stage to ensure all options are fully investigated. Once building commences it is usually too expensive to make changes.

10.12 Though there is a limited supply of barges immediately available, it is apparent that more can be returned to active use when cargoes are available. This, along with other factors, means that starting new flows is often a long process even though barge owners are ready and eager to explore new opportunities.

10.13 The cost of barge operation is directly related to carrying capacity. The restriction in waterway dimensions in Newark is a significant factor in reducing the use of the river. This produces a quoted increase in rates of over 80% a substantial difference which will, in many cases, be the difference between an economic and uneconomic operation.

10.14 Container operations on the river require the construction of an inland terminal at Newark or the opportunity to take large barges to Nottingham to be economic.

10.15 A significant rise in the price of fuel will improve the economic viability of moving freight by water. The specific fuel consumption required for moving freight by road is double that required for moving freight by water measured per ton/km.

11 Appendix A

Full list of contacts

First Name	Surname	Company
Geoff	Wheat	Humber Barges Ltd
Roger	Gregory	Park Logistics Group
Andy	Walker	Trent Concrete Limited
Stephen	Roe	Biffa Waste Services Ltd
Anthony	Clark	Tarmac Recycling
Lesley	Joy	Silvaperl
Isoldt	Harris	T W Logistics Ltd.
Steve	Beatty	John Brash Timber
Mike	Finkill	Isis Regeneration Ltd
Michael	Bryant	Abnormal Load Engineering Limited
Simon	Beardsley	Lincolnshire Chamber of Commerce
Bryn	Walters	EMRA
Sean	Kent	Lincolnshire County Council
Chris	Barlow	Lincolnshire County Council
Scott	Osborne	Innes England (Trent Lane)
Craig	Straw	Innes England (Trent Lane)
Kirsty	Scott	Innes England (Trent Lane)
Mike	Finkill	Isis Waterside Regeneration (Trent Lane)
Tara	Willey	Homes and Communities Agency (East Midlands)
Marc	Cole	Nottingham Waterside Ltd (Trent Lane)
Andrea	Tomlin	Lafarge Aggregates Ltd
Andy	Morris	Lafarge
Peter	Aarosin	Danbrit Shipping Ltd
Mike	Kirby	RMS Europe Ltd
Paul	Crossland	RMS Group Logistics Ltd Flixborough
Stephen	Hudson	Goole Intermodal Terminal
Barry	Davies	EMRA
Jonathan	Akehurst	Brett Aggregrates
Peter	Baker	PRB Associates Ltd.
Isoldt	Harris	TWL
Anne	Winfindale	DTZ
James	Hartley	Fisher Hargreaves Proctor
Juliette	Thomas Cousins	West Lindsey District Council
Christophe	Banos	EDF Energy
Andy	Jee	Lincolnshire County Council
Hugh	Frost	Hugh Frost Designs
Viv	Russell	Tarmac Ltd
Chris	Roome	Tarmac Ltd
Kevan	Wilcockson	Wastecycle Ltd
Roy	Smith	Kingsferry Wharf (RSL) Ltd
James	Lyne	New Holland Bulk Services
Ken	Morris	N W Trading (Holdings) Ltd
Tim	Cranmer	Eagle Energy UK Ltd
Julie	Duffield	SHS Freight Services Ltd
Martin	Rees	Wharton Grove Wharf Ltd
Tim	Hill	Global Shipping Services Ltd

First Name	Surname	Company
Eric	Bell	DHL Exel Europe Ltd
Paul	Bessey	Delta Shipping & Trading Co
Paul	Heath	AMA (Storage & Distribution) Ltd
Gary	Hughes	Hughes Craven Ltd
Andy	Collins	Andy Collins Aggregates Ltd
Duncan	Taylor	Foster Street Wharf Hull
Gwen	Lancaster	Maritime & Coastguard Agency
Duncan	Harris	Bardon Aggregates (A I)
David	Cox	ASD Metal Services
Stewart	Alexander	Renewable Energy Systems Ltd
Mark	Forrest	Hargreaves Services
John	Ware	West Lindsey District Council
Tony	Waddington	E V Waddington
Ian	Barnes	Boots
Damon	Scott	Nelstrop Ltd
Mark	Grimshaw-Smith	Cemex
Toby	Baker	RWE Npower (Staythorpe)
Chris	Roome	Tarmac
John	Mawer	Topmix/Tarmac
Lea	Hawkes	Veolia Environmental
Bob	Howe	British Sugar
Mick	Allen	Nottinghamshire County Council
Paul	Riley	Nottingham City Council
Dafydd	Wynn	Scottish & Southern Electricity plc
Nigel	Souter	T Ward Shipping
Colin	D'Oyley	Ennstone plc
Chris	Broughton	PD Ports Ltd
Malcolm	Miller	Corus Long Products Business
Roger	Perry	Tarmac

Appendix B

Traffic opportunities identified by the River Trent Water Freight Development Project

Company	Location	Possible Cargoes	Movement Details	Projected Annual Tonnage	Opportunities	Constraints	Potential
Andy Collins Aggregates	Dinnington, S.Yorks	Aggregates	Besthorpe/Gunthorpe etc to Rotherham	Aggregates 50,000t	Innovative small operator	Price. Availability other than Besthorpe	Short to medium term
AMA Ltd	Rotherham	Aggregates, Scrap	Wharf available for 3rd party cargoes	Aggregates see above Scrap 5,000t	Positive attitude, willing to be flexible and experiment	Depends on others	Wharf available now. Good prices
Axholme Industrial Developments	West Stockwith	Timber. General	Handling timber for Brash. Available to handle any general cargo	Timber - see J.Brash	Keen to develop possibilities	Wharf small for modern barges	Short to medium term
J N Bentley	Skipton	Gunthorpe, Sawley	Hydro plant construction sites Gunthorpe to/from Cromwell area	Aggregates to site 10,000t Spoil removal 20,000t Turbine delivery		Costs due to waterway size through Newark and South of Nottingham. Access to sites	One off construction sites
John Brash Ltd	Gainsborough	Timber In and Out	Humber ports to Gainsborough	60,000t	Wish to take full control of supply chain	Stowing packs in hold. Low current lorry rate (return load)	Short term. Ongoing planning for trial
J & S	Hull	Grain, Aggregates, Animal Feed	Grain Lincs/Notts to Hull Animal feed Hull to Flixborough Imported grain to Yorkshire Imported aggregates to Yorkshire	Grain 1,000,000t Feed 40,000t Import grain 30,000t Import type 1 50,000t	New development where barges have advantages	Costs due to waterway size through Newark. Wharf to load near Newark etc. Unloading wharves Yorkshire. Current lorry rates	Good. Possible start in 2011 - 2012
Lafarge	Besthorpe, Beeston		Besthorpe - W. Yorkshire Currently assessing viability of further movement by water in Trent area	Current 120,000t Future additional 50,000 - 200,000t	Besthorpe quarry in use loading aggregates to barges	Will not invest in current depressed market and will not 'buy' sales.	Have long term commitment to barge transport
NW Trading	Goole + Hull	Steel, biomass, fertilizer	Involved with ASD trial, will load at discount to barge	None at present	Positive attitude, willing to be flexible and experiment. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Wharf available now. Good prices
PD Ports	Keadby, Hull etc	Large operator, many cargoes + containers	Containers to/from Hull Imported steel and timber	est 1000 containers or 18,000t Timber - see J.Brash	Positive attitude, willing to be flexible. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Facilities available now
RMS Logistics	Flixborough, Gunness, Goole, Hull etc	Large operator, many cargoes + containers	Interested in Inland Ports and happy to work to/from barges. Access to Scunthorpe.	Biomass/RDF see Wastecycle Slag - see Tarmac Animal feed - see J & S	Positive attitude, willing to be flexible. Interested in Inland Port concept	Costs due to waterway size through Newark. Availability of suitable facility in Nottingham	Facilities available now
Silvaperl/Prince Minerals	Gainsborough	Perlite, vermiculite	Perlite Gunness to Gainsborough	Perlite 5000t	Has own wharf, previously used barges	Importer not keen, only part load is for Gainsborough. Cost of crane	Low volume for amount of input
Tarmac	Langford Quarry, Colwick recycling, readymix and asphalt	Aggregates	Aggregates Langford to Colwick and Yorkshire. Type 1 from Colwick Slag Scunthorpe to Colwick	Aggregates 30 - 200,000t Type 1 100,000t Slag - 50,000t	Keen to integrate in supply chain. Not averse to logistical change	Langford very near to river but no loading facility. No useable wharf at Colwick. Cost due to waterway size through Newark	Good with investment. Tomorrow or medium term
Taylor Aggregates	Hull	Aggregates	Besthorpe / new quarry to Hull	Aggregates 50,000t	Former barge operators	Suitable supply at good price	Short to medium term
Wastecycle	Colwick	Major refuse recyclers	Biomass for power station or export Recyclates for processing or export	Biomass 16,000t RDF 15,000t Recyclates 50,000t	Only 150m from Colwick wharf. Keen to expand business opportunities	Identifying waterside destinations. No useable wharf at Colwick. Cost due to waterway size through Newark	Short to medium term
Wharton Grove Wharf Ltd	Scunthorpe	Steel, coal, fertilizer, scrap, timber	Scrap from Nottingham Timber to Gainsborough - J. Brash	Scrap 80,000t Timber - see J.Brash	Active coaster wharf with all facilities and labour	Scrap not riverside in Nottingham. Cost due to waterway size through Newark	Excellent handling facility for any identified traffic

