

**WATERSLAG: survey of the freight  
potential and inventory of the  
waterway infrastructure in Flanders  
and the southern Netherlands**

**Executive Summary**

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The aim of the executive summary is to give an assessment of the freight potential of smaller waterways in Flanders and the southern Netherlands and more in particular of the class II waterways<sup>1</sup>.

The smaller canals are increasingly losing their economic role and significance. The reason for this is that shippers do not find the freight prices sufficiently interesting. The inland ships that can sail on these canals (Campine barges), have a limited capacity of 600 tons. So the industry that is located along these canals to a great extent prefers to make use of road transport.

Two strategies can be followed to once again give inland shipping a substantial role. The first strategy is long term and entails broadening and deepening the smaller canals so that they achieve a higher class.

A second strategy is the one chosen by ECSWA / Waterslag, which in the short term aims to make more optimum use of the small canals without additional investments in infrastructure. To achieve this, a tug-pushed dumb barge is attached to a Campine barge. This doubles the capacity, achieving economies of scale.

The tug-pushed dumb barge has its own drive, so that it can sail through locks on its own or to a limited degree can even travel its own haul. In the larger canals, the dumb barge connects with a pushed barge train, that can sail to or from a harbour such as Antwerp or Rotterdam for example.

In the end, the size of the tug-pushed dumb barge determines the amount of cargo that can be transported. This size depends on the size of the locks. That is why this report not only contains an assessment of the freight potential and an inventory of the lock infrastructure in the study area, but also different scenarios for the reach of tug-pushed dumb barge trains of various sizes.

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<sup>1</sup> The European Conference of the Ministers for Transport (CEMT) classified the European waterways in various classes (CEMT Resolution N° 92/2). Class II canals are navigable for ships, called Campine barges, with a maximum length of 50-55m, a maximum width of 6.6m and a maximum draught of 2.5m. The tonnage of these Campine barges is 400-650 ton.

The Waterslag study area is cross border (figure 1.1). The class II waterways in Flanders are the Kempen canals (excluding the canal Dessel-Kwaadmechelen), the canal Leuven-Dijle and the river Dender<sup>2</sup>. The Kempen canals include the canal Briegden-Neerharen, the Zuid-Willemsvaart, the canal Bocholt-Herentals, the canal Dessel-Schoten-Turnhout and the canal to Beverlo. The class II waterways in the Netherlands included in this analysis are the Zuid-Willemsvaart, the Beatrix canal, the Wilhelmina canal and the canal Wessem-Nederweert.

Figure 1.1 Cross-border study area of Waterslag



Source: Buck Consultants International, 2006

**Section 2** discusses the methodology that was applied to gain insight into the freight potential of the Waterslag concept. In **section 3** the freight potential per canal is charted. And the results of the interviews with the shippers and logistic service providers, that are located along the class II canals of the study area, are presented. **Section 4** contains an inventory of the lock infrastructure and three different theoretical scenarios. Finally, **section 5** describes the final conclusions.

<sup>2</sup> From Dendermonde to Aalst the river Dender is a class II waterway. Upstream from Aalst it is a class I waterway. Unless stated to the contrary, we are focussing on the class II part.

To get an idea of the existing freight potentials, in the first phase a statistical analysis is departed from based on the loading and unloading data for road transport. This analysis is then, in the second phase, supplemented with the results of interviews with shippers and logistic service providers that are located along the class II waterways.

## 2.1 Theoretical assessment

The theoretical assessment is based on existing international loading and unloading data for road transport<sup>3</sup>, existing traffic data for inland shipping<sup>4</sup> and macro-economic prospects for up to 2030<sup>5</sup>.

The potential for the ECSWA / Waterslag concept consists on the one hand of the inland shipping volumes caused by a shift from road transport to inland shipping and on the other hand from the inland shipping volumes that already exist<sup>6</sup>. That is why the calculation is first made of how big the shift potential is until 2030. Then the current inland shipping volumes are extrapolated to 2030 and the results of both calculations are added together.

