DCWW Submission to the Petitions Committee of the National Assembly for Wales

1. Summary

In 2009 the Petitions Committee received a petition from Rhys Williams which had collected 2,240 signatures in support of its case. The petition called for "*a public inquiry by the Welsh Assembly Government into the sewage pollution of the Burry Inlet and Carmarthen Bay*" and arose from concerns that pollution from combined sewer overflows (CSOs) in the Burry Inlet are adversely affecting the cockle population and may be the cause of the premature mortalities there.

The Committee visited Burry Port on the 27th February to hear from local people. Councillor Bill Thomas made a detailed presentation and submitted a large file of information to the Committee in support of his case. Due to the length of Councilllor Thomas's presentation and the limited time available, there was no opportunity to respond to the assertions raised at the meeting and DCWW welcomes the opportunity to present its case to the Committee at this hearing.

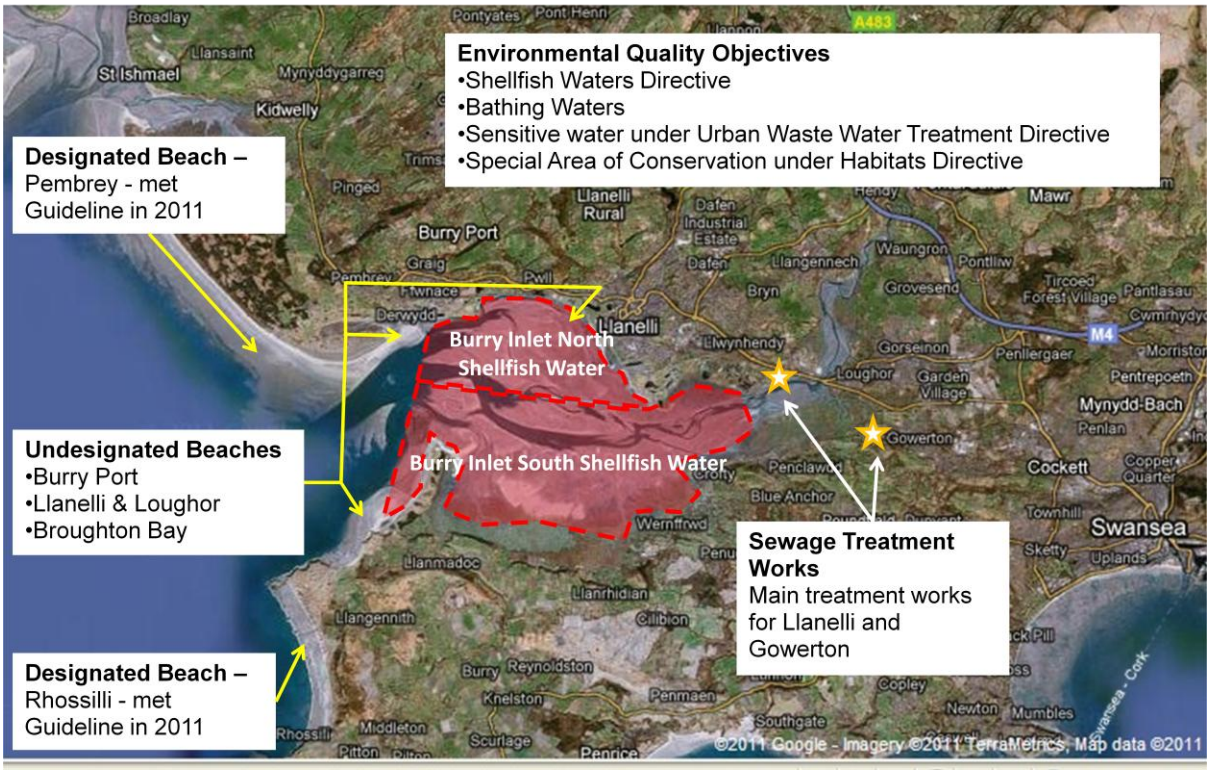
In response to the claims made DCWW would like to state that:

- The cockle mortality report has been independently produced by some of the most eminent marine biologists in the UK which gives us confidence in its findings. The report finds that a combination of biological factors is the reason for the change in cockle behaviour in the estuary and not water quality or pollution.
- DCWW has delivered huge improvements in the quality of its continuous discharges to the estuary as a result of investing £69m of customers' money on new and improved sewage treatment facilities in the 1990s and early 2000s.
- DCWW has embarked on a long term strategy of removing of surface water from the sewer network to protect customers from sewage flooding, reduce spills and allow economic development without causing detriment to water quality in the estuary. In the UK, DCWW leads the water industry in developing and implementing this form of sustainable, cost-effective surface water removal approach to improving service for customers and protecting the environment.