Traffic identified as presenting short term opportunties

Company	Location	Possible Cargoes	Movement Details	Projected Annual Tonnage	Opportunities	Constraints	Potential
Biffa Waste Services	Colwick	Export paper, metal, plastic Woodchip, Biomass	Recyclates for processing or export Woodchip – to power station/export	Paper/cardboard 15,000t Woodchip 10,000t	Site has own high quality wharf	Vehicle access to wharf. Cost due to waterway size through Newark	Short to medium term
Breedon Holdings Ltd	Derby	Aggregates	New quarry to Nottingham, Humberside, W & S. Yorkshire	Aggregates 250 - 500,000t	New facility with high tonnage	Opening of new quarry. Costs due to waterway size through Newark	Good. Possible start in 2012
Brett Aggregates	Kent	Aggregates	New quarry to Nottingham, Newark Humberside, W & S. Yorkshire	Aggregates 300,000t	New facility with high tonnage	Opening of new quarry. Costs due to waterway size through Newark	Good. Possible start in 2012-2014
British Sugar	Newark	Fuel in, sugar in/out Possible biomass longterm	Humber ports to/from Newark	Sugar in 5000t Coal 30-40,000t Limestone 50,000t	Important Inland Port development site	Needs 3rd party to develop and operate wharf	Good with outside investment. Medium term
Cemex UK Materials	Colwick / Nottingham	Aggregates (various)	Hull to Colwick Attenborough to Colwick	For Asphalt 25,000t Aggregates 40,000t	Company uses non road logistics extensively	Costs due to waterway size through Newark and South of Nottingham	Limited
DSG International	Newark Campus	Containers	Humber ports to Newark	est 5000 containers 100,000t	Large single destination flow	Needs 3rd party to develop Inland Port	Good with outside investment. Medium term
Hargreaves Transport	Durham	Coal, ash, gypsum	Ash Cottam to Gainsborough Gypsum Cottam to Ferrybridge	Ash 25,000t Gypsum 25,000t	Biomass for new developments	Loading/unloading costs. Gypsum currently by rail. Mainly road orientated.	Limited
Kingsferry Wharf	Burton Upon Stather	None at present	Keen to load/unload barges to ships	Not applicable	Wharf with all facilities and labour.	Needs partner	None at present
New Holland Bulk Services	New Holland	Grain, Biomass	Biomass to Drax. Grain from Lincs/Notts for export	Not identified	Active coaster wharf with all facilities and labour.	Lack of understanding and interest at director level	Facilities for barge loading in place. Medium to long term
Scottish and Southern	Keadby / Ferrybridge	Biomass, RDF,	Biomass/RDF to Ferrybridge	Biomass/RDF 50-200,000t	Reduction of CO^2	Availabilty alongside river. Waterway size through Newark	Long term only if biomass station is built
Trent Concrete	Colwick	Aggregates, Cement	Aggregates Humber to Colwick and Besthorpe to Colwick	Aggregates 5,000t Cement 5,000t	Will 'piggy back' on others operation	Lack of contamination is overriding consideration. Limited storage. Not regular	Only if Colwick wharf is in use by others
TW Logistics Ltd	Gainsborough	Wharf and warehousing	Possibility of involvment, also added value	Timber - see J.Brash	Commercial wharf - underused	Not initially willing to invest or innovate. No unloading facilities	Wharf available now
Woodhall Development	Woodhall Spa	Aggregates	As dug aggregates for processing	Aggregates 180,000t	Water transport may be a planning condition	River Witham - small scale	Medium term

