

West Coast Main Line, Track Enhancements

Client

Network Rail - Infrastructure
Investment Enhancements

Scope of work

Trackbed Investigation and Design as
part of multidisciplinary team



The highest profile enhancement project in the UK over the past decade, has been the upgrade of the West Coast Main Line (WCML) which has included a number of large, stand alone enhancement projects.

The Trent Valley 4 Tracking Scheme was a key component of the West Coast Route Modernisation Project, which included £350M work to provide an additional 2 tracks for over 12 miles of the line with line speeds of up to 125mph for the new fleet of active tilting trains.

This project posed particular problems and opportunities in terms of trackbed investigation and design, and is a good example of the range of services Scott Wilson offers.

New Build

The project included significant earthworks to accommodate the new tracks. These included long sections of cutting and new embankment with the trackbed built up as new. Scott

Wilson provided designs for the new trackbed to ensure suitable tie-ins with the existing and new infrastructure.

Transition Design

Detailed trackbed investigation and design was required at the transitions from the existing to the newly constructed (and untrafficked) railway formation. These locations posed a particular risk of differential settlement under loading, and geogrids were included in the trackbed designs to minimise these effects.

In addition, it was necessary to provide detailed trackbed design at the transitions from under track structures to the existing and new formation, where again problems of differential settlement need to be designed out.

Track Realignment

The enhancement works required a considerable amount of changes to the vertical alignment of the track, to interface with existing and new

structures, whilst allowing line speeds of up to 125mph and suitable gauge clearances. The trackbed design took into account detailed data, collected as part of the trackbed investigation to ensure that material horizons were properly considered in locations where the track was to be lowered, and a suitable construction was used where the track was to be lifted.

Horizontal realignment was also required which often included track slews of less 0.5m, which moved the footprint of the track structure onto some previously untrafficked formation materials. The trackbed investigation was detailed enough to assess the quality of the formation materials beneath the new track alignment, to provide confidence that there would not be any deterioration of track quality in the future.

Staging

The nature of the project meant that it was necessary to keep the line open during the construction phase

of the project. This meant that the physical works needed to be carefully staged and a number of temporary alignments were used before the track was taken to its final alignment. Therefore, it was necessary to ensure that the trackbed design took into account both the temporary alignment and also the requirements for the formation (including cross track cross falls) for the track in its final alignment.

Track Drainage Design

The trackbed and permanent way design also required careful integration with the existing track drainage system. New track and temporary alignments meant that the existing system often became redundant creating a requirement for new track drainage to be designed. It was essential that this drainage design tied in with the trackbed design for the staging process and also when the track was in its final alignment.

Ballast Cleaning and Assessment of Existing Trackbed Materials

As the project progressed, it became apparent that it would not be cost effective to renew the trackbed throughout the project and it became necessary to predict the residual life of the existing trackbed materials. It was also possible to further analyse laboratory results to assess the existing trackbed materials for their potential re-use, by renewal of sections of track using a Medium Output Ballast Cleaner.

Materials Testing

In addition to the materials testing undertaken during the trackbed design process, Scott Wilson was also commissioned to undertake chemical analysis of spoil material to be removed from site, for assessment of the requirements for it to be disposed of as special waste. Materials assessment was also undertaken on the newly placed ballast after Network Rail raised concerns about the source and transportation of the material to site during the construction process, and the possible detrimental effect on trackbed life if the ballast had become contaminated with fines.

On Site Advice

Scott Wilson also provided on site advice on a number of occasions when unforeseen circumstances were encountered during the construction process. This advice included quick remedial measures that would ensure the integrity of the final track construction and further guarantee the success of the project.

Other Enhancement Projects:

- **Reading Area Remodelling** - remodelling of Reading Station and upgrade of the associated signalling
- **East London Line** - integration of underground and National rail services, including line extensions

- **W10 Gauge Clearance** – assessment of trackbed requirements for track lowering sites at over bridges
- **Airdree to Bathgate Line Regeneration** – reopening of passenger route that has been mothballed for 50 years

