WORLD HERITAGE LIST

Canal lifts (Belgium)

No 856

Identification

Nomination	The four lifts on the Canal du Centre and their environs, La Louvière and Le Rœulx (Hainault)
Location	Walloon Region, Hainault Province
State Party	Belgium
Date	16 June 1997

Justification by State Party

The route and the installations of the Canal du Centre are a perfect response to the considerable technical restraints and challenges encountered: the instability of the sub-soil, a significant change in level over a short distance, and the lack of water to supply the canal. Safety and economic considerations, in terms of energy and resources, resulted in the use of original techniques. The design of the lifts, the choice of types of mobile bridge, and the construction of advanced locks gave rise to the invention and perfection of new processes.

The hydraulic lifts also bear witness to the ingenious use of hydraulic forces and the intelligent and innovative use of basic physical principles. Based on simple principles but complex in its implementation, this technology has proven its worth and, one hundred years later, it is still in perfect working order. **Criterion i**

Of the eight hydraulic boat lifts built at the end of the last century and the beginning of this century, the only ones still in existence in their original working condition are the four lifts on the Canal du Centre. **Criterion iii**

The hydraulic lifts, together with the mobile bridges, perfectly illustrate the state of technological research during the period, such as the use of water under pressure, the use of steel hoop joints on the cast-iron presses, and the strength of materials. The participation of designers, in particular the engineer H. Genard, at many scientific congresses of the period to present the results of research and explain the techniques adopted, as well as the renown of the lifts from the time of their construction, testify to their innovative aspect and advanced technology.

The design of these lock structures also reveals the collaboration between the designing engineers (E. Clark, H. Genard, and F. Nolet) and the engineers from the Cockerill company, the flagship of Belgian industry at the time. The research carried out jointly led to proposals for notable improvements in the field of the strength of materials (the use of hooped cast iron), which were imitated to such an extent that the Cockerill company chose it for the construction of the lift at Kirkfield in Canada. **Criterion iv**

Category of property

In terms of the categories of cultural property set out in Article 1 of the 1972 World Heritage Convention, this is a *group of buildings*.

History and Description

History

Hainault does not have a large natural navigable waterway. This led to difficulties in transporting the coal discovered in the region in the Borinage and around Charleroi at the end of the 12th century on the bad roads of the time. It was carried on the backs of men to the shore of the winding Haine river and loaded into small boats. Considerable works were carried out to improve the navigation of the Haine in the centuries that followed, so that larger boats could carry coal from Jemappes to the lower Scheldt, including the provision of sluice locks and gates.

With the transfer of the Condé region to France in 1655, plans to link the Mons area to the Scheldt by canal were first discussed, but no progress was made until the early 19th century. The Charleroi-Brussels Canal was finished in 1832, and the Houdeng and Mariemont branches, which were to play an important role in the development of the Canal du Centre, in 1839.

An Imperial decree of Napoléon I in 1807 ordered the construction of a canal between Mons and Condé, and this was completed in 1818. With the Saint-Quentin Canal, completed in the same year, the Borinage coalfield was now connected directly with Paris. Only one element was missing in this canal network linking the Scheldt and the Meuse, a canal between Mons and Charleroi.

This proposal to construct what was known as the Canal de Centre had originally been approved by Napoléon I in 1810. There was to follow a long series of projects, by French, Dutch, and Belgian engineers, on different routes and using different techniques for solving the technical problems encountered between the two ends. These were all essentially commercial schemes, funded by the enterprises who would make use of the new link. Increased competition from British, German, and northern French coalfields led the Belgian Government to intervene in 1871 and undertake to finance the canal. Studies were carried out by its Civil Engineering Authority aimed at overcoming the two major technical problems - the small quantity of water available and the large

difference in level (89.46m) between the Charleroi-Brussels and Mons-Condé canals.

The main problem lay in the upper part of the canal, in the Thiriau valley. It was decided that on this stretch the change in level was such that it might be better dealt with by means of lifts rather than locks: four lifts of the type developed by the English engineer Edwin Clark would be sufficient, one with a difference in level of 15.40m and the other three of 16.93m. These would accommodate both the difference in level on this stretch of the canal and the low supply of water, since Clark lifts had been shown to be very economical from this point of view. Belgian engineers were sent to England to study the only existing example of this type of lift, that built by Clark at Anderton on the Trent-Mersey Canal in 1872-75.

Despite some setbacks, as when there was an accident at the Anderton lift in 1881, leading to an increase in the safety coefficient to be adopted, the decision to go ahead was finally taken at the end of 1884. Clark himself was to be involved in the design and construction of the Belgian lifts. The work was put out to tender, and the construction work of Lift No 1 at Houdeng-Gœgnies was completed in April 1888; it was inaugurated on 4 June that year by King Leopold II of the Belgians.

