



CASE STUDY

Scheme	Network Rail Sussex Renewals
Location	Holmethorpe Substation
Client	BAM Nuttall
Completed	December 2017

Collaborative Engineering Solutions



The Redhill Platform Development Project was intended to develop a number of complimentary enhancements that, together, allow additional splitting/jointing of services at Redhill and provide additional resilience to facilitate operation of the proposed post-Thameslink K02 timetable.

In order to create this flexibility and increase train capacity at Redhill Station, an additional platform (referred to as Platform 0) was planned to be constructed. The new platform will be positioned over the current No.2 Up Siding, Snow Plough Siding and Up Siding Turnouts. The current Goods Loop will be converted to a passenger line (referred to as Up Loop 0) to allow trains to serve the new platform.

As part of the second stage of the Redhill Station redevelopment works, BAM Nuttall awarded RJ Power Rail the contract for the design, build, installation, test and commissioning of a new DC switchgear module at Holmethorpe substation. The aim is to provide additional resilience to the existing infrastructure and increase the operational flexibility by providing an additional DC circuit feed (B113) from both Holmethorpe and Redhill A substations to support the new Platform Zero and associated train services.

The contract to RJ Power Rail was awarded in September 2016 and was successfully commissioned into service December 2017.



Project Deliverables:

RJ Power Rail's work scope had a number of key deliverables which relied on the experience of the operations and delivery team. These included:

- 🌀 The design, build, installation, test and commissioning of a new DC switchgear module at Holmethorpe substation including craneage
- 🌀 The procurement of DC switchgear equipment from Hawker Siddley switchgear and SCADA equipment from Sella Controls for supply and fitment into the purpose-built module fabricated by Bradgate containers
- 🌀 Providing a separate DC circuit feed from both Holmethorpe substation and Redhill A substation
- 🌀 De-commission and remove the existing DC module and dispose
- 🌀 Manage the switch-over of the supply from the existing unit to new DC module
- 🌀 Supply and install all supply and feeder cables for the DC module
- 🌀 Provision of a Design and Construction CRE to engage and manage the engineering assurance process as per NR/L2/INI/02009
- 🌀 Managing the diversion of the existing HV feeder F3003 to enable the location of the new DC module within the available footprint of the Holmethorpe site
- 🌀 Provision of all handback and operational information to handover the module to Network Rail Maintenance

Further additional works were undertaken by RJ Power Rail as the overall scope of works evolved to incorporate areas of the wider Redhill re-development scheme. These included:

- 🌀 Additional HV feeder diversion works to support the Redhill Platform Zero footprint and additional HV cable containment between Redhill Station and Holmethorpe substation
- 🌀 Undertaking the full ETE scope of DC traction power cable supply and installation at both Redhill A and Holmethorpe substation in support of B113 Redhill Up Loop Platform Zero
- 🌀 Full replacement of DC traction power cables for existing circuits at Holmethorpe substation



Challenges and Solutions

Staged Works

The contracted works had to be delivered in a number of stages to support the overall client programme:

Initially RJ Power Rail supported the early decommissioning of redundant assets in order for BAM Nuttall to clear the old railway sidings to make way to the new Platform Zero enabling works. This included, relocation of points heating supplies, decommissioning of siding lighting columns and the temporary diversion of the existing HV feeder and pilot cables.

The DC module for Holmethorpe underwent design and construction and then installation of the internal equipment before a series of factory acceptance tests.

RJ Power Rail supported BAM Nuttall in preparing the Holmethorpe site for the new DC module by working with their civils team, to relocate existing earthing arrangements and slew cables from existing locations.

On completion of the Holmethorpe civils enabling works, RJ Power Rail delivered and lifted the module into site during a possession using a road crane. BAM Nuttall were then able to complete the ETE trough routes associated with the new DC breakers.

The ETE connections work scope grew during the course of the contract. RJ Power Rail were asked to support a change of scope to include the supply and installation of new DC cabling from the DC module to the conductor rail terminations for each breaker to a remote TIS unit.

RJ Power Rail worked closely with our client BAM Nuttall and the wider rail community involved in the Redhill Redevelopment works including Network Rail and the S&C Alliance to agree other areas of work-scope which required specialist electrical support. This led to the award, of another significant scope change to incorporate new ETE cable connections and test and commissioning works required to support the energisation of a spare circuit breaker within the Redhill A DC module, now designated as B113.

ETE connections between the newly installed Holmethorpe DC module and associated conductor rail and TIS termination points were undertaken during a series of pre-planned possessions using both mechanical and manual cable pulling techniques. The ETE connections for Redhill A DC circuit breaker also utilised some of the same possessions to maximise efficiencies.

