



Cardiff Harbour Authority

Environmental Report 2005-2006 (Green Dragon Level 5)

Approved: *Tony Pates*

Chief Projects Design and Development Officer

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Cardiff Harbour Authority

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(Green Dragon Level 5)**

Contents

1.0 Introduction.....Page 2

2.0 An overview of the organisation’s environmental aspects.....Page 3

3.0 An overview of the organisation’s performance (05-06).....Page 10

4.0 An introduction to the objectives and targets 06-07.....Page 12

5.0 A brief overview of the organisation’s impacts and activities...Page 14

Appendix

Cardiff Harbour Authority’s Environmental Policy.

1.0 Introduction.

Cardiff Harbour Authority was formed as part of Cardiff Council on the 1st of April 2000. Since its establishment the Authority has become a good example of quality public services delivered by democratic local government. The Harbour Authority has a vision that extends beyond the confines of Cardiff Bay, the City and Wales. It is a vision for an international water venue and visitor destination acting as a focal point for the very best of leisure, sport, environmental management and nature conservation activities.

The Harbour Authority has a range of statutory duties and responsibilities. Operationally the Harbour Authority is responsible for the management of the Barrage and the Bay, including the rivers Taff and Ely up to the weirs at Blackweir and the former Arjo Wiggins respectively. It is also responsible for the land areas of the Roald Dahl Plass (Oval Basin), the Graving Docks and the public car park adjacent to the St. David's Hotel & Spa.

The Authority also has an important environmental role in Cardiff Bay and is responsible for maintaining the water quality within the 200-hectare freshwater lake and environmental management, in addition to groundwater monitoring and control, the promotion of conservation, and the management of Flat Holm Island. The Authority's commitment to environmental management is demonstrated by it becoming the first Harbour Authority in the UK to obtain ISO 14001 accreditation.

The Harbour Authority is committed to developing Cardiff Bay as an international water venue, acting as a focal point for the very best of leisure and sporting activities. This is demonstrated through its expanding leisure role and the opening of the Cardiff Bay Water Activity Centre and the rowing lanes that were installed in the Bay during the summer of 2005.

A further significant role of the Harbour Authority is to raise the profile of Cardiff Bay as a visitor attraction and educational resource locally, nationally and internationally. This is achieved by the production of promotional materials and literature and working closely with schools and colleges on various educational initiatives and through the management of the Cardiff Bay Visitors Centre and the Norwegian Church Arts Centre.

In 2005-06, Cardiff Harbour Authority played a crucial part in Cardiff winning the Gold medal for the Britain in Bloom Award and Silver for the City category of the Wales in Bloom Award.

The Harbour Authority's Environment Policy is enclosed in Appendix 1.

2.0 An overview of the organisation's significant environmental aspects.

2.1 In order to identify the most significant environmental aspects of Cardiff Harbour Authority's operations, a comprehensive risk assessment was undertaken using Cardiff County Council's risk management framework. For each significant aspect identified, an Environment Management Programme has been prepared. Each documents the environmental impact, the process inputs, the process outcomes, the process maps and operational control, resources (both human and physical), influences and performance measurement.

2.2.1 The significant aspects identified and their potential environmental impact if not managed correctly are summarised below:

- Algae.

The environmental conditions within the Bay and rivers are favourable for the formation of large blooms of planktonic algae. Blooms can die forming scums on the surface of the water. Blue-green algal scums may contain toxins that could pose a risk to public health. The presence of scums in the bay would result in a reduction in amenity value by being both unsightly and giving rise to malodours as they decompose. Decaying blooms may also cause a breach of the oxygen standard (see below). Cardiff Harbour Authority has therefore purchased equipment for the removal of scums from the water surface and has procedures in place for doing so should the need arise.

- Bay level and flood defence

Cardiff Bay barrage was designed to exclude estuarial water from the freshwater Bay. The Severn estuary has a tidal range of up to 14 metres which means that at high water the sea level can often be higher than the bay level which is normally maintained at plus 4.5 metres above ordnance datum Newlyn (AOD). To exclude sea water the sluice gates are closed when the sea level is 30 centimetres below bay level and remain closed until the sea-level is again 30 centimetres below bay level on the ebb tide. The closure period is known as tide-lock. During tide-lock the combined flows of the rivers Taff and Ely are stored within the 200 Hectare freshwater bay. Before tide-lock river flows are monitored and in the event that river flow would result in an unacceptable rise in bay level during tide-lock the bay level is lowered somewhat to provide additional storage volume. The operation of the five sluice gates will enable the prescribed bay level to be attained and flood defence measures to be implemented in advance of such a situation. The Harbour Authority stipulates in its performance targets that a minimum of 4 sluice gates are operational at all times.

