Start Screen

EcoMetropolis

To accomodate growing needs for an expanding population, new business, and new manufacturing, a nature preserve situated between four cities is being considered for rezoning. Your task is to use this simulation to actively prepare for the urbanizing of this space in such a way that you provide for the new needs while trying to preserve as much green space and wildlife as possible, and by trying to keep pollution in check.

With a budget of $250,000,000 (more can be gained by building smartly that adds tax revenue), you'll need to weigh the pros and cons of each parcel that you urbanize. Once you build something, it cannot be reverted to nature or turned into something else. However, you will have the option after building to add green improvements to help offset some of the ecological damage your buildings may have caused.

Ready to responsibly build? Click Start to begin, and once inside, click the ? icon if you'd like additional instructions and tips.

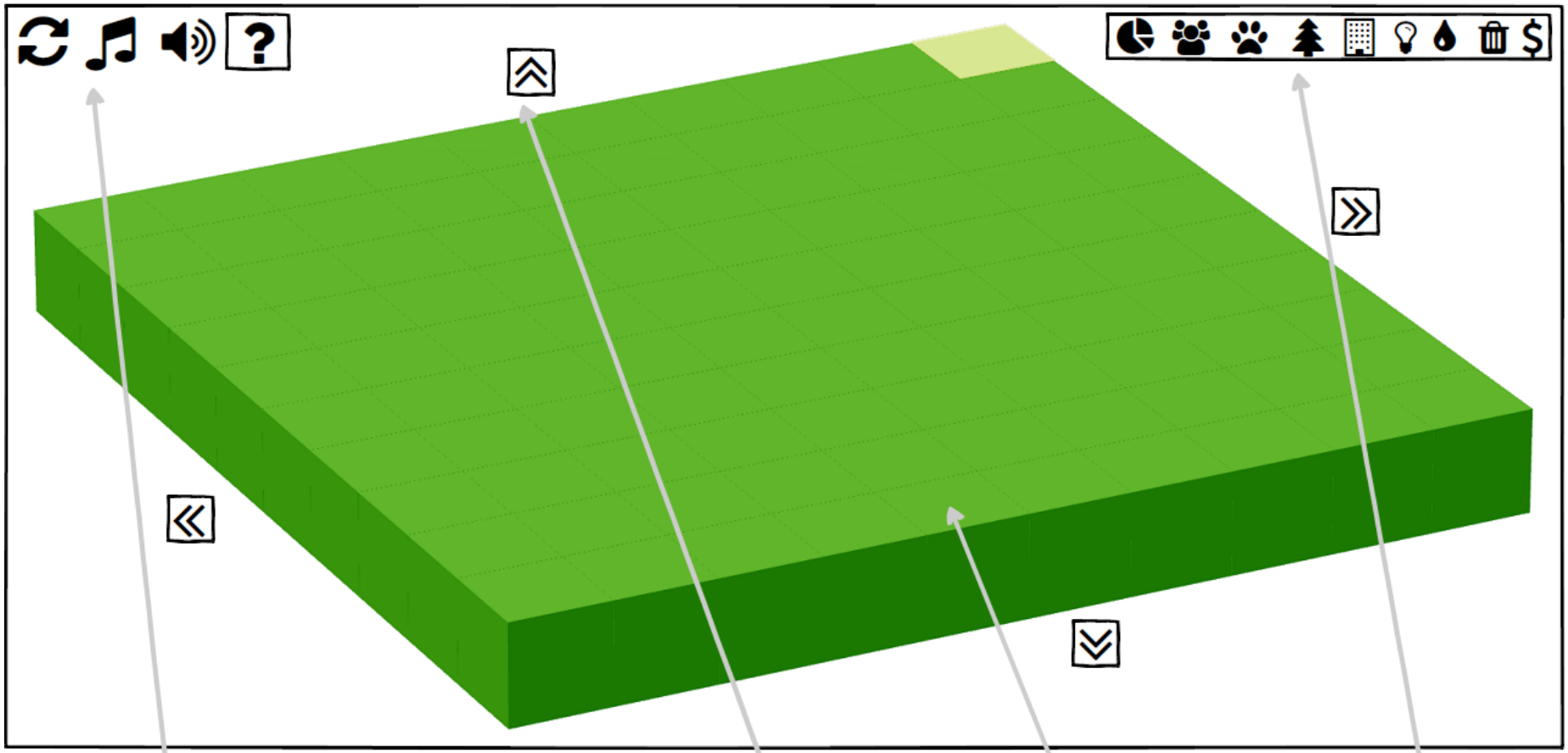
START

Standard background image with title (may be image if font and styling warrant it), text, and start button. Make this feel like a game start screen.

NOTE: No music on first screen (unless returning to it from a Reset). As with Stock Exchange, music should turn off if focus leaves the tab.

As per usual, for any buttons, please supply a standard, hover, and on-click state. Some buttons will also require a disabled state, which will be noted on a case-by-case basis.

Game Start



Reset button - opens modal to reset simulation
Music button - Needs On and Muted versions. Turns off/on music (and background SFX) only).
Sound button - Needs On and Muted versions. Turns off/on all sound.
Help button - surrounding box expands to show a help modal

Four-arrow buttons - expand into modals that show what sort of connecting resources can be found in that cardinal direction.

100 individual land parcels; start with randomized foliage (per rules shown later), and can be clicked on to display a modal showing information and build options, depending on its current status.

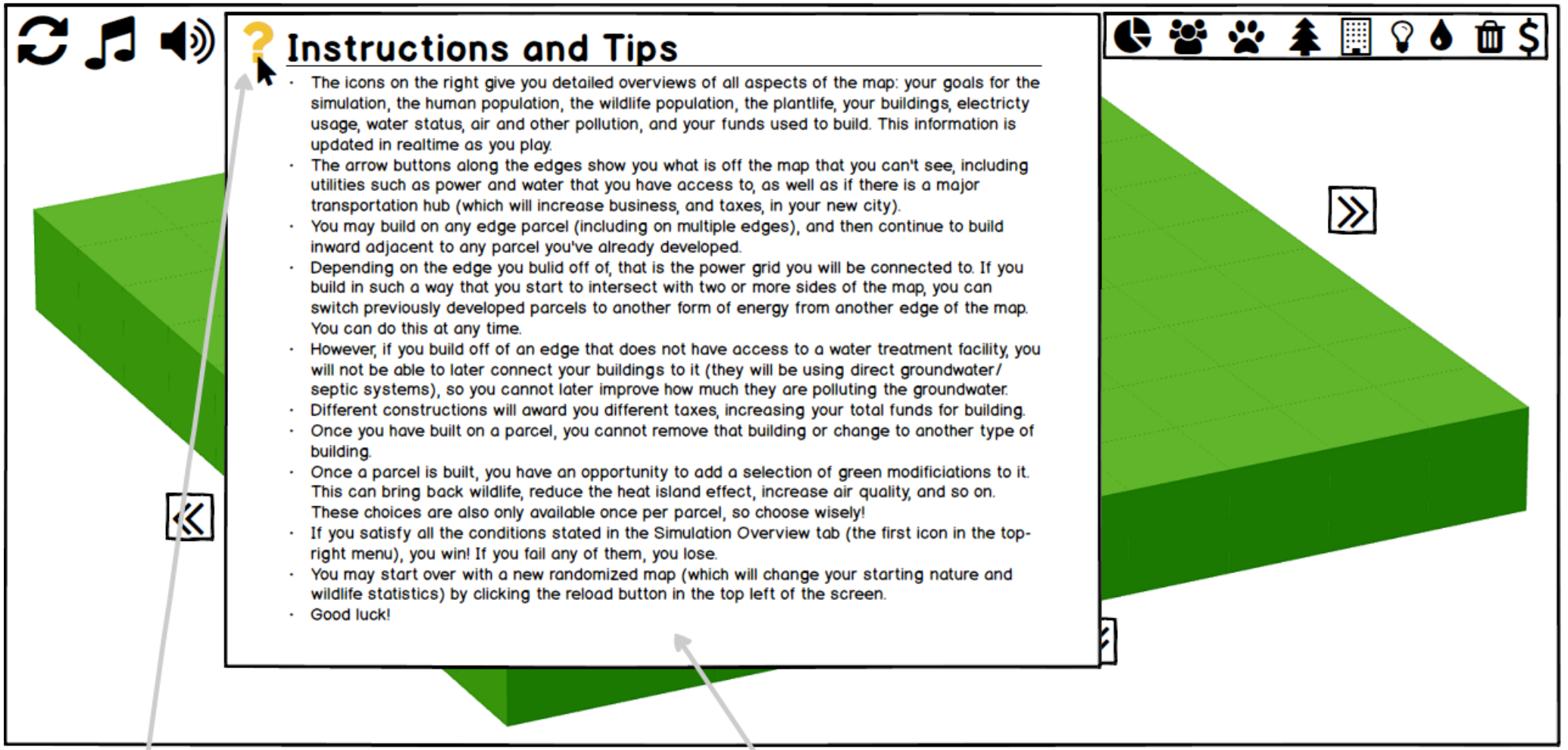
Expandable menu - Clicking on any icon will expand the rectangle to include a modal showing the related information for the clicked icon.

Music should be quiet, cozy and a decently long loop, as students will spent a good amount of time in the simulation.

Like stock exchange simulation, every click point should have a sound effect. The more often it will be clicked, the softer the sound effect will be so that it doesn't become grating over time.

One idea I had was that there could be a very soft nature track playing in the background as well (would be muted with music) with birds, wind, etc. At certain thresholds of construction, that SFX track would be muted by a % while a "city noise" track starts to fade in by the same %.

