

Quality of Service Incentive Scheme – Exceptional Events

Appointed Examiner's Report	
Reporting year	2011/12
DNO	Southern Electric Power Distribution
Cause	Windborne material damaging 33kV switchgear
Date of event	18 July 2011

Submitted to:

Ofgem and
Scottish and Southern Energy

Submitted by:

British Power International

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March 2012

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Document Status

Title: Exceptional Events Report – SEPD – Norrington Grid Substation – damage to 33kV switchgear – 18 July 2011


Reference: EE 2011/12 – SSE(SEPD)

Issue: Final Version 1.0

Date: 27 March 2012

Electronic Doc Ref: M:\BPIUSER\Projects\Current\UK Ofgem - EE one-offs for 2011/12/SSE(SEPD)/Reports

Authorisation

Name	Position	Signed	Date
Geoff Stott	Project Manager		27 March 2012

History

Issue	Date	Originator	Checker	Description
1.0	27 March 2012	Geoff Stott	Ron Webb	Final version incorporating comments
0.1	22 February 2012	Geoff Stott	Evelyne Lefevre-Farcy	Draft for circulation to Ofgem and SEPD
0.0	19 February 2012	Geoff Stott	Ron Webb	Document created from template

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Glossary

AE	Appointed Examiner
BPI	British Power International
CB	Circuit-breaker
CEGB	Central Electricity Generating Board
CI	Customer Interruptions per 100 connected customers
CML	Customer Minutes Lost per connected customer
DNO	Distribution Network Operator
EHV	Extra High Voltage – all voltages above 20kV up to but excluding 132kV
HV	High Voltage – all voltages above 1kV up to and including 20kV
QoS	Quality of Service
RIGs	Regulatory Instructions & Guidance
SCADA	System Control and Data Acquisition
SEPD	Southern Electric Power Distribution
SLD	Single Line Diagram
SoF	Statement of Facts
SSE	Scottish and Southern Energy
ToR	Terms of Reference

Notes:

Within this document:

1. The term “higher voltage” is used to indicate all voltages greater than 1kV.
2. The calculations of CI and CML within this document are adapted from the annual calculations contained in the RIGs to reflect the CI and CML generated by the actual incidents being audited. They are as follows:

CI: the number of interruptions to supply – the number of customers interrupted per 100 connected customers generated by the incidents being audited. It is calculated as:

$$CI = \frac{\text{The sum of the number of customers interrupted for incidents being audited} * 100}{\text{The total number of connected customers}}$$

CML: the duration of interruptions to supply – the number of customers interrupted per connected customer generated by the incidents being audited. It is calculated as:

$$CML = \frac{\text{The sum of the customer minutes lost for all restoration stages for incidents being audited}}{\text{The total number of connected customers}}$$

In both the formulae above, the total number of connected customers is as declared as at 30 September during the relevant reporting year. Any claims that occur and are audited prior to 30 September in the reporting year during which they occur will be audited using the total number of customers declared at 30 September in the previous reporting year.

Summary

Ofgem has appointed British Power International (the Appointed Examiner) to audit the submission made by Scottish and Southern Energy (SSE) under the “one-off” exceptional event mechanism that damage caused to 33kV equipment at Norrington Grid Substation at 04:10 on Monday 18 July 2011 adversely affected the reported performance for its Southern Electric Power Distribution (SEPD) licensed area for the reporting year 2011/12.

The Appointed Examiner (AE) has visited SEPD to audit the claim against part 1 of the “one-off” exceptional event process and finds that it passes the exceptionality threshold in terms of CI but not CML.

The AE concludes that the event falls within the category of an “other event” as defined in paragraph 8.57 of Special Licence Condition CRC 8, including meeting the exceptionality requirements set out in Appendix 3 thereof.

The AE therefore proceeded to part 2 of the “one-off” exceptional event process, assessing SEPD’s performance in mitigating the impact of the event upon its customers.

The AE concludes that SEPD had taken all practicable steps to safeguard its 33kV outdoor switchgear at Norrington Grid Substation from third party interference and windborne materials.

The AE commends SEPD’s control engineers for analysing the alarms generated by the incident and for quickly restoring supplies.

The AE also commends SEPD for effecting permanent repairs on the same day as the incident, thus safeguarding the security of supply of its customers.

