



Proposal Success Indicators

Modelling Results

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This presentation summarizes the findings from our analysis of proposal success indicators. This deck is intended for the project stakeholders who are already familiar with the proposals data.



Introduction

Project Context

IMAGINE
CREATE
ACHIEVE

a sustainable future

The Assessment & Restoration team (A&R) is looking to identify areas where they can focus their proposal efforts to maximize revenue impact.

Over the past three years, the team has submitted over 700 proposals per year with a success rate slightly above 50%.

With a goal of growing their 2025 pipeline revenue by 12%, the A&R team needs to decide how they will shift their proposal efforts during the year to hit this target.

Rather than indiscriminately increasing proposal submissions, the team can use proposal resources more effectively by prioritizing proposal types focused on.



Project Purpose

The purpose of this project is to identify key areas where proposal success rates are consistently higher or lower than the average.

Machine learning will be used to find trends among the thousands of proposal submitted by A&R over the past five years.

This analysis will identify:

- 1. Proposal types with a higher success rate where the team can focus efforts for increased revenue impact.**
- 2. Proposal types with a lower success rate where current offerings could be made more competitive.**

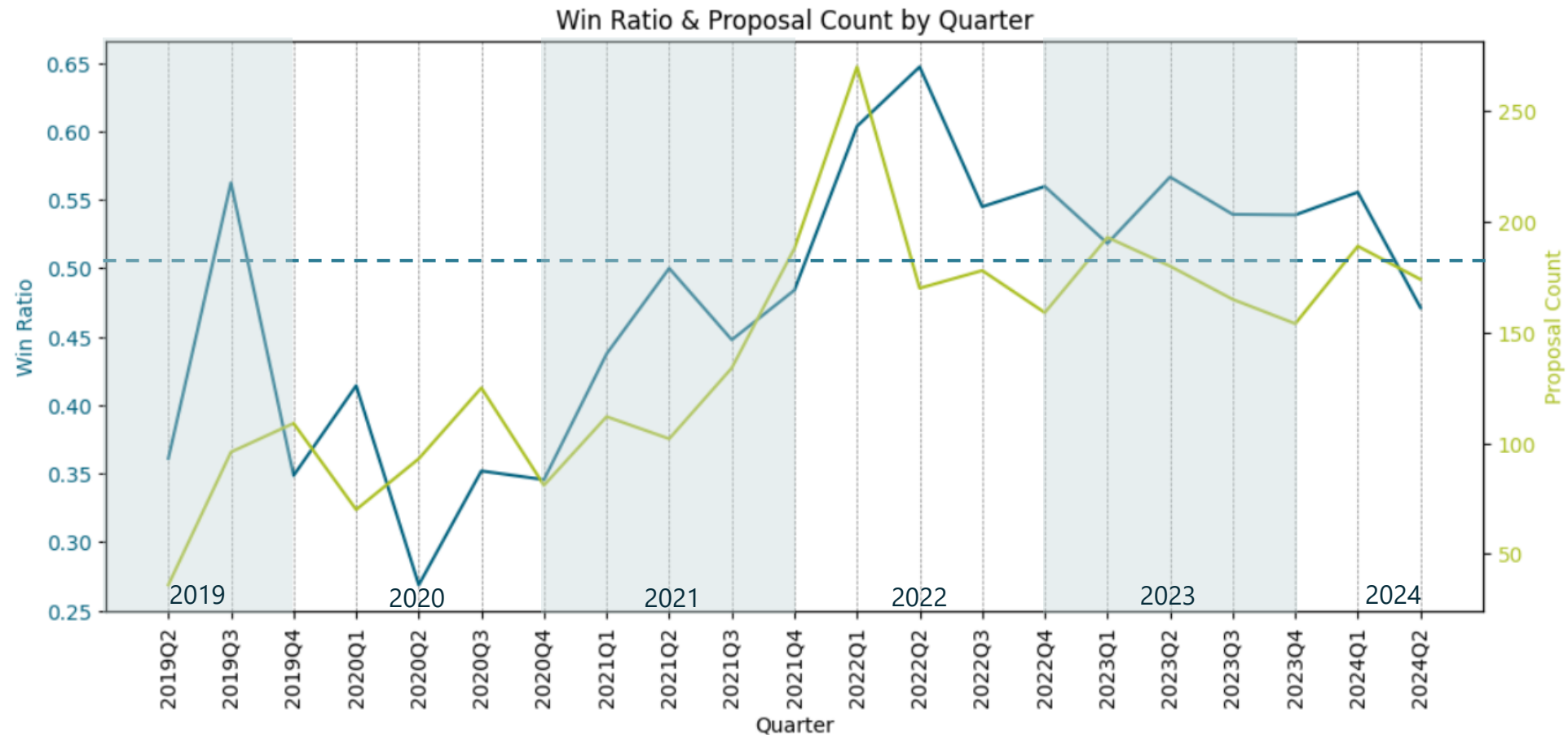


Understanding Proposal Outcome



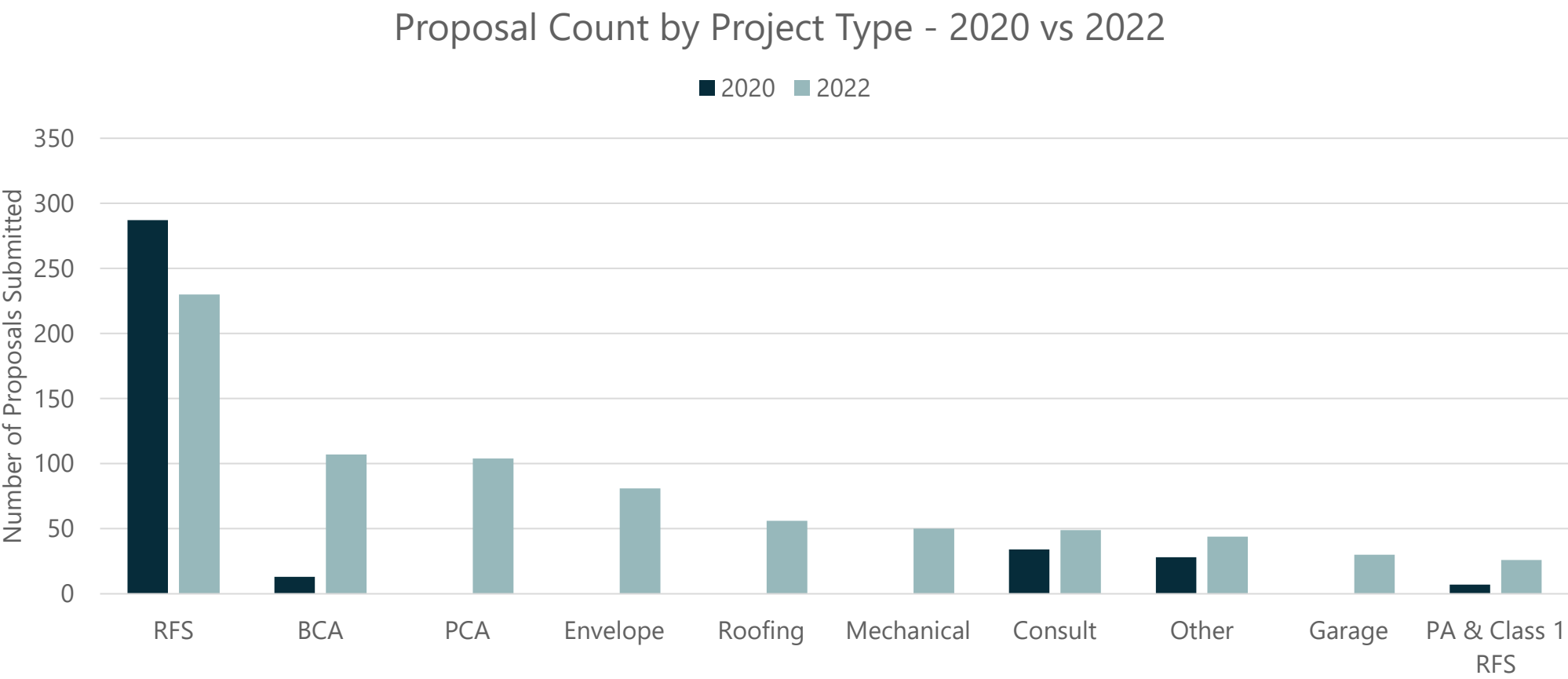
Proposal Outcome Over Time

The overall win ratio for the study period was 50.8%, but that rate has fluctuated over time along with the number of proposals submitted



Increase in Project Types Tied to Outcome Improvement

The increase in win rate corresponds to an increase in the variety of proposal types seen in the data





Modeling Results



The top of the slide features a background image of a complex, repeating geometric pattern, possibly a dome or a modern architectural structure, rendered in shades of blue and grey. A solid yellow horizontal bar is positioned on the left side, partially overlapping the text.

Model Introduction

Due to the process used by the team to record building details for Reserve Fund Study (RFS) proposals, there is significantly more data available for this proposal type.

We also found that model performance was improved when the RFS proposals were removed from the model for the data available across all project types.

Because of this, there will be two sets of data and models:

