

NRA  
Wales  
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# WHITLAND FLOOD ALLEVIATION SCHEME

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**NRA**

*National Rivers  
Authority  
Welsh Region*

# Whitland

Whitland is situated in the county of Dyfed approximately mid way between Haverfordwest and Carmarthen. The town has developed on the flood plain of the River Taf around the strategic bridging points of the River Taf to the south and the River Gronw to the east. The arrival of the railway at the turn of the century brought increased prosperity to the town but also worsened its flooding problems. Running along the flood plain to the south of the town and separating it from the River Taf, the railway acts as a barrier to flows from catchments to the north. Previously such flows had bypassed the town escaping across the flood plain and discharging straight into the River Taf.

## Flooding history

The town's location and past development makes it vulnerable to flooding and records of flood events, particularly from the River Taf, go back many years. In recent years, major flood events have occurred in December 1979, March 1981, and August 1986, and to a lesser extent in October 1991. This flooding has been mainly due to high flows in the River Taf and the River Gronw although several smaller watercourses to the west and south of the town have given problems in recent years.

Despite its large catchment (more than 216 square kms) and extensive flood plain both upstream and downstream of the town, the River Taf responds rapidly to heavy rainfall. The River Gronw, with its smaller catchment (30 square kms), responds still faster and takes only five hours to react to rainfall. By using river level and rainfall recording stations which can be interrogated remotely, the National Rivers Authority can monitor the development of flood conditions and issue warnings as appropriate.

## August 1986 event

On August Bank Holiday Monday, 1986, the remnants of "Hurricane Charley" resulted in approximately 100mm of rainfall falling on the River Gronw and its surrounding catchments in a 24-hour period. The flood flow was reported as the worst for 40 years and was estimated at approximately 30 cubic metres per second (*cumecs*) (6,600 gallons per second) compared with a normal flow of one *cumec* (220 gallons per second). Flood waters escaped from the River Gronw channel upstream of the A40 highway bridge, flowed across the school playing field before entering the town itself. Flood waters also escaped from the Cwmfelin Boeth, Cwm Waun Gron and the River Taf. Approximately 220 premises including houses, commercial properties



and the Dairy Crest Creamery were flooded. Traffic was generally disrupted and large areas of agricultural land on the flood plain were left under water. Flood damage during the event was estimated to be £1.4m.

## The scheme

Following the 1979 and 1981 flood events the South West Wales Local Flood Defence Committee, under the former Welsh Water Authority, embarked upon a river improvement scheme for the River Taf. The 1986 flood event occurred during construction of this scheme and, as a result, its scope was extended to provide improved flood protection from all four watercourses which converge on the town i.e the River Taf, Cwmfelin Boeth, Cwm Waun Gron and the River Gronw.

The general principle of the scheme was to prevent floodwaters escaping from these watercourses by means of:

- bypassing existing obstructions to flows;
- enlarging existing bridge openings and improving their entry and exit conditions; and
- constructing walls and embankments to contain floodwaters.



*Channel realignment works - River Gronw.*



*Work in progress - River Gronw floodbank on playing fields north of the A40.*





## The River Taf improvement scheme

This work was undertaken in two phases. The initial phase (July-September 1985) was part of Dyfed County Council's Trevaughan Bridge Improvement works. The work which cost £40,000 was undertaken by A Monk & Co. Ltd. and comprised:

- underpinning the existing bridge arches;
- lowering bed levels through the bridge;
- buttressing the western end of the bridge; and
- forming a flood relief channel to one side of the existing bridge.

