GSR025: Updating the SQSS to reflect the recent modification to Engineering Recommendation P28

What stage is this document at?

01	Workgroup Report
02	Industry Consultation
03	Report to the Authority

This proposal seeks to modify the NETS SQSS to update "Maximum Voltage Step Changes Permitted for Operational Switching" diagram to accommodate the modification to Engineering Recommendation P28.

This Report is submitted to the Authority to assist in its decision in relation to the implementation of the NETS SQSS Modification proposed.

Published on: **5 February 2019**

National Grid recommends:
That GSR025 should be implemented as it better facilitates the applicable NETS SQSS objectives.

High Impact:
None identified.

Medium Impact:
None identified.

Low Impact:
Transmission owners.

Contents

About this Document

This report outlines information required for interested parties to form an understanding of the proposed changes. Feedback from an Industry Consultation is included at Section 5.

This report is intended to provide the Authority with the information necessary to inform their decision on the implementation of the proposed modification.

The revisions to the NETS SQSS as proposed by National Grid and sent to the Authority require approval and will, if approved, come into force from such date (or dates) of which Authorised Electricity Operators will be notified by National Grid, in accordance with the Authority's approval.

Document Control

Version	Date	Author	Change Reference
0.1	11.09.2018	National Grid	Draft Industry Consultation
0.2	30.11.2018	National Grid Code Administrator	Final Industry Consultation
0.3	08.01.2019	National Grid Code Administrator	Draft Report to the Authority to SQSS Panel ahead of submission
0.4	05.02.2019	National Grid Code Administrator	Report to the Authority submission

Timetable

Modification Proposal submitted to Secretary	10 Sep 2018
Modification Proposal reviewed at SQSS Panel	14 Sep 2018

Any Questions?

Contact:

Chrissie Brown

Code Administrator

Shazia.Akhtar2@nationalgrid.com

07787 266972

Proposer:

Rachel Woodbridge-Stocks/Greg Heavens

National Grid ESO

Rachel.Woodbridgestocks@nationalgrig.com

07976708078

Consultation Document published/closes	30 November 2018/2 January 2019
Consultation Responses circulated to Panel	09 Jan 2019
Modification Report submitted to Authority	Jan 2019
Authority Decision	Feb 2019
Implementation Date	TBC if approved by the Authority. If approved this modification will be implemented subject to Authority consultation.

1 Executive Summary

1.1 The GSR025 Proposal was presented to the SQSS Panel at the January 2019 NETS SQSS Review Panel. The Panel recommended the Report to be issued Authority on the changes proposed to the NETS SQSS.

1.2 This Consultation closed on 2 January 2019, with two responses received. Comments received were non-material and can be accessed at Section 5.

1.3 The NETS SQSS requires that the Transmission System is developed and operated such that prior to any faults, following any secured events, and following operational switching, there are no Unacceptable Voltage Conditions. To meet this requirement:

- Voltages on the National Electricity Transmission System are required to remain within the ranges specified in Section 6 and Section 10 of the NETS SQSS; and

- Voltage Step Changes on the Onshore Transmission System are required not to exceed the limits specified in Section 6 of the NETS SQSS.

1.4 The limitations on Voltage Step Changes for operational switching that occurs at intervals of less than 10min are based on Engineering Recommendation P28 - Voltage fluctuations and the connection of disturbing equipment to transmission systems and distribution networks in the United Kingdom.

1.5 Engineering Recommendation P28 Issue 1 was first published in 1989 to provide recommended planning limits for voltage fluctuations for connection of equipment to public electricity supply systems in the UK. Engineering Recommendation P28 Issue 1 was primarily concerned with assessment of voltage fluctuations and associated flicker produced by traditional domestic, commercial and industrial loads.

1.6 Since Engineering Recommendation P28 Issue 1 was first published, the factors affecting development of transmission systems and distribution networks, and equipment connected to them have changed significantly. There has been a shift towards connection of distributed/embedded generation equipment powered by renewable energies and other low carbon technology equipment. These types of modern equipment are capable of causing voltage fluctuations.