The AE concludes that SEPD had met the criteria of Appendix 4 to paragraph 8.58 of Special Licence Condition CRC 8 and that therefore the incident is deemed to be eligible for adjustment in the DNO’s reported performance.

The AE therefore recommends that an adjustment to SEPD’s 2010/11 reported distribution system performance is made, in line with the part 1 audited CI and CML figures as shown in the following table:

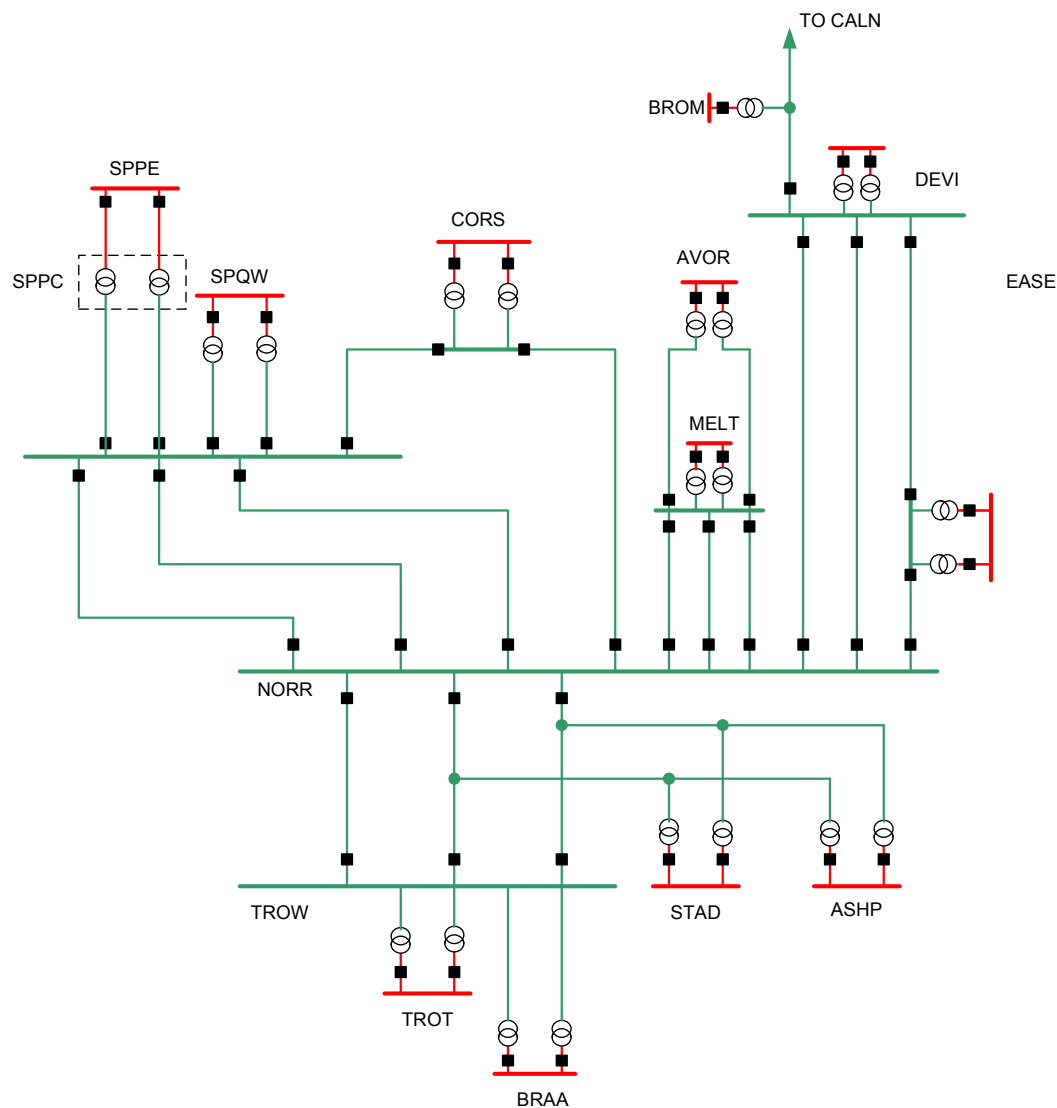
	Audited number	Number above the threshold	Recommended adjustment
CI	2.298	1.398	1.398
CML	0.184	0	0

