##### *STCP 18-5 Issue 001 CATO-TO Connections*

##### *STC Procedure Document Authorisation*

|  |  |  |  |
| --- | --- | --- | --- |
| Party | Name of Party Representative | Signature | Date |
| National Grid Electricity System Operator Ltd |  |  |  |
| National Grid  Electricity Transmission plc |  |  |  |
| SP Transmission plc |  |  |  |
| Scottish Hydro Electric  Transmission plc |  |  |  |
| Competitively Appointed Transmission Owners |  |  |  |
| Offshore Transmission Owners |  |  |  |

To be replaced by reference to STC Parties in new Schedule 1

##### *STC Procedure Change Control History*

|  |  |  |
| --- | --- | --- |
| Issue 001 | 13/0/2023 | First Issue supporting the introduction of CATOs |

# Introduction

## Scope

### This procedure details the process to be followed for the connection of a **CATO** to a **Pre-existing Transmission Owner (PTO)** and the roles and responsibilities of the PTO, the CATO and The Company (the “Lead Parties”).

### This procedure describes the process following the award of the status of Preferred Bidder to a CATO and their subsequent accession to the STC as an Onshore Transmission Owner. It defines the tasks, formal documentation, interface requirements, timescales and responsibilities between the Lead Parties and Affected TO(s).

### The Lead Parties are required to cooperate fully as STC parties to progress the connection project and are governed by:

* their status as STC Parties
* The relevant clauses of STC Section D, Planning Coordination
* their responsibilities under the Investment Planning provisions of the STC (STCP 16.1); and
* the formation of a CATO-TO Connection Sub-Group(s) for the CATO Connection Project.
* As signatories to the **CATO Connection Schedule** (Appendix A)

### Each TO in coordination with The Company is responsible for the design of the connection and the infrastructure of its Transmission System, initial Outage requirements, programme of works and asset details.

### This procedure applies to each TO and The Company.

### For the purposes of this document, the TOs are:

* NGET;
* SPT;
* SHE-T;
* Competitively Appointed Transmission Owners (CATOs); and
* All Offshore Transmission Licence holders as appointed from time to time by the Authority

## Objectives

### The objective of this procedure is to detail:

### How the CATO-TO Connection Project is addressed across the Company - PTO interface, the TO-CATO interface, and the implications on any Affected TO;

### The creation and population of the **CATO Connection Schedule** (Appendix A) which shall include the Grid Interface Data File Structure (GIDFS) (located in STCP 19-7 Appendix A7/8) and CATO Transmission Interface Site Specification (CTISS);

### the requirements for exchange of information in relation to these activities; and

### the lines of communication to be used.

# Key Definitions

## For the purposes of STCP 18-5:

### **Affected TO(s)**- means any Transmission Owner (other than the PTO & CATO) in relation to whose Transmission System the Relevant Connection Site satisfies the criteria set out in the STC, Schedule four. (see STC Section D, part 2, paragraph 2.2.2). For the avoidance of doubt, no OFTO has a role under this STCP until an OFTO has been appointed under the Tender Process

### **CATO-TO Connection Project:** Means the project undertaken under the provisions of Investment Planning to progress and complete the connection of the CATO asset to the transmission system of the PTO.

### **CATO Connection Schedule:** Means the Schedule (Appendix A) that forms the inventory of documents that underpin the project and instruct the deliverables and timescales.

### **Pre-existing Transmission Owner (PTO)** – The Transmission Owner, whose Transmission System is located at the CATO Interface Site for the CATO.

### **Lead Parties**- Means the parties forming the CATO-TO Connection Sub-Group. These will normally be the PTO, CATO and The Company.

### **Lead Persons-** means representatives from The Company, the PTO and CATO. The “Lead Person(s)”, shall oversee the connection of the CATO. The remit of the Lead Person(s) is to agree the **CATO Connection Schedule** and associated documents (GIDFS, CTISS etc), monitor progress and agree any changes. The Lead Person(s) are also responsible for resolving any disagreements at first instance, prior to any necessary escalation. Dialogue will take place in person, by email, telephone or video conferencing as appropriate.

### **CATO Transmission Interface Site Specification (CTISS)-** means the technical appendices contained within the CATO-TO Connection Schedule, detailing the specific requirements in relation to the CATO Transmission Interface

# Procedure

## Nuclear Site Licence Provision

#### 3.1.1 Where this process may interact with, impact upon or fall within the boundary of a Nuclear Site Licence holder's site, or may otherwise have any form of effect and/or implication for a nuclear power station, consideration must be given to the relevant provisions of the applicable Nuclear Site Licence Provisions Agreement, the CUSC Bilateral Connection Agreement for that site, paragraph 6.9.5 of the CUSC and Section G3 of the SO/TO Code to ensure compliance with all of these obligations.

## Basic Process

### 3.2.1 **CATO Awarded Preferred Bidder Status**

#### Following a tender process (see Appendix A for Network Competition models) the preferred bidder is appointed and shall follow the Admission of New Parties process, detailed in Section B3 and accede to the STC as an STC Party (Onshore Transmission Licensee).

**3.2.2** **CATO-TO Connection Sub-Group established for the asset connection project**

3.2.2.1 A CATO-TO Connection Sub-Group shall be established for the connection project. This will be established under the provisions of STCP 16-1-Invesment Planning. The Joint Planning Committee (JPC), consisting of named representatives (Lead Persons) from The Company and each TO shall facilitate and coordinate the establishment of the CATO-TO Connection Sub-Group for the CATO-TO Connection Project.

3.2.2.2 The CATO-TO Connection Sub-Group shall consist of relevant representatives (Lead Persons) from the Lead Parties (PTO(s), CATO and The Company)

3.2.2.3 The CATO-TO Connection Sub-Group shall meet as required and when requested by any of the Lead Parties.

3.2.2.4 If any of the Lead Parties requests clarification on certain aspects of the project or requests a meeting to clarify certain aspects of the CATO-TO Connection Project, the other Lead Parties shall provide all reasonable assistance to answer the queries raised. All Lead Parties shall accommodate any reasonable request for a meeting at the convenience of all other Lead Parties.

