

Newsletter Shallow Water

Knowledge Centre Manoeuvring in
Shallow and Confined Water

Flanders
Hydraulics



Flanders
State of the Art



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This is the 63rd newsletter of the Knowledge Centre Manoeuvring in Shallow and Confined Water, which is a collaboration between Flanders Hydraulics and the Ships and Marine Technology Division at Ghent University. In this newsletter, we provide a comprehensive overview of the simulation studies executed for the Walloon waterways network.

Simulation studies for the Walloon waterways network

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Project managed by the Hydraulic Research Laboratory of SPW Mobility and Infrastructure, and executed by IMDC in collaboration with Flanders Hydraulics and Ghent University.

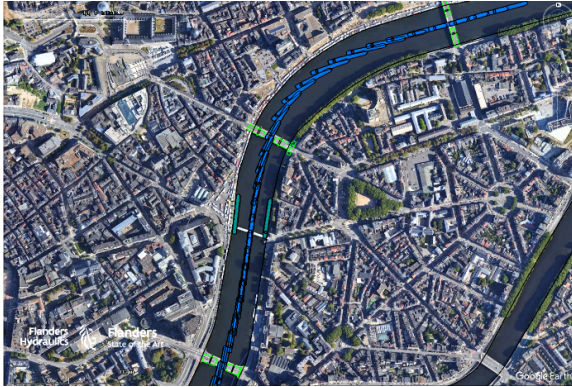
Context

There is a significant and growing interest in inland waterway transportation due to its economic, environmental, and logistical advantages over rail or road transport. However, intensive land use, geotechnical issues, and environmental constraints often represent bottlenecks for development. In this context, the waterway authority Service Public de Wallonie - Mobilité et Infrastructures has commissioned several navigation studies to improve the accessibility of the Walloon network in southern Belgium. The aim of these studies is to confirm the navigability for different ECMT ship classes while accounting for local constraints and an expected increase in larger vessel traffic.

The Walloon waterway network, integrated with the Nord-Pas-de-Calais network in France and the Flemish and Dutch inland waterway system, is a cornerstone of the Seine-Scheldt program. It will play a pivotal role in linking the future Canal Seine-Nord Europe with major seaports such as Antwerp in Belgium and Rotterdam in the Netherlands.

The reopening of the Pommeroeul-Condé canal in 2024 further illustrates this need, as it will allow vessels exceeding Class IV dimensions to access the Nimy-Blaton-Péronnes canal (CNBP).

Bottlenecks



In urban areas, navigation is frequently complicated by a succession of tight bends combined with historical arch bridges that severely limit channel width. Examples are the Middle Meuse (Liège) and the Upper Scheldt (Tournai).

In the city of Tournai, the waterway is extremely narrow, permitting only one-way traffic and requiring alternate navigation and designated waiting areas. In both cities, regulations based on vessel size are essential to ensure safety. Several canals and rivers were studied where the safety and ease of the navigation needed to be assessed to accommodate larger ships.



The different simulation studies executed between 2023 and 2025 are listed below:

- Redesign and expansion of a selection of **turning basins**.
- **Middle Meuse river**: Navigation through the **city of Liège**.
- **Upper Scheldt river** (Haut-Escaut): Navigation through the **city of Tournai**.
- Navigation study for the **Lys river** (Leie) with **185 m long push convoys** including entrance/exit of **locks**.
- **Nimy-Blaton-Péronnes Canal**: Navigation with **110 m long vessels** in the Pommeroeul-Maubray sector.
- Analysis of **AIS data** (Automatic Identification System) for traffic patterns.
- **Upper Scheldt river** (Haut-Escaut): Comprehensive analysis of the full river.
- **Nimy-Blaton-Péronnes Canal**: Assessment for **135 m and 144 m long vessels**.
- **Pommeroeul-Condé Canal**: Assessment for **144 m long vessels**.
- **Nimy-Blaton-Péronnes Canal**: Technical feasibility of a 3 m draft (**0.5 m larger than actual draft**).
- **North part of Charleroi-Brussels canal** (from Seneffe to Tubize): Assessment for **110 m long vessels**.

Methodology

To assess the safety and ease of the navigation, the study follows the PIANC three-method approach. While national and Concept Design guidelines exist, they cannot always be applied due to land constraints and have limitations in rivers with significant flow velocities.