The second phase (Summer 1986 - April 1987) was undertaken by the direct labour organisation of the former Welsh Water Authority and comprised:

- re-profiling the existing channel to increase capacity;
- construction of 150m of flood embankment;
- installing groynes and bed control weirs;
- providing blockstone bank protection; and
- general landscaping

*Flood relief channel - Old Trevaughan Bridge, River Taf.*



# CYNLLUN AMDDIFFYN RHAG LLIFOGYDD YN HENDY-GWYN



**AAC**

*Awdurdod Afonydd  
Cenedlaethol  
Rhanbarth Cymru*

## Hendy-gwyn

Mae Hendy-gwyn tua hanner y ffordd rhwng Hwlfordd a Chaerfyrddin yn Nyfed. Datblygodd y dref ar orlifdir Afon Taf o gwmpas mannau croesi Afon Taf i'r de ac Afon Gronw i'r dwyrain. Gyda dyfodiad y rheilffordd ar droad y ganrif, daeth ffyniant cynyddol i'r dref, ond gwaethgodd y problemau llifogydd hefyd o'r herwydd. Mae'r rheilffordd yn rhedeg ar hyd y gorlifdir i'r de o'r dref ac yn gwahanu'r dref ac Afon Taf gan rwystro'r llif o ddalgylchoedd i'r gogledd. Arferai llif o'r fath osgoi'r dref gan lifo ar draws y gorlifdir ac yn uniongyrchol i Afon Taf.

## Llifogydd yn y Gorffennol

Roedd safle'r dref a'i datblygiad yn y gorffennol yn ei gwneud yn agored i lifogydd helaeth, ac y mae hanes am lifogydd, yn enwedig o Afon Taf, yn mynd yn ôl ymhell. Yn ddiweddar, cafwyd llifogydd mawr iawn ym mis Rhagfyr 1979, Mawrth 1981 ac Awst 1986, ac i raddau llai ym mis Hydref 1991. Llanw uchel yn Afon Taf ac Afon Gronw oedd yn gyfrifol am y llifogydd hyn, er bod llawer o gyrsiau dŵr i'r gorllewin a'r de o'r dref wedi achosi problemau yn ystod y blynyddoedd diwethaf.

Er bod iddi ddalgylch eang (dros 216 km sgwâr) a gorlifdir helaeth i fyny ac i lawr yr afon o'r dref, mae Afon Taf yn ymateb yn gyflym i law trwm. Mae Afon Gronw, gyda'i dalgylch llai (30 km sgwâr) yn ymateb yn gyflymach fyth, a bydd yn ymateb i law mewn dim ond pum awr. Drwy ddefnyddio gorsafoedd i gofnodi lefel yr afon a'r glaw sy'n disgyn, a chasglu'r manylion ohonynt o bell, gall yr Awdurdod Afonydd Cenedlaethol gadw llygad ar gyflwr llifogydd a chyhoeddi rhybuddion yn ôl yr angen.

## Digwyddiad mis Awst 1986

Ar Ddydd Llun Gŵyl Banc mis Awst 1986 achosodd cynffon "Corwynt Charley" tua 100mm o law o fewn 24 awr ar Afon Gronw a'r dalgylchoedd o'i hamgylch. Dywedid mai'r llifogydd a ddilynodd oedd y gwaethaf ers 40 mlynedd, sef amcangyfrif o 30 metr ciwbig yr eiliad (cumeccs) (6,600 galwyn yr eiliad) o'u cymharu â'r llif arferol o un cumecc (220 galwyn yr eiliad). Llifodd y dŵr allan o sianel Afon Gronw i fyny'r afon o bont priffordd yr A40, ar draws cae chwarae'r ysgol ac i mewn i'r dref ei hun. Gorlifodd y dŵr hefyd o Gwmfelin Boeth, Cwm Waun Gron ac Afon Taf. Effeithiwyd ar ryw 220 o adeiladau gan gynnwys tai, eiddo masnachol a Hufenfa Dairy Crest.





Tarfwyd yn gyffredinol ar y traffig ac yr oedd darnau helaeth o dir amaethyddol ar y gorlifdir o dan ddŵr. Amcangyfrifwyd bod y llifogydd wedi achosi gwerth £1.4m o ddiffrod.