**3.2.3 CATO Transmission Interface Site Specification (CTISS) Populated & Signed off**

3.2.3.1 The Company and the PTO shall populate the CTISS. A generic template for HVDC and HVAC connections can be found in Appendix A.

3.2.3.2 Following the population of the CTISS the CATO shall review and sign the document, followed by the PTO and The Company.

3.2.3.3 In the event of any points of contention the contending party shall call a meeting to discuss and resolve issue/s. All parties must make all reasonable efforts to accommodate the meeting promptly.

3.2.3.4 Points of contention that cannot be resolved within the forums of the CATO-TO Connection Sub-Group shall be referred to the CATO-TO Independent Engineer (as per the Disputes Process in this STCP) to consider and provide a decision If any party continues to contend post CATO-TO Independent Engineer review the Disputes process described in this STCP shall be followed.

3.2.3.5 Following completion of the above the CTISS shall be signed by all Lead Parties.

**3.2.4 Establishment of CATO Connection Schedule**

3.2.4.1 The CATO Connection Schedule (Appendix A) shall be established. This primarily comprises the templates for the CTISS, the GIDFS and the table of Milestones and Deliverables. These items will be signed off by the Lead Parties of the CATO-TO Connection Sub-Group as appropriate and all Lead Parties shall agree as to the contents of these items prior to the issue of the FON.

### 3.2.5 **CATO Develops Asset Design**

#### 3.2.5.1 The CATO shall develop the full asset design based upon the design that was submitted and led to the project award. This will inform the connection requirements.

### 3.2.6 **CATO Asset Development Project entered into CATO’s Investment Plan**

#### 3.2.6.1 The CATO shall enter the full asset delivery project into their “Project Listings Document” (PLD). The detail that shall be included in the PLD is listed in STCP 16-1- Investment Planning and may include the following items:

* project name;
* confirmation of ownership boundaries;
* brief narrative;
* any changes to node and line data;
* schematic diagram;
* key dates (including commissioning date, date by which stage by stage drawings will be available and date of initial Commissioning Panel meeting);
* Deliverables Dates
* mathematical models in Laplace transform block diagram format to represent any dynamic control schemes present in the Transmission System.

Note that outage data shall not necessarily be included in a PLD as this is only normally available after detailed design and development and shall thus be provided by the outage planning process of STCP11-1 for years 3-6 and beyond.

**3.2.7 Identification and Notification of Affected TOs**

3.2.7.1 Based upon the PLD submitted by the CATO into their Transmission Investment Plan, The Company shall assess the project and notify any Affected TOs.

3.2.7.2 Once identified all Affected TOs shall liaise directly with the Lead Parties to ensure all necessary adjustments are made.

**3.2.8 Grid Interface Data File Structure (GIDFS) Populated**

3.2.8.1 The Grid Interface Data File Structure is the definitive document that defines the items and actions that are required to be put in place or completed prior to the energisation of the equipment through the interface. The generic template for the GIDFS can be found in Appendix A7/8 of STCP 19-7.

3.2.8.2 The PTO and The Company shall provide information to the CATO to assist in the population of the GIDFS as requested.

3.2.8.3 The CATO shall populate the GIDFS with its required items, to be considered and approved by the other Lead Parties involved in the delivery of the CATO Connection Project.

3.2.9.4 The Lead Parties of the CATO-TO Connection Sub-Group shall be signatories to the GIDFS. The document along with the process itself is iterative and subject to change. to be agreed by all Lead Parties at each revision.

**3.2.9 Design of the Interface**

3.2.9.1 Based upon the information provided from the PLD and the initial draft of the GIDFS the PTO shall work up the connection and infrastructure design proposals in further detail for the preferred option. The grid interface design shall be submitted to the CATO-TO Connection Sub-Group for its review, feedback and approval.

3.2.9.2 As part of the detailed connection and infrastructure design, the PTO shall develop their designs in accordance with relevant standards and the interface equipment specification as defined in Appendix A of STCP 19-7 (CATO-TO Compliance Processes). The interface equipment specification covers the requirements for the provision of interface equipment.

3.2.9.3 The PTO may include, but shall not be limited in including, secondary plant and apparatus but not limited to protection of light current interfaces LVAC and LVDC supplies in its detailed design provision as appropriate for the following schedules within the interface equipment specification:

• Schedule A Telecommunication Equipment; and

• Schedule B SCADA Data.

3.2.9.4 During the interface design process the PTO(s) shall discuss with The Company any requirements The Company may have for additional communications infrastructure so that delivery by the PTO can be optimised.

3.2.9.5 When changes are made to the relevant standards and interface equipment specification schedules, they shall not normally be retrospectively applicable unless otherwise agreed between the Parties.

3.2.9.6 The CATO Transmission Interface Site shall follow the requirements detailed in Section D Part 1 Paragraph 3.1.2 & 3.2 and shall follow the European Connection Conditions. While following this requirement the design of the CATO-TO Interface shall follow the principle of selecting the interface solution with the best value for customers, not requiring unnecessary over specification.

**3.2.10 Design Assurance Panel**

3.2.10.1Following publication of the first draft of the Grid Interface Design(s) the Design Assurance Panel shall be established. The Design Assurance Panel will be made up of representatives from the Lead Parties.

3.2.10.2The representatives on the Design Assurance Panel shall review the grid interface design(s).

3.2.10.3The remit of the review of the Design Assurance Panel is the PTO’s Plant and Apparatus within the busbar protection zone (principles of paragraph 3.2.2.7 should be followed). The Relevant Electrical Standards of the PTO shall apply within this zone.

3.2.10.4The Design Assurance Panel shall meet to assess the effectiveness of the interface designs and discuss any points of query or contention.

3.2.10.5Cooperation and negotiation within the Design Assurance Panel should be committed to and fully pursued to resolve any points of contention.

3.2.10.6Any points of dispute shall be referred to the CATO-TO Independent Engineer who will determine what the most reasonable and efficient option is and provide their decision to the members of the Design Assurance Panel. If any of the parties cannot accept the decision of the CATO-TO Independent Engineer they shall escalate the matter as per the Dispute Process described later in this STCP.

