Mogale City substation upgrading and construction programme

Information from Royal HaskoningDHV

Following on from the successful completion of the Krugersdorp North substation upgrade in June 2012, Royal HaskoningDHV has been awarded the contract by Mogale City local municipality (Krugersdorp) for a major upgrade of the Condale substation with a value of close to R140-million. The contract, which was awarded in the latter part of 2012, is on track and due for completion in early 2015.

The existing Condale substation, built over 60 years ago, was in need of an upgrade to accommodate the growing population of Mogale City and to ensure stable electricity supply capacity for the expanding community. The upgrade was also necessary to accommodate the proposed new Eskom infeed transformer. The existing equipment, with a fault current rating of 15 kA, is being upgraded to 25 kA. New and improved control and protection systems incorporating the latest technology are also being installed. Condale is the only main infeed substation for the whole of Mogale City.

Thys van Rooyen, Royal HaskoningDHV’s design and project manager, says that one of the challenges the Condale project presents is that it is a live yard, which means that the whole substation is being rebuilt under live yard conditions. This makes it dangerous as the substation is currently operating at full capacity, and so safety is of paramount importance.

The high electricity demand in the winter months had to be taken into consideration when planning the switchover to the new system, and back-ups need to be in place. In addition recent mine operations and recycling in close proximity to the substation has caused many problems. The acidity of the mine dust damages equipment and galvanising on steelwork. New maintenance procedures have been implemented to clean and maintain heavy duty galvanising.

The project to upgrade the 33/6,6 kV Condale substation includes the supply, delivery, off-loading, installation, erection, commissioning and handing-over in a proper working condition of all materials and equipment including all related cable, steel, civil and other works required to make the substation fully functional. This includes the western and eastern extensions of the substation; upgrading of the existing yard and 33 kV switch room; a new 10 MVA 33/6,6 kV transformer bay; and the new 6,6 kV switch room including all equipment and switchover of all 6,6 kV cables.

Fig. 1: Condale substation upgrade.

The western extension of the substation includes the extension of the 33 kV busbars with three new bays (3200 A, 25 kA) which comprises two new 33 kV line feeder bays and one new bus-coupler bay. The eastern extension of the substation includes extension of the 33 kV busbars with ten new bays (3200 A, 25 kA) comprising seven new 33 kV line feeder bays; one new Eskom incomer bay and the relocation of the existing incomer; one new bus-coupler bay; and one new bus-section bay.

The upgrading of the existing yard and 33 kV switch room comprises the modification and upgrade of 25 existing bays; the upgrade of the existing tubular busbar system to 3200 A, 25 kA; the upgrade of control and protection panels for the existing bays; the control and protection panels for new 33 kV bays; new self-supporting transmission poles to relocate Spruit 1 and 2 feeders; gantries for new Boltonia 1 and 2 and KDN 2, 3 and 4 overhead lines; new dual battery and dual charger with changeover systems; and new AC and DC distribution panels. In addition to this is the provision of a new 10 MVA 33/6,6 kV transformer bay for a new transformer.

Equipping the new 6,6 kV switch room and the switchover of all the 6,6 kV cables involves the demolition of the old Teddie Niell outdoor switchyard and the construction of a new 6,6 kV switch room. It includes a new 110 V DC battery charger and batteries; a new 240/415 V chop-over supply in the new substation building; the replacement of all of the medium voltage, multicore and low voltage cabling; the extension of the existing earthing and earth mat; new earthing and a new earth mat for the 6,6 kV substation; two new ripple control units for the 10 MVA transformers and the relocation of the existing two units for demand side management (DSM); two new capacitor banks and the relocation of the existing two units also for DSM; swing over of all existing 6,6 kV feeders to the new substation; relocation of the feeders from the old Teddie Niell 6,6 kV substation to the new substation; and the dismantling of the old 6,6 kV switchgear in the existing Condale 6,6 kV substation.

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