Traffic identified as presenting longer term opportunties

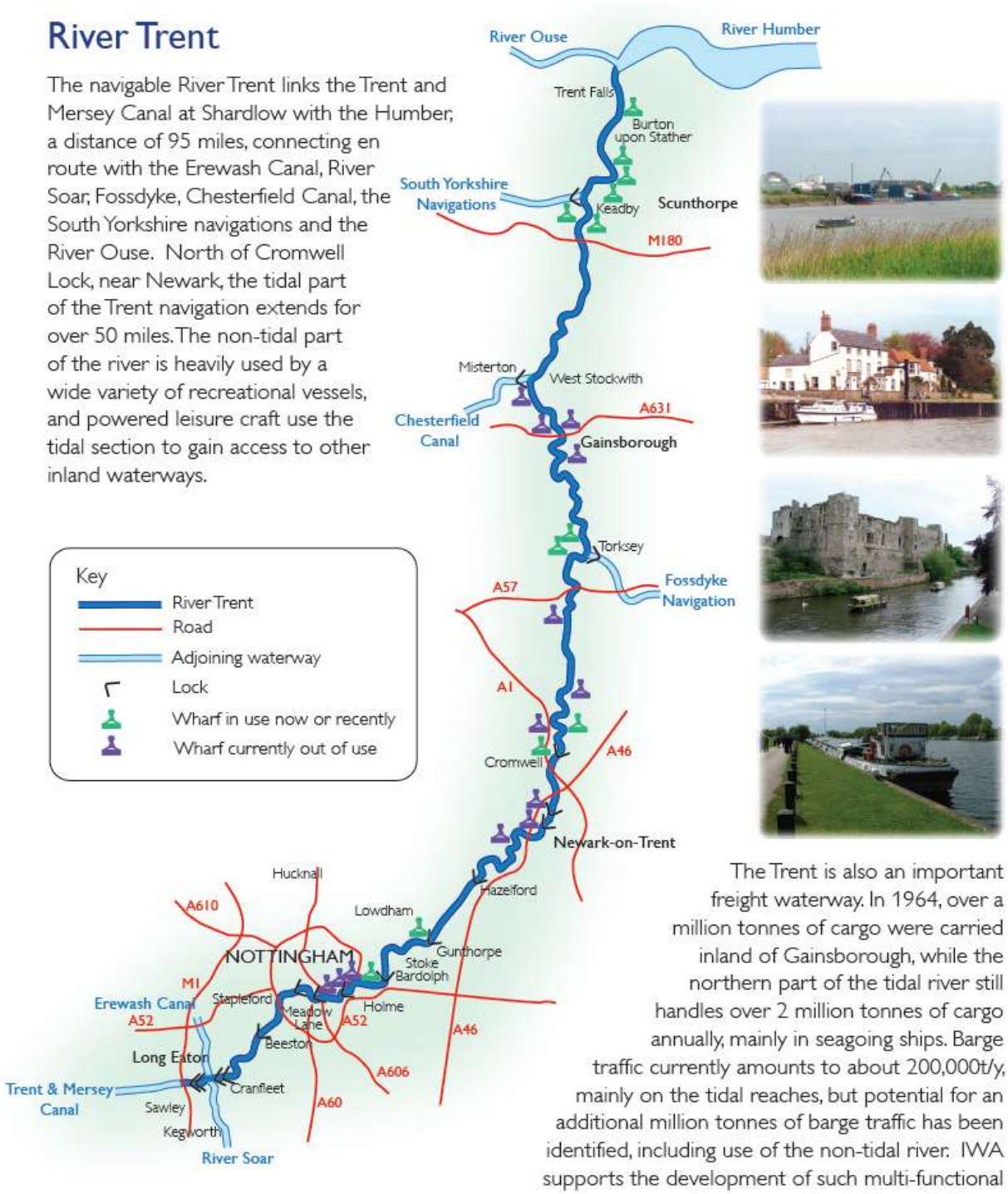
Company	Location	Possible Cargoes	Movement Details	Projected Annual Tonnage	Opportunities	Constraints	Potential
Associated British Ports for B&Q	Grimsby + Immingham	Containers	Containers to Worksop (via Gainsborough) +Doncaster	est 5000 containers 100,000t	Large single destination flows	Distribution Centres NOT near to waterways	Medium term - requires container terminals
ASD metal services	Leeds	Constructional steel for distribution	Steel Leeds to users	5000t	Currently engaged in investment to use barges for inward deliveries	Currently only in small lots not suitable for barge	Imports from Lower Trent wharves
Boots	Nottingham	Containers	Humber ports to/from Nottingham	Not Known	Interested if can get to Nottingham	Main distribution centre in Central Midlands	Limited. Regular container flow by barge
CMA -CGM	Hull & Immingham	Containers	Humber ports to/from Nottingham	est 1000 containers or 18,000t		Cost due to waterway size through Newark. Distribution site/wharf	Limited. Regular container flow by barge
Corus Long Products Business	Scunthorpe, Thrbergh	Slag for asphalt Steel products	Slag to asphalt plants - Colwick etc Steel products to stockholders	Slag 50,000t Steel 25,000t	Large tonnages available	Costs due to waterway size through Newark, low truck rates Road haul to river wharf	Limited due to location
EDF Energy	Cottam, West Burton	Biomass, Coal	Humber ports to power station	Not Known	Biomass for new developments	Minds already made up against water transport for coal	Long term only if biomass station is built
EMRA	East Midlands	Waste + Energy Policy	High level Policy	Council based		Waste policies are locally based with no regional organisation	Only if organisational policies change
Hugh Frost Designs	Newark	Local distribution	Looking for site for trial	Not Applicable		East Midlands not suitable for trial	Long term or significant change in logistics costs
Humber Sea Terminal	Killingholme	Bulk + containers	Berth currently out of use.	Not applicable		Wharf not suitable	None
Hyundai Merchant Marine	Southampton	Containers	Ports to East Midlands	Total flow +/- 250,000 containers. Not included in total	Large but disparate flows	Deep sea routes only deliver to southern ports. Feedering to Humber is not economic at present	Long term or significant change in logistics costs
Lincolnshire CC	Lincoln	Domestic waste flows	Consolidation centres to incinerator and recycling sites	None at present	None at present	New incinerator and consolidation centres not waterside. Logistics delegated on long term contracts	Only if emphasis changes from local to regional strategies
Lincolnshire Waterways Partnership	Lincoln	Contacts on all smaller waterways. Aggregates, farm produce, biofuels	From Fossdyke + R. Witham	None at present	Promoting use of waterways in all ways	Small size of waterways	Long term
MacAndrews	Hull	Containers	Hull to/from Nottingham	est 1000 containers or 18,000t		Cost	Long term or significant change in logistics costs
Nottingham City/ Energy Partnership	Nottingham	Household waste flows Biomass	Biomass to Nottingham Recyclates from Colwick	Biomass/RDF 20-40,000t Recyclates handled by Wastecycle	Long term or significant change in logistics costs	New CHP plant planned but not near to river. All logistics on long term local contracts	Only if emphasis changes from local to regional strategies
Nottinghamshire County	Nottinghamshire	Household waste flows	Recyclates and RDF for use elsewhere	None at present	None at present, despite possibilities at Nottingham and Newark	Only responsible for policy. All logistics delegated to Veolia on long term contract	Only if emphasis changes from local to regional strategies
Samskip Multimodal Container Logistics	Hull	Container shipping company.	High cube containers to Nottingham	est 1200 containers or 26,000t	Will help with trial. Handling costs can be reduced	Transit time. Waterway constraints. Lack of Infrastructure. Cost.	Long term or significant change in logistics costs
Veolia Recycling	Nottingham, Mansfield	Household refuse	Consolidation centres to incinerator and recycling sites	None at present	None at present, despite possibilities at Nottingham and Newark	All organised for road transport on long term contract. No incentive to change or co operate with neighbouring areas	Only if emphasis changes from local to regional strategies

Traffic identified as presenting opportunties if there is a significant change to the waterway or economic factors

Appendix C

River Trent

The navigable River Trent links the Trent and Mersey Canal at Shardlow with the Humber, a distance of 95 miles, connecting en route with the Erewash Canal, River Soar, Fossdyke, Chesterfield Canal, the South Yorkshire navigations and the River Ouse. North of Cromwell Lock, near Newark, the tidal part of the Trent navigation extends for over 50 miles. The non-tidal part of the river is heavily used by a wide variety of recreational vessels, and powered leisure craft use the tidal section to gain access to other inland waterways.



The Trent is also an important freight waterway. In 1964, over a million tonnes of cargo were carried inland of Gainsborough, while the northern part of the tidal river still handles over 2 million tonnes of cargo annually, mainly in seagoing ships. Barge traffic currently amounts to about 200,000t/y, mainly on the tidal reaches, but potential for an additional million tonnes of barge traffic has been identified, including use of the non-tidal river. IWA supports the development of such multi-functional use of waterways for freight and leisure.

Appendix D

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Appendix E

Potential for the movement of containers by barge between Humber ports and Newark / Nottingham

INTRODUCTION

This short report provides some insight into current container traffic movements through the Humber ports, to provide a clearer understanding of the findings presented in the River Trent Water Freight Feasibility Study: Current and Future Prospects, January 2009. The intention is to identify potential demand for the use of barge transport for inland distribution services and clarify the barriers to the use of barges, particularly for transportation along the River Trent as far as Nottingham.

There is a more detailed cost analysis used in conjunction with consultations with a number of container operators providing an up to date road cost comparison, some traffic updates and contact with major shippers, such as B&Q and a brief assessment of an alternative Newark 'by-pass'.