2. The Loughor Estuary

The River Loughor discharges via the Loughor Estuary to Carmarthen Bay. The Burry Inlet and Burry Inlet shellfish waters are situated within the estuary which is bounded to the South by the Gower peninsula and to the North by the headland containing the towns of Llanelli and Burry Port. The largest sewerage networks and waste water treatment works (WWTW) in the area are at Gowerton and Llanelli. The WWTWs and combined sewer overflows (CSOs), which contain a mixture of foul and surface water runoff, discharge either directly into the estuary or indirectly via local rivers and water courses. The estuary is an area of scientific and ecological importance and discharges are governed by a complex set of environmental quality objectives. The diagram below sets out some of the more important measures and all of these measures are brought together under the Water Framework Directive with the objective of delivering good ecological status in the water body.

Environmental Designations in the Loughor Estuary



3. Improvements in Sewage Treatment

Sewage treatment before 1997

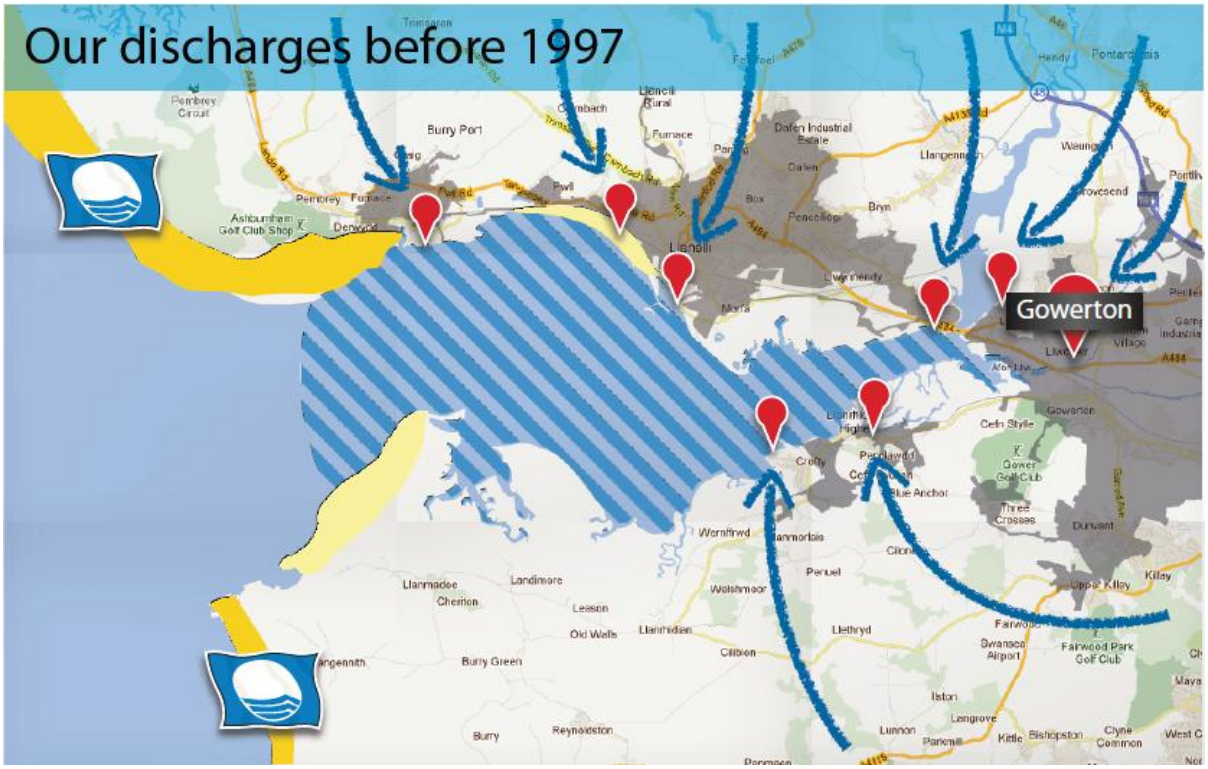
Historically, partially treated effluent arising in Llanelli was discharged from four sites at Burry Port, Pwll, Northumberland Avenue and Bynea. Sewage arising from Gowerton, Crofty and Penclawdd was treated to a somewhat better standard than in Llanelli using biological treatment before discharge but the quality from the smaller sites at was quite variable. During periods of heavy rain, the volume of sewage arising in these networks exceeded the capacity of the WWTWs so, in order to prevent customers' houses being flooded with sewage, dilute effluent was also discharged to the estuary from CSOs at all of these and other sites.

