EPCOR DISTRIBUTION & TRANSMISSION INC.

Distribution Deficiency Report (DDR) for Woodcroft Transformer Capacity Increase

Revision 1

Company	Role	Name	Date	Signature
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EDTI	Approved	Sarah Hanson, P. Eng	September 12, 2025	PERMIT TO PRACTICE EPCOR DISTRIBUTION & TRANSMISSION INC RM SIGNATURE: RM APEGA ID #: 80498 DATE: 2025-09-22 PERMIT NUMBER: P007061 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

APEGA Permit to Practice P07061

1.0 Abbreviations

AESO: Alberta Electric System Operator

ASP: Area Structure Plan

CoE: City of Edmonton

DTS: Demand Transmission Service

EDTI: EPCOR Distribution & Transmission Inc.

DDR: Distribution Deficiency Report

DFO: Distribution Facility Owner

GDP: Gross Domestic Product

LCR: Life-cycle replacement (replacement of assets for end-of-life reasons)

N-0: all distribution circuits and transmission elements in service (normal operating condition)

N-1: failure of a single transmission element or single distribution circuit (emergency operating condition)

NIS: Not in Service

pf: power factor = MW/MVA

POD: Point of Delivery

STS: Supply Transmission Service

TFO: Transmission Facility Owner

TUC: Transportation/Utility Corridor

Document History

Revision	Date	Author	Description
Rev 0	May 15, 2022	Mark Mayner	New release
Rev 1	September 12, 2025	Sana Adil	AESO Connection Process, Stage 3 Revision

1.0 EXECUTIVE SUMMARY

EPCOR Distribution & Transmission Inc. (EDTI) is requesting system access service from the Alberta Electric System Operator (AESO) to address forecast capacity concerns in West Central Edmonton (supplied by Woodcroft POD) over the next 10 years and beyond. EDTI is submitting this Distribution Deficiency Report (DDR) in conjunction with the System Access Service Request (SASR) to fulfill Stage 0 requirements.

EDTI forecasts that load at Woodcroft POD will exceed the substation's rated N-1 Firm Capacity in 2032. The N-1 Firm Capacity at Woodcroft POD is limited by the transformation capacity of the three existing 40 MVA 72/15 kV transformers. EDTI DFO has been informed by the TFO that lifecycle replacements for the three 40 MVA 72/15 kV transformers at Woodcroft POD are currently planned for 2026 (T1), 2027 (T2), and 2028 (T3). Given the timing of the forecast deficiency in relation to the planned transformer lifecycle replacements, EDTI DFO and the TFO have recognized there is an opportunity to coordinate the transformer lifecycle replacements with the emerging capacity need at Woodcroft POD for the benefit of both transmission and distribution customers. EDTI forecasts that the summer coincident peak load at Woodcroft POD will reach 76.3 MVA in 2032. In the event of a forced outage to any of the three 40 MVA 72/15 kV transformers at Woodcroft POD, this loading will violate the thermal limits of the two transformers that remain in-service. By 2049, the end of the 25-year forecast period, the Woodcroft POD summer coincident peak load is forecast to reach 89.3 MVA, which would violate the PODs N-1 Firm Capacity by 13.3 MVA.

This assessment is based upon EDTI's distribution planning criteria for feeders and PODs, which states:

- All PODs should operate at or below their N-1 firm capacity
- All 500 mcm 15 kV radial distribution feeders should operate at or below their design load rating of 6.5 MVA under N-0 in summer and 7.5 MVA under N-0 in winter
- All 750 mcm 15 kV radial distribution feeders should operate at or below their design load rating of 8.5 MVA under N-0 in summer and 8.7 MVA under N-0 in winter
- All 500 mcm 15 kV radial distribution feeders should operate at or below their emergency load rating of 10.0 MVA under N-1 in summer and 11.2 MVA under N-1 in winter
- All 750 mcm 15 kV radial distribution feeders should operate at or below their emergency load rating of 12.8 MVA under N-1 in summer and 13.2 MVA under N-1 in winter

In this Distribution Deficiency Report (DDR), EDTI demonstrates that transmission investment is required to resolve capacity concerns emerging in 2032 and worsening over the remaining 25-year forecast period. EDTI is submitting this revised DDR now while there is an opportunity to coordinate with the TFO lifecycle replacement project, as once installed the replacement transformers have a life expectancy of 50 years. The following solution alternatives were considered:

Distribution supply alternative

EDTI DFO has evaluated the distribution alternatives described below.

Alternative I – Distribution Switching

a) Load transfer from Woodcroft POD to adjacent PODs Castle Downs, Jasper, Namao, Meadowlark, Rossdale, or Victoria using existing distribution circuits and ties

Transmission supply alternatives

EDTI DFO proposes the transmission alternatives described below. This proposal is based on EDTI DFO's present understanding of the TFO's design standards and practices that are applicable to PODs.

Alternative II – POD Transformer Size Increase at Lifecycle Replacement

b) Coordinate with TFO to increase the capacity of the existing 40 MVA 72/15 kV transformers T1, T2, and T3 at Woodcroft POD to 50 MVA at their time of life-cycle replacement, currently planned in 2026, 2027, and 2028, respectively – per the TFO.

Alternative III – New circuit from Jasper POD and Castle Downs POD

c) AESO project P2543 is completed and increases the N-1 Firm Capacity at Castle Downs POD and installs new 15 kV circuit breakers.

d) Prepare new 15 kV breaker at Jasper POD;

e) Install new circuit from Jasper POD to off-load 5.7 MVA from existing Woodcroft circuit W5.

f) Prepare new 15 kV breaker (installed as part of AESO project P2543 at Castle Downs POD).

g) Install new circuit from Castle Downs POD to off-load 5.0 MVA from existing Woodcroft circuit W1 and W16.

Alternative I is not technically feasible as insufficient distribution capacity combined with circuit topology make resolution by distribution switching not possible. A brief comparison of distribution costs associated

with the two technically acceptable alternatives (II and III) is provided in the table below. Only the distribution costs associated with each alternative have been estimated in this report. If the AESO pursues a transmission alternative, they may direct EDTI TFO to prepare a facility application for the requested transmission upgrades. This facility application will include an estimate of the transmission capital cost.

Table 1: Cost of Solution Alternatives

Alternative	**II**		**III**	
Descriptor[1]	**POD Transformer Size Increase at Lifecycle Replacement**		**New circuit from Jasper POD and new circuit from Castle Downs POD**	
Total Feeders Length (km)	0		8.1	
Estimated Costs ($2025)	b	TBD	c	TBD
			d	3.2
			e	TBD
			f	3.0
Total Distribution Costs (+/- 50%, $2025)	**$ 0.0 M**		**$ 6.2 M**	

b, c, and e refer to components of the various transmission alternatives, to be determined by EDTI TFO

Alternative II is EDTI DFO's preferred alternative to address the identified deficiencies and considerations outlined in this document. Alternative II is best suited to make use of existing infrastructure and investments at Woodcroft POD, existing and future investments on distribution circuits supplied by Woodcroft POD, addresses the issue over a longer time horizon, and preserves capacity at adjacent PODs to accommodate load growth and uncertainties in their respective service areas. As the POD transformers at Woodcroft are planned for lifecycle replacement it is expected that Alternative II will involve minimal incremental transmission costs on top of what is already required for lifecycle replacement. Once installed, the new transformers have a 50-year life expectancy which will make replacement for capacity reasons in the future difficult to justify or result in stranded investment.

EDTI will not be requesting a change to its DTS contract at Woodcroft POD at this time.

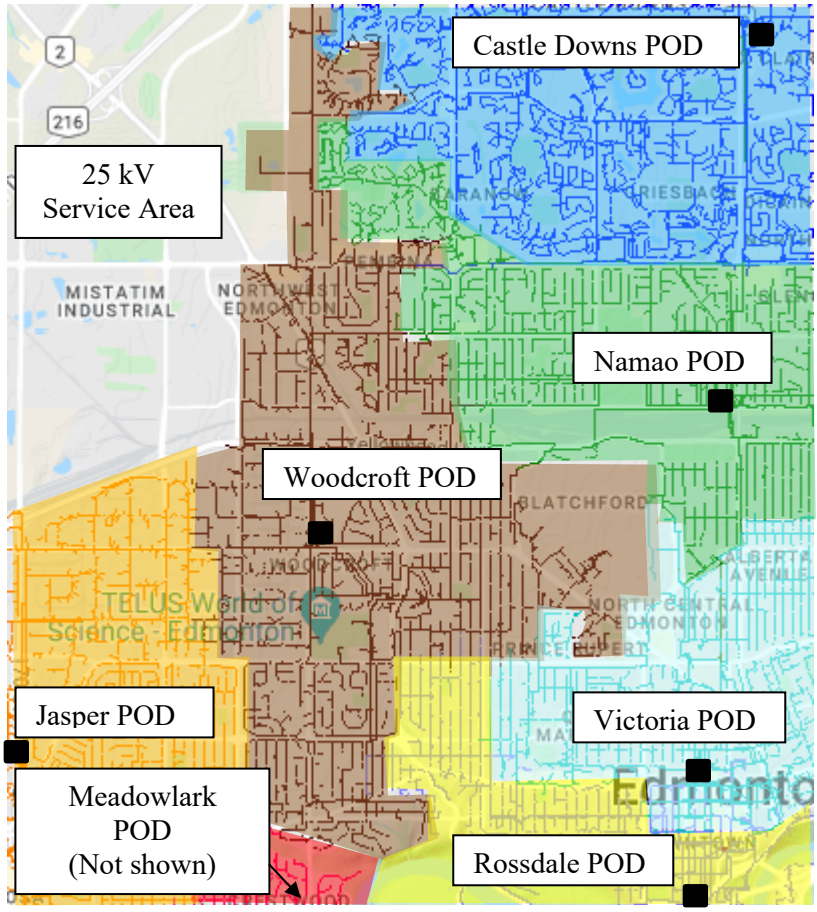
The requested in-services date (ISD) for the proposed development is to align with EPCOR TFO lifecycle replacement plans which had an original planned completion date of December 30, 2027. The TFO has noted an updated ISD date for April 30, 2028, for energization of the final TX3 transformer replacement; to which the DFO agrees.