**3.2.11 GIDFS Second Review**

3.2.11.1Following the finalisation and review of the grid interface design the PTO, the CATO and The Company shall review the GIDFS and make any necessary updates. These shall be submitted to the CATO-TO Connection Sub-Group for consideration. If any of the Lead Parties consider a meeting is required to discuss any element, they shall call a meeting of the CATO-TO Connection Sub-Group.

3.2.11.2 The CATO-TO Connection Sub-Group shall consider and agree the frequency of further meetings to review the GIDFS.

**3.2.12 GIDFS & CATO Connection Schedule Baseline Milestone and Delivery Timescales Agreed**

3.2.12.1 Following the review of the GIDFS and CATO-TO Schedule and agreement of the baseline milestones and timescales (Appendix A2). The baseline timescales for the project shall then be submitted to the Authority.

3.2.12.2 The GIDFS shall be a living, iterative document throughout the entire connection process and shall be continually revisited, as necessary. Events that could lead to revision of the GIDFS include changes to electrical parameters or models or interface design. All changes to the GIDFS (particularly those impacting CATO-TO Connection Schedule, timescales and milestones) must be reported to the CATO-TO Connection Sub-Group, together with the rationale and justification for those changes.

3.2.12.3 It may be necessary at any stage of the CATO-TO Connection Project for changes to deliverables and timescales. Where a Party identifies the need for a revision in deliverables or timescales, this shall be discussed at a meeting of the CATO-TO Connection Sub-Group. If the Parties agree that there is a need for revisions The Company representative shall then submit an application to the Authority for an extension in timescales. The Leading Parties shall provide any relevant information reasonably requested to enable The Company to make a timely submission for such an application.

**3.2.14 Outage Timings**

3.2.14.1The PTO shall notify The Company of the outage timings which shall be in accordance with the requirements of STCP 11-1.

**3.2.15 Preliminary Works Phase**

3.2.15.1A feature of some forms of Network Competition (e.g. Early Competition) is the Preliminary works phase, during which the CATO will undertake the planning, consenting and the initial groundworks. This phase can last for a number of years. During this phase there is likely to be a lesser requirement for activity and meetings of the CATO-TO Connection Sub-Group for a CATO connection. However, if the CATO becomes aware of any factor that could materially affect the CATO-TO Connection Project during this phase it shall make the Lead Parties of the CATO-TO Connection Sub-Group aware of that factor and the GIDFS and CATO Connection Schedule shall be reviewed and the revision process undertaken if required. If a revision is required a meeting of the CATO-TO Connection Sub-Group shall be called to discuss/approve the required revisions.

3.2.15.2Any adjustments to the project timescales must be reported to the Authority by the Lead Person for The Company, along with the justification for the adjustment.

**3.2.16 Post Preliminary Works Review**

3.2.16.1Following the Preliminary Works phase the CATO shall undertake a review of the GIDFS, CTISS and Deliverables Timetable (see Appendix A) to ensure that any changes to the asset design as a result of the preliminary works are considered and any necessary resultant changes to the Appendix A documents made. The CATO shall report to the CATO-TO Connection Sub-Group following the completion of the Preliminary Works phase whether it considers there needs to be any change to the Appendix A documents. If any changes are made post the Preliminary Works phase the Lead Parties shall review the revised documents and make any resultant changes. Any resultant changes to the CATO-TO Connection Project timescales shall be reported to The Authority.

**3.2.17 Disputes Process**

3.2.17.1The CATO-TO Connection Sub-Group and the meeting forums that underpin it shall be considered the primary function to resolve points of contention met in the CATO Connection Project.

3.2.17.2In the event that agreement is not able to be reached through cooperation and negotiation, a party shall raise its concern and seek to resolve the matter within 16 business days via meetings (including by agreement telephone). If the parties are unable to resolve within 16 business days of the meeting (or within such longer period as they may agree within that initial 16 Business Day period, both parties acting reasonably as to the length of the period). Either party may then refer the dispute to the CATO-TO Independent Engineer for their review and recommendation. The Independent Engineer shall provide their recommendation within 60 days.

3.2.17.3If a party does not accept the recommendation of the CATO-TO Independent Engineer they may raise a dispute by issuing a dispute notice to the Authority and each of the other dispute parties and the CATO-TO Independent Engineer.

3.2.17.4In the event that a dispute is raised the CATO-TO Independent Engineer shall provide a report to the Authority within 30 days.

3.2.17.5The Authority's determination of a dispute shall (without prejudice to any ability to apply for judicial review of any determination) be final and binding on the parties to the dispute and shall be enforceable in the courts.

**3.2.18 CATO-TO Independent Engineer**

3.2.18.1Parties agree and shall procure that the CATO- TO Independent Engineer shall act as an expert and not as an arbitrator and shall decide those matters referred or reserved to them under CATO-TO Connection Agreement by reference to Good Industry Practice using their skill, experience and knowledge and with regard to such other matters as the Independent Engineer in their sole discretion considers appropriate.

3.2.18.2All references to the CATO-TO Independent Engineer shall be made in writing by a Lead Party with notice to the others being given contemporaneously as soon as reasonably practicable and in any event within 16 days of the occurrence of the dispute to be referred to the CATO-TO Independent Engineer. The Lead Parties shall promptly supply the CATO-TO Independent Engineer with such documents and information as they may request when considering such question.

3.2.18.3The CATO-TO Independent Engineer shall use their best endeavours to give their decision upon the question before them as soon as possible following its referral to them. The Lead Parties shall share equally the fees and expenses of the Independent Engineer.

3.2.18.4The Lead Parties expressly acknowledge that submission of disputes for resolution by the CATO-TO Independent Engineer does not preclude subsequent submission of disputes for resolution by arbitration as provided in 3.2.16. Pending any such submission the parties shall treat the CATO-TO Independent Engineer's decision is final and binding unless referred to the authority.

