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West London Canal Network Study - Phase Two

Developing Water Borne Freight on the West London Canal Network

Project Ref: 15230/000

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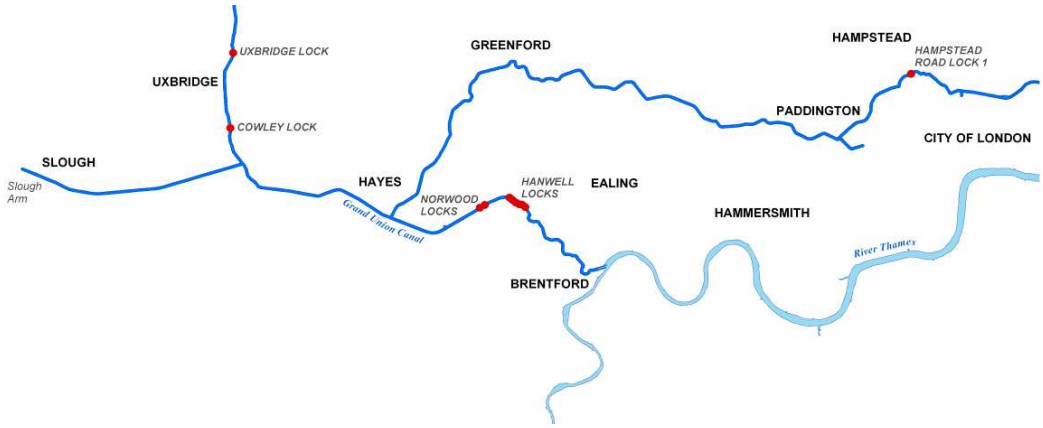
Executive Summary

This Executive Summary sets out the findings of Phases 1 and 2 of a study jointly commissioned by Transport for London (TfL) and British Waterways London to assess the opportunities for the transport of waste, recyclates and construction materials on the West London Canal Network (WLCN).

The Study Area

The WLCN study area comprises a 26 mile ***lock free*** section of the Grand Union Canal, Paddington Branch and Regents Canal. It extends from Camden – Hampstead Road Lock 1 in the East, westwards to the terminus of the Slough Arm, north to Cowley Lock and south to Norwood locks above Brentford. The Terms of Reference required that the study area should encompass industrial and commercial activities within a 2.5 km boundary either side of the canal.

The study area is shown below.



Source: Peter Brett Associates, 2005

Phase One Findings

The Phase One study primarily focused on mapping the physical status of the network. The main conclusions were:

- There is no shortage of small, simple, loading/unloading points
- There are relatively few locations which are currently suitable for ***significant*** freight transfer
- There are relatively few sites along the network which can process or handle waste and recyclates, but there are opportunities to develop further facilities
- There are several businesses along the canal which provide materials for construction, and a large number of development sites which will need construction materials
- There are other potential opportunities for canal transport, including the movement of paper, food, drink and catering supplies

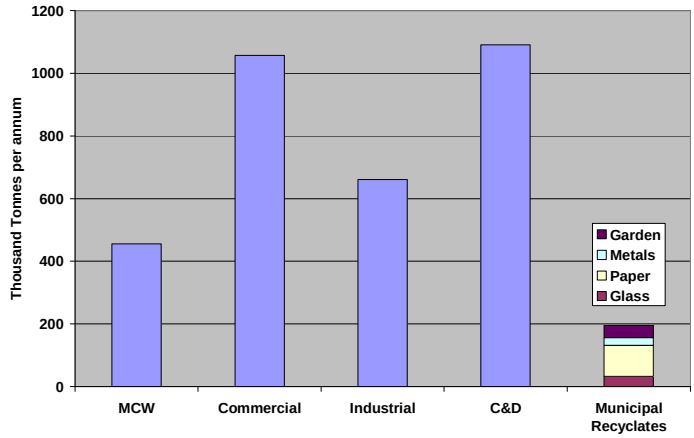
Phase Two Findings

The Phase Two work involved the broad quantification of the principal waste and construction commodities being moved in the study area, and subsequent assessment of those showing potential for movement via the WLCN. A cost model was developed and applied to a number of sample business case assessments in order to demonstrate the relative costs and benefits of including canal transport in the supply chain.

The principal commodities included in the study were:

- Municipal Collected Waste - MCW
- Commercial and Industrial Waste - C&I
- Construction and Demolition Waste - C&D
- Municipal Recyclates
- Construction Materials

The graph below shows by commodity the base estimated volumes (based on 2001 data) arising in the study area, excluding construction materials (where figures have proved difficult to forecast with any reasonable degree of accuracy).



Source: Peter Brett Associates, 2005

Overview

The fact that a commodity is produced or arises within the study area does not mean that it will be moved by canal. The potential and probability of freight moving by canal depends primarily on:

- The supply chain characteristics of the commodity
- The location of commodity sources and destinations
- Barge technology, dwell times and availability and type of transfer equipment
- Infrastructure at transfer points
- The technical ability of the canals to carry the commodity (e.g. locks/capacity)
- The economic viability of moving by canal compared to other modes.

The main sources of potential demand identified during the study fall into two groups:

- Freight flows which will need new freight origins or destinations to be developed alongside the canal, such as transfer stations and waste processing facilities used in connection with Multi-Modal Refuse Collection Vehicle[1]. (MMRCV) technology.
- Freight flows which will require temporary or permanent access to development or demolition sites.
- In addition, it is possible to envisage a future scenario where waste or recyclates are collected from small transfer points along the canal to be taken to canalside waste processing facilities.

Business Cases

The viability of a range of potential traffic flows on the WLCN was tested in the sample business cases.

Municipal Collected Waste

The MCW business cases were predicated on the widespread introduction of MMRCV technology and based around feeding the existing Brentford Waste Transfer Station by canal. This option proved to be economically unviable. However the MCW business case did demonstrate that if waste processing facilities were located alongside the canal it could be cost effective to move collected waste by canal between transfer stations to canalside processing facilities. The actual location of processing plants and transfer stations would need to be considered in relation to the specification of collection rounds and the capacity of the processing plants. Clearly this has implications for the GLA assessment of land requirements for the Mayor's Waste Strategy.

The overall forecast for MCW in the study area suggested that there is scope to locate at least 5 transfer stations along the WLCN each serving 10 wards. These transfer stations would then feed a processing plant located on the Powerday site at Old Oak sidings. Based on each transfer station handling 50,000 tonnes per annum in 2001 this would increase to 300,000 tonnes in 2006 and 360,000 in 2016. Ultimately, the modelling work suggests that for 2006, if all the tonnage from the transfer stations was carried by barge, around 335,000 lorry miles could be saved per annum. Purely from a pragmatic point of view, the likely hood of achieving this target is low and assuming a 30% probability, the lorry miles saved in the 2006 scenario would be in excess of 100,000.

Commercial and Industrial Waste

C&I waste is more than four times the tonnage generated by MCW, but its collection is not unified and controlled. The waste is handled mainly by private companies contracted to individual businesses who have their own disposal routes. We did not believe that a sensible business case could be constructed for this type of flow and concur with others that a separate study should be carried out encompassing the Park Royal Industrial Estate. A large proportion of this waste consists of paper, metals and glass which is transported to processors that are not located on the canalside. As with other flows, if canal collection is to be made a reality, then processing facilities will be needed canalside within the WLCN.

[1] MMRCV technology involves the use of refuse collection vehicles that use interchangeable bodies. Once full, these can be deposited at a local transfer station and an empty unit loaded onto the vehicle, so it can resume waste collection. These bodies are potentially transferable to other modes of transport, - for example canal and railway.

Construction and Demolition Waste

While the major constraint for the movement of building materials is lack of canalside facilities, this will not be the case for demolition waste once the Powerday facility starts operation. For the first time, builders will have the potential to access a major destination for demolition waste which is served by a modern wharf. Modelling has demonstrated that canal movement of Construction and Demolition waste can be cost effective, particularly where on-costs to move the waste to and from the canal are minimised. Forecasting the potential demand for such an operation was extremely difficult, but based on the number of development sites, we believe there is a potential to handle 186,000 tonnes per annum at 2006 levels. If 50% of this tonnage was attracted to the WLCN then nearly 40,000 lorry miles would be saved each year. It should be noted though; there will be an increasing trend towards treating demolition waste on the development site.

Municipal Recyclates

For paper and glass recyclates, the business case work was based on collecting from locations along the canal network and moving it by canal to the glass recycling facility at Charlton, or the paper facility at Crayford. Both these flows required the use of the River Thames. There are no cost advantages in either of these movements. Further analysis suggested that canal movement would be a viable option if new glass and paper processing facilities were located on the WLCN. A conservative forecast has been made that if two such facilities were developed, there would be the opportunity to process around 100,000 tonnes of recyclates per annum at 2006 levels. Again, not all of this tonnage would convert to canal but if 25% could be attracted to the WLCN this would result in 12,500 lorry miles saved at 2006 levels.

Construction Materials

For building materials the modelling demonstrates that movement by barge can be a cost effective solution to move consignments from canalside sources of material to canalside development sites. Currently the only locations handling building materials with active canal access are at Denham and West Drayton. There are one or two further sites handling building materials to which canal access could be provided. A key opportunity is the Powerday site at Old Oak. This site is ideally located to play a significant part in achieving modal shift.

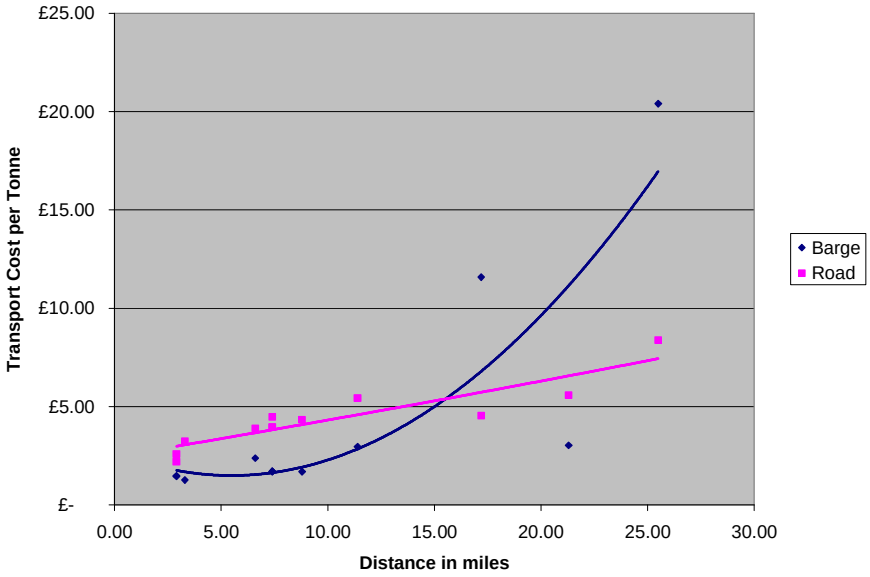
Recently, for large projects, the construction industry has begun to use building materials consolidation centres and this development opens up new opportunities for the supplies of building materials to be located alongside the canal. This in turn should encourage developers to consider the use of the canals, and local authorities to encourage or require canal use.