[1] AESO project P2543 involves a separate distribution deficiency within Castle Downs POD service area; thereby costs have not been included in this DDR.

2.0 EXISTING SYSTEM DESCRIPTION

Woodcroft POD is located at 11809 - 142 Street NW, Edmonton, AB. Figure 1 below shows the existing Woodcroft POD service area and surrounding 15 kV PODs. The service area covers the central northwest portion of the City of Edmonton. Woodcroft POD is adjacent to the 15 kV EDTI PODs Castle Downs to the northeast, Namao to the northeast, Victoria to the east, Rossdale to the southeast, Meadowlark to the south, and Jasper to the southwest. The area northwest of Woodcroft POD is serviced at 25 kV and has no interconnection with the 15 kV system.

Figure 1: Woodcroft POD Service Area



Woodcroft POD services a mixture of commercial, residential, and industrial customers. Table 2 below provides a summary of the customer counts by rate class supplied by Woodcroft POD. Industrial customers are generally located west of 142 Street and north of 111 Avenue, while residential customers are located east and south of the same roads. Commercial customers are located along major thoroughfares throughout the service area (e.g. Stoney Plain Road, St. Albert Trail, Yellowhead Trail Corridor, 127 Street, 124 Street, etc.).

Table 2: Woodcroft POD Customers by Rate Class

Rate Class	Customer Count 2022	Customer Count 2025
Residential	13,929	14,260
Commercial/Industrial < 50 kVA	1,907	1,883
Commercial/Industrial 50 – 149 kVA	376	411
Commercial/Industrial 150 < 4999 kW	125	122
Primary Commercial/Industrial 150 < 4999 kW	8	7
Security Lighting	95	82
Unmetered	59	58
Total	**16,499**	**16,823**

Woodcroft POD service area presently has a small amount of Distribution Connected Generation (DCG) connected within. A summary of the DCG connected at Woodcroft POD is shown in Table 3 below. EDTI is not aware of any significant DG additions planned for the Woodcroft service area that would significantly impact the deficiencies described within this report. EDTI presently does not have any plans to construct DCG within the service area.

Table 3: DCG connected to Woodcroft POD

Type	Size [kW]	Number of Sites (2022)	Number of Sites (2025)	Aggregate Nameplate to Date (2025) [MW]
Photovoltaic	0 – 4.9	25	147	0.465
	5.0 – 9.9	48	186	1.31
	10.0 – 49.9	15	42	0.59
	50.0 – 150.0	3	5	0.552
	150.0 – 249.9	1	1	0.174
	250.0 – 999	1	2	0.3
Cogen	250.0 – 999	0	1	0.55
Total		93	384	3.941

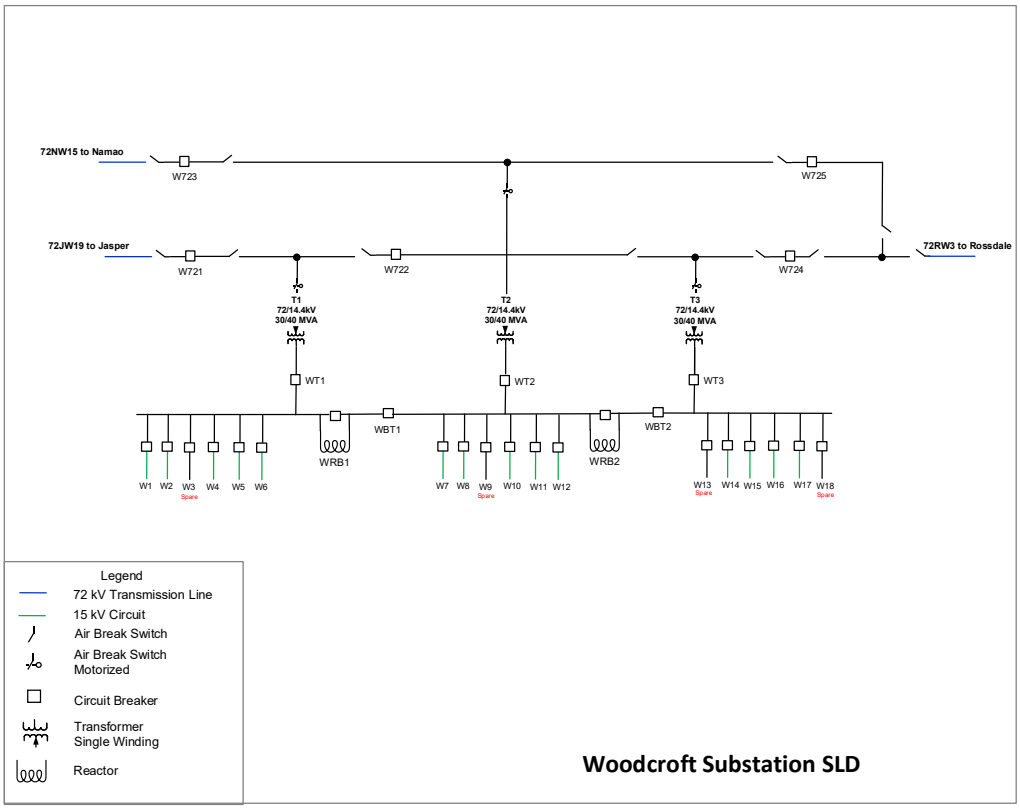
As shown in Table 3, all DCG within the Woodcroft service area are < 5 MW; in addition, the majority of all DCG are of the solar photovoltaic generation type with only one being of the cogeneration type. Due to the nature of the DCG (numerous distinct microgeneration sites), small aggregate size overall, and intermittency of the DCG connected, EDTI has not communicated with DCG operators as an option to mitigate the distribution deficiency.

Throughout this document, distribution circuit names with prefixes W, CD, N, J, M, V, and R refer respectively to circuits supplied by Woodcroft POD, Castle Downs POD, Namao POD, Jasper POD, Meadowlark POD, Victoria POD, or Rossdale POD.

2.1 Woodcroft Substation SLD

The single line diagram (SLD) for Woodcroft POD is shown in Figure 2 below. As per the SLD, Woodcroft POD is supplied by the three 72 kV transmission circuits 72NW15, 72JW19, and 72RW3. 15 kV load at the POD is supplied by three 30/40 MVA 72/15 kV transformers, each connected to a 15 kV bus with six (6) circuit positions. EDTI has not currently utilized the positions at W3, W9, W13, and W18. EDTI is effectively unable to utilize these circuit positions (except for the purposes of load transfers internal to Woodcroft POD) given the existing transformation capacity limitation.

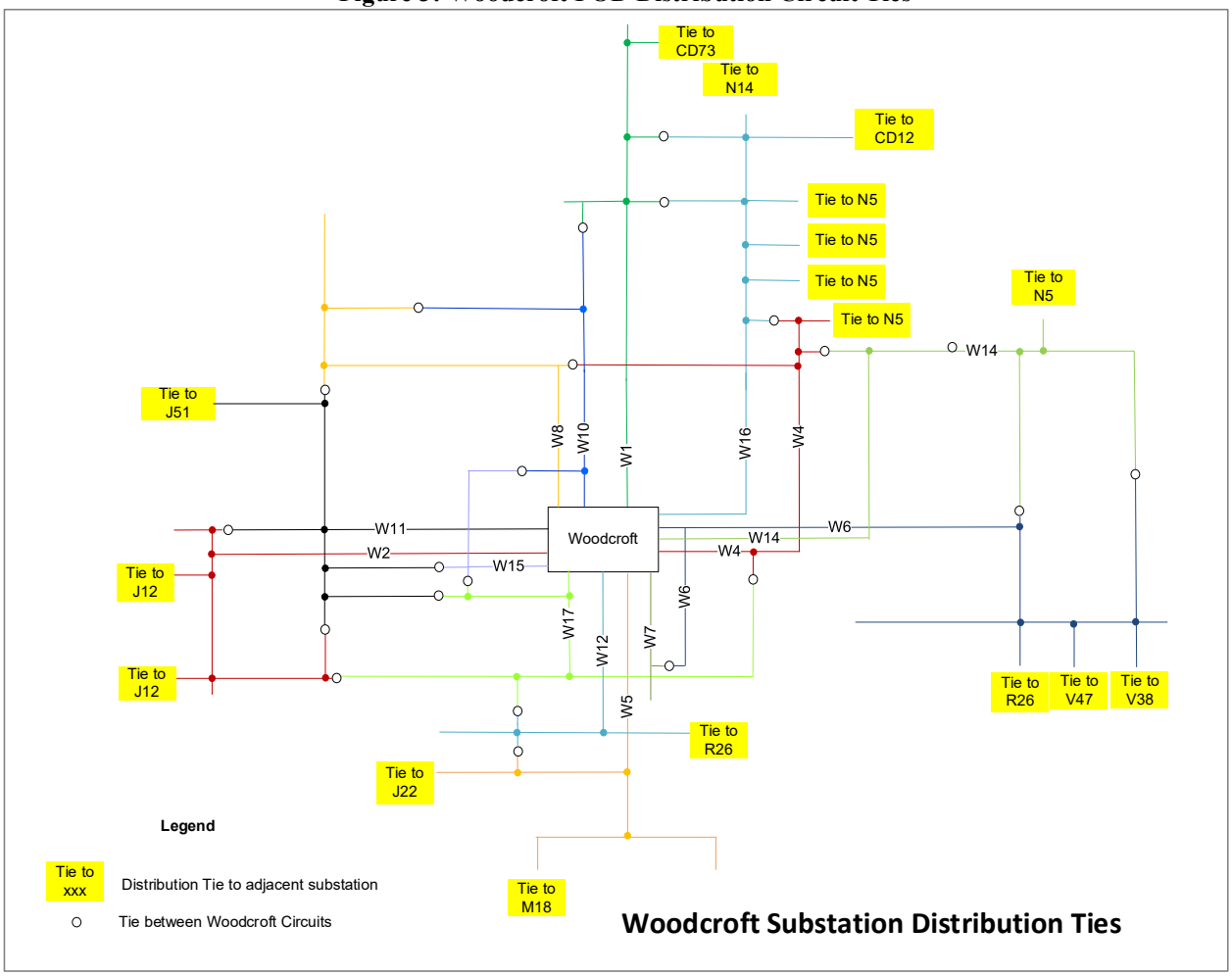
Figure 2: Woodcroft Proposed POD Single Line Diagram (SLD)



2.2 Woodcroft Distribution Ties

Figure 3 below shows a schematic diagram of the circuits supplied by Woodcroft POD and the distribution circuit ties to adjacent PODs. Ties to circuits supplied by adjacent PODs are highlighted in yellow. There are no interconnections to the 25 kV service area to the northwest. The limitations of using these distribution ties for distribution switching during a POD transformer contingency at Woodcroft POD are addressed in section 6.1 Alternative I – Distribution Switching.

