

# Wells, Wells, Wells

Look What Tanzania Has Here:  
Predicting Water Well Functionality for the Well Beyond App



# Our Team



**Annie Zheng**

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# Background Research



**59 million**  
population

**1 : 4**  
lack access to safe water

**3.7 miles**  
average distance for water

**44 pounds**  
weight of 20-liter jerrycan

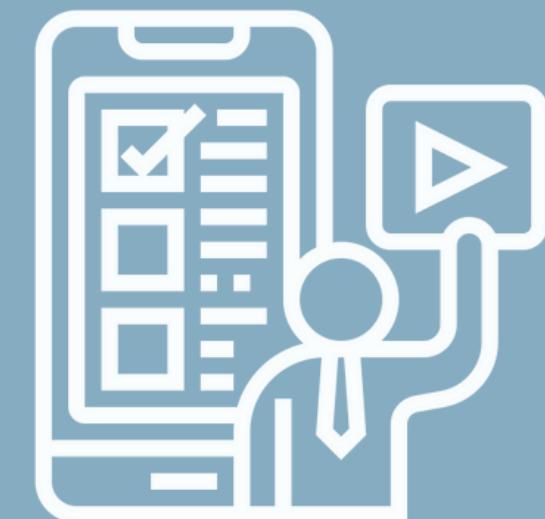
# Agenda



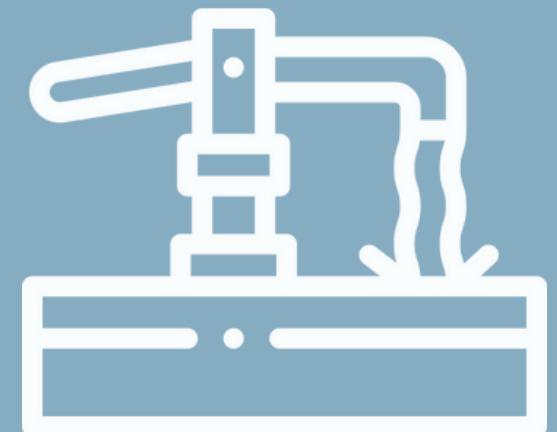
- 1 Business Problem
- 1 Data Overview
- 3 Modeling & Performance
- 4 Findings & Recommendations
- 5 Future Insights

# Business Problem

# Business Problem



New App Feature



Well Maintenance Predictor

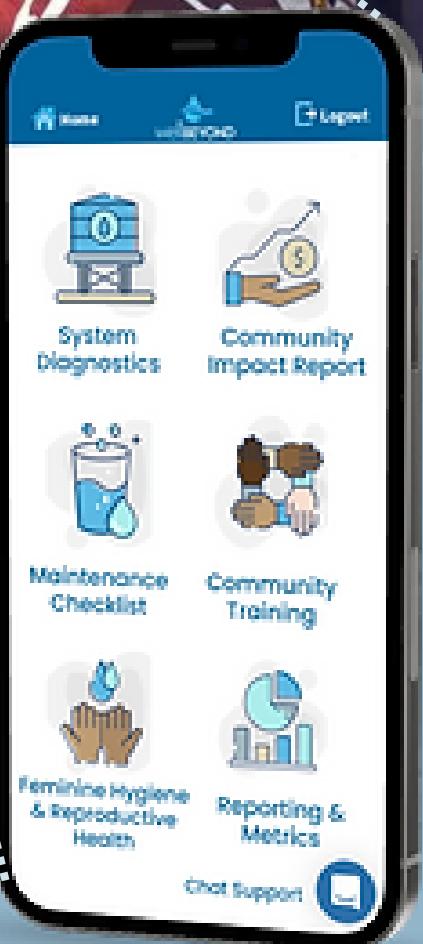
Business  
Problem

Data  
Overview

Modeling &  
Performance

Findings &  
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Future  
Insights



