Attachment 1 Operational Functions Needs and Risks Summary by EPRI August 2020

SOTO Code STC and STCPs	Summary of Obligations	Operational Requirements	Current Condition	Issues With Current	Future Needs	Consequence of Failure	Rating
STCP01-1 Operational Switching	1. Carry out operational switching in liaison with the SO and independently where necessary for emergencies.	1. Provide a 24/7 ability to respond to networks conditions and ESO requirements.	1. Up to 4 operating desks can be occupied to meet workload.	1. Inadequate system overview due to the lack of space and positions of the desks.	1. Larger transmission footprint, more devices, larger span of control, more frequent outages, weather events.	1. Drastic. Brownout or blackout conditions may develop if switching cannot be switched	Critical
	2. Manage system voltage to meet operational requirements	2. Be able to respond to changing workloads for operation, commissioning and event management.	2. No overview displays.	2. Desk space is limited, giving a small footprint for the operators to use as workspace or to install new facilities such as more advanced telephone management systems.	2. Increased commissioning of new equipment and substations adding to workload.	2. Delays to restoration of customers if there is an outage.	
	3. Outages and maintenance	Report appropriate information to ESO and the TCC team in good time.	3. Many distractions at or near the desks, direct sharing of the spaces.	3. Security Concerns: Malicious switching can be performed with inadequate security.	3. More complex equipment active systems.	3. Grid voltage or dynamic instability can occur with damage to transmission and generation systems resulting.	
		3. Carry out maintenance, and investigations for faults and failures	4. Flow of visitors unrelated to transmission in the area of the control desks.			4. Safety risks for staff working on live equipment.	
			5. Fractured team locations, not all key personnel in the vicinity of the control desks.				
STCP 02-1 Alarm and Event Management	1. Monitor and assess system alarms or events for impact.	1. A number of alarm pages are required for each desk to enable the control engineers to filter, process and react to events.	1. Due to space constraint 4 x 27" screens are the maximum that can be used to display alarm and indication displays, together with the working screens for SCADA operations.	1. Display of system conditions as an overview is needed. Alarms must be clearly displayed and easily understood for prompt action	1. Wall mounted video wall display of system conditions as an overview is needed, such that it can clearly display events and be easily understood from anywhere in the Control Room or TCC office.	1. Drastic. Wrong operation decision leading to failure of the network due to reduced situational awareness.	Critical

	2. Ensure NGESO are aware of events that have consequence on the operation of the power system	2. The state of communications and control systems must be displayed	2. Other screens such as Western Isles display and call management screens obscure the small overview screens as they have been double banked on monitor stands.	2. Small and inadequate overview of the system means reduced situational awareness.	2. Reduce confusion by having clear and uncluttered workspace.	2. Danger to the public or our workers may result from failures of equipment.	
		3. Online/offline study facilities are needed.	3. AVAYA phones are limited and do not allow call filtering/stacking. The SMS system helps	3. Engineers have to search or interpret alarms before seeing the full picture.	3. Increased in commissioned plant in future. More substations, technology and important individual systems such as HVDC will have own displays and many alarms.	3. Slow response to restoration actions when customers are disconnected.	
			4. Critical alarms are very audible	4. Events are not seen unless the engineer is at the desk and observing alarms	4. Variety of alarm will increase.	4. System security failures, by not understanding what's happening – e.g. protection failure, or inability to diagnose root cause of events.	
			5. Currently use Pi data link and telephone discussions.	5. Small additional screens have been added to assist the engineers, but this obscures some other information.			
				6. Critical alarms not displayed on wall overview displays, only on small monitors. No room to add alarms because of capacity limits.			