Figure 3: Woodcroft POD Distribution Circuit Ties



2.3 Woodcroft POD Historical Performance

2.3.1 SAIFI and SAIDI

See Table 4 below for EDTI's 10-year overall System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI).

Table 4: EDTI 2015-2024 SAIFI and SAIDI Historical Performance

Index	EDTI 2015-2024 Average
SAIFI	1.00
SAIDI	0.78

2.3.2 Woodcroft POD Outage History

EDTI began recording scheduled transmission element outages where no customer load was lost in 2018 at Woodcroft POD. The 2018-2025 historical scheduled transformer outage data for the development area of Woodcroft is presented in Table 5 below. This data is reflective of the contingency of concern to be addressed – loss of a Woodcroft POD transformer. EDTI plans its system such that all load interrupted due to transmission outages can be fully restored via transmission switching within the POD. This is required due to the design of EDTI's distribution system, which is unable to provide full contingency support for a transmission outage due to their typical durations and the magnitude of load involved. As can be observed from the data, the longest such outage required was 610 hours.

Table 5: Woodcroft POD Scheduled Transformer Outages

PLANNED OUTAGES					
OUTAGE NUMBER	OUTAGE TITLE	START	END	DURATION	REASON
OE100037	TX3 @ Woodcroft	9/29/18 7:00 AM	9/30/18 5:00 PM	34.00	Doble
OE100048	TX1 @ Woodcroft	10/22/18 7:00 AM	11/2/18 5:00 PM	274.00	Cutover of New Transformer Protection
OE100055	TX2 @ Woodcroft	11/19/18 7:00 AM	11/30/18 5:00 PM	274.00	Cutover of New Transformer Protection
OE100057	TX3 @ Woodcroft	12/3/18 7:00 AM	12/14/18 5:00 PM	274.00	Cutover of New Transformer Protection
OE100268	TX2 @ Woodcroft	4/23/19 7:00 AM	4/23/19 5:00 PM	10.00	ITM Measurement
OE100269	TX3 @ Woodcroft	4/24/19 7:00 AM	4/24/19 5:00 PM	10.00	ITM Measurement
OE100316	TX1 @ Woodcroft	5/27/19 7:00 AM	5/27/19 5:00 PM	10.00	Repair disconnect and refill breaker
OE100195	TX2 @ Woodcroft	6/17/19 8:00 AM	6/21/19 5:00 PM	105.00	Doble
OE100210	TX2 @ Woodcroft	7/8/19 8:00 AM	7/19/19 5:00 PM	273.00	LTC Upgrade
OE100209	TX3 @ Woodcroft	7/22/19 8:00 AM	8/2/19 5:00 PM	273.00	LTC Upgrade
OE100484	TX3 @ Woodcroft	6/22/20 7:00 AM	6/26/20 5:00 PM	106.00	Transformer Secondary Retrofit & Disconnect
OE100871	TX1 @ Woodcroft	11/24/20 7:00 AM	11/24/20 5:00 PM	10.00	Transducer removal
OE100873	TX3 @ Woodcroft	11/26/20 7:00 AM	11/26/20 5:00 PM	10.00	Transducer removal
OE100932	TX1 @ Woodcroft	11/23/21 7:00 AM	11/24/21 5:00 PM	34.00	Woodcroft TX1 Tap Changer Maintenance and High Temp investigation.
OE101213	TX2 @ Woodcroft	12/14/21 7:00 AM	12/15/21 5:00 PM	34.00	TX2 Tap Changer Maintenance and Leak Inspection
OE100933	TX3 @ Woodcroft	12/16/21 7:00 AM	12/16/21 5:00 PM	10.00	Woodcroft TX3 Tap Changer Maintenance
OE102579	TX1 @ Woodcroft	7/23/22 7:00 AM	7/24/22 5:00 PM	34.00	Woodcroft TX1 Surge Arrestor Replacement

OE105265	TX1 @ Woodcroft	5/29/23 7:00 AM	6/3/23 5:00 PM	130.00	Woodcroft: TX1 Tap Changer Leak Repair (043836)
OE104296	TX3 @ Woodcroft	7/17/23 7:00 AM	7/21/23 5:00 PM	106.00	Woodcroft: TX3 Zone/W724 P&C Maintenance
OE106097	TX2 @ Woodcroft	9/25/23 7:00 AM	9/28/23 5:00 PM	82.00	Woodcroft: TX2 Zone P&C Maintenance
OE107612	TX1 @ Woodcroft	5/13/24 7:00 AM	5/17/24 12:00 PM	101.00	Woodcroft: TX1 Zone Doble and WAB1, WDS2, WDS3 Disconnect Maintenance
OE107614	TX3 @ Woodcroft	5/21/24 7:00 AM	5/26/24 5:00 PM	130.00	Woodcroft: TX3 Doble and WDS6, WDS7, WAB3 Disconnect Maintenance
OE107613	TX2 @ Woodcroft	9/3/24 7:00 AM	9/17/24 11:00 AM	340.00	Woodcroft: Apparatus- TX2 Doble and WDS4, WDS5, WAB2 Disconnect Maintenance. Aerial- NW15 Pole Replacement
OE109421	TX2 @ Woodcroft	12/2/24 7:00 AM	12/13/24 5:00 PM	274.00	Woodcroft: WAB2 LCR
OE110390	TX1 @ Woodcroft	2/12/25 7:00 AM	2/12/25 5:00 PM	10.00	Woodcroft: TX1 Temperature Probe Repair
OE110587	TX1 @ Woodcroft	3/13/25 7:00 AM	3/14/25 5:00 PM	34.00	Woodcroft: TX1 Temp Probe Repair
OE110738	TX1 @ Woodcroft	4/7/25 7:00 AM	5/2/25 5:00 PM	610.00	Woodcroft: TX1 Zone, Protection Upgrade Cutovers
OE110740	TX2 @ Woodcroft	5/5/25 7:00 AM	5/23/25 5:00 PM	442.00	Woodcroft: TX2 Zone, Protection Upgrade Cutovers (Merging Unit) and W725 Breaker Maintenance (SF6)
OE110792	TX3 @ Woodcroft	6/9/25 7:00 AM	6/20/25 5:00 PM	274.00	Woodcroft: TX3 Zone, Protection Upgrade Cutovers

See Table 6 below for a list of historical customer outages occurring at Woodcroft POD due to loss of transmission supply from 2012 to 2025. Note, EDTI does not keep record of the magnitude of load lost. The data reflects operation in compliance with EDTI's N-1 firm POD loading planning criteria where load was restored via transmission switching. These numbers would increase had transmission switching not been an option.

Table 6: Woodcroft POD Loss of Transmission Supply CHI

Incident number	Substation	Year	Month	Date	Customers Impacted	Customer Hours of Interruption	Duration (hours)
14744	Woodcroft	2012	July	7/9/2012	2063	2579	1.25
15253	Woodcroft	2013	March	3/3/2013	1080	54	0.05
15252	Woodcroft	2013	March	3/3/2013	2371	119	0.05
15251	Woodcroft	2013	March	3/3/2013	743	37	0.05
15250	Woodcroft	2013	March	3/3/2013	2693	135	0.05
15249	Woodcroft	2013	March	3/3/2013	7	0	0.05
15248	Woodcroft	2013	March	3/3/2013	2063	103	0.05

15247	Woodcroft	2013	March	3/3/2013	2666	133	0.05
15246	Woodcroft	2013	March	3/3/2013	255	13	0.05
15245	Woodcroft	2013	March	3/3/2013	1236	62	0.05
15438	Woodcroft	2013	July	7/2/2013	6	6	0.98
16174	Woodcroft	2014	June	6/29/2014	6	0	0.03
INC 16011739	Woodcroft	2020	June	6/7/2020	351	500	1.43
INC 16011740	Woodcroft	2020	June	6/7/2020	2523	3545	1.41
INC 16011743	Woodcroft	2020	June	6/7/2020	195	269	1.38
INC 16011748	Woodcroft	2020	June	6/7/2020	122	171	1.40
INC 15012322	Woodcroft	2020	July	7/13/2020	3	1.2	0.60
INC 15012401	Woodcroft	2020	August	8/20/2020	865	296	0.34
INC 15014744	Woodcroft	2021	February	2/21/2021	3.06	35.9	0.12
INC 16016016	Woodcroft	2021	June	6/3/2021	321	161.3	0.00
INC 15018224	Woodcroft	2021	September	9/29/2021	8227	1234	0.15
INC 16020511	Woodcroft	2022	March	3/5/2022	6595	1072.8	0.17
INC 18001407	Woodcroft	2022	June	6/16/2022	1	4.2	0.04
INC 211000870	Woodcroft	2022	August	8/15/2022	4	10.3	2.58
INC 18001742	Woodcroft	2022	November	11/26/2022	7450	1102.7	0.19
INC 18001741	Woodcroft	2022	November	11/26/2022	6584	925.3	0.14
INC 114022795	Woodcroft	2023	June	6/22/2023	2	0.1	2.59
INC 114023121	Woodcroft	2023	July	7/1/2023	1	0.1	0.07
INC 114024751	Woodcroft	2023	October	10/20/2023	7	17.9	2.56
INC 113010749	Woodcroft	2025	January	1/31/2025	2372	65.1	0.03

3.0 EDTI DISTRIBUTION PLANNING CRITERIA

3.1 Distribution Circuit Loading Policy

Design Rating and Emergency Rating are two important parameters that EDTI considers for distribution planning purposes.