### ***Calculation of potential inland shipping following a shift in road transport***

For the calculation of the shift potential, the loading and unloading data (2003) for road transport per district (Flanders) or COROP area (the Netherlands) are departed from. On the basis of the company locations in the districts and COROP areas an assessment was then made of the share of road transport that can potentially be shifted, in other words, a ratio was applied to the loading and unloading data that reflects the assessment of the

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<sup>3</sup> For Belgium: Nationaal Instituut voor de statistiek (NIS), 2003.

For The Netherlands: Centraal Bureau voor de statistiek (CBS), 2003.

<sup>4</sup> For Belgium: Nationaal Instituut voor de statistiek (NIS), 2003.

For The Netherlands: 'Nederland en de scheepvaart op de binnenwateren', Ministerie van Verkeer en Waterstaat, 2002.

<sup>5</sup> 'European Energy and Transport – trends to 2030', European Commission, 2003.

<sup>6</sup> Interviews with shippers (see appendix 1) showed that most shippers with existing inland shipping flows indicated that they would switch to Waterslag as soon as this concept is on the market. The reasons are that for many of them 600 tons of cargo is a limit and that the current freight prices are relatively high compared to road transport.

number of companies and their flows that are located along the canals<sup>7</sup>. To make the assessment as realistic as possible, a variance has been included in the calculation. The ratios were kept low so that there certainly would not be any overestimation. The data is extrapolated to 2008 (start of commercial use of the ECSWA / Waterslag concept), on the basis of an annual growth rate of 2.4%<sup>8</sup>.

To then discover the modal shift potential from road to inland shipping, we take the share of road freight production in 2008 as the starting point and apply the existing average modal split to it. According to the European commission, the share of inland shipping<sup>10</sup> is 13%. To then find out how much this is in 2030 a growth rate of 1.5% per annum<sup>10</sup> for inland shipping.

Applying the EU average of 13% in full as the modal shift potential can obviously lead to overestimating the potential, since there are already inland shipping flows present on the small canals so logically speaking there cannot be a shift potential of 13%. However, the existing flows are usually dry bulk flows. They generally tend to decrease in absolute numbers. This decrease is related to the macro-economic changes and the increase in eco-efficient production techniques. On the other hand, an increasing number of goods categories are containerised and the absolute number of containers in the transport chain is increasing. In most of the canals studied, container flows are limited to non-existent. So there is quite a lot of potential for attracting them with Waterslag. What is more, the share of inland shipping in the Netherlands is already much over 13% and we have observed that the growth in inland shipping in Belgium between 1990 and 2000 is higher than that of the EU. In addition, the ratios that we use to calculate the share in road transport are small, in other words the starting volumes to which we apply the modal shift calculation are in any case on the low side. So we can conclude that a shift of 13% is a realistic assumption.

### ***Calculation of the evolution of existing inland shipping volumes***

For the evolution of the existing inland shipping volumes (2003) the same growth rate of 1.5% per annum was applied.

By then adding the results of both calculations, we know how much inland shipping traffic there would be in total on the various class II waterways between 2008 and 2030.

Finally, it must be emphasised that it concerns results in unchanged preconditions, that is to say the demand for transport of any new activity is not included in the calculations.

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<sup>7</sup> We assume that companies that are not based directly on the banks of class II canals can also be interested in the use of Waterslag. However, at present it is not possible to make an assessment of the total flows involved. The concrete price of transport before and afterwards will be decisive. Our statistical analysis therefore only takes into account the potential of companies that are located directly on the banks of class II canals.

<sup>8</sup> 'European Energy and Transport – trends to 2030', European Commission, 2003.

## 2.2 Market findings

For the inventory of the **concrete** market potential of the Waterslag concept, 45 interviews were conducted with shippers and logistic service providers who are located along the class II waterways in Flanders and the southern Netherlands.