STCP 03-1 Post Event Analysis	1. Report or respond to events requiring investigation as to cause.	1. Obligation to provide data or other information as required by the ESO.	1. Information is captured by the real time system, control team logging and the Pi historic database.	1. Some systems such as the disturbance recorder servers are not housed at TCC and do not have the 24hrs support that a control centre would be able to offer.	1. Additional space to house future systems and bring existing equipment under the umbrella of the TCC building for resilience.	1. Unsolved issues will be active for longer than necessary.	Important
	2. Liaison with ESO and other parties to satisfactorily exchange knowledge about events.		2. Other systems are currently housed and supported externally to the TCC.	2. Space to house more equipment does not exist at IHP for future needs.	2. Likely there will be an increase in HILF events in future so more frequent analysis and investigations will be required.	2. Failure to comply with STCP and risk of continued issues due to lack of resolution from failure to investigate.	
	3. Extensive post event analysis skills and tools are needed to fulfil our obligation.		3. The TCC office teams collate and report outside of real time and investigate incidents for onward reporting to NGESO and other parties.	3. Collaboration space is limited. Team discussions are impossible in relation to disturbances.		3. Repeat occurrences of issues e.g. increased time of disturbed voltage.	
	4. High-res disturbance recorders, historic records, fault reporting systems, data analysis and other expert assistance if needed.						
STCP 04-1 Real Time Data Change Management	1. TCC must ensure that network changes are communicated to the ESO and in time varying manner track all changes that occur with the outage and construction plan	1. Alignment of the network data, displays and controls is needed for SHET, NGESO and third parties, so that the actual system configuration is represented in the control and monitoring systems of the TO/SO/OFTO and others.	1. Operational requirements are mostly met, with occasional delays caused by lack of capacity in the team.	1. The data preparation, management and commissioning are carried out in the TCC with open access by other staff on the floor.	1. A separate area within controlled work area is needed where RT commissioning can take place as standard practice in other TCCs	1. Serious injury or death as a result of a mistake in commissioning	Important
		2. Data receipt and processing from source to recipient managed without breach of confidential records.	2. Stakeholder feedback suggests that SHET should be more flexible in accommodating changes to project plans and avoid late delivery.	2. In working on the live system and following instruction from the control engineers, there is higher risk of operation switching errors in this role.	2. There will be a big increase in new equipment and substations to be commissioned.	2. Risk of disconnection of customers as a result of a mistake	

		3. Secure work zone equal to the level of security for the main control room as RT commissioning on the live network involves SCADA controls being made by the commissioning team.	3. Errors have occurred with commissioning of alarms and controls, with the lack of concentration or distraction being contributory factors.	3. Distractions and stress often occur as people traverse along the accessways next to them.	3. Increased capacity is required to meet the needs of project teams for delivery. From 4 to 6 desk capability away from distraction.	3. Incorrect data within the EMS and data to ESO market or transmission operator systems could have large economic implications	
			4. Risk of data breach is present due to the number of people from other departments passing behind or close to the team.	4. Risk of mistakes and data security is a concern.			
				5. No capacity to increase the number of commissioning desks.			
STCP 04-2 Real Time Datalink Management	1. Monitor and resolve issues with the datalink to ESO	1. Ensure 24/7 365 days of the year service of data provision.	1. High reliability is achieved and full/immediate support is available from SSE Real Time Systems team.	1. Risk of data freeze due to overloading of communications or computer infrastructure will hopefully be addressed in T1.	1. Diverse location and improved physical security for the separate servers and communications would reduce risk of failure.	1. Lose situational awareness, no monitoring or control ability in SHET.	Very Important
			2. The shared database with SHEPD is being split with T1, which will result in less risk of performance issues due to joint processing demands as our networks increase in size.	2. No room to display datalink status on overviews, difficult to monitor the status.	2. Improve awareness of comms datalink status by shadowing data and comms links will be required in future.	2. Loss of data possible to market and transmission operation systems.	
			3. Servers are in physically diverse locations.	3. SHET Rely on third party to monitor comms datalinks.	3. Need to monitor the datalink status constantly in real time, any drop in service has severe impacts on system operation	3. ESO are blind to major portion of GB system if link goes down and undetected.	