## Y Cynllun

Yn dilyn y llifogydd ym 1979 a 1981, dechreuodd y Pwyllgor Amddiffyn Rhag Llifogydd yn Ne Orllewin Cymru, o dan hen Awdurdod Dŵr Cymru, ar gynllun gwella ar gyfer Afon Taf. Digwyddodd llifogydd 1986 tra oedd y cynllun hwnnw'n mynd ymlaen, ac o ganlyniad ehangwyd ei gwmpas i ddarparu diogelwch rhag llifogydd o'r pedwar cwrw dŵr sy'n dod at ei gilydd yn y dref, hy Afon Taf, Cwmfelin Boeth, Cwm Waun Gron ac Afon Gronw.

Egwyddor gyffredinol y cynllun oedd atal dŵr llifogydd rhag dianc o'r cyrsiau dŵr hyn drwy:-

- fynd o gwmpas yr hyn oedd yn atal y llif ar y pryd.
- ehangu agoriadau presennol y pontydd a gwella'r ffordd i'r dŵr lifo i mewn ac allan.
- adeiladu muriau a chloddiau i gyfyngu dŵr llifogydd.



*Gwathb all-lunto stanel - Afon Gronw.*



*Gwathb ar y gweill - clawdd llifogydd Afon Gronw ar y meysydd chwarae i'r gogledd o'r A40.*



## Cynllun Gwella Afon Taf

Gwnaed y gwaith hwn mewn dwy ran. Cwblhawyd y rhan gyntaf (Gorffennaf - Medi 1985) fel rhan o waith Cyngor Sir Dyfed i wella Pont Trevaughan. Gwnaed y gwaith, a gostiodd £40,000 gan A Monk a'i Gwmni Cyf a chynhwysai

- atgyfnerthu bwâu presennol y bont;
- gwneud gwely'r afon yn is o dan y bont;
- bwtresu pen gorllewinol y bont; ac,
- creu sianel i leddfu llifogydd ar un ochr i'r bont bresennol.

Gwnaed yr ail ran (Haf 1986-Ebrill 1987) gan uned waith uniongyrchol hen Awdurdod Dŵr Cymru a chynhwysai

- ail-lunio'r sianel bresennol er mwyn iddi allu cario rhagor o ddŵr;
- adeiladu 150m o glawdd llifogydd;
- gosod grwyni ac argaeau i reoli'r gwely;
- diogelu'r glannau gan flociau o gerrig;
- tirweddu cyffredinol.

*Sianel hintaru llifogydd - Hen Bont Trevaughan, Afon Taf.*





## Cwm Waun Gron

Ar ôl y llifogydd ym 1986, gwnaed gwaith brys ar gwrs dŵr Cwm Waun Gron gan uned waith uniongyrchol Awdurdod Dŵr Cymru, a olygai wella'r sianel a chlirio'r rhannau isaf. Talwyd am y gwaith gan Gyngor Dosbarth Caerfyrddin a pherchnogion y glannau. Wedyn cafodd y darn yr effeithiwyd arno ei wneud yn rhan o'r "briŵ" rwydwaith, a gwneir gwaith rheolaidd erbyn hyn ar y cwrs dŵr hwn.

## Cwmfelin Boeth

Ym 1986 llifodd y dŵr o'r cwrs dŵr "cyffredin" hwn allan o'i sianel i'r gogledd o ffordd gysylltu'r A40, yna tua'r dwyrain ar draws y gorlifdir cyn rhedeg dros y ffordd a gorlifo i mewn i eiddo ar gyrion gorllewinol y dref. Adeiladwyd clawdd atal i rwystro'r dŵr hwn rhag llifo ar draws y

gorlifdir. Gwnaed y gwaith gan uned waith uniongyrchol Awdurdod Dŵr Cymru, ar wahân i ran fechan o fewn y terfyn priffyrdd ac a wnaed gan Gyngor Sir Dyfed. Talwyd am y cynllun cyfan gan y Swyddfa Gymreig.