As part of this study Peter Brett Associates made an assessment of the volume of building materials required for the proposed development of the Southall Gas Works. From this work we made an estimate for the study area that 150,000 tonnes per annum of construction material would be required at 2006 levels. Based on sand and gravel we believe 50% of this material could transfer to canal but a lower figure of 10% was used for cement. On this basis the 2006 lorry miles saved for building materials equates to around 34,500 per annum. Other building materials could be considered such as bricks and tiles.

Key Findings

Distance and Time: Modal Reality

The graph below, compiled from the business case results, clearly illustrates that for short distance flows, movement by barge can be cheaper than movement by road. However, when barges have to pass through numerous locks, or transfer onto the River Thames, journey times become extended and may take several days to complete. By comparison, a road vehicle can complete more than one round trip per day, even for the longest journey modelled (40 miles).



Source: Peter Brett Associates, 2005

Thus road transport may not always be the lowest cost option, ***but it is almost always the easiest to implement.*** Canal transport, by contrast, usually requires a greater degree of management to coordinate the delivery of the commodity to and from the waterside, transferring it to and from the barge; and shipping it.

The work to date clearly demonstrates that movement by barge can be the most cost effective solution for ***certain commodities over short distances*** where both ends of the journey are alongside the canal. This is an ***important conclusion***, because it suggests that transport economics are not the main constraint on canal freight movement, but rather the location of origins and destinations. We believe the policy focus should be on creating new origins and destinations, or supporting the provision of canal transfer facilities at existing origins and destinations.

Necessary Conditions

The study work points to a combination of conditions required to enable a viable canal freight operation. These include:

- Canal journeys within the lock free section allow aggregation of barges which achieves economies of operation.
- Journeys outside the lock free section are clearly less economic when compared with road because of the loss of aggregation and the additional time and manpower required to negotiate the locks.
- Journeys through only one or two locks may be only marginally more expensive if aggregation takes place for the majority of the journey. Journeys involving more than two locks escalate the canal journey costs dramatically making them uneconomic.

- Where the handling systems for loading commodities on/off barges are equivalent to those used by road, there are no further cost penalties for using the canal.
- The synergy of the canal system with the River Thames and well established freight flows on the river suggested that journeys utilising both waterways may be viable. However, none of the business cases tested proved to be cost effective and such operations are generally considered to be unviable under prevailing conditions. This conclusion is only applicable to the WLCN - it is possible that journeys involving the Thames and River Lee in East London would give a different result.
- Where product source or product destination is away from the canalside and requires an additional transport leg, however short, such movements may make the canal option uneconomic when compared to road.

Overall Conclusions

The table below summarise the commodity volumes which it is believed could be processed in the study area if the necessary infrastructure is put in place. The estimates have been derived for 2006 and 2016 horizons and illustrate the potential that could be moved on the WLCN assuming full modal shift.

Commodity	***Volume Forecast 2006***	***Volume Forecast 2016***	***Lorry miles saved 2006***	***Lorry miles saved 2016***
Municipal Collected Waste	297,000	362,000	336,000	409,000
Construction & Demolition Waste	93,000	121,000	77,000	100,000
Municipal Recyclates	100,000	160,000	50,000	80,000
Construction Material	151,000	196,000	65,000	107,000
Total	**641,000**	**839,000**	**528,000**	**696,000**

However, it is highly unlikely that all of this tonnage would transfer to the canal network. An estimate has been made of the likely conversion rate of the tonnage likely to be diverted to the canal together with the resulting number of lorry miles saved. It is clear that this will only happen if the canal side infrastructure recommended in the report is provided.

Commodity	***Volume Forecast 2006***	***Volume Forecast 2016***	***Lorry miles saved 2006***	***Lorry miles saved 2016***
Municipal Collected Waste	89,000	109,000	101,000	123,000
Construction & Demolition Waste	47,000	61,000	39,000	50,000
Municipal Recyclates	25,000	40,000	13,000	20,000
Construction Material	65,000	84,000	35,000	45,000
Total	**226,000**	**294,000**	**188,000**	**238,000**

There is a very low demand for freight movement on the canal. The economics of road to canal transfer are poor, and there are a wide range of locations where freight can be transferred. It is therefore considered that at this stage a case cannot be made for protected canalside locations simply because they could be used to transfer

freight between barges and road vehicles. The key exception to this is the need to decide on four or five locations in West London where MMRCV containers can be transferred from road to barge. There is also the need to provide canal freight access to development sites, waste handling sites, and construction depots.

It is further concluded*:*

- Once suitable locations for MMRCV transfer stations have been identified, they should be protected against alternative development. In the interim, proposals for canalside development should be scrutinised to ensure that they do not remove key opportunities for MMRCV based transfer stations.
- There are relatively few locations which meet the criteria for waste or recyclates processing facilities or construction consolidation centres. Once such sites have been identified they should be protected for these uses.
- The Powerday site at Old Oak sidings offers the greatest opportunity to provide both a source and destination for commodities which can be moved by canal. It is a multi modal site and includes part of the Old Oak sidings which are connected into the North London railway line with connections to all major rail destinations. The canal frontage will be developed with a wharf which could be equipped with cranage. It could also be developed to carry out a range of other tasks including an MBT plant, recyclates processing, demolition waste recovery and a consolidation centre. The development of the site will be market driven. It is essential that the development of the site is closely monitored to ensure its canal potential is fully exploited.
- Developers should also be encouraged to plan developments in a way which will allow waste to be transferred to the canal in the future – for instance by providing for canalside bottle banks.
- Developments which restrict the potential of the canal for the movement of freight (where a potential business case has been made) should be resisted.

1 Introduction

1.1 Background

This report sets out the results and conclusions of Phase Two of a study jointly commissioned by Transport for London (TfL) and British Waterways London (BWL) to assess the opportunities for the transport of waste, recyclates and construction materials on the West London Canal network (WLCN). The work described here follows on from the Phase One survey of the canal reported in September 2004. That work identified a range of possible loading and unloading sites, freight sources and destinations, commodities and volumes on the WLCN. A comprehensive record of canal-side, physical features were mapped and coded to a GIS system. These included industrial and commercial activity in close proximity of the canal, development sites, access points and state of existing wharves. In addition, current waterborne activity was also recorded for reference and future update.

The WLCN being studied comprises the lock free section of the Grand Union Canal, Paddington Branch and Regents Canal. It extends from Camden Top Lock (Hampstead Road Lock 1) in the East, westwards to the terminus of the Slough Arm, north to Cowley Lock and south to Norwood locks above Brentford, a distance of 26 miles of uninterrupted water. The Terms of Reference required that the study boundary should encompass industrial and commercial activities to a radius of 2.5 km either side of the canal. In addition, other activities and locations of potential interest related to access into the Thames at both Brentford and Limehouse together with the Harleyford operation north of Cowley Lock, were also taken into consideration. The study area is shown in the map below Figure 1 - 1

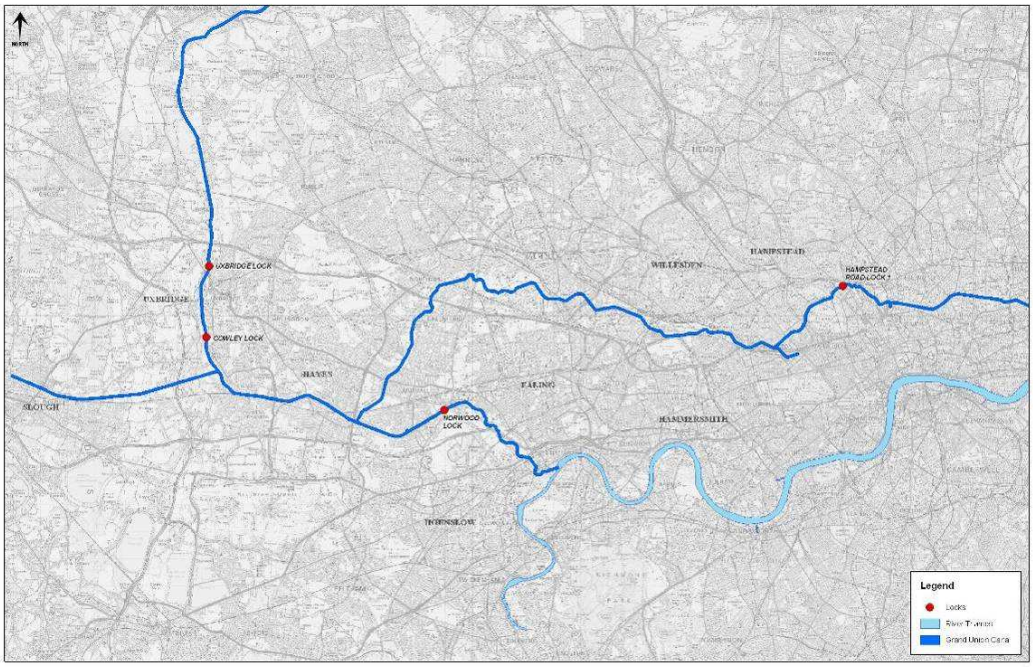


Figure 1—1: West London Canal Network

The following figures are shown in the text but reproduced at A3 size in Appendix A:

Figure 1 – 1 West London Canal Network

Figure 2 – 1 WLCN Study Corridor

Figure 2 – 3 Waste Volumes by Ward

Figure 2 – 4 Commercial & Industrial Waste by Ward

Figure 3 – 1 Waste Disposal Sites close to the WLCN

Figure 3 – 2 Development Sites

Figure 4 – 1 Business Case Sites

Figure 4 – 2 Waste Authority Areas

Figure 4 – 3 Wards adjacent to Transfer Points

1.2 Overview of Phase One Work

1.2.1 General

The Phase One survey was primarily aimed at mapping the physical status of the network, the proximity of access points, and broadly identifying land use activity that could provide the basis for the future development of proposals to move waste and other commodities by canal. The output also enables TfL and BW to assess the potential of each site and hold the data in a readily accessible format that can be used for presentations to potential users, land owners, developers and other stakeholders.