**Appendix A- CATO Connection Schedule**

**Opening statement to Appendix A- CATO Connection Schedule**

|  |  |  |
| --- | --- | --- |
| **Lead Parties** | **Lead Person** | **Signature** |
| ESO | [NAME] |  |
| CATO | [NAME] |  |
| PTO | [NAME] |  |

The Lead Parties forming the CATO-TO Connection Sub-Group, [at the first meeting of the Sub-Group or at the earliest available opportunity since its establishment] commit to the development and progression of the deliverables required in Appendix A.

**Effectiveness Statement**

All Lead Parties agree that at the date of the issue of the ION:

• all items listed in the Deliverables Timetable are effective and complete

• the information populating the GIDFS and CTISS remain accurate and complete and should be notified to the Company and PTO if this changes.

|  |  |  |
| --- | --- | --- |
| **Lead Parties** | **Lead Person** | **Signature** |
| ESO | [NAME] |  |
| CATO | [NAME] |  |
| PTO | [NAME] |  |

The CTISS, Deliverables Timetable, Construction Programme & Completion Report applying to the CATO Transmission Interface Site are set out in Appendices [A] CATO Connection Schedule (the GIDFS is set out in Appendix A8. No variation to this CATO Connection Schedule shall be effective unless made in writing and signed by or on behalf of the Lead Parties.

**Appendix A1 CATO TRANSMISSION INTERFACE SITE SPECIFICATION**

**\*TEMPLATE\***

|  |  |
| --- | --- |
| **Pre-existing Transmission Owner (PTO):** |  |
| **Competitively Appointed Transmission Owner (CATO):** |  |
|  |  |
| **Transmission Interface Site:** |  |

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**Electrical Standards**

These appendices contain references to the Relevant Transmission Licensee’s Relevant Electrical Standards (RES) and/or [The Scottish Electrical Standards for SPT’s Transmission System (SPTS)/ Scottish Electrical Standards for SHET’s Transmission System (SHETS)] throughout. The CATO shall ensure that all CATO equipment contained within Relevant Transmission Licensee’s busbar protection zone at the CATO Transmission Interface Point (see Grid Code ECC 6.2.1.2) complies with the RES/SPTS/SHETS. Copies of these standards are available from The Company’s website at:-

<https://www.nationalgrideso.com/uk/electricity/codes/grid-code/electrical-standards-documents-including-specifications-electronic>

The SPTS/SHETS and RES are updated periodically. If the SPTS/SHETS or RES are updated in the period between issuing the CATO Connection Schedule and the CATO completing the connection to the National Transmission System then the PTO will seek agreement with the CATO to use the updated RES and SPTS/SHETS as the standard for plant and apparatus at the Connection Point.

**SCHEDULE 1**

**TRANSMISSION ASSETS AT THE TRANSMISSION INTERFACE SITE**

This schedule contains a description of the CATO Transmission Connection Assets at the CATO Transmission Interface Site in accordance with STC, Section D, Part One, 2.8

**1.1 HV EQUIPMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| **LOCATION OF PLANT/APPARATUS** | **ITEM OF PLANT / APPARATUS\*\*** | **INSTALLATION YEAR** | **AGE (IN YEARS) AT TRANSFER DATE** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |

**1.2 LV EQUIPMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| **LOCATION OF PLANT/APPARATUS** | **ITEM OF PLANT / APPARATUS** | **INSTALLATION YEAR** | **AGE (IN YEARS) AT TRANSFER DATE** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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**SCHEDULE 2**

**BOUNDARY INFORMATION**

This schedule contains a description of the High Voltage (HV) boundaries in place at the CATO Transmission Interface Site in accordance with STC, Section D, Part One, 2.9

**2.1 HV BOUNDARIES**

**2.1.1 DESCRIPTION**

The electrical and ownership boundary between the CATO Transmission System and PTO at the CATO Transmission Interface Site is located at:

\*Insert Location\* :

1. Main Busbar:-
2. Reserve Busbar:- \*Details to be provided if relevant\*

**2.2.2 HV DIAGRAMS**

Figures 2.1A to 2.1B for the single line diagram and gas zone diagram boundary point between the Onshore Transmission System of the CATO and Onshore Transmission System of the PTO at the CATO Transmission Interface Site.

**2.3 LV BOUNDARIES**

To be discussed and agreed between the Lead Parties in the detailed design phase.

**Figure 2.1A Single Line Diagram (HV Boundary Point)**

**Figure 2.1B Gas Zone Diagram (HV Boundary Point)**

**SCHEDULE 3**

**SITE SPECIFIC TECHNICAL CONDITIONS**

This schedule contains a description of the technical, design and operational criteria which the CATO Transmission Interface Site Party has applied to its equipment in planning and developing its Transmission System in accordance with STC, Section D, Part One,

**SCHEDULE 3.1**

**ANCILLARY SERVICES**

|  |  |  |
| --- | --- | --- |
| PTO: |  | |
|  |  | |
| CATO: | |  |
|  | |  |
|  | |  |
| CATO Transmission Interface Site: |  | |

**SCHEDULE 3.2**

**DEROGATED PLANT**

|  |  |  |
| --- | --- | --- |
| PTO: |  | |
| CATO: | |  |
|  | |  |
|  | |  |
| CATO Transmission Interface Site: |  | |

**Derogated Plant**

Not applicable.

**SCHEDULE 3.3**

**SPECIAL AUTOMATIC FACILITIES**

|  |  |  |
| --- | --- | --- |
| PTO: |  | |
|  |  | |
| CATO: | |  |
|  | |  |
| CATO Transmission Interface Site: |  | |

**Special Automatic Facilities**

* 1. General

Other Facilities

|  |  |
| --- | --- |
| Requirement |  |
| Automatic Open/Closure Schemes | N/A |
| System Splitting/Islanding Schemes | N/A |

1. **Synchronising**
   1. Synchronising requirements at the CATO Transmission Interface Point

There is no requirement for Synchronising facilities to be installed at the CATO Transmission Interface Point however the CATO Plant and Apparatus must always be de-energised prior to closure of the circuit breakers at the CATO Transmission Interface Point.

