

DRAFT Reliability Standard Audit Worksheet¹

TPL-007-4 – Transmission System Planned Performance for Geomagnetic Disturbance Events

This section to be completed by the Compliance Enforcement Authority.

Audit ID: Audit ID if available; or REG-NCRnnnnn-YYYYMMDD
Registered Entity: Registered name of entity being audited
NCR Number: NCRnnnnn
Compliance Enforcement Authority: Region or NERC performing audit
Compliance Assessment Date(s)²: Month DD, YYYY, to Month DD, YYYY
Compliance Monitoring Method: [On-site Audit | Off-site Audit | Spot Check]
Names of Auditors: Supplied by CEA

Applicability of Requirements

	BA	DP	GO	GOP	PA/PC	RC	RP	RSG	TO	TOP	TP	TSP
R1					X ³						X ⁴	
R2					X ³						X ⁴	
R3					X ³						X ⁴	
R4					X ³						X ⁴	
R5					X ³						X ⁴	
R6			X ⁵						X ⁶			
R7					X ³						X ⁴	
R8					X ³						X ⁴	

1 NERC developed this Reliability Standard Audit Worksheet (RSAW) language in order to facilitate NERC’s and the Regional Entities’ assessment of a registered entity’s compliance with this Reliability Standard. The NERC RSAW language is written to specific versions of each NERC Reliability Standard. Entities using this RSAW should choose the version of the RSAW applicable to the Reliability Standard being assessed. While the information included in this RSAW provides some of the methodology that NERC has elected to use to assess compliance with the requirements of the Reliability Standard, this document should not be treated as a substitute for the Reliability Standard or viewed as additional Reliability Standard requirements. In all cases, the Regional Entity should rely on the language contained in the Reliability Standard itself, and not on the language contained in this RSAW, to determine compliance with the Reliability Standard. NERC’s Reliability Standards can be found on NERC’s website. Additionally, NERC Reliability Standards are updated frequently, and this RSAW may not necessarily be updated with the same frequency. Therefore, it is imperative that entities treat this RSAW as a reference document only, and not as a substitute or replacement for the Reliability Standard. It is the responsibility of the registered entity to verify its compliance with the latest approved version of the Reliability Standards, by the applicable governmental authority, relevant to its registration status.

The NERC RSAW language contained within this document provides a non-exclusive list, for informational purposes only, of examples of the types of evidence a registered entity may produce or may be asked to produce to demonstrate compliance with the Reliability Standard. A registered entity’s adherence to the examples contained within this RSAW does not necessarily constitute compliance with the applicable Reliability Standard, and NERC and the Regional Entity using this RSAW reserves the right to request additional evidence from the registered entity that is not included in this RSAW. Additionally, this RSAW includes excerpts from FERC Orders and other regulatory references. The FERC Order cites are provided for ease of reference only, and this document does not necessarily include all applicable Order provisions. In the event of a discrepancy between FERC Orders, and the language included in this document, FERC Orders shall prevail.

² Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs.

³ Planning Coordinator with a planning area that includes a Facility or Facilities specified in 4.2.

⁴ Transmission Planner with a planning area that includes a Facility or Facilities specified in 4.2.

⁵ Generator Owner who owns a Facility or Facilities specified in 4.2.

⁶ Transmission Owner who owns a Facility or Facilities specified in 4.2.

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	BA	DP	GO	GOP	PA/PC	RC	RP	RSG	TO	TOP	TP	TSP
R9					X ³						X ⁴	
R10			X ⁵						X ⁶			
R11					X ³						X ⁴	
R12					X ³						X ⁴	
R13					X ³						X ⁴	

Legend:

Text with blue background:	Fixed text – do not edit
Text entry area with Green background:	Entity-supplied information
Text entry area with white background:	Auditor-supplied information

Facilities

Facilities that include power transformer(s) with a high side, wye-grounded winding with terminal voltage greater than 200 kV.

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Findings

(This section to be completed by the Compliance Enforcement Authority)

Req.	Finding	Summary and Documentation	Functions Monitored
R1			
R2			
R3			
R4			
R5			
R6			
R7			
R8			
R9			
R10			
R11			
R12			
R13			

Req.	Areas of Concern

Req.	Recommendations

Req.	Positive Observations

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Subject Matter Experts

Identify the Subject Matter Expert(s) responsible for this Reliability Standard.

Registered Entity Response **(Required; Insert additional rows if needed):**

SME Name	Title	Organization	Requirement(s)

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R1 Supporting Evidence and Documentation

R1. Each Planning Coordinator, in conjunction with its Transmission Planner(s), shall identify the individual and joint responsibilities of the Planning Coordinator and Transmission Planner(s) in the Planning Coordinator’s planning area for maintaining models, performing the study or studies needed to complete benchmark and supplemental GMD Vulnerability Assessments, and implementing process(es) to obtain GMD measurement data as specified in this standard.

M1. Each Planning Coordinator, in conjunction with its Transmission Planners, shall provide documentation on roles and responsibilities, such as meeting minutes, agreements, copies of procedures or protocols in effect between entities or between departments of a vertically integrated system, or email correspondence that identifies an agreement has been reached on individual and joint responsibilities for maintaining models, performing the study or studies needed to complete benchmark and supplemental GMD Vulnerability Assessments, and implementing process(es) to obtain GMD measurement data in accordance with Requirement R1.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete benchmark and supplemental GMD Vulnerability Assessments, and implementing process(es) to obtain GMD measurement data.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

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Compliance Assessment Approach Specific to TPL-007-4, R1