*Clawdd llifogydd - Cwmfelin Boeth.*

*Cydlifiad Afon Taf, Afon Gronw ac Afon Cwm Waun Gron yn dangos sianel lliniaru llifogydd Hen Bont Trevaughan.*



# Gwelliannau ar Afon Gronw

Cam terfynol y cynllun cyfan oedd lleihau perygl llifogydd o Afon Gronw yn gorlifo drwy ganol y dref. Golygai hynny ffrwyno llifogydd o fewn y sianel bresennol cyn arllwys i mewn i Afon Taf. Roedd cynllun yr Awdurdod Afonydd Cenedlaethol yn golygu—

- adeiladu cloddiau llifogydd i'r gogledd o'r A40;
- ehangu pont yr A40 drwy ddarparu ail agoriad;
- codi'r muriau llifogydd ar hyd glan orllewinol Afon Gronw drwy'r Hufenfa;
- mynd heibio'r llifddorau presennol gan ddefnyddio cored ymyl a sianel gorlifo; ac
- ail-linellu'r sianel bresennol i gymryd y sianel gorlifo, ei gwneud yn bosibl i bont y rheilffordd gymryd mwy o ddŵr a gwella'r ffordd i'r dŵr lifo i mewn ac allan wrth bont y rheilffordd.

Cwblhawyd y gwaith ar ran olaf y cynllun ym mis Hydref 1993. Caiff canol y dref ei diogelu nawr rhag gorlifo o'r afon mewn llifogydd sy'n debygol o ddigwydd unwaith bob 100 mlynedd ar gyfartaledd. Ar ran Cyngor Dosbarth Caerfyrddin, mae'r AAC ar hyn o bryd yn ymchwilio i broblemau dŵr wyneb sy'n effeithio ar y dref.



*Sianel wedi'i ball-lunio ac amddiffynfeydd rhag llifogydd i fyny'r afon o'r bont reilffordd.*



*Cored ochr a sianel osgol.*

*Amddiffynfeydd rhag llifogydd neuwydd ger y man llwytho.*



## Problemau'r Safle

Roedd adeiladu cynllun Afon Gronw yn achosi amrywiaeth o broblemau peirianneg anodd. Gwnaed y rhan fwyaf o'r gwaith ar yr afon o fewn ffiniau ffatri, gyda ffordd gysylltu Caerfyrddin-Hwlfordd i'r gogledd a phrif reilffordd Llundain-Abergwaun i'r de. Cyfyngwyd y gwaith adeiladu i ddarn cul o dir ar hyd ymyl y cwrs dŵr, a chyfyngwyd ymhellach ar y mynediad gan rwydwaith cymhleth o bibau a manau croesi gan wasanaethau yn rhedeg o dan sianel yr afon, drosti ac ar ei hyd. O sianel yr afon ei hun yn unig y gellid gwneud llawer o'r gwaith, a byddai llanw uchel yn yr afon yn aml yn tarfu ar y gwaith. Achoswyd



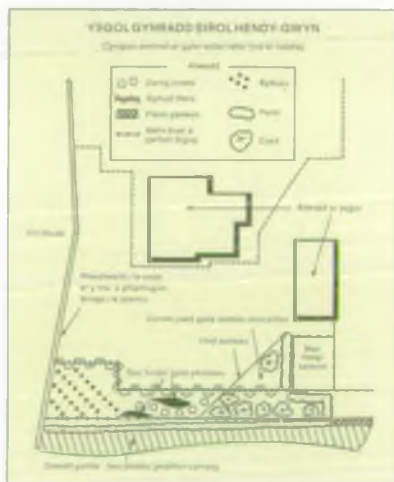
*Gwaith ar y gweill yn dangos yr amodau gwaith anodd, mynediad cyfyng a threfniadau gwasanaethau cymhleth o fewn safle'r Hufenfa.*

cymhlethdodau pellach am fod angen gwyro traffig dros dro wrth adeiladu'r bont newydd ac am fod y gwaith ei hun mor agos at bont y brif reilffordd.