Work on the completion of the canal itself and of the other three lifts was, however, not to be completed so speedily, for a variety of reasons. The 14km stretch from Mons to Thieu was opened in 1892, but further work was delayed because it was discovered that other stretches of the canal ran through an area pitted with abandoned coal mines. It was not until 1909 that work began on the remaining three lifts, built, like No 1, by the Cockerill company in Seraing. The German occupation in World War I did not see the work suspended, because the occupying power saw the strategic value of this important link, and so the entire length of the Canal du Centre was finally opened for traffic in August 1917.

In 1957 it was decided to upgrade the entire Canal du Centre to accommodate vessels of up to 1350t, and a new section was dug from Mons to Havré. This meant that the stretch of 300t canal that is the subject of the present nomination became redundant. Consideration was first given to various solutions for the stretch that was going out of commercial use, ranging from complete obliteration by demolition and filling to various partial forms of conservation. Financial constraints favoured its retention in its entirety, and a major public relations campaign led to the stretch of canal now proposed for inclusion on the World Heritage List being maintained in operation for recreational purposes. The project received many awards and prizes in the 1980s and 1990s.

Description

The Canal du Centre was initially 20.919km long, between La Louvière and Mons; however, the stretch now open for 300t traffic is only 7km long, from La Louvière to above Lift No 4 at Thieu. This is the property nominated for inscription on the World Heritage List (it also includes a 1.1km long disused bay that includes Lock No 1 at Thieu and the lock-keeper's house).

It follows the Thiriau valley with a difference in height of 66.196m over the 7km of its length. Water is supplied from the Sambre, but this is limited to no more than 12,000m^3 a day, to avoid lowering the water level on the Charleroi canal, which is also supplied from the Sambre; the Haine also supplies a supplementary supply.

The canal itself is built either on embankments or in cuttings. At its widest on straight stretches it is 10.50m (with increases on curves) and the normal depth of water is 2.40m. The maximum tonnage of vessels using it is 360t; their overall length (including rudders) must not exceed 40.50m and the maximum draught is 2.10m. There was a deliberate tree-planting programme that began along the banks of the canal in 1911, based on a succession of American elm and ash, oak, poplar, maple, and sycamore, with copses of alder, mixed with willow, silver birch, and false acacia. A variety of species (black pine, false acacia, maple, hazel, elder, and black poplar) were planted around the lifts. At the present time the most common species are lime, maple, chestnut, and ash.

Lift No 1 (Houdeng-Gœgnies) consists essentially of two mobile compartments, each supported by a single hydraulic press, the latter being joined by pipes in such a way that, when one compartment is at the level of the upper bay, the other is at the level of the lower bay. As the first descends as a result of the introduction of water from the upstream bay, the other rises; a sluice gate in the middle of the pipe between the two presses governs the movement of the compartments.

The compartments are made of sheet steel, supported by latticed structural elements. At each end they are closed by means of steel gates that can raised and lowered in grooves with rubber seals. The head of water in each compartment is that of the water in the canal itself, 2.40m, giving a maximum weight per full compartment of 598t. To cause the upper compartment to descend, an extra 0.30m of water (74t) is required and this, added to the weight of the container itself (296t) means that the total weight that has to be raised by each press is 1048t.

The cast-iron pistons of the presses are 19.44m long overall. Each press has an internal diameter of 2.06m, and is made up of three sections. At the base there is a cast-iron plate 15cm thick. Then come eight cylindrical housings 2m high, each consisting of a cast-iron cylinder with an internal diameter of 2.06m, secured by 50mm steel hoops set in place when hot. Finally comes the upper section, 1.599m high overall and made up of three components, permitting the circulation of water so as to create the considerable forces needed to operate the lift.

Because of the impossibility of creating a system that is completely watertight, and also to provide power to operate the hydraulic machinery for towing boats and operating the lock gates, supplementary machinery is installed, consisting of a twin Gerard

horizontal-axis free-deviation turbine powered by water from the upstream bay.

Both the compartments and the bays are fitted with an ingenious and efficient system of watertight lifting gates, which makes it possible to reduce the overall weight of the containers to a minimum. There is a dual safety system, operating on the one hand on the reciprocating movements of the two compartments and on the other on the sequence in which the phases of the operation take place; they are independent of one another.

Downstream from Lift No 1 there is a vertical brick supporting wall reinforced with bluestone ties, buttresses, and limestone bonding stones in a checkerboard pattern; moulded cornices are supported on blind arcading in brick on stone corbels. This softens the somewhat bleak appearance of the architecture, which is also relieved by the iron safety rail with its curved motifs. It is extended by two small metal canal bridges that span the entrance channel.

Lifts No 2 (Houdeng-Aimeries), No 3 (Bracquegnies), and No 4 (Thieu) were built thirteen years after No 1 came into operation, and they incorporate a number of modifications to the basic design resulting from operational experience. However, the operating principle remains the same; the modifications apply mainly to the guides, the hydraulic presses and their pistons, and the gates.