The data base provided by the Phase One report underpins the ability of commercial enterprises and stakeholders to record changes as they evolve and to influence change where appropriate. The survey provided an extensive amount of information on each location, including text descriptions of sites, and locational data. For sites with the potential to generate freight, or with good potential to be used as transfer points, this detailed information has been invaluable during the second phase of the study by:

- Focussing attention on the sites with best potential, and
- Providing site information to help when developing proposals to make use of the canals for new freight flows

The following sections review the key findings from the Phase One work.

1.2.2 Freight Access and Transfer Points

The report showed there to be a small number of potentially freight generating activities located close to the canal, a larger number of businesses generating waste, and a very large number of potential transfer locations. The survey work suggested that providing canal side access for freight is not, in itself, a necessarily serious problem. Small scale transfer locations may be useful if, for instance, the canal were to be used for waste collection from offices or businesses along the canal. Such an operation may require a relatively large number of simple facilities.

But clearly, at the end of the waste collection journey, full barges will need to transfer the waste to land. This is a larger scale operation, requiring a different kind of facility, and with very specific locational and accessibility needs.

Similarly, barges may be used to transfer building materials to the various development sites along the canal. Most of these sites can provide a space for the transfer of materials onto the site, and these locations are recorded on the database. But the building materials need to be loaded onto the barge somewhere – either directly (at a quarry for instance), or possibly at a major facility which would allow building materials to be brought in by road or rail for transfer to the canal.

The number of various types of access point identified is illustrated in Table 1.1 below.

	Number	Description
No access	97	No Access available
1	203	Could be used but constrained
2	111	Good canal access but constrained road access
3	47	Good access but limited land or little nearby potential freight
4	11	Good access but not good enough for full intermodal terminal
5	1	Excellent site
Total	470	

Table 1-1: Potential Access Points

1.2.3 Freight Sources and Volumes by Commodity Type

The locations of potential freight sources (and destinations) were illustrated in map form showing the main commodity group for freight to or from each location. The majority of sources identified in the Phase One survey were places generating waste, including offices and large blocks of housing, many of which would probably generate relatively small volumes infrequently. Table 1.2 below shows the number of source locations identified for each commodity group.

Number	Commodity Group Source
250	Waste office & domestic
13	Construction materials
3	Industrial materials
1	Metals
1	Paper products

Table 1-2: Source Locations for Key Commodity Groups

The survey also attempted to assess the estimated volumes that may potentially transfer at each source. These were at a broad level of detail based on professional judgement and research. They are shown in Table 1.3 below.

Number	Ranking	Description
99	1	Occasional part barge loads
131	2	Regular part barge loads
28	3	Potential for occasional full barge per week
8	4	Potential for several full barges per week
1	5	More than one barge per day

Table 1-3: Source Volumes

1.2.4 Freight Destinations

There were fewer potential destinations for freight compared to sources identified by the survey. This is because while almost any large facility would generate waste, relatively fewer receive freight of the types and volumes that would make canal movement attractive. For the movement of waste, the key destinations will be locations which dispose of, concentrate, process, or recycle waste. There are a few such sites already in existence. An important focus for the Phase Two work was to investigate the potential location of waste transfer, processing, or recycling facilities alongside the canals based on sites identified in Phase One. It should also be noted that apart from the focus areas of waste, recyclates, and building materials, a number of sites receiving significant volumes of non bulk commodities were identified. These included the numerous catering outlets along the canal. Table 1.4 below shows the number of destinations identified for each commodity group and table 1.5, shows the estimates of potentially transferable volumes in terms of barge loads.

Number	Commodity Group destinations
26	Construction materials
21	Food and beverages
9	Domestic & office waste
5	Industrial products
3	Office supplies
3	Paper
1	DIY Goods
1	Furniture
1	Metals
1	Tyres
1	Retail goods

Table 1-4: Key Commodity Group destinations

	Ranking	Description
28	1	Occasional part barge loads
17	2	Regular part barge loads
7	3	Potential for occasional full barge per week
6	4	Potential for several full barges per week
1	5	More than one barge per day

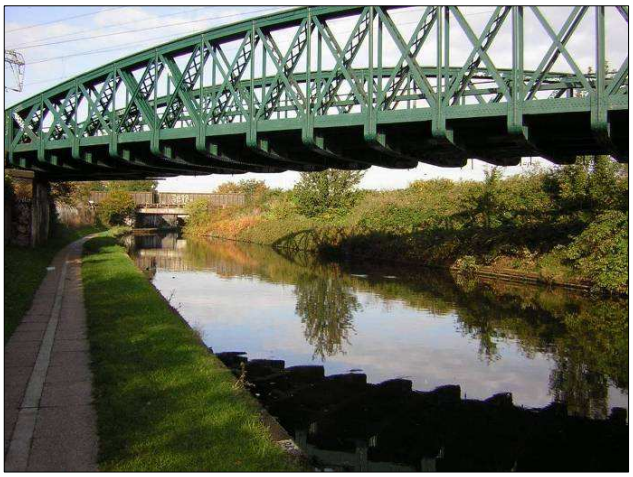
Table 1-5: Destination volumes

1.3 Identification of Potentially Significant Freight 'Generators'

The Phase One survey identified a limited but potentially significant number of freight 'generators' and following an extensive series of site visits and interviews with key commercial activities, we have summarised these in the following sections.

1.3.1 Powerday

Whilst the Phase Two work was being carried out, Powderday plc obtained planning permission to develop a canal side site at Willesden. This potentially provides a major source and destination point for freight**.** Powerday are proposing to develop the site for a number of activities including the handling of waste and the reprocessing of demolition waste.



Photograph: Canal frontage of the Powerday Site Old Oak Sidings

1.3.2 Park Royal

Park Royal is the largest industrial estate in Europe and comprises an area of 6.35 sq km, which is approximately twice the size of the City of London. Park Royal Industrial Estate accommodates a mixture of enterprises from small and medium sized operations through to multinational occupiers. From the existing companies there is the potential to aggregate freight flows of varying commodities, and of course, waste. The Park Royal Partnership exists to help the development and running of the estate and is an ideal forum to develop and coordinate the more sustainable organisation of freight activity to and from the estate. A new study currently being commissioned by Park Royal Partnership and TfL will examine the potential for canal based freight operations.

As the estate is constantly changing and evolving - with demolition and new building being carried out simultaneously - there is a significant potential for the movement of

aggregates and building materials on and off the estate by water. There is a large amount of new empty warehousing and the site has potential for a multi-modal interchange.

The site is ideally placed having reasonable road access but also rail access and a canal frontage. Powerday Limited is proposing to move product both to and from the site by canal.

1.3.3 Paddington Basin

The Paddington Basin has all the elements to attract freight movement by water to and from the area. It also has several access points including wharf and vehicle access possibilities directly to the canal side.

Photograph: Paddington Basin looking east

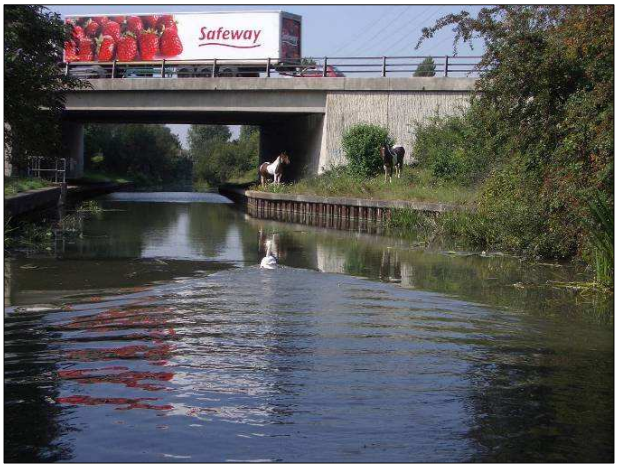
Firstly, there is a large amount of high quality office space recently developed. This is generating all types of waste including paper and potential exists to aggregate office waste. With large entities such as Marks and Spencer, St Mary's Hospital and the Hilton Hotel established in the area, there will undoubtedly be scope to actively engage similar organisations in dialogue regarding the inclusion of canal in their supply and waste chains. This work has already started with Marks and Spencer.

There is a similar amount of high quality residential accommodation which will generate large volumes of household waste. There is also an Hotel which will generate waste but attract large inputs of food, beverages and laundry. The area is still developing, and there is a construction site water side which could consider the use of canal for the movement of aggregates and building materials.

St Mary's Hospital is a large site with direct canal side access. The hospital as a whole could be studied for opportunities to move waste and other commodities to and from the site. Its shear size and versatility makes this site worthy of specific consideration.

1.3.4 Slough Arm

The Slough Arm initially passes through an important area of Green Belt land near to Iver. This land is close to the M25, and is the focus of a number of development proposals. Buckinghamshire County Council has proposed the development of a freight interchange on the canal in this area.



There are also various proposals for nearby land at Colnebrook, including a possible waste to energy plant. The Slough Heat and Power Station is located near to the end of the Slough Arm, and forms a potential destination for woodchip and other combustible commodities.

Photograph: The M25 cross the Grand Union Canal Slough Arm

1.3.5 Brentford

While parts of the canal in Brentford are outside of the lock free section of the canal, the area as a whole is important both in terms of the number of opportunities for freight transfer and because there is likely to be pressure to develop such sites for housing or other non freight use. Of importance is the waste transfer station which, though close to the canal, would require a road transfer and also the canal journey requires passage through the Hanwell flight.

1.3.6 Development Sites

The Phase One survey collected information on sites which are scheduled for development and vacant sites which appeared to offer development potential. Planners and developers already tend to be attracted to the canal as it offers clear benefits in terms of amenity value. The canal's potential to bring freight on to, or away from, development sites is generally ignored unless there is a serious road access problem.

Photograph: An advertisement for a major canalside development

The Phase One survey identified several major sites which are likely to be developed over the coming years, and Phase Two considers how to encourage developers and builders to use the canal to bring building materials onto these sites. Of particular interest is the housing development on the Southall Gas Works site. Several of the development sites could also be considered as potential locations for waste facilities.