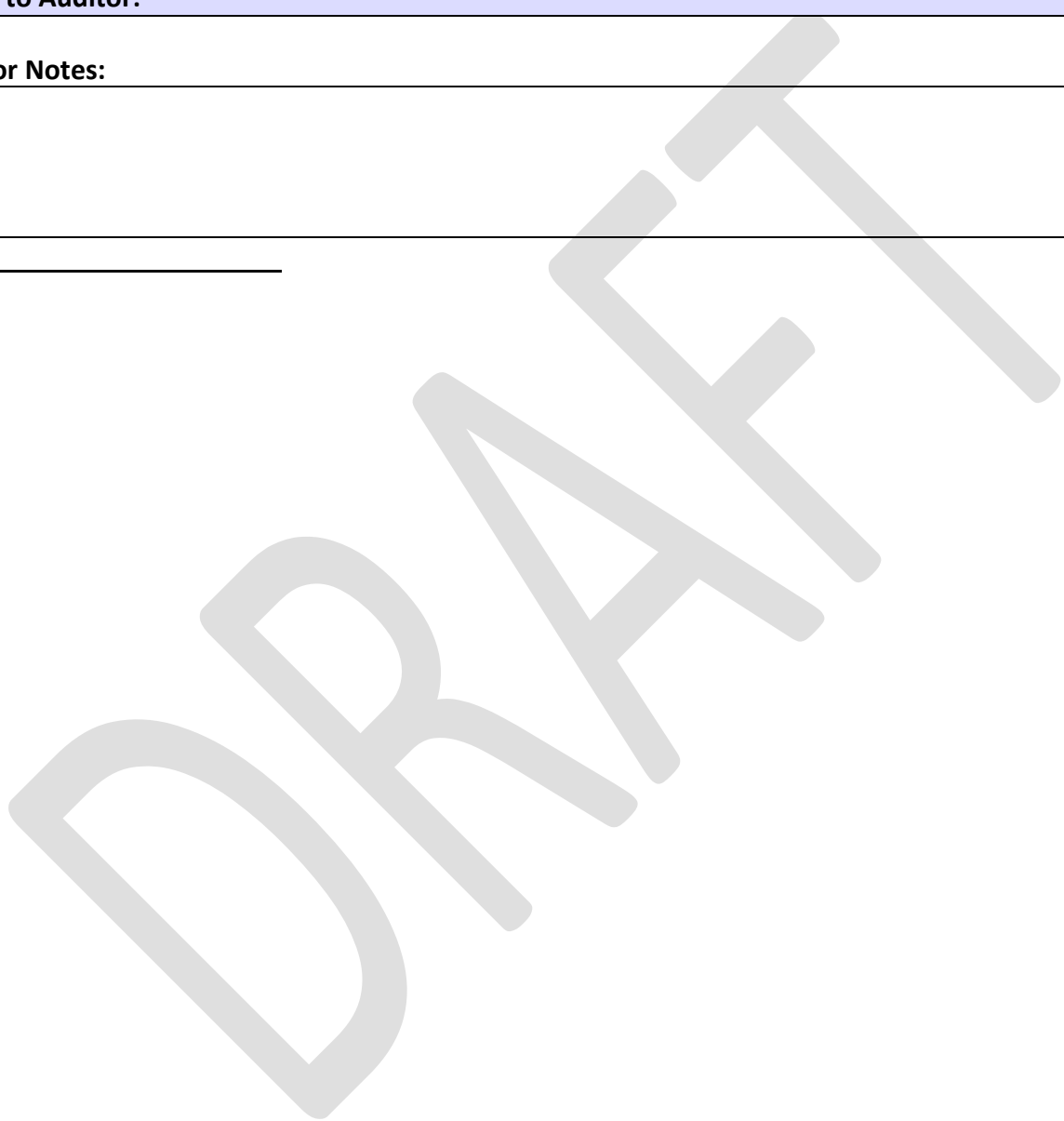
This section to be completed by the Compliance Enforcement Authority

Confirm existence of documentation identifying the individual and joint responsibilities for the responsible entities, defined in Requirement R1, for maintaining models, performing studies needed to complete benchmark and supplemental GMD Vulnerability Assessments, and implementing process(es) to obtain GMD measurement data.
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Note to Auditor:

Auditor Notes:

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R2 Supporting Evidence and Documentation

- R2.** Each responsible entity, as determined in Requirement R1, shall maintain System models and GIC System models of the responsible entity’s planning area for performing the study or studies needed to complete benchmark and supplemental GMD Vulnerability Assessments.
- M2.** Each responsible entity, as determined in Requirement R1, shall have evidence in either electronic or hard copy format that it is maintaining System models and GIC System models of the responsible entity’s planning area for performing the study or studies needed to complete benchmark and supplemental GMD Vulnerability Assessments.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Evidence to demonstrate maintenance of System models and GIC System models for the responsible entity’s planning area.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete benchmark and supplemental GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R2

This section to be completed by the Compliance Enforcement Authority

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Verify the responsible entity maintained System models and GIC System models for performing studies for benchmark and supplemental GMD Vulnerability Assessments.

Note to Auditor:

Benchmark and supplemental GMD Vulnerability Assessments require a GIC System model, which is a direct current representation of the System, to calculate GIC flow. In benchmark and supplemental GMD Vulnerability Assessments, GIC simulations are used to determine transformer Reactive Power absorption and transformer thermal response. See the *Application Guide for Computing Geomagnetically-Induced Current in the Bulk Power System* for details on developing the GIC System model.

Auditor Notes:

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R3 Supporting Evidence and Documentation

- R3.** Each responsible entity, as determined in Requirement R1, shall have criteria for acceptable System steady state voltage performance for its System during the GMD events described in Attachment 1.
- M3.** Each responsible entity, as determined in Requirement R1, shall have evidence, such as electronic or hard copies of the criteria for acceptable System steady state voltage performance for its System in accordance with Requirement R3.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Criteria for acceptable System steady state voltage performance for the entity’s System during the GMD events described in Attachment 1.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R3

This section to be completed by the Compliance Enforcement Authority

	Verify the responsible entity has criteria for acceptable System steady state voltage performance for its System during the GMD events described in TPL-007 Attachment 1.
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Note to Auditor:

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Auditor Notes:

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R4 Supporting Evidence and Documentation

- R4.** Each responsible entity, as determined in Requirement R1, shall complete a benchmark GMD Vulnerability Assessment of the Near-Term Transmission Planning Horizon at least once every 60 calendar months. This benchmark GMD Vulnerability Assessment shall use a study or studies based on models identified in Requirement R2, document assumptions, and document summarized results of the steady state analysis.
- 4.1.** The study or studies shall include the following conditions:
 - 4.1.1.** System On-Peak Load for at least one year within the Near-Term Transmission Planning Horizon; and
 - 4.1.2.** System Off-Peak Load for at least one year within the Near-Term Transmission Planning Horizon.
 - 4.2.** The study or studies shall be conducted based on the benchmark GMD event described in Attachment 1 to determine whether the System meets the performance requirements for the steady state planning benchmark GMD event contained in Table 1.
 - 4.3.** The benchmark GMD Vulnerability Assessment shall be provided: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, and adjacent Transmission Planners within 90 calendar days of completion, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the benchmark GMD Vulnerability Assessment, whichever is later.
 - 4.3.1.** If a recipient of the benchmark GMD Vulnerability Assessment provides documented comments on the results, the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.
- M4.** Each responsible entity, as determined in Requirement R1, shall have dated evidence such as electronic or hard copies of its benchmark GMD Vulnerability Assessment meeting all of the requirements in Requirement R4. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has distributed its benchmark GMD Vulnerability Assessment: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, and adjacent Transmission Planners within 90 calendar days of completion, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the benchmark GMD Vulnerability Assessment, whichever is later, as specified in Requirement R4. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email notices or postal receipts showing recipient and date, that it has provided a documented response to comments received on its benchmark GMD Vulnerability Assessment within 90 calendar days of receipt of those comments in accordance with Requirement R4.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied

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evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Dated copies of the current and preceding benchmark GMD Vulnerability Assessments of Near-Term Transmission Planning Horizon.
Evidence the study or studies include System On-Peak Load and System Off-Peak Load conditions for at least one year within the Near-Term Transmission Planning Horizon.
Evidence the study or studies were conducted based on the benchmark GMD event described in Attachment 1 for the steady state planning benchmark GMD event to determine whether the System meets the performance requirements for the steady state planning benchmark GMD event contained in Table 1.
Dated evidence that the responsible entity provided the benchmark GMD Vulnerability Assessment within 90 calendar days of completion to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners.
Dated evidence that the responsible entity provided the benchmark GMD Vulnerability Assessment to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the benchmark GMD Vulnerability Assessment, whichever is later.
If a recipient of the benchmark GMD Vulnerability Assessment provided documented comments on the results, dated evidence the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R4

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This section to be completed by the Compliance Enforcement Authority

	(R4) Verify the responsible entity completed the benchmark GMD Vulnerability Assessment of the Near-Term Transmission Planning Horizon at least once every 60-calendar months.
	(R4) Verify the use of studies to complete the benchmark GMD Vulnerability Assessment based on models evidenced in R2.
	(R4) Verify the benchmark GMD Vulnerability Assessment documented assumptions and summarized results of the steady state analysis.
	(Part 4.1) Verify the study or studies include System On-Peak Load and System Off-Peak Load conditions for at least one year within the Near-Term Transmission Planning Horizon.
	(Part 4.2) Verify the study or studies were conducted based on the benchmark GMD event described in Attachment 1 to determine whether the System meets the performance requirements for the steady state planning benchmark GMD event contained in Table 1.
	(Part 4.3) Verify the benchmark GMD Vulnerability Assessment was provided within 90 calendar days of completion to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners, and to any functional entity that submits a written request and has a reliability-related need.
	(Part 4.3) Verify the benchmark GMD Vulnerability Assessment was provided to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the benchmark GMD Vulnerability Assessment, whichever is later.
	(Part 4.3.1) If a recipient of the benchmark GMD Vulnerability Assessment provided documented comments on the results, verify the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Note to Auditor: Auditor should consider reviewing Requirement R4 in conjunction with Requirement R7, since the development and review of Corrective Action Plans are corollaries to the benchmark GMD Vulnerability Assessment.	

Auditor Notes:

R5 Supporting Evidence and Documentation

R5. Each responsible entity, as determined in Requirement R1, shall provide GIC flow information to be used for the benchmark thermal impact assessment of transformers specified in Requirement R6 to each Transmission Owner and Generator Owner that owns an applicable Bulk Electric System (BES) power transformer in the planning area. The GIC flow information shall include:

- 5.1.** The maximum effective GIC value for the worst case geoelectric field orientation for the benchmark GMD event described in Attachment 1. This value shall be provided to the Transmission Owner or Generator Owner that owns each applicable BES power transformer in the planning area.
- 5.2.** The effective GIC time series, GIC(t), calculated using the benchmark GMD event described in Attachment 1 in response to a written request from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area. GIC(t) shall be provided within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 5.1.

M5. Each responsible entity, as determined in Requirement R1, shall provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided the maximum effective GIC values to the Transmission Owner and Generator Owner that owns each applicable BES power transformer in the planning area as specified in Requirement R5, Part 5.1. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided GIC(t) in response to a written request from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area.

Registered Entity Response (Required):

Question: During the audit period, did the entity receive a written request for effective GIC time series, GIC(t), from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area?

Yes No

If Yes, provide a list of such requests.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested¹:

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Provide the following evidence, or other evidence to demonstrate compliance.
A list of each Transmission Owner and Generator Owner in the planning area that owns an applicable BES power transformer.
Evidence demonstrating the responsible entity provided the maximum effective GIC value for the worst case geoelectric field orientation for the benchmark GMD event described in Attachment 1 to each Transmission Owner and Generator Owner in the planning area that owns an applicable BES power transformer in the planning area.
Evidence demonstrating the responsible entity, within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 5.1, provided the effective GIC time series, GIC(t), calculated using the benchmark GMD event described in Attachment 1 in response to a written request from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R5

This section to be completed by the Compliance Enforcement Authority

	(R5) Verify the responsible entity provided GIC flow information to each Transmission Owner and Generator Owner that owns an applicable BES power transformer in the planning area.
	(Part 5.1) Verify the GIC flow information provided by the responsible entity included the maximum effective GIC value for the worst case geoelectric field orientation for the benchmark GMD event described in Attachment 1.
	(Part 5.2) For all, or a sample of, written requests from applicable Transmission Owner or Generation Owners, verify the responsible entity provided the effective GIC time series, GIC(t), within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 5.1.

Note to Auditor:

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Auditor Notes:

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R6 Supporting Evidence and Documentation

- R6.** Each Transmission Owner and Generator Owner shall conduct a benchmark thermal impact assessment for its solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R5, Part 5.1, is 75 A per phase or greater. The benchmark thermal impact assessment shall:
- 6.1.** Be based on the effective GIC flow information provided in Requirement R5;
 - 6.2.** Document assumptions used in the analysis;
 - 6.3.** Describe suggested actions and supporting analysis to mitigate the impact of GICs, if any; and
 - 6.4.** Be performed and provided to the responsible entities, as determined in Requirement R1, within 24 calendar months of receiving GIC flow information specified in Requirement R5, Part 5.1.
- M6.** Each Transmission Owner and Generator Owner shall have evidence such as electronic or hard copies of its benchmark thermal impact assessment for all of its solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R5, Part 5.1, is 75 A per phase or greater, and shall have evidence such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided its thermal impact assessment to the responsible entities as specified in Requirement R6.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
The GIC flow information provided by the Planning Coordinator or Transmission Planner in accordance with Requirement R5.
Dated evidence demonstrating the completion of the benchmark thermal impact assessment for each of the entity’s solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R5 Part 5.1 is 75 A per phase or greater.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R6