The CATO Plant and Apparatus is required to interface with The National Electricity Transmission System voltage selection scheme at the Transmission Interface Point in accordance with the applicable Electrical Standards.

**SCHEDULE 3.4**

**RELAY SETTINGS & PROTECTION**

|  |  |  |
| --- | --- | --- |
| PTO: |  | |
|  |  | |
| CATO: | |  |
|  | |  |
|  | |  |
| CATO Transmission Interface Site: |  | |

**Relay Settings & Protection**

* 1. Relay Settings at the CATO Transmission Interface Point

The CATO shall complete the attached protection schedule pro-forma (Schedule 3.4 - Appendix 1) in respect of the CATO Plant and Apparatus at the CATO Transmission Interface Point at <Location>. The CATO has agreed these protection settings with The Company and the PTO. This includes details of the following:

1. Circuit diagrams of both ac connections and tripping for the purposes of interpreting the schedule;
2. Protection co-ordination report confirming compliance with the applicable clauses of the Grid Code European Connection Conditions, the report shall also show how co-ordination with the PTO’s existing system backup protection is achieved including proposed back-up protection grading curves; and
3. Details of the Protection Dependability Index per protected zone which shall be consistent with the requirements defined in ECC 6.2.2.2.2 (d) of the Grid Code.

Any subsequent alterations to the protection settings, shall be agreed between The Company, the PTO and the CATO which shall be consistent with the requirements defined in Grid Code (ECC.6.2.2.5), as provided in the STC Section D Part 1, 2.2.6.

* 1. Protection Arrangements at the Transmission Interface Point

The fault clearance time (from fault inception to circuit breaker arc extinction) for faults on the CATO Plant and Apparatus directly connected to the PTO System meets the following minimum requirement(s):-

At 400kV:- within 80ms

At 275kV:-within 120ms

At 132kV:-within 120ms

For faults on transformers the clearance time is specified for the HV side (e.g. for a fault on a 400/220kV transformer the maximum clearance time is 80ms. Where intertripping is required to open circuit breakers, the overall fault clearance time shall not be extended by more than 60ms (total 140ms) to allow such intertripping to operate.

**Schedule 3.4- Appendix 1**

PROTECTION AND INTERTRIPPING DETAILS AT THE CATO TRANSMISSION INTERFACE POINT

SITE NAME:

CIRCUIT NAME\*:

| CIRCUIT BREAKER TO BE OPERATED | PROTECTION | | | | | SPECIFIED CLEARANCE TIME  (See OF4 Item 2) | MOST PROBABLE CLEARANCE TIME | | | | FAULT SETTING | | RELAY SETTINGS PLUS COMPONENT VALUES | CT RATIO VT RATIO |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PROTECTED ZONE | FUNCTION | MAKE | TYPE/ RATING | DEPENDABILITY INDEX | PROT• | CB | INTER TRIP | TOTAL | PHASE- PHASE | PHASE- EARTH |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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CIRCUIT NAME\*:

| CIRCUIT BREAKER TO BE OPERATED | PROTECTION | | | | | SPECIFIED CLEARANCE TIME  (See OF4 Item 2) | MOST PROBABLE CLEARANCE TIME | | | | FAULT SETTING | | RELAY SETTINGS PLUS COMPONENT VALUES | CT RATIO VT RATIO |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PROTECTED ZONE | FUNCTION | MAKE | TYPE/ RATING | DEPENDABILITY INDEX | PROT• | CB | INTER TRIP | TOTAL | PHASE- PHASE | PHASE- EARTH |
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Note: \* BU DT Phase Overcurrent protection is able to detect both phase-phase and phase-earth faults under minimum infeed conditions from PTO side and trip in less than 300ms (protection operating time).

**SCHEDULE 3.5**

**OTHER TECHNICAL REQUIREMENTS**

|  |  |  |
| --- | --- | --- |
| PTO: |  | |
|  |  | |
| CTO: | |  |
|  | |  |
| Transmission Interface Site: |  | |