1.7 Significant developments in Electromagnetic Compatibility (EMC) requirements have also taken place, which are captured in the International Electro-technical Commission (IEC) 6100 series of Standards and technical reports. United Kingdom implementation of these Standards is captured in the various parts of BS EN 61000.

1.8 Engineering Recommendation P28 is referenced in the Grid Code, Distribution Code and SQSS. A joint Grid Code and Distribution Code Working Group was established to oversee the revision of Engineering Recommendation P28 Issue 1 and associated modification to requirements for voltage fluctuation in the Distribution Code and the Grid Code and the working group has produced a revised version of Engineering Recommendation P28 i.e. EREC P28 Issue 2 which was submitted to the Authority for approval on 17 May 2018.

1.9 In the revision, it has been proposed to align the requirements on the minimum time interval between Voltage Step Changes with that specified in IEC 6100. This alignment will have an impact on the NETS SQSS. Other changes proposed by the revision have no impact on the NETS SQSS.

1.10 Therefore, a sequential modification is required to the SQSS to update the reference to the minimum time interval between voltage changes in Table 6.5 and

to change Figure 6. which has been updated in Issue 2 of P28. It is proposed that the minor changes are made to Table 6.5 and a new diagram should replace Figure 6.1.

Recommendation

1.11 It was proposed that this modification progress directly to consultation to align with the corresponding Grid Code modification GC0118 which will be progressing to Code Administrator consultation at the same time. Following this, it is proposed that all three modifications are submitted to the Authority at the same time as a complete package.

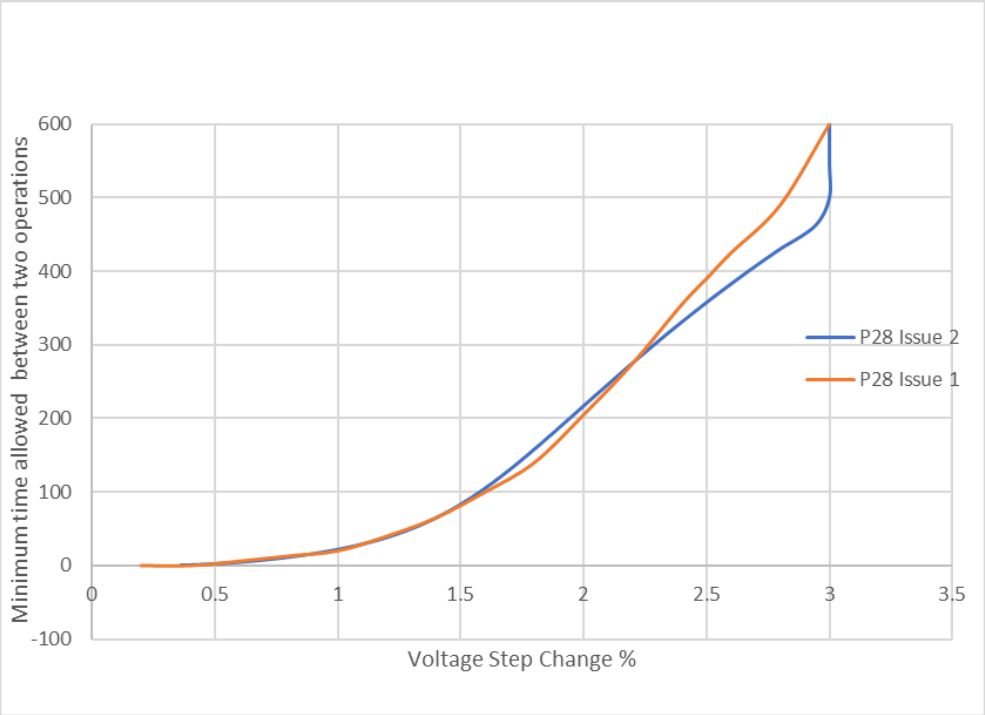
1.12 More information on the proposed modification to the Engineering Recommendation P28 can be found here under the "DCRP/18/01/PC – Closed" tab.

2 Why Change?

2.1 The changes are required to align the SQSS with the proposed new requirements of EREC P28 Issue 2, subject to its approval.