1. Audit part 1

Summary of main facts

- 1.1 The AE's headline information log for this event is set out in Table A-1 at Appendix A. In addition, the following paragraphs summarise the main facts of the event.
- 1.2 SEPD has furnished photographic evidence to support its claim that windborne material in the form of a metallised balloon came into contact with SEPD's outdoor 33kV equipment at its Norrington Grid Substation.
- 1.3 The ensuing flashover irreparably damaged a 33kV support insulator of 33kV busbar isolator C1W6 which is situated on the reserve busbar side of the bus-coupler circuit-breaker. The flashover precipitated a busbar fault that was cleared by the operation of the 33kV circuit-breakers associated with the three incoming 132/33kV grid transformers.
- 1.4 SEPD's protection operated correctly to clear the incident from SEPD's distribution network.
- 1.5 SEPD's standby engineer was called to site and reported finding the remains of a metallised balloon on the ground beneath 33kV busbar isolator C1W6 and that one of the porcelain post-type insulators of the isolator had been shattered by the flashover and was in need of replacement.
- 1.6 The 33kV overhead connection around which the metallised tail of the balloon had wrapped was also damaged during the incident.
- 1.7 Supplies from twelve of SEPD's Primary Substations were lost as a result of the incident, resulting in the loss of supplies to 67,439 of SEPD's customers in the county of Wiltshire.
- 1.8 SEPD's control engineers rapidly assessed the alarms generated by the incident and restored all but 1 of the customers' supplies in eight minutes by tele-controlled switching.
- 1.9 The final customer was restored via manual switching at 05:48.
- 1.10 A simplified view of the section of SEPD's 33kV network affected by this event is shown in Figure 1.

Figure 1-1 – Simplified Network Diagram of SEPD's 132/33kV distribution network affected by the incident



Norrington 33kV Network Overview

Notes:

1. SEPD's distribution system affected by this incident was running normally at the time of the incident.
2. Supplies to all but one of the affected customers were restored via tele-switching.
3. The remaining customer was restored by manual switching.

Exceptionality requirements

Does the event qualify for exclusion?

- 1.11 The AE considers that the event falls within the category of an “other event” as defined in paragraph 8.57 of Special Licence Condition CRC 8, and meets the exceptionality requirements set out in Appendix 3 thereof.
- 1.12 The AE therefore considers that, subject to satisfying the requirements of Appendix 4 to CRC 8, the event qualifies for possible exclusion under the “one-off” exceptional events process.

Exceptionality test results

- 1.13 The number of incidents attributed to the event is shown in Table 1-1.

Table 1-1: Number of incidents attributed to the event

Number of incidents attributed to the event	Claimed number	Audited number
132kV	0	0
EHV	1	1
HV	0	0
LV	0	0
Total	1	1

- 1.14 The results calculated by the AE to test this claim against Ofgem's exceptionality criteria are shown in Appendix A. A summary of the results is shown in Table 1-2.

Table 1-2: Summary of exceptionality test results

Test	Threshold	Claimed number	Audited number	Pass / Fail	Amount above threshold
CI exceptionality	0.9	2.298	2.298	Pass	1.398
CML exceptionality	0.7	0.184	0.184	Fail	0

Notes:

1. Ofgem's CI and CML exceptionality criteria are set out in the AE's ToR¹.
2. The audited CI and CML used in the exceptionality test have been determined from the number of incidents attributed to the event.
3. Where the event passes either or both the exceptionality thresholds, the amount(s) above threshold is/are carried forward into the Audit part 2 assessment of DNO performance.
4. In accordance with guidance from Ofgem, the AE's calculations use the threshold values contained in the current Distribution Price Control and the number of customers connected to the DNO's network relevant to the date on which the incident occurred.

SEPD's views of its performance

- 1.15 SEPD's Norrington Grid Substation is supplied via three 132/33kV transformers from National Grid's Melksham Substation.
- 1.16 In turn, SEPD's Norrington Grid Substation, which comprises outdoor 33kV switchgear, bus bars and connections, provides supplies to twelve of SEPD's 33/11kV Primary Substations in the county of Wiltshire.
- 1.17 Norrington Grid Substation was commissioned in its present form in the mid 1960s by the then Central Electricity Generating Board (CEGB). It consists of a U-shaped main busbar with a reserve busbar running down its centre.
- 1.18 The system is normally run 'solid' with two of the 132/33kV transformers feeding the main busbar, the third 132/33kV transformer feeding the reserve busbar and with the bus-coupler circuit-breaker closed.
- 1.19 At 04:10 on Monday 18 July 2011, a metallised balloon came into contact with the 'yellow' phase connection of 33kV busbar isolator C1W6. The ensuing flashover irreparably damaged a 33kV post-type insulator and also damaged the 33kV overhead conductor.
- 1.20 Supplies to all but one of SEPD's customers were restored at 04:18 via tele-controlled switching.