Instructions Modual



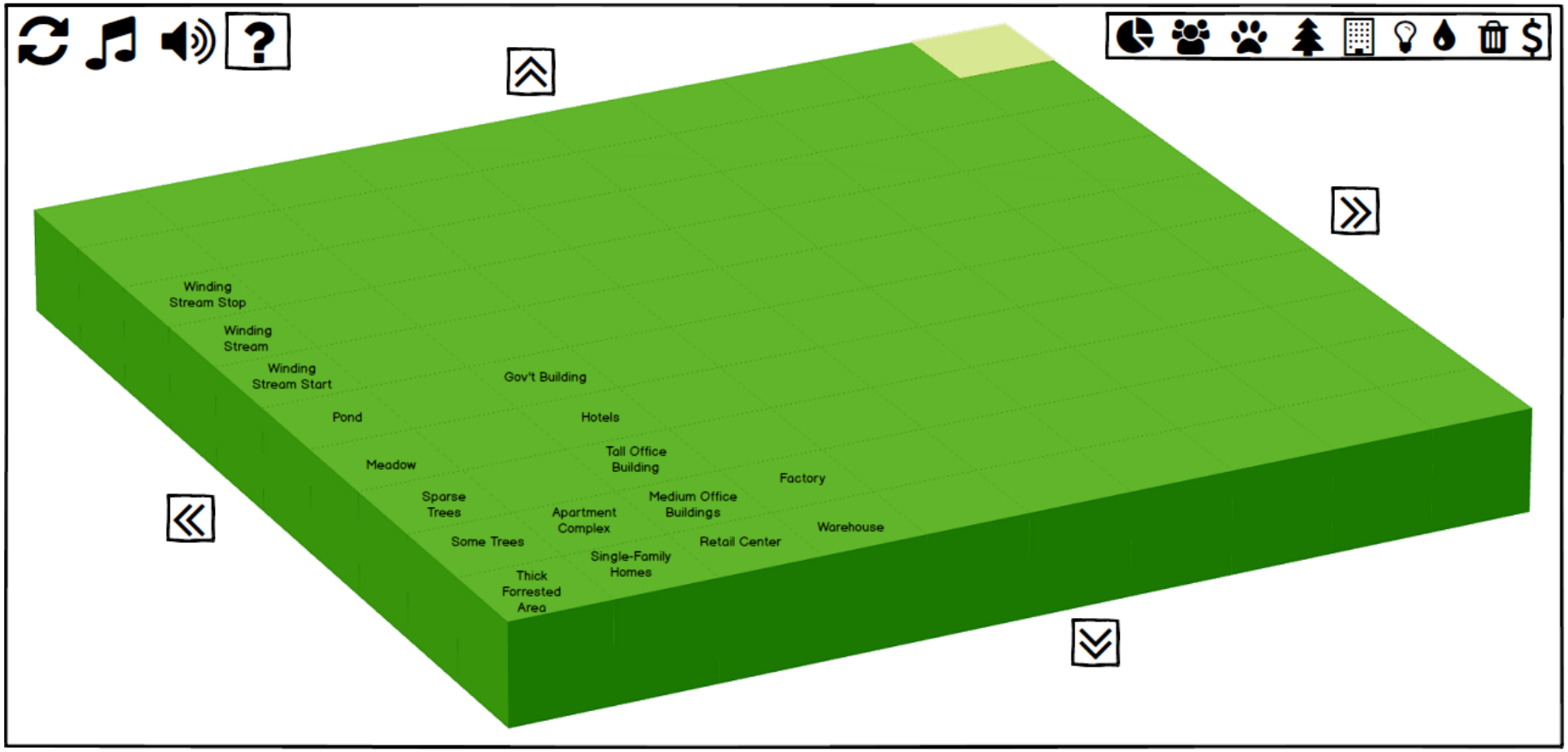
Clicking the icon again closes the modal. This will be a reocurring means of closing these sorts of modals tied to icons.

Basic gameplay instructions and tips to get students started will be included here. Current text is accurate but will be modified through playtesting. The space should be large enough to contain a lot of information. Engaging styling will be important (for final graphic mockup).

The square around the ? icon expands to create the modal.

Generally speaking, it should be noted that clicking another icon that opens a different modal (including clicking on a parcel of land) should also close an already open modal. Otherwise, we need to disable all other click points behind the open model until it is closed to prevent errors.

Parcel Types



Additional visual guidance for buildings:

SFH: As many detached homes as we can fit in a square.

APT: 2-3 apartment buildings (whatever fits)

Retail: Several stores

Med Office: 2-3 2-4 story office buildings

Tall office builing: one tall office building

Hotels: 2-3 hotels

Govt Building: 2-3 buildings (school, fire, police)

Warehouse: 1 warehouse

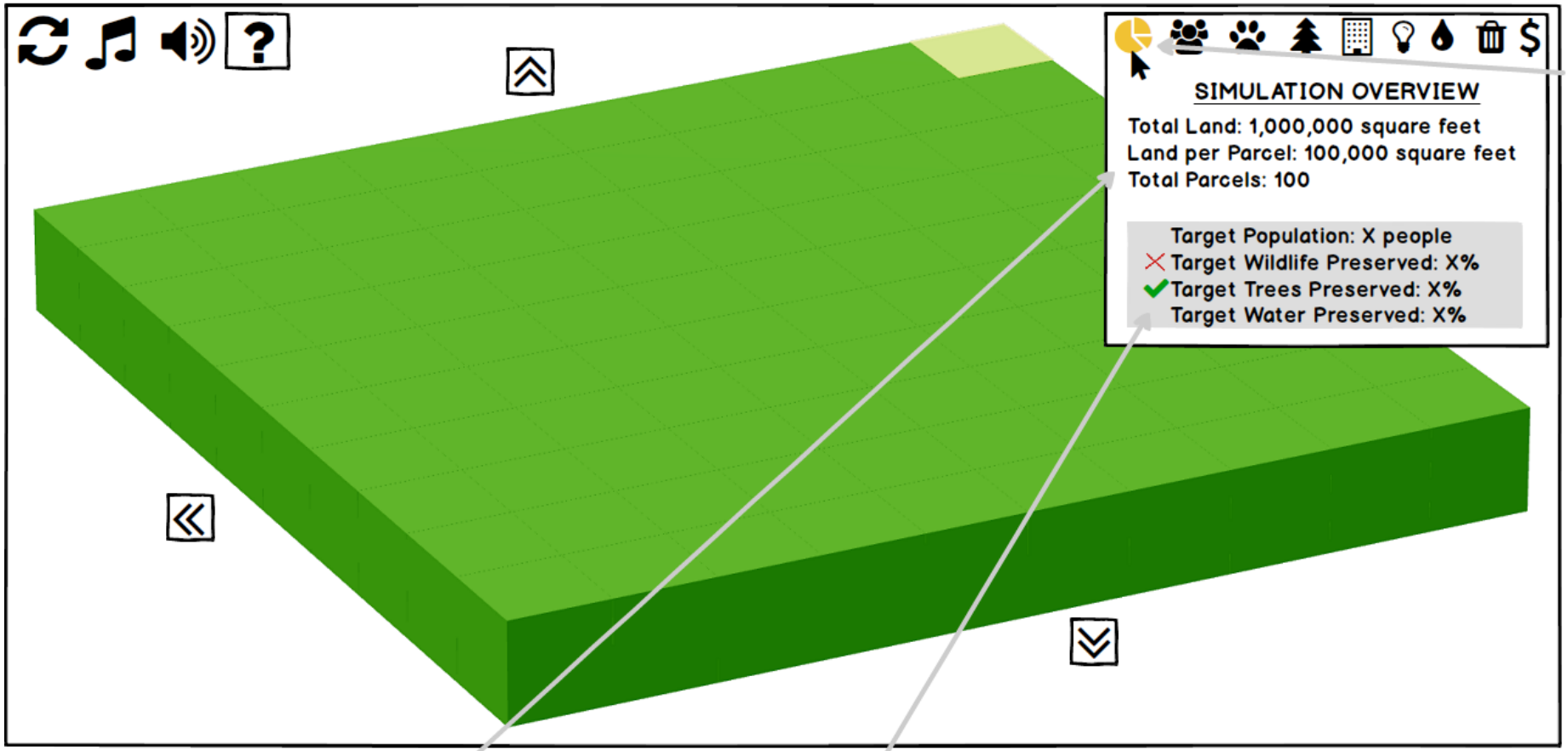
Factory: 1 factory with smokestacks (animated?)

Parcel Notes (randomily pick number from all ranges):

- Sparse Trees: Visually, 2 trees; actual count is 10-20. X-Y small animals, X-Y birds.
- Some Trees: Visually, 6 trees spaces out; actual count is 60-80. X-Y small animals, X-Y birds.
- Thick Forrested Area: Visually, dense cluster of trees; actual count is 250-300. 1-2 large mammals, X-Y small animals, X-Y birds.
- Meadow: Visually, grass only. No trees. X-Y small animals, X-Y birds.
- Pond: X-Y fish, X-Y reptiles, X-Y amphibians.
- Winding stream (any): X-Y fish, X-Y reptiles, X-Y amphibians.

- SF Homes: +30-60 pop, X-Y electricity usage, +12-20 cars, +20% GW pollution, +$X tax
- Apartments: +550-720 pop, X-Y electricity usage, +300-400 cars, +30% GW pollution, +$ tax
- Retail Centers: X-Y electricity usage, +100 cars, +40% GW pollution, +$ tax
- Med Office: X-Y electricity usage, +150 cars, +40% GW pollution, +$ tax
- Tall Office: X-Y electricity usage, +300 cars, +40% GW pollution, +$ tax
- Hotels: X-Y electricity usage, +150 cars, +40% GW pollution, +$ tax
- Gov't: X-Y electricity usage, +50 cars, +40% GW pollution, +$ tax
- Warehouse: X-Y electricity usage, +200 cars, +60% GW pollution, +$ tax
- Factory: X-Y electricity usage, +1000 cars, +100% GW pollution, +$ tax

Simulation Overview Screen

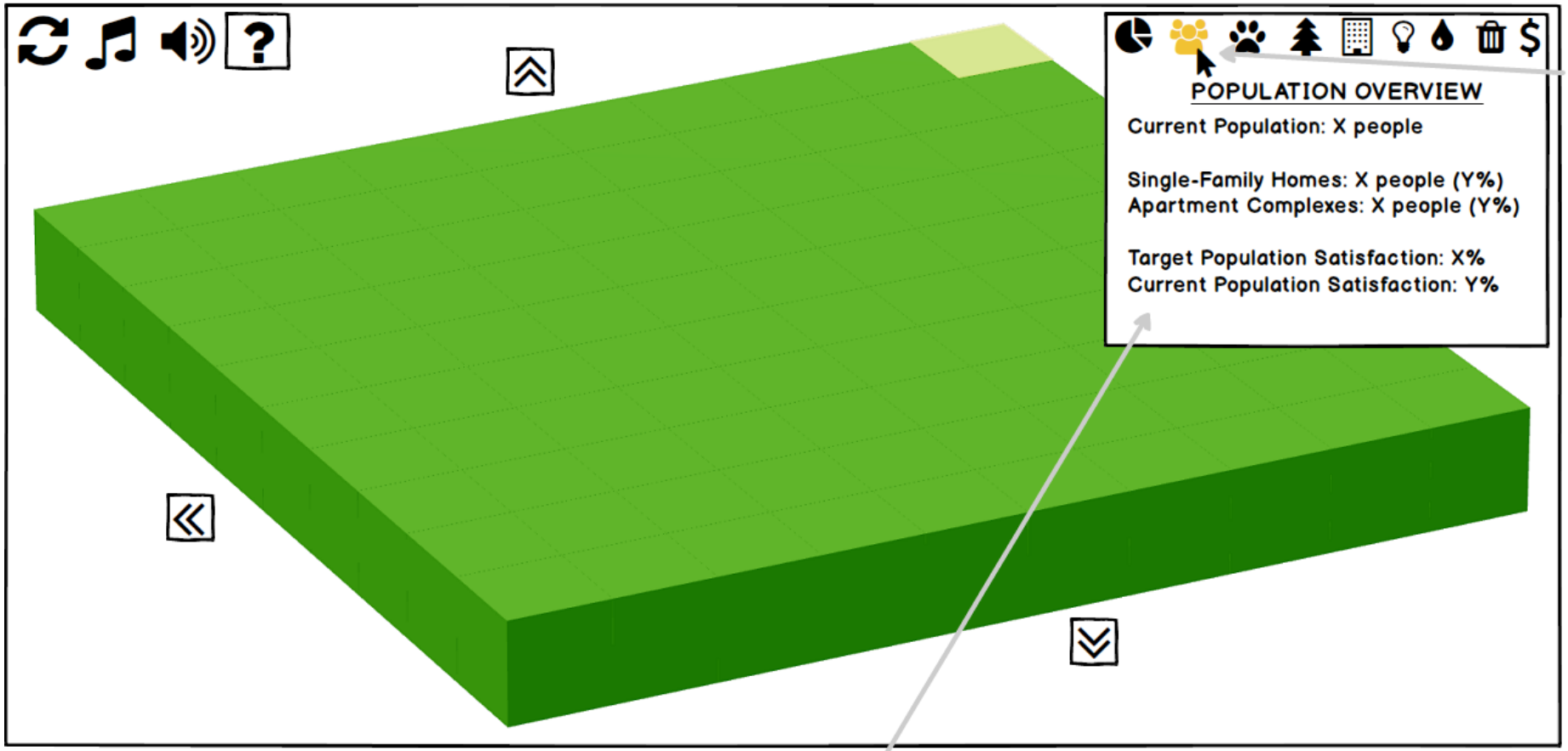


Clicking the icon again closes the menu.

