

Distribution Deficiency Report (DDR) Guideline

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1. Purpose of DDR Guideline

This Distribution Deficiency Report (DDR) Guideline is a document intended to provide guidance to legal owners of electric distribution systems (Distribution Facility Owners or DFOs) about the supplemental information required by the Alberta Electric System Operator (AESO) to accept a System Access Service Request (SASR) from a DFO.

2. Purpose of the DDR

The DDR is a document prepared by the DFO, with the purpose of describing the distribution planning decisions that led the DFO to submit a SASR to the AESO, including a description of the DFO's planning criteria, current distribution system configuration, historical actual load data, and future load forecasts. The DDR also describes existing or expected deficiencies on the distribution system, identifies the distribution alternatives and provides supporting analysis to explain why each distribution alternative does not address the identified distribution deficiency.

The AESO intends the DDR to be used for one or more of the following:

- Review and confirm the DFO's distribution deficiency;
- Assess whether the DFO has a reasonable opportunity to exchange electric energy and ancillary services;
- Determine if, and when, an expansion or enhancement of the transmission system is required in response to a SASR;
- Prepare a Needs Identification Document (NID)¹ for filing with the Alberta Utilities Commission (AUC), if required; and
- Provide evidence in support of the AESO's needs approval submission.

3. Contents of the DDR

The DFO must determine which of the following requirements apply to its project and provide the applicable information in its DDR. DFOs can provide rationale for information that is not provided under a separate cover.

3.1 Document Naming Convention

The AESO recommends that the DDR submitted by the DFO be entitled "Distribution Deficiency Report". This will ensure consistent nomenclature among all DFOs and in the appendices supporting the AESO's needs approval submission.

3.2 Authentication

The DDR contains the professional engineering work of the DFO, which the AESO is relying upon to make its assessment and support its needs approval submission. The AESO recommends that final DDRs and supplemental engineering documents be professionally authenticated by the DFO.

3.3 TFO Information

¹ DDR Guideline also applies to projects that qualify under the AESO's Abbreviated Needs Approval Process (ANAP).

Information from a TFO is not required in the DDR, however, if the DFO wishes to include such information to support the DDR, the AESO requests that this information be provided under a separate cover by the TFO.

3.4 Current Distribution System Configuration

Provide current single line diagram(s) (SLD) of the existing distribution system. The SLDs should represent the applicable development area², including distribution connected generation (DCG) >1 MW³ and feeder ties to other substations in sufficient detail to clearly support the distribution deficiency and distribution alternative analysis.

3.5 Historical and Forecast Load Information

3.5.1 Load Tables and 12-month Load Trend

- Provide load tables including the following:
 - Actual summer or winter peak load values for the past 5 years for all substations in the development area (if 5 years historical data is not available, all available historical data should be provided);
 - 10-year peak load forecast values as specified below:
 - Non-coincident peaks of all feeders connected to the Point of Delivery (POD);
 - Transformer peaks that are coincident peaks of all the feeders served by that transformer;
 - POD peaks that are coincident peaks of all the transformers in the POD;
 - In cases where there are multiple PODs that provide backup or have the potential to provide back-up, provide the coincident factors of those PODs;
 - Identify permanent planned load transfers between feeders. If load transfers are identified, indicate any that also involve a transfer of a rate DTS contract; and
 - Loads should be in megavolt amperes (MVA), include the applicable power factor(s).
- The AESO has provided a recommended format for load tables in Appendix A.
- For substations with distribution deficiencies, provide load trend graphs for the first year of the deficiency. The AESO suggests the following format:
 - MVA on the Y-axis;
 - hour-day-month-year on the X-axis; and
 - 12-month hourly load trend line for each POD transformer and POD total.

3.5.2 DFO Forecast

- Provide a description of the DFO's forecasting methodology, including how existing and future DCG was considered in the DFO's load forecast. For example, is the DCG considered in the net load?
- Explain the reasons for load growth in the development area. The AESO suggests that load growth be identified as resulting from:
 - organic load growth attributed to existing customers;

² Development area should include any PODs with identified deficiencies and adjacent substations that the POD is connected to through transmission and distribution systems.

³ Distributed connected generation information can also be provided in a tabular form that includes generation size, fuel type and the feeder that it is connected to.