STCP 04-3 Real Time Data Provision	1. Comply with RT data provision and ensure compliance with code	1. Specification of the data that needs to be provided to NGESO.	1. Data is passed through from third party to SHET to NGESO.	1. The data preparation, management and commissioning are carried out in the TCC with open access by other staff on the floor.	1. A separate area within controlled work area is needed where RT commissioning can take place as standard practice in other TCCs	1. Serious injury or death as a result of a mistake in commissioning	Important
		2. Alignment of the network data, displays and controls is needed for SHET, NGESO and third parties, so that the actual system configuration is represented in the control and monitoring systems of the TO/SO/OFTO and others.	2. Operational requirements are mostly met, with occasional delays caused by lack of capacity in the team.	2. In working on the live system and following instruction from the control engineers, there is higher risk of operation switching errors in this role.	2. There will be a big increase in new equipment and substations to be commissioned.	2. Risk of disconnection of customers as a result of a mistake	
		3. Data receipt and processing from source to recipient managed without breach of confidential records.	3. Stakeholder feedback suggests that we should be more flexible in accommodating the changes to project plans and avoid late delivery.	3. Distractions and stress often occur as people traverse along the accessways next to them.	3. Increased capacity is required to meet the needs of project teams for delivery. From 4 to 6 desk capability away from distraction.	3. Incorrect data within the EMS and data to ESO market or transmission operator systems would have large economic implications	
			4. Errors have occurred with commissioning of alarms and controls, with the lack of concentration or distraction being contributory factors.	4. Risk of mistakes and data security is a concern.			
			5. Risk of data breach is present due to the number of people from other departments passing behind or close to the team.	5. No capacity to increase the number of commissioning desks.			
STCP 04-5 Operational Telephony	1. Ensure that the primary means of communication between operators is maintained.	1. Robust telephony system and solid back up capable of operating in extreme events	1. Ongoing work in SHET on improvements to the telephony systems	1. Susceptible to third party system providers availability at present.	1. Using data network or controlled telephony is part of a future project.	1. Lose ability to dispatch, potentially lose the ability to control system	Critical
					2. Security and reliability will need to be increased	2. Safety checks unable to be carried out.	

STCP 06-1 Black Start	1. Ensure that the SHET system is always ready for a Black Start condition.	1. The TCC team must be practiced in offline training for dealing with all significant events, specifically, blackstart recovery requires a high degree of understanding, which is trained for in an offline environment	1. Shared facilities, 1 small kitchen, with 1 toilet block incorporating 1 shower, for both men and women which services the TCC, SHEP office, SHEPD Control, SHEPD Customer Contact Centre, RTS, a managers area and Scottish Gas Networks call cenrtes,	1. The shared facilities at IHP are not suitable for managing a blackstart, due to limitations in the space available to coordinate freely between the Incident Management Centre, Planning Team and Control rooms.	1. High Impact Low Frequency (HILF) and unanticipated events likely to increase, due to weather events, weaker grids, fragile complex network new equipment.	1. Drastic. Slow response, of restoration has major socioeconomic impacts. Ernst Young estimate a 913 million GBP per day loss to Scotland for a blackout [7].	Critical
	2. Maintain documentation, skills and tools to ensure blackstart success.	2. The building must provide a safe environment for SHET teams and be able to keep running for up to 5 days, keeping communications, control and welfare systems in working order without external support.	2. No adequate overview displays giving a wide-area, instant view of the Scottish or GB system state as it is being restored, (ref: Seab paper)	2. The joint kitchen has 2 small domestic fridges that serve all staff on the floor (160) with no room to expand without encroaching into office space, which is already limited.	2. Increased need to train operators as the system evolves. Blackstart events are difficult to model and predict on the future system.	2. Deficiency in training operators for unanticipated events will result in delays in restoration or inadequate response.	
	3. Act as System Operator and balancing of generation for SHET territory until initial restoration plan is completed		3. External facilities for accommodation, may not be adequate because of pandemics.	3. No accommodation facilities for people if they need to be housed on site (e.g. NGNET in 2020). No prospect of secure facilities for this.	3. Blackstart contracts are annually negotiated, plans will change annually necessitate improved training.	3. Inability to adapt to new blackstart routes adequately as they can change more often than previously.	
			4. Open campus site with access by the public and limited ability to restrict access to the floor with the TCC in the event of a restoration.	4. A secure perimeter is needed for blackstart scenarios	4. Classroom type environment to practice and train operators effectively as part of a team		
				5. Limited number of restoration desks, limits the pace at which SHET can restore the system.			
				6. There is no secure area outside of the building to protect staff or equipment.			