- Conservation.

There is a requirement under the Cardiff Bay Barrage Act (1993) to preserve and promote flora and fauna within Cardiff Bay. Cardiff Harbour Authority works closely with other organisations such as the Countryside Council for Wales, Wildfowl & Wetlands Trust and the Environment Agency to achieve this. Certain areas have been identified within Cardiff Bay, which are already important for nature conservation, such as the Cardiff Bay Wetlands Reserve, parts of the River Ely and Hamadryad Park beneath the Peripheral Distributor Road. A collaborative approach between the organisations listed above ensures that these areas achieve their potential to encourage biodiversity within the Bay. Furthermore, all new developments are assessed on their impact upon the natural environment, and planning guidance is provided to mitigate or compensate for any loss of habitat.

To ensure a consistent approach to conservation and biodiversity enhancement within the Bay, Cardiff Harbour Authority has produced a Conservation Strategy which states its aims and also contains recommendations, which are reviewed annually. A new officer is due to be employed shortly to monitor the ecology of Cardiff Bay, which will allow any changes in biodiversity to be quickly identified.

- Effects of works carried out by external contractors

All contractors invited to tender for works are selected from the Cardiff County Council's schedule of Approved contractors and as such have already demonstrated their commitment to and achievement of appropriate standards of health and safety performance. The Harbour Authority includes in its standard contractual terms the Environment Agency's 'Special Requirements for Developers and Construction contractors' - which cover issues such as flood defence, pollution control, waste management, water resources, conservation and fisheries requirements. In addition, all contractors are required to observe conditions relating to working hours, noise control and routine access requirements. It is considered that without setting out these requirements in the tender documents and monitoring during the works, there could be a detrimental impact on the environment of Cardiff Bay during the execution of contracts.

- Dissolved Oxygen.

Under certain conditions, particularly during the summer months when the weather is warm and there is little wind and rain, the dissolved oxygen levels in the deeper waters of the Bay will naturally drop. Low dissolved oxygen levels could significant

impact upon the fish, invertebrate and birds living in and on Cardiff Bay. The Cardiff Bay Barrage Act 1993 requires the dissolved oxygen levels to be at a minimum of 5mg/l in all places and all times. Cardiff Harbour Authority therefore uses an aeration system to mix the water thereby raising the dissolved oxygen levels in the deeper waters of the Bay. Additionally, if required, oxygen is added to the water using a mobile oxygenation vessel. Continuous real-time water quality monitoring and routine water quality sampling analysis facilitate the measurement of dissolved oxygen levels.

- Dredging

The high energy of the Severn Estuary derived from the large tidal range results in estuarial water bearing high concentrations of silt. This remains in suspension in the main Estuary but on entering the relative quiescent conditions of the outer harbour and approach channels this sediment is deposited such that navigation in and out of the Bay would not be possible at low water. The Cardiff Bay Barrage Act 1993 requires that "the outer harbour is at all times available for use by pleasure craft and other vessels which are about to pass, or have recently passed from, the Inland Bay, or need to use it as a harbour of Refuge" (CBBA 1993, Part 111, Section 13). Cardiff Harbour Authority therefore arranges for the outer harbour and approach channels to be dredged twice a year.

- Groundwater

During the consultation phase of the barrage project stakeholders expressed concerns that a permanently raised water level in the Bay would result in a rise in the local groundwater levels which could affect basements of properties. The Cardiff Bay Barrage Act 1993 recognised these concerns by incorporating a comprehensive protection scheme for properties in South Cardiff (known as the Protected Property Area). In accordance with the protection scheme, if any property suffers damage as a result of the construction of the barrage, the owner/occupier will be entitled to free remedial works, or in certain circumstances compensation.

The protection scheme also requires the establishment of a groundwater monitoring system. This system was installed in two phases during the period May to December 1995 with further monitoring points being installed in 1999 in areas of groundwater control.

The Groundwater Monitoring System currently comprises 239 monitoring locations consisting of groundwater piezometers located in each of the three superficial geological formations (Made Ground, Alluvium and Gravel), rain gauges and river/tide gauges. Water levels are recorded at thirty-minute intervals with data

regularly downloaded and stored in a database. Rainfall data is recorded at two stations and is compared to rainfall data obtained from the Meteorological Office. The Meteorological Office also provides barometric pressure data. Tide and bay level data are measured by Cardiff Harbour Authority.

