



St. Asaph Flood Risk Management Scheme Case Study – KS2/3

St. Asaph

Awarded city status 2012, St Asaph is a small city in North Wales, situated in the Vale of Clwyd between Denbigh and the coastal resort of Rhyl. It is home to the smallest Cathedral in Britain and has a population of just under 3,500 according to the 2011 census. It is located on the lower reaches of the River Elwy.

The River Elwy

The River Elwy, a tributary of the River Clwyd comes into existence in the village of Llangernyw (South-west of St.Asaph) as three rivers converge to form the Elwy – Afon Gallen, Afon Collen and the Afon Cleddwen - see **Figure 1**.

Tributary – A tributary is a stream or river that flows into a larger river or lake.

From Llangernyw the Elwy flows easterly to Llanfair Talhairn where another tributary, the Afon Aled joins the Elwy. After passing through Bont-Newydd, the Elwy turns northwards and flows through St.Asaph. Flowing directly through the city, the Elwy is a medium sized river with a catchment area of around 250km² when it reaches St. Asaph.

Catchment – A catchment is an area of land where water collects when it rains, often bounded by hills. As the water flows over the landscape it finds its way into streams and down into the soil, eventually feeding a river. Every inch of land on the Earth forms part of a catchment.

The Elwy has its confluence with the River Clwyd 1.8km downstream of St Asaph – see **Figure 2**.

Confluence - the point at which two rivers or streams join.

History of flooding at St. Asaph

Flood risk to the city comes predominantly from raised water levels in the River Elwy overtopping the city's flood defences Historically flooding has occurred in the city in 1871, 1882 and 1896. During the 20th century, flooding was reported during 1913, 1964 and 1965. This prompted construction of the original defences through the city in the 1960's.

These defences were raised again during 1975. The defences withstood all flood events until the 27th November 2012.



Figure 1 – map showing the Rivers Gallen, Collen and Cledwen meeting at Llangernyw to form the River Elwy