STCP 06-2 De-synchronised Island Management	1. Manage parts of the system that have been disconnected from the main power system and resynchronize when safe to do so	1. Maintain the capability to de-syncronize, re-syncronize and manage small power islands, for frequency, voltage and energy requirements at TCC.	1. DIP overview is poor. Displays and tools to help manage the situation are needed.	1. Staff are Ill-prepared due to lack of experience and relevant displays. It often relies on the island generation team to manage the groups.	1. Training and more suitable displays are needed. Off-line training would benefit the operator teams greatly.	1. Costs of maintaining islands is high if the timeframe is long for restoration.	Important
		2. Enhance the capability for future connection and DER systems.	2. The fallback relies on local networks staff to manage the islands without much input from control room	2. Re-synchronizing is often an issue due to lack of practice and inadequate displays.	2. Development of a set of suitable displays could be done to enhance awareness and better manage the situation, requiring more space.	2. Lack of opportunity for gens to return to market has cost implications for them.	
				3. Lack of situational awareness if island is desynchronized		3. Overuse of diesel generation when islands are de-synchronized	
STCP 06-3 System Incident Management	1. Manage significant incidents or those incidents that have the potential to become significant incidents on or affecting a Transmission Owner's (TO's) Transmission System	1. Ability to set up and populate a system incident centre.	1. The TCC office would be used as the Silver command and communications centre.	1. The open office, has no option for creating a suitable communication hub during events.	1. A predefined room for the main incident room and smaller area for sensitive discussion or confidential work. This should be as close as possible to the CR.	1. Slow or inadequate response to major incidents, with major socio-economic impacts.	Very Important
			2. A room or facility exists but the physical location is remote from the control room and is shared with SHEPD.	2. For a storm or major incident that also involves SHEPD, one shared room is not enough to manage the incident. It would be unsuitable as SHEPD are likely to use it. It also is not large enough for an effective Silver command room.	2. Suitable wall areas for display of plans and progress.	2. Socio-Economic issues and implications as per the blackstart STCP	
			3. An option to use the SHEPD storm room, with a few PCs, teleconference and small table is adjacent to the CR.	3. No nominated area for a transmission incident room close to the CR exists.	3. Increase communication facilities such as SMART boards and comms ports for extra equipment and people.		

				4. Facilities to manage operating strategies, communications and record keeping are inadequate in an open office with few places to display progress or plan.			
				5. A silver command room would be set up elsewhere in the building but a significant advantage of keeping the TCC teams close would limit communications effectiveness.			
				6. Additional staff needed for widespread event management would most likely be distant from the TCC team, with further reduced effectiveness.			
				7. Private space for confidential discussion is not available near the CR.			
STCP 06-4 Contingency Arrangements	1. Separate and robust ability to operate the system in the event of loss of a main control facility	1. At least 2 sites must be provided, each capable of autonomy for SCADA control and data management.	1. The main site at Inveralmond House has full SCADA control, data services and is able to meet most requirements for the label "Main Site".	1. The same grid supply point is used for both locations.	1. Risk of business facilities failure requiring transfer to backup facility due to weather, external threats.	1. Increasingly complex system more difficult to monitor and control from the backup site	Critical
			2. Buroughmuir as the contingency has minimal facilities and reduced capacity compared to Inveralmond, where only 2 control desks and 2 support desks are allocated.	2. The NCI requirements for Inveralmond are lacking due to the open nature of the site, building and our floor area.	2. Increased risk of pandemic related issues requiring use of parallel facilities and regular changeovers	2. Increase in cyber/physical security risk at backup site	