General land information is provided here.

Goals for the simulation are listed here. If a goal is met, a Checkmark is added beside it. If a goal has failed, an X is added beside it. These can dynamically update through play, so once one or the other mark is added, it can later be changed.

Population Overview Screen



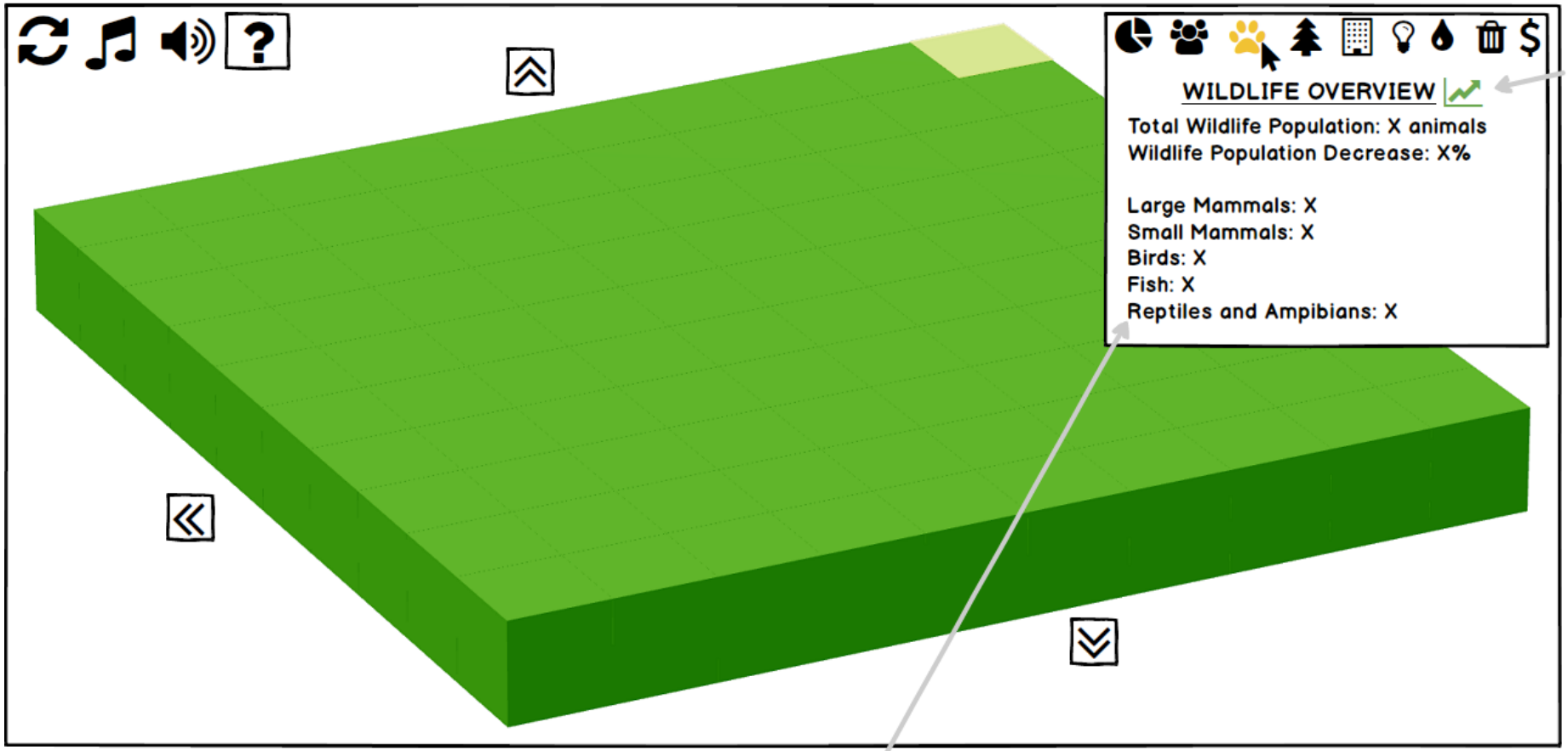
Clicking a different icon wihle the menu is open just swaps out the data under it (it does not open a separate modal).

Human population related statistics.

All statistics are updated dynamically every time changes are made.

Population is determined only by single-family homes and apartment complexes.

Wildlife Overview Screen

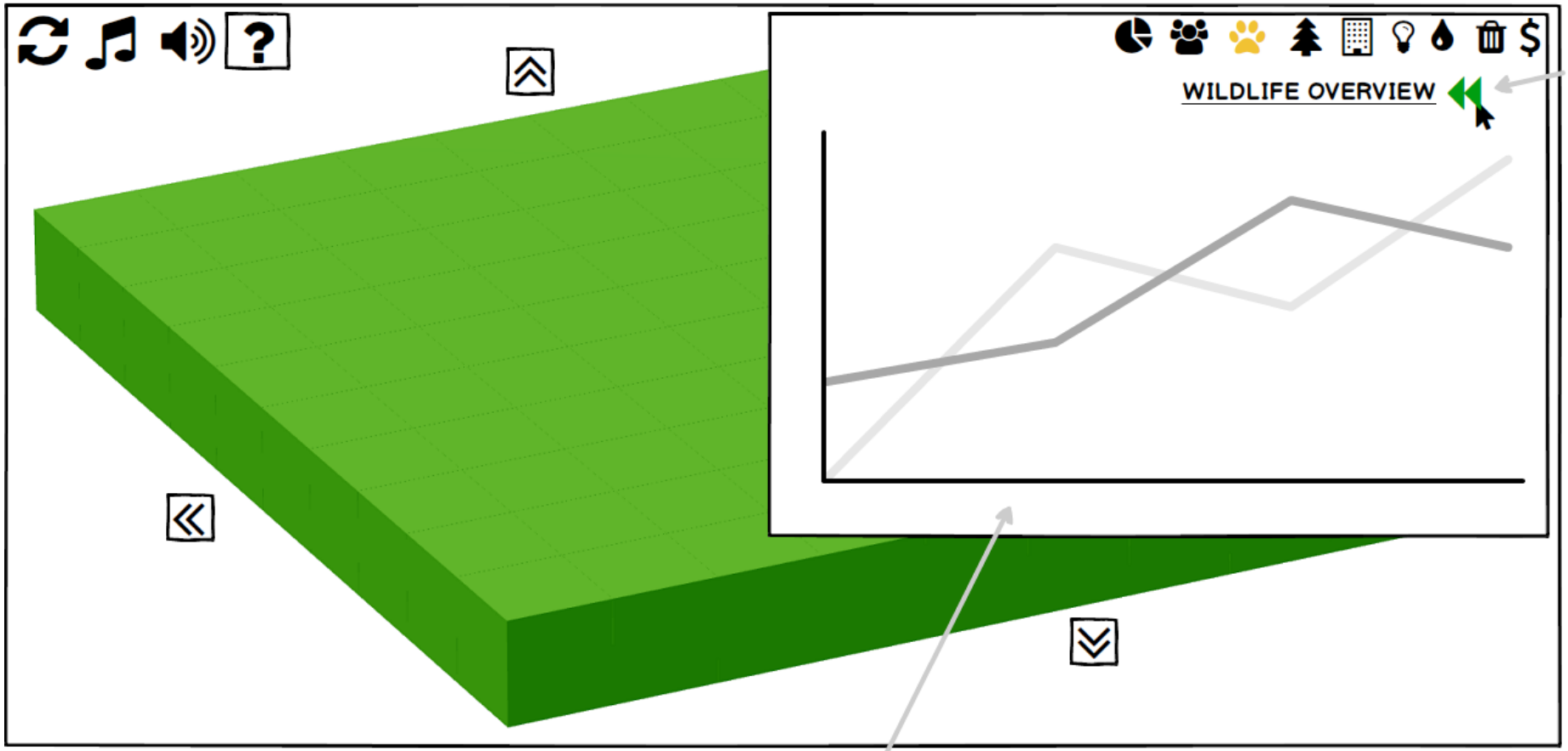


If this icon appears next to the name, you can click it and get an alternate graph view.

Wildlife population related statistics

Each type of nature parcel has ranges for animals of the different types. Numbers are randomly generated within those ranges and applied to the parcel at the start of the game. These numbers are removed from totals if the parcel is urbanized. Some of these numbers (not fish, reptiiles, amphibians, or large mammals) can increase again through certain building green improvements.

