

LNW Civils TW313 Midlands Earthworks

Client: Network rail
Designers: Scott Wilson Rail & Atkins Rail
Value: £1.7m. **Date:** Jan—Nov 2010

The TW313 Midlands Earthworks contract involved completing stabilisation, earthworks and drainage improvements to embankments and cuttings on 4 separate sites across the midlands rail network.

1. Brill Cutting Drainage Improvements

Brill Cutting, located 10km to the south east of Bicester, carries the Ashendon Junction to Aynho Junction Line. This section of line often flooded during periods of heavy rain due to uncontrolled land drainage discharges into the cutting. The scheme was designed to channel overland flow into trapezoidal ditches at crest level, discharging into upgraded cess drains via a cascade to the south end of the scheme, also enhancing existing siphons and containment structures to the north end of the site. Large areas of the site fell within the Rushbeds Wood SSSI and as such extensive liaison was required with Natural England and Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust.

Work involved; 10,000m² of de-vegetation to dense woodland on the down main cutting slope, 700m of trapezoidal ditch and containment bund, 60m of hand excavated ditch around mature tree roots, 400m of cess drain upgrade with associated chambers, construction of a 30m long stone pitched cascade to transfer flows to upgraded cess drainage, construction of new 1500mm wide x 800mm high highway culvert and headwalls below Wotton End Road to carry the increased flow, daily track monitoring during cess drainage works and miscellaneous improvements to existing siphons and brick structures to the crest drain at interface points.



Cess drainage renewal works were undertaken using T2H and T3 possessions between 01.00 and 05.30. Limited possession times meant that the use of on-track plant to undertake the work wasn't feasible as the nearest RAP was a mile away from the worksite, therefore temporary access routes from the crest to cess level were formed to enable work to be undertaken using dumpers and midi-excavators in the cess. This method allowed us to utilise T2H possessions as an alternative to the lengthier process of booking T3 possessions.

Crest drainage and other lineside work was generally undertaken during the day and covered by the normal RIMINI planning procedure where applicable. Where required, specific safety critical staff were provided to ensure protection of the line at all times.



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2. Weedon Embankment Stabilisation

Weedon embankment is located at the village of Weedon on the down main West Coast Main LEC1 lines between 71m 60ch and 72m 0ch, approximately 8 miles south of Rugby station. The electrified line has a 125mph line speed.

This 400m section of embankment had been exposed to back scars and was infested with rabbits which had caused extensive damage to the surface of the embankment fill. This had subsequently led to collapsed burrows, void migration, collapse settlement, localised transitional sliding, undermining of cess retention and the loss of support of the embankment shoulders.

The scheme involved;

- Creating an 800m access road to the site was created through farmland which included a 400m section of portable roadway placed adjacent to high voltage cables running parallel to the embankment to avoid safety issues with excavation plant.
- Clearing the embankment slopes of the existing vegetation.
- Re-construct the collapsed and blocked toe drain for the full length of the upgraded embankment.
- Re-lay an existing water service from a well in the field adjacent to the embankment to nearby cottages (100m).
- Re-grade and stabilise the 400m section of embankment by excavating away loose surface materials generally 1m but up to 2m deep in places (4000m³), placing a stone starter/drainage layer to a wider base footprint and then re-filling with 10,000m³ engineered structural fill in compacted layers to a new shallower gradient
- The wider embankment provided cess retention and the establishment of a new safe cess.
- Rabbit netting was then installed on the completed embankment slopes followed by topsoiling.
- Throughout the duration of the scheme a 24 hour track monitoring programme was in place.

As site access was not available in the land adjacent to the embankment, all materials had to be transported along the narrow embankment earthworks layers requiring double handling and the use of 9t dumpers and midi-excavators to ensure safe clearance distances were maintained.

We were able to re-design the embankment crest works so that all work was carried out in fenced green zone working facilitated by installation of 500m of Vortok fencing and the use of small plant.



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3. Roade Cutting Rock Face Stabilisation

Roade Cutting is located approximately 10km to the south of Northampton and carries the fully electrified LEC1 and HNR West Coast Lines.

The objective of the scheme was to stabilise an 850m section of rock cutting by clearing trees, root balls and vegetation from the existing rock faces of the cutting and installing rock fall prevention netting over the full length. Trees were removing to a distance of 2m beyond the crest of the cutting. The stumps were treated with an approved herbicide and root killer.

Work on the crest and rock face required use of secured rope access arrangements for operatives. Light scaling of the rock face to remove unstable rock and soil materials was carried out by hand or hand held power tools.

Installation of top anchorage dowels was carried out using hand held drilling equipment while the bottom dowels were installed using a road/rail excavator with a rotary percussive drilling attachment.

270 nr x 2.2m long top and bottom anchors were installed together with 5000m² of secured rock netting to protect the rock face.

The work was carried out using various possessions including T3 weekend possessions, working in both separated green zones and safe guarded green zones, and separated green zone weekday works – whilst working on crest installing anchors & de-vegetation works. Management of the electrification isolations was also carried out.



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4. Baggeridge Cutting and Embankment Works

This stabilisation work was undertaken along the Down Main cutting slope at Baggeridge, nr Tamworth to a 40m unstable length of cutting slope.

The project consisted of;

- Construction of 262m of new crest drain to address poor drainage issues. A 300mm perforated pipe was installed in a 2m deep x 750mm wide geotextile lined and stone filled trench. A number of manholes with weir walls and orifice plates were constructed on the new crest drain to provide flow control. The new drain was connected to an existing surface water manhole at the downstream end.
- On completion of the crest drain it was reinstated over with a pinned filtration geotextile with 100mm of gravel placed over to hold the geotextile in place.
- Stabilisation of the cutting slope was carried out by excavation of existing near surface soils in 5m sections down through the soft and organic clays into the underlying coal measures. The excavation was taken to 2m below track level and the excavated face benched to allow tie-in of the filling materials.
- Excavations to the lower embankment were undertaken during night time T3 possessions, with debris protection boarding placed on the track side of the excavation.
- The excavated faces were lined with geotextile before re-filling with 6G granular stone fill placed to a new shallower gradient.
- Daily track monitoring was carried out during the excavation work.