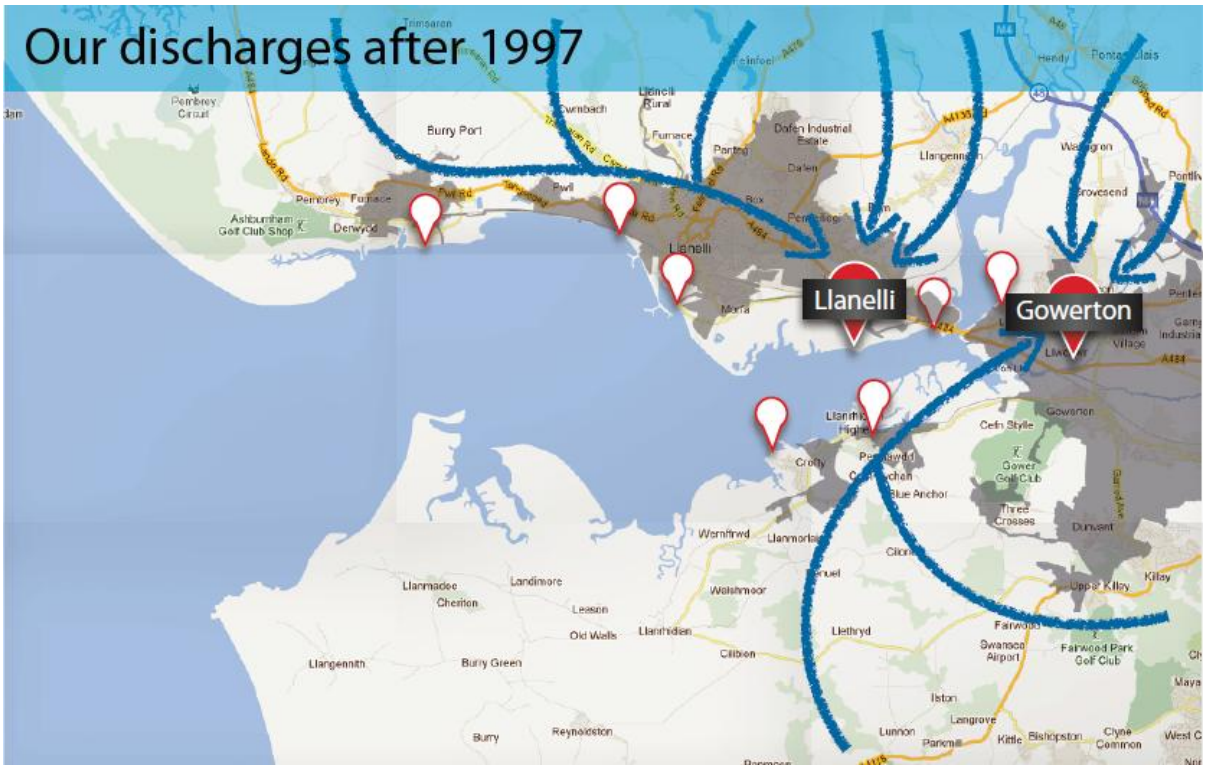
1990s Investment Programme

In the mid 1990s DCWW invested £69m of customers' money in order to meet new tighter environmental standards. The programme of work included the construction of a new WWTW at Bynea to treat sewage from Llanelli and extensions to the works at Gowerton as well as improvements at Llanant WWTW. The photograph below shows Gowerton WWTW during construction and gives an indication of the scale of the undertaking:

Gowerton WWTW

The old treatment works in Llanelli and Gowerton were converted into pumping stations and the flows transferred to the new works. The existing CSOs were improved with screening and some of the sites were also provided with storage in order to reduce the number of spills to the environment.





Waste Water Treatment Works (WWTW)

Combined Sewer Overflow (CSO)

Designing the New Sewage Treatment Works

When the new sewage treatment works were designed, the consultants went back to the drawing board and calculated the expected flows and loads based on the actual and predicted future populations in each area, trade effluent and infiltration flows (a measure of the amount of ground water that gets into the network). These calculations would have been backed up by population and property counts, impermeable area surveys (areas of roof and road drainage connected to the combined sewer network), infiltration surveys and temporary network flow monitoring. In the Llanelli catchment for example, the population served at the time was calculated at 52,301 and the new sewage treatment works was designed to cope with the biological load from a future population of 62,673.