A major development proposed for the long term is Cross Rail for which land has been safeguarded along side the canal in the Old Oak Common area. This presents both an opportunity with respect to freight movement, but also a potential constraint to the development of access points along this section of the canal.

1.4 Waste and Recyclates

The study identified that a large number of sites generate small volumes of waste. However, there are currently no major waste *disposal* facilities alongside the West London Canal Network. In a few cases, destinations for waste *processing* are already located alongside the canal. The key locations concerned are facilities for metals recycling and fridge disposal near to Scrubs Lane operated by EMR and O'Donnovans. EMR also have a canal side facility at Brentford. In themselves, services to these locations could be important generators of freight traffic for the canals. The addition of the Powerday site adds to these potential waste processing locations. Therefore, developing approaches to waste collection using the canal has been an important task for phase two and has informed the development of business cases.

For waste and recyclates movement where there are no suitable destinations, alternatives are considered in phase two including:

- Developing waste transfer points
- Developing new facilities alongside the canal.

1.5 Building Materials and Aggregates

Building materials suitable for movement by canal include aggregates, cement, and bricks. These materials would ideally be loaded onto barges directly at their sources (e.g quarries, cement batching plants, stone depots, or brick yards.) Fortunately there are some such locations already located on the WLCN including the Hanson site at West Drayton.

However, even where the source is not directly alongside the canal, it may be possible to develop new locations to transfer building materials from rail or road to the canal for onward movement to the development sites. Suitable locations are identified in the Phase Two work.

Photograph: Building materials being delivered to site by barge

1.6 Main Conclusions

The main conclusions of the Phase One Study were as follows:

- There is no shortage of small, simple, loading/unloading points on the WLCN
- However, there are relatively few locations which are currently suitable for *significant* freight transfer
- There are relatively few sites along the network which can process or handle waste and recyclates, but there are opportunities to develop further facilities
- There are several businesses along the canal which provide materials for construction, and a large number of development sites which will need construction materials
- There are other possibilities for canal transport, including the movement of paper, food, drink and catering supplies

The survey was an important first step in assessing the opportunities to move freight via the canal network and forms the basis of the Phase Two work reported in this document.

1.7 Phase Two Brief

Following the submission of the Phase One report, the Phase Two brief was issued in November 2004 and work commenced on 31st January 2005. The Phase Two study area was broadly similar to the Phase One work. This includes the WLCN from Camden Top Lock in the East, westwards to the terminus of the Slough Arm, up to Cowley Lock and down to the Norwood Locks above Brentford. This work specifically focuses on the lock-free section.

The geographical boundary of the study was increased during Phase Two in order to assess the opportunities that might exist in the Brentford area where the Grand Union Canal exits into the Thames, and also north of Cowley Lock to include the Harleyford Gravel Pit. In addition the sphere of influence was re – defined as within a boundary 2.5km either side of the WLCN.

1.8 Phase Two Study Tasks

The Phase Two tasks were broken down into four main areas of activity as follows:

Activity 1: Identify the Study Area Waste Flows and other bulk commodities which could be handled using the WLCN

- The identification of key waste commodities within the study area and the determination of commodity volumes, current and predicted, using a 2016 forecasting horizon

Activity 2: Prioritise the Opportunities

- Assessment of the waste data to identify key flows, supply chain characteristics, commodity types and outline service patterns as input to sample business cases
- In depth market research with key businesses to support and assess the opportunities to move commodity types considered significant enough to develop modal shift

Activity 3: Develop Sample Business Cases

- Development of sample business cases and a cost model comparing current estimated costs against those developed for the particular commodity. Prepare a cost model for evaluation of ongoing and future schemes
- Develop Action Plans linked to the Business Cases
- Prioritise major development sites along the WLCN and a prioritised geo-coded list of wharves
- Assess the feasibility and benefits of developing one or more strategic storage and distribution facilities at key multi-modal interchange points on the WLCN

Activity 4: Reducing the Barriers

- Identify the main physical (technical and operational), psychological and policy barriers that might Impact the development of the Business Cases and consider the range of options to mitigate these including gap funding, policy and UK and EU best practice measures
- Draft content of promotional material and revised planning guidance on water freight for the revised Mayor's Transport Strategy

1.9 Overall Approach

As set out in the original brief, both the Phase One and Phase Two work has very much focused on the application of a practical approach to assessing opportunities to move waste by canal. There is no waste moving on the WLCN at the moment, and the study and client team has embarked on a relatively new area of research. Nonetheless, we have assembled experts in barge and operational technology, coupled with commercial experience to guide the potential service and infrastructure development. This has been combined with economics and costing analysis to assess the potential viability of the more promising opportunities.

A considerable number of site visits and business interviews have been carried out - varying from organisations carrying out waste and recyclates handling - to potential sites which are, or could be, developed as waste transfer stations, consolidation centres and development sites. Throughout the study process, regular contact has been maintained with key commercial entities to ensure that the work has appropriate validation, and that practical and potentially viable opportunities are developed.

The project team comprised Peter Brett Associates, Intermodal Solutions Limited and Wood Hall and Heward Limited

1.10 Structure of this Report

The remainder of this report comprises:

Chapter 2: Key Commodities and Forecasts

Chapter 3: Commodity Supply Chains in Relation to the Canal Network

Chapter 4: Sample Business Cases

Chapter 5: Business Case Results

Chapter 6: Requirements for canal side Facilities and Prioritised Locations

Chapter 7: Reducing the Barriers

Chapter 8: Conclusions & Action Plans

The report is supplemented by a number of Appendices comprising:

Appendix A: Supporting Figures

Appendix B: Companies visited during the compilation of the report

Appendix C: List of Potential Development Sites

Appendix D: Bibliography of Source Material

Appendix E: Abbreviations

2 Key Commodities and Forecasts

2.1 Introduction

In this chapter we describe the work carried out in identifying the potential volumes of key commodities which could be moved by canal and generating forecasts to the 2016 planning horizon.

The way waste is handled in the United Kingdom is changing to reflect the latest legislation regarding the need to meet European Union recycling targets and Directives to reduce the use of landfill. The need to dispose of waste close to its source - "the proximity principle" - will also contribute to change. These developments are discussed and the outcomes reflected in the forecasts for waste that are provided by the Greater London Authority.

Commodities featured include:

- Municipal Collected Waste MCW
- Commercial and Industrial Waste - C & I
- Construction and Demolition Waste – C & D
- Paper
- Metals
- Glass
- Development site building materials

2.2 Key Commodities and Volumes

This section provides an estimate by Peter Brett Associates of current and forecast volumes of each commodity generated in the study corridor.

2.2.1 Geographical Area and Basis of the Forecasts

In order to make the work more manageable, the area studied was disaggregated to an electoral ward level, such that all wards investigated were chiefly within a 2.5km radius either side of the WLCN. The majority of wards included in the study are located in London boroughs, although a small number are part of the Slough and South Buckingham geopolitical areas. Population data related to each ward was obtained from the 2001 census. Figure 2.1 shows the geographical extent of the study.

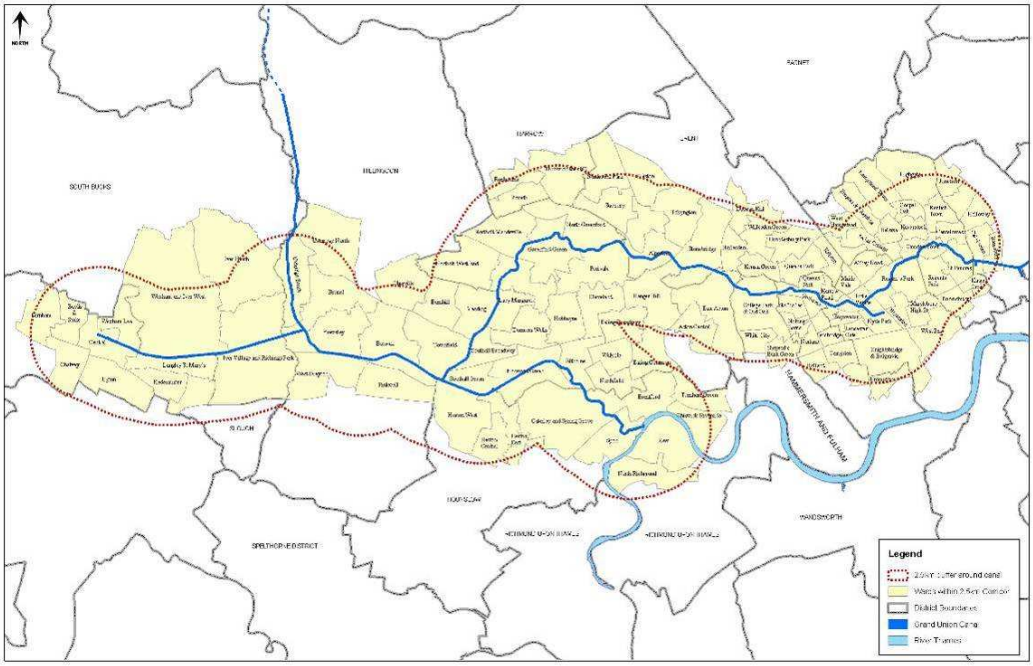


Figure 2—1: WLCN Study Corridor

Data about the amount of retail, industrial, office and warehouse floorspace was obtained from Commercial and Industrial Floorspace and Rateable Value Statistics 2003 (ODPM, 2003). The amount of commercial floorspace included in the study area is approximately equivalent to 25% of all commercial property in Greater London. The type of commercial property distributed across the study area tends to be clusters in different localities, with most retail and office space being concentrated in the area of London known as the 'West End', industrial and warehousing in Park Royal and more industrial buildings in Slough.

With respect to people living in the study area, there is a population of 1.3 million people, which translate into 544,000 households - each equivalent to the 18% of the Greater London conurbation.

2.2.2 Summary of Results

Figure 2-2 summarises the results of the commodity volume research, illustrating the total volume of each of the main commodities generated in the study area.

