



## Case Study



## Water Management

### Cardiff Waterfront Redevelopment

**Problem to resolve:** One formerly most important European harbours lost its economic base and turned into costly brown field land

#### The context

Just 30 years ago, Cardiff Bay was dead — both environmentally and economically. For decades, the two rivers that feed into the bay — the Taff and the Ely — had been so black with coal dust, sewage and industrial waste that no fish could survive. Nearby mines that once exported one-third of the world’s coal through Cardiff’s port had shut down. So had steel factories, put out of business by cheaper foreign competition. Cardiff, whose center lies a mile inland, turned its back on the decrepit port and befouled bay.

But over time, the Welsh capital has gone to great lengths to clean up both its water and its waterfront. Tourists and locals alike now swarm the dockside known as Mermaid Quay, while salmon once again swim in the bay and run up the rivers to spawn. Cardiff Bay is no longer seen as an embarrassment. Rather, it’s an amenity to paddle on, eat by and live near — a new locus for residential, commercial and retail development for a growing city-region of 1.4 million people.

Today this city’s bayfront is often packed with people: families boarding tour boats, office workers enjoying a waterside lunch, theatergoers out strolling before a performance, and fans of the TV show Doctor Who emerging from tours of the BBC studios where the series is made. How that transformation happened is an instructive story for any city struggling with polluted waterways. It’s also a reminder of how urban regeneration over the long run requires public and private forces to come together around a common goal.





*Rivers in the Welsh capital once ran black with coal dust. Now, they form a clean lake that has become the revitalized heart of the city. (Matthew Dixon/Shutterstock)*

In 1987, the UK Government created the Cardiff Bay Development Corporation under the chairmanship of Sir Geoffrey Inkin, who had served on the council of a nearby county. He was backed by an 11-person board with members from local administrations, academia and the private sector; Michael Boyce, the chairman of Cardiff City, served as CEO. The Secretary of State for Wales tasked the Corporation with upgrading infrastructure and implementing a development strategy, with a mandate to engage the private sector.

The infrastructure needs were huge. For example, the Corporation spent £14 million (roughly US\$34 million in today's dollars) on diverting sewage that used to outfall directly in the bay. The water company Hyder built a new sewage treatment plant at a cost of £118 million (\$US283 million today).

But the biggest project — and the real key to the area's revival — was out at the mouth of Cardiff Bay where its waters meet the sea. This is where the Corporation built a great dam, known as Cardiff Bay Barrage. Opened in 1999, the 1.1-kilometer (half-mile) barrage essentially seals off the freshwater bay from the saltwater sea. Before, large tides left vast mudflats exposed twice a day, stranding any boats in the smelly muck. The barrage created a permanent lake that became quite clean as environmental standards were raised and enforced.



*The Cardiff Bay Barrage (left) created a freshwater lake that has become home to much waterfront development. (Cardiff Harbour Authority).*

The barrage includes a long rock and sandfill embankment, rising to a maximum height of 20 meters (66 feet). It contains three locks to admit vessels and five sluices to control the water level inside and keep most of the seawater out. Two fish passes allow salmon and trout to migrate between the sea and the rivers. Atop the dam, hundreds of people daily use a walk-and-cycle path that connects Cardiff to a suburb called Penarth.

The barrage also improves Cardiff's defenses against flooding and sea-level rise. "If a lot of rain is forecast, we drop the bay to allow the water to come in," says David Hall, an environmental officer with the Cardiff Harbour Authority, which operates the barrage. When I spoke with Hall recently, water in the bay was at 4.5 meters, or about 15 feet. "But everything in the bay is designed to be allowed to rise another four meters above that level," he says, "to take account of high astronomical tides and a 1-in-100 year storm event at the same time."

To clean up the bay, the strictest environmental standards were applied — and still are. Diverting raw sewage to be treated before reaching the bay helped a lot in this regard. So did a UK law that set specific requirements around oxygen levels in the waters, a move intended to help fish and their prey. About 12 km (7 miles) of specially laid underwater pipes regularly pump compressed air into the water through more than 100 diffusers.

Cardiff's transformation isn't complete. Levenson notes that a rail link and a key road link remain unfinished. But it's a far cry from the scenes of polluted desolation that gripped this place a generation ago, or the hard-drinking "rough dockers" that worked the port here generations before that. "There's a lot more that can be done in terms of leisure and tourist attractions, and more residential accommodation," Levenson says. "It's not finished yet, but I am very proud of what has happened."

## Credentials:

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Editors: Kosta Mathey and Florian Steinberg.

All Photos: Ramboll Studio. <https://www.asla.org/2016awards/171784.html>

## Source of the material:

Thorpe, D. 2016. How Cardiff turned a polluted bay into one of Europe's best waterfronts. *Citiscopes*. 9 September.

[http://citiscopes.org/story/2016/how-cardiff-turned-polluted-bay-one-europes-best-waterfronts?utm\\_source=Citiscopes&utm\\_campaign=7e43e2709a-](http://citiscopes.org/story/2016/how-cardiff-turned-polluted-bay-one-europes-best-waterfronts?utm_source=Citiscopes&utm_campaign=7e43e2709a-Mailchimp_2016_09_09&utm_medium=email&utm_term=0_ce992dbfef-7e43e2709a-118049425)

[Mailchimp\\_2016\\_09\\_09&utm\\_medium=email&utm\\_term=0\\_ce992dbfef-7e43e2709a-118049425](http://citiscopes.org/story/2016/how-cardiff-turned-polluted-bay-one-europes-best-waterfronts?utm_source=Citiscopes&utm_campaign=7e43e2709a-Mailchimp_2016_09_09&utm_medium=email&utm_term=0_ce992dbfef-7e43e2709a-118049425)