			3. The SCADA backup is in Portsmouth, relying on significant numbers of communications nodes to be functioning across Scotland and England to remain a viable backup.	3. The NCI requirements for Buroughmuir are lacking due to the lack of facilities and major are required.	3. Increased degradation in main and backup facilities over time.	3. Compromised space requirements and cleanliness of facilities for sterilization and pandemic related pathogens.	
				4. Business as usual would require most of the SHET operations team working on another site to regain capability to continue as "normal". This would take time, maybe a week or so.			
STCP 08-1 Protection Testing	1. Planning and managing operations with depletion of protection.	1. Understanding and awareness of system conditions, weather and general risks involved with the depletion of protection and signaling that might cause failure of the network	1. SHET manage the requests from plan to delivery	1. Lack of capacity and space for testing, relies on using existing monitoring screens for protection testing while also monitoring the system	1. Increased number of tests due to new equipment and maintenance of existing equipment	1. If a protection test goes wrong or is improperly managed, there may be impacts on safety of personnel, customer load, and / or equipment	Important
			2. Coordination of the protection testing of relay devices and signaling, alarm checking with field personnel and ESO	2. Lack of overviews limits wide area view of the system and alarm screens if a protection test goes wrong	2. Increased number of alarms and devices with different control system interactions.	2. Equipment without protection for any period is a risk that must be managed by system operators.	
STCP 08-2 Circuit Live Trip & DAR Tests	1. Plan and execute trip and DAR (Direct Auto reclose) tests to prove equipment performance by agreement with ESO.	1. Manage the requests from plan to execution	1. SHET Manage the requests from plan to delivery	1. Lack of capacity and space for testing, relies on using existing monitoring screens for protection testing while also monitoring the system	1. Increased number of tests due to new equipment and maintenance of older, existing equipment	1. If a protection goes wrong or is improperly managed, there may be impacts on safety of personnel, customer load, and / or equipment	Important

			2. Coordination of the protection trip testing of relay devices and signaling, alarm checking with field personnel and ESO	2. Lack of overviews limits wide area view of the system and alarm screens if a protection test goes wrong	2. Increased number of trip commands from multifunction devices with different control system interactions.	2. Equipment without protection for any period is a risk that must be managed by system operators.	
STCP08-3 - Operational Tests and System Tests	1. Manage tests by agreement with ESO	1. Tests can be simple or complex, ranging from a single switch to area-wide tests.	1. Manage the requests from plan to delivery.	1. Lack of capacity and space for testing, relies on using existing monitoring screens for operation testing while also monitoring the system.	1. Increased number of tests due to new equipment and maintenance of existing equipment	1. If an operation test goes wrong or is improperly managed, there may be impacts on safety of personnel, customer load, and / or equipment	Important
		2. A high level of skill and awareness is required to ensure stability of the network, from a planning point of view and RT operations.	2. Coordination of the operational testing of equipment devices and signaling, alarm checking with field personnel and ESO.	2. Lack of overviews limits wide area view of the system and alarm screens if an operation test goes wrong			
STCP 08-4 User Tests	1. Identify or facilitate test requests on User's systems that require operations on the SHET network.	1. Tests can be simple or complex, ranging from a single switch to area-wide tests.	1. Manage the user test requests from plan to delivery	1. Lack of capacity and space for testing, relies on using existing monitoring screens for operation testing while also monitoring the system.	1. Increased number of user tests due to new equipment and maintenance of existing equipment	1. If a user test goes wrong or is improperly managed, there may be impacts on safety of personnel, customer load, and / or equipment	Important
		2. A high level of skill and awareness is required to ensure stability of the network, from a planning point of view and RT operations.	2. Coordination of the user testing devices and signaling, alarm checking with field personnel and ESO.	2. Lack of overviews limits wide area view of the system and alarm screens if an user test goes wrong			
STCP 09-1 Safety Co-ordination between Parties	1. Provide safety co-ordination across control boundaries between other operators and SHET and comply with Grid Code OC8	1. Act as Safety coordinator across control boundaries.	1. Agree, implement and hold safety precautions within SHE transmission area and across control boundaries.	1. Safety coordination needs are increasing in volume as more interfaces with OFTO, new users and interconnectors builds.	1. Due to new builds and maintenance of existing network, outages and, as a result, switching and safety coordination will increase in future.	1. Drastic risks to health and safety of working field personnel if safety coordination is mismanaged by the control room operators	Critical