In addition to the recent study for the Trent there have been studies carried out to assess the potential to use the Aire Calder Canal to move containers between Leeds and the Humber ports. During the course of this short study it became clear that bridge and lock restrictions on the Aire Calder Canal restricting the size of barge that can be used and the loading capacity are significantly different to those on the River Trent. Recently work has extended to commissioning bespoke barge designs that will optimise the loading capacity on these routes.

The January 2009 study identified the Newark bridges and the Nether Lock as the restricting factor on the size of barge able to reach Nottingham and proposed civil works that could alleviate the problem, but innovative barge design was not a suggested solution.

CONTAINER SERVICES, CAPACITY AND TRAFFIC VOLUMES

Containers are handled through the Humber ports (Immingham, Killingholme, Goole and Hull) on a number of different services and service types. Containers could be carried on container vessels providing either deep sea feeder services or dedicated Intra European services, or they could be carried on RoRo ferry services, loaded on wheeled ship's equipment.

There are no direct deep sea service calls into the Humber ports and deep sea operators need to make an informed choice, based on timings and costs, on whether to use feeder services from the Continent or to discharge into a UK deep sea port and deliver over a longer distance to the UK destination. Still, however, the majority of containers moving through the Humber ports are carrying intra-European cargo on intra-European container services.

The range of services, service types and unit (container or trailer) carrying capacity (in FEU – forty foot equivalent units) provided through the Humber ports is summarised in the table below:

Service	Route	Service type	Capacity LoLo	Capacity RoRo
P&O Ferries	Hull/Rotterdam	RoRo		212,940
P&O Ferries	Hull/Zeebrugge	RoRo		67,315
Finnlines	Hull/Finland	RoRo		37,045
UPM Seaways	Hull/Baltic	RoRo		5,788
Samskip	Hull/Rotterdam	LoLo	142,948	
MacAndrews	Hull/Baltic	LoLo	26,416	
UCI	Goole/Duisburg	LoLo	39,520	
TransAtlantic	Goole/Baltic	LoLo	27,664	
Stena Line	Killingholme/Hook	RoRo		152,880
Cobelfret	Killingholme/Zeebrugge	RoRo		202,800
Norfolkline	Killingholme/Rotterdam	RoRo		155,376
DFDS Lys Line	Immingham/Norway	LoLo	4,160	
Samskip	Immingham/Iceland	LoLo	34,900	
NCL	Immingham/Norway	LoLo	2,425	
Feederlink	Immingham/Continent	LoLo feeder	38,064	
CMA-CGM	Immingham/Continent	LoLo feeder	21,034	
Tschudi Lines	Immingham/Scandinavia	LoLo	17,871	
DFDS Tor Line	Immingham/Cuxhaven	RoRo		115,740
DFDS Tor Line	Immingham/Esbjerg	RoRo		136,246
DFDS Tor Line	Immingham/Norway	RoRo		22,308
DFDS Tor Line	Immingham/Rotterdam	RoRo		80,821
DFDS Tor Line	Immingham/Gothenburg	RoRo		228,353
Eimskip	Immingham/Iceland	LoLo	18,824	
Sea-Cargo	Immingham/Norway	RoRo		32,864
Finnlines	Immingham/Baltic	RoRo		14,093
UCI	Immingham/Moerdijk	LoLo	21,684	
TOTAL			**395,510**	**1,464,569**

Source: PRB Associates UK Short Sea Freight RoRo and LoLo Capacity Report 2009

The analysis from PRB Associates' UK Short Sea Freight RoRo and LoLo Capacity Report 2009 indicates that on pure container (LoLo) services there is capacity to carry nearly 400,000 forty foot equivalent units in a year, while there is also capacity available on the RoRo ferries to carry not insignificant numbers of containers. There is therefore combined capacity for the movement of approximately 500,000 FEU through the Humber in a year (1,370 per day) and the actual numbers of units is likely to be even higher because of the number of twenty foot equivalent units in the overall mix.

The Department for Transport Maritime Statistics 2008 indicate that the actual number of containers passing through the Humber ports is indeed in the region of 500,000 units:

Humber port	Containers	Shipborne port-to-port trailers	Total
Goole	37,000		37,000
Grimsby & Immingham	97,000	183,000	280,000
Hull	133,000	104,000	237,000
TOTAL	**267,000**	**287,000**	**554,000**

Source: Department for Transport: Maritime Statistics 2008
Note: Grimsby & Immingham includes Killingholme

Shipborne port-to-port trailers could be carrying bulk cargoes such as steel or paper, but if carrying containers one trailer could be carrying up to four empty twenty foot units. The conclusion is that container unit throughput via the Humber ports is at least 500,000 in a year.

Virtually all of these container units are transported to and from the Humber ports hinterland by road and it is the nature of the service provision that determines that the origin and destination of the cargo will lie within a hinterland that stretches in a broad band across the Pennine corridor.

Containers that would be destined for other parts of the UK, either north or south of the Humber estuary will be loaded onto alternative services calling into ports in the south east of England, the Thames Estuary, the Haven ports, or Teesport and the Tyne. Many of the services that call into the Humber (in the table above) offer services on the alternative routes to satisfy the demands of their customers and very few services, other than those from Iceland, Scandinavia and the Baltic do not offer services to alternative UK entry ports.

The logistics and economics for container feeder services is slightly different because the economic choice has to take into account the comparison between handling costs on the Continent, added to feeder service costs and further handling costs, plus the inland transport costs in the UK, versus handling costs and inland transport costs from a more distant UK deep sea port of call, likely to be in the south of England. Current feedback from the container operators is that it is cheaper to discharge containers at the UK deep sea port

because of the relatively high feeder costs (partly due to the strength of the Euro). Containers being 'fed' into the Humber (Immingham) on the CMA-CGM and Feederlink services are destined to and originate from the immediate port hinterland only.

INLAND ORIGIN / DESTINATION

In the January 2009 report (Table 4.7) there is an estimate of 123,000 TEU (twenty foot equivalent units) of all container units passing through the Humber ports in 2010 being destined to or originating from the East Midlands (17% of total). The forecast for 2030 is 209,000 TEU. The volumes in 2010 are significant enough (340 per day in 2010) to warrant utilisation of a daily barge service, if economic and logistical factors are favourable.

Unfortunately the delivery and collection times and timings demanded by shippers and receivers, the need to meet vessel schedules and the very competitive cost of road haulage continue to dictate against the use of the inland waterways system. Furthermore, due to the way the logistics industry has developed in the last 20 years, the ultimate origin and destination of loads in the East Midlands are not likely to be located by the River Trent and there will therefore need to be a further road leg of any journey involving a barge, between the barge terminal and the shipper, or consignee's premises.

COST ANALYSIS

Shippers and carriers of intra-European freight will generally arrange to direct containers through the UK port closest to its ultimate origin, or destination in order to minimise the door-to-door cost of the movement. This traffic, that is captive to RoRo and containers services using the Humber ports, will be transported to and from the hinterland by road because trial rail services have proved too inflexible in the past and barge services have never been offered due largely to the navigation constraints (bridges and locks) on relatively short inland waterway movements. For the Humber the hinterland market is generally regarded as the Pennine Corridor and points north of the corridor, unless the service calling into the Humber has no alternative port of call in the south of England.

For the East Midlands the Humber ports will be competing with ports of entry further south, such as Tilbury, Felixstowe and Harwich, where the combination of lower sea freight costs but higher road transport costs might still be lower than the Humber combination.