This section to be completed by the Compliance Enforcement Authority

	(R6) Verify the entity conducted a benchmark thermal impact assessment for each applicable BES power transformer where the maximum effective GIC value provided in Requirement R5, Part 5.1, is 75 A per phase or greater.
	Review thermal impact assessments for applicable BES power transformers and confirm the thermal impact assessment meets the requirements identified in Requirement R6 Part 6.1 through Part 6.4.
	(Part 6.1) Be based on the effective GIC flow information provided in Requirement R5.
	(Part 6.2) Document assumptions used in the analysis.
	(Part 6.3) Describe suggested actions and supporting analysis to mitigate the impact of GICs, if any.
	(Part 6.4) Be performed and provided to the responsible entities as determined in Requirement R1 within 24 calendar months of receiving GIC flow information specified in Requirement R5, Part 5.1.
Note to Auditor:	

Auditor Notes:

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R7 Supporting Evidence and Documentation

R7. Each responsible entity, as determined in Requirement R1, that concludes through the benchmark GMD Vulnerability Assessment conducted in Requirement R4 that their System does not meet the performance requirements for the steady state planning benchmark GMD event contained in Table 1, shall develop a Corrective Action Plan (CAP) addressing how the performance requirements will be met. The CAP shall:

- 7.1.** List System deficiencies and the associated actions needed to achieve required System performance. Examples of such actions include:
- Installation, modification, retirement, or removal of Transmission and generation Facilities and any associated equipment.
 - Installation, modification, or removal of Protection Systems or Remedial Action Schemes.
 - Use of Operating Procedures, specifying how long they will be needed as part of the CAP.
 - Use of Demand-Side Management, new technologies, or other initiatives.
- 7.2.** Be developed within one year of completion of the benchmark GMD Vulnerability Assessment.
- 7.3.** Include a timetable, subject to ERO approval for any extension sought under Part 7.4, for implementing the selected actions from Part 7.1. The timetable shall:
- 7.3.1.** Specify implementation of non-hardware mitigation, if any, within two years of development of the CAP; and
- 7.3.2.** Specify implementation of hardware mitigation, if any, within four years of development of the CAP.
- 7.4.** Be submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 7.3. The submitted CAP shall document the following:
- 7.4.1.** Circumstances causing the delay for fully or partially implementing the selected actions in Part 7.1 and how those circumstances are beyond the control of the responsible entity;
- 7.4.2.** Revisions to the selected actions in Part 7.1, if any, including utilization of Operating Procedures, if applicable; and
- 7.4.3.** Updated timetable for implementing the selected actions in Part 7.1.
- 7.5.** Be provided: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), and functional entities referenced in the CAP within 90 calendar days of development or revision, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.
- 7.5.1.** If a recipient of the CAP provides documented comments on the CAP, the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.

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M7. Each responsible entity, as determined in Requirement R1, that concludes, through the benchmark GMD Vulnerability Assessment conducted in Requirement R4, that the responsible entity’s System does not meet the performance requirements for the steady state planning benchmark GMD event contained in Table 1 shall have evidence such as dated electronic or hard copies of its CAP including timetable for implementing selected actions, as specified in Requirement R7. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records or postal receipts showing recipient and date, that it submitted a request for extension to the ERO if the responsible entity is unable to implement the CAP within the timetable provided in Part 7.3. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has distributed its CAP or relevant information, if any, (i) to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), and functional entities referenced in the CAP within 90 calendar days of development or revision, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later as specified in Requirement R7. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email notices or postal receipts showing recipient and date, that it has provided a documented response to comments received on its CAP within 90 calendar days of receipt of those comments, in accordance with Requirement R7.

Registered Entity Response (Required):

Question: Did the responsible entity conclude through the GMD Vulnerability Assessment conducted in Requirement R4 that their System does not meet the performance requirements of Table 1? Yes No

If Yes, provide a dated list of CAPs developed to address how the performance requirements will be met.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested¹:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.
Copy of the benchmark GMD Vulnerability Assessment conducted in Requirement R4
A list of System deficiencies identified through the GMD Vulnerability Assessment.
All dated CAPs associated with the System deficiencies, which identify the associated actions needed to achieve required System performance.

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Evidence the CAP was submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 7.3.

Dated evidence that the CAP was provided, within 90 calendar days of development or revision, to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), functional entities referenced in the CAP.

Dated evidence that the CAP was provided to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.

If a recipient of the CAP provided documented comments on the CAP, evidence the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R7

This section to be completed by the Compliance Enforcement Authority

	(R7) Verify the entity developed a CAP addressing how the performance requirements will be met for the steady state planning benchmark GMD event, if the entity concluded through the benchmark GMD Vulnerability Assessment conducted in Requirement R4, that their System does not meet the performance requirements of Table 1. Verify the CAP:
	(Part 7.1) List system deficiencies and associated actions needed to achieve required System performance.
	(Part 7.2) The CAP was developed within one year of completion of the benchmark GMD Vulnerability Assessment.
	(Part 7.3) The CAP includes a timetable.
	(Part 7.3.1) A timetable specifying implementation of non-hardware mitigation, if any, within two years of development of the CAP.
	(Part 7.3.2) A timetable specifying implementation of hardware mitigation, if any, within four years of the development of the CAP.
	(Part 7.4) Verify the CAP was submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 7.3.

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	(Part 7.4.1) Verify the submitted CAP documents circumstances causing the delay for fully or partially implementing the selected actions in Part 7.1 and how those circumstances are beyond the control of each responsible entity.
	(Part 7.4.2) Verify the submitted CAP documents revisions to the selected actions in Part 7.1, if any, including utilization of Operating Procedures if applicable.
	(Part 7.4.3) Verify the submitted CAP documents an updated timetable for implementing the selected actions in Part 7.1.
	(Part 7.5) Verify the responsible entity provided the CAP, within 90 calendar days of development or revision, to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), functional entities referenced in the CAP.
	(Part 7.5) Verify the responsible entity provided the CAP to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.
	(Part 7.5.1) If a recipient of the CAP provided documented comments on the CAP, verify the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Note to Auditor:	

Auditor Notes:

R8 Supporting Evidence and Documentation

- R8.** Each responsible entity, as determined in Requirement R1, shall complete a supplemental GMD Vulnerability Assessment of the Near-Term Transmission Planning Horizon at least once every 60 calendar months. This supplemental GMD Vulnerability Assessment shall use a study or studies based on models identified in Requirement R2, document assumptions, and document summarized results of the steady state analysis:
- 8.1.** The study or studies shall include the following conditions:
 - 8.1.1.** System On-Peak Load for at least one year within the Near-Term Transmission Planning Horizon; and
 - 8.1.2.** System Off-Peak Load for at least one year within the Near-Term Transmission Planning Horizon.
 - 8.2.** The study or studies shall be conducted based on the supplemental GMD event described in Attachment 1 to determine whether the System meets the performance requirements for the steady state planning supplemental GMD event contained in Table 1.
 - 8.3.** The supplemental GMD Vulnerability Assessment shall be provided: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners within 90 calendar days of completion, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the supplemental GMD Vulnerability Assessment, whichever is later.
 - 8.3.1.** If a recipient of the supplemental GMD Vulnerability Assessment provides documented comments on the results, the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.
- M8.** Each responsible entity, as determined in Requirement R1, shall have dated evidence such as electronic or hard copies of its supplemental GMD Vulnerability Assessment meeting all of the requirements in Requirement R8. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has distributed its supplemental GMD Vulnerability Assessment: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners within 90 calendar days of completion, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the supplemental GMD Vulnerability Assessment, whichever is later, as specified in Requirement R8. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email notices or postal receipts showing recipient and date, that it has provided a documented response to comments received on its supplemental GMD Vulnerability Assessment within 90 calendar days of receipt of those comments in accordance with Requirement R8.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

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Evidence Requested¹:

Provide the following evidence, or other evidence to demonstrate compliance.
Dated copies of the current and preceding supplemental GMD Vulnerability Assessments of Near-Term Transmission Planning Horizon.
Evidence the study or studies include System On-Peak Load and System Off-Peak Load conditions for at least one year within the Near-Term Transmission Planning Horizon.
Evidence the study or studies were conducted based on the supplemental GMD event described in Attachment 1 to determine whether the System meets the performance requirements for the steady state planning supplemental GMD event in Table 1.
Dated evidence that the responsible entity provided the supplemental GMD Vulnerability Assessment within 90 calendar days of completion to the responsible entity's Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners.
Dated evidence that the responsible entity provided the supplement GMD Vulnerability Assessment to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the supplemental GMD Vulnerability Assessment, whichever is later.
If a recipient of the supplemental GMD Vulnerability Assessment provided documented comments on the results, dated evidence the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R8

This section to be completed by the Compliance Enforcement Authority

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	(R8) Verify the responsible entity completed the supplemental GMD Vulnerability Assessment of the Near-Term Transmission Planning Horizon at least once every 60-calendar months.
	(R8) Verify the use of studies to complete the supplemental GMD Vulnerability Assessment based on models evidenced in R2.
	(R8) Verify the supplemental GMD Vulnerability Assessment documented assumptions and summarized results of the steady state analysis.
	(Part 8.1) Verify the study or studies include System On-Peak Load and System Off-Peak Load conditions for at least one year within the Near-Term Transmission Planning Horizon.
	(Part 8.2) Verify the study or studies were conducted based on the supplemental GMD event described in Attachment 1 to determine whether the System meets the performance requirements in Table 1.
	(Part 8.3) Verify the supplemental GMD Vulnerability Assessment was provided within 90 calendar days of completion to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinators, adjacent Transmission Planners.
	(Part 8.3) Verify the supplemental GMD Vulnerability Assessment was provided to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of completion of the supplemental GMD Vulnerability Assessment, whichever is later.
	(Part 8.3.1) If a recipient of the supplemental GMD Vulnerability Assessment provided documented comments on the results, verify the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Note to Auditor:	

Auditor Notes:

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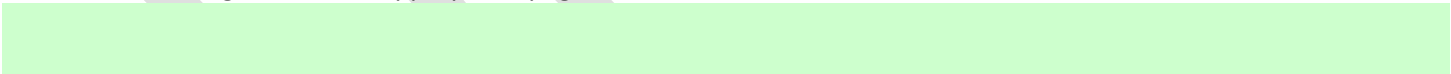
R9 Supporting Evidence and Documentation

- R9.** Each responsible entity, as determined in Requirement R1, shall provide GIC flow information to be used for the supplemental thermal impact assessment of transformers specified in Requirement R10 to each Transmission Owner and Generator Owner that owns an applicable Bulk Electric System (BES) power transformer in the planning area. The GIC flow information shall include:
- 9.1.** The maximum effective GIC value for the worst case geoelectric field orientation for the supplemental GMD event described in Attachment 1. This value shall be provided to the Transmission Owner or Generator Owner that owns each applicable BES power transformer in the planning area.
 - 9.2.** The effective GIC time series, GIC(t), calculated using the supplemental GMD event described in Attachment 1 in response to a written request from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area. GIC(t) shall be provided within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 9.1.
- M9.** Each responsible entity, as determined in Requirement R1, shall provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided the maximum effective GIC values to the Transmission Owner and Generator Owner that owns each applicable BES power transformer in the planning area as specified in Requirement R9, Part 9.1. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided GIC(t) in response to a written request from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.



Evidence Requested¹:

Provide the following evidence, or other evidence to demonstrate compliance.
A list of each Transmission Owner and Generator Owner in the planning area that owns an applicable BES power transformer.
Dated evidence demonstrating the responsible entity provided the maximum effective GIC value for the worst case geoelectric field orientation for the benchmark GMD event described in Attachment 1 to each Transmission Owner and Generator Owner in the planning area that owns an applicable BES power transformer in the planning area.
Dated evidence demonstrating the responsible entity, within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 9.1, provided the effective GIC time series, GIC(t), calculated using the benchmark GMD event described in Attachment 1 in response to a written request

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from the Transmission Owner or Generator Owner that owns an applicable BES power transformer in the planning area.

Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R9

This section to be completed by the Compliance Enforcement Authority

	(R9) Verify the responsible entity provided GIC flow information to each Transmission Owner and Generator Owner that owns an applicable BES power transformer in the planning area.
	(Part 9.1) Verify the GIC flow information provided by the responsible entity included the maximum effective GIC value for the worst case geoelectric field orientation for the supplemental GMD event described in Attachment 1.
	(Part 9.2) For all, or a sample of, written requests from applicable Transmission Owner or Generation Owners, verify the responsible entity provided the effective GIC time series, GIC(t), within 90 calendar days of receipt of the written request and after determination of the maximum effective GIC value in Part 9.1.