3 Solution

3.1 The minimum time required between two consecutive operations causing a Voltage Step Change of a specific level are shown in Figure 1 below for both P28 Issue 1 and Issue 2.



3.2 In order to reflect this change in the NETS SQSS it will be necessary to

Change the 10 minutes referred to in Row 1 and Row 2 of Table 6.5 of the NETS SQSS to 8 minutes; and

Replace Figure 6.1 of the NETS SQSS by a new Figure 6.1 which is based on Figure B1.2 of the new EREC P28 Issue 2.

3.3 The changes arise as a consequence of the proposed change to Engineering Recommendation P28. The DCRP Consultation paper DCRP/PC/18/01 describes the proposed changes to Engineering Recommendation P28.

4 Impact & Assessment

Impact on the NETS SQSS

4.1 GSR0 requires amendments to the following parts of the NETS SQSS:

Figure 6.1: Maximum Voltage Step Changes Permitted for Operational Switching

Table 6.5: Voltage Step Change Limits in Planning and Operational Timescales

4.2 The text required to give effect to this proposal is contained in Annex 1 of this Industry Consultation document.

Impact on the National Electricity Transmission System (NETS)

4.3 The relaxation of the step voltage change requirement will make the operation of the transmission system slightly easier.

Impact on NETS SQSS Users

4.4 The proposed modification should have a small positive impact on NETS SQSS Users, e.g. faster ramping of line-commutated HVDC schemes and would allow more rapid operational switching of shunt reactors or MSCDN's

Impact on Greenhouse Gas Emissions

4.5 The proposed modification will have no impact.

Assessment Against NETS SQSS Objectives

4.6 The NETS SQSS Review Panel considers that the proposed changes would better facilitate the NETS SQSS objectives:

facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner;

Positive. The alignment of all the standards relevant to Voltage Step Changes would ensure that the transmission system is developed in a coordinated manner.

ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;

The proposal has a neutral impact on this objective.

facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and

The proposal has a neutral impact on this objective.

facilitate electricity Transmission Licensees to comply with their obligations under EU law.

The proposal has a neutral impact on this objective.

Impact on Core Industry Documents

4.7 It will be necessary to ensure that the relevant Distribution Code, and Grid Code sections have been updated to ensure full alignment of the requirements amongst P28, the Distribution Code, the Grid Code, and the NETS SQSS.

Impact on Other Industry Documents

4.8 The proposed modification does not impact on any other industry documents.

Implementation

4.9 The implementation date should be aligned with that of the other relevant modifications to the Grid Code and EREC P28. However, of GSR025 cannot be implemented at the same time as the Distribution Code, Grid Code and P28 changes due to requiring a licence change, we do not believe it should prevent the other modifications being implemented sooner.

5 SQSS Panel Recommendation

5.1 During the period 30 November 2018 to 2 January 2019, industry was invited to respond to the consultation paper and the following questions:

1. Do you agree with that the SQSS should be aligned to Issue 2 of P28?
2. Do you agree that Figure 6.1 should be updated rather instead of removed?
3. Do you believe that GSR025 better facilitates the appropriate NETS SQSS objectives?
4. Do you have any other comments?

5.2 Two consultation responses were received from National Grid and Northern Powergrid. These can be read in full I Annex 2. Both respondents supported the modification.

5.3 At the SQSS Panel meeting in 16 January 2019 the Panel unanimously agreed that the modification to the NETS SQSS was required and the Panel Secretary to send the Final Modification Report to the Authority recommending that the modification be implemented.

Annex 1 - Proposed Legal Text

This section contains the proposed legal text to give effect to the proposals. The proposed new text is in red and is based on NETS SQSS Version 2.3.

Voltage Step Change Limits in All Timescales

6.1. *Voltage step change* limits must be observed at every interface point between the *national electricity transmission system* and Users' plant. The *voltage step change* limits do not apply where no User is connected.