The pre-commissioning and commissioning strategies of Holmethorpe and Redhill were also independent of each other as the breakers B107, B108, B109 and B110 were required to be commissioned into service during week 33, enabling the de-commissioning and removal of the redundant DC module during week 37, for supply to Network Rail as strategic spares.



Challenges and Solutions (continued)

Clarification of Technical Scope of Work

The delivery of the Redhill Station re-development programme was split into specific packages of technical scope of work to be delivered by multiple parties. Our client BAM Nuttall were working alongside both Network Rail and the S&C Alliance to deliver the renewal of assets, including buildings and civil structures, electrification and plant, track renewals and signalling.

Where the scopes crossed, there were a number of opportunities for items to fall between these independent scopes of work. RJ Power Rail worked both pro-actively to highlight opportunities for these gaps and reactively where our client identified a requirement for assistance.

An example of this is where RJ Power Rail identified a potential gap in coverage for the ETE connections between Redhill A substation and the connection to the track isolation switch, which formed part of the S&C Alliance scope of works for installation only.

RJ Power Rail attended several technical review meetings with both the client and wider programme delivery organisation, to offer technical guidance to the overall delivery strategy and offered solutions that RJ Power Rail were able to deliver with our technical expertise. This resulted in RJ Power Rail being awarded this scope of works, which was installed in line with the clients' requirements without any extension to our programme.

Decommissioning of Existing SCADA Communications

In order for the new DC module to be brought into service, the existing SCADA lines had to be migrated over from the RTU within the existing DC module. There were known to be reliability issues with the existing comms system and therefore concerns were raised regarding any potential loss of communication during migration due to the condition of some of the existing cables.

RJ Power Rail contacted the Network Rail Maintenance team during the initial site surveys at project commencement, to obtain an understanding of the works involved and build a working relationship with them, so that when the programme reached the installation phase, our team had the necessary end user technical support for transferring circuits within the existing infrastructure.

New telecoms cables were also pre-installed by RJ Power Rail to the trackside telecoms cabinets. Network Rail Maintenance agreed to support these works and supplied some of their own telecoms specialists to support key shifts whilst the communications circuits were migrated.

The flexible relationship that was developed and technical support from the Network Rail Maintenance team was a key contributor to the successful migration and entry into service.



Challenges and Solutions (continued)

Removal of Redundant DC module

Due to the absence of records for the redundant DC module, a lifting strategy had to be developed to accommodate a number of lifting options. The proposed roof mounted lifting eyes were inaccessible due to a temporary roof being fitted that could not be removed without causing damage. The bottom mountings used to secure the module were a second option considered, however, over the years had deteriorated in condition and could not be considered suitable for lifting purposes.

RJ Power Rail contacted our specialist lifting contractor and agreed to undertake an additional survey to review further lifting options on site and determine an option based on the safest and most practical approach, in consideration of the presented constraints.

The solution selected, involved manually jacking the module off the ground and positioning lifting strops underneath to lift in a cradle configuration. This method was successfully undertaken during week 37 and the unit was subsequently delivered to Network Rail.

Final Commissioning

The commissioning and energisation had to be performed in two separate stages due to the readiness of project deliverables outside of the RJ Power Rail scope of works.

The first commissioning stage, encompassed energisation of four of the DC circuits within the new DC module at Holmethorpe substation which replaced the DC breakers within the existing module. This activity was not restricted by any third party works and was achieved on time in Week 33.

The second and final commissioning stage was technically more complex as it was dependant on the completion of third party works by the S&C Alliance during the Christmas 2017 blockade.

The commissioning strategy was to energise DC circuits B113 at both Holmethorpe and Redhill in tandem with the track installation works undertaken by the S&C Alliance for the new Platform Zero and the associated section proving of the new track configuration.

RJ Power Rail raised a request for a review of the commissioning strategy and suggested that this should be undertaken in an interactive forum to enable consideration of all parties' work to remove any conflicts, to ensure that the necessary testing and commissioning activities could be achieved for the new platform to be entered service to meet the New Year operating timetable. This forum was attended by the project stakeholders, which raised several items requiring action by multiple parties to ensure the successful delivery of the Christmas blockade works.



Testimonials

“Following the successful relocation of the last telecoms cable at Redhill over the weekend, I am glad to be able to state that we have now completed the signalling, telecoms and power diversion works at Redhill. Thank you all very much for your hard work and dedication through this extremely challenging and sometimes painful phase of the works. It was certainly not easy and some of the issues we had to deal with were so far outside of our control they could never have been foreseen.

“It was a pleasure working with you all on this element of the works and I hope to work with you again in the future.”

Dave Hennigar
Project Manager
BAM Nuttall Limited