# Data Overview

# Data Overview

## Source

DrivenData  
Pump it Up: Data Mining the Water Table

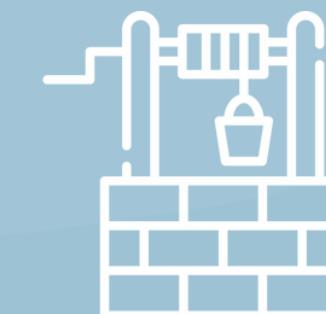
## Metric

Accuracy

## Data

55,973 Wells  
24 Features

## Well Status



Fully Functional



Non Functional



Functional  
Needs Repairs

Business Problem

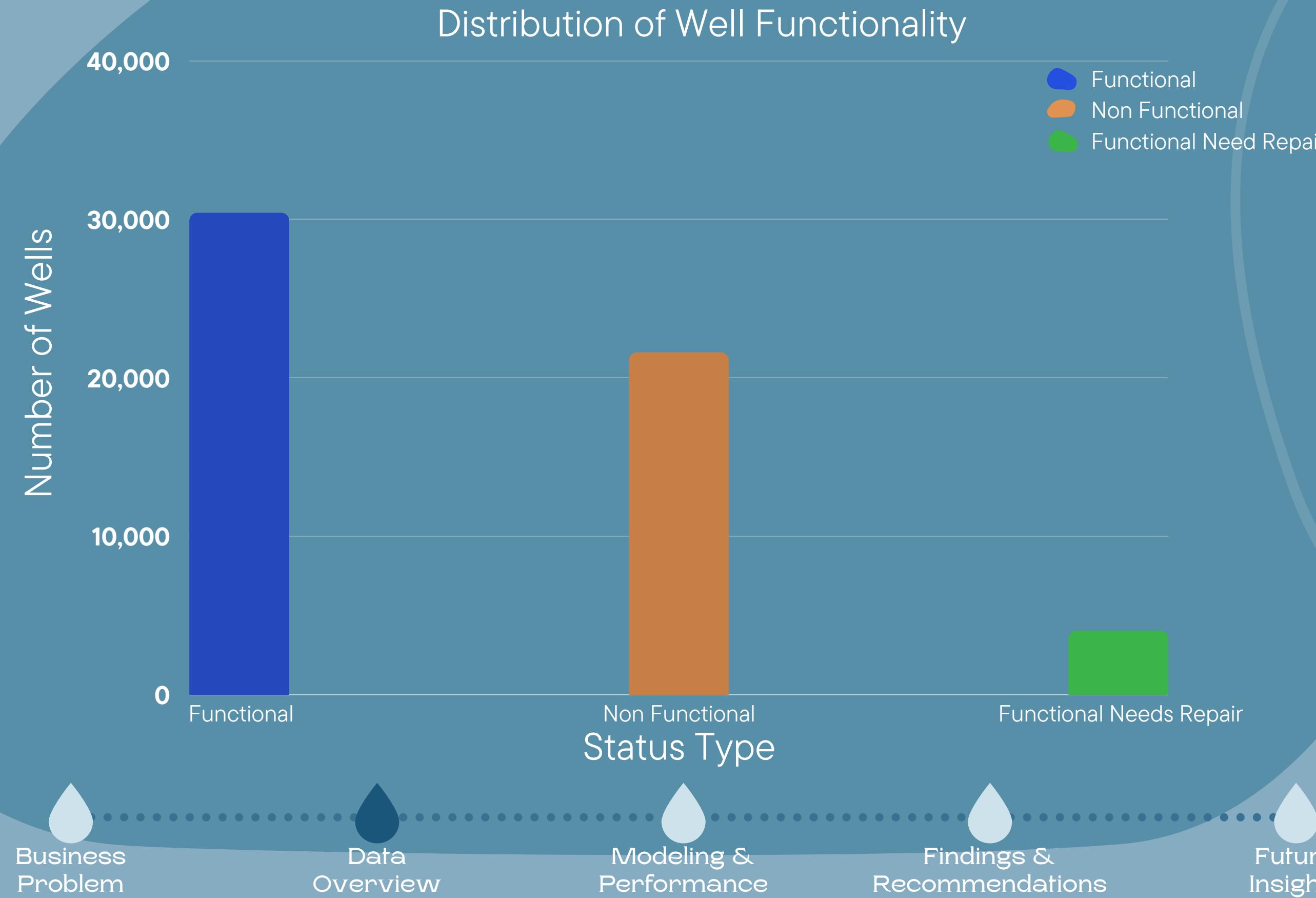
Data Overview

Modeling & Performance

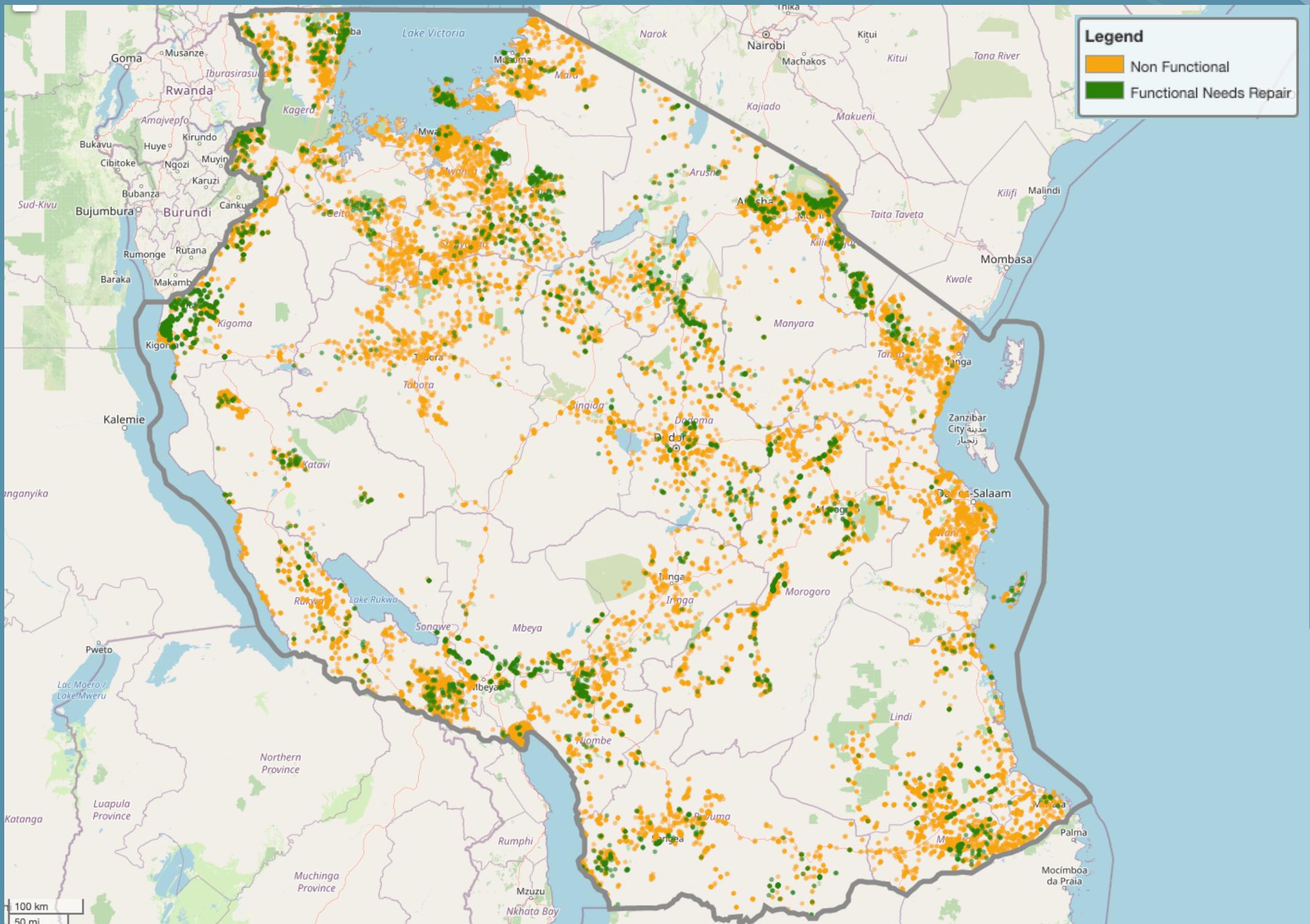
Findings & Recommendations

Future Insights

# Data Imbalance



# Near Bodies of Water & Rivers



Business  
Problem

Data  
Overview

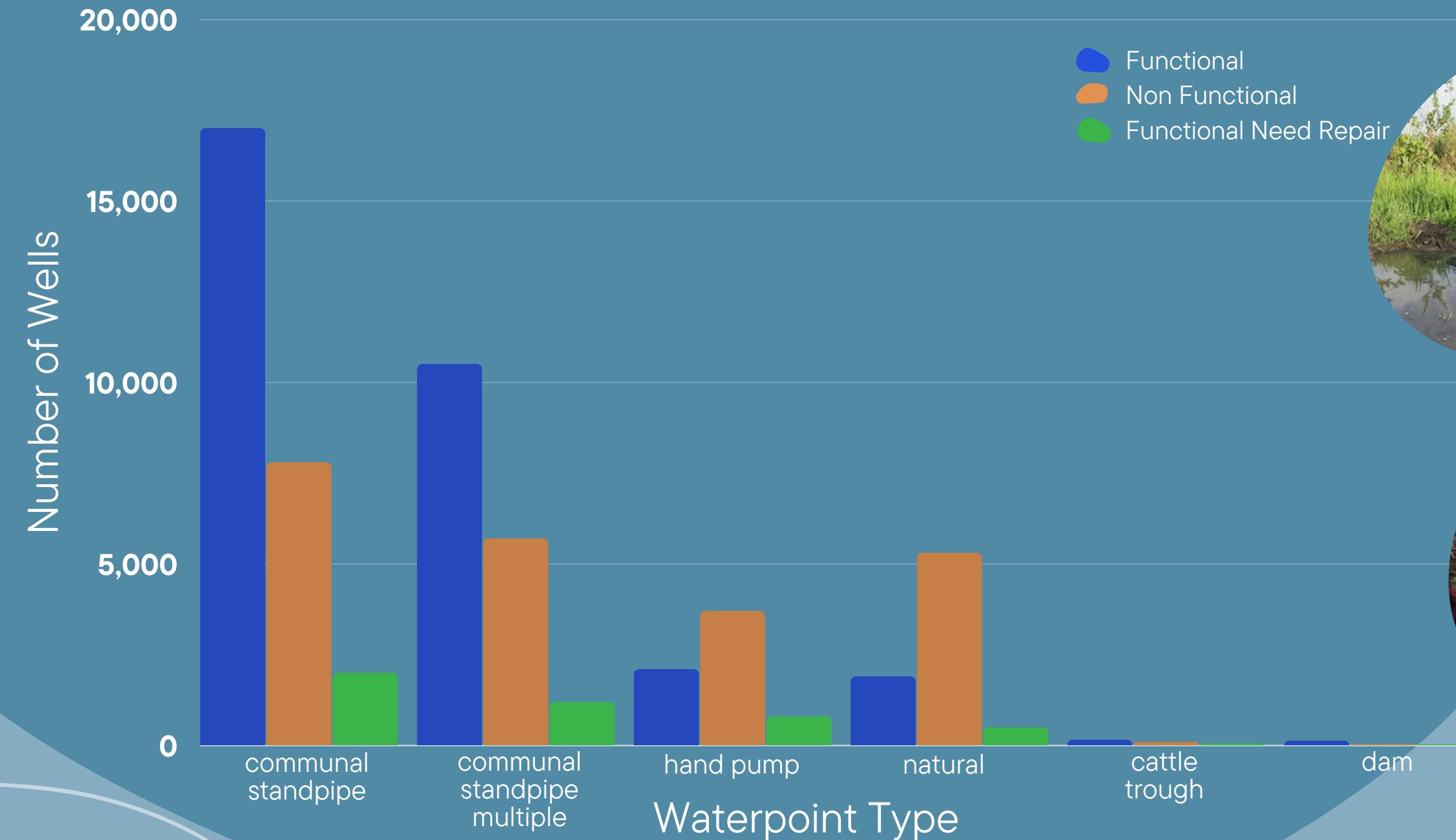
Modeling &  