- During normal operating condition (N-0), the loading on an EDTI distribution circuit shall not exceed the circuit's Design Rating, which corresponds to 2/3 of the circuit's Emergency Rating. For 15 kV 500 mcm distribution feeders, EDTI's Design Rating is 6.5 MVA in summer and 7.5 MVA in winter. For 15 kV 750 mcm distribution feeders, EDTI's Design Rating is 8.5 MVA in summer and 8.7 MVA in winter.

- During emergency operating condition (N-1), the loading on an EDTI distribution circuit shall not exceed the circuit's Normal Rating for duration of more than three days.
- At no time shall the loading on an EDTI distribution circuit exceed the circuit's Emergency Rating. For 15 kV 500 mcm distribution feeders, EDTI's Emergency Rating is 10 MVA in summer and 11.2 MVA in winter. For 15 kV 750 mcm distribution feeders, EDTI's Emergency Rating is 12.8 MVA in summer and 13.2 MVA in winter.

3.1.1 Design Rating

The Design Rating is the maximum acceptable distribution circuit load under normal operating conditions. Loaded to Design Rating, each circuit has the reserve capacity to pick up 50% of the load on any adjacent circuit during contingency situations. In practice, it may not be possible to transfer the entire load from a faulted circuit to two adjacent circuits, due to circuit configurations, infrastructure limitations and load distributions.

3.1.2 Normal Rating

The Normal Rating is the maximum load a cable can be operated at without reducing its service life. Normal daily load cycling, peak loading for 8 hours with the average load throughout the day no more than 75% of the peak ratings, is assumed. If the load criterion is exceeded, the cable may experience thermal degradation and accelerated cable failure. If loaded to a level between the Design Rating and the Normal Rating, it will not be possible to take full advantage of the circuit's load transfer capability to support N-1 contingency conditions.

3.1.3 Emergency Rating

The Emergency Rating is the maximum load that EDTI is capable of operating a circuit under a contingency situation, when load is transferred from an adjacent circuit that has experienced an outage. It is expected that loss of cable life will occur, which is based upon "the assumption that the maximum number of emergency periods will not exceed 3 periods in any 12 consecutive months nor on average of 1 period per year for the life of the cable. The maximum duration of any one period should not exceed 36 hours."[1] If the cable loading exceeds the Emergency Rating, it is expected that the feeder will experience acute thermal degradation resulting in an accelerated cable failure, reducing the asset life of the cable.

3.2 POD Loading Policy

The Firm Capacity of a POD is an important parameter that EDTI DFO considers for distribution planning purposes. EDTI DFO defines a POD's firm capacity as the maximum load that the POD can supply without

overloading any transmission equipment under an N-1 contingency. N-1 contingencies include, but are not limited to, the loss of a single transmission line supply to a POD or the loss of a single transformer at a POD. The thermal capability of terminal equipment at the POD may further restrict the firm N-1 capacity. All PODs are to operate at or below their N-1 firm capacity. EDTI shall increase the N-1 Firm Capacity of a POD in a timely manner if the connected coincident peak load is forecasted to exceed its N-1 Firm Capacity within the 10-year forecast period.

[1] CSA Standard C68.1 Appendix G, note 3

4.0 HISTORICAL AND FORECAST LOAD DEMAND

4.1 Load Forecasting Methodology

EDTI uses a hybrid and multilayered load forecasting methodology that combines economic theory, statistical techniques and end-use methods to forecast electricity peak demands at the system level, POD levels and distribution circuit levels. EDTI DFO has determined that load demand in the Edmonton area is highly sensitive to weather conditions. Furthermore, the DFO found that the majority of load growth can be explained by three parameters: gross domestic product (GDP), population growth and housing starts. EDTI's load forecasting methodology can be summarized as follows:

- Weather normalization – As electricity peak demands in the Edmonton region are sensitive to weather conditions, historical peak load demands - both summer and winter - are separated into two components (weather sensitive load and non-weather sensitive load) using the Jackknife analysis. Non-weather sensitive peak demands have higher correlation with load growth factors in the city of Edmonton and they allow for more accurate regression models. Based on the past twenty years of daily temperature during system peak, EDTI DFO has determined the 90th percentile temperature, provided in the table below. The DFO produces a 90th percentile summer and winter peak forecast at the system and POD levels using the temperatures found in Table 7.

Table 7: 90th percentile temperatures

	Summer	Winter
90^{th} percentile	33.9°C	-32.8°C

- System level load forecasting – Multiple linear regression analysis is deployed to model the system level coincident load based on historical hourly system loading data, historical and forecasted GDP for the Edmonton area, historical and forecasted housing starts, historical and forecasted population growth.

- POD level coincident and non-coincident peaks – EDTI DFO categorizes each POD as residential, mixed/commercial, or industrial depending on the POD's load profile. Residential PODs are the most sensitive to weather conditions whereas industrial PODs are the least sensitive. Depending on the type of the POD, weather sensitivity is adjusted and different predictors are used for the regression analysis. In addition, an area study is performed for each POD to set the upper limit of load growth and historical growth is examined to validate the regression model. Lastly, any anticipated load transfers and special loads are included. Coincident peaks are computed from the POD non-coincident peaks using coincidence factors derived from historical data.

- The winter/summer power factor recorded at each of the PODs in 2024 is used as the winter/summer forecast for years 2025 to 2034.

4.2 Load Growth Drivers

Load growth within the Woodcroft service area is driven by several factors, including but not limited to:

- Redevelopment of the former City Centre Airport lands. A total of 576 acres of land is set to be redeveloped as a new mixed-use community in Central Edmonton known as Blatchford. The first new residential homes were completed in 2020 and the community is expected to be fully built out by 2045. The vision for the new community is shown in Figure 4 below. Load growth in the community is currently being accommodated by Woodcroft circuits W6 and W14. As development of the community continues load will be accommodated by Victoria circuits V38 and V22.

Figure 4: Blatchford Neighborhood Development Vision

- Development of the new Valley Line West LRT along Stony Plain Road. Construction of the new LRT line itself will require the connection of two new traction power substations (TPSS) within Woodcroft service area, each TPSS adding approximately 1 MVA of load in 2026. Additionally, development of the new LRT line is expected to drive high-density mixed-use developments along the LRT corridor in accordance with City of Edmonton planning policy. These developments are expected to be large and discrete in nature, and are not included in current load forecast unless an application for service has been received, which occurs when a project reaches the execution stage. One such high-density development has already been completed.
- Throughout the territory supplied by Woodcroft, it is becoming increasingly common for homes in mature neighborhoods to be demolished, their lots subdivided, and are redeveloped as two new

homes. This infill is increasing the load density within the Woodcroft POD service area. The City of Edmonton has indicated its desire to further incentivize these types of redevelopments through policy.

- In the future, electrification of transportation is expected to be a large source of load growth within the Woodcroft POD service area. Woodcroft POD has been identified by EDTI as a POD with high electric vehicle load growth potential due to the number of industrial or commercial customers with fleets located within the service area. Potential load growth from such developments has not been included in the load forecasts provided in this DDR due to a lack of maturity in data.

4.3 Load Forecasting Results

Non-coincident peak load demand for the past five years and the next 10 years is provided in Table 8 and Table 9 for the summer and winter season, respectively. POD peak load data, including apparent power [MVA] and power factor [pf], is provided for Woodcroft, Castle Downs, Namao, Jasper, Meadowlark, Rossdale, and Victoria PODs. The 5-year historical POD transformer loading data – in MVA - is provided for the Woodcroft POD transformers. Circuit peak load data - in MVA - is provided for 15 kV distribution circuits in Woodcroft service area and for circuits supplied by adjacent PODs with direct distribution ties to Woodcroft POD. Given that the deficiency arises late in the 10-year forecast period, the 25-year long term load forecast for Woodcroft POD has been included in Table 10. Highlighted in red in these tables are violations of either EDTI DFO's feeder loading policy or POD loading policy, discussed in section 3.0.