Data as Graph

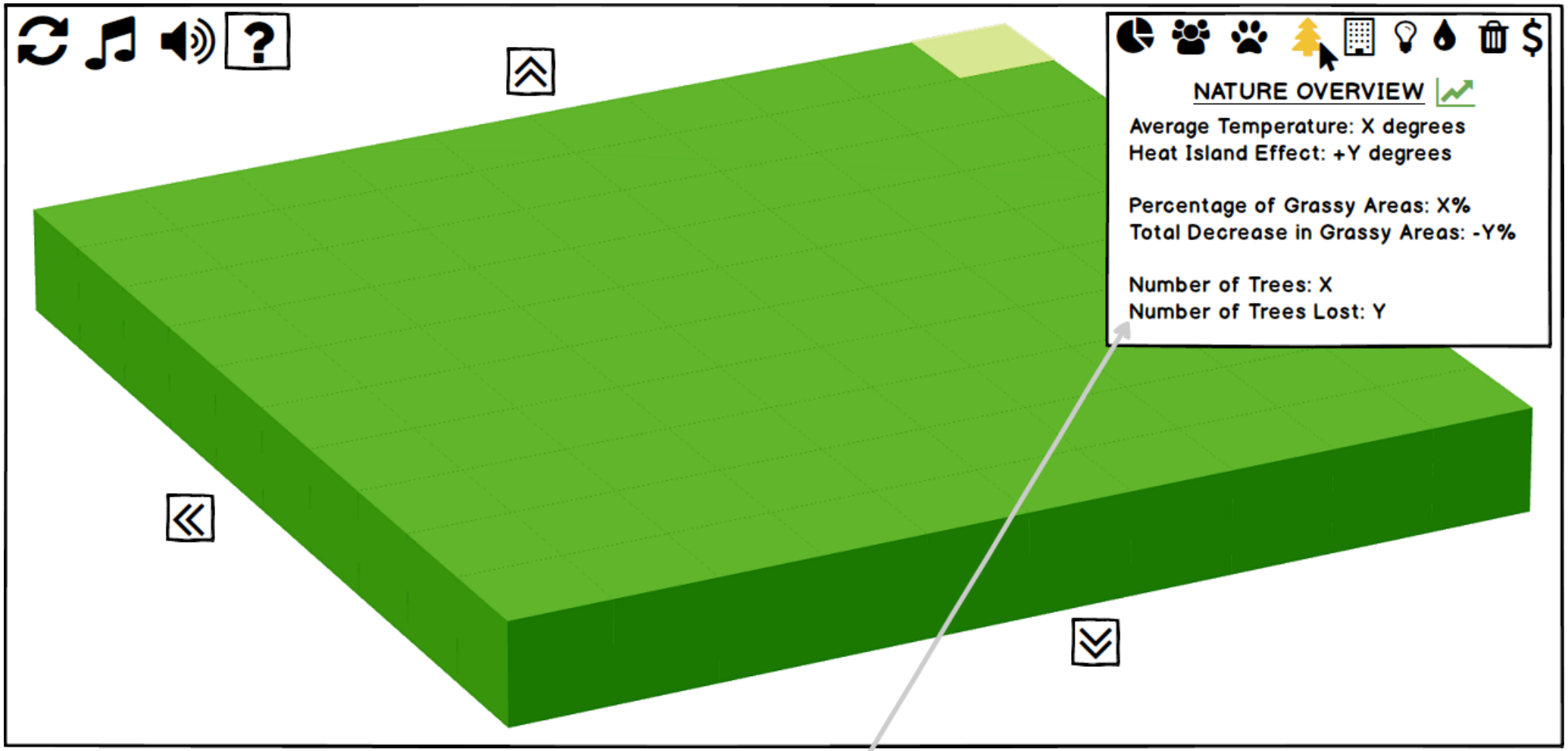


A "back" icon appears to return you to the text-based view of the data, and the modal size returns to normal.

In graph view, the modal expands to make this more readable. The same data points are shown. There are only two points: start of game, and current. This, however, gives students a quick visual view of the current trajectory. A key at the bottom will explain what the line colors represent. The bottom left corner represents the Start, and and bottom right corner represents Now. Numbers will scale dynamically along the Y access to represent the numbers needed for the lines.

This can also be represented as a bar graph, if desired.

Nature Overview Screen



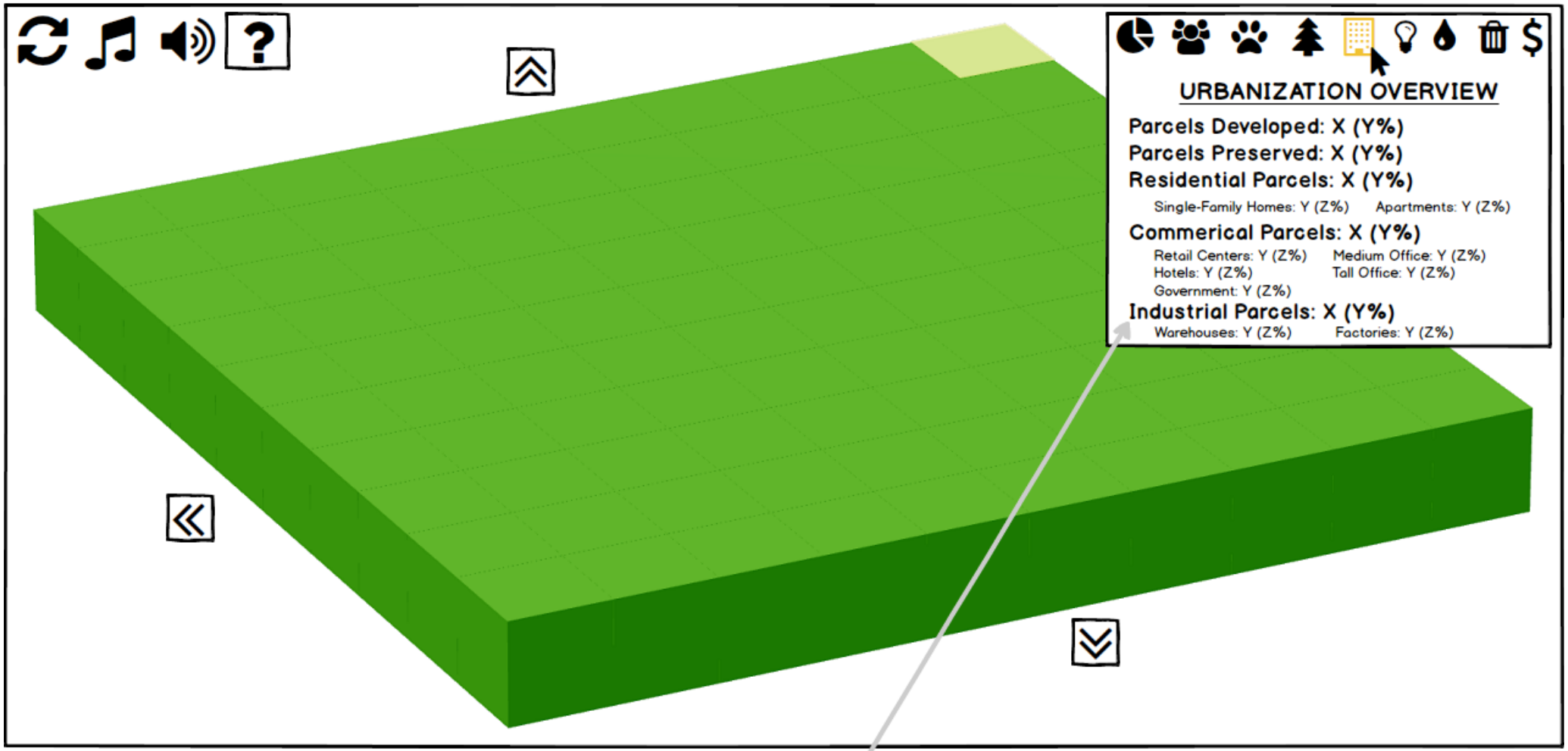
Nature related statistics

Average temperature will start at a set default. It will increase as more concrete is built. The offset will also be shown (heat island effect).

Grassy areas (meadows and sparse trees) are shown here.

Number of trees is kept track of. Parcels with trees have ranges of trees, and at the start, these parcels have their number determined as random picks from those ranges. If that parcel is developed, those trees are removed from the totals. Tree count can increase again through a green improvement (those new trees are reduced from the Trees Lost count).

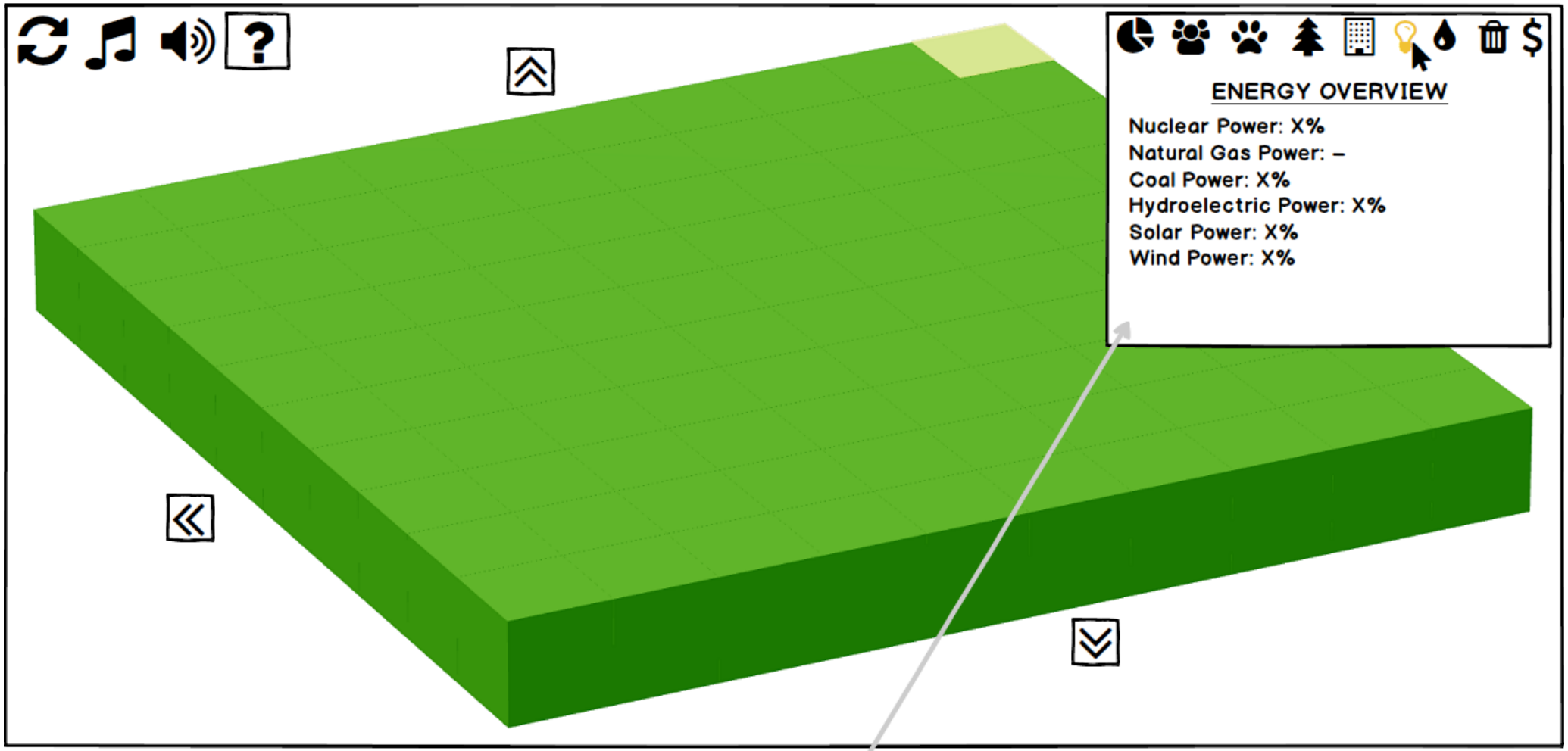
Urbanization Overview Screen



Construction related statistics

Easy reference sheet for how much you have built versus preserved, and how much in each main group (i.e., 4 industrial, which is 25% of all buildings), 2 of which are warehouses (which is 50% of industrial).

