An-Najah National University

Computer Science Apprenticeship by the Faculty of Engineering

Tree Cutting Priority Analysis Report

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Prepared by:

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1. Introduction

The purpose of this project is to identify priority areas for removing dead trees in the town of Fire Creek.
Due to limited removal resources, it is essential to determine which locations pose the highest risk to people, property, and infrastructure.

This analysis integrates five spatial risk factors and produces a final Tree Cutting Priority Map that classifies the landscape into low, medium, and high-priority zones.

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2. Data and Priority Factors

The analysis uses five key factors, each representing a potential hazard if dead trees remain standing:

1. Tree Mortality
   Areas with a higher number of dead trees are more dangerous and require faster intervention.

2. Community Features
   Includes important public facilities. Nearby dead trees increase risk to people and structures.

3. Egress Routes
   Emergency and evacuation roads must remain accessible. Dead trees near these lines pose safety threats.

4. Populated Areas
   Higher population density increases the urgency of removing hazardous trees.

5. Electric Utilities
   Power lines and substations are critical infrastructure. Dead trees pose fire and outage risks.

These factors were clipped to the Fire Creek boundary and prepared for integration.

3. Cutting Grid Framework

A cutting grid layer was provided for the town.
Each grid cell acted as an independent analysis unit where all factors were evaluated and scored.

Grid layers seen in the project include:

- *Grids_1, Grids_2, Grids_3, Grids_4*
- The final merged grid: All_Scores

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4. Factor Scoring Process

Each factor was spatially analyzed and assigned a score indicating whether the factor increases urgency within each grid cell.

Examples based on your project layers:

- Mortality_join → mortality score
- Pop_join → population score
- Community_join → community risk score
- Utilities_points_join / Utilities_lines_join → electric utility score
- Egress_join → proximity to emergency routes

Typical scoring method:

- 1 = High-risk factor present
- 0 = Factor absent

This standardized scoring allowed the five datasets to be combined easily.

5. Combining the Factors (Weighted Sum)

After preparing the five factor scores, all values were merged into a single grid using QGIS Field Calculator.

The final priority score was computed as:

```
All_Scores = Mortality_score
             + Population_score
             + Utilities_score
             + Community_score
             + Egress_score
```

This process produced the unified layer All_Scores, visible in your project.

Cells with higher totals represent locations where multiple risk factors overlap, meaning dead trees in these areas pose greater danger.

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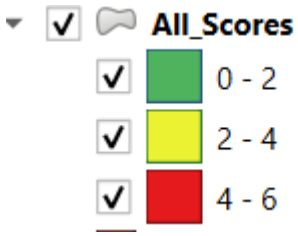
6. Classification and Final Mapping



The final score values were reclassified into three priority levels:

- 0 – 2 → Low Priority (Green)
- 2 – 4 → Medium Priority (Yellow)
- 4 – 6 → High Priority (Red)

The Tree Cutting Priority Map was styled using a clear color scheme and includes:

- Title
- Legend
- Classified symbology
- Grid representation

This visualization clearly shows which areas require immediate tree removal.

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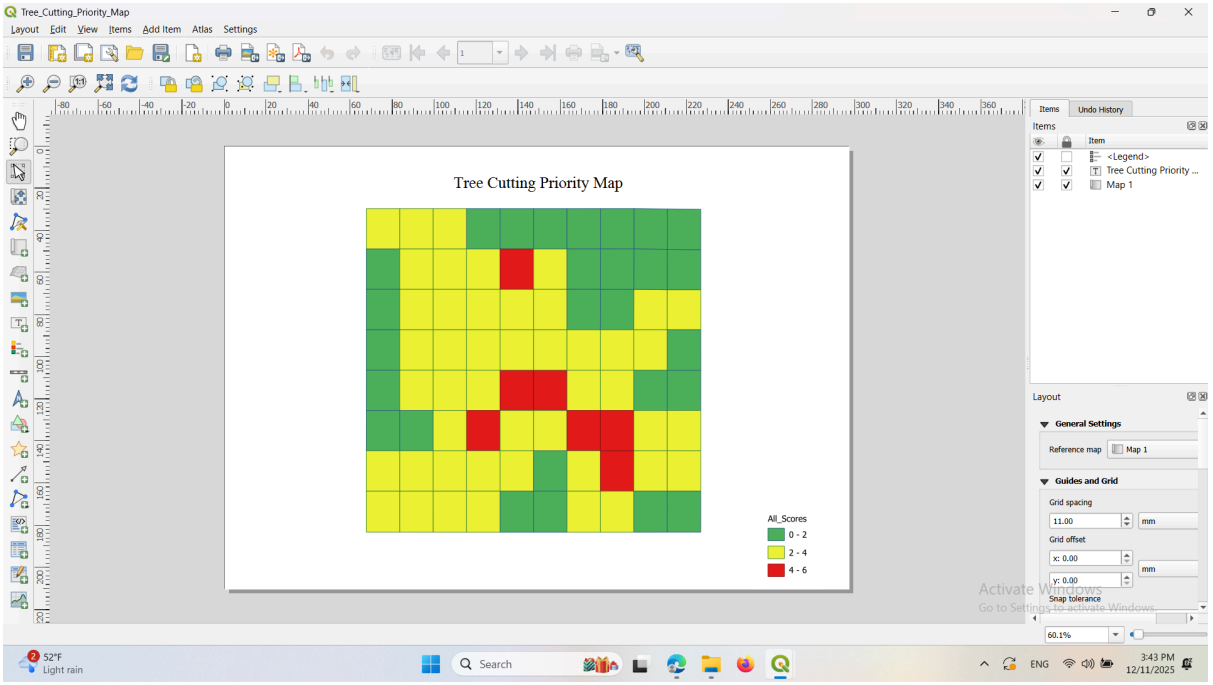
7. Conclusion

The final Tree Cutting Priority Map successfully integrates five hazard-related datasets into a single, interpretable decision-support product.
Areas where several high-risk factors overlap were identified as high-priority zones, enabling Fire Creek decision-makers to:

- Allocate tree-removal resources efficiently
- Reduce hazards to residents
- Protect critical infrastructure
- Maintain safe emergency evacuation routes

This structured approach provides a transparent and repeatable method for future risk-based tree management.



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