Table 8: Summer Non-Coincident Peak Load Demand

				Historic and Forecast Load - Summer Peak														
				LOADING - RECORDED						FORECAST LOAD								
			W	[2020]	[2021]	[2022]	[2023]	[2024]		[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]
SUB		CAPACITY[1]	or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	POD/Tx/Feeder	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Woodcroft	POD	76.0	S	58.2	73.6	66.6	65.0	74.2	93.0%	66.2	69.3	70.7	71.4	72.4	73.6	74.5	76.3	77.7
	T1	40.0	S	21.9	34.8	29.2	28.8	30.6	-	EDTI does not forecast at the POD transformer level.								
	W1	8.5	S	5.4	9.2	8.0	7.5	7.8	-	7.2	7.3	7.4	7.4	7.5	7.6	7.7	7.9	8.1
	W2	6.5	S	3.7	3.9	3.8	3.8	3.8	-	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9
	W3	NIS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W4	8.5	S	6.4	7.3	6.8	6.8	7.4	-	7.5	8.8	8.8	8.8	8.9	9.0	9.1	9.2	9.4
	W5	6.5	S	5.6	7.6	4.3	4.4	4.6	-	5.2	5.4	5.7	5.9	6.2	6.6	7.1	7.7	8.2
	W6	6.5	S	0.8	6.8	6.2	6.3	7.0	-	6.4	7.0	7.5	7.5	7.6	7.7	7.8	7.9	8.1
	T2	40.0	S	22.3	22.4	23.6	26.4	26.7	-	EDTI does not forecast at the POD transformer level.								
	W7	6.5	S	1.7	2.7	2.6	2.4	2.3	-	2.3	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.1
	W8	8.5	S	5.6	5.9	5.2	6.0	6.1	-	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
	W9	NIS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W10	8.5	S	6.1	5.7	5.8	7.7	7.8	-	7.3	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4
	W11	8.5	S	5.7	6.0	5.9	6.1	6.1	-	6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.4
	W12	8.5	S	3.2	2.2	4.1	4.1	4.4	-	4.3	4.8	4.9	5.0	5.2	5.4	5.7	6.1	6.4
	T3	40.0	S	17.4	20.8	19.3	18.6	19.3	-	EDTI does not forecast at the POD transformer level.								
	W13	NIS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W14	6.5	S	5.4	4.2	3.8	3.9	4.1	-	3.8	3.9	3.9	4.0	3.9	4.0	4.1	4.3	4.4
	W15	8.5	S	4.8	4.9	4.6	4.5	4.5	-	4.6	4.6	4.7	4.7	4.8	4.8	4.8	4.9	4.9
	W16	6.5	S	3.4	7.9	7.1	6.4	6.7	-	6.0	6.1	6.1	6.2	6.3	6.4	6.6	6.8	7.1
	W17	6.5	S	3.7	3.8	3.8	3.8	3.9	-	3.8	3.8	3.9	3.9	4.0	4.0	4.0	4.1	4.2
	W18	NIS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Castle Downs	POD	100.0	S	99.2	114.9	101.1	97.7	114.7	98.0%	101.1	102.9	106.0	109.7	111.9	114.8	116.4	120.0	123.9
	CD12	8.5	S	6.2	4.0	3.7	4.5	5.6	-	7.8	8.0	8.9	9.7	10.0	10.4	10.9	11.4	12.0
	CD73	8.5	S	8.2	6.8	5.9	6.2	6.4	-	5.7	5.8	5.9	6.1	6.4	6.7	7.1	7.5	8.0
Namao	POD	68.7	S	56.3	57.4	58.4	59.4	65.1	96.0%	59.6	61.4	62.0	63.2	64.3	65.7	67.0	68.6	70.2
	N5	6.5	S	4.9	5.5	4.8	4.3	5.0	-	4.6	4.7	4.8	4.9	5.0	5.2	5.4	5.6	5.9
	N14	8.5	S	7.5	8.2	7.7	7.2	8.7	-	7.9	8.0	8.0	8.2	8.3	8.5	8.8	9.0	9.4
Jasper	POD	148.6	S	126.3	138.4	129.5	119.5	130.8	94.0%	126.9	129.8	131.0	131.6	132.3	133.1	133.9	134.9	135.9
	J12	8.5	S	6.3	6.1	5.8	5.9	6.1	-	6.3	6.4	6.4	6.5	6.5	6.6	6.8	6.9	7.1
	J22	8.5	S	5.9	6.6	6.0	5.5	6.6	-	6.7	7.8	7.9	8.0	8.1	8.2	8.3	8.5	8.7
	J51	8.5	S	8.0	7.7	8.2	8.1	7.7	-	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8
Meadowlark	POD	77.5	S	49.9	57.4	57.9	57.8	67.0	98.0%	62.3	64.4	66.7	68.8	71.4	73.3	75.5	79.1	83.3
	M18	6.5	S	3.8	4.5	4.1	4.4	4.6	-	4.9	5.1	5.4	5.7	6.1	6.6	7.2	8.0	8.7
Rossdale	POD	183	S	129.5	138.1	127.7	123.4	132.4	94.0%	126.7	129.6	132.9	134.9	136.9	139.3	141.4	143.1	145.3
	R26	8.5	S	6.1	7.2	7.5	7.0	8.2	-	7.8	8.8	10.0	10.2	10.5	10.9	11.3	11.8	12.4
Victoria	POD	180.0	S	123.1	127.7	123.2	124.8	132.0	94.0%	135.6	139.9	143.4	147.7	151.5	155.5	159.8	164.3	168.7
	V38	8.5	S	6.0	2.2	3.9	4.2	4.7	-	4.2	4.2	4.2	4.3	4.4	4.4	4.4	4.5	4.6
	V47	6.5	S	5.5	6.7	4.6	5.6	6.3	-	7.3	7.4	7.4	7.5	7.5	7.6	7.7	7.9	8.1

1. N-1 Firm Capacity for PODs, Transformer Capacity (seasonally dependent), and Design Capacity for Circuits

Table 9: Winter Non-Coincident Peak Demand

							Historic and Forecast Load - Winter Peak										
				LOADING - RECORDED						FORECAST LOAD							
			W	[2020]	[2021]	[2022]	[2023]	[2024]		[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]
SUB		CAPACITY[1]	or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	POD/Tx/Feeder	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Woodcroft	POD	89.0	W	60.2	63.4	62.2	62.2	60.0	95.0%	61.6	65.1	66.3	67.3	68.4	69.6	71.2	73.2	74.3
	T1	47.5	W	22.0	31.7	27.2	28.2	26.3		EDTI does not forecast at the POD transformer level.								
	W1	8.7	W	5.0	6.5	6.7	6.6	6.1	-	6.3	6.4	6.5	6.5	6.6	6.7	6.9	7.2	7.3
	W2	7.5	W	3.6	3.6	3.5	3.5	3.3	-	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4
	W3	NIS	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W4	7.5	W	7.2	7.3	6.5	5.3	6.9	-	7.5	8.8	8.8	8.9	8.9	9.0	9.2	9.4	9.5
	W5	7.5	W	5.6	8.7	5.0	6.8	4.5	-	5.2	5.5	5.7	6.1	6.5	7.0	7.6	8.2	8.9
	W6	7.5	W	0.7	5.5	5.5	6.0	5.5	-	5.9	6.3	6.9	7.0	7.1	7.1	7.2	7.4	7.5
	T2	47.5	W	21.4	21.0	23.9	24.9	23.7	-	EDTI does not forecast at the POD transformer level.								
	W7	7.5	W	2.0	2.1	2.0	2.0	2.1	-	2.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	W8	8.7	W	5.2	4.8	5.9	5.9	5.7	-	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
	W9	NIS	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W10	8.7	W	5.9	5.7	6.2	7.1	6.7	-	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8
	W11	8.7	W	5.3	5.1	5.3	5.5	5.1	-	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.3	5.3
	W12	8.7	W	2.9	3.3	4.5	4.4	4.1	-	4.3	4.8	4.9	5.1	5.3	5.6	6.0	6.4	6.8
	T3	47.5	W	18.3	18.0	18.2	17.9	16.5	-	EDTI does not forecast at the POD transformer level.								
	W13	NIS	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W14	7.5	W	5.7	3.4	3.9	3.8	3.6	-	3.8	3.8	3.9	3.9	3.9	4.0	4.1	4.3	4.4
	W15	8.7	W	4.9	4.4	4.5	4.5	4.2	-	4.3	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.8
	W16	7.5	W	3.9	6.5	6.4	6.3	5.5	-	5.7	5.8	5.9	5.9	6.1	6.3	6.5	6.8	7.0
	W17	7.5	W	3.7	3.6	3.4	3.3	3.1	-	3.2	3.2	3.3	3.4	3.4	3.4	3.4	3.6	3.6
	W18	NIS	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Castle Downs	POD	100.0	W	100.4	99.5	97.1	100.1	92.6	99.0%	99.6	101.0	105.1	109.3	112.3	114.6	117.7	121.5	125.2
	CD12	8.7	W	6.1	4.2	4.2	5.6	7.2	-	8.1	8.3	9.2	10.1	10.4	10.9	11.5	12.1	12.8
	CD73	8.7	W	9.0	5.9	5.5	5.6	4.9	-	5.2	5.3	5.5	5.7	6.0	6.4	6.9	7.4	8.0
Namao	POD	83.6	W	57.7	57.7	59.0	59.1	61.3	98.0%	60.4	62.3	63.2	64.4	65.6	67.0	68.6	70.6	72.0
	N5	7.5	W	4.7	5.4	5.8	5.0	4.8	-	5.0	5.1	5.2	5.3	5.4	5.6	5.9	6.1	6.4
	N14	8.7	W	7.0	6.6	7.2	6.9	6.7	-	6.9	7.0	7.1	7.2	7.4	7.7	8.0	8.3	8.7
Jasper	POD	148.6	W	108.7	108.0	109.8	106.8	98.7	96.0%	103.3	106.2	107.5	108.1	108.8	109.6	110.7	111.7	112.9
	J12	8.7	W	6.0	6.0	6.1	6.1	5.4	-	5.5	5.6	5.7	5.8	5.8	5.9	6.1	6.3	6.5
	J22	8.7	W	6.3	6.4	6.5	6.5	5.9	-	6.1	7.1	7.2	7.3	7.4	7.5	7.7	7.8	8.0
	J51	8.7	W	6.8	6.9	6.7	6.9	6.4	-	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Meadowlark	POD	92	W	54.5	54.4	57.0	62.4	62.07	99.0%	67.7	70.7	71.9	76.2	79.2	82.3	84.4	88.6	92.3
	M18	7.5	W	4.5	4.6	4.6	4.7	4.3	-	4.6	4.9	5.2	5.6	6.0	6.7	7.5	8.3	9.3
Rossdale	POD	220.3	W	109.7	112.9	111.2	116.4	106.8	97.0%	106.6	109.5	113.3	115.2	117.8	120.3	123.0	124.7	126.3
	R26	8.7	W	6.0	6.6	7.2	7.1	6.6	-	7.1	8.1	9.2	9.7	10.0	10.5	11.0	11.5	12.3
Victoria	POD	196.0	W	97.9	93.1	102.2	101.0	99.26	96.0%	103.1	106.8	109.6	113.1	116.2	119.4	123.0	126.8	130.3
	V38	8.7	W	5.3	1.9	4.4	4.2	3.9	-	3.4	3.4	3.5	3.5	3.6	3.6	3.6	3.7	3.8
	V47	7.5	W	4.7	4.8	4.9	4.5	4.2	-	5.3	5.3	5.4	5.5	5.5	5.6	5.8	6.0	6.1