Note to Auditor:

Auditor Notes:

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R10 Supporting Evidence and Documentation

R10. Each Transmission Owner and Generator Owner shall conduct a supplemental thermal impact assessment for its solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R9, Part 9.1, is 85 A per phase or greater. The supplemental thermal impact assessment shall:

- 10.1.** Be based on the effective GIC flow information provided in Requirement R9;
- 10.2.** Document assumptions used in the analysis;
- 10.3.** Describe suggested actions and supporting analysis to mitigate the impact of GICs, if any; and
- 10.4.** Be performed and provided to the responsible entities, as determined in Requirement R1, within 24 calendar months of receiving GIC flow information specified in Requirement R9, Part 9.1

M10. Each Transmission Owner and Generator Owner shall have evidence such as electronic or hard copies of its supplemental thermal impact assessment for all of its solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R9, Part 9.1, is 85 A per phase or greater, and shall have evidence such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has provided its supplemental thermal impact assessment to the responsible entities as specified in Requirement R10.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
The GIC flow information provided by the Planning Coordinator or Transmission Planner in accordance with Requirement R9.
Dated evidence demonstrating the completion of the supplemental thermal impact assessment for each of the entity's solely and jointly owned applicable BES power transformers where the maximum effective GIC value provided in Requirement R9 Part 9.1 is 85 A per phase or greater.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document
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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R10

This section to be completed by the Compliance Enforcement Authority

	(R10) Verify the entity conducted a supplemental thermal impact assessment for each applicable BES power transformer where the maximum effective GIC value provided in Requirement R9, Part 9.1, is 85 A per phase or greater.
	(R10) Review supplemental thermal impact assessments for applicable BES power transformers and confirm the thermal impact assessment meets the requirements identified in Requirement R10 Part 10.1 through Part 10.4.
	(Part 10.1) Be based on the effective GIC flow information provided in Requirement R9.
	(Part 10.2) Document assumptions used in the analysis.
	(Part 10.3) Describe suggested actions and supporting analysis to mitigate the impact of GICs, if any.
	(Part 10.4) Be performed and provided to the responsible entities as determined in Requirement R1 within 24 calendar months of receiving GIC flow information specified in Requirement R9, Part 9.1.

Note to Auditor:

Auditor Notes:

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R11 Supporting Evidence and Documentation

R11. Each responsible entity, as determined in Requirement R1, that concludes through the supplemental GMD Vulnerability Assessment conducted in Requirement R8 that their System does not meet the performance requirements for the steady state planning supplemental GMD event contained in Table 1, shall develop a Corrective Action Plan (CAP) addressing how the performance requirements will be met. The CAP shall:

- 11.1.** List System deficiencies and the associated actions needed to achieve required System performance. Examples of such actions include:
 - Installation, modification, retirement, or removal of Transmission and generation Facilities and any associated equipment.
 - Installation, modification, or removal of Protection Systems or Remedial Action Schemes.
 - Use of Operating Procedures, specifying how long they will be needed as part of the CAP.
 - Use of Demand-Side Management, new technologies, or other initiatives.
- 11.2.** Be developed within one year of completion of the supplemental GMD Vulnerability Assessment.
- 11.3.** Include a timetable, subject to ERO approval for any extension sought under Part 11.4, for implementing the selected actions from Part 11.1. The timetable shall:
 - 11.3.1.** Specify implementation of non-hardware mitigation, if any, within two years of development of the CAP; and
 - 11.3.2.** Specify implementation of hardware mitigation, if any, within four years of development of the CAP.
- 11.4.** Be submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 11.3. This submission shall include the following:
 - 11.4.1.** Circumstances causing the delay for fully or partially implementing the selected actions in Part 11.1 and how those circumstances are beyond the control of the responsible entity;
 - 11.4.2.** Revisions to the selected actions in Part 11.1, if any, including utilization of Operating Procedures if applicable; and,
 - 11.4.3.** Updated timetable for implementing the selected actions in Part 11.1.
- 11.5.** Be provided: (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), and functional entities referenced in the CAP within 90 calendar days of development or revision, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.
 - 11.5.1.** If a recipient of the CAP provides documented comments on the CAP, the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.

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M11. Each responsible entity, as determined in Requirement R1, that concludes, through the supplemental GMD Vulnerability Assessment conducted in Requirement R8, that the responsible entity's System does not meet the performance requirements for the steady state planning supplemental GMD event contained in Table 1 shall have evidence such as dated electronic or hard copies of its CAP including timetable for implementing selected actions, as specified in Requirement R11. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records or postal receipts showing recipient and date, that it submitted a request for extension to the ERO if the responsible entity is unable to implement the CAP within the timetable provided in Part 11.3. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email records, web postings with an electronic notice of posting, or postal receipts showing recipient and date, that it has distributed its CAP or relevant information, if any, (i) to the responsible entity's Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), and functional entities referenced in the CAP within 90 calendar days of development or revision, and (ii) to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later as specified in Requirement R11. Each responsible entity, as determined in Requirement R1, shall also provide evidence, such as email notices or postal receipts showing recipient and date, that it has provided a documented response to comments received on its CAP within 90 calendar days of receipt of those comments, in accordance with Requirement R11.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation that identifies the roles and responsibilities of entities in the planning area for maintaining models and performing the studies needed to complete GMD Vulnerability Assessments.
Copy of the supplemental GMD Vulnerability Assessment conducted in Requirement R8
A list of System deficiencies identified through the supplemental GMD Vulnerability Assessment.
All dated CAPs associated with the System deficiencies, which identify the associated actions needed to achieve required System performance.
Evidence the CAP was submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 11.3.
Dated evidence that the CAP was provided, within 90 calendar days of development or revision, to the responsible entity's Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), functional entities referenced in the CAP.
Dated evidence that the CAP was provided to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.
If a recipient of the CAP provided documented comments on the CAP, evidence the responsible entity shall provide a documented response to that recipient within 90 calendar days of receipt of those comments.

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Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R11