¹ Audits of Electricity Distribution Network Operators' One-off Exceptional Events Claims for 2011/12

- 1.21 The final customer, Staverton Dairies, was restored via manual switching at 05:48.
- 1.22 SEPD considers that its duty control engineers reacted well in assessing the alarms generated by the event and restoring the majority of the supplies via tele-controlled switching in eight minutes.
- 1.23 SEPD also considers that its engineering team did well in bringing to site a new post-type insulator; repairing the 33kV isolator and associated overhead connections; and replacing the post-type insulator on the same day as the incident.

SEPD's answers to questions on its performance

- 1.24 Within the last three years, the AE has reviewed SEPD's design standards, construction methods and maintenance procedures during previous visits to audit exceptional event claims and found them fit for purpose.
- 1.25 The AE is aware that SEPD is modifying the protection arrangements at installations such as Norrington Grid Substation and, as part of the audit of this claim, the AE therefore included a discussion on how far SEPD had progressed with its programme.
- 1.26 The AE confirms that SEPD's emergency procedures provide for the type of event being examined here.
- 1.27 To aid understanding of the background to SEPD's SoF, the AE prepared a list of initial questions regarding this incident. These questions were used as the basis for the examination of SEPD's claim.
- 1.28 The initial questions were discussed during the AE's visit to SEPD's Portsmouth Control Centre on 15 February 2012, when the records of SEPD's SCADA system, the incident report and other information were made available.
- 1.29 Given the information and photographic evidence provided by SEPD and the fact that the AE has experience of the layout of the type of outdoor 33kV switchgear affected by this incident, it was considered to be unnecessary to visit Norrington Grid Substation.
- 1.30 SEPD has provided answers to the AE's initial list of questions. For ease of reference, the AE's questions are printed in bold font with SEPD's answers being printed in normal font.

Q1. What changes, if any, has SEPD made to its emergency plans and procedures since BPI last visited to audit the exceptional event claim concerning the incident that occurred at SEPD's Portsmouth Grid on 26 June 2010?

- A1 SEPD has reviewed its emergency plans and procedures following the incident at Portsmouth in June 2010. SEPD concluded that its processes and procedures catered for the incident at Portsmouth and consequently no changes have been made to SEPD's emergency plans as a result.

Q2 When were the 33kV busbars and switchgear commissioned at SEPD's Norrington Grid Substation?

A2. The site was commissioned in the mid-1960s under the auspices of the then CEGB. The 33kV busbar isolators were maintained in August 2009 as part of SEPD's routine maintenance programme. A full thermal imaging survey was carried out prior to this maintenance, to identify any "hot-spots" or areas of potential risk on the busbar and its associated apparatus. Comprehensive maintenance records for Norrington Grid Substation were shown to the AE during the audit visit.

Q3. What is the precise location of the damaged 33kV equipment at SEPD's Norrington Grid Substation?

A3. The damaged equipment was located on isolator C1W6 at Norrington Grid Substation, which is the reserve busbar side of the bus coupler circuit-breaker. Repairs were made to the isolator and its associated insulators and jumpering following the successful restoration of supplies. Photographs of the damaged equipment were shown to the AE during the audit visit.

Q4. What are the as-found details of the damaged 33kV equipment? The Appointed Examiner will need to understand the orientation of the damaged 33kV equipment in relation to the layout of the Substation.

A4. As above, the damaged equipment was located on isolator C1W6 at Norrington Grid Substation. Repairs were made to the isolator and its associated insulators, following the successful restoration of supplies. On arrival at Norrington substation, a metallic balloon was found in the vicinity of isolator switch C1W6. The remnants of the balloon can be seen in one of the photographs shown to the AE.

Q5. Given that SEPD attributes this incident to wind-blown debris, how near is Norrington Grid Substation to any land-fill sites?

A5. Norrington Grid Substation is not located near any land-fill sites. It is believed the debris in question is likely to have originated from a domestic property.