To attract business away from road, barge transport has to first prove to be less costly than road transport, even before issues of delivery lead time and potential delay are taken into account. If the barge mode can attract business through cost competitiveness it may attract more deep sea feeder traffic through the Humber as it contributes to an overall reduction in the cost of the feeder option over the direct deep sea call option in the south of England. For the purposes of this report it is the comparison between road and barge transport cost to and from the Humber ports and associated logistical issues that are considered as important.

A complete review of the barge costings in the January 2009 has been carried out, prompted by the unfeasibly high rates quoted in some cases. The basic parameters used, for comparison purposes, are the same at 75% load factor and level of financial returns.

The most important additional factor is maximising the inherent advantage of a barge to carry heavy weights within its volume constraints. A truck will normally only be able to carry one container irrespective of its length whilst a barge is most efficient carrying more shorter containers. This means that 20' containers can be carried at a significantly reduced price.

Based upon barge service scenarios and costings provided by BargeConsult the following range of possibilities and barge transport costs are feasible, offering a 5% return on capital:

CASE 1: Existing maximum size vessel (Inland Navigator) with new wheelhouse 45m x 6m to **Nottingham**
12 TEU vessel capacity, with 2 round trips per week, 75% load factor, £220 per 40' container
Only possible if two high container loading will fit under bridges in Newark

CASE 2: New maximum size vessel 45m x 5.7m (Q-Barge) within present waterway to **Nottingham**
24 TEU vessel capacity, with 2.5 round trips per week, bottom layer full + half top layer (18 TEU), 75% load factor, £220 per 40' container

CASE 2a: New maximum size vessel 45m x 5.7m (Q-Barge) within present waterway to **Nottingham**
24 TEU vessel capacity, with 2.5 round trips per week, two full layers, 75% load factor, £165 per 40' container

CASE 3: New maximum size vessel 63m x 9m to **Newark**. 48 TEU vessel capacity, with 3 round trips per week, £100 per 40' container

CASE 4: Existing vessel, no longer than gravel barges (54m x 7m) to **Newark**. 28 TEU vessel capacity, with 2 round trips per week, £140 per 40' container

CASE 4a: Existing vessel, no longer than gravel barges (54m x 7m) to **Newark**. 28 TEU vessel capacity, with 3 round trips per week, £120 per 40' container

CASE X: Existing vessel, new **Nottingham** max (current maximum for locks with Newark by-pass) 50m x 9m.
30 TEU vessel capacity, with 2 round trips per week, £140 per 40' container

Case	TEU capacity	Return trip per week	Rate / 40’	Rate / 20’	TEU load at 75%
1	12	2	£220	£150	9
2	18	2.5	£220	£150	13.5
2a	24	2.5	£165	£115	18
3	48	3	£100	£70	36
4	28	2	£140	£95	21
4a	28	3	£120	£85	21
X	*30*	*2*	*£140*	*£95*	*22.5*

The barge rates derived above are the minimum rates required to provide a barge operator with a 5% return on capital, operating at 75% of capacity. Ignoring the scenario that requires the construction of a Newark by-pass (X) the optimum rate possible for a movement to Nottingham is £165 (more feasibly £220) and the optimum rate for Newark is £100 (Scenario 3).

However, to compare directly with the inland door-to-door cost of road haulage the cost of handling to and from barge in the Humber port and the inland port have to be taken into account, along with the cost of final road delivery / collection to / from the customer’s premises.

The total handling cost at the ports and the inland terminals is estimated to be £115 (£40 loaded charge at port / £35 at inland terminal, £20 x 2 empty handling charge). If a container is loaded to, or discharged from a road trailer at the port (in the Humber) there is generally recognised to be no additional charge and the terminal operator recovers the cost as part of the overall ship-to-shore handling charges levied on the container line. Terminal operators regard the operation of loading to and from barges as a secondary ship-to-shore movement and would intend to charge accordingly.

Experience has shown that the handling costs at seaports can be significantly reduced by commercial pressures from large shippers.

When these additional costs are taken into account the full cost of transporting 40’ containers between the Humber port and inland destination close to Nottingham and Newark are as follows:

Destination	**Barge cost**	**Loading Humber[1]**	**Discharge inland[2]**	**Local haulage**	**Total**
Nottingham	£220	£40	£35	£50	**£345**
Newark	£100	£40	£35	£50	**£225**

Notes:
1 – Indicative container barge loading/discharge cost obtained from Associated British Ports
2 – Inland terminal discharge cost based upon hire of mobile crane

The comparison between these derived barge costs and all-road haulage costs and the potential areas for reducing the overall barge cost are examined in following sections of this report.

BARGE MOVEMENT LOGISTICS

The most feasible maximum loading capacity to Nottingham is currently 18 TEU while the Newark the maximum is 48 TEU with a new, specifically designed vessel.

If the cost of moving a container inland by barge becomes more competitive compared to road haulage, as a result of higher fuel prices raising the cost of road haulage, or critical mass and economies of scale (through innovative barge design and/or infrastructure capacity improvements on the river and canal) reducing the unit cost of barge movements, there are other logistical barriers that have to be overcome.

The frequency of barge movements and the additional handling required through inland terminals leaves the barge mode less flexible and slower than the road mode, although road congestion and loading / discharge delays at customer premises can often cause significant delays. The optimum round trip time for a barge service between Hull / Immingham and Nottingham is 2 days, whereas road vehicles can easily be 'triangulated' to deliver in to one destination and then collect a container for export from another customer nearby, all in one day. This is more a perceived delay than an actual one. In general a container delivered by barge would arrive one day later than if delivered direct by road.

Conversely there is an increasing 'value' being attached to the environmental benefit obtained by moving containers on the inland waterways system, rather than on the roads. The development of inland terminals with direct access to canals and rivers (as well as rail sidings) also provides opportunity for added value services, higher road vehicle utilisation on local 'shunts', lower container storage costs and greater container utilisation possibilities.

When the inland terminal becomes the effective origin or destination for the cargo in the same way that occurs at distribution facilities around major road junctions and rail terminals, then the economics of transporting containers by barge show some potential.

Instead of single empty containers being transported by road back to the ports, a barge-load of containers makes more economic and environmental sense.

CONSULTATIONS

A number of deep sea, feeder and short sea container service operators were contacted to obtain views and information on the potential use of barge services for the movement of containers on the River Trent between the Humber Ports and Nottingham / Newark and existing road haulage services and costs. More detailed contact reports are available but for summary purposes the main findings from contacts with deep sea and feeder service providers were as follows:

Dan Foley, CMA-CGM: Barge services would have to match service levels provided by road haulage for short sea traffic; immediate, rapid and cost competitive inland delivery once discharged from vessel in port. Feeder traffic delivered into Immingham is for local deliveries only. DF is interested in evaluating indicative barge service schedules and rates using the company's route optimisation model.
Peter Edward, Evergreen: Evergreen use mainly Felixstowe and Thamesport for deep sea import and export, linking into the UK rail network for long distance inland collection and delivery. They carry freight for Boots in Nottingham.
Stephen Dragonetti, Mitsui OSK Lines: Far East traffic for Nottingham delivered via Southampton, from the USA MOL call at Felixstowe. MOL carries for Wilko, based in Worksop. Not currently economic to feed containers into Immingham. Deep sea feedering is more likely when UK hub ports are congested, feeder costs more competitive and road haulage costs are high. Even with a barge cost of £140 SD estimates the direct movement through Southampton would still cost £100 less, overall.
Danny Wright, Maersk: 10-year agreement with Hutchison Group, linked to minimum throughput levels dictates that Maersk will direct deep sea traffic through Felixstowe. Only Maersk traffic being 'fed' through Immingham is B&Q traffic to Doncaster.
Peter Livey, Hyundai Merchant Marine: Hyundai use Immingham to 'feed' containers to M62 customers but do not consider the Humber Ports as optimal for delivering to and collecting from Nottingham. HMM were previously interested in the barge mode to move containers from Immingham to Leeds, and Leeds is a much more viable destination for feeder traffic through the Humber ports than Nottingham.
Bryan Haworth, Samskip: BH had concluded from previous discussions that barge movements from Hull to Nottingham would not be feasible for three reasons. Firstly it was advised that the transit from Hull to Nottingham would be 2 days, secondly it was indicated that there is insufficient infrastructure in terms of wharves and capacity constraints through bridges and locks and finally he was left with the impression that the cost would be prohibitive. Currently road haulage rates are at a historically very low level, an indicative road haulage cost for a loaded container delivered to Nottingham, including the empty return, is £240 (£210 for Newark).

