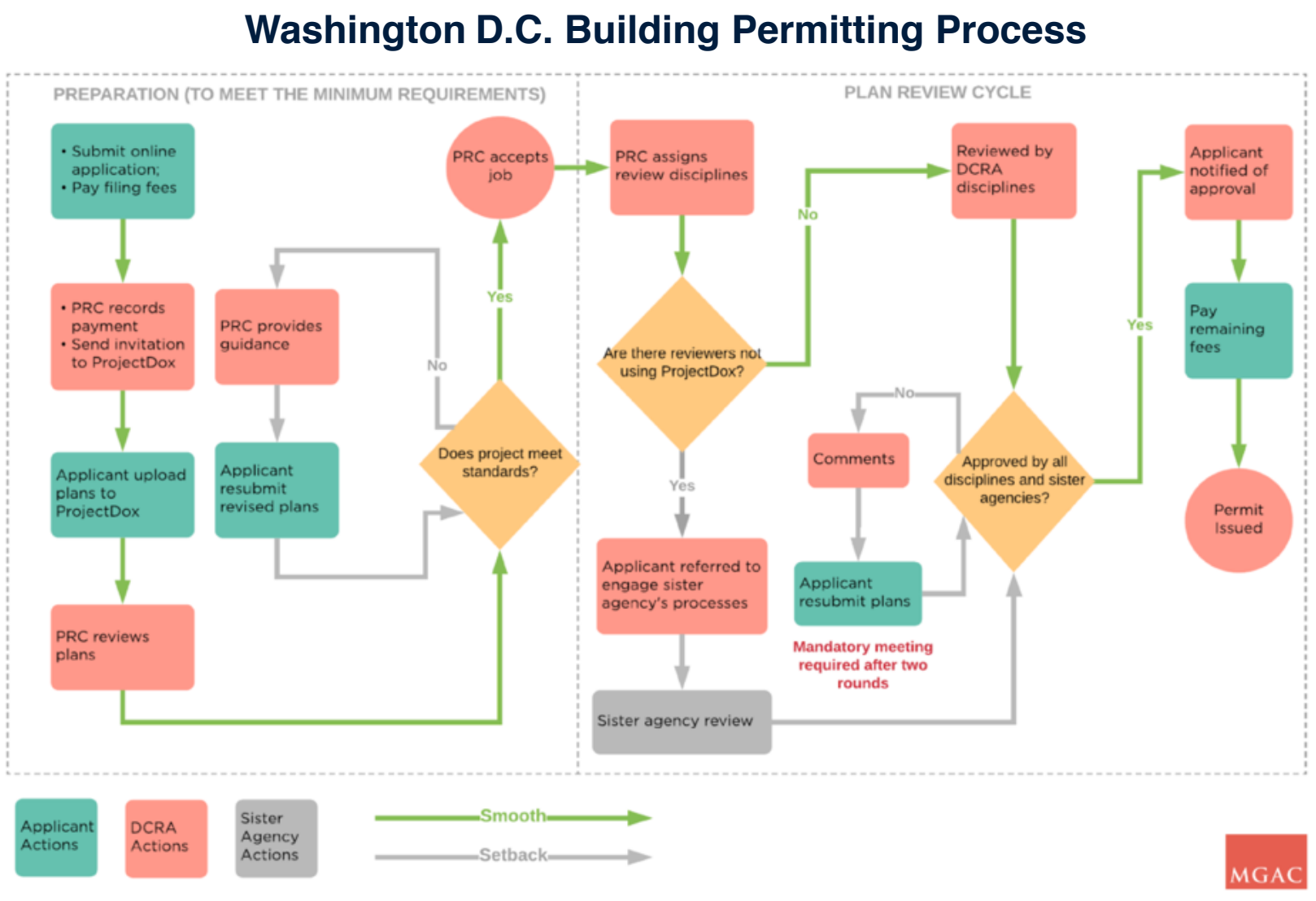


IMPROVING DCRA PERMIT PROCESS

BACKGROUND

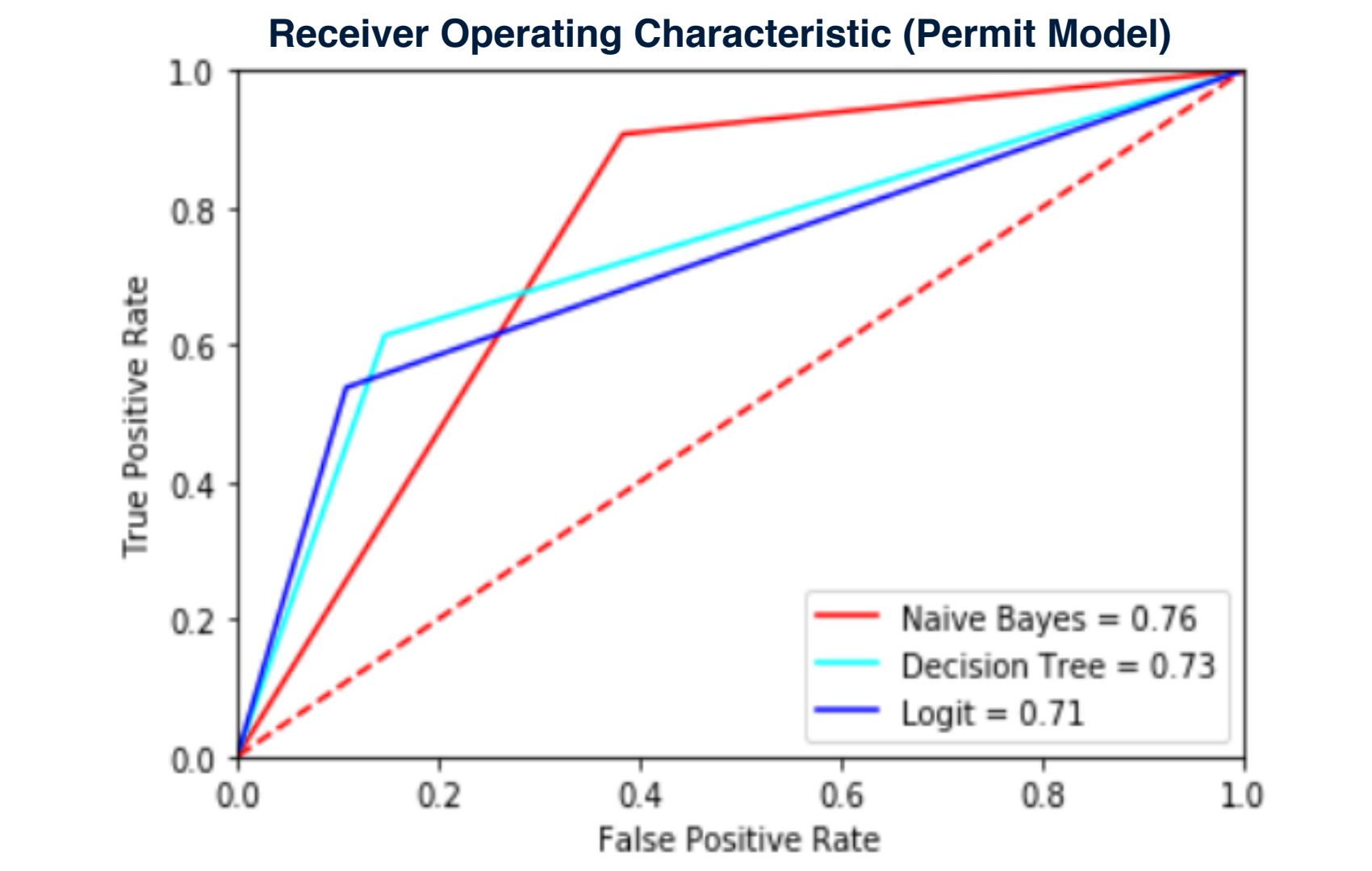
While the Construction and Renovation Market is booming in the District of Columbia, the permitting process hasn't been fast enough to speedily process the applications. This is due to a host of factors especially the involvement of multiple DCRA sister agencies and review cycles.