The interviews with shippers and logistics service providers offer a supplement to the theoretical cargo potential. The interviews provide insight into the concrete cargo flows (both inbound and outbound) of companies that lie on the canals studied, as well as the willingness of the shippers to (continue to) use inland shipping and the preconditions for this. Although all the flows were discussed during the interviews, only the flows that qualify for the ECSWA / Waterslag concept are charted in this report. Whether or not a flow is suitable above all depends on the type of goods and their origin / destination. When charting the flows, the fact of whether the company in question does or does not have a quay wall was not taken into account<sup>9</sup>.

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<sup>9</sup> The greater majority of the companies interviewed has a quay wall.

### 3.1 Theoretical assessment

Analysis of the goods transported shows that the nature of the good transported on the various canals in the study area is suitable for the Waterslag concept. The majority of the goods transported are bulk goods, namely raw materials, construction materials, agricultural products, food products and animal feed. Containers, also suitable for the Waterslag concept, are only transported to a limited degree.

The prognoses for the inland shipping potential emphasise the possible success rate of the Waterslag concept. Table 3.1 provides an overview of the minimum and maximum total inland shipping potential per canal in 2008 and 2030.

Table 3.1 Total shift potential per waterway (theoretical assessment)

In tons	2008		2030	
	Minimum	Maximum	Minimum	Maximum
<b>Belgium</b>				
Kempen canals	4,609,636	4,796,751	6,396,163	6,655,798
Canal Leuven-Dijle	192,151	261,887	266,622	363,385
River Dender <sup>10</sup>	465,558	496,065	645,991	688,321
<b>The Netherlands</b>				
Zuid-Willemsvaart	2,837,734	3,614,577	3,937,537	5,015,457
Canal Wessems-Nederweert	1,863,499	1,918,716	2,585,724	2,662,340
Beatrix canal	319,125	385,036	436,262	526,367
Wilhelmina canal	1,159,932	1,271,042	1,609,480	1,763,652

Source: Buck Consultants International, 2006

### 3.2 Market findings

Table 3.2 indicates, per canal, the total goods flows that qualify for the Waterslag concept, both inbound and outbound. These figures are, as already pointed out, based on interviews with shippers and logistic service providers who are located along the canals.

<sup>10</sup> This only concerns the class II section of the river Dender between Aalst and Dendermonde

Table 3.2 Total identified market potential per waterway (market survey)

In tons/TEU/m <sup>3</sup>		
<b>Belgium</b>	Inbound	Outbound
Kempen canals	700,000 t 2 million m <sup>3</sup>	730,000 t 4300 TEU
Canal Leuven-Dijle	350,000 t	120,000 t 6205 TEU
River Dender <sup>11</sup>	300,000 t	2800 TEU
<b>Southern Netherlands</b>	Inbound	Outbound
Zuid-Willemsvaart	65,000 t	/
Canal Wessems-Nederweert	NA	NA
Beatrix canal	26,000 t 400,000 m <sup>3</sup>	/
Wilhelmina canal	28,000 t 138 TEU	tbd t 138 TEU

Source: Buck Consultants International, 2006

Both the statistical analyse and the market survey confirm that there is sufficient potential for the Waterslag concept. However, this does not confirm its “commercial” feasibility. To assess the commercial feasibility, first the necessary logistical concepts have to be worked out and tested against the freight potential.

<sup>11</sup> This concerns the river Dender as a whole (class I and class II)

## Section 4

# **Inventory waterway infrastructure**

To determine the right dimensions of the Waterslag tug-pushed dumb barge, an inventory was made of the waterways both in Flanders and in the southern Netherlands that belong to the study area of Waterslag. For each canal, the length, width and depth of the locks and maximum headroom of the bridges was investigated. In addition, comments were noted with regard to things that had to be taken into account when determining the sizes. Table 4.1 shows the results of the inventory.