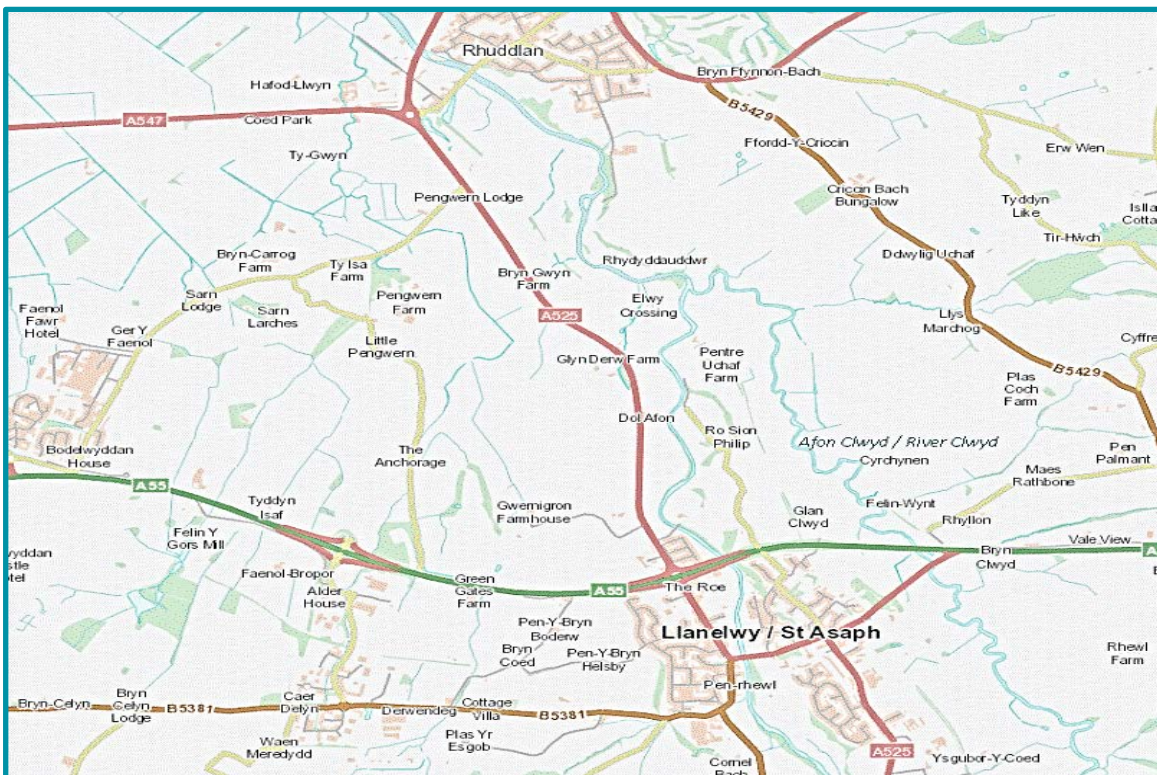


Figure 2 – Map showing the confluence of the River Clwyd and Elwy



Figure 3 - Images from the 1964/1965 St.Asaph floods



November 2012 Floods

The flooding in November 2012 occurred when prolonged, intense rainfall fell over the catchment. During the early hours of Tuesday the 27th November 2012, the defences were overwhelmed when the Elwy rose 3 metres above its normal level. 322 homes, 32 businesses and 70 caravans within the city were flooded. A flood depth of 0.8 metres was recorded and the floods resulted in one tragic fatality. **Figure 4.** demonstrates the extent of flooding experienced by St.Asaph.



Figure 4 – flooding at St. Asaph

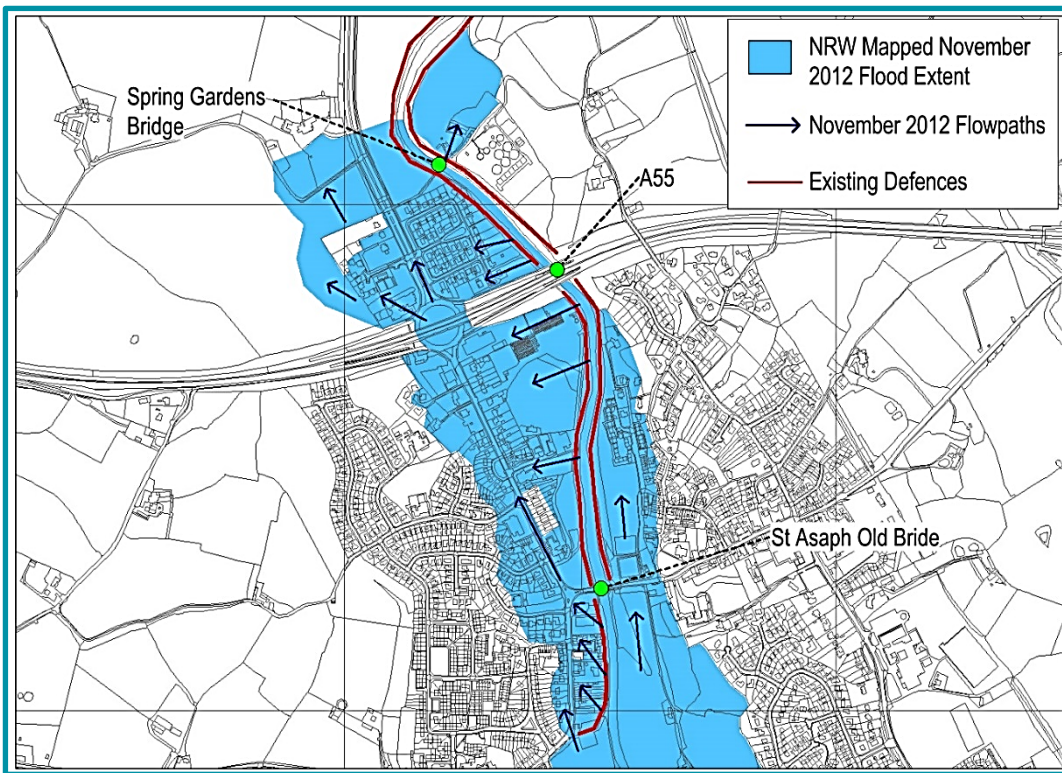


Figure 5 – map showing the November 2012 flood extent

Overtopping of the defences during November 2012 caused severe flood damage throughout the city.

Standard of Protection (SoP)

Standard of Protection - A flood defence standard of protection calculates an estimated level of risk to a specific area from flooding from the sea or a river.

Flood defences are built to reduce the risk of flooding from the sea or a river. The standard of protection they offer is usually described in terms of the likelihood of a flood event happening from overtopping of those defences.

For example, a flood defence could be described as providing a 1 in 100 year standard of protection. This means that the defence could overtop if subjected to an event which has a probability of less than 1% in any given year.

The November 2012 flood was estimated to have been between a 1 in 100 (1%) and 1 in 200 (0.5%) annual probability event.