Performance

Findings &  
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# Man-Made Majority

## Waterpoint Type Frequency



Business  
Problem

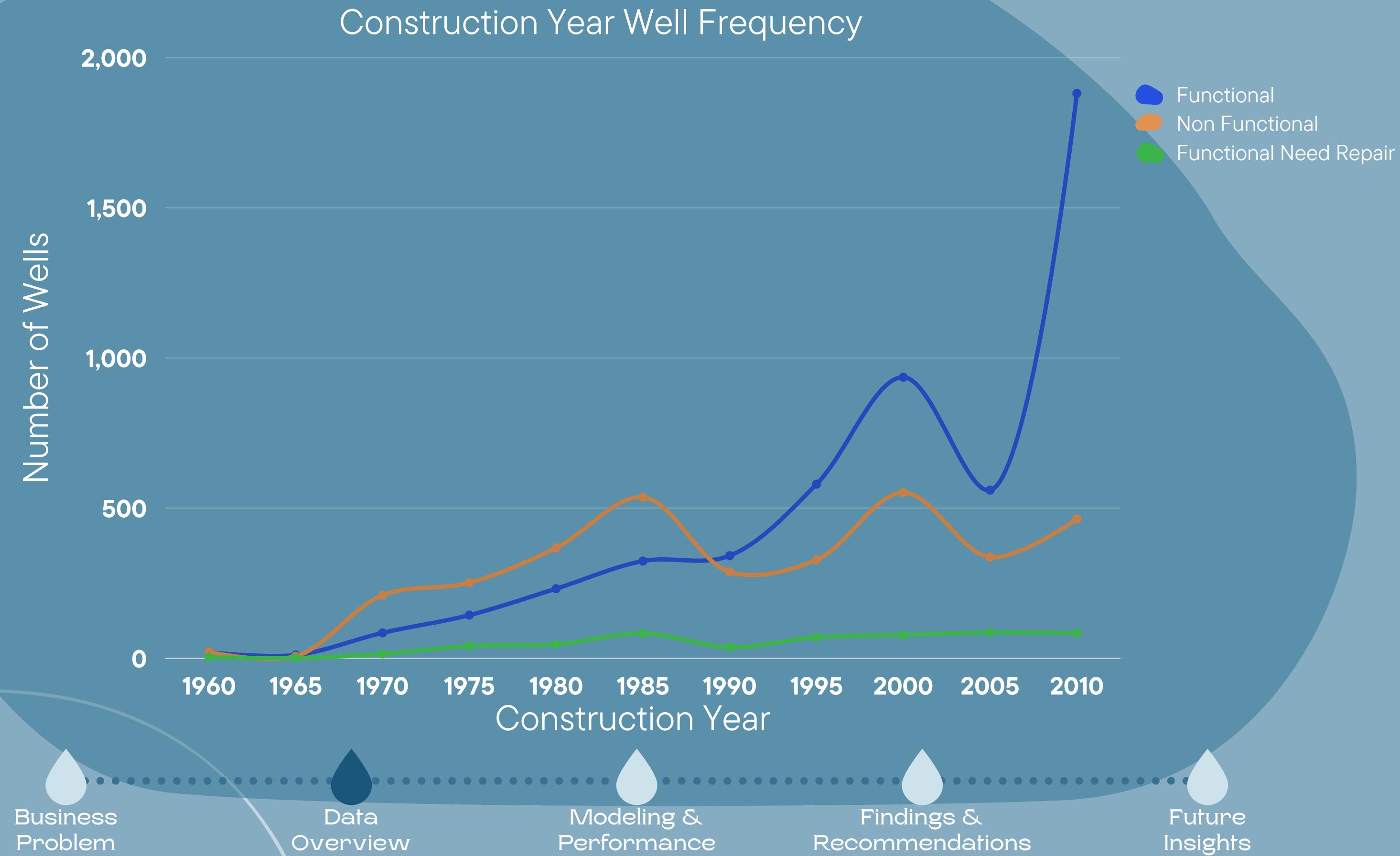
Data  
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# Recent Construction Likely to be Functional