- **RFS**
- **Non-RFS**

Predicting Proposal Success with Available Data

Data was available on many aspects of the proposals submitted by Egis

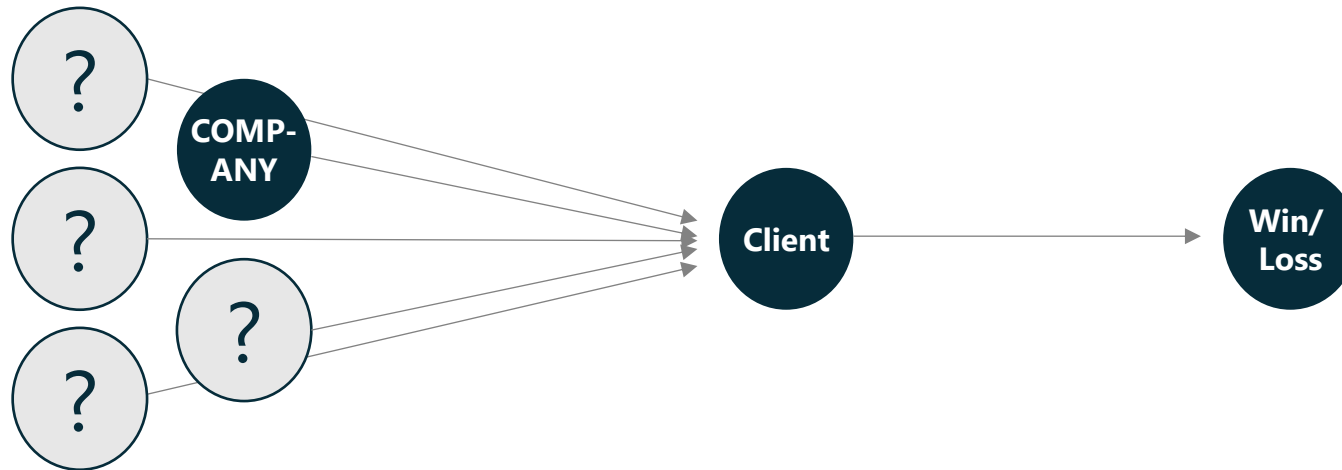
This is what we
are predicting



Availability	Column	Description
All	Outcome	The outcome of the proposal (win/loss)
All	region	Region that the condo corp is registered in
All	sow (scope of work)	The type of work that is proposed (Mechanical vs Class 2 RFS)
All	Project_type	Groupings of the SOW (RFS vs Renovation)
All	fee_probable	The revenue that would be expected if the proposal was successful
All	issued_date	The date that the proposal was submitted to the prospective client
RFS	prev_rfs	Whether Egis conducted the client's previous RFS
RFS	reminder	Whether the proposal is being sent as a reminder (rather than the client reaching out to ask for a proposal)
RFS	building_type	Indicates whether the building is a townhouse, highrise, commercial etc
RFS	building_age	Age of building on the date that the proposal is submitted
RFS	units	Number of units in the building

Predicting Proposal Success with Available Data

Given the price-sensitive nature of the industry and the fact that we don't have information on competitive bids, the results are likely proxies for COMPANY's price competitiveness in different areas



We are predicting proposal outcome only with information on COMPANY's proposal, the prospective client, and the proposal outcome for COMPANY.

Modelling Background

Various modelling approaches were tested for both the RFS and Non-RFS data. In both cases, the Logistic Regression model had the highest accuracy rate

Model Types Tested:

- **Logistic Regression**
- Classification Tree
- Random Forest
- Gradient Boosting
- KNN

Interestingly, Logistic Regression was the highest-performing model in both cases. This model type works like an equation in that it has a set of constant coefficients tied to each significant feature. **This could indicate that the major influences on proposal outcome are generally consistent across proposal types.**

A good comparison is the Gradient Boosting model that was also tested. This results in a series of true/false questions that lead a proposal down a path of branches to a final outcome probability. In this model type, depending on how the branches split, how a Toronto-based proposal is predicted could be different than how a Consult-type project is predicted. This model type did not perform well with the proposal data.

Predicting Non-RFS Proposal Success

We achieved a 73% accuracy rate for predicting the outcome of non-RFS proposals, with the key features of the model being region and fee indicators

Top 10 Predictive Factors for Non-RFS Proposal Success

Size of Impact on Prediction	Direction of Impact	Feature
1.33	Positive	Fee 0 – Less than \$1,700
1.06	Negative	Region – Peel
0.76	Negative	Fee 9 – Greater than \$34,500
0.70	Negative	Region – Toronto
0.66	Positive	Fee 2 – \$2,650 to \$3,190
0.65	Negative	Region – Huronia
0.63	Positive	SOW – PCA
0.61	Positive	Fee 1 – \$1,700 to 2,650
0.51	Positive	Region – Eastern Ontario
0.46	Negative	Region – Greater Horseshoe

- **9 of the 10 most important features to predicting success were region- or fee-based.** This indicates the top factors are consistent for these non-RFS projects regardless of project scope.
- **All three of the lowest price tiers are significant predictors of success.** Anything priced under \$3,190 has a higher chance of succeeding. There is likely less competition for these smaller projects, or fewer companies are willing to price as low.
- **Property Condition Assessments (PCA) outperform the other project types.** It is the only project type that cracked the top 10 and it has a fairly significant impact on outcome.

See Appendix A for a more complete list of factors and impacts

Predicting RFS Proposal Success

We achieved a 68% accuracy rate for predicting the outcome of RFS proposals, with the key features of the model being whether FA&R completed the client's previous RFS and the building's unit count

Top 10 Predictive Factors for RFS Proposal Success

Size of Impact on Prediction	Direction of Impact	Feature
1.85	Positive	Prev_rfs
1.23	Negative	Reminder
0.94	Negative	Units 9 – More than 260
0.86	Negative	Building type – Unknown
0.83	Positive	SOW – Class 3 RFS
0.48	Negative	Units 8 – 144 to 260
0.45	Negative	Units 7 – 91 to 143
0.42	Negative	Region – Toronto
0.41	Negative	Building type – mixed-use
0.35	Negative	Building type - Commercial

- **Whether the A&R group conducted the client's previous RFS is the strongest predictor of proposal success.** An RFS proposal is much more likely to succeed if they conducted the previous study, which is a great reflection on the team's work!
- **RFS proposal success is less likely for buildings with over 90 units**, with all three of the highest Units groupings appearing as top outcome predictors all with a negative impact on win rate.
- **Proposals related to commercial and mixed-use buildings are less likely to be successful.**
- Interestingly, fee does not show up in the top 10

See Appendix A for a more complete list of factors and impacts

Recommendations based on Model Results

- 1 All proposals are at a significant disadvantage in the Toronto region, which is the largest region from a proposal count perspective.**

Recommend revisiting pricing and margins to see if there is room to improve pricing in this region.

