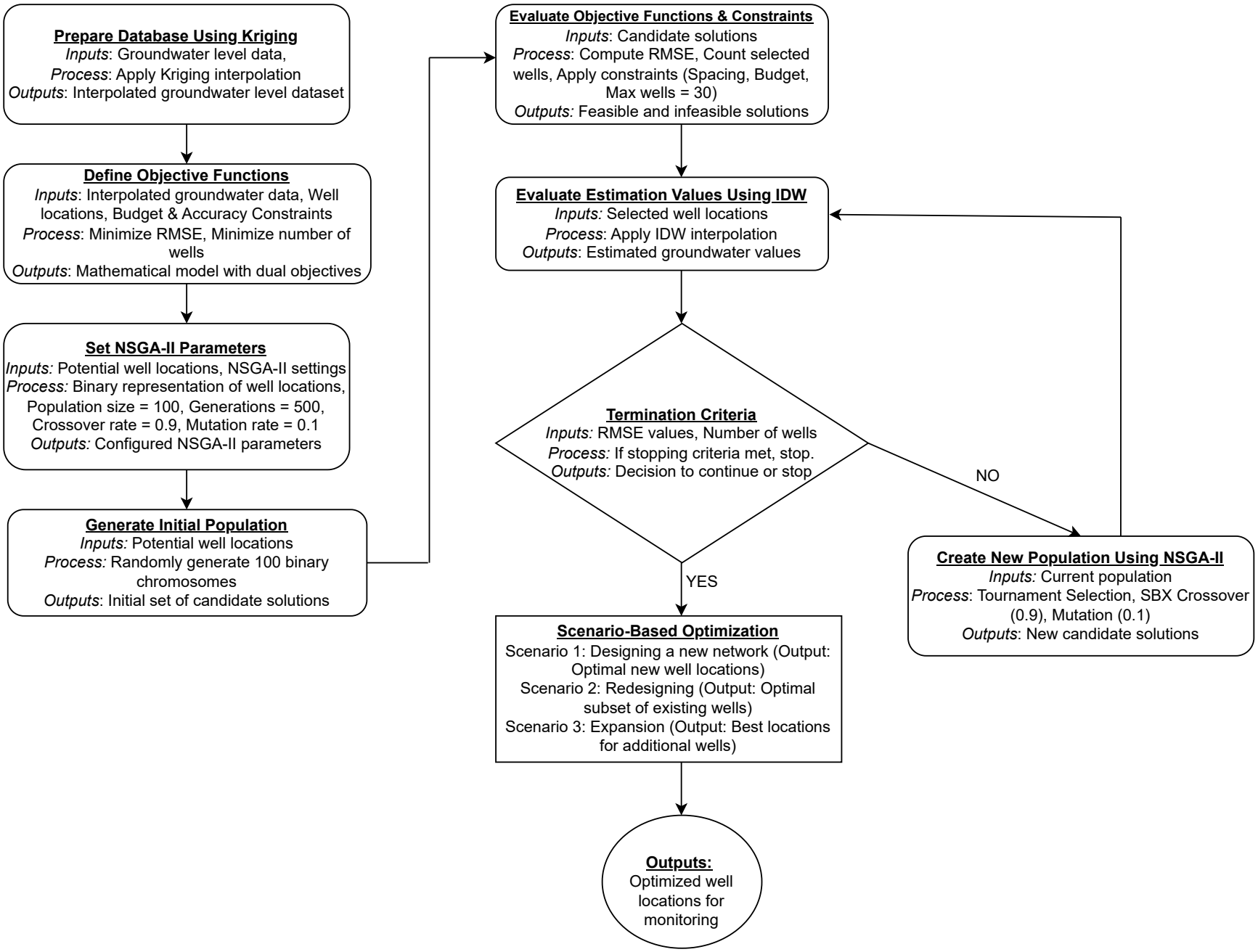
Prepare Database Using Kriging
Inputs: Groundwater level data,
Process: Apply Kriging interpolation
Outputs: Interpolated groundwater level dataset
Define Objective Functions
Inputs: Interpolated groundwater data, Well locations, Budget & Accuracy Constraints
Process: Minimize RMSE, Minimize number of wells
Outputs: Mathematical model with dual objectives
Set NSGA-II Parameters
Inputs: Potential well locations, NSGA-II settings
Process: Binary representation of well locations, Population size = 100, Generations = 500, Crossover rate = 0.9, Mutation rate = 0.1
Outputs: Configured NSGA-II parameters
Generate Initial Population
Inputs: Potential well locations
Process: Randomly generate 100 binary chromosomes
Outputs: Initial set of candidate solutions
Evaluate Objective Functions & Constraints
Inputs: Candidate solutions
Process: Compute RMSE, Count selected wells, Apply constraints (Spacing, Budget, Max wells = 30)
Outputs: Feasible and infeasible solutions
Evaluate Estimation Values Using IDW
Inputs: Selected well locations
Process: Apply IDW interpolation
Outputs: Estimated groundwater values
Termination Criteria
Inputs: RMSE values, Number of wells
Process: If stopping criteria met, stop.
Outputs: Decision to continue or stop
NO
YES
Create New Population Using NSGA-II
Inputs: Current population
Process: Tournament Selection, SBX Crossover (0.9), Mutation (0.1)
Outputs: New candidate solutions
Scenario-Based Optimization
Scenario 1: Designing a new network (Output: Optimal new well locations)
Scenario 2: Redesigning (Output: Optimal subset of existing wells)
Scenario 3: Expansion (Output: Best locations for additional wells)
Outputs:
Optimized well locations for monitoring