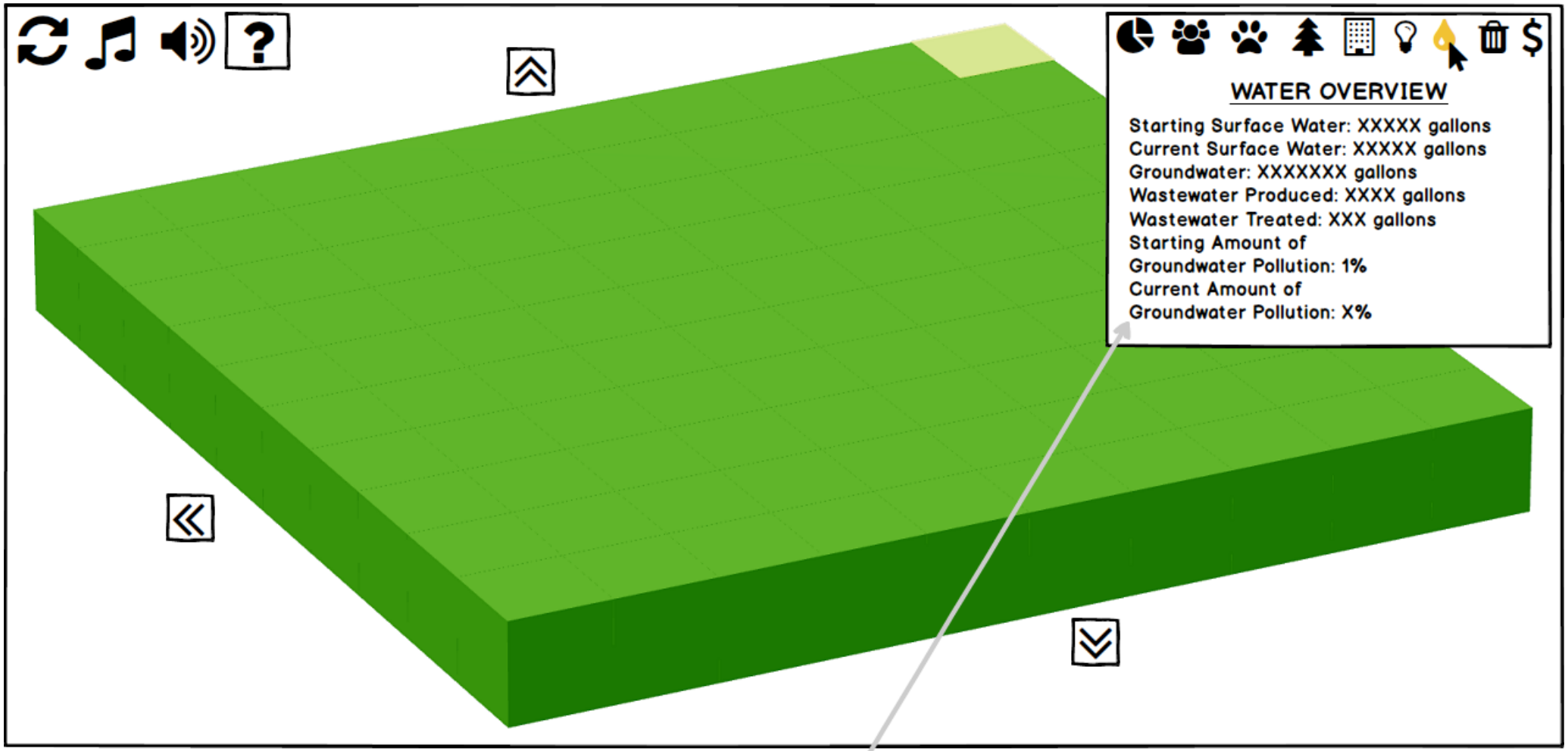
Energy Overview Screen



Energy related statistics

Each building must be connected to one of four available power grids (one type will be missing from each scenario, if so, it is noted with the en dash).
Solar is only an option per building as a green improvement.

Water Overview Screen

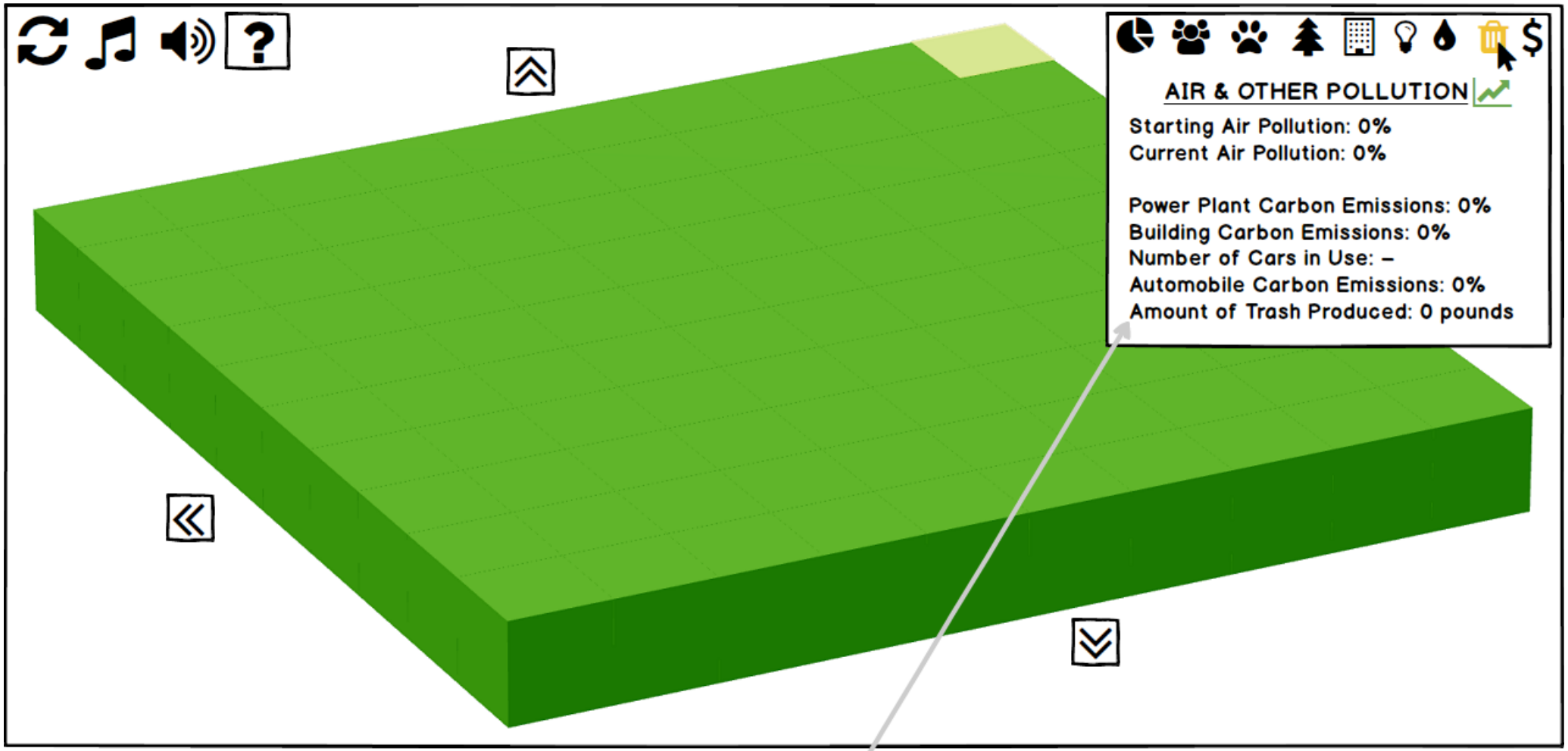


Water related statistics

Surface water will be a set amount (from ponds and the stream). It is lessened (by a set amount) if those parcels are urbanized.
Wasterwater will be static for each building type and added up here. Wastewater can only be treated if it is built connected to a side with a water treatment plant (this cannot be changed later).

Groundwater pollution is affected in a static amount per building and type.

Pollution Overview Screen

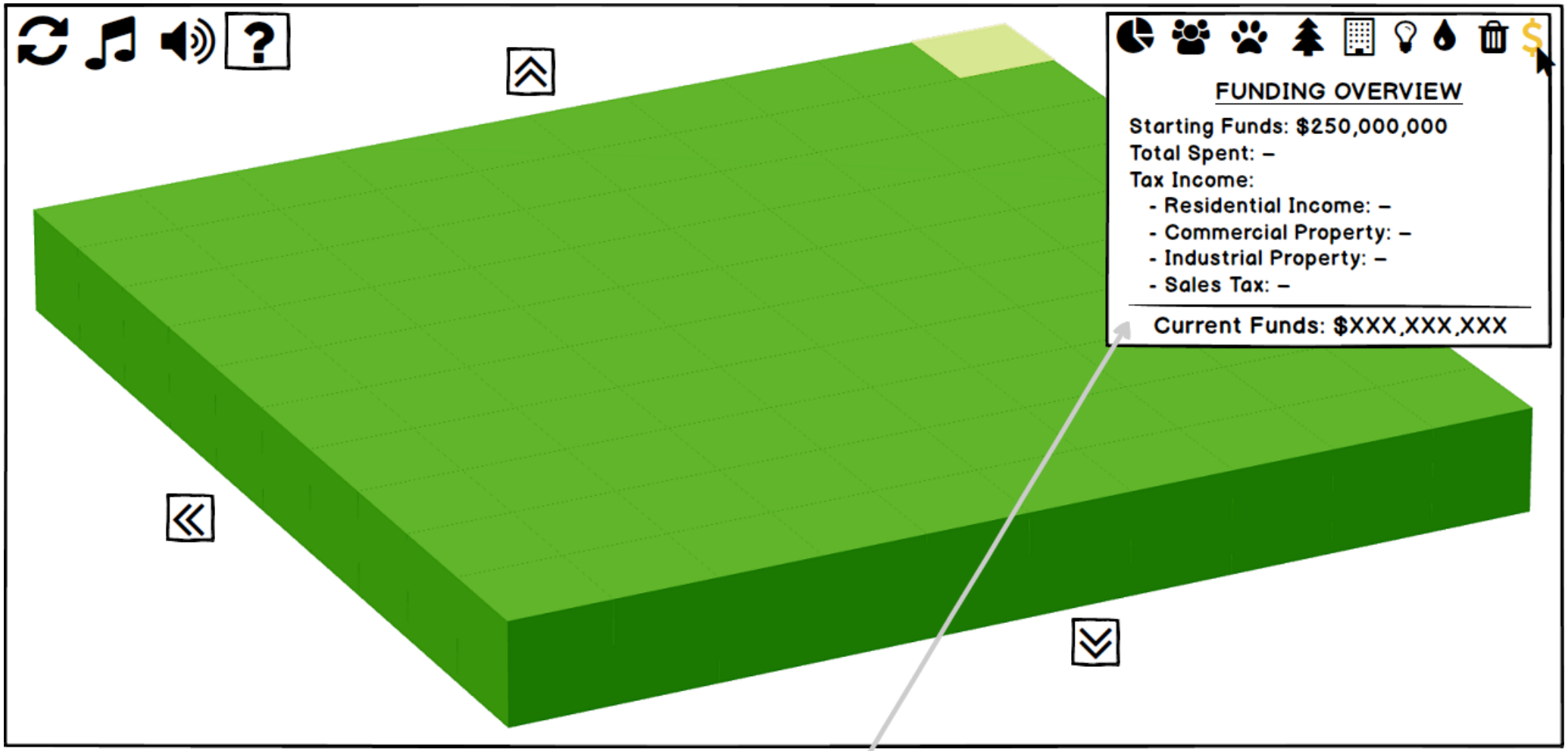


Other pollution related statistics

Air pollution is affected by loss of trees, and all building types by virtue of the type of building and/or the number of cars each building adds to the total cars.