- 2 Non-RFS projects with a fee below \$3,190 consistently have a higher success rate, indicating there may be room to increase fees for these projects.**

Recommend evaluating the option of adding a price floor for smaller projects.

- 3 RFS proposals for properties with over 90 units could be made more competitive.**

Recommend reviewing existing pricing procedures and project margins to see if there is room to adjust the RFS pricing model for these larger properties.



Appendix A

Detailed Model Results



Non-RFS Detailed Model Results

We achieved a 73% accuracy rate for predicting the outcome of non-RFS proposals, with the key features of the model being region and fee

Model Results

Feature	Coefficient
fee_0	1.331820
region_PC	-1.064925
fee_9	-0.760525
region_TOR	-0.695438
fee_2	0.657875
region_HUR	-0.647528
sow_PCA	0.628713
fee_1	0.612511
region_EO	0.511225
region_GH	-0.462428
sow_Mechanical	0.442313
region_YR	-0.434569
sow_BCA & RFS	-0.412932
sow_PA & Class 1 RFS	-0.397872
sow_Roofing	0.395804
sow_PPA	0.365678
fee_8	-0.267788
sow_PA1, C1, PA2	-0.232991
fee_3	0.199519
region_Other	0.199151
sow_Structural	0.162790
sow_Other	-0.118409

Fee Bins for Reference

	min	max	count
	fee_probable	fee_probable	fee_probable
equal_fee_binned			
0	175.0	1695.0	141
1	1700.0	2650.0	128
2	2685.0	3190.0	135
3	3195.0	4150.0	135
4	4190.0	5400.0	135
5	5490.0	6750.0	133
6	6790.0	9720.0	134
7	9750.0	15095.0	135
8	15190.0	33975.0	134
9	34500.0	651000.0	135

RFS Detailed Model Results

We achieved a 68% accuracy rate for predicting the outcome of RFS proposals, with the key features of the model being whether FA&R completed the client's previous RFS and the building's unit count

Model Results

Feature	Coefficient
prev_rfs	1.846701
reminder	-1.231590
unit_bin_9.0	-0.937500
building_unknown	-0.859826
sow_Class 3 RFS	0.825727
unit_bin_8.0	-0.479561
unit_bin_7.0	-0.446463
region_TOR	-0.416009
building_mixed_use	-0.414722
building_commercial	0.352745
fee_bin_1.0	-0.334794
building_townhouse	-0.322331
sow_Class 2 RFS	-0.272219
fee_bin_5.0	0.270367
region_HUR	0.263257
unit_bin_3.0	0.201757
fee_bin_9.0	-0.188581
unit_bin_6.0	0.169292
region_YR	-0.162135
fee_bin_7.0	-0.152941
region_PC	-0.135291
sow_Class 1 RFS	-0.124944
region_GH	0.121007

Unit Bins for Reference

	min	max	count
	units	units	units
equal_units_binned			
0.0	1.0	11.0	101
1.0	12.0	18.0	106
2.0	19.0	25.0	95
3.0	26.0	34.0	100
4.0	35.0	45.0	99
5.0	46.0	63.0	101
6.0	64.0	90.0	103
7.0	91.0	143.0	96
8.0	144.0	260.0	100
9.0	261.0	799.0	100

Fee Bins for Reference

	min	max	count
	fee_probable	fee_probable	fee_probable
equal_fee_binned			
0	932.0	1995.0	121
1	2080.0	2295.0	145
2	2300.0	2495.0	106
3	2500.0	2695.0	83
4	2750.0	2995.0	118
5	3000.0	3295.0	105
6	3345.0	3695.0	102
7	3795.0	4195.0	102
8	4295.0	5195.0	112
9	5295.0	11895.0	102