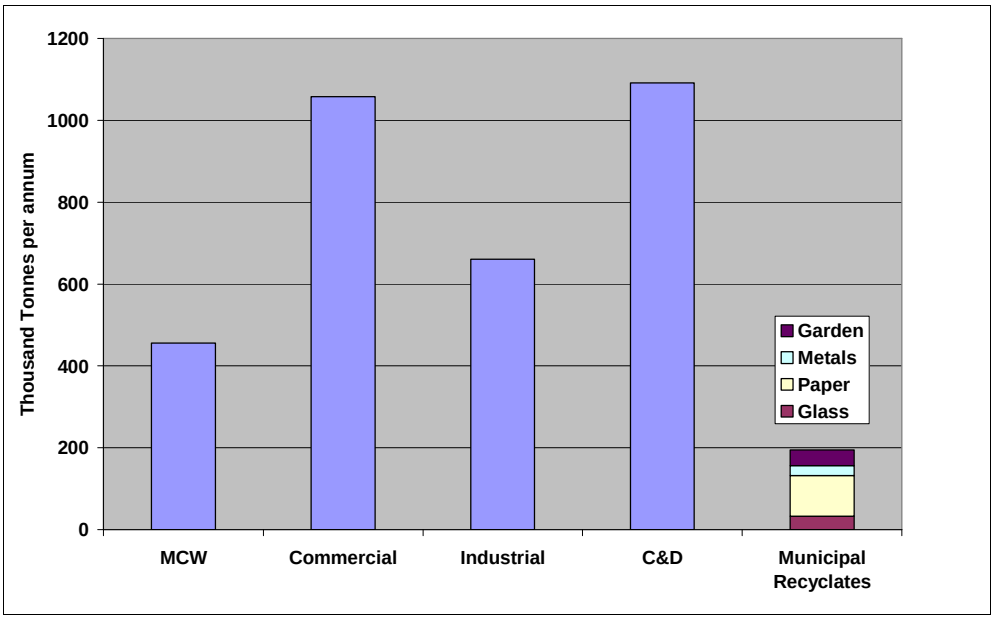


Figure 2—2: Volumes of main commodities in study area

From analysis data from the *Survey of arisings and use of construction and demolition waste 2001*, it can be seen that the volumes of commercial waste and C&D waste are much higher in the study area than municipal collected waste. However, it should also be noted that much of the C&D waste is treated on site and then reused without the need for further transportation. The following sections provide a more detailed analysis of the individual waste commodity forecasts by ward.

2.3 Municipal Collected Waste

There are various types of municipal waste arisings, including municipal collected waste, waste taken to civic amenity sites (**CA**), recycled waste (such as compost, paper and glass) were collected separately, and commercial and industrial waste collected by the waste collection authority (**WCA**).

'Capitalwastefacts.com' provides a breakdown of the volumes of waste collected in each Borough. Studies for the GLA have identified some inconsistencies in this data at a Borough level, but it was considered to be adequate for the purposes of this study. The estimate of municipal collected waste includes the following categories:

- Collection round (bin) waste
- Other collected waste

It excludes CA waste (which will be considered separately on a site by site basis for sites alongside the canal), recycled waste (which is dealt with separately), and non-household waste (which will largely be covered under the commercial and industrial waste category).

Waste volume estimates are provided by ward, and ward level data has been used to forecast demand for selected opportunities to move MCW by canal. Ward estimates were derived *pro rata* from the volumes for each borough based on the number of households in the ward.

Analysis of the Capitalwastefacts.com data suggests that a typical ward in London includes 4,000 to 5,000 households and is likely to generate 4,500 to 5,000 tonnes of

MCW per annum. This is broadly equivalent to 18 tonnes per day, which would equate to three waste collection rounds per day. This quantity was verified with data for Hackney obtained from the December 2004 report on the Hackney Waste by Water Pilot Scheme, which confirmed the broad estimate of waste volumes by ward and by round.

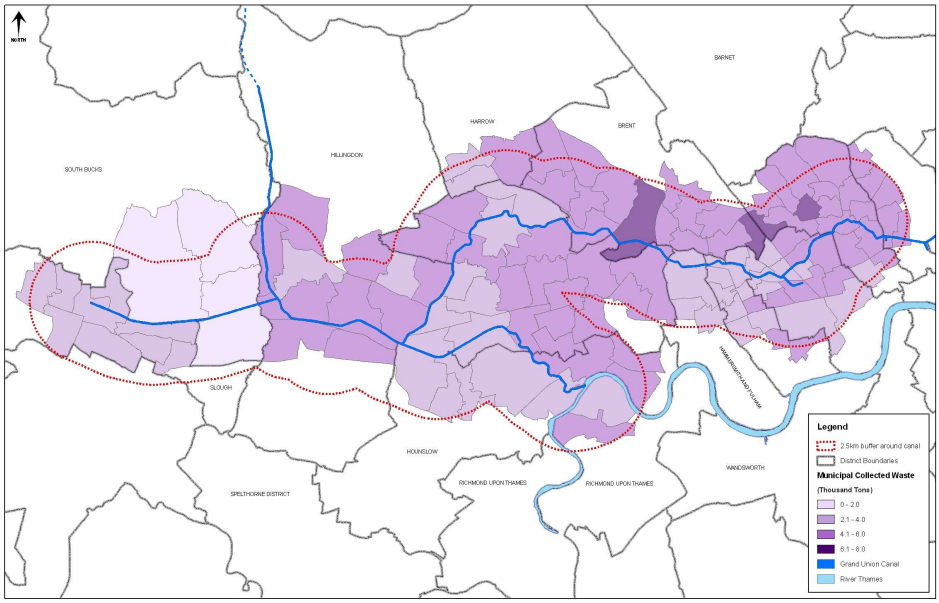


Figure 2—3: Waste Volumes by Ward

The total MCW arising in the study area in 2001/2002 was estimated at:

Waste Commodity	Tonnage
Municipal Collected Waste 2001/2	456,000 tonnes per annum

2.3.1 Municipal Collected Waste Forecast

Forecasting changes in MCW generation volumes is not a straightforward matter, depending on a variety of factors including:

- Change in the volume of waste generated per person or per household
- Change in the way waste is collected – particularly whether recyclates are separated at the household for kerbside collection
- Change in population, or household mix, of the area concerned

We have used a simple approach to generate a 10 year forecast. This is predicated on the assumptions set out in the GLA report "Municipal Waste Options – Technical Report, September 2003" which is based on the earlier "Technical Assessment" study. We have used the "Central" scenario, which assumes 3.5% annual growth in MCW until 2006 and then 2% per annum growth for future years.

This approach ignores any differences in growth rates between Boroughs, but is accurate enough given the other uncertainties in the GLA data. The forecast also

assumes that kerbside recycling rates will remain constant as a percentage of MCW. Material currently collected by kerbside recycling is NOT included in the forecast. The forecast is summarised as follows:

Waste Commodity	Tonnage 2001	Tonnage 2006	Tonnage 2016
MCW	456,000	541,000	660,000

2.4 Commercial and Industrial Waste

There is no data on C&I waste at a Borough level. C&I waste data was mainly sourced from the Environment Agency "Waste produced in England and Wales 1998-99" survey, which is also the data used in the "Technical Assessment for Waste Management in London" (**TAWML**) report. This survey may include C&I waste which is collected by councils, but we have tried to exclude C&I volumes from our consideration of municipal waste.

The TAWML report broke C&I waste down to sub regional level in proportion to the population of each sub region. For this study we have used a more detailed approach, based on ODPM floorspace data. The volume of commercial or industrial waste in each ward was estimated pro rata based on the proportion of London's commercial or industrial floor space in each ward. This data clearly shows the West End of London creating the most commercial and industrial waste in the London area (259,000 tonnes per annum).

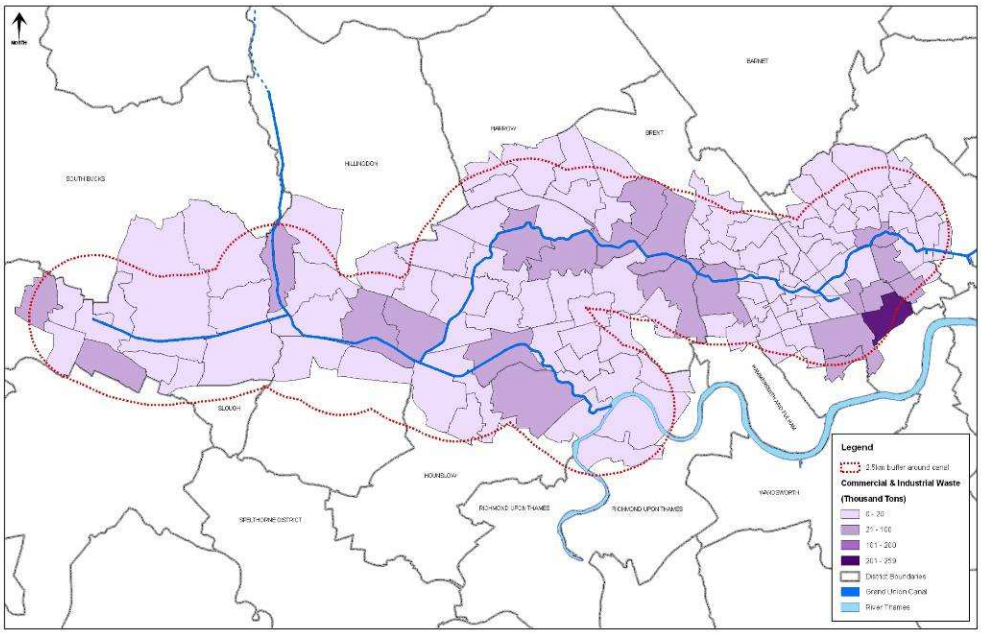


Figure 2—4: Commercial & Industrial Waste by Ward

In total, the study area is estimated to produce 1.7 million tonnes of C&I waste, of which 1.1 million tonnes is commercial waste and 0.6 million tonnes is industrial waste. A very large proportion of C&I waste is classified as "General Commercial and Industrial Waste", but the Environment Agency survey does identify paper waste separately. The volume of C&I paper waste arising in the study area is estimated to be 200,000 tonnes per annum.

Waste Commodity	Tonnage 2001
Commercial	600,000
Industrial	1,100,000
Commercial and Industrial	1,700,000

2.4.1 Commercial and Industrial Waste Forecast

The forecast for C&L waste has been made using the broad assumption in the Mayor's waste strategy that C&I waste volume will grow in line with GDP. GDP in West London is forecast to grow by 2.64% per annum, which produces the following forecast:

Waste Commodity	2001	2006	2016
Commercial	600,000	753,000	977,000
Industrial	1,100,000	1,204,000	1,563,000
C&I	1,700,000	1,959,006	2,542,016

2.5 Recyclables

Identifying the volume of recyclables produced in London each year is difficult, particularly given the wide range of methods of sortation and the lack of data on commercial and industrial waste.