These round trip door-to-door road haulage costs compared to indicative barge transit costs are summarised below:

Destination	**Nottingham**	**Newark**
Road haulage	£240	£210
Barge transit:		
Hull to Newark/Nottingham	*£345*	*£225*
Nottingham/Newark to	*£150*	*£90*

Hull		
Total	£495	£315
Extra barge cost v road	**-£255 (106%)**	**-£105 (50%)**

Even if the road haulage rate to Nottingham is nearer £300, as indicated by **Colin Clark at MacAndrews** the adverse differential is still significant.

With each of the container operators contacted the sentiment is towards using the barge mode for inland container distribution, but only if the cost and service is right. The prevailing, cost driven trend for deep sea operators is away from feeder services into the Humber and onto direct deep sea calls into Southampton and Felixstowe. If the balance is so delicate between direct services and feeder services, it does not auger well for long term investment in barges and infrastructure.

The example of B&Q, in this instance, is relevant. Carriers still 'feed' containers destined for B&Q's Doncaster RDC through the Humber ports but traffic destined for its Worksop RDC have been diverted from the feeder route, back onto direct services into Southampton and onward delivery from there.

NEWARK "BY-PASS"

The Nether Lock and three bridges in Newark are the 'bottleneck' that prevents larger barges reaching Nottingham. If this bottleneck can be by-passed barges capable of carrying 30 TEU could transit all the way to Nottingham (see Case X in table on page 4).

The cost of such infrastructure works has to be justified either in pure commercial terms or in conjunction with the value of the environmental impact that may be brought about as the result of such works. However, the full justification has to be set against two competing issues. Not only must the project justify itself by enabling the competitive movement of containers on barges from the Humber ports, compared to the road alternative, it must also justify itself in comparison with the option to transport containers to Nottingham, via direct deep sea vessel calls in Felixstowe and Southampton.

The project requires a detailed appraisal of the infrastructure options and an investment analysis over the lifetime of the project (life of a barge) of up to 40 years. Against a background of rising fuel costs and innovative barge design the aim will be to establish whether barge operations can be economically viable.

Other freight demands in the region for the development of barge operations as an alternative to road operations could be combined to allow for the development of a more economical 'all-purpose' barge design, capable of carrying bulk products as well as containers.

CONCLUSIONS AND RECOMMENDATIONS

There is currently a significant gap between road haulage rates and door-to-door costs involving barge transport between the Humber ports and Nottingham / Newark. As a rough estimate the current additional cost of barge over road for a round trip door-to-door movement between Immingham or Hull and Nottingham is £255 (-106%) and for Newark the differential is £105 (-50%).

Many analysts expect fuel costs to rise substantially in the future which would be expected to have a significant effect on the road haulage costs. Any barging operation is much less fuel dependant and would become more cost effective.

With further analysis the differential for Newark, allied to the presence of regional and national distribution facilities in the area, may be easier to 'bridge'.

Development of the inland terminal concept which becomes the effective origin and destination for the cargo, together with added value services, would be a significant driver to making an overall economic case. The possible sites for such a strategic development should be protected from inappropriate development.

Current logistical operations indicate that only intra-European container movements are likely to be transhipped in the Humber ports in the short term, due to the unlikely arrival of deep sea direct deliveries and the added cost of feedering.

If cost reduction and equalisation is regarded as the key, the areas to investigate are the loading and discharge costs at the ports and inland terminals and the local haulage cost from Newark quay to local distribution depot. This is a significant extra cost that should be challenged, but this can only occur with the involvement of a major shipper.

The handling cost levied at the inland terminal has to be viewed with a longer term, multi-purpose terminal development perspective. Such a terminal will require development in Newark and when viewed as a long term investment with other added value services.

As a part of a feasibility study to assess the commercial and environmental benefits of a Newark by-pass there should also be an assessment of the prospects for a multi-purpose, multi-modal barge handling terminal and distribution park both just north of the Nether Lock in Newark and near Nottingham.

Appendix F

Our thanks go to ASD metal services, Leeds for providing this study

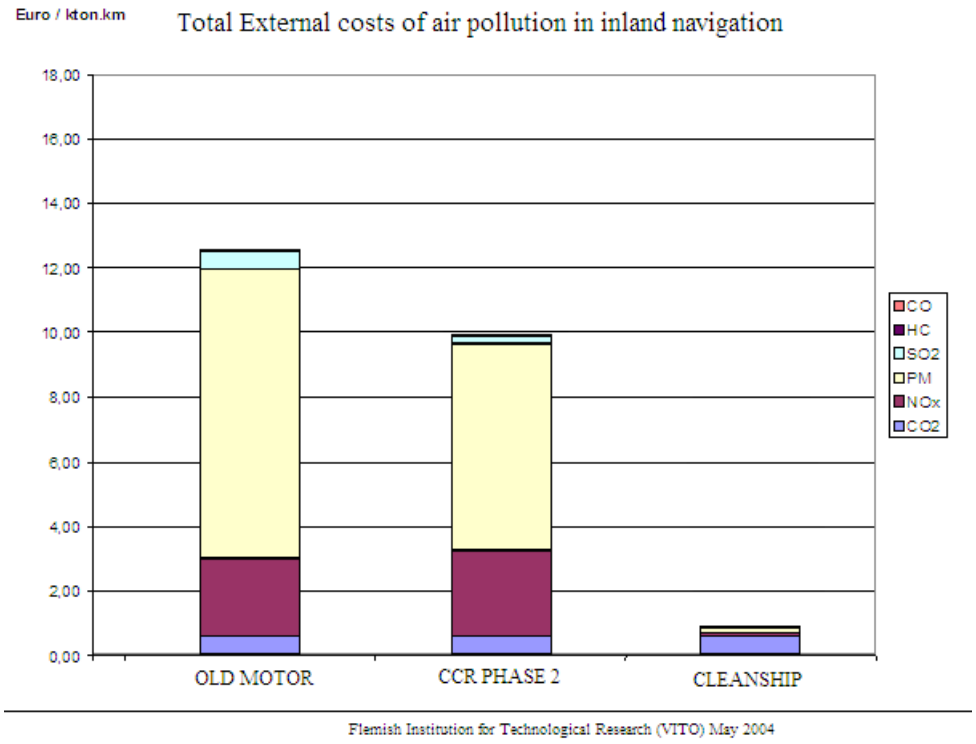
ENVIRONMENTAL REPORT

Transport of constructional steel Grove Wharf, Scunthorpe to Stourton Point, Leeds

The environmental impact of a transport flow is often assumed to refer only to the amount of Carbon Dioxide produced or its carbon footprint. In reality there are many other factors that need to be included such as other released pollutants (NO_x SO_2 particulates) and the wider impact on the environment (noise, accidents, congestion).