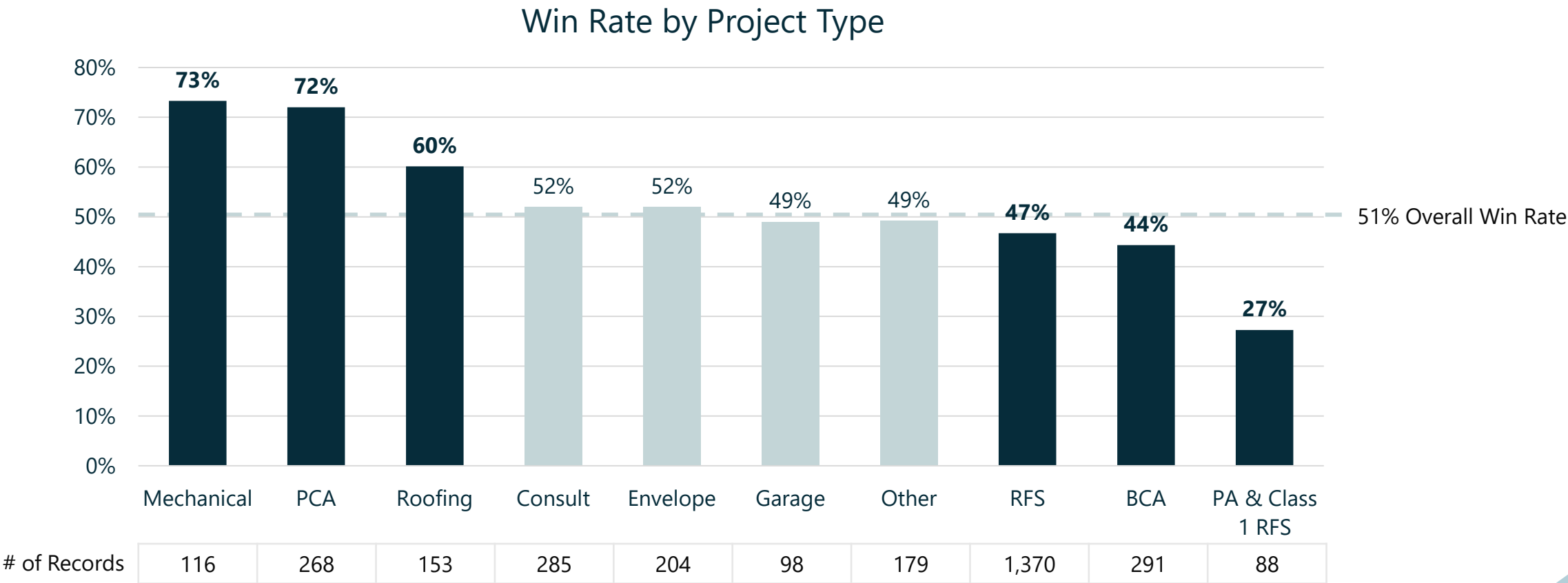
Appendix B

Detailed Exploration of Features (EDA)



Project Type

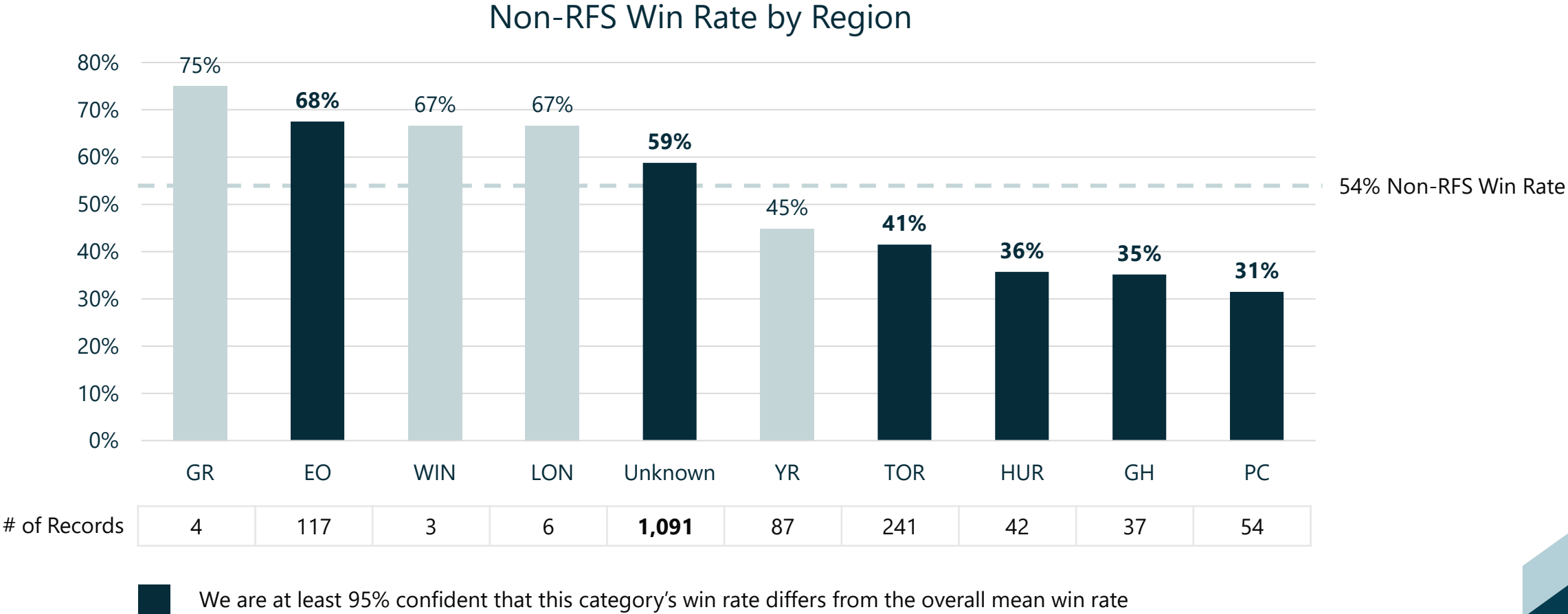
Mechanical, PCA and Roofing projects have higher than average success rates, while RFS and BCA projects are slightly below the average