Q6. BPI is aware that SEPD has a programme of equipping its outdoor 33kV switchgear with a form of busbar protection. What associated work has been done at SEPD's Norrington Grid Substation since the event that occurred there on 21 June 2004?

A6. To-date this type of busbar protection has been successfully installed in 36 of SEPD's open-busbar grid substations following the incident at Norrington Grid Substation in 2004. Work continues to complete the remaining 12 schemes which are complicated by the configuration of the network, by large-scale embedded generation or by impending network changes.

Due to the complex nature of the running arrangements at Norrington Grid Substation, and restrictions on circuit-breaker and transformer ratings, it has not been possible to implement a busbar auto-reclose scheme to date. Additional complications include a 300 metre distance between the 132kV and the 33kV protection panels, and a requirement to install new auto-reclose relays and tele-controlled tripping relays. The scheme, which has to combine both busbar auto-reclose and an auto-close scheme (in the event of a loss of one the 132kV infeed circuits), is due for installation during 2012/13.

The value of installing this type of busbar auto-reclose scheme was evident at Aldershot Grid Substation in January 2012, when supplies to 31,899 customers were successfully restored.

Q7. An examination of the 33kV system diagram for Norrington Grid Substation in SEPD's SoF suggests there is no bus-section circuit-breaker in the main busbar. If this is the case, what plans does SEPD have to install a bus-section circuit-breaker and incorporate it into a busbar protection scheme?

A7. As discussed during the audit visit, SEPD has reviewed the possibility of installing a bus section circuit-breaker at Norrington Grid Substation as an integral part of its revised protection scheme. However SEPD has concluded that the retro-installation of a bus section circuit-breaker will not be practicable and, in any event, the proposed busbar protection scheme will be sufficient to improve the security of supplies should one of the 132kV infeeds fail. The proposed scheme will utilise the existing bus coupler circuit-breaker C1W0. SEPD will continue to consider the practicalities of retro-installing a bus section circuit-breaker in the design of future busbar auto-reclose schemes.

Q8. At the time of the incident on 18 July 2011 what protection schemes were installed at SEPD's Norrington 132 / 33kV Grid Substation on:

- a. the 33kV busbars?
- b. the 33kV sides of the three 132 / 33 kV transformers? and
- c. the 33kV bus coupler circuit-breaker?

A8(a). As discussed, there are no specific busbar protection schemes currently in operation at Norrington Grid Substation. The 132/33kV transformers are fitted with voltage controlled overcurrent and standby earth fault protection on the 33kV side. These are designed to operate in the event of a busbar fault.

A8(b). In addition to the above, the 33kV sides of the 132kV transformers are fitted with Restricted Earth Fault protection, Buchholz, Winding Temperature, Duobias transformer protection and overcurrent, earth fault and under voltage protection.

A8(c). There are overcurrent and earth fault settings applied to the bus coupler C1W0, although they are not currently designed to operate in the event of a fault.

[AE's note: The AE is satisfied that the protection schemes installed at SEPD's Norrington Grid Substation are appropriate to the site as originally commissioned. The AE is pleased to note that SEPD's forward programme includes the upgrading of the busbar protection at its Norrington Grid Substation to further improve the security of supply to its customers (please see A.6 above)].

Q9. What settings were applied to the above protection schemes?

A9. A full list of protection settings that are applied at Norrington Grid Substation were shown to the AE during the audit visit. *[AE's note: The AE is satisfied that the settings applied to the protection schemes installed at SEPD's Norrington Grid Substation are appropriate].*

Q10. What protection operated when supply was lost?

A10. Circuit-breakers C1T0, C2T0 and C3T0 had tripped on voltage controlled overcurrent.

Q11. In addition to SEPD's response to the above questions, the following will be useful to inform the discussions during the audit of the present claim:

- a. **Sight of the recovered metallised balloon;**
Remnants of the metallised 'tail' of the balloon can be clearly seen in one of SEPD's photographs dangling from the 33kV busbars.

