



GRIFFITHS

civil engineering and construction

Rail Division Case Study **Llanrwst Emergency Works**

On Boxing Day 2015, the Conwy Valley branch line that runs by the village of Llanrwst in North Wales was significantly damaged by flooding as a result of prolonged rainfall. Subsequent flooding resulted in ballast washout to the line and damage to a number of bridges.

The Conwy Valley branch line runs between Llandudno Junction and Blaenau Ffestiniog and is an important rail connection for the local community. It was therefore vital the line was repaired as soon as possible to allow services to be restored.

During December the area had over three times its average monthly rainfall, resulting in exceptionally high levels of water run-off unable to flow into the swollen River Conwy. The rail line along this stretch typically acts as a barrier between the river and the adjacent flood plain.

The rising waters breached the line, washed away ballast and deposited it in nearby culverts and ditches.

The full extent of the damage and remedial work could not be assessed until the flood waters had receded.

Working in close collaboration with Network Rail, teams from Griffiths arrived at the site on 28th December to

assess the damage. 2.4km of line needed urgent attention.

The first task was to clear the 1,200 tonnes of ballast and other material which had been washed into culverts and ditches. It was important to ensure these assets would correctly function and would not themselves cause further flooding. A significant amount of material also had to be removed from privately owned land, which was then reinstated.

Poor ground conditions presented its own challenge with the Griffiths trackside compound flooded at times up to 1m. Difficult access to the site was overcome by the use of the rail line to bring in equipment and materials.

In total 1,000 tonnes of new ballast was brought in to repair the line. The partly failed embankment was reinstated and protected with 600 tonnes of new rock armour. Although Griffiths was tasked only with repairing the damage, additional measures to build-in resilience

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were proposed as the area will remain susceptible to flooding.

One of the solutions proposed by Griffiths was to cover the embankment slopes with geotextile membrane, keyed into a trench at the toe of the embankment. Rock armour was then placed up to cess level.

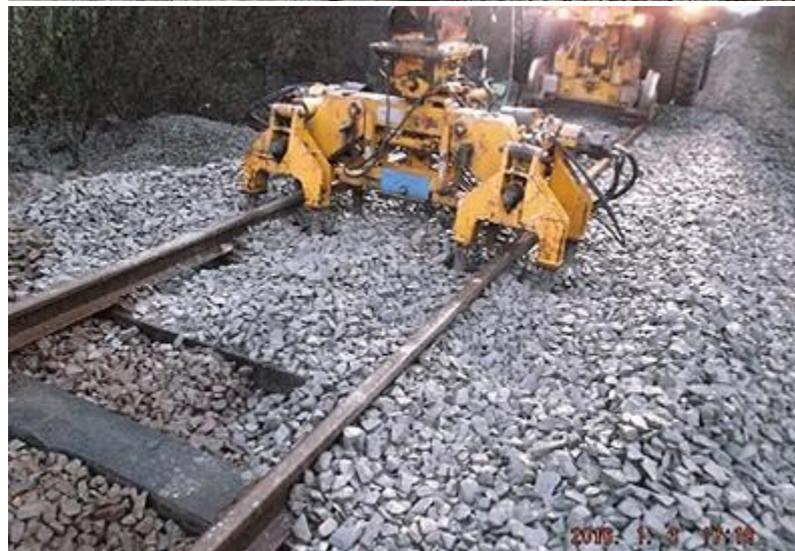
Additional work included repairs to retaining walls and abutments on Bridge 14, which had been undermined by fast-flowing water. This work included repairs to an 11-tonne transition slab which had dropped.

Again, Griffiths recommended building-in future resilience for this bridge, with extended wing walls and anti-scour protection. A key trench with 500mm stone wrapped in geotextile matting was reworked at a shallow angle to ensure that earthwork fill material would be protected from future flooding.

The final stage of the work involved repairing a failed parapet wall on a small aqueduct spanning the railway line. The failure had resulted in water, silt and debris being deposited on the line below. The watercourse over the aqueduct was over-pumped to allow the failed parapet to be rebuilt. Griffiths strengthened the works with stainless steel dowels to prevent damage and debris being deposited on the line in future.

Boundary fences along the line were either repaired or replaced.

Network Rail's aspiration was that the line should be ready to open in February. Thanks to the efficiency of the Griffiths team the work was completed well within schedule during January.



Pictured:

TOP: Flood waters had over-topped the line causing significant ballast washout. As a result the Conwy Valley Branch Line was disabled.

CENTRE: 600 tonnes of new rock armour was brought on to site to allow Griffiths to repair the line as well as build-in future resilience.

BOTTOM: Repairs to the damaged track were conducted using a tamping bank.

Project details at a glance

Client: **Network Rail**
Location: **Llanrwst, Conwy, Wales**
Completed: **January 2016**
Value: **£1.7m**
Contract: **NR4**