The groundwater data are detailed in reports produced on a six monthly basis. These reports are reviewed by the County Council's independent expert advisor, Professor John Lloyd.

In addition, prior to impoundment, the Harbour Authority undertook a risk assessment to identify geographical areas where groundwater damage may occur due to the character of the underlying superficial geology. Six areas were identified and active groundwater control systems have been installed in these areas, including pumped horizontal and vertical wells and field drains. The pumped groundwater from the underlying gravel aquifer is discharged to the River Taff. Regular sampling and analysis of the discharged groundwater is undertaken to ensure there is no deterioration in groundwater quality and thus preventing any impact on the River Taff.

- Pollution incidents

The Harbour Authority is responsible for managing the water quality of the Bay to provide an area of high ecological and recreational value. The Harbour Authority has developed emergency plans and procedures to minimise the impact of any pollution incidents.

- Litter and debris in the Bay.

At times of high river flow the two rivers transport large quantities of debris from their catchments into the bay. Prior to the barrage this material entered the Severn Estuary, much being subsequently deposited along the coastline of England and Wales. The Harbour Authority has purchased specialised litter/debris collection vessels and these together with land-based staff remove around 1000 tons of debris per annum from the area of the bay. Without this removal the debris would collect in the Bay and be a hazard to navigation, cause disturbance to marginal areas that are important fish nurseries and significantly reduce the amenity value of the water. The Harbour Authority has established cleanliness standards for edges of the Bay in accordance with the Environment Protection Act 1990.

- Migratory fish.

The Rivers Taff & Ely are recovering rivers for migratory fish, that is, salmon and sea trout. Although once important for these fish species, heavy industry in the late 18th and most of the 19th centuries caused a complete decline in numbers. As river water quality is improving, migratory fish are returning to these rivers to spawn. To assist passage of fish through the Barrage, a state of the art fish pass is included within the structure which allows fish through at all stages of the tide. To ensure that the pass is working properly, the Environment Agency regularly monitors the passage through the Barrage with a camera system that can identify and enumerate the fish. Furthermore, a trap is incorporated into the fish pass at Blackweir on the River Taff.

- Nuisance plants.

Certain alien species of plant such as Japanese knotweed, Himalayan balsam and Giant hogweed are highly invasive. If left to grow unchecked there would be a reduction in the number and variety of native plant species and associated wildlife communities. Additionally some plants can pose a health hazard. For example the sap from Giant hogweed can lead to severe irritation of the skin. Whilst not directly a health hazard Japanese knotweed is capable of growing through concrete causing serious structural damage to buildings walls and paths. It is therefore essential that these plants are controlled. Cardiff Harbour Authority employs specialist contractors to identify and undertake a programme of herbicide spraying to keep these plants under control.

- Pests

Many animals and insects, when present in large numbers are considered to be pests. Some groups such as rodents are capable of transmitting disease to humans. In order to provide an attractive and safe water area Cardiff Harbour Authority regularly uses bait boxes to control the number of rodents and traps to keep mink under control. Chironomid midges caused nuisance shortly after freshwater impoundment by virtue of their numbers. The Harbour Authority undertook research and successfully employed an experimental method to reduce the size of the Chironomid population.

- Recreational management

Cardiff Harbour Authority manages a water activity sports centre offering canoe, sailing and rowing tuition and organised access to the Bay for pilot schemes such as wind surfing and water-skiing.

Vessel wakes can have a detrimental impact on the ecology of the area if a caring attitude is not taken towards the environment. For example the wash created by speeding vessels in rivers can cause disturbance of marginal nesting areas and contribute to bank erosion. The Harbour Authority has set a maximum speed limit of five knots to minimise these effects. The speed limit is enforced by the harbour patrol vessels. Speed tracking systems are being installed on commercial vessels operating in the Bay.

The increasing number of recreational vessels in the Bay inevitably results in an increased risk of water pollution from oily discharges and a risk that marine toilets will be used within the freshwater bay. To reduce the risk the Harbour Authority has installed both bilge water and chemical toilet discharge facilities at the southern end of the barrage that are available to boat users free of charge.

- Saline intrusion.