There were originally six drawbridges on the Canal, four of which remain, two of them within the nominated area. They consist of mobile platforms balanced by a system of counterweights housed in a casing at the end of each beam. The beam is supported by two towers on the banks of the canal. A cable linking one end of the beam to the bridge platform is used to raise and lower it.

At bends in the canal swing bridges are used, two of them on the nominated section. The platform, with a latticed metal safety barrier, rotates on a central pivot located on a massive cylindrical pile with two breach rollers at each end.

The nominated area also includes the old lock No 1 at Thieu, now no longer in use. It is 40.80m long by 5.20m wide, with a water depth of 4.20m. The side walls are in finely dressed bluestone.

Three buildings house the hydraulic machinery needed for operating the lifts, serving Lifts No 1, 2 and 3 jointly, and 4 respectively. They are built with a good deal of style, that serving Nos 3 and 4 having two accumulator towers in a baronial form. They contain the original machinery, made by the Cockerill company: turbine pumps, and accumulators. They are accompanied by houses for the use of the operators, either integral with the engine house or detached. There is also a number of modest two-storey houses along the Canal, to provide accommodation for bridge and lock keepers.

Management and Protection

Legal status

On 22 September 1992 the 300t Canal from its point of origin to sluice gate 1 at Thieu was listed by Decree as a site and the four lifts, together with the drawbridges at Bracquegnies and Thieu, were listed as monuments. Listing is a means both of recognizing the outstanding value and ensuring the protection of monuments and sites. All work, with the exception of certain minor maintenance operations, require authorization by means of a building permit. This can only be obtained after consultation with specialists of the Heritage Section (*Division du Patrimoine*) of the Ministry of the Walloon Region (*Ministère de la Région Wallonne*) and with the Royal Commission on Monuments, Sites and Excavations (*Commission Royale des Monuments, Sites et Fouilles*).

The listed area is surrounded by a protection zone, which constitutes an adequate buffer zone, as required by the *Operational Guidelines for the Implementation of the World Heritage Convention*. This buffer zone has been very carefully defined, not without difficulty, since this is a built-up area. Its main objective was to ensure that the surrounding area as seen from the Canal was not adversely impacted by inappropriate new constructions. The report of the ICOMOS-TICCIH expert mission commented favourably on the resulting zone.

The site was entered on the list of exceptional properties (*Liste du Patrimoine Exceptionnel*) of the Walloon Region on 29 July 1993. This list, based on criteria defined by UNESCO, is revised every three years, and the 1993 registration was confirmed on 25 July 1996.

Most of the trees along the length of the Canal are protected by a Ministerial Decree of 7 July 1995, and may not be cut or lopped without a permit, obtainable after consulting the Department of Natural Resources and the Environment (*Direction Générale des Ressources Naturelles et de l'Environnement*) of the Ministry of the Walloon Region.

Management

The Canal and its equipment (lifts, bridges, engine rooms, roads, etc) is public property, belonging to the Waterways Department of the Walloon Ministry of Infrastructure and Transport (*Direction Générale des Voies Hydrauliques, Ministère Wallon de l'Équipement et des Transports* - MWET). Certain plots are private property, belonging to the Société Usines Gustave Boël. There are no plans for the public acquisition of these plots.

Management of the Canal is the statutory responsibility of the MWET Waterways Department. It operates through its relevant subsidiary specialized and regional administrations. However, certain aspects, such as the development of the area for recreational and educational use, is delegated to the Compagnie du Canal de Centre, an enthusiastic and active non-profit-making body which works closely with the official bodies.

Account is taken of the special nature of the nominated area in the Sub-Regional Plan of La Louvière-Soignies (*Plan de secteur de la Louvière-Soignies*), in which it is considered to be of special landscape value.

MWET has an overall management plan for this section of the Canal, since it is maintained in operational condition. It also has a number of tourism enhancement projects, including a proposal for the floodlighting of Lift No 4, the provision of small boats for hire, and the improvement of parking access at Lift No 3, where a visitor reception and interpretation centre is being set up in the former store buildings.

Conservation and Authenticity

Conservation history

Since this section of the Canal was in continuous commercial operation until the decision was taken to upgrade to 1350t, it was maintained in impeccable working order. When the decision was taken in 1979 to preserve the 300t section, the plans for reuse for recreational purposes gave high priority to maintenance and conservation of the waterway and its equipment, notably the four lifts.

Authenticity

The level of authenticity is very high in every respect. No modifications have been carried out to the lifts since they were built, and their operating machinery is still in its original form and in superb condition. Similarly, the other components of this industrial landscape have been preserved and maintained in their original form, with the minimum of modifications resulting from minor technological developments. The buildings in brick and stone have been well maintained and sympathetically restored where necessary.