■ We are at least 95% confident that this category's win rate differs from the overall mean win rate

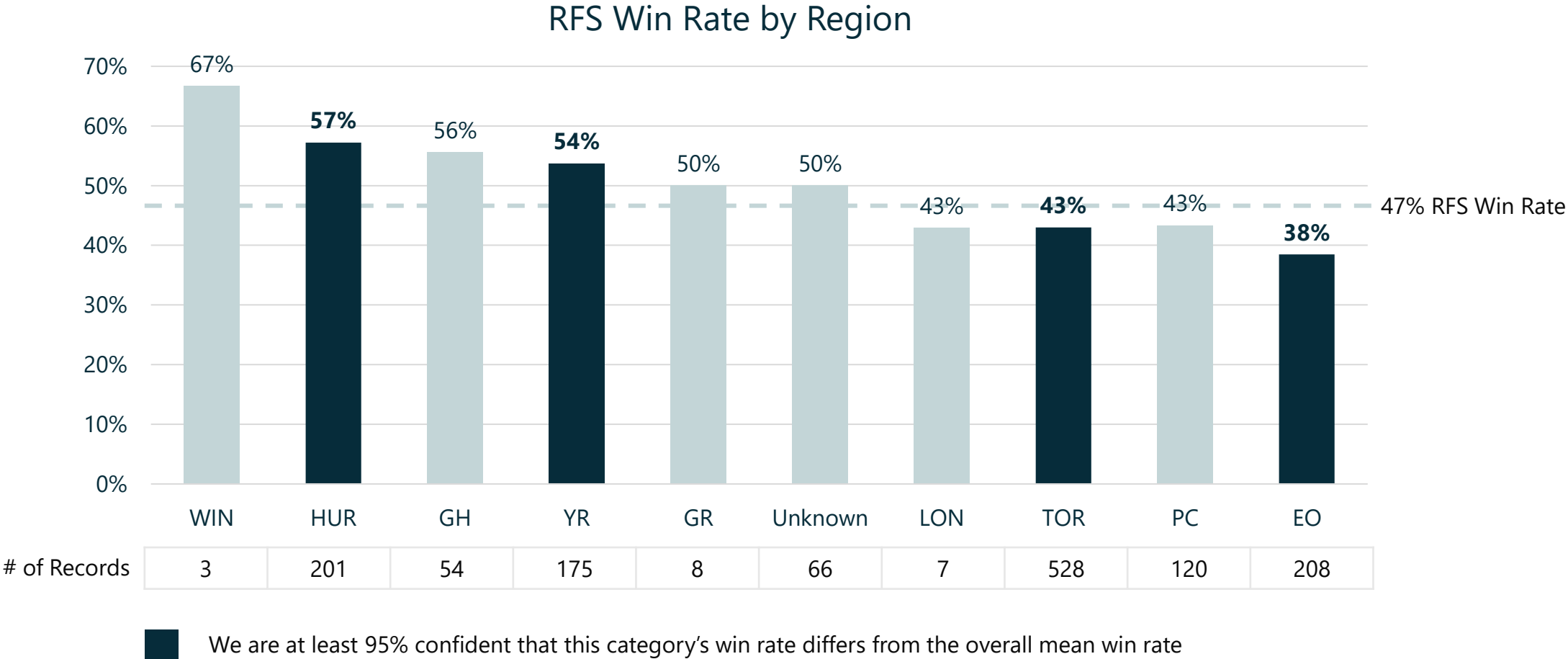
Region – Everything Except RFS

Proposals not for RFS projects are more likely to be successful for condos registered in Eastern Ontario, and less successful in Toronto, Huronia, Golden Horseshoe, and Peel