Cardiff Bay barrage is a tidal exclusion barrage creating a freshwater lake across the mouths of the rivers Taff and Ely. To protect the ecology of the freshwater lake saline intrusion from the estuary must be controlled. A saline sump has been constructed on the freshwater side of the navigation locks to collect salt water that enters as a result of locking operations. Collected salt water is returned to the estuary through a pipe from the base of the sump. The level of salt water in the sump is monitored and management procedures are in place to prevent incursion into Bay in the event that the sump fills with saline water. Monitoring of salinity is also undertaken by the electronic water quality monitoring buoys to confirm no incursion is occurring.

- Water quality monitoring and protection.

During the consultation phase of the barrage project fears were expressed by stakeholders and consultants that the fresh water impounded by the barrage would be of poor-quality (primarily low dissolved oxygen content) such that it would act as a barrier to migration of salmonid fish. A dissolved oxygen standard was consequently incorporated into the Cardiff Bay barrage Act 1993. The standard is enforced by the Environment Agency as Regulator of water quality in England and Wales. To demonstrate compliance with the standard the Harbour Authority has installed a number of automatic water quality monitoring stations. These take measurements of a number of parameters (Dissolved Oxygen, pH, Temperature, Conductivity (salinity), turbidity and chlorophyll) every 15 minutes and send the data to a computer at the Harbour Authority offices. Here the data is assessed and if required action taken to improve the dissolved oxygen content. The data returned by the monitoring stations is accessible in real-time by the Environment Agency.

In addition to measuring dissolved oxygen a comprehensive water quality monitoring programme is undertaken to facilitate identification of any temporal change in water quality. Bacteriological samples are also taken routinely to identify any public health issues that may arise from use of the water for leisure activity. A full list of all the determinants monitored is available from Cardiff Harbour Authority.

3.0 An overview of Cardiff Harbour Authority's performance against its 2005/06 targets

3.1 The Harbour Authority's performance in the financial year of 2005/06 with respect to its environmental aspects is summarised in Table 1 below.

ASPECT/EMP	Performance Target	Performance Summary 05/06
Algae	Removal of any algal scum within 48 hours	No incidents of blue/green algal scum.
Bay level & flood defence	Maintain at least 4 sluices gates operational	100%
Conservation	Annual report of the Conservation Strategy	Conservation Strategy Approved by Council's Executive in September 2006. First annual report scheduled for 2007.
Contracts	No. of complaints from residents and Environment Agency regarding damage to environment from HA's construction activities (target 0)	No complaints
Dissolved Oxygen	Maintain dissolved oxygen levels at or above 5mg/ in all places and at all times	99.8% (Average)
Dredging	Maintenance of navigation through outer harbour and approach channel	Navigation through Outer Harbour and approach channel maintained
Groundwater	Recovery of valid data from 238 groundwater level data loggers - target 95% per month	97% (Average)
Incidents	Performance against Major Incident Plan	No incidents.
Litter and debris deposition in the Bay	No. of times that Grade A Standard (EPA 1990) is not met in Inner Harbour and on Barrage as determined by weekly inspections. Target -	Inner Harbour – 0 failures Barrage – 8 failures All failures recorded between September and November

Environmental Report 2005-2006 - (Green Dragon Level 5)

ASPECT/EMP	Performance Target	Performance Summary 05/06
	less than 6 failures per area/per annum.	immediately after occurrence of inclement weather when high river flows deposited large amounts of debris in Cardiff Bay
Migratory fish	Salmon equivalents recorded at Blackweir 1000 – considered as long term target (for 2005)	191
Nuisance plants	No. of nuisance plants treated by the end of the year. Target 100%	100%
Pests	No of written complaints about rodents and flying insects (non biting chironomids) Targets: less than 4 and 3 (per/annum) respectively.	Number of written complaints received about rodents (0). Number of written complaints received about flying insects (0).
Recreational management	"No of complaints received from residents and the Environment Agency regarding damage to the environment as a result of the Harbour Authority's recreational activities" - Target 0	No complaints received
Saline intrusion	No. tides where salinity readings at Site 34 upper water quality sonde exceeds 1 part per thousand (Target < 1%)	0.27 %
Water quality monitoring and protection	Recovery of valid data from 9 items of water quality monitoring equipment Target 95% per month	97.5%

Table 1

4.0 An introduction to the objectives and targets which have been set for 2006/07.

4.1 The Harbour Authority's targets for the period 2006/07 are set out in Table 2 below.

4.2 A new Environmental Aspect has also been identified following a review of the Harbour Authority's environmental risk assessment. This aspect is Building Management and Sustainability. Without effective building management, energy consumption cannot be controlled and emissions of carbon dioxide cannot be monitored, measured and reduced. Carbon dioxide is the main contributor to climate change and makes up 80% of emissions from industrialised countries. This gas is released into the atmosphere primarily from burning fossil fuels such as oil, petrol and natural gas. Carbon Dioxide, combined with other greenhouse gases absorb infrared radiation in the atmosphere and thus change the dynamic balance between energy arriving from the sun and energy escaping.