# Modeling & Performance



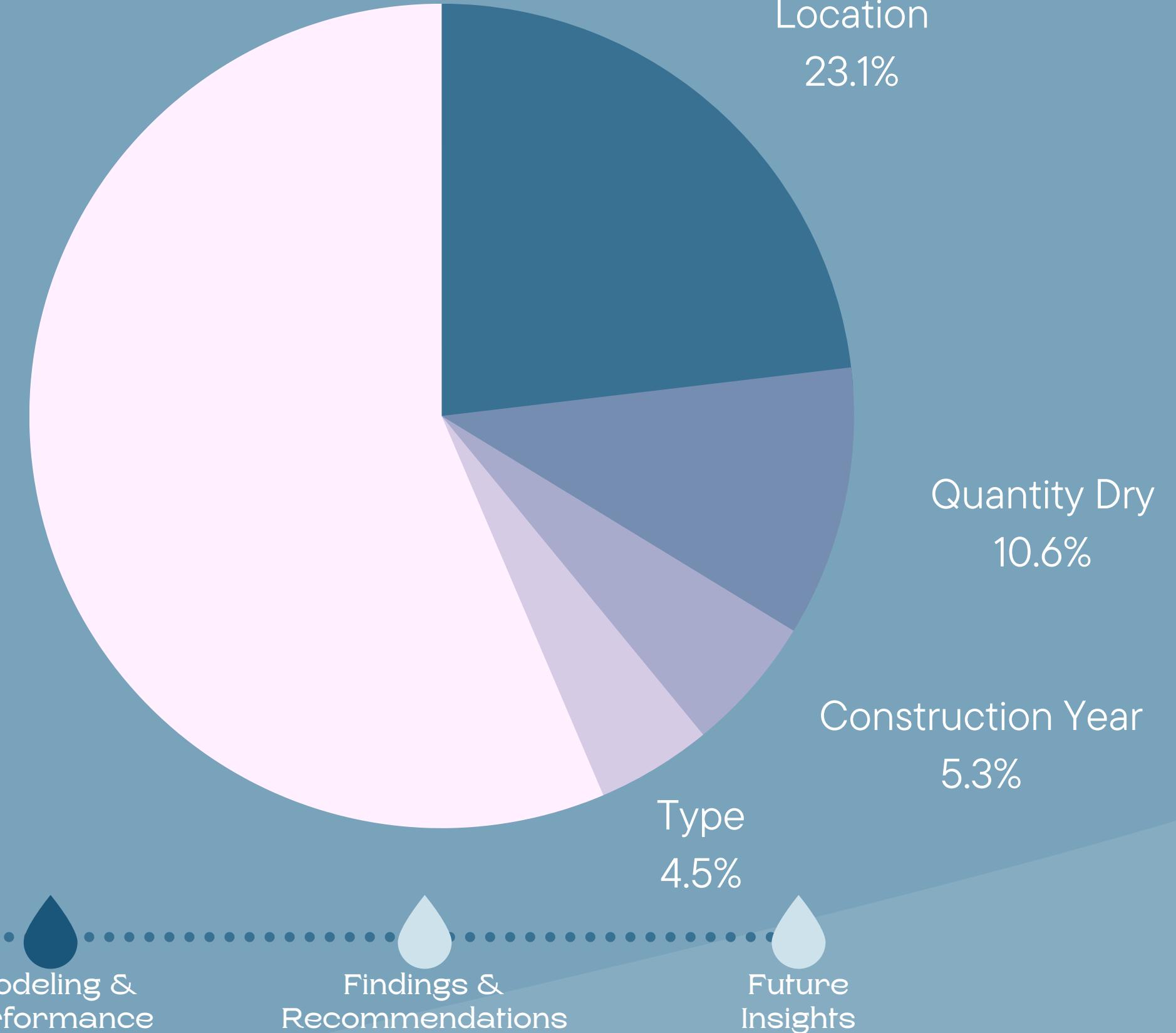
# 30% Improvement from Baseline Model

MODEL	MODEL DETAILS	ACCURACY
BASELINE	Always Predicts Functional Well	54.9%
DECISION TREE	<p>Low Complexity</p> <ul style="list-style-type: none"><li>• Many categorical attributes</li></ul>	75.1%
RANDOM FOREST	<p>Higher Complexity</p> <ul style="list-style-type: none"><li>• Balanced dataset</li><li>• Only the most influential attributes</li></ul>	86.4%



# 4 Features Provide Nearly Half the Predictive Power

Other Attributes  
56.4%



Business  