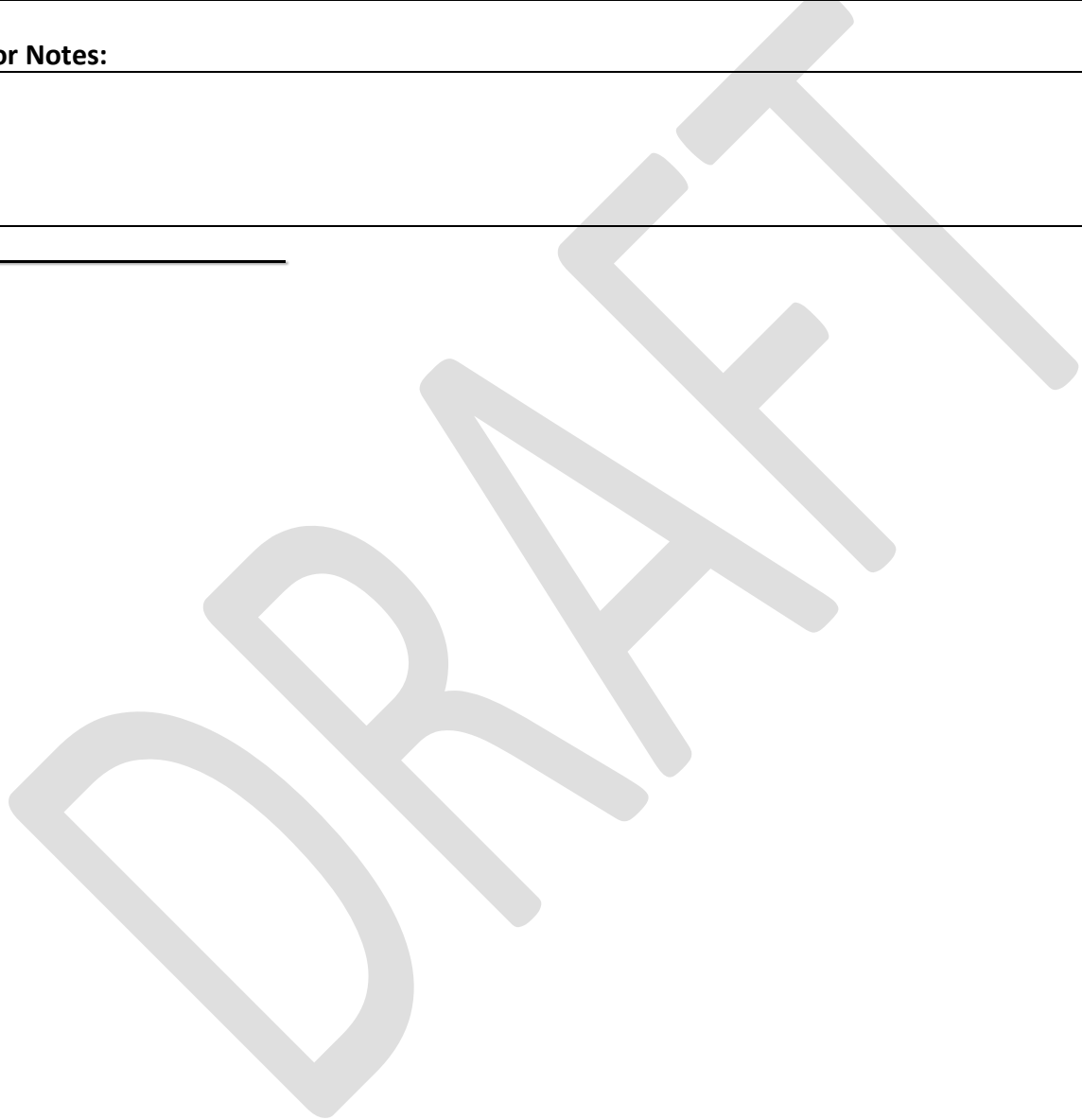
This section to be completed by the Compliance Enforcement Authority

	(R11) Verify the entity developed a CAP addressing how the performance requirements will be met for the steady state planning supplemental GMD event, if the entity concluded through the supplemental GMD Vulnerability Assessment conducted in Requirement R8, that their System does not meet the performance requirements of Table 1. Verify the CAP:
	(Part 11.1) List system deficiencies and associated actions needed to achieve required System performance.
	(Part 11.2) The CAP was developed within one year of completion of the supplemental GMD Vulnerability Assessment.
	(Part 11.3) The CAP includes a timetable.
	(Part 11.3.1) A timetable specifying implementation of non-hardware mitigation, if any, within two years of development of the CAP.
	(Part 11.3.2) A timetable specifying implementation of hardware mitigation, if any, within four years of the development of the CAP.
	(Part 11.4) Verify the CAP was submitted to the ERO with a request for extension if the responsible entity is unable to implement the CAP within the timetable provided in Part 11.3.
	(Part 11.4.1) Verify the submitted CAP documents circumstances causing the delay for fully or partially implementing the selected actions in Part 11.1 and how those circumstances are beyond the control of each responsible entity.
	(Part 11.4.2) Verify the submitted CAP documents revisions to the selected actions in Part 11.1, if any, including utilization of Operating Procedures if applicable.
	(Part 11.4.3) Verify the submitted CAP documents an updated timetable for implementing the selected actions in Part 11.1.
	(Part 11.5) Verify the responsible entity provided the CAP, within 90 calendar days of development or revision, to the responsible entity’s Reliability Coordinator, adjacent Planning Coordinator(s), adjacent Transmission Planner(s), functional entities referenced in the CAP.

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	(Part 11.5) Verify the responsible entity provided the CAP to any functional entity that submits a written request and has a reliability-related need within 90 calendar days of receipt of such request or within 90 calendar days of development or revision, whichever is later.
	(Part 11.5.1) If a recipient of the CAP provided documented comments on the CAP, verify the responsible entity provided a documented response to that recipient within 90 calendar days of receipt of those comments.
Note to Auditor:	

Auditor Notes:



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R12 Supporting Evidence and Documentation

R12. Each responsible entity, as determined in Requirement R1, shall implement a process to obtain GIC monitor data from at least one GIC monitor located in the Planning Coordinator’s planning area or other part of the system included in the Planning Coordinator’s GIC System model.

M12. Each responsible entity, as determined in Requirement R1, shall have evidence such as electronic or hard copies of its GIC monitor location(s) and documentation of its process to obtain GIC monitor data in accordance with Requirement R12.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation that identifies the implementation of a process to obtain GIC monitor data from at least one GIC monitor located in the Planning Coordinator's planning area or other part of the system included in the Planning Coordinator's GIC System model.
Documentation that identifies the roles and responsibilities of entities in the planning area for implementing process(es) to obtain GMD measurement data.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R12

This section to be completed by the Compliance Enforcement Authority

	Verify that the responsible entity, as determined in Requirement R1, implemented its process to obtain
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	GIC monitor data.
	Verify that GIC monitor data came from at least one GIC monitor located in the Planning Coordinator's planning area or other part of the system included in the Planning Coordinator's GIC System model.
Note to Auditor:	

Auditor Notes:

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R12 Supporting Evidence and Documentation

R13. Each responsible entity, as determined in Requirement R1, shall implement a process to obtain geomagnetic field data for its Planning Coordinator’s planning area.

M13. Each responsible entity, as determined in Requirement R1, shall have evidence such as electronic or hard copies of its process to obtain geomagnetic field data for its Planning Coordinator’s planning area in accordance with Requirement R13.

