

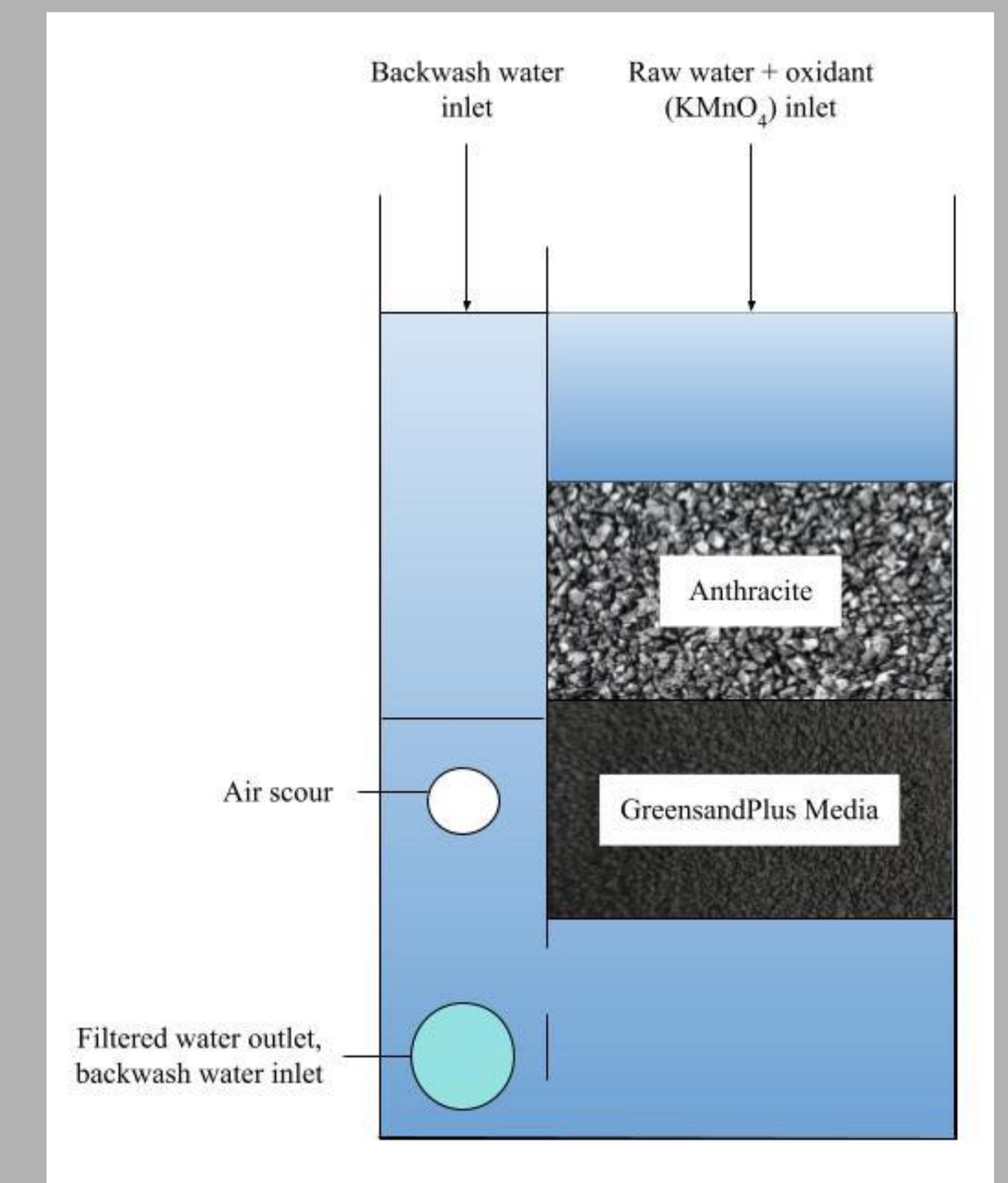
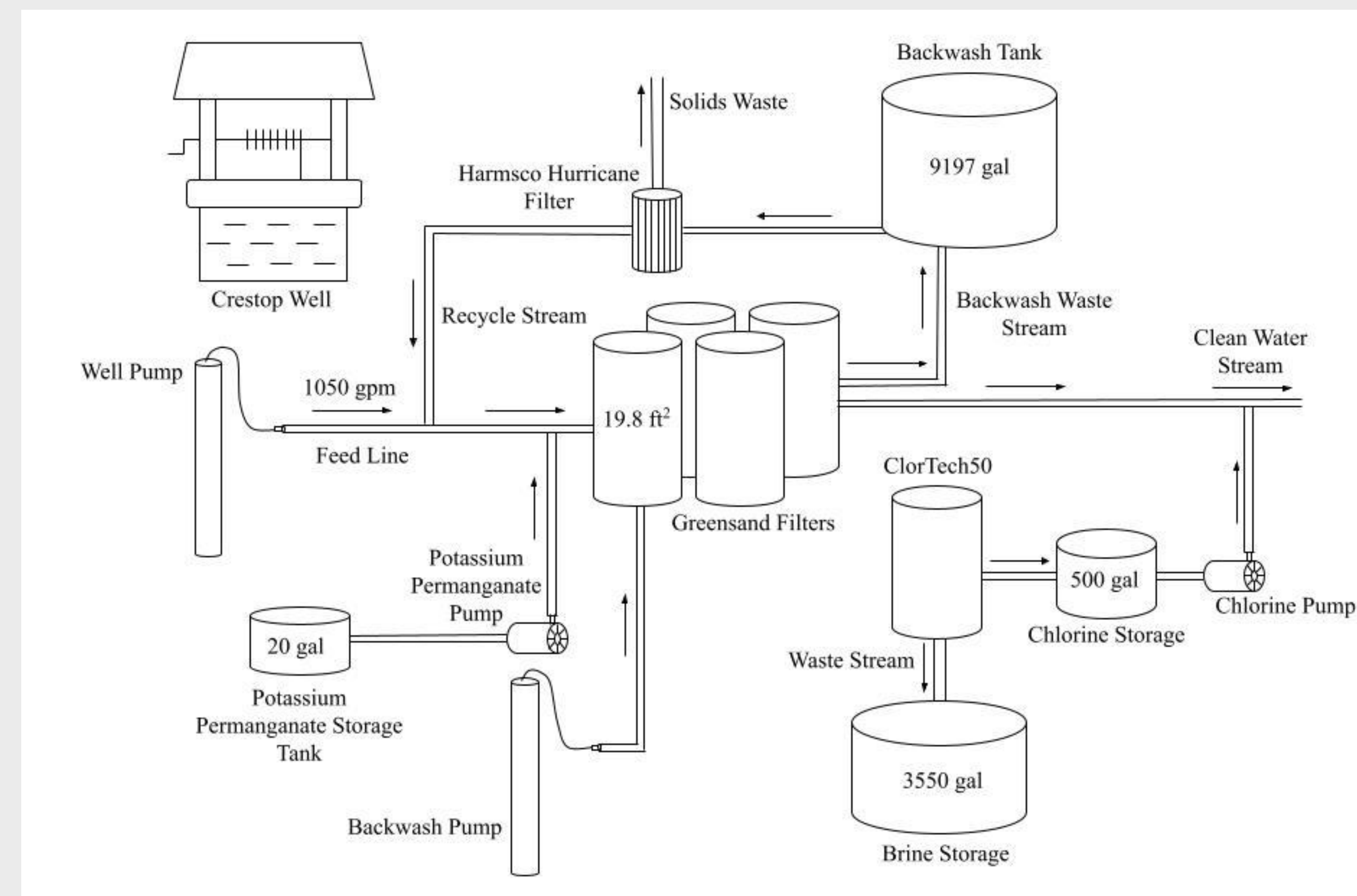
SUSTAINABLE WATER TREATMENT: OXIDATION AND GREENSAND FILTRATION