## Cadwraeth

Cyn dechrau'r gwaith o lunio cynllun Gwella Afon Taf, gwnaed arolwg o'r afon a'i choridor er mwyn nodi cynefnoedd bywyd gwyllt pwysig, ac i benderfynu'r effaith a gai'r gwaith ar amgylchedd yr afon. O ganlyniad, cafodd coredu, grwyni a chloddiau eu hymgorffori i gymryd lle nodweddion naturiol yr afon a fyddai'n diflannu. Plannwyd coed a thirweddwyd yn helaeth ar hyd glan yr afon, a cludwyd cerrig a graean i sefydlu'r sianel newydd. Cafodd planhigion dŵr eu storio hefyd dros dro ar y safle a'u defnyddio fel "had" ar gyfer y sianel newydd.

Dewiswyd y llwybr ar gyfer y cloddiau llifo newydd er mwyn iddynt gael cyn lleied â phosibl o effaith ar dirwedd, ac i gollu cyn lleied â phosibl o goed a thyfiant ar hyd y glannau. Yn y



manau trefol, mae defnyddio amddiffynfeydd caled ynghyd â thirwedd cyffredinol ar y glannau gerllaw wedi gwella'r amgylchedd leol.



# Ffeithiau a ffigurau

## Awdurdodau ariannu

Hen Awdurdod Dŵr Cymru

(Cyn 1989)

Awdurdod Afonydd Cenedlaethol

(Ar ôl 1989)

Y Swyddfa Gymreig

Hufenfa Dairy Crest

## Awdurdodau Hybu

Awdurdod Afonydd Cenedlaethol,

Rhanbarth Cymru

Awdurdod Dŵr Cymru (Cyn 1989)

## Arfarniad posibilrwydd a chynllun manwl

Gwella Afon Taf

Hen Awdurdod Dŵr Cymru

(Cyn 1989)