Change in Quality of Sewage Treatment Works Discharges

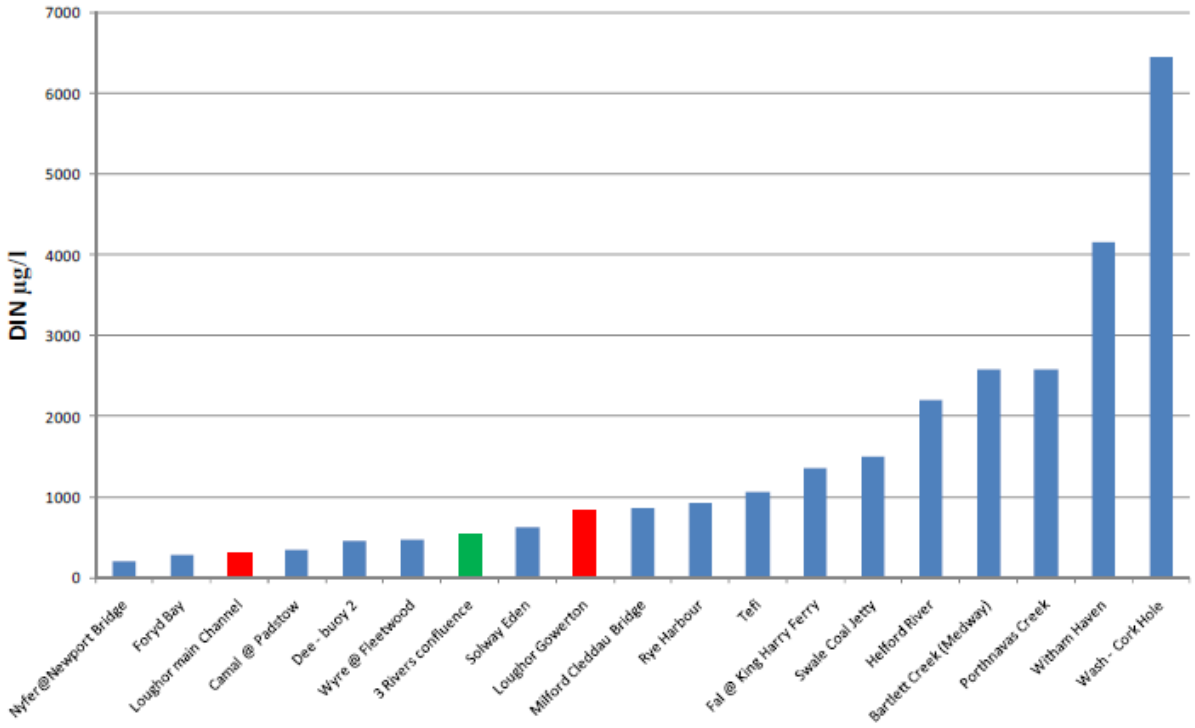
To demonstrate the improvement in the quality of discharges to the environment, the table below compares the average effluent quality from the old WWTWs between 1991 and 1993 with the average effluent quality from the WWTWs at Llanelli and Gowerton in the 3 years to the end of 2011. In fact the water quality from Llanelli WWTW is so good now that it is used by the Wildfowl and Wetland Centre to help maintain the correct nesting conditions in the sanctuary.

	% Improvement in the quality of continuous discharges from 1991-1993 to 2009-2011	
	Gowerton	**Llanelli**
Biological Oxygen Demand	64%	97%
Ammonia	40%	98%
Faecal Coliform Bacteria	Not available	99.95%

4. Cockle Mortality Report

Episodes of mass cockle die off were reported from the estuary from the early 2000s and such was the concern that Welsh Government asked the EA to manage an independent investigation into the causes of the problem. The EA asked Professor Mike Elliot, Director of the Institute of Estuarine and Coastal Studies at Hull University, to lead an experienced and highly qualified research team and their final report was published in January this year.

The report highlights a number of biological factors as the cause of the change in cockle behaviour and specifically rules out poor water quality or pollution. To support this conclusion the report showed that water quality in the Loughor compares very well with similar estuaries around the UK and the estuary will meet almost all the criteria for Good Ecological Status under the Water Framework Directive. For example the graph below (copied from the report) shows that levels of dissolved inorganic nitrogen in the Loughor compare very well with other areas around the UK coast.



The investigation team also looked at other shellfish species in the estuary with similar feeding and habitat requirements to the cockle. They found these other benthic species were behaving normally and this would not be the case if pollution was the cause of the problems.

A final point to highlight is that is that shellfish harvesting has been reported in the Loughor Estuary since Roman times. This includes the period of the industrial revolution from the late 18th to the middle of the 20th century when high levels of pollution were discharged untreated from industrial and domestic premises in an uncontrolled manner and water quality would have been significantly poorer that now. In spite of this there appear to be no similar reports of mass cockle mortalities.