The main sources of recyclable waste are:

- Kerb side collection of municipal waste
- Civic amenity sites
- Bottle bank type facilities
- Commercial and industrial waste

Given that the main requirement for this part of the study is to provide a broad estimate of the volume generated within the study area, a simple approach has been adopted. We have therefore used the volumes cited in the Mayor's Waste Strategy for London as a whole. These have been allocated *pro rata* across the wards in the study area, according to the number of households in each ward.

This provides the following estimate of recyclable arisings in the study area:

Recyclable Commodity	Tonnage 2005
Glass	33,000
Paper	99,000
Metals	25,000
Kitchen Waste	0
Garden Waste	38,000

2.5.1 Recyclable Materials Forecast

This volume is expected to grow dramatically as London improves its recycling rates. Using the GLA report "Municipal Waste Options: Technical Report" Option 3 and combined growth rate scenario, volumes could be expected to grow to the following levels by 2015:

Recyclable Commodity	2005	2015
Glass	33,000	86,000
Paper	99,000	257,000
Metals	25,000	63,000
Kitchen Waste	0	45,000
Garden Waste	38,000	230,000

Some of this additional volume will come from kerb side collections, in which case the volume of MCW available would reduce. However, a very large proportion of it is likely to arise at Materials Recycling Facilities, Civic Amenity Sites, or similar facilities. Note that these forecasts exclude commercial and industrial recyclables.

2.6 Construction materials

2.6.1 Current Estimates

In 2001 London consumed 2 million tonnes of land won sand and gravel, 5 million tonnes of marine sand and gravel, and 2.5 million tonnes of crushed rock. (Source: 2001 Aggregate and Minerals Survey ODPM / BGS).

As a very broad estimate, 18% of London's population lives within the study area, and we have thus estimated minerals consumption as follows:

Commodity	Tonnage 2001
Land sand & gravel	360,000
Marine sand & gravel	900,000
Crushed rock	450,000

2.6.2 Construction Materials Forecasts

It has not proved possible to obtain forecast data for the consumption of construction materials in London. However, construction output varies broadly in line with GDP (albeit generally slightly in advance of GDP changes), and therefore the forecast below provides a forecast of construction commodity growth based on the West London GDP forecast of 2.64% per annum.

Commodity	2001	2006	2016
Land sand & gravel	360,000	410,096	532,172
Marine sand & gravel	900,000	1,025,240	1,330,430
Crushed rock	450,000	512,620	665,215

2.7 Construction and Demolition (C&D) Waste

2.7.1 Current Estimates

Data on C&D waste has been derived from the ODPM 2001 Survey of Arisings and Use of C&D Waste in England and Wales. It was allocated on a ward basis based on the population of each ward. This is a very crude method of allocation, but should provide a reasonable estimate of the total volume of C&D waste likely to arise in the study area each year. It is important to note that much of this material will be reused on site.

In reality, some wards have no construction projects while others are major centres for redevelopment, and so the volume of C&D waste at ward level will vary significantly. In total the study area is estimated to produce 1.1 million tonnes of C&D waste.

2.7.2 C&D Forecasts

As with construction materials, it is likely that construction and demolition waste volumes will increase at a similar rate to GDP, producing the following forecast for the WLCN study area:

Commodity	2001	2006	2016
C&D	1,100,000	1,253.072	1,626,082

3 Commodity Supply Chains in Relation to the Canal Network

3.1 Introduction

Chapter 2 identified the volumes of target commodities moving into or out of the study area and (for most commodities) forecast how volumes might change between 2005 and 2015.

Clearly, the fact that a commodity is produced or arises within the study area does not necessarily mean that it could, or would ever, move by canal. The likelihood of freight moving by canal depends on:

- The supply chain characteristics of the commodity – how and why the commodity is currently transported
- The location of commodity sources and destinations
- The technical ability of the canals to carry the commodity
- The economic viability of moving by canal compared to other modes.

This chapter examines the supply chain characteristics of each of the target commodities with respect to these variables. It also outlines the assumptions and key issues which have defined the development of the sample business cases.

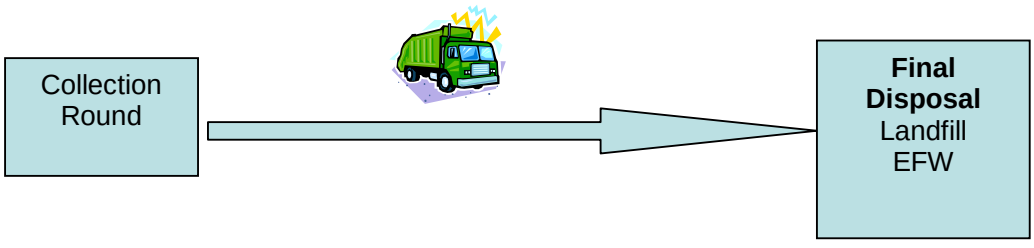
3.2 Municipal Waste Supply Chain

It is important to consider municipal waste in detail, not only because it is an important potential commodity to move by canal, but also because the supply chain is going through a period of radical change, which may offer additional opportunities. This is considered in the following sections.

3.2.1 Municipal Collected Waste for Disposal

Currently over 90% of London's municipal waste is disposed of at landfill or by incineration at energy from waste (EfW) plants. The MMWS makes it clear that ultimately only a small proportion of London's waste will not be recycled or processed in some way. Waste destined for final disposal in these ways is generally transported in one of two ways as outlined below.

3.2.2 Disposal Route 1: Via Direct Transfer



Where the point of final disposal is reasonably close to the area where waste is collected, the collection vehicles may be used to transport waste to the landfill or EFW plant. This method of transfer is relatively inefficient as the waste is only slightly

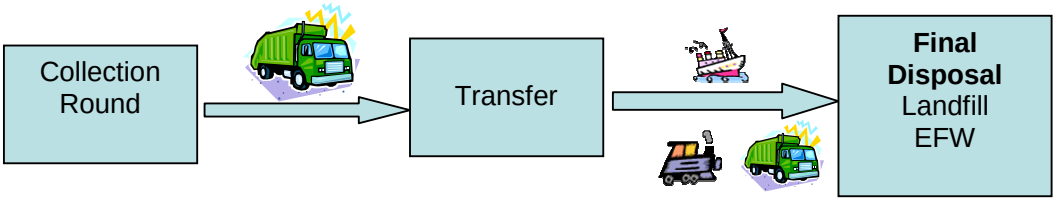
compacted and collection rounds are interrupted if the vehicle fills up part of the way through. Very little waste in the study area is transported in this way. The main direct flow is from Westminster to the SELCHP (South East London Combined Heat and Power) plant at Deptford, south east London.

As municipal waste cannot be collected from households by canal, this direct type of operation does not offer obvious opportunities for canal transport.

However, the Hackney - Edmonton pilot project combined canal transport with a modified road collection system to reduce the cost and impact of direct transfers to an EFW plant. In this case, the solution tested was effectively to convert some of the direct movements to movements via a transfer station, and this type of solution is considered in the next section.

Photograph: The Waste by Water Pilot Scheme in Hackney

3.2.3 Disposal route 2: Via Transfer Stations



Most waste from the WLCN is transferred from vehicle to vehicle or to another mode at some point in its journey towards final disposal. Waste collection vehicles drive to the transfer station after or during their collection shift. At the transfer station waste is compacted into special containers for movement by river, rail, or sometimes road to landfill or EFW plant. Waste transfer has become more difficult due to legislation requiring organic waste to be handled in covered facilities, leading to the closure of some smaller transfer stations.

The secondary leg of the journey from the transfer station to the disposal point is generally very long, for instance as far as Bedfordshire by rail or Essex by river. The benefit of not using inefficient waste collection vehicles for such long journeys is clear.

3.2.4 Existing Municipal Collected Waste Potential for WLCN

None of the final disposal destinations used by the boroughs in the WLCN corridor are on the canal network. Only Edmonton EFW is served by canal. This is not used by WLCN corridor boroughs, and transporting waste to Edmonton from canal side transfer stations on the WLCN is likely to be expensive. In addition it would not comply with GLA strategy for waste to be dealt with as close as possible to its source.

One major MCW transfer station is adjacent to the WLCN – Transport Avenue, Brentford, operated by the West London Waste Authority. Some waste has to travel over relatively long distances from collection rounds across West London to reach this transfer station. It may be viable to move such waste by canal, although this would involve an intermediate transfer at the canal side near to the collection rounds in an operation similar to the Hackney pilot project.

Another problem with Brentford is that the facility is below the Hanwell flight of locks, and the transfer station is not immediately alongside the canal. Nonetheless the potential for this type of movement has been modelled as part of the study.

3.2.5 Future Final Disposal Routes

Any future ability to use landfill will be greatly reduced as the GLA is developing a strategy which will lead to a reduction in landfill disposal from over 2.9 million tonnes in 2005 to under 1.2 million tonnes in 2020.

This fall will be achieved partly by a significant increase in recycling rates from 25% in 2005 to 45% in 2020. Remaining non recycled material which is not sent to landfill will be dealt with using a range of technologies such as:

- Mechanical Biological Treatment (MBT) – 1.2 million tonnes by 2020
- Anaerobic Digestion – 230 thousand tonnes by 2020
- Gasification / Pyrolysis – 384 thousand tonnes by 2020
- Conventional Incineration (EFW) – 866 thousand tonnes by 2020 (no increase from 2005)

It is important to note that some of these processes produce residual material which would either go to landfill (for instance ash from incineration) or to further use (e.g. dry fuel is a product of MBT).

These changes in disposal patterns will result in changes in transport demand:

- Demand for movement through transfer stations to rail or the Thames will be reduced significantly
- New facilities will be developed within London, within or as close as possible to source boroughs, resulting in reduced demand for longer distance movement of waste

The GLA will shortly publish its views on land availability for the new facilities. The initial search is limited to GLA Preferred Industrial Locations (PIL) and Industrial Business Parks (IBP).

The principles followed will be:

- First priority will be for land which is local to the source of waste
- The second priority will be for sites which are served by waterways or rail

This provides an important opportunity for the WLCN. If the new facilities are alongside the canals, then there may be opportunities to move waste in, and residual material out, by canal.

The extent of the opportunity will depend on the density and location of new facilities. If there are a large number of small facilities, the opportunities for movement of waste to processing facilities will be limited, as it will be most efficient to use the waste collection vehicles to move waste in by road from each round. This scenario would be preferred because it conforms most closely to the proximity principle.