Climate change is predicted to increase the frequency with which severe floods occur in St Asaph. Future climate change would both significantly reduce the standard of protection provided by the existing defences and increase the number of properties at risk from flooding.

Following the floods in 2012 it was decided that a new flood risk management scheme was required to reduce both the present day risk of flooding in St Asaph and to allow for it to be managed for the effects of future climate change. It was agreed to raise the existing flood defences and replace the Spring Gardens Bridge.



Figure 6 – An otter sculpture in the park during the 2012 floods.

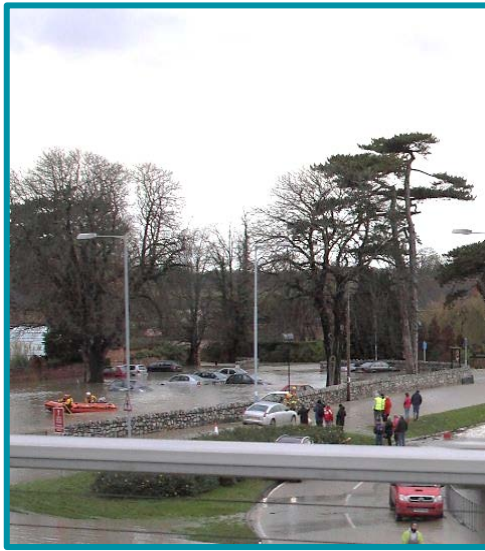


Figure 7 – view along the A525 during the 2012 floods

Photos taken by Alun Williams

The new Flood Risk Management Scheme will provide a 1 in 200 (0.5%) annual event probability standard of protection against flooding with the defences being designed so they can be raised again in the future for climate change to maintain a 1 in 100 (1%) annual event probability standard throughout their design life (100 years).

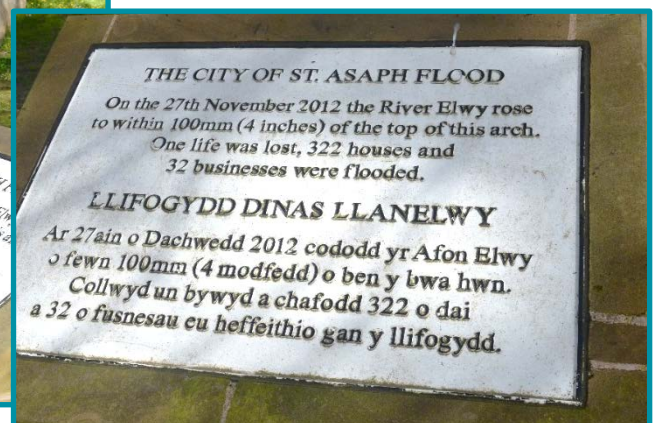


Figure 8 – work in progress to replace Spring Gardens Bridge



Figure 9 – Above - work in progress by the Old Bridge at St. Asaph

Figure 10 – Left, a plaque to remember the 2012 flood and the damage it caused



Good for the environment

Scheme detriments

The key negative impact resulting from the Scheme has been tree loss along the river corridor to enable the construction of the Scheme. Approximately 80-90 trees were removed however more new trees were planted to compensate for the loss.



Figure 11 - several trees had to be removed along the river corridor to allow access for machinery to begin work on raising existing defences

Scheme benefits

Good for the environment

- An interpretation board for St. Asaph Old Bridge Scheduled Ancient Monument was installed in collaboration with Cadw.
- Bird, bat boxes and otter holts were installed to increase the biodiversity in the project study area and coarse woody debris used to provide fish refuges.

Holt - Otters rest in underground dens, called holts, under waterside trees or in cavities in bank-side rocks.

- Landscaping of embankments and sowing of wild flowers seed mix within the recreation ground improved the appearance of the river corridor.

- Access to the river was encouraged by reducing embankment slope gradient.
- Waste and litter bins were installed to help reduce the amount of litter along the riverbank.
- Tree and hedgerow planting were undertaken including the planting of native black poplars and the establishment of a community orchard

Good for people

- Existing foot and cycle paths that linked to the existing flood defences were widened, resurfaced and new lengths of footpath established along the embankment crests. New signage, separate lanes for cyclists and improved access ramp gradients were installed.
- A contribution was made towards the installation of sculptures along the river embankments to add to the appeal of the riverside walks.

Also available:

A Key Stage 4/5 'Task and Problem' and 'Solution' document for this case study can be found on the Education, Learning and Skills pages of NRW's website.

You may also wish to refer to the 'St. Asaph November 2012 Floods Data Report' which can also be found on these pages.

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