OVERVIEW

- Lakedale Utility District requests the treatment of the drinking water drawn from the Crestop Well, one of their highest producing wells, by improving the following aesthetics:
 - Water discoloration, particulate formation, and staining caused by manganese and iron
 - Unpleasant sulfur smell caused by hydrogen sulfide
- The District has won awards for the taste of their water in other wells from the Northwest American Water Works Association, and they strive to remain producing high quality drinking water
- Treatment objectives are shown below:

| Constituent | Goal |
|------------------------|--------------------------------------|
| Manganese | 0.03 mg/L |
| Iron | 0.15 mg/L |
| Hydrogen Sulfide | below detection |
| Residual Free Chlorine | 0.5-1 mg/L, target 0.75 mg/L |
| Temperature | unchanged |
| pH | unchanged |
| Alkalinity | 100-120 (mg/L as CaCO ₃) |

- The well should run reliably year-round with a flow into the 0.625 million gallon reservoir ranging from 900-1050 gpm
- Lakedale Utility District proposes a 4 month preliminary design period submitted by June 1st



Detailed view of a dual media greensand filter. Process water treated with the oxidant enters and passes through both medias. Backwash water enters and passes through the filter in the opposite direction, cleaning the media of all solids collected.

FEATURES

Primary:

- Removal of iron, manganese under Secondary Maximum Contamination Level.
- Recycle minimize discharge to <50 gpm.
- The design operates constantly all year long.

Secondary:

- Treating hydrogen sulfide to remove the bad smell from untreated water.
- Design footprint <2000 sq ft to mitigate noise and odor concerns in the neighborhood.
- Keep the water parameters unchanged.
- Minimal in-person monitoring and maintenance.

DETAILS

- Permanganate Dose: For oxidation and treatment of manganese, iron, and hydrogen sulfide
- Greensand Filter: Four dual media filters with anthracite and Greensand Plus
- Backwash: Reversed flow of water to flush out impurities from the filtered system.
- Harmsco Hurricane filter: cyclone separator to remove dense solids; liquid stream re-enters process flow
- Chlorine for disinfection

STATUS

The following deliverables are final:

- Project Scope and Project Management Plan
- Literature Review
- Alternatives Analysis
- Basis of Design

NEXT STEPS

The following deliverables are in progress:

- Preliminary Design
- Cost Estimate
- Sustainability Analysis

DESIGN TEAM

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