5. Combined Sewer Overflows in the Loughor

The Reason for Having Combined Sewer Overflows (CSOs)

The primary function of the sewerage network is to protect public health by separating contaminated waste water from water used for drinking, washing and food preparation. However all "combined" sewer networks, such as the systems in Llanelli and Gowerton, also drain the rainfall that lands on roofs and roads and the volume of water carried by any combined system can increase enormously during wet weather, exceeding the capacity of the infrastructure to cope with it. CSOs are built into these networks to maintain protection of public health by providing "relief valves" that can discharge dilute sewage to the rivers and coastal waters during periods of heavy rainfall.

The Impact of CSOs on the Cockles

The main concern from CSOs spilling dilute effluent during heavy rainfall is that it puts additional faecal microorganisms into the environment. Heavy rainfall also causes an increase in diffuse pollution from agricultural and urban runoff and modelling shows that such background loads can have a significant impact on the environment even when CSOs are not operating.

While the faecal microorganisms do not have a detrimental effect on the shellfish themselves, it is a problem for shellfish collected for human consumption and standards have been set for the monitoring and treatment of shellfish before human consumption. Ministerial guidance and statutory regulations set minimum standards for shellfish flesh and water quality to be achieved and also set higher guideline standards that Wales should "endeavour to achieve". The EA interpreted these standards in their 2003 policy *Consenting Discharges to Achieve the Requirements of the Shellfish Waters Directive (Microbial Quality)*. Using these guidelines, DCWW worked with the EA to model the effect of our discharges on the commercial quality of shellfish in the Loughor. This led, in turn, to the installation of ultra violet (UV) dinsinfection at Llanelli, Gowerton and other WWTWs further upstream on the Loughor, some CSOs had storage added to reduce the frequency of spills and spills from Llanelli WWTW storm tanks Northumberland Avenue pumping station are also disinfected which reduces the bacterial load on the estuary still further.

CSO Spill Frequency

However it has since become clear that the frequency of CSO spills to the estuary is excessive. A recently completed modelling exercise highlighted the increasing amount of rain water entering the local networks and the table below demonstrates how severe the situation in Llanelli has become by comparing it with the much larger catchment of Swansea City:

	Swansea	**Llanelli**
Population Served	191,701	70,931
Properties Served	76,861	24,887
Area Served	57.3km^2	18.81km^2
Inflow to the main pumping stations	5,361 l/sec	4,632 l/sec

The traditional method of reducing spills is to construct concrete storage tanks that store dilute sewage during storms and return the flows to the network when the heavy rain abates. However when this approach was examined, we found that the volumes of storage required were so large as to be unaffordable for our customers, technically unfeasible to build and operate, provide no long term resilience for climate change and would not tackle the fundamental problem of too much rainwater getting into the system in the first place. For example, Llanelli WWTW storm tanks alone would have to be increased in volume by 216,000m3, the equivalent of 108 Olympic sized swimming pools or building an underground storage chamber the size of the Parc y Scarletts' stadium.

Long Term Strategy for Llanelli and Gowerton

DCWW has adopted a long term strategy of separating surface water from existing networks through a combination of sustainable urban drainage (SUDS) and changes to existing infrastructure. This will slow down, attenuate and redirect rain water in order to prevent it from getting into the sewerage system in the first place. This is a new approach for the UK and DCWW is leading other water companies in our adoption of techniques already proven abroad in cities such as Malmo in Sweden and Portland in the USA.

Using this strategy we have developed outline designs for over 150 individual projects across the two local networks that will deal with the risk of sewage flooding for customers, planning blight and excessive spills in a cost effective and sustainable way and will leave our assets better able to cope with the impact of climate change.

We have already made a start on this programme by committing £12m to 10 projects for reducing spills and another £5m to protect customers at serious risk of having their houses flooded by sewage. We are also making our designs available to others to implement in order to facilitate economic development in the area without causing environmental detriment through increased spills.

As these first projects are delivered we will monitor their impact on our customers and the environment. We plan to use a continuous cycle of *improve, monitor and review* over the coming years to determine our future programme of works in order to ensure we deliver the maximum benefit at the lowest cost to our customers.

6. Conclusion

In conclusion,

- DCWW has delivered a significant improvement in the quality of the effluent from its sewage treatment works since the early 1990s.
- The cockle mortality report clearly shows that the change in cockle behaviour is caused by a combination of biological factors and not as a result of water quality or pollution.
- Finally DCWW has developed a long term strategy, in conjunction with the EA, aimed at protecting customers from sewage flooding and improving the area they live in, removing restrictions to economic development and reducing spills by tackling the underlying problem of too much rainfall runoff entering our sewerage networks.