However, it may be that developing small facilities is uneconomic, or that there is insufficient land in the right locations for such a strategy. In particular, the central London boroughs are likely to suffer from a lack of suitable sites. In such a case, the canal may be a useful route for waste moving from transfer locations to the new facilities, along the lines of the Hackney scheme.

The canal could also be used to move residual materials away from facilities, for instance moving combustible products from an MBT to a facility such as Slough Heat and Power. The new facilities are likely to each handle between 50 ktpa and 200 ktpa of waste and would require around 4.2 hectares for a 180,000 MBT, including space for an MRF.

Photograph: Slough Heat and Power Station

We have developed sample business cases for these scenarios / locations for canal side MBT plants, including movement of the residual material to Slough Heat and Power.

3.2.6 Multi Modal Refuse Collection Vehicles

In parallel with these important supply chain changes, refuse collection authorities are considering important changes in the way that refuse is collected and transported.

It should be noted that there is no single authority that controls the collection and management of municipal waste in Greater London. The strategic authority covering MW in London is the GLA. The collection of waste is the responsibility of the London Boroughs. Twelve London Boroughs arrange for the disposal of waste themselves. These are Bexley, Bromley, Corporation of London, Croydon, Greenwich, Kingston upon Thames, Lewisham, Merton, Southwark, Tower Hamlets and Westminster. The remaining Boroughs are serviced by four statutory Waste Disposal Authorities namely East London, North London, West London and Western Riverside. Because of this structure, there is the requirement for a considerable amount of agreement between the agencies for change to occur.

As described in earlier sections, currently waste is collected in specialist refuse collection vehicles (RCVs). These vehicles carry waste from collection round to disposal or transfer locations. Generally, they make the journey from the collection round to the disposal / transfer location at the end of each collection shift, whether the vehicle is full or not. They also need to make the journey in the middle of a collection round if it becomes full.

An alternative is to use a new type of RCV which carries interchangeable bodies. In this case, when the vehicle becomes full, it drives to a local transfer station close to the collection round where the full intermodal unit is swapped for an empty one. This

means that the RCV spends much less time travelling to and from transfer stations, and more time actually collecting waste. These vehicles are known as Multi Modal Refuse Collection Vehicles (MMRCVs).

Transport for London is researching the productivity and environmental benefits of MMRCV operations, with a view to introducing this technology to Hackney.

While the original concept for MMRCV operation was developed in order to deliver a canal transport solution, it is now recognised that one of the substantive benefits of MMRCV operation are reduced waste collection costs and reduced congestion. If these apparent benefits are confirmed, it is possible that MMRCV operation could be applied to other waste collection authorities across London.

With MMRCV operation, if both the local transfer station and the final disposal facility or bulk transfer station is alongside the canal, waste disposal authorities could choose between canal transport and road transport to move the intermodal waste units between the local transfer stations and the disposal / transfer location.

In contrast, with RCV operations, canal transport cannot be used, because transferring the waste onto the canal would involve emptying the RCV at the canal side and loading the barge. This is impracticable, particularly given the regulatory restrictions on the transfer of waste.

Therefore, for this study our comparison of road and canal movement has ***assumed*** that MMRCV operation is introduced in West London. The comparison then considers whether, for an MMRCV operation, it is cost effective or viable to move the intermodal units between the local transfer station and final destination by canal - rather than by road.

3.2.7 Civic Amenity Sites

London's 38 civic amenity sites (CA), otherwise known as reuse and recycling centres, handle 15% of household waste plus some commercial waste. Ninety per cent of waste from CA sites is presently disposed of by landfill or incinerators. In the future, these sites will become important processing centres for recyclable material, and therefore higher volumes will be recycled (up to 50%) and lower volumes sent for disposal. Selected CA sites are undergoing investment to become Reuse and Recycling Centres.

CA sites could be useful opportunities for movement of waste by canal, because they offer a high concentration of freight volume. Initially the main opportunity would be to transport waste for final disposal, but, as discussed above, this will depend on final disposal facilities being developed alongside the canals.

Several CA sites are located alongside the WLCN:

- Rigby Lane, Hillingdon (SITA West London Transfer Station)
- Southall WRC, Gordon Road (scheduled for closure)
- Langley Park Road (Berks)
- Brent Reuse and Recycling Centre (formerly Twyford Solid Waste Transfer Station)

Opportunities for canal freight from these sites could include:

- Movement of waste from the CA to a transfer station en route for disposal (e.g. to Transport Avenue, Brentford)

- Movement of recyclable material from the CA to recycling processing facilities.

3.2.8 Summary of Municipal Waste Opportunities

We have noted that opportunities for movement of municipal waste within existing supply chains are very limited. The clearest opportunity is to use the canal to move waste into the Brentford waste transfer station. This opportunity has been tested in our business case developments.

In the future there is an important opportunity to create new supply chains optimised for both road and canal transport. Key to this will be the development of new disposal and processing facilities alongside the canal. To test this potential, we have developed Sample Business Cases which consider the potential for an MBT facility at the Powerday site – although clearly this could be located on a similar site within Park Royal or any other canal served Preferred Employment Location.

Figure 3.1 shows the position and type of waste disposal sites and their relationship with the West London Canal Network.

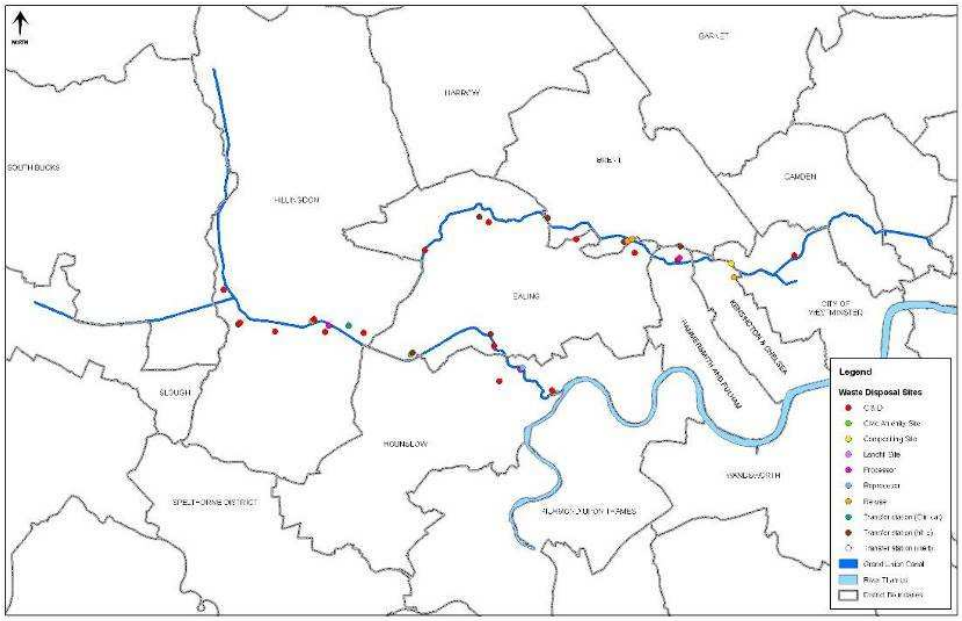


Figure 3—1: Waste Disposal Sites close to the WLCN

3.3 Recyclable Materials Supply Chains

Flows of recyclable materials are more complex than materials for disposal because of the variety of materials concerned and the various ways in which recyclable materials are collected.

3.3.1 Collection

Recyclable material can be collected:

- From the doorstep pre-sorted by the householder
- From kerbside “bring” systems
- By being extracted from normal bin waste collected in the usual way

Waste collected from households may then pass through a Materials Reclamation Facility where the recyclable material is extracted and sorted. Currently there are only 9 such facilities in London, of which none are on the canal network. The main facility of this type in West London is operated by Shanks Group plc at Acton.

It is likely that more MRF will be developed in the future and clearly locating such facilities alongside the canal could offer opportunities for movement of recyclable materials by canal.

3.3.2 Processing

Once collected or extracted from the waste stream most recyclable materials require some form of processing. This might include sorting, washing, and crushing of glass, or baling and sorting of paper, for instance. There are at least 166 facilities in London which process recyclable materials. Of these, 69 process metals.

Several of these facilities are located alongside the WLCN, mainly handling metals or processing aggregates. Those concerned with reprocessing materials other than aggregates alongside the canals include:

- Camberley Plastic Products in Hayes (although this seems to have ceased trading)
- BFI Ltd., Rigby Lane
- W R Pollard & Son, Rigby Lane
- Greener World at Maypole Dock
- United Kingdom Tyre Exporters at Scrubbs Lane
- UK Waste Recycling Services, Rigby Lane (paper)
- Intertex International at Maypole Dock (textiles)

Additionally, there are facilities operated by Grundon at Harefield and Colnbrook, which are near to the canal and may be useful.

Some of these processors collect materials from a wide area and operating collection rounds using vehicles from the home base can be logistically difficult. Use of the canal, with vehicles bringing material to a transfer location near to concentrations of their customers, and with barges then transporting material to the processing plant, may help businesses to improve operating efficiency as well as sustainability.

3.3.3 Reprocessing

Reprocessing turns recyclable materials into useful products, for instance, turning cullet into glass bottles or scrap paper into ‘new’ paper. Unlike processing, the majority of reprocessing facilities receiving recyclable material from London are ***not*** located in London. For example, paper manufacturing is concentrated in coastal locations such as Kent. None of the reprocessors identified by the GLA are located near to the WLCN, although several are accessible via the Thames, including paper plants in Kent.

One of the sites, which is on the River Thames, is the London Remade “Glass Eco Site” operated by Day Group – there is an Aggregates Eco Site next door. Another is the Paper Eco Site operated by Grosvenor at Crayford Creek (which may be accessible to river transport).

3.4 Metals Supply Chain

The GLA has identified 69 metals processors in London with the potential to process over 3 million tonnes of metal each year. Scrap metal arises from a wide range of sources including:

- Municipal waste recycling facilities
- Civic amenity sites
- Commercial and industrial waste
- Demolition waste
- Trade in scrap including End of Life Vehicles (ELV)

Some metal products need special handling, notably fridges for which a special plant has been developed at EMR Willesden.

Once processed nearly all scrap metal is sent out of London for reprocessing, for instance to steel smelters. It is unlikely that any of the reprocessing destinations can be accessed easily by canal or waterways. Therefore the main opportunity for canal transport is to bring metals waste in to metal processors within London.