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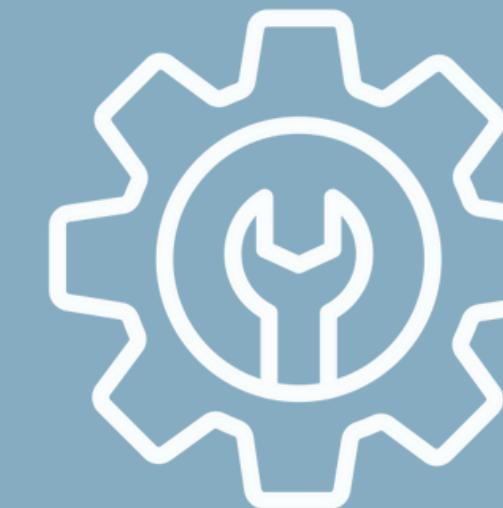
Future  
Insights

# Results & Recommendations

# Key Results and Findings



86.4% Overall  
Accuracy



**94.4%** Accuracy on  
Wells that Need Repair



More Data,  
More Improvements

Business  
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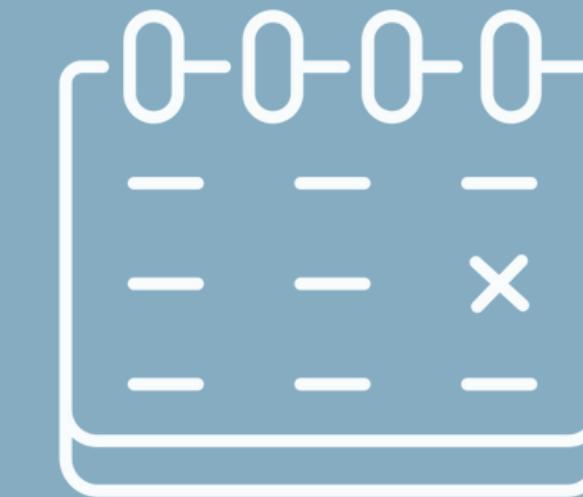
# Recommendations



Provide  
Greater Monetary  
Incentives



Prioritize Repairs  
for All Non Fully  
Functional Wells



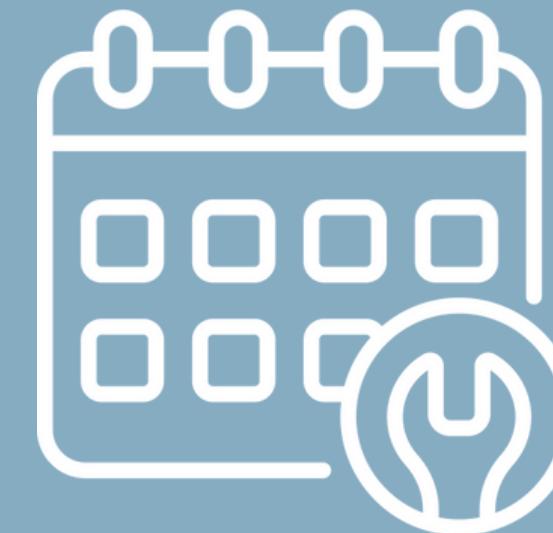
Get More Data on the  
Construction Year