		2. Ensure precautions are held on the safety system employed to ensure no failure of safety occurs.	2. Safety coordination needs to be a highly disciplined and focused activity.	2. Increase in distraction, disruption and noise due to traffic through floor	2. Increasing work load will bring increase in workforce on the ground, necessitating still more robust safety management	2. Risk of damage to equipment and assets with cost implications.	
				3. Lack of space to coordinate activities with other team members	3. An improved environment to ensure operators can concentrate on safety activities.		
				4. Lack of overviews of the system, showing any system risks			
STCP 10-1 Asset Nomenclature	1. Ensure the asset nomenclature is aligned to requirements of the code and have NGESO agreement.	1. Authorship of the SHET nomenclature document	1. This is carried out by operations personnel in coordination with EMS maintenance and operators	1. Resources to keep this current have been lacking. Draft documents and publication are often behind on review.	1. Major increase in new assets connected in future will require increased resource for administration an data management is likely to be needed within the period of T2.	1. Confusion in switching plans and orders may result in mistakes in switching or operation	Important
	2. Maintain co-ordination of the SHET documentation for this, by authoring the document determining the policy within SHET.			2. Together with all other TCC documentation there is no overall coordinating role or facility	2. One extra desk plus storage system will be required to manage this role	2. Incorrect data or naming can have cost implications for asset management	
				3. No easily accessed centralised database for tracking information and updates			
STCP 11-1 Outage Planning	1. Each TO shall provide NGET with Outage Definitions for all Outage Proposals or Outage change requests and assist NGET in co-ordinating and facilitating User Outages and Outages of each other Party	1. Plan outages up to 6 years ahead and coordinate with ESO	1. The outage planning team is split into 2 and physically separated due to lack of space in Inveralmond House.	1. Dislocation reduces communication and ideas sharing between the year ahead team and the current year team and the manager's awareness is reduced for half of the group	1. There will be an increase in outages in the future as a result of new build plans and maintenance work on the existing network. This will require more outages and more resources in planning and optimizing outages	1. Sub-optimal outage planning can have major impacts on delivery of extremely capital intensive works projects.	Important

				2. This can result in miscoordination and suboptimal planning of outages and creates barriers to general awareness of activities within the team.	2. Exponential rise in planning activity due to the needs of the ESO to have more flexibility in the system.	2. Cancellations, deferrals can have major implications on cost and resource adequacy planning for the asset owners and generators.	
					3. The outage team should work very closely with the system operators and CR team on O/P, benefiting from the knowledge transfer from close proximity to experienced staff	3. Increase in alternative planning and network access strategy adds to team workload, to maintain efficiency and reduce errors.	
					4. Increased uncertainty due to flexible plans will require more contingency planning and alternative solutions to be planned.		
STCP 11-2 Outage Data Exchange	1. Exchange pertinent data about outages with NG ESO	1. The rolling plan from year out to day-ahead, has to be assessed, costed and approved with ESO.	1. The outage planning team is split into 2 and physically separated due to lack of space in Inveralmond House.	1. This reduces communication and ideas sharing between the year ahead team and the current year team and the manager's awareness is reduced for half of the group	1. There will be an increase in outages in the future as a result of new build plans and maintenance work on the existing network. This will require more outages and more resources in planning and optimizing outages	1. Sub-optimal outage planning can have major impacts on delivery of extremely capital intensive works projects.	Important
		2. Our information has to flow smoothly to achieve successful results.		2. This can result in miscoordination and suboptimal planning of outages	2. The outage team should work very closely with the system operators and CR team on O/P, benefiting from the knowledge transfer from close proximity to experienced staff	2. Cancellations, deferrals can have major implications on cost and resource adequacy planning for the asset owners and IPPs	

					3. Increased uncertainty due to flexible plans will require more contingency planning and alternative solutions to be planned.		
STCP 11-3 TO Outage Change Costing	1. To provide for efficient co-ordination and data exchange between NGET and TOs in relation to the management of costs related to NGET requests for a change to a TO Outage after Plan Freeze	1. Outage planning team work with ESO on changes and costs of changes of outages	1. The outage planning team is split into 2 and physically separated due to lack of space in Inveralmond House.	1. This reduces communication and ideas sharing between the year ahead team and the current year team and the manager's awareness is reduced for half of the group	1. There will be an increase in outages in the future as a result of new build plans and maintenance work on the existing network. This will require more outages and more resources in planning and optimizing outages	1. Sub-optimal outage planning can have major impacts on delivery of extremely capital intensive works projects.	Important
				2. This can result in miscoordination and suboptimal planning of outages	2. The outage team should work very closely with the system operators and CR team on O/P, benefiting from the knowledge transfer from close proximity to experienced staff	2. Cancellations, deferrals can have major implications on cost and resource adequacy planning for the asset owners and IPPs	
STCP 12-1 Data Exchange Mechanism	1. Provide the framework, timing, content, transfer method of data exchange for the processes that define the relationship between NGESO and SHET	1. Defined by operations team in SHET	1. Carried out by operations team within SHET	1. Dislocated and disjointed nature of the team means gaps may exist in the data exchange mechanisms	1. Likely increase in the data types, content, technology, legal processes, and data diversity for the future power system,	1. Risks to ESO operations and market processes if data is not cleanly exchanged or if there is a breakdown in the processes for any reason.	Important
				2. Inefficiencies in data exchange methods may exist due to disperse nature of the group.			