- b. SEPD's photographs of the faulted / damaged equipment;**
As provided to the AE during the audit visit.
- c. Sight of SEPD's investigation into the cause of the incident;**
Given the nature of this incident SEPD concluded that it was unnecessary to carry-out a detailed internal investigation as all protection operated correctly to clear the fault off its distribution system.
- d. SEPD's control room log;**
SCADA fault Job shown to the AE during the audit visit.
- e. SEPD's incident report;**
A copy of SEPD's Nafirs report shown to the AE during the audit visit.
- f. The details of SEPD's SCADA alarms received during this incident;**
As shown to the AE during the audit visit.
- g. If available, a representation of SEPD's SCADA record of this incident;**
A representation of the affected section of SEPD's network was demonstrated to the AE on SEPD's SCADA. **and**

Additional to that of the SoF, a simplified single line diagram (SLD) of the affected sections of SEPD's 33kV network would assist BPI to 'picture' the connectivity of the affected primary substations. An electronic copy of this SLD will be needed for the appointed examiner's report.

As made available to the AE during the audit visit.

A visit to SEPD's Norrington 132 / 33kV Grid Substation may assist the audit of this incident. [AE's note: During the discussion of this incident it was agreed that a visit to site would be unnecessary].

Q12. What learning points has SEPD incorporated into its procedures as a result of this incident?

A12. SEPD has reviewed its existing procedures following this incident, and is satisfied with its current procedures to minimise the impact of busbar faults in open-busbar substations.

Q13. What further learning points should be considered as a result of the application of the current one-off Exceptional Event Claims process?

A13. SSE's previous suggestion was for the audit to follow relatively soon after the event - as in this case.

1.31 SEPD also provided further information both during and subsequent to the audit visit. This includes:

- photographs of the damaged equipment;
- sight of the maintenance history for Norrington Grid Substation;
- sight of SEPD's control room log as included in the SCADA record of the incident;
- sight of SEPD's SCADA alarms received during this incident;
- a representation of the incident on SEPD's SCADA system;
- copies of SEPD's protection schemes and associated relay settings for its 132kV and 33kV feeders affected by this event;

- a single line diagram (SLD) of the relevant sections of SEPD's 33kV network showing all the Primary Substations affected by the loss of supply during this incident; and
- sight of SEPD's incident report from which it calculated the CI and CML attributed to the event.

2. Audit part 2

SEPD's performance in preventing the event

- 2.1 In viewing SEPD's performance in preventing this event, the AE has considered what more SEPD could have reasonably done to ensure that its 33kV switchgear at Norrington Grid Substation was safeguarded from the effects of third party interference and windborne materials.
- 2.2 The AE has discussed SEPD's policy on its preventative measures and has been shown photographs of the site from which it is possible to determine that they are properly applied.
- 2.3 Using the on-line facilities of "Google Earth" and "Google Maps", views of SEPD's 33kV outdoor switchgear compound at Norrington Grid Substation show it to be surrounded by an 'unclimbable' palisade fence in accordance with accepted UK practice for this type of substation. The fence is in good condition and carries statutory warning notices.
- 2.4 Photographs taken at the time of the incident show the remains of the metallised balloon, the damaged 33kV overhead connection and the irreparable damage to the post-type insulator at 33kV busbar isolator C1W6.
- 2.5 The remains of the metallised tail dangling from the 33kV overhead connection are readily visible in photograph 1.
- 2.6 The irreparable damage to the post-type insulator is obvious from photograph 2.
- 2.7 A comparison with the replacement post-type insulator can be gauged from photograph 3 which shows the equipment after repairs had been completed.
- 2.8 Photograph 4 shows a general view of SEPD's Norrington Grid Substation. The reserve busbar can be seen in the upper central portion of the photograph. The bus coupler circuit-breaker is in the photograph to the right of centre.
- 2.9 It is practically impossible to insulate all the live exposed conductors in 33kV compounds such as at SEPD's Norrington Grid Substation.
- 2.10 The AE has discussed SEPD's progress with retrospectively modifying the protection schemes at its 33kV outdoor substations and is pleased to note that the programme is still on course with Norrington being currently scheduled for work during 2012/13.
- 2.11 SEPD's measurement systems clearly show the tripping of the three 33kV circuit-breakers associated with the grid transformers (A1MT, A2MT and A3MT) at 04:10 on 18 July 2011.
- 2.12 SEPD's measurement systems also confirm the restoration of supplies to eleven of the twelve affected Primary Substations via tele-controlled switching at 04:18 on 18 July 2012. The restoration of the final customer, Staverton Dairies is shown at 05:48 on 18 July 2011.