- discrete large load additions attributed to existing customers; and/or
- discrete large load additions attributed to new customers or new development areas where no electric facilities exist.
 - o For discrete large load increases, the timing and phasing of load can be uncertain. The AESO suggests the DFO provide supporting evidence, such as:
 - specific reference to the plans relied upon in its forecast (e.g. commercial, industrial, cities, municipalities, etc.) including an explanation of how the DFO translated such plans to the timing and MVA calculations of its forecast; and/or
 - descriptions of contracts, financial security or other documentation provided by end use customers which supports the DFOs decision to include customer load additions in its forecast.
- Provide a summary of existing DCG in the development area, including total aggregated micro-generators.
- Identify known planned DCG project additions in the development area.

3.6 Historical Performance Information

- Provide DFOs 10-year overall System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI)⁴.
- Provide a 10-year history of outages in the development area, include all relevant substations. The AESO suggests a table format to indicate the year, month, date, time, duration and magnitude of real-time load which could not be restored.
- When historical data is not available, the DFO should state that in the DDR and present any available data.

3.7 Distribution Deficiencies

3.7.1 Distribution Planning Criteria

- Provide details on the DFO's distribution system planning criteria, guidelines, or standards applicable to the SASR, including existing equipment and operating limits.
- Provide the latest version of the DFO's fulsome distribution system planning criteria, guidelines, or standard as an attachment to the DDR⁵. DFOs should cite the relevant sections of their planning criteria in the DDR.

3.7.2 Distribution Planning Violations

- Identify violations of the relevant DFO criteria, guidelines, or standard.
 - o Clearly indicate potential "unsupplied load" or "load at risk" for all substations applicable to the development area for the current year and the 10-year forecast. The AESO recommends utilizing a table format as shown in Appendix A.
 - o Provide a description of the methodology used to calculate the maximum backup capability from alternate PODs.

⁴ AUC Rule 002 Service Quality and Reliability Performance Monitoring and Reporting for Owners of Electric Distribution Systems and for Gas Distribution.

⁵ The fulsome planning criteria can be posted and maintained on the DFO's website.

- Provide detailed rationale for the requested timing to mitigate the distribution deficiency.
- For each POD with an identified deficiency, provide a summary of the types of customers currently served. The AESO recommends utilizing a table format as shown in Appendix B.
- For each POD with an identified deficiency, identify customer loads that the DFO considers critical to restoring power in the event of an outage and include the following:
 - Description of the customer load, including why the DFO considers the load to be critical and the typical amount of load;
 - Indicate whether these sites would be unsupplied during a contingency; and
 - Identify whether the critical load has on-site backup generation, and if so, whether there are any limitations associated with the backup generation.
- For each POD with an identified deficiency, provide a summary of the distributed connected generation (DCG) and any relevant communication the DFO may have had with DCG operators to determine the availability of DCGs to help mitigate the distribution deficiency. The AESO recommends utilizing a table format as shown in Appendix C.

3.7.3 Restoration Times

- In the event of an outage which results in unsupplied load, provide an overview of procedures the DFO would take, and the estimated times the DFO expects it would take, to restore service to customers in the relevant substations.

3.8 Alternative Evaluation

3.8.1 Distribution-Only Alternatives

This section discusses distribution-only (D-only) alternatives. Note, transmission developments, such as the addition of a circuit breaker at a substation to accommodate a new distribution feeder, are considered transmission solutions and are therefore not considered D-only solutions.

- Provide a description of all D-only alternatives considered by the DFO, including analysis and conclusions. The AESO recommends that, where applicable, the description include the following:
 - Conceptual SLDs that represent the applicable development area, including DCGs and feeder ties to other substations, in sufficient detail to clearly support the distribution alternative analysis;
 - Summary of new, modified or salvaged distribution equipment;
 - Summary of high-level land use and environmental impacts;
 - Contingency load table;
 - +20% to +50% and -15% to -30% cost estimates⁶ for technically feasible alternatives only;
 - Summary of the D-only alternatives and corresponding rationale for the elimination of each alternative. The AESO recommends that the summary include supporting data (diagrams, tables, and calculations), analysis and a rationale for the elimination of each D-only alternative;
 - Description of the alternatives considered with neighboring DFOs and why these alternatives were eliminated; and

⁶ This cost estimate accuracy range aligns with the Association for the Advancement of Cost Engineering (AACE) Class Level Estimate Class 4.