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation that identifies the implementation of a process to obtain geomagnetic field data for its Planning Coordinator’s planning area.
Documentation that identifies the roles and responsibilities of entities in the planning area for implementing process(es) to obtain GMD measurement data.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to TPL-007-4, R13

This section to be completed by the Compliance Enforcement Authority

	Verify that the responsible entity, as determined in Requirement R1, implemented its process to obtain geomagnetic field data.
	Verify that geomagnetic field data is for the Planning Coordinator’s planning area.

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Note to Auditor:

Auditor Notes:

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Additional Information:

Reliability Standard

<insert final PDF here>

The full text of TPL-007-4 may be found on the NERC Web Site (www.nerc.com) under “Program Areas & Departments”, “Reliability Standards.”

In addition to the Reliability Standard, there is an applicable Implementation Plan available on the NERC Web Site.

In addition to the Reliability Standard, there is background information available on the NERC Web Site.

Capitalized terms in the Reliability Standard refer to terms in the NERC Glossary, which may be found on the NERC Web Site.

Regulatory Language <to be updated after approval>

In Order No. 830, issued in 2016, the Federal Energy Regulatory Commission approved Reliability Standard TPL-007-1 and directed further revisions. Specifically, FERC directed NERC to: (1) revise the benchmark GMD event definition so that the reference peak geoelectric field amplitude component is not based solely on spatially-averaged data (P 44); (2) make corresponding revisions to Requirement R6, relating to transformer thermal impact assessments (P 65) ; (3) require entities to collect GIC monitoring and magnetometer data (P 88); and (4) include deadlines for the development and completion of Corrective Action Plans to address identified system vulnerabilities (PP 101-102). Order No. 830, *Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events*, 156 FERC ¶ 61,215 (2016).

In response to FERC’s Order No. 830 directives, NERC developed Reliability Standard TPL-007-2. Reliability Standard TPL-007-2 added new Requirements for entities to assess their vulnerabilities to a second defined event, the supplemental GMD event. The standard added new Requirements for the collection of GIC and magnetometer data. The standard also revised Requirement R7 to include deadlines for the development and completion of any necessary Corrective Action Plans.

The Commission approved Reliability Standard TPL-007-2 in Order No. 851, issued in 2018. In this Order, FERC also directed further revisions as follows:

1. Require Corrective Action Plans for Supplemental GMD Vulnerability Assessment Vulnerabilities

29. As proposed in the NOPR, pursuant to section 215(d)(5) of the FPA, we also determine that it is appropriate to direct NERC to develop and submit modifications to Reliability Standard TPL-007-2 to require the development and completion of corrective action plans to mitigate assessed supplemental GMD event vulnerabilities. Given that NERC has acknowledged the potential for “severe, localized impacts” associated with supplemental GMD event vulnerabilities, we see no

basis for requiring corrective action plans for benchmark GMD events but not for supplemental GMD events.¹¹ Based on the record in this proceeding, there appear to be no technical barriers to developing or complying with such a requirement. Moreover, as discussed below, the record supports issuance of a directive at this time, notwithstanding NOPR comments advocating postponement of any directive until after the completion of additional GMD research, because relevant GMD research is scheduled to be completed before the due date for submitting a modified Reliability Standard. The Commission therefore adopts the NOPR proposal and directs NERC to submit the modified Reliability Standard for approval within 12 months from the effective date of Reliability Standard TPL-007-2.

2. Implement Case-by-Case Exception Process for Considering Corrective Action Plan Completion Deadline Extensions

30. We also determine, pursuant to section 215(d)(5) of the FPA, that it is appropriate to direct that NERC develop further modifications to Reliability Standard TPL-007-2, Requirement R7.4. Under NERC's proposal, applicable entities are allowed, without prior approval, to exceed deadlines for completing corrective action plan tasks when "situations beyond the control of the responsible entity [arise]."¹² Instead, as discussed below, we direct NERC to develop a timely and efficient process, consistent with the Commission's guidance in Order No. 830, to consider time extension requests on a case-by-case basis. Our directive balances the availability of time extensions when applicable entities are presented with the types of uncontrollable delays identified in NERC's petition and NOPR comments with the need to ensure that the mitigation of known GMD vulnerabilities is not being improperly delayed through such requests. Further, as proposed in the NOPR, we direct NERC to prepare and submit a report addressing how often and why applicable entities are exceeding corrective action plan deadlines as well as the disposition of time extension requests. The report is due within 12 months from the date on which applicable entities must comply with the last requirement of Reliability Standard TPL-007-2. Following receipt of the report, the Commission will determine whether further action is necessary.

56. In reaching our determination on this issue, we considered NERC's NOPR comments, which attempted to address the concerns with Requirement R7.4 expressed in the NOPR, stating that NERC and Regional Entity compliance and enforcement staff will review the reasonableness of any delay in implementing corrective action plans, including reviewing the asserted "situations beyond the control of the responsible entity" cited by the applicable entity, and by citing specific examples of the types of delays that might justify the invocation of Requirement R7.4. NERC's comments also characterized Requirement R7.4 as being "not so flexible ... as to allow entities to extend Corrective Action Plan deadlines indefinitely or for any reason whatsoever."¹³ We generally agree with the standard of review that NERC indicates it will use to determine whether an extension of time to implement a corrective action plan is appropriate. However, the assessment of whether an extension of time is warranted is more appropriately made before an applicable entity is permitted to delay mitigation of a known GMD vulnerability. While NERC indicates that under proposed Requirement R7.4 there are compliance consequences for improperly delaying mitigation, mitigation of a known GMD vulnerability will nonetheless have been delayed, and we conclude it is important that any proposed delay be reviewed ahead of

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time. Therefore, we direct NERC to modify Reliability Standard TPL-007-2, Requirement R7.4 to develop a timely and efficient process, consistent with the Commission’s guidance in Order No. 830, to consider time extension requests on a case-by-case basis.

Order No. 851, *Geomagnetic Disturbance Reliability Standard; Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events*, 165 FERC ¶ 61,124 (2018).

In February 2019, the NERC Board of Trustees adopted a regional Variance for Canadian jurisdictions in Reliability Standard TPL-007-3. None of the continent-wide Requirements were changed. This standard version has been submitted to the Canadian provincial authorities for approval and to FERC for informational purposes only.

Revision History for RSAW

Version	Date	Reviewers	Revision Description
1	08/02/2019	NERC Compliance, Standards, RSAWTF	New Document

ⁱ Items in the Evidence Requested section are suggested evidence that may, but will not necessarily, demonstrate compliance. These items are not mandatory and other forms and types of evidence may be submitted at the entity’s discretion.