**Other Technical Requirements**

|  | **Criteria** | **Code Ref – CATO to comply with:** | **Obligations** |
| --- | --- | --- | --- |
| 1. | Protection of interconnecting connections at the CATO Transmission Interface Point | ECC 6.2.2.3.1  ECC.6.2.2.2.2 | Defined as connections between current transformers on the circuit side of the CATO Plant and Apparatus of the circuit breaker and the busbar clamps on the busbar side of the busbar selector disconnectors at the CATO Transmission Interface Point.  The PTO:  Designed the protection scheme for the Interconnection Connections at the site after the Construction Programme commenced.  The CATO:  Installed auxiliary components on its circuits compatible with those of the PTO to provide the required dependability and setting for the protection.  Provided two current transformers type PX-B cores in each of the PTO’s bays in accordance with TS 3.02.04\_RES exclusively for use by the PTO for the protection of the Interconnecting Connections. This ensured compatibility with PTO’s interconnecting connections protection system.  All protection equipment capable of tripping the interconnecting circuit breaker complies with ECC.6.2.2.2.2 of the Grid Code. As provided in STC Section D, Part 1, 2.2.6  In the event that the CATO connects any CATO Plant and Apparatus within the Transmission busbar protection zone which utilises Gas Insulated Switchgear equipment, then the PTO shall provide all necessary alarms and indications with respect to any gas zones across the ownership boundary. |
| 4. | Circuit Breaker Fail Protection at the CATO Transmission Interface Point | ECC.6.2.2.3.2 | The CATO:  Shall install circuit breaker fail protection equipment on all CATO Plant and Apparatus circuit breakers operating at Supergrid Voltage that interfaced directly with the PTO System. The CATO shall provide Circuit breaker fail back trip facilities to integrate with the PTO’s back tripping scheme.  Alarms and Indications associated with the Circuit Breaker Fail Scheme were provided to The Company and PTO to indicate operation of circuit breaker fail protection.  In the event that the Circuit Breaker Fail is an integral function of the PTO’s busbar protection scheme, the CATO shall provide CT signals, plant status and initiation contacts from their bay(s) to The Company. The CATO accepts trip commands from PTOs Busbar Protection/Circuit Breaker Fail scheme to the CATO’s circuit breaker trip systems.  All provisions are to be in accordance with TS.3.24.39\_RES. |
| ML- 5. | Fault Disconnection Facilities |  | The CATO:  To make provision for tripping of the circuit breakers forming part of the CATO Plant and Apparatus at the CATO Interface Point by PTO’s protection systems in accordance with RES. |
| 6. | Reactive capability at the Transmission Interface Point |  | The CATO:  Required to meet the requirements of ECC.6.3.2.4 of the Grid Code.  HVAC- Shall be determined on a case by case basis (default .95 litres, .95 Lag  HVDC- As per Grid Code 6.3.8 & 6.3.2 |
| 7. | Restoration |  | The restoration capability the CATO is required to put in place shall comprise measures to ensure apparatus has restoration capability specified in the STC. |
| 8. | Voltage Control Requirements at the Transmission Interface Point | ECC.6.3.8.4  ECC.E7 | The CATO:  To be defined on a case by case basis. |
| 9. | Power Oscillation Damping |  | To be determined on a case by case basis |
| 10. | Fault Ride Through | ECC.6.3.15 | The CATO:  To meet the applicable requirements of ECC.6.3.15. The total fault clearance time on the National Electricity Transmission System shall be agreed by the Lead Parties. |
| 11. | Harmonic Performance at the CATO Transmission Interface Point | ECC.6.1.5(a) | The CATO:  Carried out an Assessment to ensure that its CATO Transmission System complies with the applicable standards specified in the Grid Code ECC.6.1.5.  The PTO shall provide information to the CATO as requested. This includes (but not restricted to) information on the impedance characteristics, and background level of harmonic distortion at the CATO Transmission Interface Point.  Satisfied the requirements of ER G5/5, which includes an obligation to ensure compliance at sites on the Transmission System and/or Distribution System remote from the CATO Transmission Interface Point. The results of this assessment is published as a formal statement of compliance. |
| 12. | Power Quality Monitoring at the CATO Transmission Interface Point |  | The CATO:  Provided three phase voltage transducers on the CATO Plant and Apparatus of suitable accuracy and performance. These shall be appropriately sited at the CATO Transmission Interface Point to enable continuous power quality voltage monitoring to be undertaken with the CATO’s Plant and Apparatus at the CATO Transmission Interface Point energised.  Examples of suitable voltage traducers are detailed in TS 3.02.05\_RES “Voltage Transformers” (with particular reference to section 1.3) or, alternatively, in TS 3.02.12\_RES “Voltage Dividers”.  Provided three phase current transducers of suitable accuracy and performance on the CATO Plant and Apparatus at the Transmission Interface Point to enable continuous power quality current monitoring to be undertaken by The Company.  The PTO shall provide the output signal of these voltage and current transducers to The Company and the PTO.  The PTO:  Shall install permanent, Class A power quality monitors as defined in IEC 61000-4-30 at the CATO Interface Point in order to check compliance against the specified limits and provide cubicle space, power supplies, and ancillary equipment within the relevant Substation. The CATO provided CT and VT signals (as specified above) to a suitable termination point within the cubicle.  The PTO shall undertake a four week period of continuous power quality voltage measurements using the above facilities immediately prior to the energisation of the CATO Plant and Apparatus feeders to establish a baseline for compliance with the Grid Code.  Continuous power quality monitoring is then performed during and after commissioning of the CATO Plant and Apparatus both with and without the connection to the transmission system. |
| 13. | Voltage Phase Unbalance | ECC.6.1.5(b)  ECC.6.1.6 | The CATO:  Shall carry out an unbalance assessment in accordance with Grid Code Conditions CC.6.1.5(B) and ECC.6.1.6.  The results of this assessment are published as a formal statement of compliance. |
| 14. | Electromagnetic Transients | ECC.6.1.7(a)  ECC.6.1.7(b) | The CATO:  Shall take appropriate measures to minimise the probability and severity of electromagnetic voltage transients which may occur when the CATO Plant and Apparatus (or any material subsystem) is connected to or disconnected from the National Electricity Transmission System.  Provided to The Company and PTO with details of such measures and an assessment of the predicted probability and severity of such transients.  The Company:  Provided the latest fault level information to enable the assessment detailed above.  Note: The OTSDUW User may wish to make reference to guidance documents including, but not limited to, IEC 60071-4.  In order to limit voltage change at the CATO Interface Point, (for example during energisation), the CATO shall also be required to satisfy the requirements of ECC.6.1.7(a) and ECC.6.1.7(b) of the Grid Code. |
| 15. | Operational Telephony | STCP 04-5 | The CATO:  To fulfil the obligations defined in STCP 04-5 |
| 16. | Critical Tools & Facilities | ECC.7.10  ECC 7.11 | The CATO:  AS required under Grid Code 7.10 and 7.11 is required to have specialist critical tools and facilities in accordance with the Grid Code ECC 7.10. In addition the CATO will also be required to comply with ECC 7.11 |
| 17. | Real Time Data Transfer | STCP 04-3 | The CATO :  Is required to supply real time data as specified in STCP 04-3 |
| 18. | Dynamic System Monitoring | ECC.6.6 | To be installed on a case by case basis, as agreed by the Lead Parties. |
| 20. | Safety and Operational Interlocking at the Transmission Interface Point |  | The CATO:  Shall provide electrical and mechanical interlocking on the CATO Plant and Apparatus located within the zone covered by the PTO’s substation busbar protection at the CATO Transmission Interface Site in accordance with the Electirical Standards. |
| 22. | Earthing Requirements at the Transmission Interface Point |  | All earth mats on the PTO’s site(s) and the PTO’s site(s) where these are adjacent may be bonded together. The PTO’s site earth mats can be bonded to the CATO’s site earth mat.  The CATO:  Carried out an earthing survey of its sites prior to construction of the CATO’s Plant and Apparatus. The earthing system is designed to withstand a short circuit current of 63kA for 1 second.  The CATO shall also ensure that it’s Plant and Apparatus is designed and installed such that the rise of earth potential (ROEP) at <insert location> conforms to the touch, step and transfer voltage limits which are defined in ENA TS 41 – 24. Where intertripping (second main protection) is required to open circuit breakers, the overall fault clearance time shall not be more than 140ms.  The CATO’s earthing system design review shall take the PTO’s earthing system design into account and the CATO shall collaborate with the PTO to ensure that compliance has been demonstrated at the CATO Transmission Interface Point and mitigation of 3rd party impact is considered.  It should also be noted that the earthing system at <insert location> shall be designed to comply with ESQCR 2002 and BS EN50522. |
| 24. | CATO Plant and Apparatus Compliance Process | STCP 19-7 | The CATO:  Shall demonstrate compliance with STCP 19-7 |
| 26. | Short Circuit Levels at the Transmission Interface Point |  | The Company:  The following are the values maximum and minimum fault levels at the CATO Interface Point considered for the studies – provided by the RTL on <insert date>:  Maximum Fault Level  <insertlevels>  Minimum Fault Level  <insert levels) |