4.3 To improve its building management and sustainability performance, the Harbour Authority has implemented a number of improvements. These include:

- The installation of a biomass boiler in the Harbour Authority's Environment Building. Initially, waste wood collected from the Bay would be sent to landfill for disposal. Here, it would degrade over time, releasing greenhouse gases which contribute to climate change. However, all clean and bulky timber is now salvaged, dried, chipped and used as a fuel for the biomass boiler.
- The installation of other renewable energy products such as solar panels on the Environment Building and photovoltaic cells on water quality telemetry stations, LED displays in waterbus shelters and pay and display meters
- The encouragement of all staff to be environmentally aware and adopt energy saving practices around the office. Targets are set targets for the reduction of electricity consumption. All energy invoices and consumption levels are monitored on a monthly basis so that action can be taken to ensure the targets are met.

Environmental Report 2005-2006 - (Green Dragon Level 5)

Corporate Policy Action Plan	Harbour Authority Action Plan	Environmental Aspect	Performance Target for 2006 - 2007
Corporate Priority 5 A Clean and Attractive City	HA AIM 1 To maintain the best environmental standards possible throughout Cardiff Bay and continue to promote the sustainable policy of the	Algae	Algal scum removal to be commenced from the water surface within 48 hours of scum identification (Target 100%).
		Bay level & flood defence	Maintain 4 operational sluices at all times (Target 100%)
		Conservation	Produce annual report of the Conservation Strategy
		Contracts	Number of complaints from Residents and the Environment Agency regarding damage to the environment arising from the Harbour Authority's construction activities. (Target 0) Percentage of Contractors (awarded the Contract) scoring 48+ in Performance Assessment Rating (Target 100%)
		Dissolved Oxygen	Maintain oxygen levels at greater than 5mg/l in all places at all times (Target 100%).
		Dredging	Maintenance of Navigable Channel in the Outer Harbour (Target 100%)
		Groundwater	Retrieve water level data from groundwater monitoring system (230) data loggers (Target 95%). Percentage of time that pumps are working. (Target >95%). No. properties damaged (Target 0) (Annual Figure)
		Incidents	Implementation of Oil Spill Contingency Plan within 30 minutes during Office hours and within 1 hour in out of office hours (Target 100% for all occasions).
		Land based litter collection	Achieve Grade A Standard (EPA 1990) in the Inner Harbour, determined by Weekly inspections. (Target 90% annual) Achieve Grade A Standard (EPA 1990) on the Barrage Embankment, determined by Weekly inspections. (Target 90% annual)
		Migratory fish	Salmon equivalents (i.e. Salmon, plus Sea Trout divided by 4) trapped at Blackweir (long term target 1000) Annual Figure. Fish Pass Inlet gate flows within prescribed limits (1.5 – 2.0 cumecs). Monthly Figure.
		Nuisance plants	Number of nuisance plant areas identified by annual report successfully treated by the end of the year. (Target >95%)
		Pests	Number of written complaints about rodents (Target 0 per annum) Number of written complaints about flying insects (Target <3 per annum)
		Recreational management	No of complaints received from residents and the EA regarding damage to the environment as a result of the Harbour Authority's recreational activities (Target 0)
		Saline intrusion	No. tides where salinity readings at Site 34 upper water quality sonde exceeds 1 part per thousand (Target < 1%)
		Water quality monitoring and protection	Recovery of data from equipment suspended from buoys within the Bay (Target >95%).
Building management and sustainability	Reduce annual emissions of CO2 in all CHA buildings (compared to 2005/2006 figure). (Target 10% annual) Reduce annual energy consumption in CHA occupied part of Queen Alexandra House (compared to 2005/2006 figure). (Target 10% annual) Percentage of total waste collected from the Bay diverted for use in the biomass boiler (Target 1% per annum) Percentage of time renewable or sustainable energy (biomass burner or solar panels) used to heat the Environment Building (Target 70% per annum)		