Trash production is a set amount per building and type.

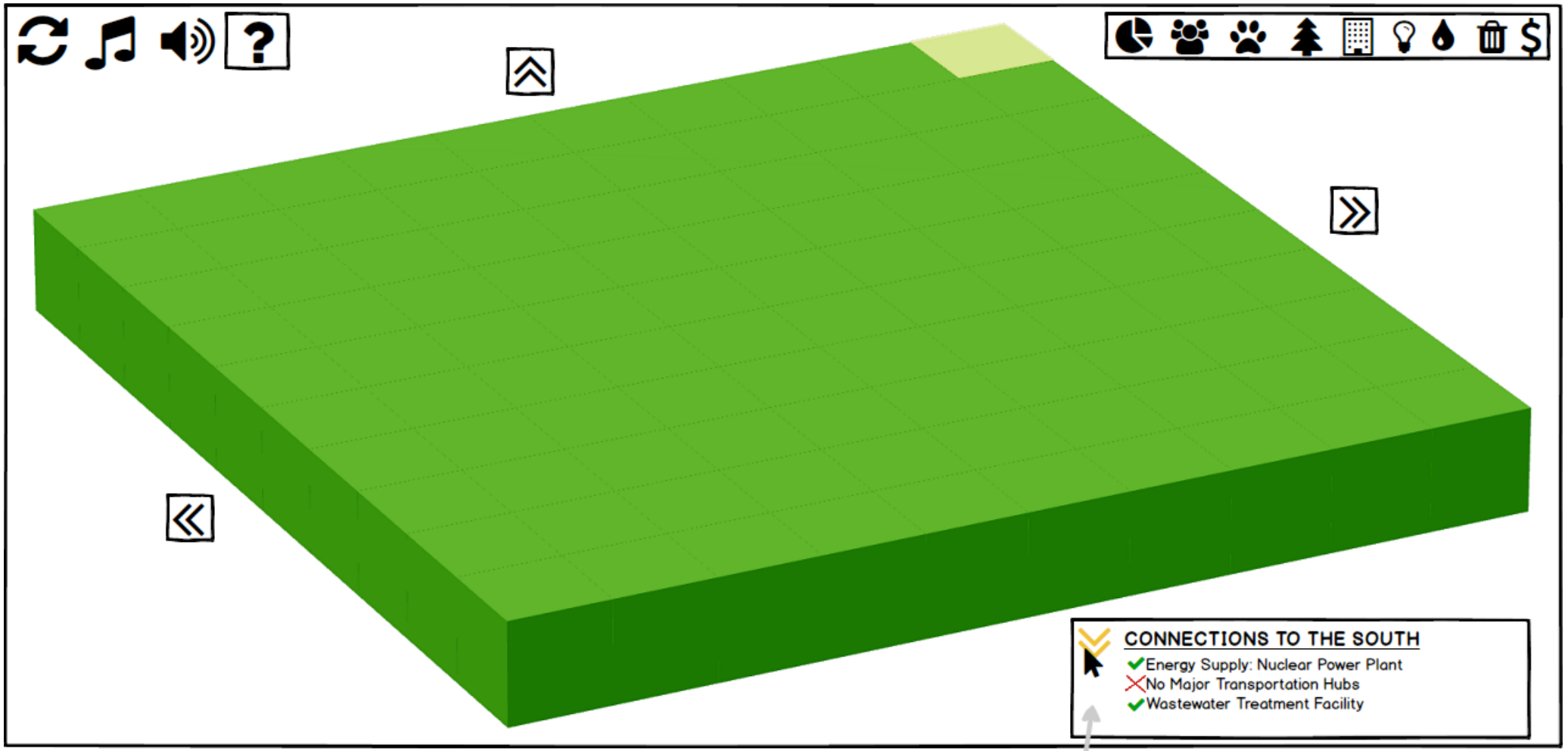
Funding Overview Screen



Money related statistics

Students always start with the same amount of money. We track what they spend. They also get money back in the form of taxes. These buildings make more in taxes than they cost to build (time is nebulous in the simulation, so the tax benefit is applied immediately). This is why students will need to build commercial and industrial buildings, to continue to fund the city. They need to have enough funds to build everything to hit the scenario goals. This is to force them to balance building with pollution and wildlife management.

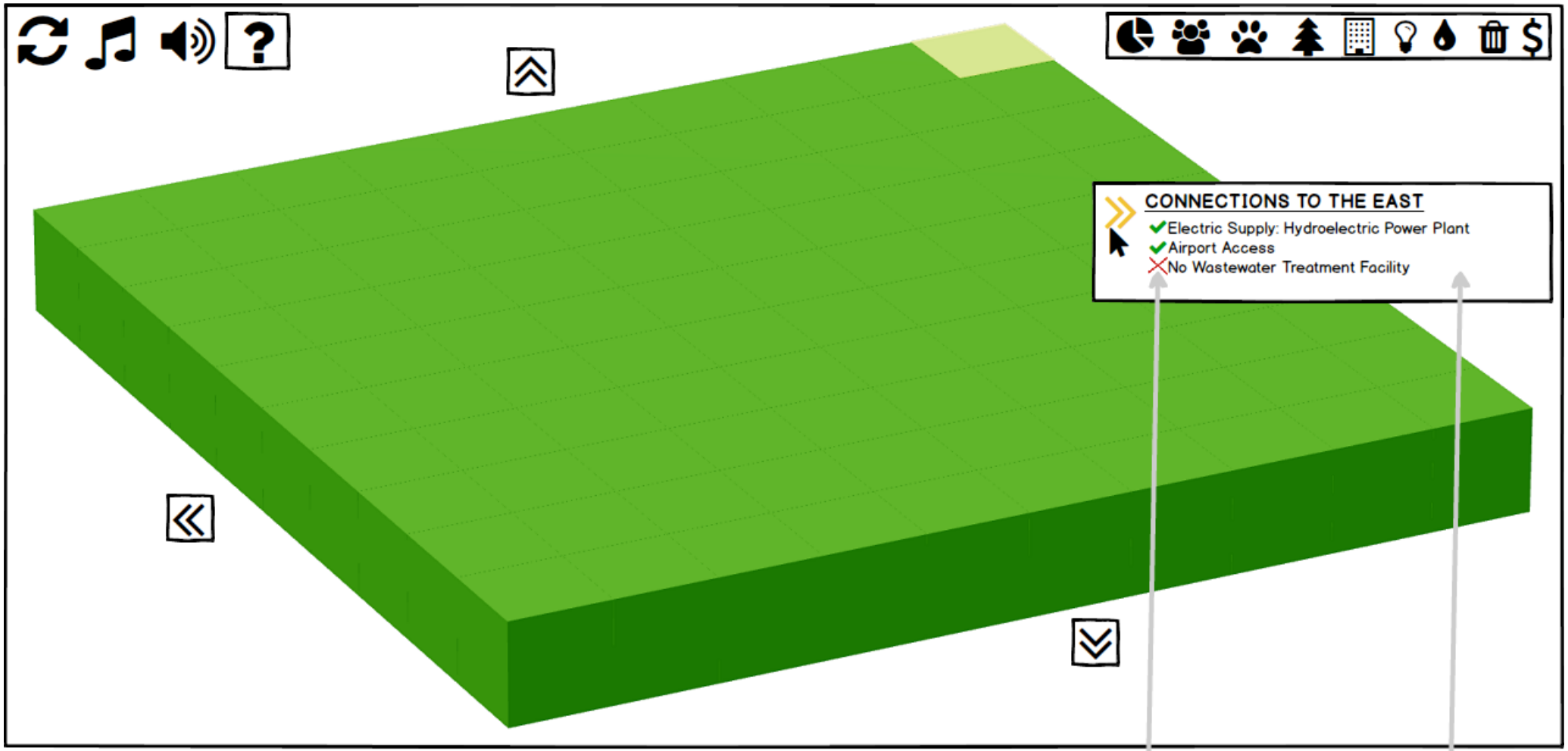
Connections to the South



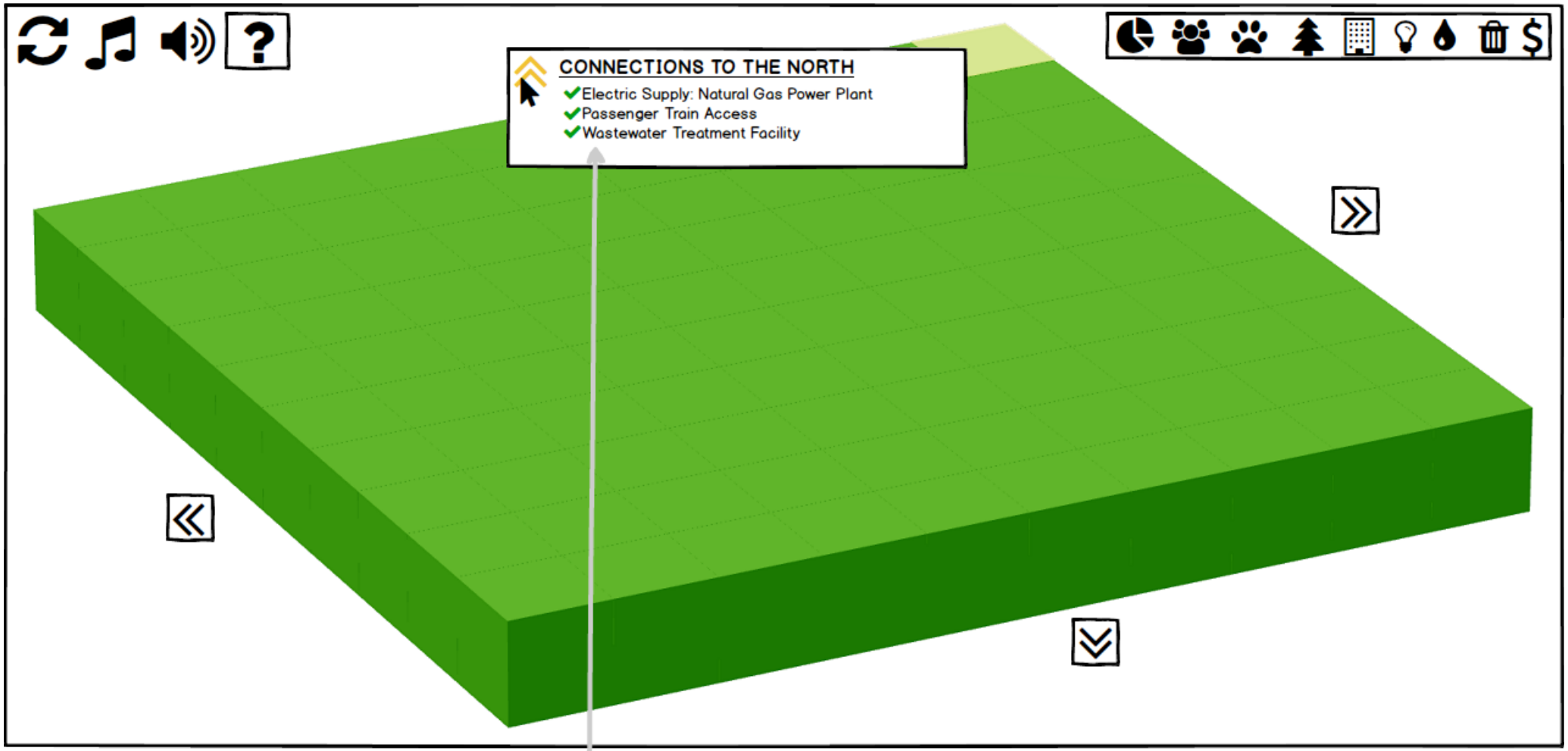
These are information panels. This information COULD be on the screen all the time, but I don't want the space to feel cluttered all the time, so this can be explored by the graphics team.