**Schedule 3.5 – Appendix 1**

Site Specific Technical Conditions – Harmonic Performance (ECC.6.1.5(a))

* 1. The CATO shall ensure its Plant and Apparatus is designed and constructed to limit the contribution of injected harmonic currents such that the incremental harmonic voltage distortion at the CATO Interface Point conforms to the limits specified in Table 1.

**Table 1: Incremental Voltage Emission Limit**

| **Harmonic Order ‘h’** | **Incremental Voltage Distortion Limits (due to harmonic current injection) at the CATO Interface Point (% of fundamental)** |
| --- | --- |
| 2 |  |
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* 1. The CATO shall ensure that its Plant and Apparatus, at the CATO Interface Point was designed and constructed such that the total harmonic voltage distortion at the CATO Interface Point conform to the limits specified in Table 2.
  2. Table 2 also provides the levels of background harmonic voltage distortion at the CATO Interface Point prior to the connection of the CATO Plant and Apparatus.
  3. The limits specified in Table 1 and Table 2 shall apply for all possible conditions of the CATO Plant and Apparatus. They shall apply for all possible conditions of the Network System (which includes the Transmission Network and relevant Distribution or EU Code User’s networks) whose system impedance envelopes at the CATO Interface Point and will be specified by The Company to the CATO, unless otherwise agreed. The outage specification will describe the network states to be included in the envelopes.

**Table 2: Background Harmonic Voltage Distortion and Total Harmonic Voltage Distortion Limits**

| **Harmon Order ‘h’** | **Background Voltage Distortion at the CATO Interface Point prior to the connection of the CATO Plant and Apparatus and associated Offshore Generation (% of fundamental)** | **Total Harmonic Voltage Emission Limits (% of fundamental)** |
| --- | --- | --- |
| 2 |  |  |
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1. Harmonic Voltage Distortion Limits for the above the 50th harmonic
   1. The CATO shall ensure that its Plant and Apparatus, is designed to limit the contribution of injected harmonic currents with a frequency above 2.5kHz such that the incremental harmonic voltage distortion at the CATO Interface Point conform to the limits specified in Table 3.

**Table 3: Limits of Contribution (Emission) from the CATO Plant and Apparatus including any contribution from the Offshore Generation at the Transmission Interface Point**

| **Harmon Order ‘h’** | **Total Harmonic Voltage Emission Limits (% of fundamental)** |
| --- | --- |
| Harmonics 2.5kHz |  |

* 1. The CATO shall also ensure its Plant and Apparatus is designed such that the total harmonic voltage distortion for frequencies above 2.5kHz at the CATO Interface Point conform to the limits specified in Table 4.
  2. Table 4 also provides the levels of background harmonic voltage distortion at the Transmission Interface Point prior to the connection of the OTSDUW Plant and Apparatus.

**Table 4: Background Harmonic Voltage Distortion and Total Harmonic Voltage Distortion Limits**

| **Harmon Order ‘h’**  **All harmonics above 2.5kHz** | **Existing Background (% of fundamental)** | **Total Harmonic Voltage Limits (% of fundamental)** |
| --- | --- | --- |
| Even and odd-multiple of 3 |  |  |
| Odd non-multiple of 3 |  |  |

* 1. The CATO Plant and Apparatus conforms to the Total Harmonic Distortion (THD) level, at the CATO Transmission Interface Point as calculated in accordance with Engineering Recommendation G5/5 and IEC 61000-4-30, given in Table 5 below.

**Table 5: Total Harmonic Distortion Limits**

|  |  |  |
| --- | --- | --- |
| **Frequency Range** | **THD** | |
| ≥100Hz | |  |
| ≥2.5kHz | |  |

* 1. The limits specified in Table’s 3, 4 and 5 shall apply for all possible CATO Plant and Apparatus and National Electricity Transmission System operating conditions whose system impedance envelopes at the CATO Transmission Interface Point for frequencies above 2.5kHz up to 5kHz.

1. **Voltage Flicker Limits**
   1. The CATO shall ensure its Plant and Apparatus is designed and constructed to comply with the voltage flicker limits specified in Table 6 at the Transmission Interface Point.

**Table 6: Voltage Flicker Limits**

|  |  |
| --- | --- |
| **Limits for Voltage Flicker at the Transmission Interface Point** | |
| Short Term Severity (Pst) |  |
| Long Term Severity (Plt) |  |

**Schedule 3.5 – Appendix 2**

Site Specific Technical Conditions - Communications Plant (ECC.6.5))

| **Description** | **Location** | **Source** | **Provided By** | **Comments** |
| --- | --- | --- | --- | --- |
| Operational Telephony | CATO Plant and Apparatus Control Centre | The Transmission Substation Exchange or as agreed with The Company | PTO provided and installed cross site wiring at the CATO Plant and Apparatus Control Centre | Control Telephony provides secure point to point telephony for routine Control calls, priority Control calls and emergency Control Calls.  The CATO’s control point must be immediately and directly contactable by The Company at all times and operators should be able to communicate in clear plain English.  If the CATO intends to have a nominated Trading Point/Control Point outside of GB, The Company will provide the communication routes and Control Telephony facilities to the CATO’s Control Point but will charge the CATO for the overseas element of this work including any ongoing regular maintenance. Any subsequent relocation of the Control Point will be charged to the CATO by The Company. |
| PSTN (or other off-site communications circuits) for Telephony  (ECC.6.5.2 to ECC.6.5.5) | CATO Plant and Apparatus Control Centre | Public Telecommunications Operator (PTO) | Data and speech services required by The Company and the PTO was cabled from the CATO Control Centre to the Public Telecommunications Exchange. The CATO provided their own off site wiring and communications paths. |  |