Gwella Afon Gronw

W S Atkins - Cymru

# Manylion y cynllun

## Rhan 1 — Gwella Afon Taf

(a) Diwygiadau Pont Trevaughan

1985 £40,000

A Monk a'r Cwmni Cyf

(b) Cloddiau llif Afon Taf

1986/87 £90,000

Uned Waith Uniongyrchol

Awdurdod Dŵr Cymru

## Rhan 2 — Gwaith Cwm Waun Gron

1987 £5,000

Uned Waith Uniongyrchol

Awdurdod Dŵr Cymru

## Rhan 3 — Cloddiau atal Cwmfelin Boeth

1987/88 £4,000

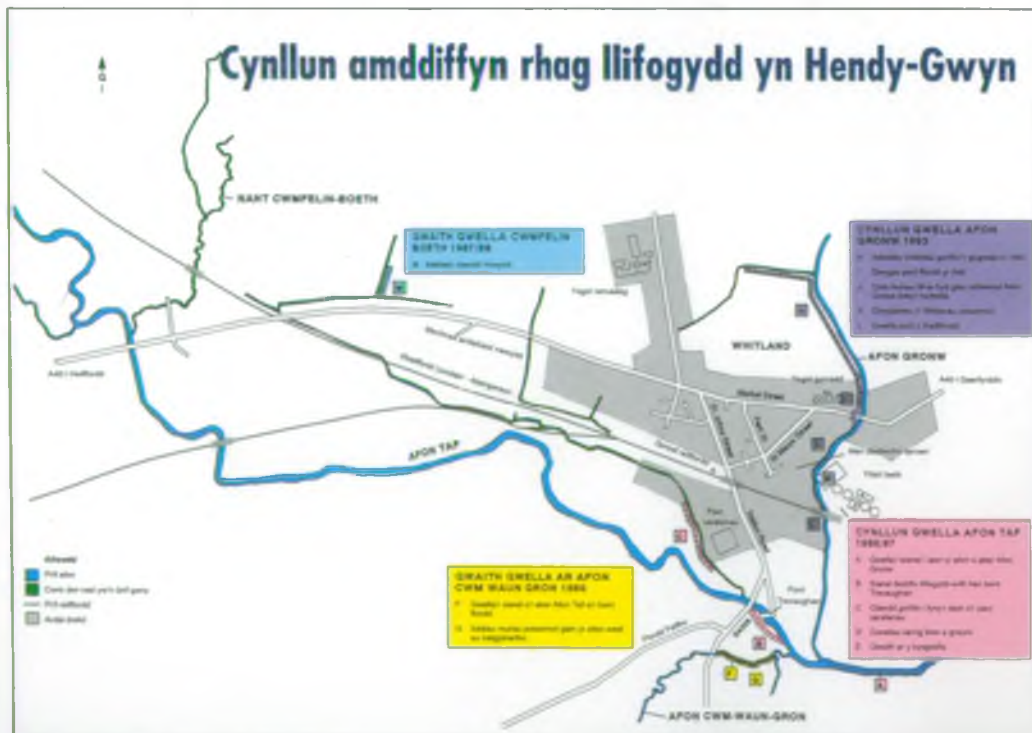
Uned Waith Uniongyrchol

Awdurdod Dŵr Cymru

## Rhan 4 — Cynllun Gwella Afon Gronw

1993 £373,000

Alun Griffiths (Contractiwr) Cyf



Cynhyrcbwyd ar bapur wedi et all gylchu.

## Site problems

Construction of the River Gronw scheme posed a variety of challenging engineering problems. Most of the river works were undertaken within the confines of a complex factory environment, bounded to the north by the Carmarthen-Haverfordwest trunk road and to the south by the London-Fishguard main railway line. Construction work was restricted to a narrow working strip alongside the watercourse and access was further restricted by the presence of a complex network of pipe and service crossings running under, over and alongside the river channel. Much of the work could only be carried out from within the river channel and operations were



*Work in progress showing difficult working conditions, restricted access and complex services arrangements within Creamery site.*

frequently disrupted by high river flow. The need to temporarily divert traffic while constructing the new bridge and the proximity of the works to the main railway line caused further complications.

## Conservation

Before design work began on the River Taf improvement scheme the river and its corridor was surveyed to identify important wildlife habitats and to determine the impact the work would have on the river environment. As a result, weirs, groynes and bankside works were incorporated to replace natural river features which were lost. Along the river bank extensive tree planting and landscaping was carried out and boulders and gravel were imported and used to establish the new channel.

The route for the new flood embankments was chosen to generally minimise their impact on the landscape and to keep tree and bankside vegetation loss to a minimum. In the urban areas the use of soft and hard flood defences together with general landscaping of the adjoining banks has enhanced the local environment.



The NRA has agreed to develop a nature area for Whitland County Primary School within the school grounds. The proposal includes seeding the floodbank with a mix of wild flowers; a seating area, bird table and bath, bird boxes, butterfly borders and a wildlife corner.

# Facts and figures

## Funding authorities:

- Former Welsh Water Authority (Pre 1989)
- National Rivers Authority (Post 1989)
- Welsh Office
- Dairy Crest Creamery

## Promoting authorities:

- National Rivers Authority, Welsh Region
- Welsh Water Authority (Pre 1989)

## Feasibility appraisal and detailed design:

- River Taf improvement
- Former Welsh Water Authority (Pre 1989)
- River Gronw improvement
- W S Atkins - Wales

# Scheme details

## Stage 1 — River Taf improvements

- (a) Trevaughan Bridge modifications  
1985 £40,000  
A Monk & Co. Ltd.
- (b) River Taf flood banks  
1986/87 £90,000  
Welsh Water Authority  
Direct Labour Organisation