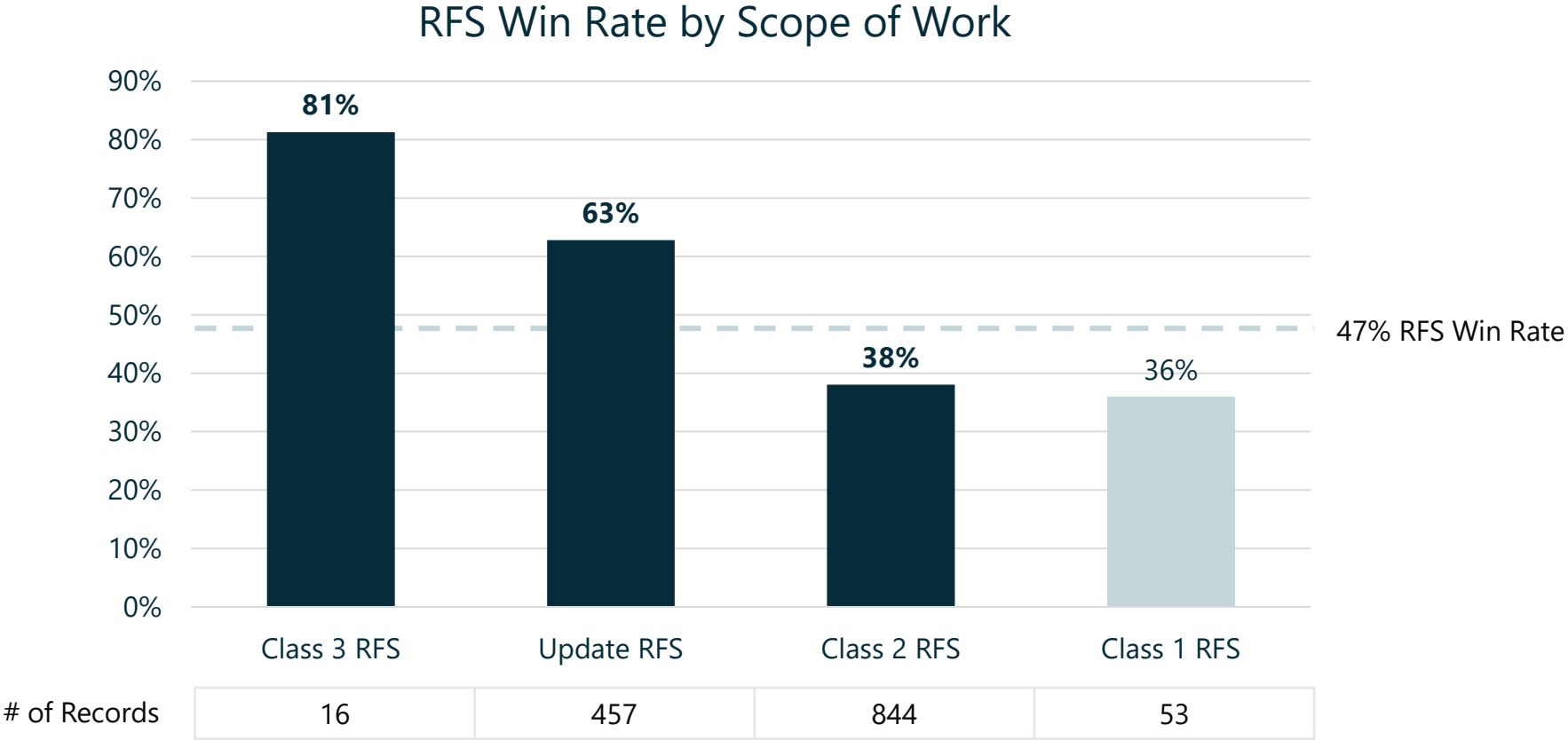
Region – RFS Only

RFS proposals are more likely to be successful for condos registered in York Region and Huronia, and less likely to be successful for those registered in Toronto and Eastern Ontario



Scope of Work – RFS Only

Within Reserve Fund Studies, Update RFS and Class 3 proposals are more likely to be successful, while Class 2 proposals have a significantly lower win rate



■ We are at least 95% confident that this category's win rate differs from the overall mean win rate

Previous RFS & Reminder – RFS Only

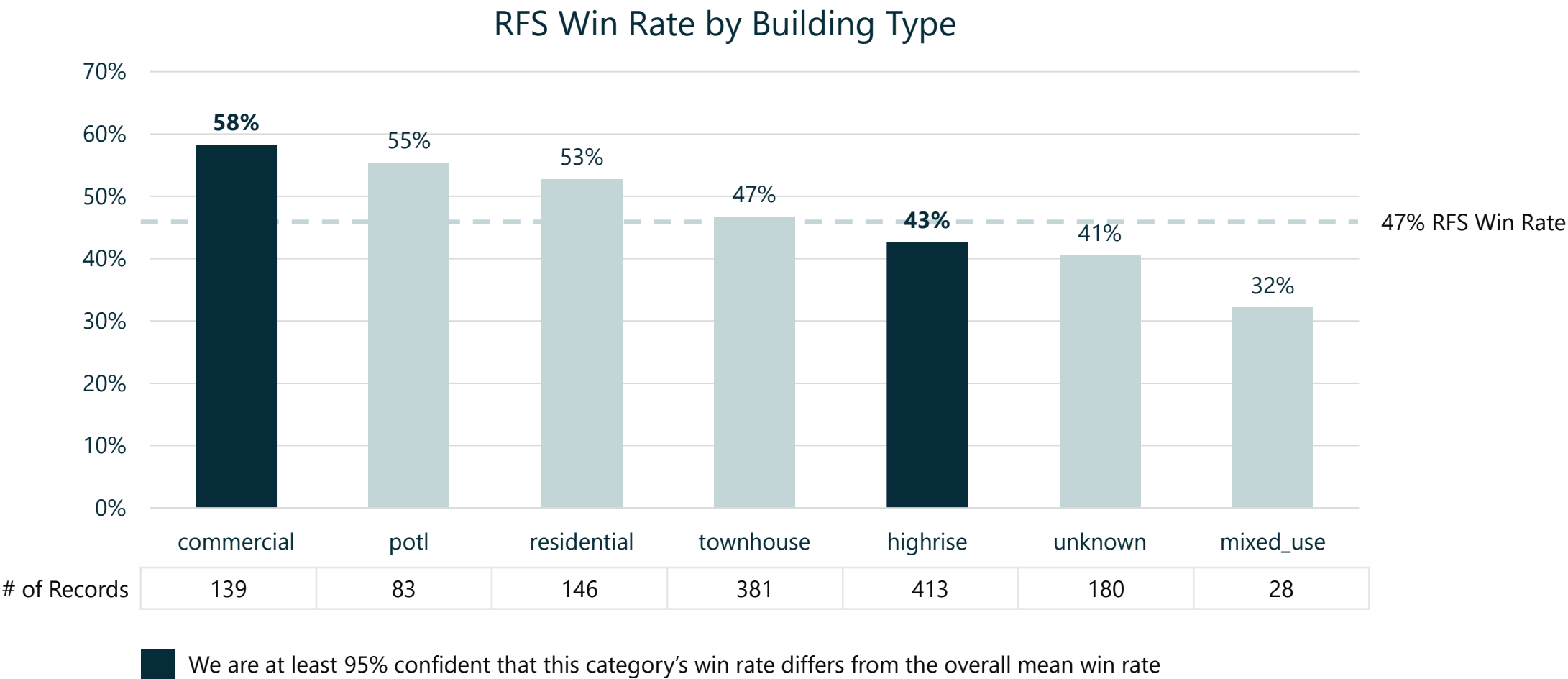
These RFS-specific indicators are all significant factors with an impact on proposal success