# Future Insights

# Additional Data Features to Explore



Gallons  
per Day



Date of Last  
Maintenance



Proximity to Next  
Nearest Well

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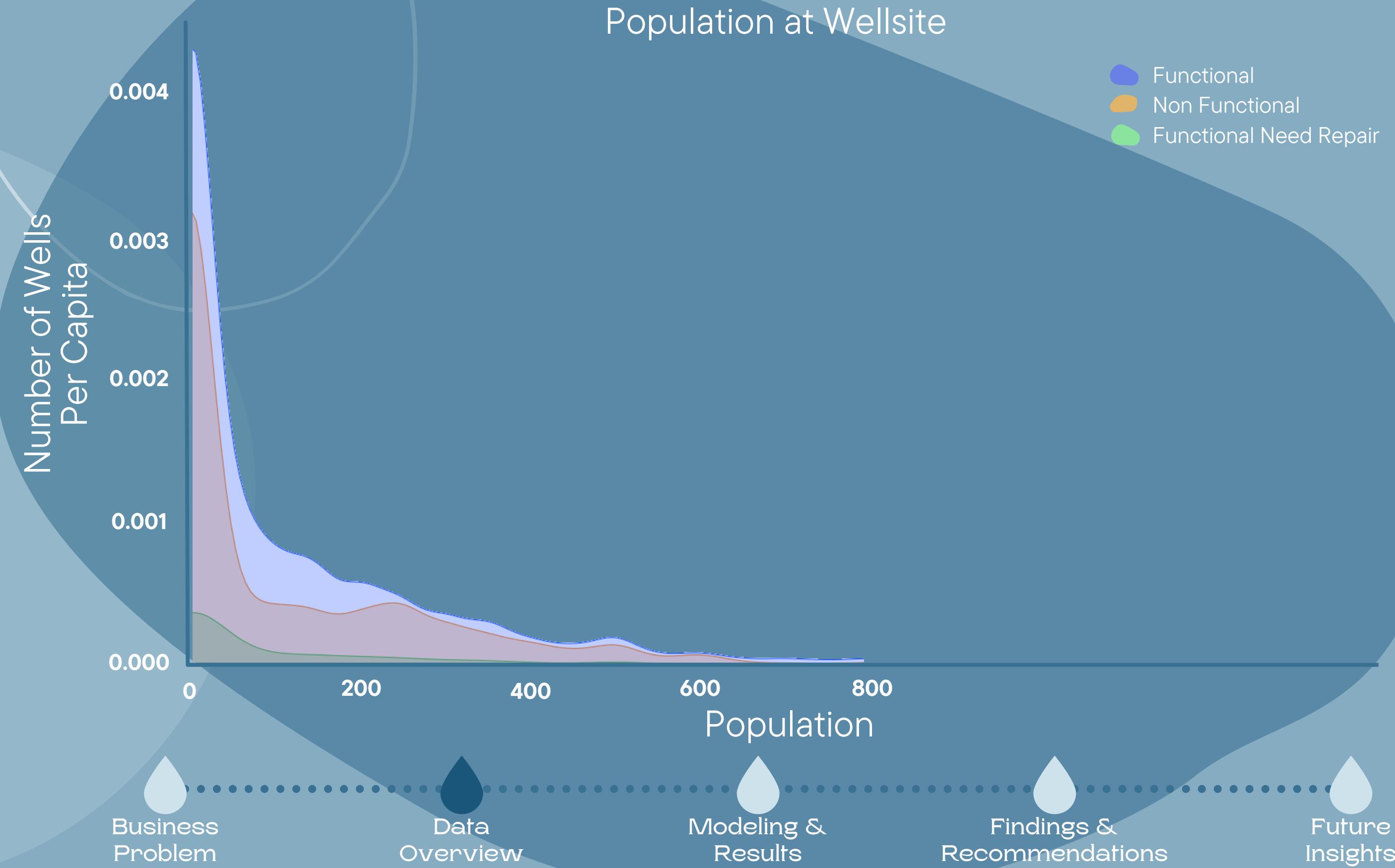
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# Thank you!