## Stage 2 — Cwm Waun Gron works

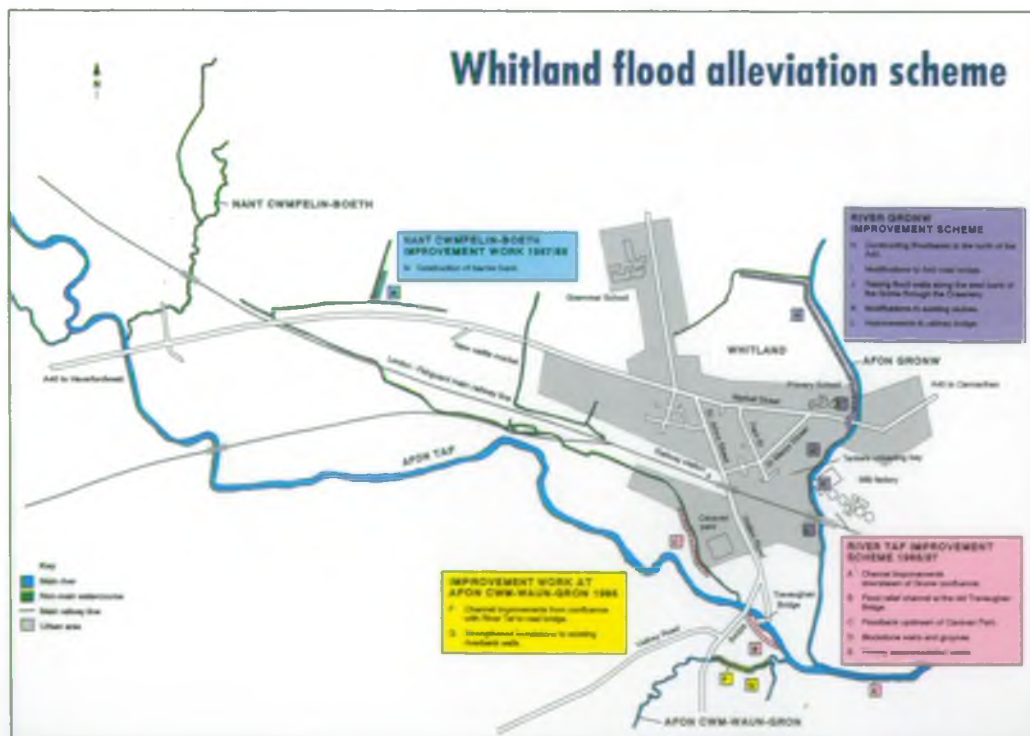
- 1987 £ 5,000  
Welsh Water Authority  
Direct Labour Organisation

## Stage 3 — Cwm Felin Boeth barrier banks

- 1987/88 £ 4,000  
Welsh Water Authority  
Direct Labour Organisation

## Stage 4 — River Gronw improvement scheme

- 1993 £373,000  
Alun Griffiths (Contractor) Ltd.





## Cwm Waun Gron

Following the 1986 floods emergency works were carried out on the Cwm Waun Gron watercourse by the Welsh Water Authority direct labour workforce which involved channel improvement and clearance works on the lower reaches. The work was funded by Carmarthen District Council and riparian owners. The affected length was then "mained" and regular maintenance work is now undertaken on this watercourse.

## Cwmfelin Boeth

In 1986 floodwaters from this "ordinary" watercourse left the main channel to the north of the A40 trunk road, migrated eastward across the flood plain before overtopping the road and flooding property on the western outskirts of the

town. To prevent this migration across the flood plain a barrier bank was constructed. This work was carried out by the Welsh Water Authority direct labour workforce apart from a small section which fell within the highway boundary and was carried out by Dyfed County Council. The whole scheme was funded by the Welsh Office



*Barrier bank - Cwmfelin Boeth.*

*Confluence of Rivers Taf, Gronw and Cwm Waun Gron showing Old Trevaughan Bridge flood relief channel.*



# River Gronw improvements

The final stage of the overall scheme was to minimise the risk of the River Gronw flooding the town centre. This involved containing flood flows within the existing channel before discharging into the River Taf. The National Rivers Authority scheme involved:

- constructing flood banks to the north of the A40;
- enlarging the A40 bridge by providing a second opening;
- raising flood walls along the west bank of the Gronw through the Creamery;
- bypassing the existing sluice structure using a side weir and overflow channel; and,
- realigning the existing channel to accommodate the overflow channel and improving the capacity and the entry and exit conditions at the railway bridge.

Work was completed on the last stage of the scheme in October 1993. The town centre is now largely protected from flood events likely to occur on average once every 100 years. On behalf of Carmarthen District Council, the NRA is currently investigating surface water problems affecting the town.

*New flood defences alongside loading bay.*



*Realigned channel and flood defences upstream of railway bridge.*



*Side weir and sluice bypass channel.*