Table 2

5.0 A Brief Overview of Cardiff Harbour Authority's Impacts and Activities in Other Areas

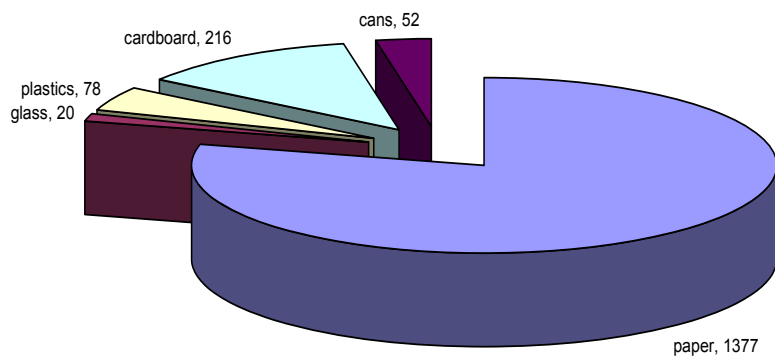
5.1 Waste

The Harbour Authority carries out routine litter/debris clearing operations from the water and banks of Cardiff Bay, and the rivers Taff and Ely (within the areas of responsibility). A total of 944 tonnes was removed in the period 2005-06. As part of the sustainable waste management operations, 19 tonnes of clean bulky timber was diverted from landfill and used to fuel the biomass boiler in the Environment Building.

The Harbour Authority has also implemented recycling measures in the office and all other buildings under its ownership where feasible. All plastics, cans, paper, glass and cardboard are recycled. Quantities are now measured, monitored and reported to the Welsh Assembly Government on a quarterly basis.

The recycling results for 2005-2006 are shown below:

Queen Alexandra House office waste recycling (kg's)



5.2 Water

During 2005-2006, the Harbour Authority's total water consumption was 6,276 m³. This includes all buildings that it owns or is responsible for, the water features in the Mermaid Quay, public toilets around Mermaid Quay, Havannah Street and public showers/toilets in the new Environment Building.

5.3 Energy

In 2005/06, Cardiff Harbour Authority's total energy consumption was 903,502 (kWh). This includes the Harbour Authority Offices at Queen Alexandra House, Barrage Control and also its infrastructure, the aeration system and the ground water control kiosks. Where feasible, energy efficient technologies have been implemented on the aeration system. Initiatives planned for 2006-2007 include the installation of passive infra-red sensors in Queen Alexandra House toilets and kitchen areas.

The total Carbon Dioxide emitted for the same period was (kg CO₂) 388,506 which is the equivalent to 10.6 tonnes of carbon.

5.4 Transport

The Harbour Authority's transport comprises a number of road vehicles (that travel very low mileage) and it's predominate mode of transport, vessels on the water. Calculations show that total emissions during 2005-2006 were 122,163 Kg CO₂ which is the equivalent to 33 tonnes of carbon.

5.5 Legal compliance

During 2005-2006, the Harbour Authority operated with full legal compliance. This was verified during routine BSI auditing against the EN ISO 9001: 2000 and EN ISO 14001: 2004 standards.

5.6 Pollution Prevention

During 2005-2006 there were no major pollution incidents in Cardiff bay. The Harbour Authority ran an annual training exercise in accordance with its Oil Spill Contingency Plan.

APPENDIX



Cardiff Harbour Authority Environmental Policy Statement

Cardiff Harbour Authority was created on 1st April 2000 by the County Council of the City and County of Cardiff and is responsible for management of the Cardiff Bay Barrage, the impounded waters of Cardiff Bay and the Outer Harbour. The main activities of the Authority are set out in the business plan and this includes a commitment to minimise the environmental impacts of all activities.

The principles and practices of environmental responsibility will be managed through:-

- ensuring staff and members of the public are aware of the environmental issues
- continuing development of expertise in environmental disciplines, thus providing knowledge transfer and specialist expertise in the environmental protection of Cardiff Bay
- promoting practices consistent with environmental protection and pollution prevention both within and outside the service area
- striving to continually improve our environmental performance and comply with all legal and other requirements
- implementing this policy through comprehensive programmes with measurable goals. This will be achieved through monitoring and analysis of performance against the programme

The Harbour Authority will manage and address environmental issues by improving monitoring, intervention, research and training, through internal means and partnerships. The Authority intend not only to be at the forefront of environmental management, but also to lead in ensuring that staff and the public are fully aware of these issues and contribute to their resolution. Furthermore, the Authority will instil environmental responsibility as an intrinsic feature of all practices and procedures.

Chief Officer
Issue 4 - 05/06

A handwritten signature in blue ink that reads 'Tony Fisher'. The signature is written in a cursive style and is positioned above the printed name of the Chief Officer.