6.2. The *voltage step change* limits must be applied with load response taken into account.

Table 6.5 Voltage Step Change Limits in Planning and Operational Timescales

Type of Event	Voltage Fall	Voltage Rise
(a) At substations supplying *User Systems* at any voltage		
Following *operational switching* at intervals of less than ~~10~~ 8 minutes	In accordance with Figure 6.1	
Following *operational switching* at intervals of more than ~~10~~ 8 minutes. except for *infrequent operational switching* events as described below	-3%	+3%
Following *infrequent operational switching* ***(Notes 8, 9)***	-6%	+6%
In planning timescales, following a *fault outage of* a *double circuit supergrid* overhead line ***(Note 10)***	-6%	+6%
Following any other *secured event*, ***(Note 11)*** except as detailed below:	-6%	+6%
(b) At substations supplying *User Systems* at voltages above 132kV		
7. Following a *secured event* involving a *fault outage* of a section of *busbar* or a mesh corner	-12%	+6%
In operational timescales, following a *secured event* involving a *fault outage* of a *double circuit* overhead line	-12%	+6%
(c) At substations supplying *User Systems* at 132kV ***As (a) and (b) plus:***		
Following a *secured event* involving loss of a double circuit transmission overhead line, and one or more *supergrid* transformers stepping down to 132 kV	-12%	+6%
Following a *secured event* involving loss of a single *transmission circuit* and one or more *supergrid* transformers stepping down to 132kV, with a prior outage of another circuit connected to the substation or of another mesh corner at the substation	-12%	+6%

Following a *secured event* involving loss of a *double circuit* transmission overhead line operating at 132kV **(*Note 12)***	-12%	+6%
(d) At substations supplying *User Systems* at voltages below 132kV ***As (a), (b) and (c) plus:***		
Following a *secured event* involving the loss of one or more Grid Supply Transformers	-12%	+6%

Notes

6. An individual User must not experience voltage steps exceeding ±3% due to infrequent operational switching:
   - (i) on a regular basis, and / or
   - (ii) at intervals of less than two hours,
   - (iii) unless abnormal conditions prevail

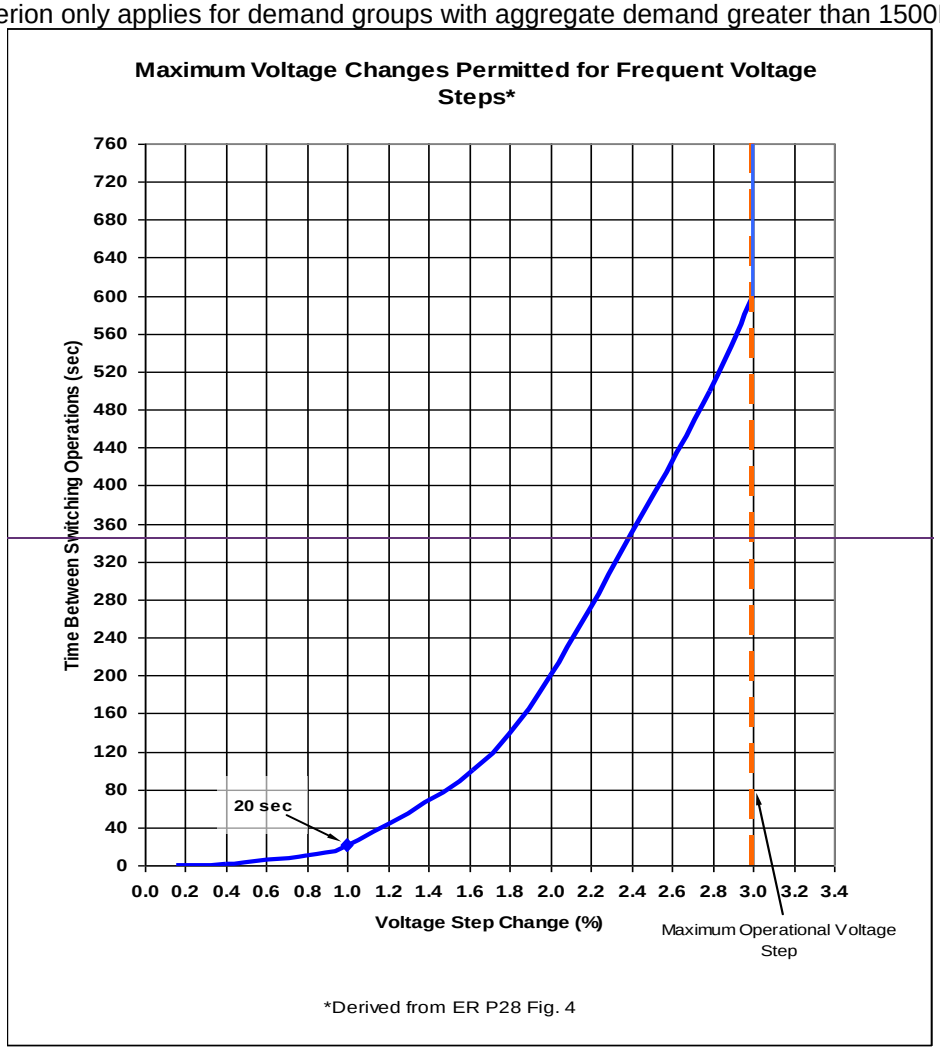
   Infrequent operational switching would typically include disconnection of circuits for routine maintenance. It would not include switching out of circuits for voltage control, or switching out of circuits to allow safe access to other plant, where it is foreseen that such switching may be a regular practice; such events would be classed as *operational switching*.