- 2.13 An examination of SEPD's measurement systems and a SCADA representation of its distribution network confirm that SEPD did all it could to restore supplies as expeditiously as possible.
- 2.14 An examination of SEPD's measurement systems confirms that SEPD's control engineers acted quickly to assess the alarms generated by the incident and to restore supplies as speedily as possible.
- 2.15 The AE concludes that SEPD had done all it could reasonably have been expected to do in considering that its outdoor 33kV equipment at its Norrington Grid Substation was protected from the effects of third party interference and windborne material in accordance with accepted good practice within the UK electricity supply industry.

SEPD's performance in mitigating the effects of the event

- 2.16 The damage to the 33kV overhead connection and the irreparable damage to the 33kV post-type insulator are consistent with a metallised object coming into contact with them.
- 2.17 The resultant flashover would have created virtually simultaneous faults on the main and reserve busbars at SEPD's Norrington Grid Substation.
- 2.18 The AE has studied the running arrangements of SEPD's 33kV distribution network at its Norrington Grid Substation and concludes that SEPD's protection systems worked correctly to clear the incident from SEPD's distribution system.
- 2.19 The AE commends SEPD's control engineers for analysing the situation and restoring supplies as rapidly as possible, thereby minimising the duration of the interruption.
- 2.20 The AE commends SEPD for continuing with its programme of modifying the protection schemes at its outdoor 33kV substations and for its continual review of the performance of those schemes it has completed with a view to introducing further improvements in its on-going programme, including considering the possibilities of installing bus section circuit-breakers where of benefit and where reasonably practicable.

Recommended performance adjustment(s)

2.21 The AE's recommendations to Ofgem are shown in Table 2-1.

Table 2-1: Audit part 2 recommended adjustment(s)

	Amount above threshold	Audit part 2 recommendation
CI	1.398	1.398
CML	0	0

Detailed justification

- 2.22 In reaching a judgement on a recommendation, the AE has firstly considered whether or not SEPD could have reasonably taken any different course of action that would have prevented the metallised balloon from causing a flashover of the 33kV switchgear at SEPD's Norrington Grid Substation.
- 2.23 In viewing SEPD's performance in preventing this event, the AE has taken into account his personal knowledge of distribution switchgear and that of his colleagues who have considerable operational experience of incidents due to many causes.
- 2.24 The AE considers that the preventative measures employed by SEPD on its 33kV outdoor switchgear at Norrington BSP are in accordance with the current industry standard and, as far as is reasonably practicable, prevent damage due to third party interference or windborne objects.
- 2.25 In considering SEPD's restoration strategy, the AE is conscious that SEPD's duty control engineers acted with commendable skill and speed in analysing the SCADA alarms and indications generated by this incident.
- 2.26 The AE is satisfied that SEPD has carried out network management / loading studies of its 33kV system radiating from Norrington Grid Substation and that it is being run as efficiently as practicable, there being no reasonable alternative given the configuration and current lack of busbar protection at Norrington Grid Substation.
- 2.27 The AE is satisfied that SEPD's distribution network at Norrington Grid Substation complies with the requirements of Security of Supply Standard P2/6.
- 2.28 The AE has discussed SEPD's learning from this incident, including the discussions regarding the physical layout of the switchgear, the possibilities of installing a bus section circuit-breaker and the proposed modifications to the protection scheme. The on-going work of SEPD's extensive programme would be reviewed and taken into account in the event of any subsequent incident of this type.

- 2.29 The AE has discussed SEPD's learning from this incident, including the incorporation of the enhanced protection measures it is proposing to put in place.
- 2.30 The AE commends SEPD for having carried out repairs to the damaged equipment on the same day as the incident occurred, thus restoring the security of supply to its customers.
- 2.31 The AE is satisfied that SEPD has met the criteria for preventative and mitigating actions set out in Appendix 4 to paragraph 8.58 of Special Licence Condition CRC 8.
- 2.32 The AE therefore concludes that SEPD's claim is justified and recommends to Ofgem that the amount of CI above the threshold values should be excluded from its performance for reporting year 2011/12.

