

1.0 NCC SCADA Integration

The purpose of the NCC SCADA integration scope for Lalomauga is to:

- Maximize the benefits brought about by EPC's existing investment in nationwide SCADA
- Provide the End User with a uniform and consistent national system that both monitors all their generation assets and allows for remote control of same
- Minimize the duplication of monitoring/control system equipment and configuration
- Allow sites to run unmanned to the greatest safe and practical extent

It is particularly important that the monitoring and control of all of EPC sites is integrated to allow for a holistic generation, distribution and load management approach to be actioned both automatically (under EPC's grid stability system) and by remote operator intervention from SCADA.

2.0 Scope Overview

The NCC SCADA integration of two refurbished generation assets at Lalomauga, in the eastern area of Upolu for the purposes of remote monitoring and automatic control.

Lalomauga currently hosts two generators that are monitored from the EPC National Control Centre at Fuluasou via an existing SCADA panel. Lalomauga communicates with Fuluasou via a fibre optic link to Lufilufi (Bluesky telco tower opposite the entrance to the Le Uaina Resort) from where it passes into the EPC microwave network to Mount Vaea (Bluesky tower overlooking the Apia region), before joining the End User's main fibre network at EPC Fiaga and EPC Tanugamanono.

Lalomauga generation monitoring is currently limited to data obtained from the associated SEL protection relays, as the existing generator panels have no facility for signal interface. Consequently, there is also no automatic or remote control of the assets currently available.

However, Lalomauga head pond level information from Sauniatu is monitored from the power house, via a UHF data radio link.

The EPC corporate IT, VoIP telephone and CCTV systems use the same network and channels to access Lalomauga via dedicated VLANs and may be used to assist in the commissioning of remote control and monitoring functionality. Under this scope, no changes are foreseen to the communications infrastructure.

NCC SCADA integration is to be achieved by the physical LAN connection of the local automation devices proposed elsewhere under this tender (i.e. PLC equipment and any other new intelligent field devices).

The recently upgraded protection relay panels and SCADA panel shall not be replaced, and connection to the existing SCADA panel at Lalomauga shall use UTP CAT cable, Ethernet TCP/IP communicating DNP3 or Modbus protocol. Most plant data, including key parameters such as governor signals shall be made available to NCC SCADA via the PLC, hence removing the requirement for discrete input/output (I/O) already fitted to the NCC SCADA panel.

The existing NCC SCADA panel shall be able to log data and issue plant controls as required and in line with the functionality of the new PLC equipment. It should be noted that this panel is designed to operate in “stand-alone” mode, logging data without communications (stored ready to update NCC National Control Room with the “missing” data upon resumption of communications) and operating on its own internal dc battery system for up to four hours without external power.

The key component of the NCC SCADA panel allowing the above functionality is a Remote Telemetry Unit (RTU), this is a SCADA device that is optimized for use in wide area networks where communications can be intermittent, unreliable and of low bandwidth. The RTU uses DNP3 protocol to the NCC SCADA server systems.

The existing NCC SCADA panel also provides switch ports for the connection of EPCs current VoIP, Corporate IT and CCTV infrastructure.

Full control at the Lalomauga site is assumed to be handled by the local PLC system. NCC SCADA shall be configured to be able to issue all controls in parallel with the local PLC system, but only when the local panel is selected to be in “REMOTE” mode. When selected as “REMOTE”, NCC SCADA shall be able to override the PLC in the same way as the local panel pushbuttons. In summary:

- The local PLC shall control the site 24/7 with the panel in “REMOTE”, allowing the NCC operators to override PLC control if required
- When operators visit site, they may switch the panel to “LOCAL” to prevent unexpected local events and allow pushbutton overrides of the PLC control
- When the operator leaves site, they will switch the panel to “REMOTE” to allow NCC/MCC SCADA overrides of the PLC control to continue

3.0 IntegrationScope

The design, test, supervision and commissioning of the expansions to the existing EPC NCC SCADA system as required by the Lalomauga project; more particularly as follows:

- System design and documentation
- Modification of existing Lalomauga / NCCSCADA network infrastructure configuration
- Configuration of national SCADA system servers and networks for EPC operations to include the Lalomauga project
- Configuration of communications network equipment in line with existing EPC standards
- Factory integration testing using a current backup copy of the existing NCC SCADA system and spare RTU (EPC to free-issue on loan for testing purposes)
- Commissioning of signals provided to / from the Lalomauga RTUs, along with associated plant operational controls

3.1 SCADA & Network Modifications

Modifications shall be made to the existing NCC SCADA database in the form of database copies for review and approval prior to finalization. The final integration of these changes shall be performed during the FAT and the proven configuration finalized during the FAT exported into the live NCC system prior to commissioning.

Additions to the current system configuration are required to be made to allow EPC operators access to the new site information and control. EPC shall be provided with identical operator interfaces and functionality to existing sites. Matching NCC screen displays shall be added and overview screens shall be modified and updated to reflect the new sites input to the national grid. New functionality and operator interfaces shall be added for the Lalomauga local control interface and new interfaces from both assets integrated with the NCC SCADA.

Identical screens shall be provided on the local NCC SCADA panel HMI. Contract shall also configure all communications and network equipment in line with existing EPC standards.

3.2 Test & Commission Works

Factory and site testing and commissioning shall proceed with End User assistance and witness.

Test and commissioning works shall proceed along the following lines:

- FAT at suppliers works using recent NCC SCADA database and spare RTU (EPC to free-issue on loan for testing purposes)
- Post site installation, Lalomauga visit to check all new installation and interface works relevant to SCADA
- Confirmation of healthy communications to NCC
- Signal-by-signal check of all Lalomauga parameters monitored by NCC SCADA
- Signal-by-signal check of all Lalomauga parameters controlled by NCC SCADA
- Confirmation of NCC generator control sequence interface
- Extended/overnight run test period with Lalomauga under full auto control with Remote NCC operator override

4.0 Existing NCC SCADA Information

The following information is provided to assist tenderer in understanding the type and general arrangement of the site equipment to be worked upon.

4.1 Existing NCC Remote SCADA Panel Information

The existing panel located at the Lalomauga Powerhouse is a 600mm(W) x 600mm(D) x 2200mm(H) coated steel panel with bottom and top entry cabling.

Contractor shall run and gland all required cabling to the NCC SCADA panel in accordance with EPC advice.

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|--------------------|----------------------------------|
| SCADA devices: | 10.50.xxx.xxx/16 DG10.50.255.254 |
| Corporate network: | 10.40.xxx.xxx/16 DG10.50.255.254 |
| CCTV ports: | 10.30.xxx.xxx/16 DG10.30.255.254 |
| VoIP devices: | 10.20.xxx.xxx/16 DG10.20.255.254 |

In the above schema, the third octet should be set to 8 for all Lalomauga located devices. However, all equipment supplied for integration should be capable of being reconfigured to alternative IP schemes as required.

Other than VoIP handsets, all IP addresses of equipment connected to NCC SCADA are, and shall be, static.

5.0 NCC SCADA Interface Interoperability

During the project design phase and prior to FAT, Contractor shall provide to EPC the following documents and engineering design information:

- PLC drawings, network configuration, process description documents, formulas and calculations as required. In particular, an automatic control philosophy document explaining how the PLC control modes function and what, if any, functionality is required from the SCADA interface other than the presentation of set point data and monitoring of same.
- PLC and all Intelligent Field Device (including protection relays, revenue meters and governors) input/output lists in a readily understandable and verbose format including schedules of ratings, scaling detail, engineering units, tag names, DNP3/Modbus addresses and point types, along with a description of what each point represents/does an any interrelation to automatic control
- Alarm priority list and grouping (in particular, “ready to start” signals and critical alarm lists
- Network security detail, including all device IP addresses policy requirements for configuration, installation and maintenance of high level network equipment (e.g. firewalls, AV software)
- All required technical support, documentation and manuals for interfaced third party items

All the above information should be supplied in standard electronic format (i.e. MS Word or pdf) and should be fully searchable using standard search tools, documents containing cut-and-paste images of tables and text shall not be acceptable.