   Voltage steps exceeding ±3% due to *infrequent operational switching* may be accepted only on busbars or circuits fed directly by the *transmission circuits* involved in the *infrequent operational switching*.

   It is permissible to relax this to -12%, +6% in Scotland if the aggregate demand of sites experiencing voltage falls between 6% and 12% and does not exceed 1500MW.

   Operationally, the -6% requirement may be relaxed to -12% at a site or sites with a combined group demand of less than 1500MW, provided all other NETS SQSS requirements are met, if the -6% requirement may only be met by shedding load.

   In planning timescales, for demand groups with aggregate demand less than 1500MW, this criterion applies to any demand left connected post-fault. Operationally, this criterion only applies for demand groups with aggregate demand greater than 1500MW.



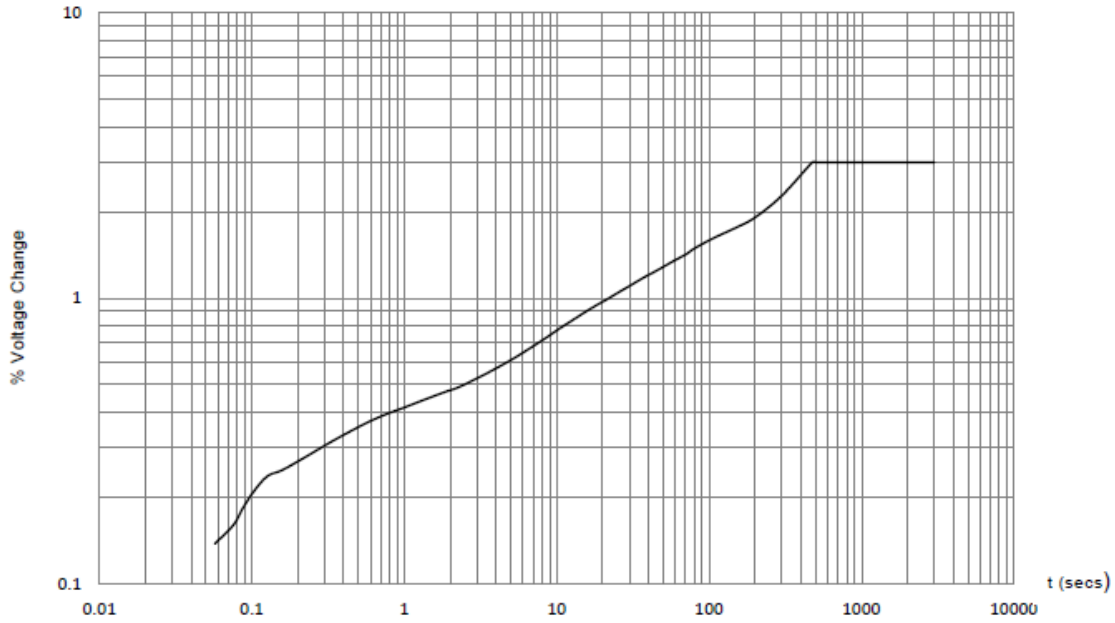


Figure 6.1 Maximum Voltage Step Changes Permitted for *Operational Switching* derived from ER P28 B.1.2