Exhaust emissions

Inland navigation is significantly less contaminating to the environment than other modes of transport, even when taking into account technological modernisation of truck engines and the advanced standardisation of fuels in road transport over the past decade. Even then inland navigation is still a much cleaner mode of transport than road transport. The slower technological modernisation of barge engines is partly caused by the much more sustainable character of barge engine investments, which as a consequence need much slower renewal.



No research has been carried out in the UK relating to pollution caused by inland waterways transport. Therefore research carried out in Belgium and the Netherlands has been used, this analysis uses data for vessels comparable in size to those in use in the UK.

Current EC regulations, in force since 2008, require the installation of CCR Phase 2 compliant engines in new vessels or when replacing the engine in an existing vessel. Improvements in

the design of diesel engines have resulted in a small increase in fuel efficiency and in a reduction of particulate matter and SO_2. As can be seen from this graph there will still be significant emissions of NO_x, SO2 and particulates.
In practice the SO_2 emissions are purely due to the amount of sulphur in the fuel. Over the last few years the quantity of sulphur in the diesel used by road vehicles has been reduced to an absolute minimum whilst at the same time the quantity of sulphur in fuel used for barges (gas oil) has stayed the same. During 2009 this will change as all types of diesel fuel will be of the same grade, resulting in the elimination of all SO_2 emissions from inland waterways vessels whatever the age of the motor.

Though the emission of particulate matter (PM) has been reduced in a modern CCR phase 2 compliant diesel motor it is still significant. It is possible to reduce PM by a further 95% by the installation of a regenerating particulate filter such as the Huss MD system.

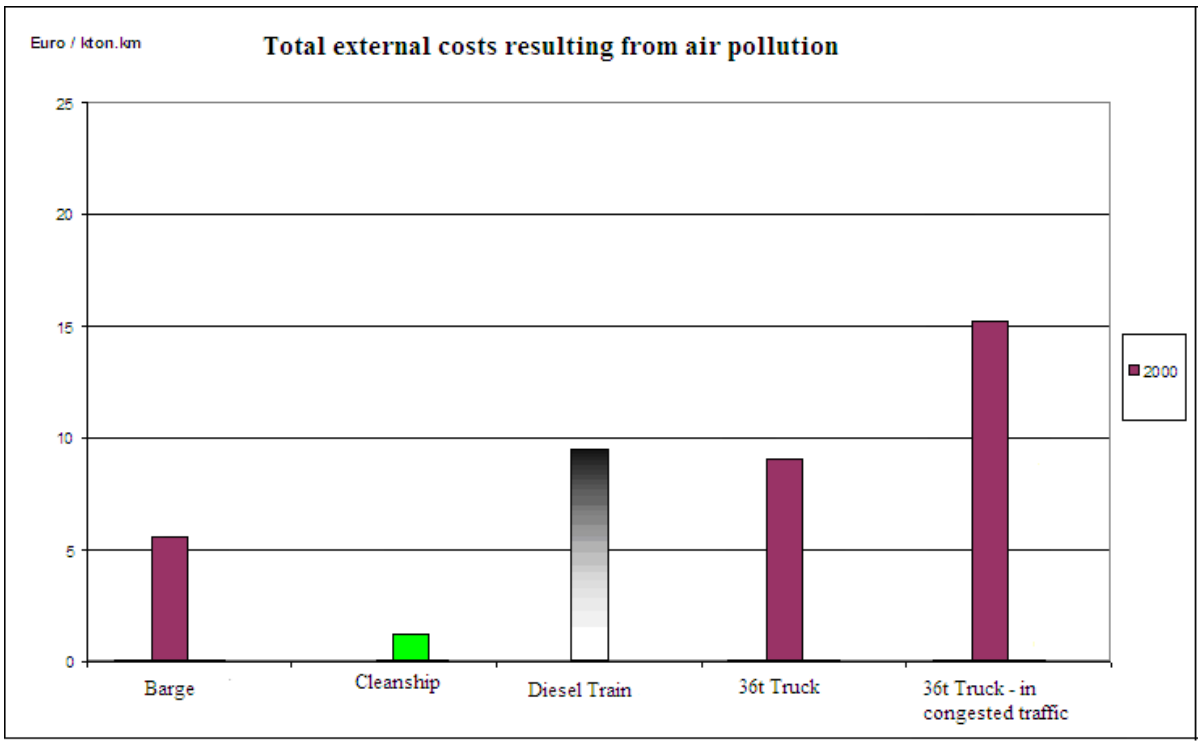
Further reduction of NO_x is not quite as simple, current technological solutions require the injection of a urea solution into a specialist secondary catalytic convertor such as the Huss SCR system which reduce emissions by approximately 80%.

In order to test these possibilities the **cleanship** project has been promoted by the European commission and has included all these tecnologies. The table below shows the decrease in emissions that have been obtained in practice.

	NOx	PM	FC	CO2	SOx
ATM Fuel Efficiency CCR phase2	-7%	-7%	-7%	-7%	-7%
LSF Low sulphur fuel, EN 590, 10 ppm	none	-17%	none	none	-99.5%
SCR Selective catalytic reduction (urea injection)	-85%	none	none	none	none
PMF Particulate matter filter	none	-95%	+2%	+2%	+2%
Total emission reduction	-86%	-96%	-5%	-5%	-99.5%

http://www.cleanestship.eu/project

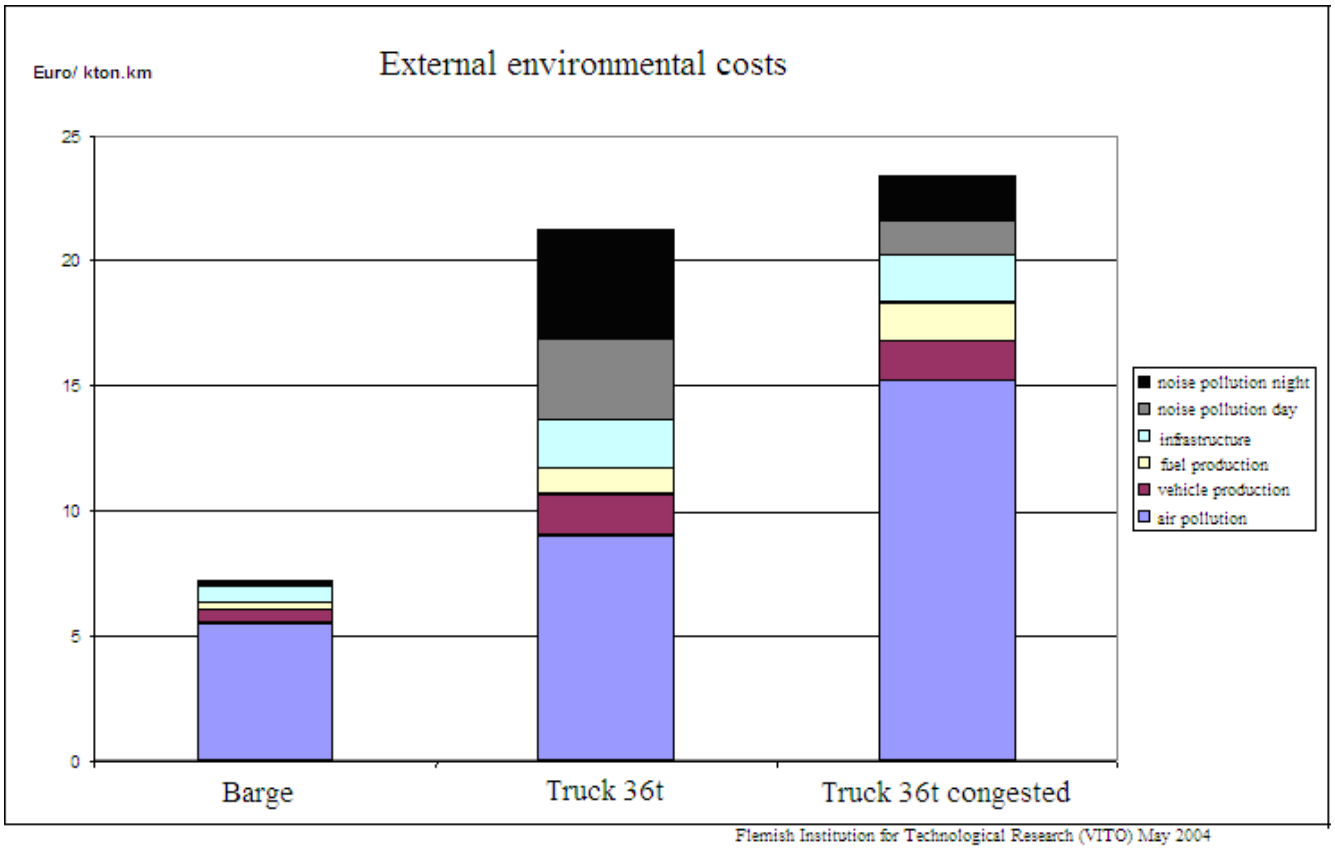
The resulting overall reduction in emissions can be seen below



