APPENDIX 1

Guidance for surface water management for development
In both the Llanelli and Gowerton catchments

Criteria to be used in drainage calculations for the removal of surface water from catchments draining into the Burry Inlet.

Summary

Foul flows generated by a development will only be allowed to connect to the sewerage system for disposal once existing flows (surface water or foul) have been removed from the system to allow capacity or other works undertaken to improve the infrastructure. There is also the requirement for a betterment factor. The arrangements are the same for Swansea and Carmarthenshire LPAs:

- The arrangements for larger developments will involve bespoke solutions, dependant on the size and location of the development, based on the modelling exercise recently completed for DCWW. DCWW will provide maps to each LPA which will contain site specific information on each of the drainage areas likely to be affected by the proposal. These will inform negotiations between the LPA and the applicant, in consultation with DCWW and the EAW, to identify the necessary compensatory mitigation to enable their development to go forward at that particular location.

- The arrangements for smaller applications i.e. those of 10 dwellings or less or equivalent, are that a betterment factor for development connecting to the system is X 2+ i.e. For every litre/sec of foul generated by a development 2 litres/sec + needs to be removed from the system beforehand. These savings can be achieved locally to the development or can be matched towards schemes on the Surface Water Register held by the relevant LPA.

Any agreed commitments then need to be entered onto the Hydraulic Register held by the appropriate Planning Authority, namely City and County of Swansea or Carmarthenshire County at the time of Planning application approval. The register contains a list of relevant surface water removal opportunities to which the development can be partnered. Alternatively the developer can propose their own opportunity for surface water removal in line with the following criteria.
Following is the criteria for calculation of flows from a particular development and how they can be mitigated for:

1 **Peak Foul Flow / dwelling**

The peak flow per residential property arriving in the public sewer system should be based on the following criteria;

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Consumption</td>
<td>180 litres/head/day</td>
</tr>
<tr>
<td>Residential Infiltration allowance</td>
<td>120 litres/head/day</td>
</tr>
<tr>
<td>Miscellaneous consumption</td>
<td>25 litres/head/day</td>
</tr>
<tr>
<td>Residential occupancy</td>
<td>2.5 persons/property</td>
</tr>
<tr>
<td>Peak flow factor (diurnal)</td>
<td>2.0 x</td>
</tr>
</tbody>
</table>

Given the above criteria the contribution of peak flow from an individual household will be approximately;

180+25 x2.5 x2.0+120 litres/day, approximately 1150 litres/day

Approximately **0.013** litres/second per residential property at peak flow times ie breakfast and evening mealtimes.

*Site/road drainage is considered separately and is covered elsewhere within the MoU (Memorandum of Understanding) but as a matter of principle no surface water should be allowed to enter the system*

**Peak storm flow**

Peak storm flow is the amount of flow runoff expected per m² area at the peak of the storm, and is the flow that would be expected to impact the drainage system.

This is dependant on the storm duration (hours) and return period for a rainfall event. The Flood Estimations Handbook (FEH) provides statistical information relevant to different geographical areas. A mathematical result can be derived from statistical analysis.

Table 2.1 below summarises data for a 1:30 year rainfall event in the Burry Inlet area.
Table 2.1

FEH peaks and Linear distribution of rainfall intensities for a 1:30 year return period storm in the Burry Inlet area.

<table>
<thead>
<tr>
<th>Storm Duration (Hrs)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Rain in Storm (mm)</td>
<td>30.6</td>
<td>39.0</td>
<td>45.0</td>
<td>49.8</td>
<td>53.8</td>
<td>57.3</td>
</tr>
<tr>
<td>Peak Rain Rate (Linear distribution) mm/hr</td>
<td>30.6</td>
<td>19.5</td>
<td>15.0</td>
<td>12.5</td>
<td>10.8</td>
<td>9.6</td>
</tr>
<tr>
<td>Peak Rain Rate (FEH (peak)) mm/hr</td>
<td>28.6</td>
<td>26.3</td>
<td>34.0</td>
<td>22.2</td>
<td>20.6</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

- “The system should be designed not to flood any part of the site in a 1:30 year return period” – Sewers for Adoption 2.14
- Linear rainfall distribution assumes that the rain that falls during a storm falls at a consistent rate eg 5mm of total rain falling in a 5 hour period equates to a rate of 1mm/hr.

A 1 in 30 year storm return period concords with sewer design criteria

A 5-6 hour storm duration is considered a typical “influencing storm”

The figure for a 5 hour duration, 1 in 30 year return period, using linear rainfall distribution is to be used to calculate rainfall run-off.