Several major metals processors are located alongside the WLCN, including:

- EMR Metals at Willesden and Transport Avenue
- T Holloway and Sons at Transport Avenue

The EMR site at Willesden is not immediately beside the canal, but could be accessed via the Powerday site. The EMR site at Transport Avenue is alongside the canal, but developing unloading facilities would be difficult due to land level differences and the layout of the site. The T Holloway facility could be provided with level access, but is below the Hanwell flight of locks.

The main opportunity for movement of scrap metal to the processors is likely to be from CA sites or MRF sites adjacent to the canal.

3.4.1 Opportunities for the movement of recyclable glass

Glass can be recycled into the following products:

- Glass aggregates
- Glass sand
- Fibre glass
- Grit and shot blasting sand
- Water filtration media
- Fluxing agent for brick and ceramics industries
- Decorative products
- Glass cullet for the glass industry

We have investigated the location of glass processors and most are located in East London. One of these is the Day Glass Recycling Plant at Charlton East London which has wharf access to the River Thames. This plant produces glass sand. If collection points were established along the canal it would be possible to aggregate loads and move them by water to Charlton. The journey to the site would be by way of the canal system and the River Thames. The main opportunity for handling recycled glass on the WLCN would be between collection points located on the canal to a new processing plant located on the canal in West London.

3.4.2 Opportunities for the movement of recyclable paper

Most locations which handle waste paper are located in East London and the Medway area. There is a plant operated by Grosvenor at Crayford which has a wharf adjacent to it and this could be used for transporting waste paper from a collection point on the West London Canal Network.

The most likely opportunity would require the setting up of a Paper Eco type facility within the canal network and arrange for collection points and a barge feeder service to the plant.

3.5 Building Materials Supply Chains

Building materials for London come from a range of sources and supply points. They include sea gravel, lime stone, cement, aggregates, bricks, blocks and plaster board. Traditionally these commodities are moved from point of extraction, processing or manufacture direct to building sites. Other distribution supply chains could be considered including the provision of a "Consolidation Centre":

- Supply ▸ building site
- Supply ▸ process ▸ site
- Supply by rail/barge ▸ consolidation centre ▸ building site
- Supply ▸ consolidation centre ▸ building site

Photograph:

British Airways Heathrow Consolidation Centre

Figure 3.2 shows the development sites close to the West London Canal Network which may have the potential to be serviced by the canal.

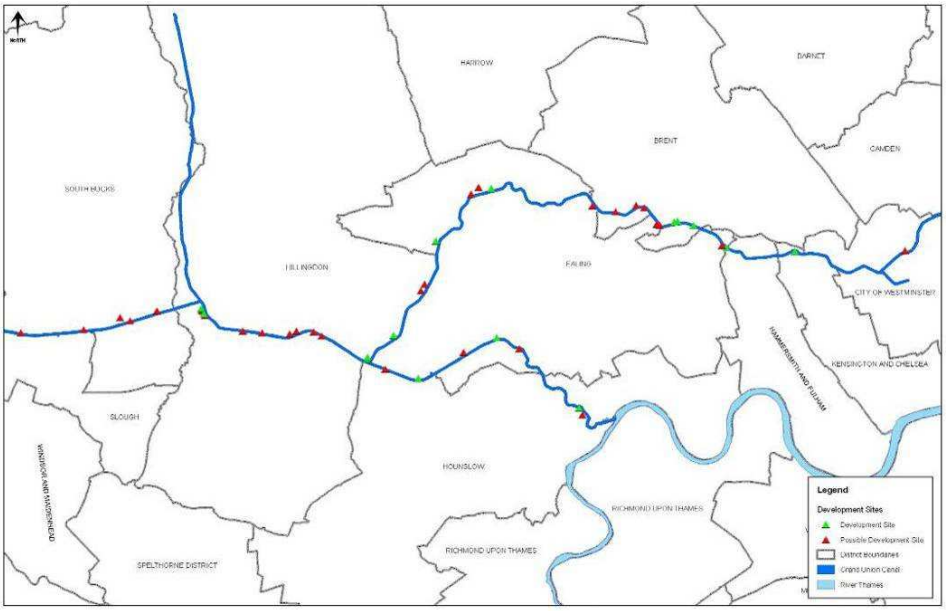


Figure 3—2: Development Sites

3.6 Construction and Demolition Waste Supply Chain

London already recycles a large percentage of its demolition waste, much of it on the building site itself. The remainder is processed at one of the reprocessing sites described below.

The WLCN study needs to identify whether canals can be used as a viable option for C&D waste transport from demolition sites located away from the canal or whether canal use will only be viable from properties located immediately on the canal side. If the latter is the case, the volume of C&D waste available for canal transport would be significantly less.

C&D waste accounts for 35% of waste generated in London by weight (6 million tonnes). Ninety seven per cent of this waste is reused, with only a small volume being sent for landfill. C&D waste for reuse passes through recycling facilities, of which there are 174 in London with the combined potential to handle the full forecast volume of C&D waste.

Between 0.7 and 1.2 million tonnes of C&D waste is generated in the West of London, where the GLA has identified 56 facilities which process the waste for reuse. According to GLA figures, there is a mismatch between the capacity of West London to reprocess waste – estimated to be 1.7 million tonnes, and the volume of waste arising in the sub region 0.7 to 1.2 million tonnes. This could be a result of the difficulty in allocating C&D waste arisings to sub regions, or it could reflect movement of C&D waste into the sub region to feed construction projects.

3.6.1 C&D Waste Facilities

Facilities handling C&D waste located close to the WLCN include:

- Sweeney Environmental, Trout Lane, Yiewsley
- Drinkwater Sabey, Springwell Lane, Harefield (beyond Cowley Lock)
- Tarmac at Pump Lane, Hayes
- SITA at Rigby Lane, Hayes
- Day Aggregates at Transport Avenue
- Powerday Site, Park Royal

Of these the Powerday site is currently the most significant. It is being developed to provide easy access to the canal, and has the capacity to handle over a million tonnes of C&D waste per year.

3.6.2 C&D Waste Sources

While the locations of C&D waste facilities are fixed, the source of waste and destination of recycled material will depend on where construction activity is taking place. It is important to note the opportunities for two way transport of materials – from demolition site to processor and then onwards to a construction site.

The potential for canal transport of materials will be maximised where a demolition or construction site is located alongside the canal. Fortunately, there are a number of major development sites alongside the WLCN which were identified during Phase One of the study, the canal survey.

The study considered the feasibility of using the canal to serve development sites located a short distance from the canal, with transfer to canal by road or conveyor.

Photograph: Development site along the Grand Union Canal

3.6.3 Opportunities for C & D Waste

We have modelled two canal side and one nearby development sites and assess the feasibility of using the canal to take out demolition waste and bring in recycled aggregates.

3.7 Case Studies

We have described the supply chain for the major commodities which are capable of transferring to canal. The following section demonstrates two case studies one of which illustrates a canal flow in operation and the second shows the potential for canal use in a development site context. These deal with building materials and demonstrate the practical opportunities for developing further canal freight.

Case Study 1: Harleyford Aggregates to Hanson Aggregates

Aggregates are one of the few commodities being moved on a regular basis on the WLCN. Harleyford Aggregates, Hanson Aggregates and British Waterways London have established a scheme to move 45,000 tonnes of sand and Gravel from the Lea North site in Denham Buckinghamshire. This is the first commercial freight contract for the Grand Union Canal for more than 30 years and directly displaces this tonnage from road to canal. The cost of this scheme is approximately £460,000 and funding was provided by various grants from the Department of Transport (FFG) and SRB London Waterways Partnership. The equipment required included two purpose designed barges, a conveyor system from stock pile to waterside and infrastructure works to the canal. The sand and gravel is moved to the Hanson depot at Hillingdon a distance of 5 miles. The Lea North site is above Cowley Lock which has to be passed through.

This flow is seen as an important step in attracting freight to the canal and demonstrates the feasibility on the freight flow.

The Hanson site is rail connected and brings in limestone and other construction commodities. This opens up the possibility of moving other commodities between the Hanson site and locations in central London adjacent to the Grand Union Canal. It should be noted that this development would not have occurred without substantial grant aid.

With any development, large quantities of bulk materials are required to be moved to and from the development site. In the initial stages the site requires clearing, and this can involve the removal of materials which cannot be reused or cleaned up on site. This is especially true on brown field sites where there are contamination issues.

Once clear, foundations will be dug with the possibility of more material to be moved off site. Then large quantities of cement and other materials will be required for the construction phase.

The existence of a source of aggregates adjacent to the canal is an important building block in the scheme of creating modal shift.

The second case study analyses the potential volumes of building materials involved on a development site and has provided some of the data used to develop the business cases.

Case Study 2: Southall Gas Works Development

Plans are well advanced for a mixed development. The site is approximately 91 acres, (30 ha) and said to be one of the largest brown field development sites in West London. The site is being developed by Castlemore and SecondSite Property. The development will consist of 4,000 new homes of various types, 50,000 square metres for employment including offices, manufacturing and an hotel. 6,000 square metres of new retail shops are also included. The site has a canal frontage of approximately 1 km

We have estimated the potential for building materials to be moved to the site. Given the large numbers of assumptions made, these estimates are at broad level of magnitude, but we believe, sufficient to illustrate the potential for the development. There will be additional quantities of materials to be brought to site because no allowance has been made for site infrastructure such as roads and drainage. Our estimate of building materials is shown in Table 3.1 below. These figures are an estimate of the total requirement for the site and should not be considered as a yearly estimate.

Commodity	Tonnes
Cement	145,000
Sand	215,000
Aggregate	450,000
Brick & Block work	190,000
Total	**1,000,000**

There are facilities along the WLCN within the lock free section, for the provision of aggregates, gravel and sand. There are facilities for delivering other building materials by rail to facilities which have direct access to the Great Western Railway line and the canal.
The case for using the canal network for deliveries to and from site in the development stage of the Southall Gas Works development is especially high in view of the size of the development and the road access conditions at the start of the project. It could also act as a beacon project for a Best Practice Study.

As a very crude rule of thumb for considering other development sites a figure of 33,000 tonnes per hectare of development site could be used to give order of magnitude information.

Post development the collection of waste is an important consideration for this site. There is the potential to generate 4,000 tonnes of waste per annum which could be handled through the WLCN provided suitable facilities were incorporated at the planning stage of this development.

Similar arguments apply to the waste generated by the industrial parts of the development. Inclusion in the Mayors Strategy could be a way of ensuring the use of the canal for the development and post development phase of all new developments with direct access to the WLCN.