Appendix A Record of Audit part 1

Table A-1: Appointed Examiner's Information Log

“One-Off” Exceptional Event	Reporting Year 2010/11
Licensed Area	SEPD
Date of event	18 July 2011
Cause	Damage to 33kV switchgear
Notification to Ofgem	25 July 2011
SoF received	26 July 2011
SoF information	<ul style="list-style-type: none"> at Norrington Grid Substation 33kV protection on the 33kV sides of the three 132/33kV Grid Transformers operated to de-energise the 33kV busbars at 04:10 on Monday 18 July 2011; supplies to twelve of SEPD's 33/11kV Primary Substations in Wiltshire were interrupted; SEPD's duty control engineers: <ol style="list-style-type: none"> requested the standby engineer to attend Norrington Grid Substation; and rapidly analysed the alarms generated by the incident and restored supplies to eleven of the affected Primary Substations by tele-controlled switching ten minutes after the incident occurred. SEPD's standby engineer reported finding the remnants of a metallised balloon below an irreparably damaged 33kV post-type insulator on isolator C1W6 which is on the reserve bus bar side of the bus coupler circuit-breaker; manual switching was carried out to restore the supply to Staverton Dairies at 05:48 on 18 July 2011; and the damaged equipment was permanently repaired on the same day as the incident.
Additional pre-visit information provided	Based on the SoF the AE drew up a list of initial questions. These were discussed during the audit visit. This initial list of questions, together with SEPD's response, is contained in paragraph 1.30 of the report.
Location of audit visit	SEPD's Portsmouth Control Centre
Date of audit visit	15 February 2012
Visiting Auditor	Geoff Stott (BPI)
SEPD's Representatives	John Blyth, Arshia Kadhim and Adam O'Hara

<p>Information provided during and subsequent to the audit visit</p>	<p>Comprehensive documentation / information including:</p> <ul style="list-style-type: none"> • a discussion of the protection arrangements at Norrington Grid Substation and their associated settings; • a copy of the relevant 33kV SLD; • sight of the printout from SEPD's SCADA system that shows the alarms generated by the event; • the control engineer's switching schedules covering the event; • the switching log showing the loss of supplies from Norrington Grid commenced when the 33kV CBs associated with Grid A1MT, A2MT and A3MT tripped to clear the incident at 04:10 on 18 July 2011; • the normal network running arrangements were demonstrated; • the switching operations to restore supplies were demonstrated; • sight of SEPD's 'NaFIRS' incident report that shows: <ul style="list-style-type: none"> ◦ the number of customers affected by the incident to be 67,439; and ◦ the customer minutes lost to be 539,602. • the AE confirms that these figures agree with those quoted in SEPD's SoF; • using SEPD's total connected customers at 30 September 2010 of 2,934,581 the number of customers affected equates to a CI of 2.298. $[67439 \times 100 / 2934581]$; and • similarly, the customer minutes lost for this event equate to a CML of 0.184. $[539602 / 2934581]$. <p>"Google Earth" and "Google Maps" show the compound fence and warning signs.</p> <p>SEPD standards as seen at other locations - no need to visit Norrington Grid Substation to clarify anything.</p> <p>Discussed the on-going programme of modifications to SEPD's protection schemes at its 33kV outdoor substations.</p> <p>Discussed post-fault learning points, including anything to affect the above programme.</p> <p>Confirmed P2/6 compliant (90 MVA firm).</p> <p>SEPD provided answers to the initial questions plus additional information both during and subsequent to the audit visit.</p> <p>Ok regarding compliance with Appendix 4 of Paragraph 8.58 of CRC 8.</p>
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Table A-2: Impact on CI and CML

	CI		CML	
	Claimed	Audited	Claimed	Audited
132kV	0	0	0	0
EHV	2.298	2.298	0.184	0.184
HV	0	0	0	0
LV	0	0	0	0
Total	2.298	2.298	0.184	0.184
SEPD Threshold (total)	0.9		0.7	
Part 1 Exceptionality Test	Pass		Fail	
Part 1 Precondition of eligibility (meets App 3 to paragraph 8.57 of CRC 8)	Pass			

SEPD's measurement systems are subject to QoS audits for accuracy of reporting and it is not within the AE's ToR to repeat that work as part of the examination of exceptional event claims, although any consequential adjustments to reporting accuracy will be reflected in Ofgem's final adjudication of reported performance for the regulatory reporting year 2011/12.

Appendix B SEPD's Photographs of the damaged equipment



Photograph 1 – View of 33kV isolator C1W6 showing the remnants of the metallised tail of the balloon dangling from the overhead connection and the in-situ irreparably damaged post-type insulator



Photograph 2 – The irreparably damaged 33kV post-type insulator



Photograph 3 – View of 33kV isolator C1W6 following replacement of the irreparably damaged post-type insulator



Photograph 4 – General view of the outdoor 33kV switchgear at SPED's Norrington Grid Substation