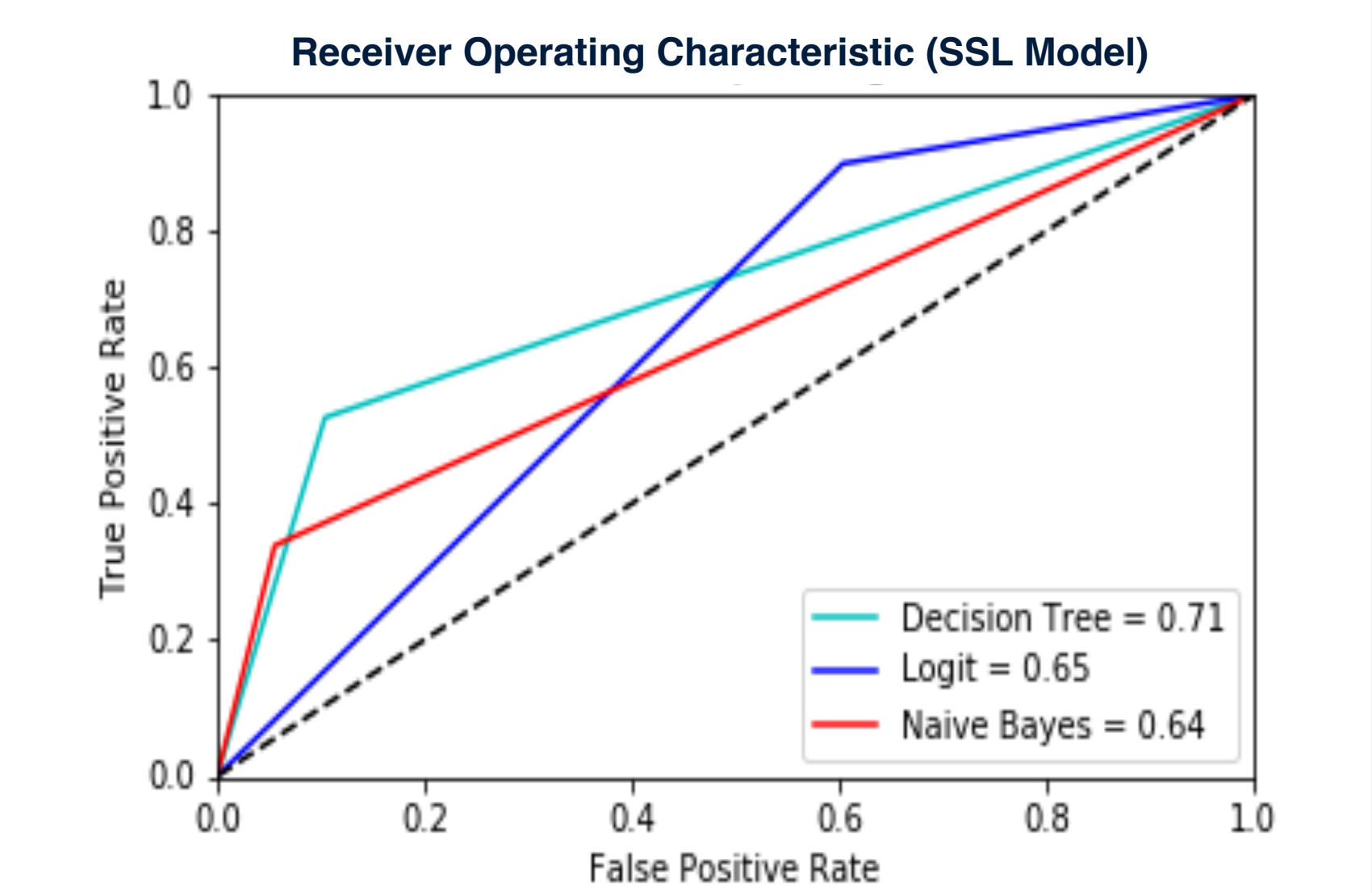
METHODOLOGY

We are building two models for analysis at two different scales: permit-level and SSL-level.

The permit-level model analyzes the time taken per permit review based on DCRA permit process attributes like agency it goes to and the review cycle, along with property attributes like price and year. We have categorical outcome in the form of whether the review process exceeds the threshold of 14-day, using different types of classifier such as Naive Bayes, Logit and Decision Tree.