1. N-1 Firm Capacity for PODs, Transformer Capacity (seasonally dependent), and Design Capacity for Circuits

Table 10: Woodcroft POD 25-Year Long Term Load Forecast

			25 YEAR FORECAST LOAD																								
		W	[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]	[2034]	[2035]	[2036]	[2037]	[2038]	[2039]	[2040]	[2041]	[2042]	[2043]	[2044]	[2045]	[2046]	[2047]	[2048]	[2049]
SUB	CAPACITY[1]	or	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	MVA	S	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Woodcroft	76.0	S	66.2	69.3	70.7	71.4	72.4	73.6	74.5	76.3	77.7	78.9	79.9	80.4	81.3	82.0	82.8	83.9	85.2	85.5	86.2	87.5	88.0	88.4	88.8	89.0	89.3
	89.0	W	61.6	65.1	66.3	67.3	68.4	69.6	71.2	73.2	74.3	75.7	76.9	78.5	79.4	79.8	80.2	81.4	83.6	84.6	85.6	85.2	85.76	86.2	87.8	88.1	88.6

1. N-1 Firm Capacity

4.4 Woodcroft POD Summary

Fourteen out of eighteen 15 kV feeder breakers at Woodcroft POD have distribution feeders connected to them. As shown in Table 8 and Table 10, by summer 2032, the demand at Woodcroft POD is forecasted to exceed the POD's N-1 transformer capability for the first time. There are no issues observed during the winter peak period at Woodcroft POD.

5.0 DEFICIENCY ASSESSMENT

This section focuses on evaluating the deficiencies in supply of distribution load for the Woodcroft service area. As per EDTI DFO's POD loading policy (section 3.2), the transmission N-1 firm capacity is defined as the maximum load that the POD can supply without overloading any transmission equipment under an N-1 emergency operating condition.

The term "Unsupplied Load" refers to any distribution load that is predicted to be unserved under POD N-1 emergency conditions, due to the distribution load exceeding the remaining available transmission capacity at Woodcroft POD, and due to the distribution load exceeding the available circuit tie capacity from adjacent PODs[2].

5.1 Woodcroft POD Contingency Load Table

Table 11 presents the contingency load table for the forecast deficiency during summer peak periods at Woodcroft POD. The deficiency of concern is the loss of one of the three POD transformers at Woodcroft POD. Violations of EDTI DFO's POD loading policy are highlighted in yellow. "Unsupplied Load" is highlighted in red. The values below in Table 11, which show the existing available load contingency, will not change based on the status of AESO project P2543.

Table 11: 2024-2034 Summer Load Contingency Table at Woodcroft POD

					Contingency Load Table - Summer Peak										
				[2024]		[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]	[2034]
				Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
				MVA		MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
T1 or T2 or T3 Contingency at Woodcroft		Woodcroft Total Load		74.2		66.2	69.3	70.7	71.4	72.4	73.6	74.5	76.3	77.7	78.9
		N-1 Capacity		76.0		76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0
		Back up from Castle Downs		0.0		6.0	6.0	3.5	3.5	3.5	3.5	0.0	0.0	0.0	0.0
		Back up from Namao[1]		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Back up from Jasper		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Back up from Meadowlark		1.9		1.6	1.4	1.1	0.8	0.4	0.0	0.0	0.0	0.0	0.0
		Back up from Victoria		5.4		5.1	4.9	1.1	0.8	0.4	0.0	0.0	0.0	0.0	0.0
		Back up from Rossdale		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total Unsupplied Load		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7	2.9
1. Namao back up capacity assumes P7078 completion by 2030 year end.															

Back-up capacity from circuits supplied by adjacent PODs is not forecast to be available from 2031 onwards due to load growth and load additions concentrated in geographical areas that make it so the distribution ties cannot be used without exceeding their capacity limitations. Distribution circuit tie capacity is dependent on

[2] Available circuit capacity is determined with consideration to the length of outages observed for transmission elements and with consideration to technical limitations required to safely and reliably operate EDTIs distribution system.

switching points, distribution asset capacities, and circuit topology i.e. where / how load is actually connected and distributed along the circuit. The specific limitations of each distribution tie are provided in section 6.1 Alternative I – Distribution Switching.

For the purposes of evaluating/developing alternatives, EDTI has also provided the longer term forecast summer load contingency table at Woodcroft POD for the years 2035 to 2049 in Table 12 below. Violations of EDTI DFO's POD loading policy are highlighted in yellow. "Unsupplied Load" is highlighted in red.

Table 12: 2035 – 2049 Summer Load Contingency Table at Woodcroft POD

		CONTINGENCY LOAD TABLE - SUMMER PEAK - 2035-2049														
		[2035]	[2036]	[2037]	[2038]	[2039]	[2040]	[2041]	[2042]	[2043]	[2044]	[2045]	[2046]	[2047]	[2048]	[2049]
		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
T1 or T2 or T3	Woodcroft Total Load	79.9	80.4	81.3	82.0	82.8	83.9	85.2	85.5	86.2	87.5	88.0	88.4	88.8	89.0	89.3
Contingency	N-1 Capacity	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0
at Woodcroft	Backup from adjacent PODs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total Unsupplied Load	**3.8**	**4.4**	**5.3**	**6.0**	**6.8**	**7.9**	**9.2**	**9.5**	**10.2**	**11.5**	**12.0**	**12.4**	**12.8**	**13.0**	**13.3**

As can be seen from Table 11 and Table 12 above, the deficiency starts in 2032 with a 0.3 MVA shortfall and increases to 13.3 MVA by 2049.

5.2 Woodcroft POD Load Trend Graphs

EDTI does not currently forecast load profiles for future years at the hourly level. EDTI is currently unable to provide a meaningful load trend graph in the year of the forecast deficiency, 2032.

5.3 Restoration Plans

In the immediate aftermath of an N-1 transformer contingency, the remaining two transformers would take on the total substation demand and system operators would monitor the remaining two transformers loading. If either of the two remaining transformers exceeded 40 MVA in loading, operators would transfer load away from the POD to the extent possible available using distribution circuit ties, and if necessary shed load. For contingencies lasting longer than 36 hours (such as most POD transformer related outages), EDTI is unable to utilize its distribution circuit ties during peak operating conditions without damaging cable assets or otherwise compromising distribution system reliability.

EDTI TFO does not utilize or own a mobile substation. Restoration of a failed transformer would depend on the nature of the failure and parts availability – the repair timeline could extend from hours to days or weeks. EDTI does not have any spare 72 / 15 kV transformers. In the case a transformer replacement is required the transformer would be out-of-service for a period longer than 6 months. For a Transmission outage of this length, EDTI will only load Distribution circuits to their design rating, which is the normal operating condition of the Distribution system. A circuit loaded between the Design Load Rating and the Normal Peak Load Rating

will constrain the Operators ability to transfer load during a planned or unplanned N-1 Distribution contingency event. Distribution infrastructure is significantly more exposed to environmental factors that can result in outages; for example: motor vehicles colliding with transformers or poles, animal contacts, lightning strikes, etc. are all relatively common events on the distribution system of an urban utility as compared to the transmission system.

5.4 Unsupplied Loads

Any unsupplied load would predominantly consist of residential customers, however, depending on the magnitude of Woodcroft POD overload, and the specific portion of circuits de-energized to reduce loading, other customers supplied by the same distribution circuit could be impacted. EDTI prioritizes customer loads in criticality as identified in Table 12 below.

Table 13: EDTI Woodcroft POD Customer Criticality

Criticality	Description	Unsupplied During Contingency	On-Site Backup Generation
1	EDTI Critical Loads – Woodcroft POD station service	No	No
2	Public Safety (Hospitals, EMS HQ, Police HQ, 911 HQ dispatch centers, water facilities)	No	Typically. Details unknown
3	Law and Order (Fire, Police, EMS stations, Government Emergency Operation Facilities)	No	Unknown
4	Downtown Network & LRT	n/a	n/a
5	Community Interest (Schools, Community Centers, Senior Centers)	Potentially	Unknown
6	Gathering Places (Malls, Multipurpose Indoor Arenas, Convention Centres)	Potentially	Unknown
7	Commercial or Special Request (Residential with Medical Devices)	Potentially	Unknown
8	Residential High Rise (Residential High Rise with water pumps)	Potentially	Typically. Details unknown
9	Residential and all other Non-Critical	Likely	Not Typically. Details unknown

6.0 IDENTIFIED ALTERNATIVES

The deficiency assessment in section 5 has demonstrated a POD N-1 deficiency will emerge in 2032 given load growth in the Woodcroft POD service Area. The deficiency is forecast to increase to 13.3 MVA by 2049. To alleviate transmission deficiency when it is forecast to occur, the following solution alternatives were explored:

Distribution Alternatives

6.1 Alternative I – Distribution Switching

This alternative leverages the existing distribution circuit ties shown in Section 2.2 to explore the possibility of distribution load transfers from Woodcroft to adjacent PODs to resolve the issue. EDTI has determined this is not technically viable. Limitations on utilizing adjacent distribution capacity to resolve the deficiency are summarized in Table 14 below.