- Description of other measures, such as emergency backup generation, mobile substations or transformers, spare equipment, DCG or voluntary load curtailment that could address the identified deficiency.

3.8.2 Alternatives which Include Transmission

- If any transmission-only or transmission plus distribution alternatives are identified, the AESO recommends including the following details:
 - Total length of new feeders that would be required;
 - Contingency load table; and
 - +20% to +50% and -15% to -30% cost estimate for the distribution portion of the alternative.
- Provide a summary that explains why each alternative was eliminated. The AESO recommends that the summary include supporting data (diagrams, tables, calculations, etc.), an analysis and the rationale for eliminating each alternative.
- If a transmission alternative is proposed, in addition to the details requested above, provide supporting information to demonstrate that the DFO has evaluated whether a partial transmission solution (i.e. reduced transmission scope), in combination with additional distribution, could adequately address the deficiency.

3.9 Other considerations

The AESO recommends that the DFO provide any additional information that may be relevant and further support the DFO's SASR.

4. Updates to the DDR

4.1 DDR Supplement

The load-related information in the DDR including, contract additions, actuals and forecast information, must be up-to-date and accurate at the time the AESO submits for a needs approval.

Updated information that was not available at the time the DDR was prepared may be provided by way of a "supplemental document". A supplemental document to the DDR is acceptable for the following types of information:

- Updated historic load tables;
- Updated forecasted load tables;
- Updated DFO customer requests or DFO contracts that do not require changes to the requested DTS or STS;
- Confirmation that the distribution deficiency still exists and that the DFO's analysis and conclusions in the DDR remain unchanged notwithstanding any updated information provided by the DFO; and
- DFO analysis of transmission alternatives developed by the AESO (including load tables).

A supplemental document is not acceptable for purposes of correcting errors or omissions in the DDR.

4.2 DDR Revisions

The DDR will require revisions in situations where:

- The DFO has determined that there are errors or omissions in the DDR;
- The fundamental driver of the DFO's distribution deficiency has changed over time prior to the AESO seeking a needs approval (e.g., if the original DDR states capacity is the driver and the DFO subsequently determines that the distribution deficiency is related to both capacity and reliability);
- The rationale provided for eliminating certain alternatives is no longer valid after new information becomes available as the project moves forward (e.g., if the DDR states an alternative is not technically viable, but subsequent discussions and data demonstrate that it is viable); or
- Any of the DFO's conclusions have changed based on any new or updated information.

5. Appendix

5.1 Appendix A - Load Forecast and Contingency Tables

Historic and Forecast Load																			
		LOADING - RECORDED								FORECAST LOAD									
SUB	CAPACITY	W	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]
No	Tx/Feeder/VR	MVA	S	Peak	Peak	Peak	Peak	Peak	PEAK	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
XXXS	T1			MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
	VR1								XX%										
	XXL																		
	YYL																		
YYYS	Tn																		
	VRn																		
	ZZL																		
			Total	XX	XX	XX	XX	XX		XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Load Transfer			
MVA	From	To	Year
XX	XXXS-YYYS	XXXX	

Unsupplied Load for the year deficiency observed	
MWh	Year

Contingency Load Table																		
Multiple load tables may be required for different contingencies																		
		[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]	[Year]
		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
		MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Contingency at XXXS sub	XXXS Total Load	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	N-1 Capacity	0																
	Back up from AAS	0																
	Back up from BBS	0																
	Back up from CCS	0																
	Back up from DDS	0																
	Total Unsupplied Load	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Please use colour to indicate DFO criteria violation

5.2 Appendix B –Types of Unsupplied Loads

Types of Unsupplied Loads		
	<Insert POD Name>	
Customer Type	Number of Customers	Approximate MVA
Residential		
Industrial		
Commercial		
Agricultural		
Oil & Gas		
<Insert rows as required>		
Total		

5.3 Appendix C – DCG Summary

DCG Summary at POD Name			
DCG Name or ID	Type	Size	Comments
<Insert rows as required>			