Win Rate		Previous RFS	
		No	Yes
Reminder	No	35%	72%
	Yes	3%	56%

Count of Proposals		Previous RFS	
		No	Yes
Reminder	No	628	263
	Yes	75	404

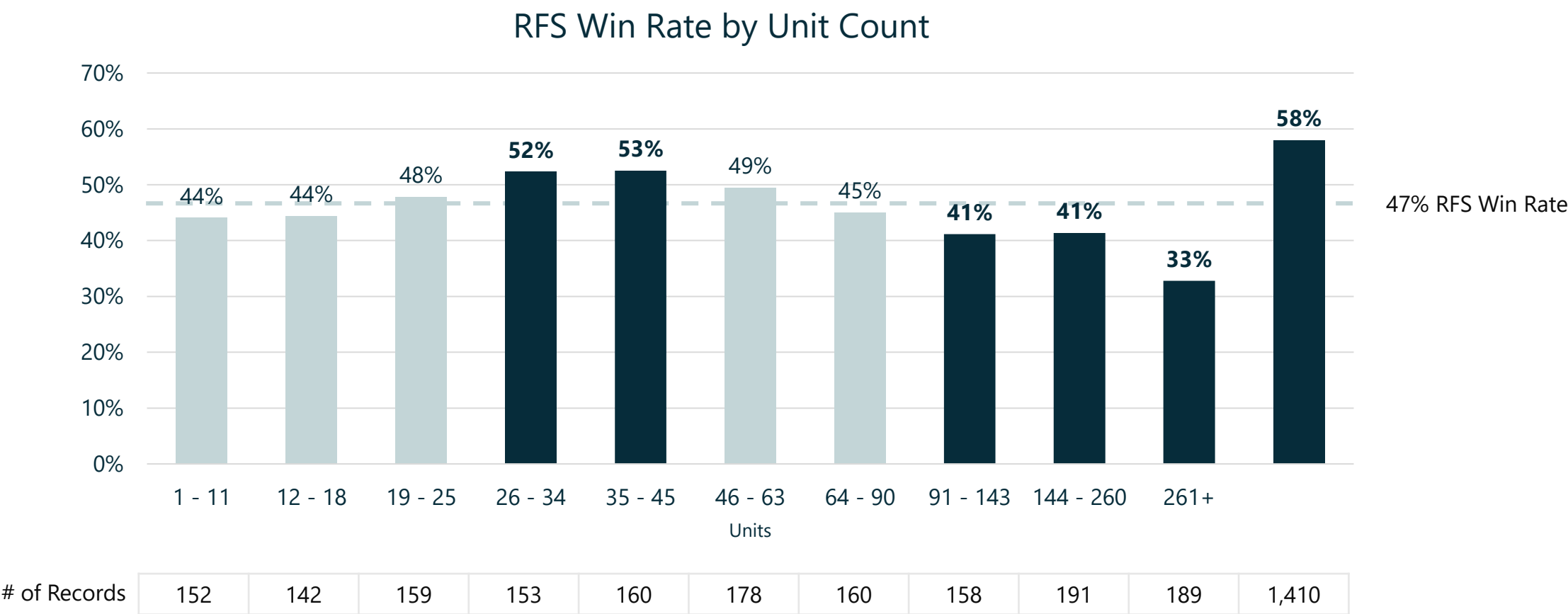
Building Type – RFS Only

Proposals for Commercial properties consistently perform well above average, while High-rises have a below average win rate



Unit Count – RFS Only

RFS proposals are more likely to be successful for properties with 26 – 45 units, and less likely to succeed for properties with more than 90 units



■ We are at least 95% confident that this category's win rate differs from the overall mean win rate



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