Per Dwelling

As a simple guide, using the criteria above a single dwelling would need to improve an impervious area of approximately 9m² to achieve a 2 times betterment.
Hydraulic Flow Data to be used for “Betterment” calculations

1  Peak foul flow Residential  =  0.013 l/s per residential property

1A  Guidance for Peak Foul Flows - Commercial:

<table>
<thead>
<tr>
<th>Commercial Property Type</th>
<th>Water Consumption l/head/day</th>
<th>Peak foul flows (For comparison) l/head/second</th>
<th>Peak foul flow by Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>55</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>50</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Rest Homes</td>
<td>300</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>Hospitals</td>
<td>450</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td>Public Houses</td>
<td>15</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Caravans</td>
<td>120</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>Camp Sites</td>
<td>75</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Hotels</td>
<td>200</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>Restaurants</td>
<td>25</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Industrial Sites (Expected Large water use)*</td>
<td></td>
<td>55m3/Ha/day = 2.5l/s per Ha</td>
<td></td>
</tr>
<tr>
<td>Industrial Sites * (Light Industry)</td>
<td></td>
<td>10m3/ha/day = 0.7l/s per Ha *</td>
<td></td>
</tr>
</tbody>
</table>

* Note: For Industrial sites the figures above are a guide only. In ALL cases DCWW MUST be contacted to confirm appropriate figures to be used

Figures above are based on average daily flows assume an 8 and 12 hour working day for light/heavy industries respectively. A peaking factor of x 2 has been used

2  Peak rain intensity  =  10.8 mm/hr

3  Betterment Factors  =  Burry Inlet  minimum  x  2
Appendix 2: Burry Inlet Discharges
Gowerton, Llanelli and Llanant Sewerage Catchments

Legend
- Relevant Consents
- Other DWWI Discharges (Major Catchments only)
- EU Bathing Waters
- SACs
- SPSs
- UKWTD Sensitive Area
- Major Sewerage Catchments
- Waste Sewerage Catchments
- Shellfish Waters

Appendix 2. Llanelli Sewerage System Schematic
(SAMPLE SHEET NOT FOR USE) N.B. Catchments referred to are secondary catchments as referred to in the glossary of terms

<table>
<thead>
<tr>
<th>Area Ref</th>
<th>Description</th>
<th>Contributing Area (ha)</th>
<th>Suggested Improvement</th>
<th>Estimated Savings Range (l/s)</th>
<th>Revised Flow Estimates</th>
<th>Reason for revision</th>
<th>Complete</th>
<th>Cost</th>
<th>Description of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO1</td>
<td>Selyn Samuel Centre</td>
<td>1.3</td>
<td>Separation of s.w. drainage from the combined sewer</td>
<td>8.6</td>
<td>14.9</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO2</td>
<td>Ropewalk Street &amp; Westbury Street</td>
<td>2.4</td>
<td>Separate drain from the combined sewer if connected</td>
<td>9.6</td>
<td>14.9</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO3</td>
<td>Albert Street, People's Park</td>
<td>0.5</td>
<td>Disengage s.w. system and discharge to River Lledi</td>
<td>2.8</td>
<td>7.4</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO4</td>
<td>Old Castle Road, Pepppers Park</td>
<td>0.3</td>
<td>Disengage s.w. system and discharge to River Lledi</td>
<td>1.7</td>
<td>4.4</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO5</td>
<td>Caroline Street, Drucie Street</td>
<td>0.1</td>
<td>Separation of s.w. drainage from the foul sewer</td>
<td>8.6</td>
<td>14.9</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO6</td>
<td>Dan Y Banc, Tyfan</td>
<td>0.6</td>
<td>Separate the s.w. drainage system</td>
<td>37</td>
<td>99</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO7</td>
<td>Gower View, Tyfan</td>
<td>0.7</td>
<td>Disengage the s.w. system from the combined sewer</td>
<td>3.2</td>
<td>8.5</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO8</td>
<td>Corporation Avenue, Maes tir</td>
<td>11.1</td>
<td>Separate highway drainage from the combined sewer</td>
<td>37</td>
<td>99</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO9</td>
<td>Heol Gofa Car Park</td>
<td>0.3</td>
<td>Re-direct s.w. drainage to the river Lledi</td>
<td>2.3</td>
<td>6.2</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO10</td>
<td>Brynmennyn &amp; Artyn Avenue</td>
<td>7.7</td>
<td>Separate highway drainage from the combined sewer</td>
<td>42</td>
<td>114</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO11</td>
<td>Alban Road &amp; Clos Yr Ysgol</td>
<td>1.5</td>
<td>Separate highway drainage from the combined sewer</td>
<td>8.2</td>
<td>22</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO12</td>
<td>Seine-Sea Road &amp; James Street</td>
<td>11.3</td>
<td>Separate highway drainage from the combined sewer</td>
<td>42</td>
<td>114</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO13</td>
<td>Codsstream Street, Penco P.S.</td>
<td>0.6</td>
<td>Separate s.w. drainage and transfer to Lledi culvert</td>
<td>40</td>
<td>106</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO14</td>
<td>Mansel Street, Dillyn Street</td>
<td>10.4</td>
<td>Separate highway drainage from the combined system</td>
<td>57</td>
<td>153</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO15</td>
<td>Trinity Road &amp; Ropewalk Street</td>
<td>3.0</td>
<td>Separate highway drainage and transfer to Dafen Ph</td>
<td>198</td>
<td>531</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO16</td>
<td>The Eastgate Development</td>
<td>2.3</td>
<td>Convey all s.w. drainage to the River Lledi</td>
<td>18</td>
<td>48</td>
<td></td>
<td>8.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub Total</td>
<td></td>
<td>96.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Schemes not in original list