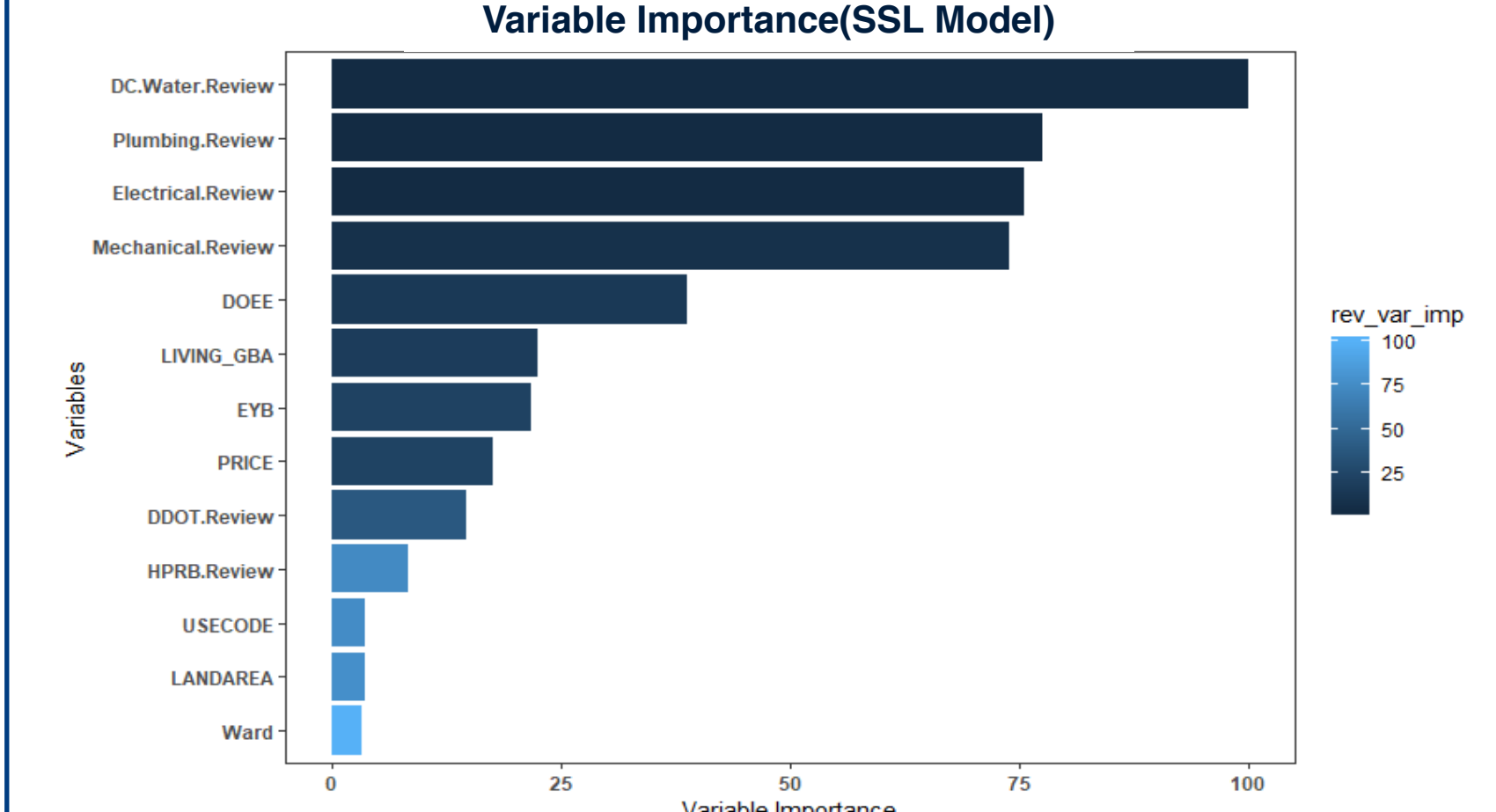
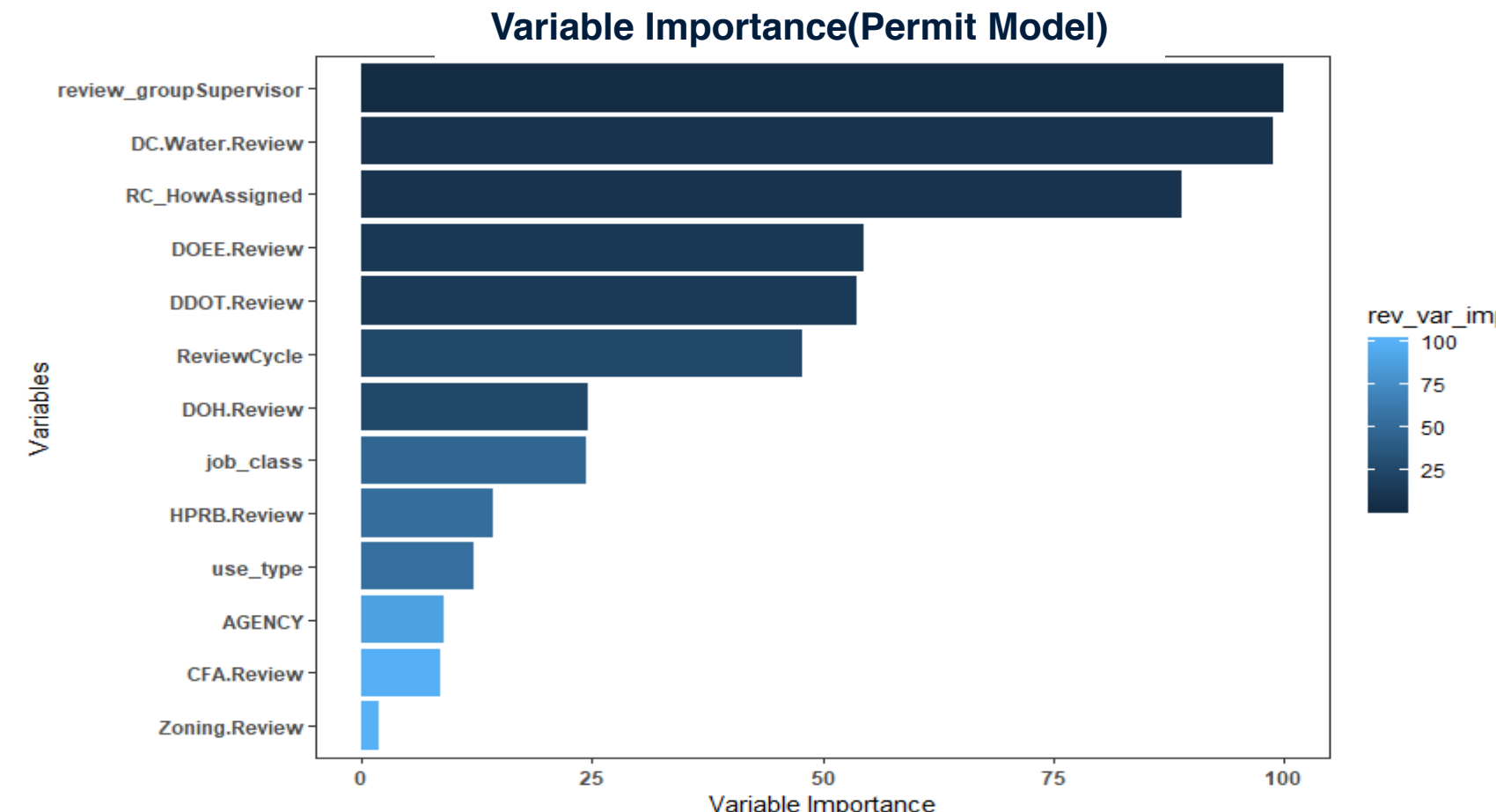
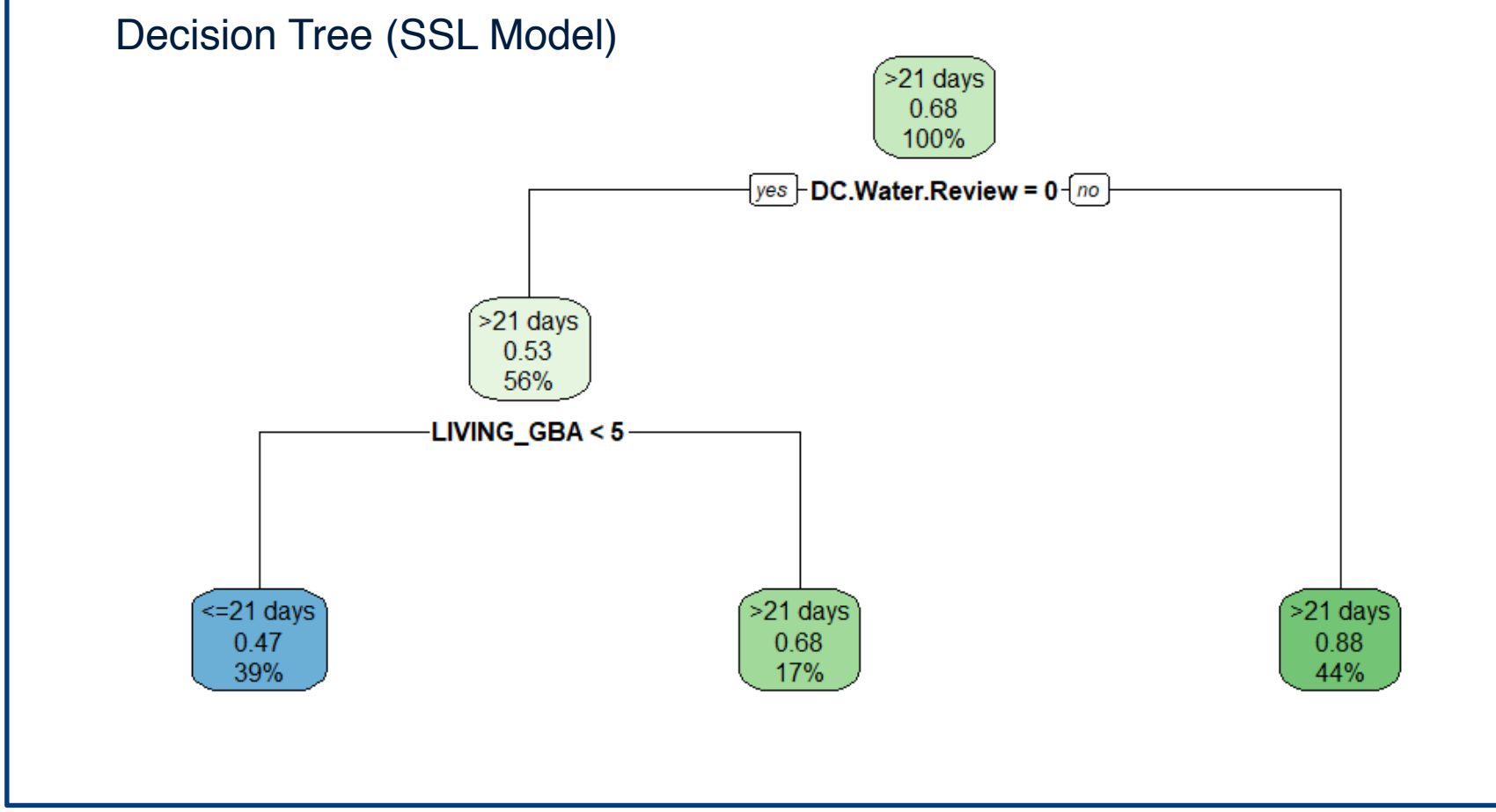
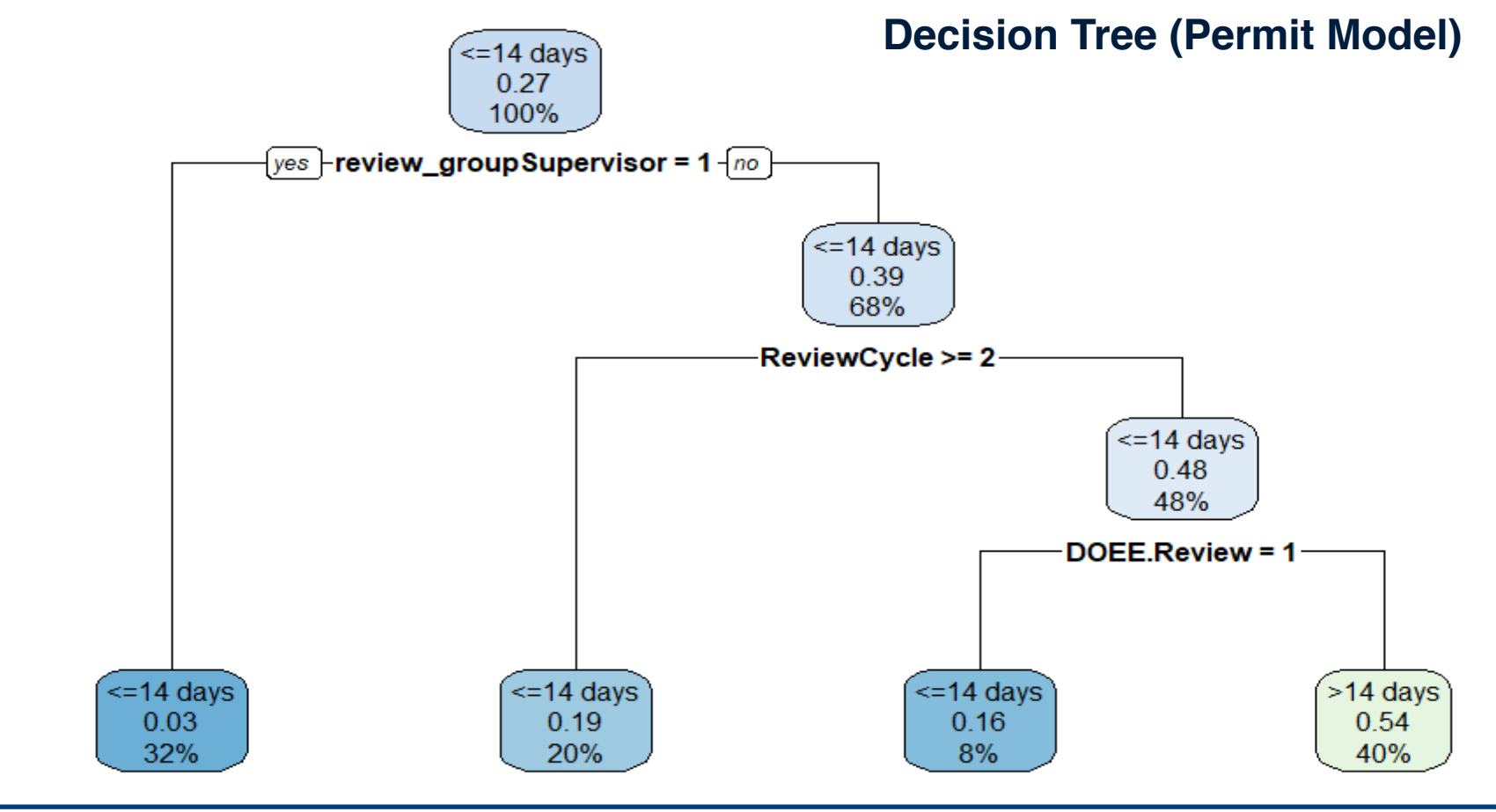
In the SSL-level model we analyze the mean time taken by permits originating from a property identified by its SSL. We model the property attributes like its age, area, et cetera against the binary time outcome with a threshold of 21-days to analyze whether certain properties tend to take longer for permit review and correlate it with their attributes using machine learning algorithms.