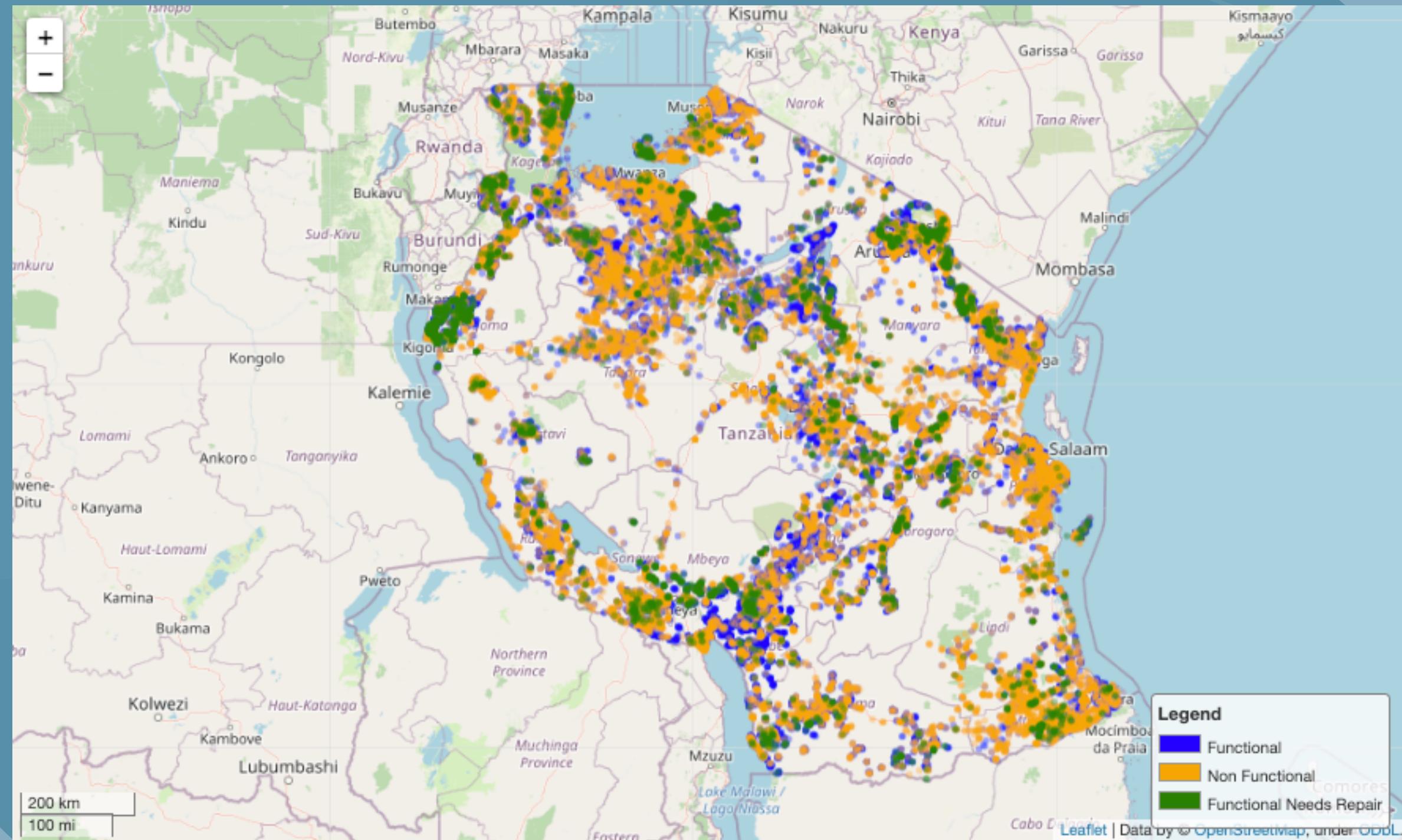
Questions?

# Appendix

# Farther for Functional Wells



# Near Bodies of Water & Rivers



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# Sources

## Images

- Communal Standpipe - <https://www.flickr.com/photos/afdbprojects/35196432055>
- Child gathering water - <https://lifewater.org/blog/tanzania-water-crisis-facts/>
- Woman carrying water container - <https://www.worldvision.org/clean-water-news-stories/carrying-water-pain-neck>
- Icons - <https://www.flaticon.com>
- Men using the phone and tablet - <https://wellawareworld.org/well-beyond-app/>
- Mother & child getting water from a puddle - <https://www.compassionuk.org/wp-content/uploads/2018/03/Images-of-water-.jpg>
- Mother & child scooping water - <https://lifewater.org/blog/tanzania-water-crisis-facts/>

## Research

- [Tanzania's water and sanitation crisis](#)
- [Fixing Water Systems In East Africa Before Problems Get Out Of Hand](#)
- [Introducing the Well Beyond App](#)
- [Well Beyond App](#)
- [Walk for water: Your 6K vs. theirs](#)