Energy supply is what buildings connected on this side will get their power from (and thus create more or less pollution).
Transportation hubs increase the number of people visiting, which increases sales tax (but increases cars). If we need to include population satisfaction, this would be a factor as well.
Wastewater treatement will affect groundwater supply and groundwater pollution. If you build not connected to one, this problem cannot be fixed later.

Connections to the East

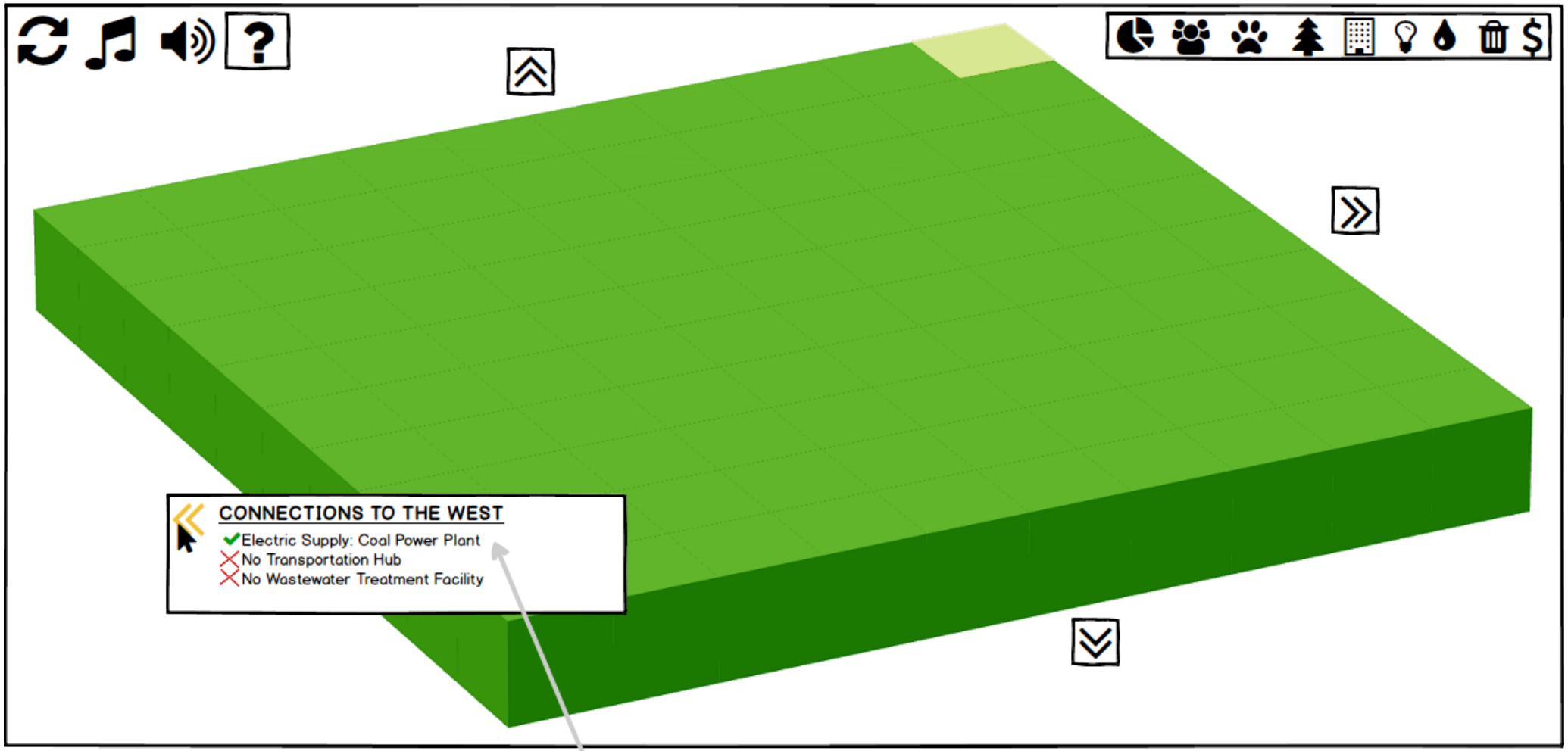


If we use these as modals, clicking the arrows opens and closes them. Due to spacing, the one here on the east would need to expand out differently so that it stays on the screen.



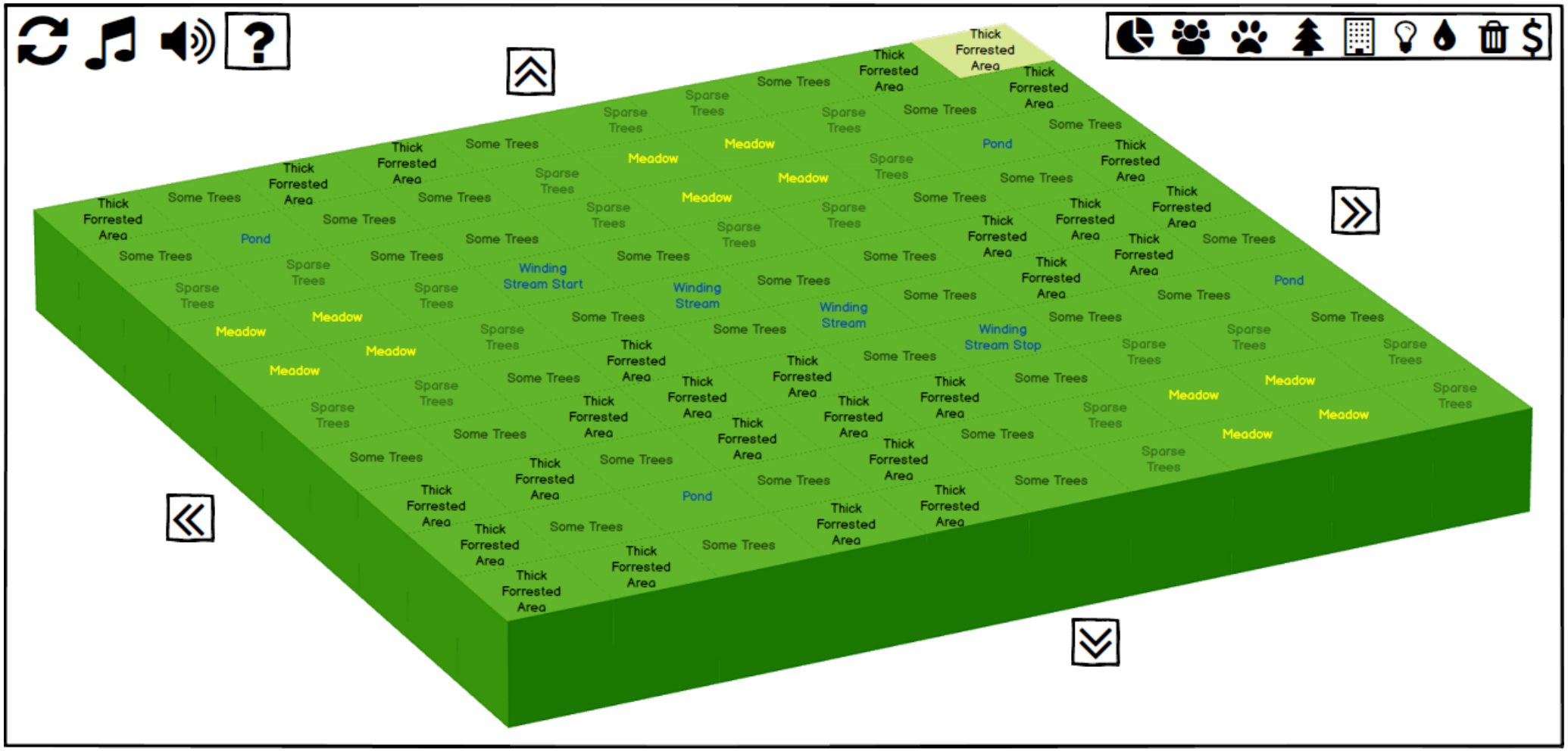
Only two sides can have transportation hubs. They may be any two sides. One is an airport, one is a passenger train station.

Only two sides can have wastewater treatment facilities. They should be on opposite sides (north/south, or east/west).



Because there are only 4 plants used in a game, but 5 types available, these should be randomized each game, with one left out.

