Terrain Design Document:

Green highlight is stuff I expect to be MVP

Yellow highlight is technically not MVP but adds a lot of depth to the game without too much programming

Blue highlight is stuff that are a would more advanced/technical but could be really cool optional features

Also using a cascading priority system withing the bullet points; Terrain is absolutely part of MVP, the terrain slowly shifting and eroding is not necessary to implement terrain. Biome is not MVP, and Biomes having different associated mutation chances is MVP for the biome feature, but is not MVP for the entire game.

3 Tier system:

* Terrain
  + Grass, Sand, Stone Water
  + Cannot be changed by player
  + Each Terrain has a set of potential biomes
  + Terrains slowly shift and erode
* Biome
  + The biome system is less explicit to the player and thus not mvp, we can just have Terrain and Feature but I believe it will add a lot to map generation and evolutions with it existing
  + Forrest, City, Tundra, Mountain, Plains, Freshwater etc
  + Each Biome will be associated with different mutations chances
  + Each Biome will have naturally generating features
  + Biome “strength” will define how biome edges will interact. E.G a Mountain biome will have a hard border while a forest biome might taper off.
  + Biomes shift more quickly
* Features
  + Features are explicit in game objects
  + Features can only be built on associated terrain
  + Features will have “hitboxes” that obstruct the placement of other features
  + Some features will be destructible
  + Some features will be movement obstructions
  + Buildings created by the player will be part of the feature set
  + Proximity to certain features, like poison or radiation will influence evolution
  + Features influence biome growth

Terrain:

* Terrain should influence rat movement depending on what the rats have evolved to traverse on. Water movement should be the most difficult/evolution dependent e.g maybe impossible without swimming trait, or with an oxygen system or something. Hopefully water generation will create interesting “strategic positions” for strongholds.
* Terrain should also influence food and starvation as well, this should be through the biome system if we implement that but the simple version is that Grass will have the most food and sand/stone will have the less, and water will have none
* Terrain will be generated by joining Voronoi tiles together, I think it would be best for most of the map to be land traversable and connected, with maybe a few small islands dotted around. Land Terrain should be most common Grass then Sand then Stone
* Sand terrains more common nearer equator and shores

Biome

* Generated on top of terrains; select certain terrain cells to be “seeds” and have them “grow” and algorithmically expand to neighbouring cells to create biomes
* Biomes also have a related “danger” level which influences mortality beyond food and climate, This could be amount of hazardous features generated or just a flat increase in mortality rates. E.g the forest has a lot of predators so just traversing/existing in forests are more dangerous
* Main attributes for Biome Class are:
  + Terrain it can form on
  + Food levels
  + Climate
  + How it influences mutation
  + Features it generates
  + Danger level
* 5 main core biomes:
  + City
    - High food levels
    - Medium climate
    - Can form on any Land terrain
    - Dangerous
    - Hazardous Features like rat traps and rat poison
    - Expands and shrinks dynamically
  + Plains
    - Grass default biome
    - Medium-Low food levels
    - Medium climate
    - Can form on Grass Terrain
    - Safe
    - Expands and shrinks dynamically
  + Forest
    - Medium food levels
    - Medium climate
    - Can form on Grass Terrain
    - Dangerous
    - Tree features naturally grow in forest biome
    - Expands and shrinks dynamically
  + Desert
    - Very Low food levels
    - Hot climate
    - Safe
    - Only forms on Sand Terrain
    - Also forms on most sand terrain
  + Tundra
    - Very low food levels
    - Cold climate
    - Safe
    - Forms on all land terrain
* Some Terrain can remain biome less, water and stone can just remain water and stone with only the terrain related evolutions and no food
* “DLC” Biomes
  + Some of these are more developed than others, all of there should be unique extreme biomes that mainly exist to give access to more interesting mutations. I recommend adding at most 2 of these if any otherwise we may be overcomplicating a 10 minute game.
  + Radioactive
    - Forms near a radioactive features
    - Mutated/corrupted features
    - Medium Food levels
    - Radioactive Climate
    - High mutation
    - Forms on all land terrain
  + Rainforest
    - Similar to forest
    - Hot Climate
    - High Danger
    - High food levels
    - Forms on Grass terrain
  + Saltwater
    - Forms on outland water
    - Mainly to create more mutation variety
  + Freshwater
    - Forms on inland water
    - Mainly to create more mutation variety
  + Volcano
  + Magic
  + Alien

Feature

* Necessary features are only the ones built by the player; Rat strongholds etc
* Requires a hitbox for space and to be on correct terrain
* Other features are generated, either with the biome system or just randomly on terrain, these should include
  + Food generating features
  + Hazards
  + Travel obstructions like mountains