Table 4.1 Inventory of the waterway infrastructure in Flanders and the southern Netherlands

	Length	Width	Depth	Clearance	Notes	
<b>FLANDERS</b>						
Leuven-Dijle						
Tildonk lock	52	7.75	2.3	6	Sharp curve at Wijgmaal	
Kampenhout lock	52	7.75	2.3	6	The lock is between 2 fairly sharp curves (estimated maximum vessel length = approx. 60 m)	The length and width stated are those of the lock. To determine the max permitted length and width of the vessel, you should subtract 0.3 m from the stated lengths and 0.2 m from the stated widths respectively
Buortmeerbeek lock	52	7.75	2.3	6		
Battel lock	52	7.75	2.3	6		
Zennegat lock	52	7.75	2.3	6	Slight curve after the lock	
Brugge-Oostende						
New Dammepoort lock	89.7	10.2	2.5	6	2.5 depth as far as Plassendale lock	
Wagelwater rail bridge				5.5		
Dok lock	282.5	18	at least 4.5	unlimited		
Deneij lock	120	17.5	at least 4.5	unlimited		
Dender upstream Aalst to Dendermonde						
Aalst lock	42.65	5.25	2.5	5.06		
Denderbelle lock	55	7.5	2.5	5.06		
Oudegem rail bridge				5.06	5.10 is the height of the rail bridge at Oudegem at normal water level (3.9 TAW)	
Crossover New canal - Old Dender					Sharp curve: transition 1350 ton to 600 ton area after which 1350 ton area is resumed	
Dendermonde lock	168	16	2.5	7.22		
Dessel-Turnhout-Schoten lock CLASS 2 to 600T						
section Dessel to lock 1 Rijkversel	55.00 m	6.70 m	1.90 m	5.15 m	depth 2.10 m, at own risk	
section lock 1 Rijkversel to Schoten	51.50 m	6.70 m	1.90 m	5.15 m	depth 2.10 m, at own risk	
					You must sail 4 m away from the bank	
					2 laden ships cannot pas one another	
					Bridge lock 1 Rijkversel 7.03 m clearance width	
					Between lock 2 Brecht and Alb canal bulkhead distance between locks is too short for coupling	The dimensions stated are the maximum dimensions of the ships
Canal Bocholt-Herentals CLASS 2 up to 600 t						
Section Bocholt to lock 1N Lommel	57.50 m	7.30 m	2.50 m	5.50 m	permit up to 86.00 m length and 8.300 m width	
Lock 1N Lommel	55.00 m	7.30 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 2N Mol	55.00 m	7.30 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 3N Mol	55.00 m	7.30 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 4 Dessel	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 5 Dessel	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 6 Mol	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 7 Mol	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 8 Geel	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 9 Geel	51.50 m	6.70 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Lock 10 Herentals	55.00 m	7.30 m	2.10 m	4.93 m	depth 2.50 m, at own risk	