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***Appendix A2 : CATO-TO Connection Deliverables Timetable***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item/process/Agreements** | **STC/STCP Reference** | **Drafting Responsibility** | **First Draft Due by** | **Final To be Agreed By** | **To be Agreed By** |
| Transmission interface Agreement | STC Section D,  Part Three | Relevant TO | [Date to be agreed 6 months prior to Energisation of TO Assets] | [Date to be agreed prior to Energisation of TO Assets] | Lead Parties |
| CATO Transmission Interface Site Specification | STC Section D,  Part Three | Relevant TO | [Date to be agreed 6 months prior to Energisation of TO Assets] | [Date to be agreed prior to Energisation of TO Assets] | Lead Parties |
| Completion Report | STCP 18-5  Appendix \*\* | Relevant TO | [Date to be agreed 6 months prior to Energisation of TO Assets] | [Date to be agreed prior to Energisation of TO Assets] | Lead Parties |
| Provision of Asset Operational Information | STCP04-4 | Existing Procedure to be followed |  |  | Lead Parties |
| Communication Arrangements | STCP04-6 | Existing Procedure to be followed |  |  | Lead Parties |
| Safety Coordination | STCP09-1 | Existing Procedure to be followed |  |  | Lead Parties |
| Outage Planning Information | STCP12-2 | Existing Procedure to be followed |  |  | Lead Parties |
| Connection Process | STCP18-5 | Existing Procedure to be followed |  |  | Lead Parties |
| Construction Programme | STCP19-7 | Existing Procedure to be followed |  |  | Lead Parties |
| Operational Notification Process | STCP19-7 | Existing Procedure to be followed |  |  | Lead Parties |
| Commissioning Process | STCP19-4 | Existing Procedure to be followed |  |  | Lead Parties |
| Production of Models for NETS Planning | STCP22-1 | Existing Procedure to be followed |  |  | Lead Parties |
| GIDFS | STCP 19-7 Appendix \*\* | Existing Procedure to be followed |  |  | Lead Parties |

The above Party Entry Process Timetable has been agreed by:

Party: …………………………………STC Committee Representative …………………………………. Date:…………………………………...

Party: …………………………………. STC Committee Representative ……………………………………. Date:…………………………………...

Party: …………………………………. STC Committee Representative ……………………………………. Date:

**APPENDIX A3**

**CATO-TO CONSTRUCTION PROGRAMME**

CATO: \*\*\*\*\*\*\*\*\*

Connection Site: \*\*\*\*\*\*\*\*\* Substation

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The Construction Programme comprises the following:

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| --- | --- | --- |
| **CATO Requirements** | | |
| 1 | The date by which the CATO expects to apply for Planning consent |  |
| 2 | Financial Investment Decision is achieved by the CATO |  |
| 3 | CATO to confirm to PTO the design of the CATO’s substation bays |  |
| 4 | Data exchange as outlined in the STCP 12-1 |  |
| 5 | The date by when final diagrams are exchanged and agreed between The PTO and CATO |  |
| 6 | The date by which all CATO's Works are to be completed by |  |

**Pre-Construction**

|  |  |  |
| --- | --- | --- |
| **Optioneering** | | |
| 1 | The date by which the PTO should review the relevant reinforcement works to deliver a compliant CATO Transmission Interface |  |
| **Detailed Engineering** | | |
| 2 | PTO and the CATO jointly carry out site investigations to confirm ground condition to inform tender specifications at CATO Transmission Interface Site by |  |

**Construction**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tendering** | | | | | |
| 1 | | The latest date by which the PTO will commence the tender process for the transmission reinforcement works at the CATO Transmission Interface Site. | |  | |
| **Contract Award** | | | | | |
| 2 | | The latest date by which the PTO will award contracts for the transmission reinforcement works at the CATO Transmission Interface Site. | |  | |

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| --- | --- | --- |
| **Equipment Order** | | |
| 3 | The latest date by which the PTO will place orders for equipment for the transmission reinforcement works at the CATO Transmission Interface Site. |  |

|  |  |  |
| --- | --- | --- |
| **Construction / Commissioning** | | |
| 4 | The date by which the detailed requirements in relation to the communications links, trip facilities and monitoring facilities have been discussed and agreed between the CATO and PTO |  |
| 5 | The date by which the detailed requirements in relation to the metering equipment (the meters and communication links) have been discussed and agreed between the CATO and the PTO as defined in the Appendix A STCP 18-5. |  |

|  |  |  |
| --- | --- | --- |
| 6 | First energisation Available from CATO Transmission Interface Site to CATO |  |
| 7 | The date by which One Off works are to be completed |  |
| 8 | Completion Date- as agreed in Schedule X |  |
| 9 | The date by which the PTO Transmission Reinforcement Works are to be completed |  |

**Notes:**

1. The Construction Programme is based upon the assumption that both parties agree outages.

2. These dates may be amended by agreement of both parties.

3. Changes to the Completion Date must be reported to The Authority and approved.

**APPENDIX A4**

MATTERS FOR COMPLETION REPORT

[List matters to be included which shall contain]

• Confirmation of Compliance Statement; 19-7

• type test results\reports;

• confirmation that the signed Transmission Interface Agreement is in place;

• confirmation that the signed Transmission Interface Site Specification is in place

• confirmation that Safety Rules have been exchanged;

• confirmation that the Site Responsibility Schedule is complete and in place.

* Confirmation of Construction Program

Appendix B: CATO-TO Connections Project Process

Appendix C- Early Competition Asset Delivery Indicative Timescales.