STCP19-4 Commissioning and Decommissioning	1. Manage and review the connection and removal of equipment from the network	1. Commissioning and decommissioning carried out as part of defined processes in SHET CR.	1. Documentation to bring on or remove equipment on the network is always managed such that the operators have updated network data for parameters, configuration, control and live data.	1. Lack of desk space for planning and reviewing documentation	1. Likely large increase in new commissioning and some decommissioning in the coming years will require more frequent procedures to be developed, checked, studied, verified requiring more resources or capacity to implement	1. Safety systems can fail if the commissioning is not correct, resulting in injury or death or damage to equipment	Very Important
		2. Exchange pertinent information with NGESO as part of pre-defined exchange mechanisms.	2. Co-ordinated application of this is to collate and distribute information, ready for ongoing transmission to NGESO in defined timescales.	2. Lack of team meeting facilities to plan and coordinate		2. Delays in delivery of this information are difficult to recover from and can delay the delivery of a project.	
			3. Included in this area is the agreed process that confirms the equipment is proven, a commissioning programme.				
STCP 26-1 Active Network Management	1. Monitor and ensure that ANM schemes are operating correctly, to ensure security of the system on behalf of the ESO.	1. System monitoring by on-line system study and by liaison with the ESO requirements.	1. ANM devices and systems are monitored from the CR desks by operators on the existing screens	1. The optimal way to monitor is to have a status indication or alarms visible on an overview for one look awareness of the status. The lack of overview screens makes this difficult.	1. There will likely be a major increase in ANM systems in the coming years impacting transmission and distribution systems, increasing demands on the team in planning and RT timescales.	1. Failure of the devices can have can have security standard violations and system impacts.	Very Important
			2. Information in relation to them is in procedure folders or stored online.	2. Training is required on all of the devices, given their complexity. New devices will likely be added requiring new training programs.	2. All will have to be modelled in the SHET system, monitored, studied and controlled as necessary by operators	2. Human error in failing to correctly monitor ANM devices could exacerbate poor system conditions	

			3. Knowledge is required to monitor, operate, diagnose issues if they exist.		3. The complexity and interactions of these systems with existing power electronic devices will be important to monitor and manage.	3. Lack of awareness, knowledge as a result of degraded training can pose a system risk	
STCP27-01 System Performance Monitoring Requirements	1. This is a new requirement and will involve additional information being transferred to the TO.	1. Monitor the system using advanced phasor monitoring units, disturbance recorders or protection relays.	1. Performance monitoring is carried out in the CR and in operations teams in the back office roles.	1. Adding performance monitoring equipment to monitor the system, by necessity screens and overviews to view visualizations and / or status of the monitoring equipment. This is not possible given lack of display capability.	1. Many more performance monitoring devices will be installed on the SHET system in the coming years.	1. A failure in performance monitoring equipment will lead to degraded situational awareness for a period.	
	2. SHET must be aware of the health of the systems being used and keep ESO informed of problems	2. Monitor health of the monitoring equipment at all times. Notify ESO of any issues	2. Alarms and displays exist but not prominently displayed		2. It is likely that all new generation connections and any new equipment will have an associated monitoring equipment, the status and data will be monitored from the CR and fed to ESO.	2. In a system that is weaker and more complex, a degraded system for any period may cause system issues to go undiagnosed or may exacerbate already bad system conditions	Important
					3. Dynamic line rating devices will be increased that will requiring monitoring.	3. Lack of training on these ANM devices poses a risk to understanding of the risks to the system.	
					4. Devices that are not yet developed but will undoubtedly form part of the future system and may involve increased automation.		
					5. All new ANM devices will require training in relation their operation and interactions.		