Canal to Beverlo CLASSE 2 upto 600 t						
Section Lommel to nv Unimore	57.50 m	6.60 m	2.30 m	5.25 m		
Section nv Unimore to Leopoldsburg	57.50 m	6.60 m	1.90 m	4.40 m	depth 2.10 m, at own risk	
Canal Briedgen-Neerharen						
Lock Lanaken	55.00 m	7.30 m	2.10 m	6.05 m	depth 2.50 m, at own risk	
Lock Neerharen	55.00 m	7.30 m	2.10 m	6.05 m	depth 2.50 m, at own risk	
South Willemsvaart (Flanders)						
Lock 18 Bocholt	52.00 m	6.70 m	1.90 m	5.15 m	laden vessel and empty on departure; 55.00 m empty vessels going upstream	
Lock 17 Lozen	52.00 m	6.70 m	1.90 m	5.15 m	laden vessel and empty on departure; 55.00 m empty vessels going upstream	
section Smeermaas - Lock 18 Bocholt	86.00m	8.30m	2.50m			
Section lock 18 Bocholt-Dutch border	52.00m	6.70m	2.50m			
<b>NETHERLANDS</b>						
Canal Wessem-Nederweert (mouth Maas route)						
Lock Panbeel	150	12.6	3.95		Maximum clearance: 95 x 9.5 x 2.10 m	These are lock dimensions and NOT the permitted depth
Kelperbrug				5	Bridge with the least height clearance on this canal	
South Willemsvaart (Dutch Limburg)						
Lock 16 Weert	65	8.14	2.5		Maximum clearance: 65 x 7.25 x 2.10 m	
Lock 15 Nederweert	65	8.14	2.5		Maximum clearance: 65 x 7.25 x 2.10 m	
Bridge over lock 16				5.23	Bridge with the least height clearance on this canal	
South Willemsvaart (Dutch Brabant)						
Lock 13	82	9.5	1.9		maximum clearance 50.50x6.70x1.90	
Lock 12 width between lock door 6.90	52.47	21.11	1.9		maximum clearance 50.50x6.70x1.90	
Lock 11	82	9.5	1.9		maximum clearance 50.50x6.70x1.90	
Lock 10 width between lock door 6.90	52.58	21.95	1.9		maximum clearance 50.50x6.70x1.90	
Lock Helmond	110	12.6	1.9	5.7	maximum clearance 50.50x6.70x1.90	
Lock 6 width between lock door 6.90	52.4	19.79	1.9		maximum clearance 50.50x6.70x1.90	
Lock 5 width between lock door 6.90	52.36	20.21	1.9		maximum clearance 50.50x6.70x1.90	
Lock 4 width between lock door 6.90	52.49	19.96	1.9	5.2	maximum clearance 50.50x6.70x1.90	
Lock Schijndel	110	12.6	2.1		maximum clearance 90x6.70x2.10	
Lock O width between lock door 6.97	124.2	26.4	2.1		maximum clearance 90x6.70x2.10	
Lock Engelen	92	18	2.7	5.8	maximum clearance 90x12x2.70	
Wilhelmina canal						
Lock I	120	14	2.7	5.4	maximum clearance: 90x9.50x2.70	
Lock II width between lock door 7.50	65	16	2.1	5.4	maximum clearance: 63x7.20x2.10	
Lock III width between lock door 7.50	65	16	2.1	5.1	maximum clearance: 63x7.20x2.10	
Lock IV width between lock door 7.500	65	16	1.9	5.1	maximum clearance: 63x7.20x1.90	
Beatrix canal in Eindhoven			1.9			