ANALYSIS

In the Permit Model, according to the ROC curves which compare the overall performance of different classifiers, the decision tree classifier is chosen to predict whether the queue time is over 14 days. The tree stratifies permit applications into four regions of predictor spaces. It indicates that the applications in general have a 60% probability of expecting queue time less than 14 days. It also predicts relatively long queue time (over 14 days) for permit applications that are reviewed by department groups and that require approval from Department of Energy and Environment (DOEE).

In the SSL model, based on ROC scores the Decision Tree model is the best performing classifier. It predicts that only 40% of applications from more than 1500 SSLs take less than 21 days on an average. For applications taking longer than 21 days, it is usually the Water Review process that holds up the process.



DATA

Two datasets are used in the analysis:

1. DCRA permit review dataset is a dataset containing application attributes collected in the permit process, like the permit type, agencies involved, ward, property attributes, etc.
2. Computer Assisted Mass Appraisal (CAMA) is an open-source dataset containing attribution on housing characteristics for commercial, residential and condominium properties.

We merged two datasets according to SSL (Square, Suffix and Lot).

37465 Permits

1543 SSLs

Avg Review Time 11 days

RECOMMENDATIONS

The permit process involves multiple components. The Decision Tree Classifier model that has higher AUC suggests that DC water involvement and review cycle appear to matter most in the queue time.

We recommend the following measures:

- Build an integrated system with sister agencies especially DC Water department to attenuate administrative and procedural discrepancies;
- Improve the online submission system to better inform applicants of the required materials to help reduce processing time caused by longer review cycles.
- Flag risky permits based on property characteristics such as older properties and properties with larger gross area, and process these risky permits separately to reduce overall processing time.