Evaluation

Action by ICOMOS

An ICOMOS-TICCIH expert mission visited the property in November 1997. ICOMOS also consulted a leading TICCIH expert on historic canals.

Qualities

This nominated property is an exceptionally complete and well preserved example of 19th century technology of great importance in the study of the application of scientific and engineering principles in this period of intensive economic and industrial expansion.

Comparative analysis

In the ICOMOS-TICCIH *International Canal Monuments List* (1996), seven canal boat-lifts are singled out for special mention. The highest grading is given to the Anderton Lift on the Trent and Mersey Canal (UK), which is especially significant because it was the first of the Clark lifts to be built. However, as the study points out, the four lifts on the Canal du Centre "form part of an integrated industrial landscape," and as such they are exceptional. For this reason they figured on a short list of outstanding industrial monuments prepared by TICCIH in 1995.

ICOMOS recommendations for future action

The report of the ICOMOS-TICCIH expert mission drew attention to the restructuring of the Gustave Boël works at the eastern end of the nominated area, alongside Lift No 1, that will probably be carried out as a result of the acquisition of this company by the Dutch Hoogovens group. This works forms an appropriate background to the Canal, since its operations were made possible by its creation (and, moreover, the Boël family was closely involved with its construction). It is hoped that Hoogovens will collaborate with the relevant authorities in Belgium to ensure that this link is maintained by sympathetic redevelopment of the site. This applies with equal force to the parkland of the Château Boël, to the west of the works, which is of special significance as part of the historical landscape of the Canal.

The report also commented on some houses built at two points along the Canal to accommodate workers, the design of which is discordant in relation with the 19th and early 20th century structures. It is understood that there are plans for a third such construction; ICOMOS strongly urges the competent authorities either to relocate these outside the nominated area or to redesign them in a style that is more in keeping with the historic environment.

Brief description

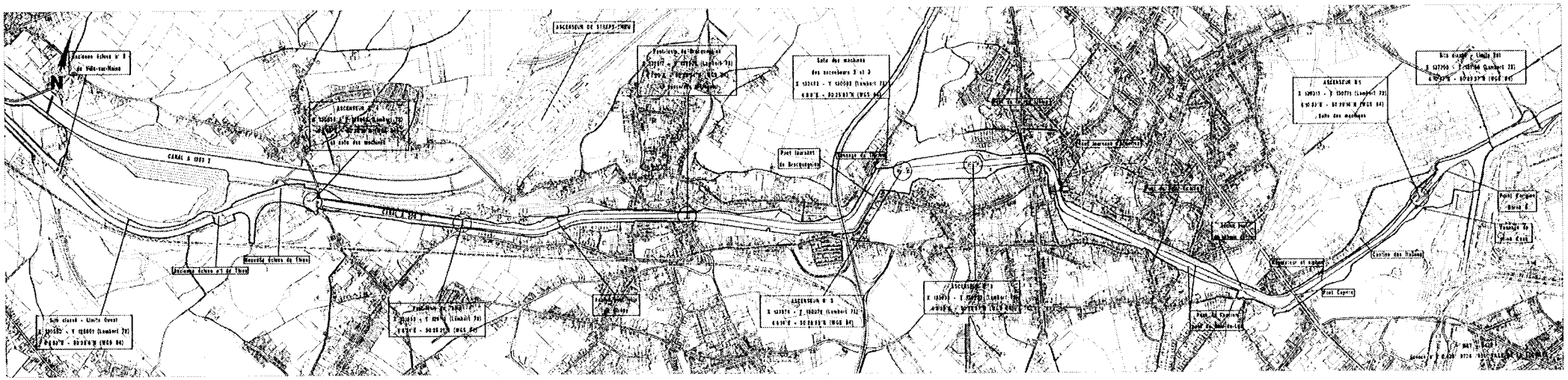
The four hydraulic boat-lifts on this short stretch of the historic Canal du Centre are industrial monuments of the highest quality. Together with the Canal itself and its associated structures, they constitute a remarkably well preserved and complete example of a late 19th century industrial landscape.

Recommendation

That this property be inscribed on the World Heritage List on the basis of ***criteria iii and iv***:

> ***Criterion iii***: The boat-lifts of the Canal du Centre bear exceptional testimony to the remarkable hydraulic engineering developments of 19th century Europe.
>
> ***Criterion iv***: These boat-lifts represent the apogee of the application of engineering technology to the construction of canals.

ICOMOS, October1998



Les quatre ascenseurs du Canal du Centre et leur site, La Louvière et le Roeulx (Hainaut) /
The four lifts on the Canal du Centre and their environs, La Louvière and Le Roeulx (Hainault) :
Plan indiquant la zone proposée pour inscription et la zone tampon /
Map showing nominated property and buffer zone