Three scenarios were then developed on the basis of the length of the tug-pushed dumb barge and then for each of the scenarios the waterways that are and are not navigable in the scenario in question were charted. The width and depth were kept constant in the scenarios at 6.60 m and 2.30 m respectively. The scenarios that were developed are:

- 1 Scenario 1: tug-pushed dumb barge 38 m long, which corresponds with 3 container lengths<sup>12</sup>
- 2 Scenario 2: tug-pushed dumb barge 50 m long, which corresponds with 4 container lengths
- 3 Scenario 3: tug-pushed dumb barge 62 m long, which corresponds with 5 container lengths

A study of the scenarios shows that the reach of scenarios 1 and 2 is identical. In the third scenario (62 m), the navigability is limited to a small part of the waterway network in the southern Netherlands. Scenarios 1 and 3 were compared with scenario 2 and ruled out for the following reasons:

- Scenario 1: identical reach as scenario 2 but a far more limited capacity.
- Scenario 3: greater capacity than scenario 2 but too limited reach.

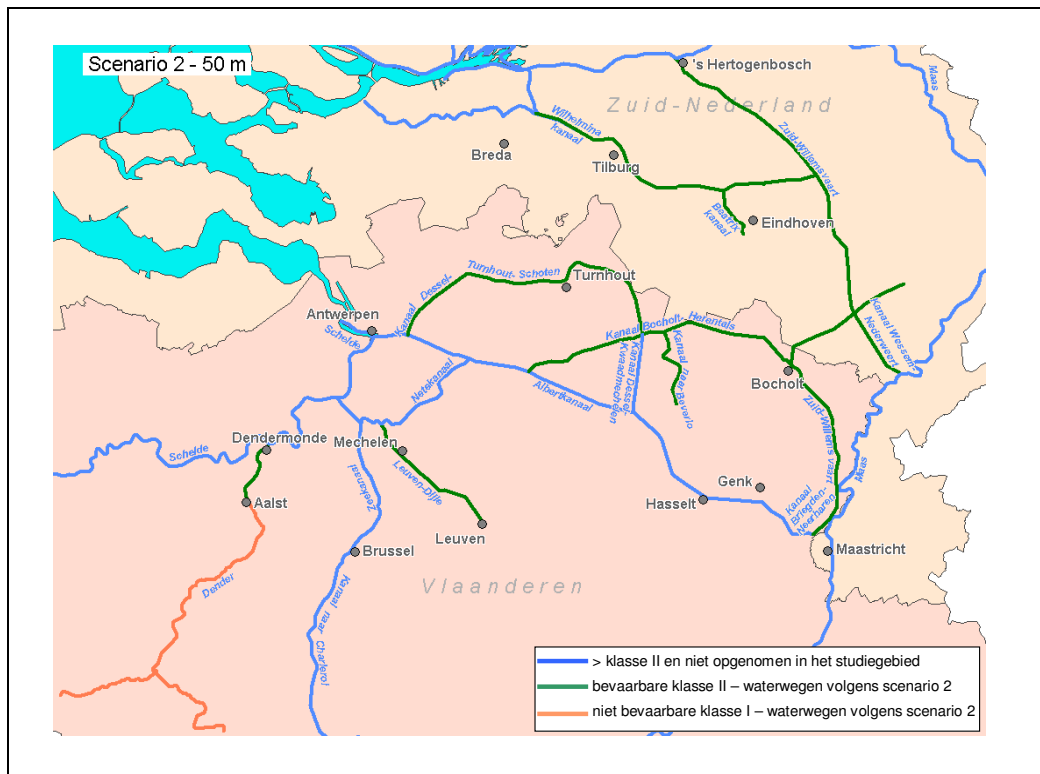
That is why the idle scenario was opted for (50 m). This scenario is the most attractive because it makes a transnational service possible and at the same time has a sufficiently large capacity. The reach in accordance with scenario 2 is shown in the figure below.

The chosen tug-pushed dumb barge length of 50 m is an indication of size and should not be seen as a precise, imperative size. The precise dimensions of the tug-pushed dumb barge will after all be determined later, taking into account its structural characteristics.

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<sup>12</sup> A container length of 12 metres was assumed. In addition, 2 metres were added for a wheel house and placing the drive.

Figure 4.1 Reach in accordance with scenario 2



Source: Buck Consultants International, 2006

1. On the basis of statistical research linked to a market survey, it is clear that there is sufficient freight potential to continue elaborating the ECSWA / Waterslag concept. On an annual basis, it concerns the following in the southern Netherlands and Flanders:

- 2,500,000 tons dry bulk;
- 2,500,000 m<sup>3</sup> and<sup>13</sup> and
- 14,000 TEU.

These company flows were concretely identified and are the equivalent of **185,000 rides by lorries**<sup>14</sup> that every year can be shifted to Waterslag.

2. A tug-pushed dumb barge approximately 50 m long will in all probability have the greatest chance of success. With such a barge all the small canals in the study area can be navigated. A smaller length (38 m) is not interesting commercially speaking since too little cargo can be transported. Using a longer barge (62 m) reduces the navigable area too greatly. Such a barge cannot even be used on the Flemish canals.
3. The interviews held with shippers and logistic service providers shows very great interest in Waterslag. Practically all the parties interviewed expressed the wish to participate in the trial run. This is because shippers and logistic service providers see Waterslag as a possibility of transporting inbound and outbound existing goods flows in an environmentally friendly way at a competitive price.

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<sup>13</sup> Converted this means about 1,000,000 tons whereby 50m<sup>3</sup> corresponds with 20 tons.

<sup>14</sup> For the conversion to lorry rides avoided, the hypothesis was used that one lorry corresponds with 20 tons or 1.5 TEU.