| Total   | 591 | 1002 | 1955 | 8.12 |

*Note: All values are approximate and subject to change based on further analysis and data collection.*
<table>
<thead>
<tr>
<th>Catchment</th>
<th>Scheme or Applic. Ref</th>
<th>Application Approval or Scheme Completion Date</th>
<th>Site</th>
<th>Data entered by</th>
<th>Date</th>
<th>Pre-development</th>
<th>Post-development</th>
<th>Actual Sewage Reduction</th>
<th>SW Factor</th>
<th>Target Surface Water Reduction from this scheme</th>
<th>Actual Surface Water Reduction from elsewhere in catchment</th>
<th>Requires SW Balance from elsewhere in catchment</th>
<th>SW Balance from elsewhere in catchment</th>
<th>Surface Water Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northumberland</td>
<td>NO1</td>
<td>2009/2010</td>
<td>Selwyn Samuel Centre</td>
<td>Al</td>
<td>9.8.10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>6.02</td>
<td>N</td>
<td>6.02</td>
</tr>
<tr>
<td>Northumberland</td>
<td>NO9</td>
<td>Mar-10</td>
<td>Heol Goffa Car Park</td>
<td>Al</td>
<td>9.8.10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>2.3</td>
<td>N</td>
<td>2.3</td>
</tr>
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<td></td>
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</tbody>
</table>

Carmarthenshire County Council and City of Swansea Council have funded Dwr Cymru Welsh Water to undertake phosphate stripping at the Llannant STW. This interim compensation measure is intended to offset any new nutrient loading to the Burry Inlet resulting from new development granted planning permission after 1st April 2010. This additional dosing will allow development capacity within the Burry Inlet area to develop 2000 houses without impacting the current nutrient status in the Burry Inlet. Current building completions are in the range of 200 – 300 in total per year for both local authority areas.

When that capacity is achieved additional phosphate stripping would need to be funded and instigated either at the Llannant works or another works which discharges into the CBEEMS and a further allocation of dwellings quantified and recorded.

This phosphate removal work should not be confused with the works now included in the Welsh NEP under the current DCWW AMP (Asset management programme) which will provide phosphate stripping at the Parc y Splotts, Pontyberem, Llanelli, Gowerton Treatment Works. This funding is exclusively to bring about water quality improvements to attain the required water quality standards required for the Habitat regulations and the Water Framework Directive by 2015.

The phosphate removal at the Llannant STW is achieved by the method of ferric sulphate dosing at the plant and was initiated on 1 April 2010. DCWW are also trialling organic phosphate stripping at other sites and this may be the preferred method into the future.

All partners in the Memorandum of Understanding need to have 6 monthly updates on the current status and implications of the above phosphate removal measures at the Llannant STW. The Registers maintained by CCC, CCS and DCWW will be critical to this
Appendix 5. Role of relevant bodies.

- **Carmarthenshire County Council**
  Partner in the existing Memorandum of Understanding and responsible for processing planning applications; considering surface water drainage issues and preparing appropriate assessments. Under the Habitats Regulations they are also the competent authority in planning matters.

- **City and County of Swansea Council**
  Partner in the existing Memorandum of Understanding and responsible for processing planning applications; considering surface water drainage issues and preparing appropriate assessments. Under the Habitats Regulations they are also the competent authority in planning matters.

- **Countryside Council for Wales.**
  Partner in the existing Memorandum of Understanding and designated as the conservation body under the Habitats Regulations. They are also a consultee for planning applications.