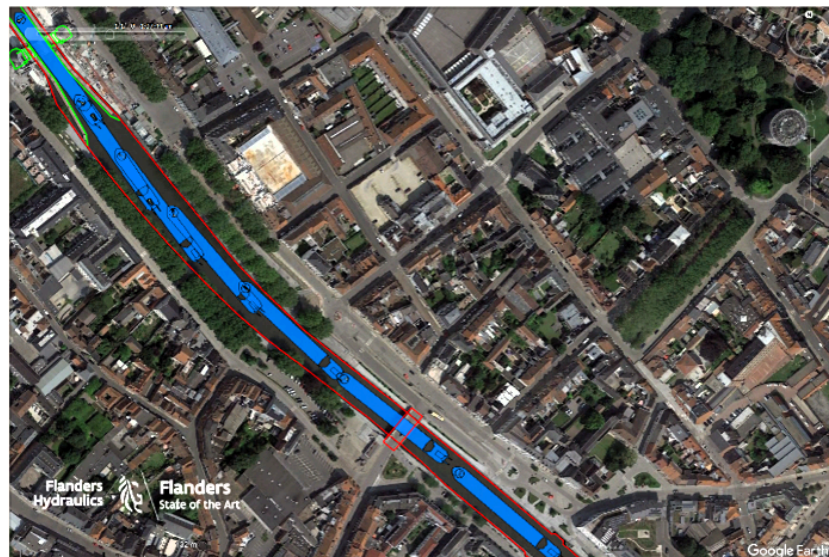


Therefore, this study utilizes the Detailed Design method in critical sections (assessed through desktop analysis). By employing a ship manoeuvring simulator, nautical experts can assess the passage under bridges and navigation through narrow bends under specific hydro-meteorological conditions.

Simulations in rivers are particularly complex due to the influence of significant currents and challenging lock approaches. These scenarios require high-fidelity modelling of hydrodynamic phenomena, including:

- Ship-to-ship interactions: Necessary for assessing safety near moored vessels or during encounter manoeuvres in two-ways traffic.
- Bank effects: Accounting for the suction and cushion forces applied on the hull in confined sections.
- High blockage ratios: Modelling the increased resistance caused by the vessel's large cross-section relative to the limited transversal cross-section of the waterway.

The final objective is to determine safety rules for each waterway, including maximum dimensions, recommended speeds, and infrastructure measures.



Key Conclusions

Part of the research was presented at [SMART RIVERS 2025](#) and at the [35th PIANC World Congress](#). The key conclusions are:

- Liège: Simulations identified maximum river discharge limits for Class Va and Vb vessels to navigate safely through urban bends and historical arch bridges.

- Tournai: Defined safe discharge thresholds and recommended relocating mooring areas to resolve bottlenecks in narrow one-way sections for Class Va, including adaptations for Class Va extended to 135 m.
- Nimy-Blaton Canal: Validated safe operation for Class Va and extended 144m convoys after widening works in progress. The study demonstrated that a 1 m water level increase with bridge raise would technically permit a 3 m draft (0.5 m increase) under optimized conditions.
- Turning Basins: Validated and improved geometries to identify maximum discharge for 110 m and 135 m ships across various canal and river locations.

Current Outlook (2026)

This year is dedicated to the final part of the network and additional studies ordered to fine-tune the accessibility of the Walloon waterway network.



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Activities

In 2027, Flanders Hydraulics hosts the ITTC2027 full conference in September. Many of you are members of ITTC and will receive your personal invitation after summer. The conference however offers limited opportunities to attend the five day conference to external companies active in shipping and marine. The target audience are technical experts, who seek the latest state-of-the-art on performance and design optimisation. The website will go live after summer.



Researchers associated with the Knowledge centre recently published:

Eslandoost, A.; Bensow, R.E.; Ponkratov, D.; Kömpe, A.; Geremia, P.; Pekküçük, Ç.B.; Aydin, C.; Villa, D.; Ntouras, D.; Seo, D.C.; Rosano, G.; Vesting, F.; Bigini, G.; Chillce, G.; Kaufmann, J.; Lin, J.; Muralha, J.; Dott, L.; Ilter, K.; Lampropoulos, D.S.; Sagmo, K.; Lübke, L.; Kubota, M.; Vasilev, M.; Wheeler, M.; Sahid, M.; Grlj, C.G.; Kühl, N.; Crepier, P.; Joga, R.; Bilandi, R.N.; Boyd, M.; Del Toro, A.; Cunningham, S.; Bozzo, S.; Schumacher, F.; Melissaris, T.; Tissot, V.; Sorrentino, V.; Van Hoydonck, W.; Li, Z.-H. (2026). A summary of the Lucy Ashton resistance prediction workshop. Ocean Eng. 343: 122951. <https://dx.doi.org/10.1016/j.oceaneng.2025.122951>, [more](#)

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