Table 14: Adjacent Distribution Circuit Limitations

Adjacent Circuit	Limitation / Issue
CD73	Circuit CD73 cannot be utilized to offload W1 beginning in 2024 without exceeding circuit CD73 design capacity due to load growth on both W1 and CD73 north of 153 Avenue and west of 127 Street.
CD12	Circuit CD12 cannot be utilized to offload W16 beginning in 2028 without exceeding circuit CD12 design capacity due to load growth on CD12 along 137 Avenue.
N5	Circuit N5 cannot be utilized to offload W16 or W14 without exceeding circuit N5 design capacity due to the topology of circuits W14 and W16 which make sectionalization of load on the circuits to the degree required not feasible.
N14	Circuit N14 cannot be utilized to offload W16 as it has no remaining design capacity.
J12	Circuit J12 cannot be utilized to offload W2 without exceeding circuit J12 design capacity due to the topology of circuit W2 which makes sectionalization of load on the circuit to the degree required not feasible.
J22	Circuit J22 cannot be utilized to offload W5 without exceeding circuit J22 design capacity due to the topology of circuit W5 which makes

Adjacent Circuit	Limitation / Issue
	sectionalization of load on the circuit to the degree required not feasible. This is further exacerbated by connection of a TPSS to W5 in 2026.
J51	Circuit J51 cannot be utilized to offload W11 without exceeding circuit J51 design capacity due to the topology of circuit W11 and not enough design capacity remaining on circuit J51.
M18	Circuit M18 cannot be utilized to offload W5 beginning in 2026 without exceeding circuit M18 design capacity due to the connection of a new TPSS on a section of W5 that would also need to be transferred to M18.
V38	Circuit V38 cannot be utilized to offload W6 without exceeding circuit V38 design capacity beginning in 2024 due to a reconfiguration being performed to accommodate a new TPSS connection and future load growth / customer connections in Blatchford.
V47	Circuit V47 cannot be utilized to offload W6 as it has negligible remaining design capacity.
R26	Circuit R26 cannot be utilized to offload W12 due to circuit topography of R26 and W12 (providing main and alternate feeds to a large customer) and plans for the circuit that require its use to resolve separate distribution loading issues that exist in the Rossdale Service Area.

Alternative I is not considered technically viable to resolve the issue in 2032 or in the years following. EDTI requires new transmission capacity and / or transmission investment to connect new distribution circuits to resolve the issue, and particularly over the longer term as shown in Table 12 of Section 5.0.

Transmission Alternatives

6.2 Alternative II – POD Transformer Size Increase at LCR

This alternative consists of expanding the capacity of Woodcroft POD between 2026 and 2028 by coordinating with the TFO to replace the current 40 MVA 72/15 kV transformers with at-minimum, 50 MVA transformers at the time of their lifecycle replacements. Lifecycle replacements are currently planned for 2026 (T1), 2027 (T2), and 2028 (T3) per EPCOR TFO. There is no distribution work required to implement this solution.

EDTI DFO estimates that Alternative II will add 20 MVA of N-1 POD firm capacity to the Woodcroft POD service area. This alternative addresses the deficiency forecast to begin in 2032 and remains a viable

solution throughout the 25-year forecast period, 2049, and beyond. For context on the longevity of this solution, the expected life of a new POD transformer is 50 years. By the end of the 25-year forecast period, 2049, the first transformer replaced at Woodcroft POD in 2024 will have more than 25-years of life expectancy remaining.

If Alternative II is pursued, the AESO may direct EDTI TFO to prepare a facility application for the requested transmission upgrades. This facility application will include an estimate of the transmission capital cost.

Alternative II is considered technically viable.

6.3 Alternative III – New circuit from Jasper POD and Castle Downs POD

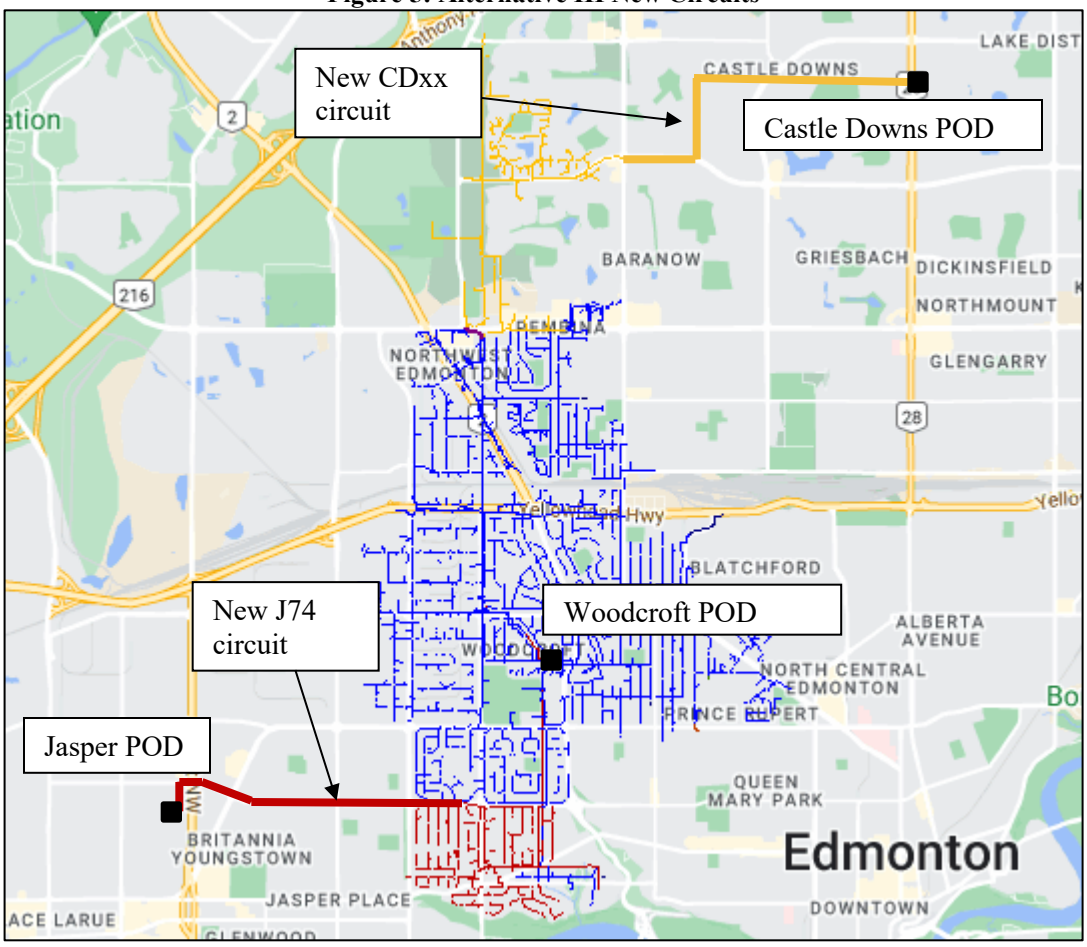
This alternative is predominantly distribution based and consists of building a new circuit from Jasper POD and a new circuit from Castle Downs POD to offload Woodcroft POD following the completion of AESO project P2543 at Castle Downs. P2543 is required to be completed to increase the N-1 Firm Capacity at Castle Downs and install new 15 kV circuit breakers at Castle Downs. This alternative also assumes those circuits will not be required to resolve other distribution issues that may arise between now and their proposed need dates indicated below.

The first new circuit would be required in 2029, while the second new circuit would be required in 2039. The scope of the new circuits required is as follows:

- New circuit J74 from Jasper POD would be constructed in 2032. Using the new circuit, 5.7 MVA of summer peak load from circuit W5 would be transferred from Woodcroft POD to Jasper POD. Approximately 4.3 km of new feeder cable would be required and 1 new switching cubicle.
- New circuit CDxx from Castle Downs POD would be constructed in 2042. Using the new circuit, 5.0 MVA of summer peak load from circuits W16 and W1 would be transferred from Woodcroft POD to Castle Downs POD. Approximately 3.8 km of new feeder cable would be required and 1 new pole with a GI switch.

Preliminary routes for the new circuits required as part of this alternative and the approximate areas that would be transferred from Woodcroft POD are shown in Figure 5 below. Note, this alternative is highly dependent on how loading develops over the next ten years and would be subject to change as required for system needs. This alternative uses the last remaining circuit breaker at Jasper POD limiting distribution solutions for unforeseen issues that may develop in that PODs service area in the future.

Figure 5: Alternative III New Circuits



Alternative III is considered technically viable.

7.0 COST COMPARISON

A summary comparison of costs for the two alternatives considered is shown in Table 15 below. Only the distribution costs associated with each alternative have been estimated. If a transmission alternative is pursued, the AESO may direct EDTI TFO to prepare a facility application for the requested transmission upgrades. This facility application will include an estimate of the transmission capital cost.