Flemish Institution for Technological Research (VITO) May 2004

External Costs

This can be split into two sections, the environmental costs and the total external costs.

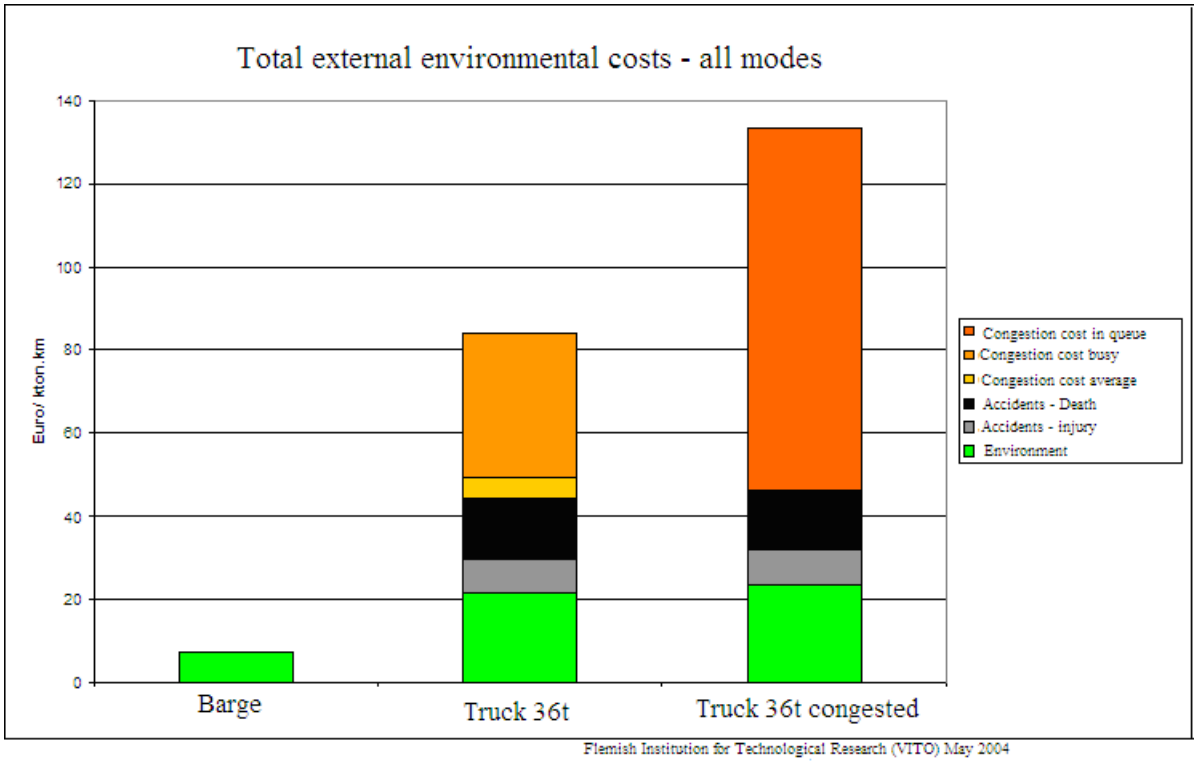


The VITO research in May 2004 reported that for inland navigation, total external costs of environmental impacts, accidents and congestion are 7 times lower than in road transport. Except for the costs of sulphur dioxide (reduced to zero in 2009) and for nitrogen oxide (removable by special catalyst), all categories of external costs have a better score in inland navigation than in other modes of transport. The benefits of inland navigation are even greater, if the external costs of the total life cycle are taken into account. Total life cycle costs include production and maintenance of the infrastructure and of the vehicles.

This finding is a consequence of the relatively longer life span of infrastructure and vessels in inland navigation.

Other external costs compared with external environmental costs.

In order to compare total external costs of several modes of transport, VITO also studied costs that are not related directly to the environment. In this respect as well, inland navigation scores much better than railway and road transport. Inland navigation is by far the safest mode of transport. On canals and rivers in Flanders, some 7 accidents are counted per billion ton-kilometres; on the Rhine there are 11 accidents per billion ton-kilometres. By contrast, an average of 150 accidents per year is counted per billion ton-kilometres in road transport. The accident figure is ten times lower for railway transport, and even 20 times for inland navigation. The number of deaths in inland navigation accidents is 240 times lower than in road transport, and the number of heavily injured even 1.300 times. The this is also the case for congestion and noise pollution as well.



Carbon Footprint Calculation:

The current operation transports imported steel from Wharton Grove Wharf Ltd. Grove Wharf, Gunness, Scunthorpe DN15 8UA to ASD metal services, Stourton Point, Haigh Park Road, Leeds LS10 1RX.

By Road:

Currently the steel is transported by truck in 24 tonne loads. The distance by road is 52miles (84km) or a total of 104miles for a round trip. The ASD transport department reports an average fuel use of 9 miles/gallon.

104/9 = 11.55 gallons per load or for a 24 tonne load 0.48 gallon/tonne = 2.18l/tonne

Giving an emission of 69g CO_2/tonne/km

By Water:

The MV Inland Navigator was used for the trial period on this route. The distance by water is 46 miles, but the lorry distance of 52miles is used for comparison purposes. Over five round trips an average of 412l of fuel was used for a complete round trip, with no correlation with the tonnage carried, so a full load of 300 tonne is used for calculation purposes.

412l/300tonne = 1.37l/tonne

Operation with a larger vessel (600 tonne capacity) would be more fuel efficient with an expected fuel usage of approximately 1.2l/tonne, a saving of 0.98l/tonne or 45% over road transport.

Producing an emission of 38g CO_2/tonne/km

ASD expect to transport 60,000 tonnes per year saving a total of 58,800 l/year

Specific Gravity of Diesel 0.84
1kg of diesel = 860g of Carbon = 3150g of CO_2 1l of diesel = 722g of Carbon = 2650g of CO_2

One year's operation would therefore save 42,450 kg off Carbon or 156 tonnes of CO_2