- **Dwr Cymru Welsh Water.**
  Partner in the existing Memorandum of Understanding and responsible for the provision of sewerage disposal within the Burry Inlet area.

- **Environment Agency Wales.**
  Partner in the existing Memorandum of Understanding and responsible for advising the local planning authorities on the environmental implications of proposed development within the Burry Inlet with particular attention to water quality, flooding and shellfisheries.

- **Llanelli and Gowerton Modelling sub group.**
  Officer group looking at the modelling and methodology of seeking solutions to existing issues and opportunities within the Burry Inlet area. Members from Dwr Cymru Welsh Water and Environment Agency Wales.

- **Llanelli Flood Forum.**
  Llanelli Flood Forum is a group aimed to get the relevant authorities to deal with local flooding problems within the Burry Inlet. Local politicians are involved including Nia Griffiths M.P. for Llanelli.

- **Llanelli Flood Technical Working Group.**
  This is a working group of officers from the Environment Agency Wales: Carmarthenshire County Council and Dwr Cymru Welsh Water. This is a special task force set up by the three organisations who are working together to assess how to protect the town from future flooding.

- **Burry Inlet Management Advisory Group: (BIMAG).**
To meet on a regular basis to work with the EAW to inform the development of a new management plan for the Burry Inlet.
To assist the EAW in communicating to the wider community.

- **Burry Inlet Cockles Investigations working group.**
  A group concerned with scientific research and investigations into the current cockle problems within the Burry Inlet.

- **Burry Inlet Stakeholder Forum: (BISF)**
  This will be a large group of representatives from the long list of stakeholders. It would include the advisory group and the Cockles Investigations Working group.

- **Relevant Authorities Group. (RAG).**
  This is a consortium of authorities and agencies which act as management group for the Carmarthen Bay Special Area of Conservation SAC). They are considered competent authorities under The Habitats Regulations and include EAW;CCW; CCS; CCC.

- **Swansea University, Bangor University & Hull University.**
  These are a group of universities which are currently undertaking a research project on the issue of Cockle mortality in the Burry Inlet.

- **Burry Inlet MOU Steering Group and Technical Officers Group.**
  Senior Officers and their Technical advisors from CCC ,CCS ,DCWW, the EA and CCW responsible for drawing up , using and monitoring the MOU in the discharge of their statutory functions .
Appendix 6. Relevant Legislation.

- The current European Council Bathing Water Directive (76/160/EEC). This will be superseded by the end of 2014 by The Bathing Water Directive (2006/7/EC).


- The European Council Freshwater Fish Directive (78/659/EEC)

- Planning Policy Wales (Edition 2, July 2010)

- The European Council Shellfish Waters Directive (2006/113/EC)

- The Town and Country Planning Act 1990 (As amended)


“AA” Appropriate Assessments.

“AMP” Asset Management Plan.

“Carmarthenshire” Defined as being the whole of the Carmarthenshire County Council administrative area, excluding the Brecon Beacons National Park which is a separate Planning Authority.

“CBEEMS” refers principally to the Carmarthen Bay and Estuaries European Marine Site (EMS) and, for the purposes of this MoU, is defined as including: 1) all of the following Natura 2000 sites: Carmarthen Bay and Estuaries Special Area of Conservation (SAC), Carmarthen Bay Special Protection Area (SPA) and Burry Inlet SPA; and 2) that area of the Estuary designated as a RAMSAR site under the Convention on Wetlands of International Importance, 1971 (The RAMSAR Convention).

“CCW” Countryside Council for Wales.

“CSO’s” Combined sewer overflows.

“Development” Defined as being the construction of any dwelling, commercial or industrial unit requiring sewerage and/or surface water disposal.

“EAW” Environment Agency Wales.

“EIA” Environmental Impact Assessment.

“METOC” Metoc plc who were commissioned to report, by DCWW, in response to a request to undertake an assessment of chemical loads to the Burry Inlet.

“Nutrients” Nitrates and phosphates.

“OFWAT” Office of Water Services. It is the economic regulator for the water and sewerage industry in England and Wales.

“Party” Defined as being all of the individual signatories equally.

“Primary Catchment” Defined as being the areas of land at Llanelli and Gowerton which comprises the drainage catchment for the Burry Inlet and Loughor Estuary.

“SAC” Special Area for Conservation

“Secondary Catchment” Defined as being one of the areas within Llanelli which feeds to a particular part of the sewerage infrastructure e.g. Pwll or Bynea

“Swansea” Defined as being the whole of the City & County of Swansea administrative area.

“WAG /WG” Welsh Assembly Government/Welsh Government.