Table 15: Distribution Cost Comparison

Alternative	Description	Estimated Costs (+/- 50%, $MM, $2025)
II	**POD Transformer Size Increase at Lifecycle Replacement**	
	Transmission Costs	**TBD**
	Total Costs for Alternative II	**TBD**
III	**New circuit from Jasper POD and Castle Downs POD**	
	Distribution Costs	
	New J74 circuit	**3.2**
	New CDxx circuit	**3.0**
	Transmission Costs	**TBD**
	Total Costs for Alternative III	**TBD**

8.0 PREFERRED ALTERNATIVE

EDTI prefers Alternative II – POD Transformer Size Increase at Lifecycle Replacement. EDTI prefers this alternative for the following reasons:

1. By coordinating with the TFO POD transformer lifecycle replacement project, a relatively small incremental cost is expected to be required considering the magnitude of capacity gains that will be realized (20 MVA). This cost is expected to be less than Alternative III, while also carrying less risk.
2. The life expectancy of the POD transformers to be installed as part of the TFO lifecycle replacement is 50-years. In 2046, approximately half-way through the POD transformers lifecycle for the transformers the TFO is planning to replace in 2024-2026, Woodcroft POD would still be forecast to have 10.1 MVA of remaining POD N-1 Firm Capacity. Without a POD transformer capacity increase, there is significant risk the POD transformers will need to be replaced earlier than otherwise required for lifecycle reasons.
3. As EDTI DFO replaces 500 mcm 15 kV distribution circuit cables for lifecycle replacement reasons, EDTI DFO installs 750 mcm 15 kV cable as standard. New POD transformation capacity at Woodcroft will allow EDTI DFO to effectively make use of this incremental capacity. Without an increase in POD transformation capacity, EDTI DFO will be unable to fully utilize this incremental distribution circuit capacity to support customer loads.
4. Woodcroft POD has four spare 15 kV circuit positions available to be connected to that can be used as necessary, to support forecast load growth, or any other unexpected load increases or connections that may occur at Woodcroft POD. Without a POD transformer capacity increase, EDTI DFO is only able to utilize these spare circuit positions for load transfers or connections with no net load change at Woodcroft POD.

Pending the completion of transmission-related assessment and associated costs, EDTI would use the following implementation strategy of the preferred alternative to address the identified deficiencies.

8.1 Woodcroft POD N-1 Firm Capacity

Upon completion of the capacity increase of Woodcroft POD, the POD N-1 firm capacity constraint at Woodcroft POD will be eliminated. Woodcroft POD will have sufficient capacity to supply forecasted load growth in Northwest Central Edmonton for the next 25-years. The new POD N-1 firm capacity at Woodcroft POD is estimated to be 100 MVA (pending final project implementation and TFO analysis).

8.2 Distribution Circuits Constraints

As identified in Section 5.0, the deficiency identified violates EDTI's POD N-1 Firm Loading policy during a POD transformer outage and as such Woodcroft POD loading is the primary concern in this DDR. Distribution circuit constraints will be addressed via conventional distribution solutions internal to Woodcroft POD such as

cable upgrades, and circuit reconfiguration optimally timed to address need. The solutions required to address current circuit deficiencies that exist are similar in scope and cost regardless of Alternative II and Alternative III and thus have been omitted from detailed analysis in this DDR.

However, with respect to the two alternatives ability to resolve distribution constraints, the preferred alternative provides Woodcroft POD with the capacity required to enable full use of four spare 15 kV feeder breakers at Woodcroft POD over the next 25 years as required to accommodate load growth at Woodcroft POD and adjacent substations. The following feeder breakers are currently spare and have limited potential to support load growth due to transformer capacity as it stands:

- W3
- W9
- W13
- W18

Furthermore, as EDTI DFO performs lifecycle replacements on existing 500 mcm circuits the feeder cable will be replaced with 750 mcm (EDTI standard) providing for an increased distribution circuit capacity on those circuits. Without additional POD transformation capacity, EDTI DFO will be unable to make use of this incremental capacity.

8.3 Effectiveness of Preferred Alternative II

The effectiveness of the preferred alternative is evident in the following Table 16, whereby the POD N-1 Firm Capacity at Woodcroft has increased to 100 MVA, providing sufficient capacity to accommodate load growth at Woodcroft POD forecast over the 25-year forecast period. There is also forecast to be 10.1 MVA capacity remaining in 2049 to accommodate further load growth as may be required over the full lifetime of the POD transformers, which would be expected to be 25 years or more.

Table 16: Alternative II –25 Year Load Forecast for Impacted PODs after Solution Implementation

			25 YEAR FORECAST LOAD																									
		W	[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]	[2034]	[2035]	[2036]	[2037]	[2038]	[2039]	[2040]	[2041]	[2042]	[2043]	[2044]	[2045]	[2046]	[2047]	[2048]	[2049]
SUB	CAPACITY[1]	or	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	MVA	S	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Woodcroft	100.0	S	66.2	69.3	70.7	71.4	72.4	73.6	74.5	76.3	77.7	78.9	79.9	80.4	81.3	82.0	82.8	83.9	85.2	85.5	86.2	87.5	88.0	88.4	88.8	89.0	89.3
	100.0	W	61.6	65.1	66.3	67.3	68.4	69.6	71.2	73.2	74.3	75.7	76.9	78.5	79.4	79.8	80.2	81.4	83.6	84.6	85.6	85.2	85.8	86.2	87.8	88.1	88.6
1. N-1 Firm Capacity																												

8.4 Effectiveness of Alternative III

The effectiveness of Alternative III is evident in the following Table 17, whereby Woodcroft POD loading has been reduced below the POD N-1 Firm Capacity for the duration of the 25-year forecast period, however both Castle Downs and Jasper PODs loading exceed their POD N-1 Firm Capacities. Jasper POD first exceeds N-1 Firm Capacity during 2041 summer and Castle Downs POD first exceeds N-1 Firm Capacity during 2040 winter. In resolving the identified deficiencies through Alternative III, EDTI has used the last remaining spare circuit position at Jasper POD, limited its ability to make use of 4 spare 15 kV feeder breaker positions at Woodcroft POD, limited its ability to utilize incremental capacity gains that otherwise would be available due to lifecycle replacement of 500 mcm 15 kV circuit cable, and pushed both Jasper POD and Castle Downs POD to first exceeds N-1 Firm Capacity within the 25 year forecast. Alternative III is less flexible in accommodating unexpected developments that may occur over the 25-year forecast period and over the 50-year expected life of the POD transformers being replaced by the TFO. There is significant risk that EDTI DFO might be required to initiate a POD transformer upgrade of the same scope as the preferred Alternative II relatively early into their life expectancy if Alternative III is selected.

Table 17: Alternative III - 25 Year Load Forecast for Impacted PODs after Solution Implementation

			25 YEAR FORECAST LOAD																								
		W	[2025]	[2026]	[2027]	[2028]	[2029]	[2030]	[2031]	[2032]	[2033]	[2034]	[2035]	[2036]	[2037]	[2038]	[2039]	[2040]	[2041]	[2042]	[2043]	[2044]	[2045]	[2046]	[2047]	[2048]	[2049]
SUB	CAPACITY[1]	or	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	MVA	S	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
Woodcroft	80.0	S	66.2	69.3	70.7	71.4	72.4	73.6	74.5	70.6	72.0	73.2	74.2	74.7	75.6	76.3	77.1	78.2	79.5	74.8	75.5	76.8	77.3	77.7	78.1	78.3	78.6
	80.0	W	61.6	65.1	66.3	67.3	68.4	69.6	71.2	67.5	68.6	70.0	71.2	72.8	73.7	74.1	74.5	75.7	77.9	73.9	74.9	74.5	75.1	75.5	77.1	77.4	77.9
Jasper	148.6	S	126.9	129.8	131.0	131.6	132.3	133.1	133.9	140.6	141.6	142.7	143.7	144.5	145.5	146.4	147.2	147.9	148.6	149.2	149.7	150.3	150.8	151.2	151.6	151.7	152.4
	148.6	W	103.3	106.2	107.5	108.1	108.8	109.6	110.7	117.4	118.6	119.8	120.9	122.0	123.0	123.9	124.6	125.0	126.2	126.8	127.4	127.8	128.2	128.6	129.1	129.4	129.3
Castle Downs	167.0[2]	S	101.1	102.9	106.0	109.7	111.9	114.8	116.4	120.0	123.9	128.5	136.0	140.1	144.7	149.7	153.6	159.7	163.6	171.0	174.4	176.2	179.4	181.2	182.9	184.4	184.8
	167.0[2]	W	99.6	101.0	105.1	109.3	112.3	114.6	117.7	121.5	125.2	130.0	138.0	145.2	150.7	155.9	160.7	167.5	171.5	180.5	183.8	186.9	189.3	187.1	192.6	194.3	196.4

1. N-1 Firm Capacity

2. N-1 Firm Capacity at Castle Downs to be determined following outcome of P2543. This alternative depends upon the medium voltage switchgear limitation at Castle Downs being removed to increase that PODs N-1 Firm Capacity.

9.0 CONCLUSION

EDTI DFO has determined that resolving the deficiencies through distribution means only is not technically viable over the 25-year forecast period.

Pending the completion of transmission-related assessment and associated costs, EDTI DFO suggests Alternative II as the preferred alternative to address the identified deficiencies and considerations outlined in this document. EDTI DFO believes that Alternative II, and Alternative III are both technically viable and address the distribution and transmission deficiencies identified in section 5.0. However EDTI anticipates that Alternative III will have a higher total cost due to the length of feeder cable to be installed. Alternative III also provides less value to the system and customers due to its inability to handle deviations in load growth or load connections from what is currently forecast. For example, Alternative III strands four circuit positions at Woodcroft POD (due to the POD transformer capacity constraint), and uses the last remaining spare position at Jasper POD significantly reducing the number of solutions available for localized distribution issues that might arise. Selecting Alternative III is much more likely to result in a scenario where additional transmission investment will be required shortly into the 50-year expected lifecycles of the POD transformers to be replaced by the TFO between 2026-2028, which is possible should growth increase faster than expected due to drivers such as transportation electrification or faster than anticipated infill developments. If additional transmission investment was required it would likely be of the same nature as in the preferred Alternative II, requiring the replacement of transformers relatively early into their lifecycles. Due to the coordination with the TFOs lifecycle replacement plans, Alternative II is expected to be a low cost option that provides a flexible and optimal solution to addressing both foreseeable and unforeseeable developments within the Woodcroft POD service area.

EDTI will not be requesting a change to its DTS contract at Woodcroft POD at this time.

The requested in-services date (ISD) for the proposed development is to align with EPCOR TFO lifecycle replacement plans which had an original planned completion date of December 30, 2027. The TFO has noted an updated ISD date for April 30, 2028, for energization of the final TX3 transformer replacement; to which the DFO agrees.