Annex 2 – Industry Consultation responses

NETS SQSS and Grid Code Industry Consultation Response Proforma

GSR025 Updating the SQSS to reflect the proposed modification to Engineering Recommendation P28

Views are invited upon the proposals outlined in this consultation. Please submit your formal responses on this form to box.SQSS@nationalgrid.com no later than **5pm 2 January 2019.**

The proposals set out in this consultation are intended to better meet the NETS SQSS Objectives. To achieve this, they are intended to facilitate efficient and economic connection arrangements whilst ensuring there is no impact on the safety and security of the transmission system.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	*Gregory Heavens* *Greg.Heavens@nationalgrid.com*
Company Name:	*National Grid Electricity Transmission plc*
1. Do you agree that the SQSS should be aligned to Issue 2 of P28?	*Yes*
2. Do you agree that Figure 6.1 should be updated instead of removed?	*Yes, though the inclusion of the figure may require further SQSS modifications should P28 be updated in the future, this prevents needing to refer to the source document when reading the SQSS.*
3. Do you believe that GSR025 better facilitates the appropriate NETS SQSS objectives?	*Yes, the proposal is positive against objective (i), and neutral against the other objectives.* *The alignment of the relevant codes and standards to P28 Issue 2, which is taking place across this SQSS modification and the accompanying changes to the Distribution Code and Grid Code, will ensure that the transmission system is developed in a coordinated manner.*
4. Do you have any other comments?	*No*

If you wish to submit a confidential response please note the following:

i. Information provided in response to this consultation will be published on National Grid's website unless the response is clearly marked "Private and Confidential". We will contact you to establish the extent of the

confidentiality. A response marked “Private and Confidential” will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the NETS SQSS Review Panel and/or Grid Code Review Panel or the industry and may therefore not influence the debate to the same extent as a non-confidential response.

ii. Please note an automatic confidentiality disclaimer generated by your IT System will not in itself mean that your response is treated as if it had been marked “Private and Confidential”.

NETS SQSS and Grid Code Industry Consultation Response Proforma

GSR025 Updating the SQSS to reflect the proposed modification to Engineering Recommendation P28

Views are invited upon the proposals outlined in this consultation. Please submit your formal responses on this form to box.SQSS@nationalgrid.com no later than **5pm 2 January 2019.**

The proposals set out in this consultation are intended to better meet the NETS SQSS Objectives. To achieve this, they are intended to facilitate efficient and economic connection arrangements whilst ensuring there is no impact on the safety and security of the transmission system.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	Alan Creighton alan.creighton@northernpowergrid.com
Company Name:	Northern Powergrid
1. Do you agree that the SQSS should be aligned to Issue 2 of P28?	Yes
2. Do you agree that Figure 6.1 should be updated instead of removed?	Yes
3. Do you believe that GSR025 better facilitates the appropriate NETS SQSS objectives?	*For reference the applicable NETS SQSS objectives are:* *(i) facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner;* The proposal has a positive impact on this objective in that it harmonises technical requirements with the Distribution Code and Grid Code thus helping to facilitate the development of a co-ordinated system. *(ii) ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;* The proposal has a neutral impact on this

	objective. *(iii) facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and* The proposal has a neutral impact on this objective. *(iv) facilitate electricity Transmission Licensees to comply with their obligations under EU law.* The proposal has a neutral impact on this objective.
4. Do you have any other comments?	No

If you wish to submit a confidential response please note the following:

i. Information provided in response to this consultation will be published on National Grid's website unless the response is clearly marked "Private and Confidential". We will contact you to establish the extent of the confidentiality. A response marked "Private and Confidential" will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the NETS SQSS Review Panel and/or Grid Code Review Panel or the industry and may therefore not influence the debate to the same extent as a non-confidential response.

ii. Please note an automatic confidentiality disclaimer generated by your IT System will not in itself mean that your response is treated as if it had been marked "Private and Confidential".