Starting Parcel Randomization



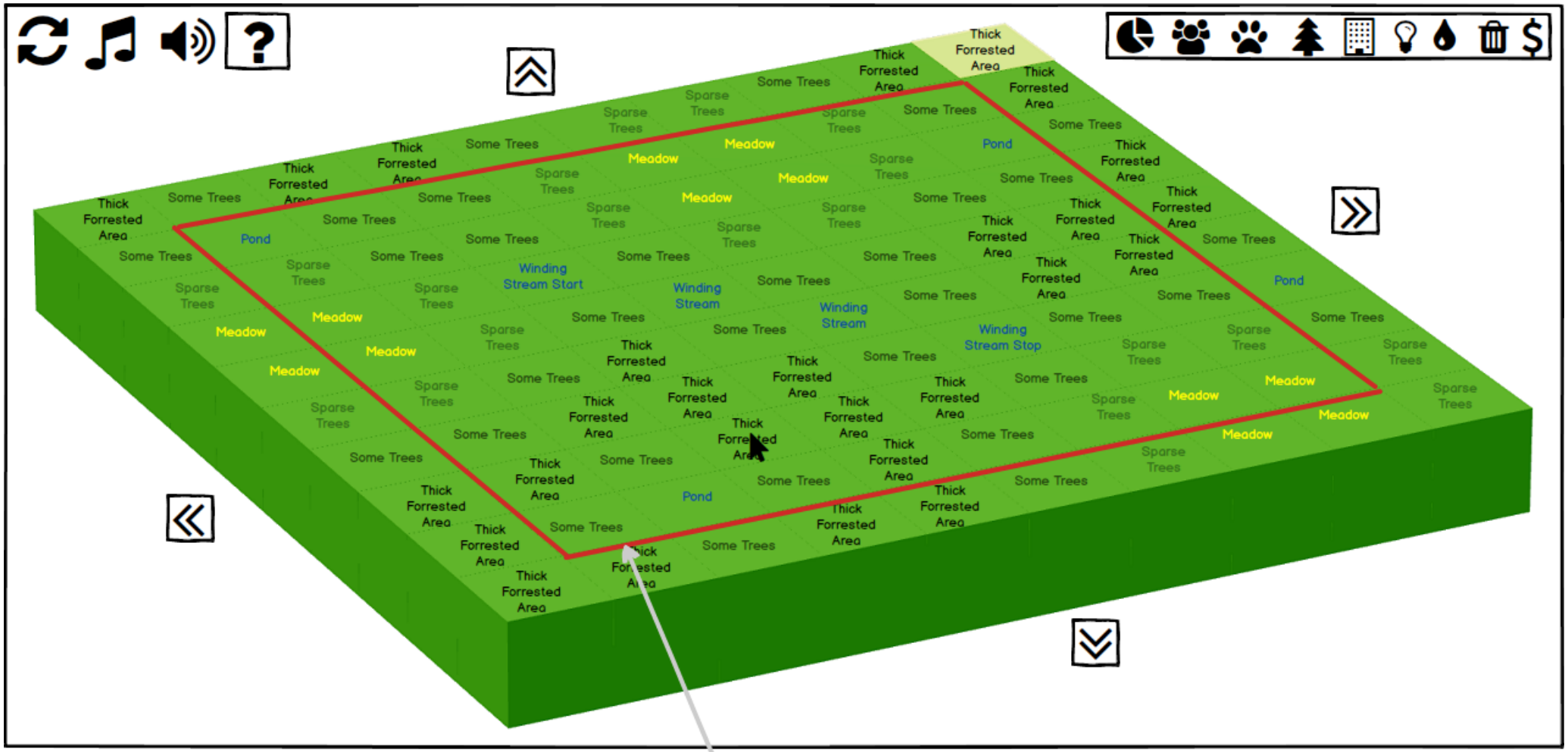
Random Nature Generation Rules (to be generated in this order):

- 1 winding stream (diagonal parcels, visually connecting at the upper left/ lower right corners) that is 4 parcels long
- 4 ponds
- 3 meadows (meadows must be 4 parcel-squares)
- None of these three types should touch each other directly (orthogonally)
- All other spaces are trees, placed in priority (see right).

Tree Generation Priorities:

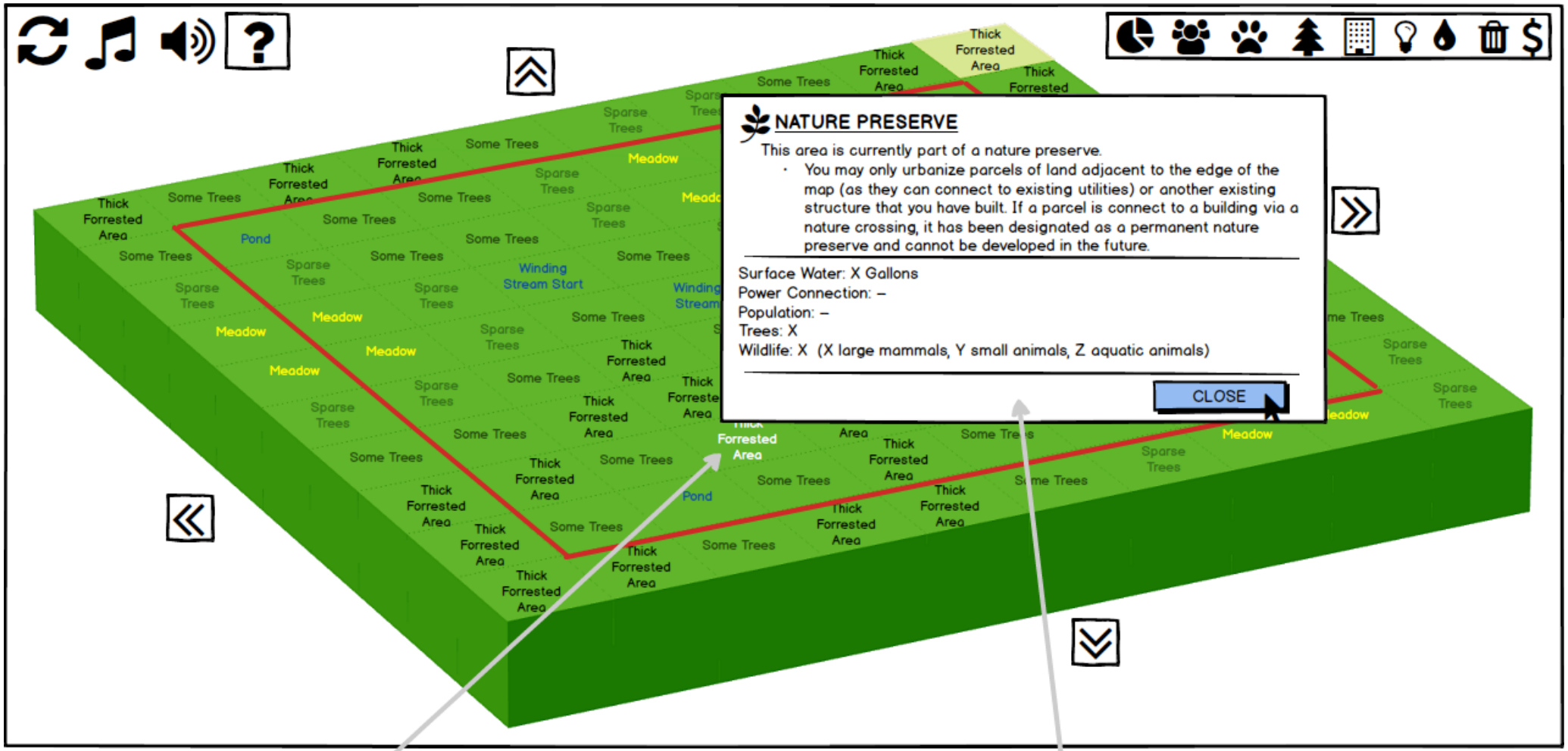
- Meadows must be surrounded by sparse tree parcels (orthogonally).
- Ponds and Streams must be surrounded with some trees, unless next to a meadow, in which case sparse trees takes precedence.
- If sparse trees have no body of water or meadow orthogonally next to them, place some trees there.
- If some trees have no body of water next to them, place thick forested area there.

Initial Building Area Restrictions



At the start, you can only build next to one of the four edges (or in a corner that allows connection to two edges) in order to connect to existing utilities, namely power. It might be good to show this visually if possible. However, this information can be included in Help, and this is made obvious if you try to build on a non-edge space when you click it.

Nature Preserve Modal

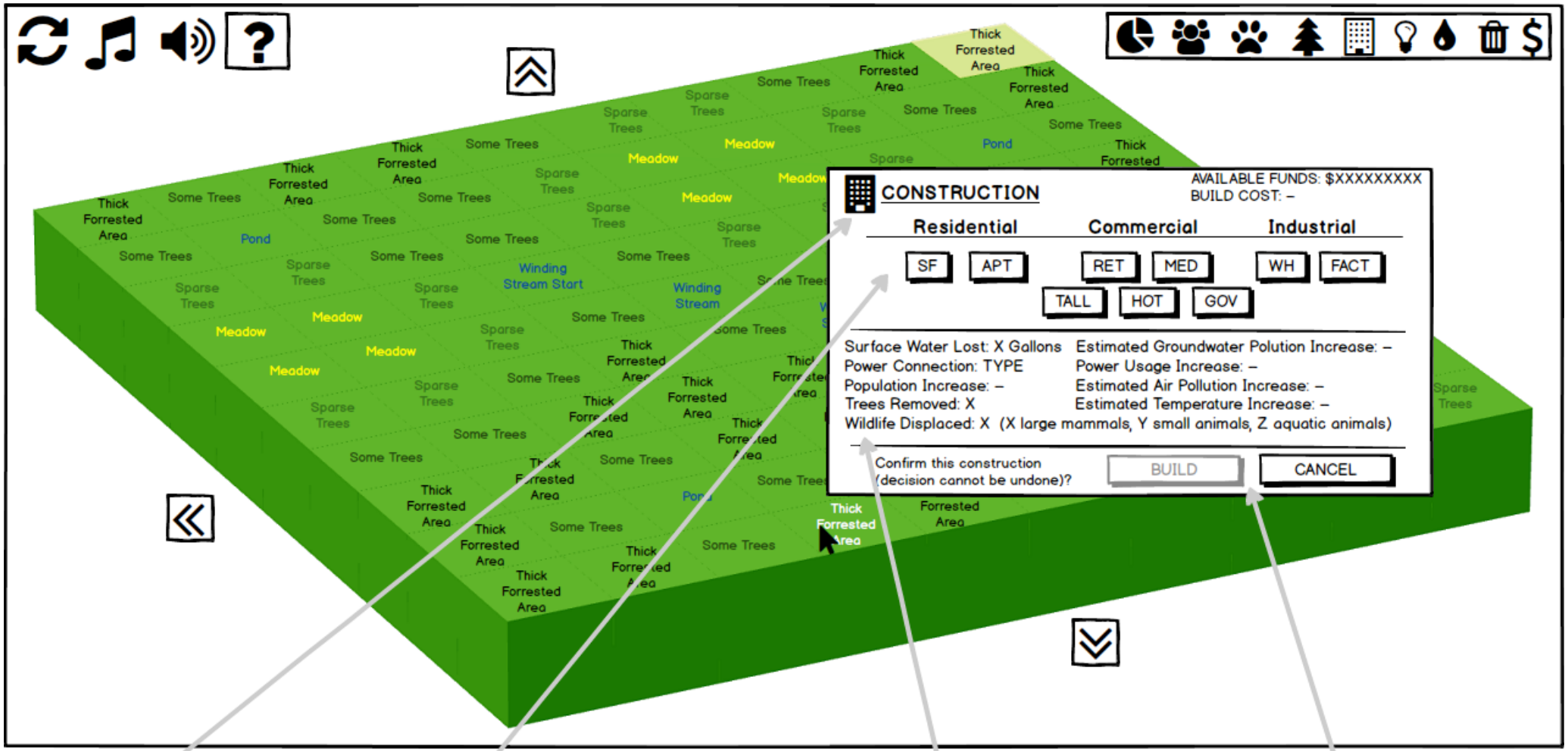


When a parcel is clicked, it would be good if it could be highlighted in some way so it's clear which one we're addressing.

If the parcel is a nature preserve AND
- is not on an edge or connected orthogonally to an existing building, or
- is connected to another building via a nature crossing...

we get this type of modal (situated in such a way that it's as clear as possible which parcel it's addressing; this can be workshopped during graphics mockups), which lets you know you can't currently build here, and gives you relevant information about the space. You can close this via a button.

Construction Modal



If the space can be built upon, we get a construction modal. It shows your current money and how much this will cost.

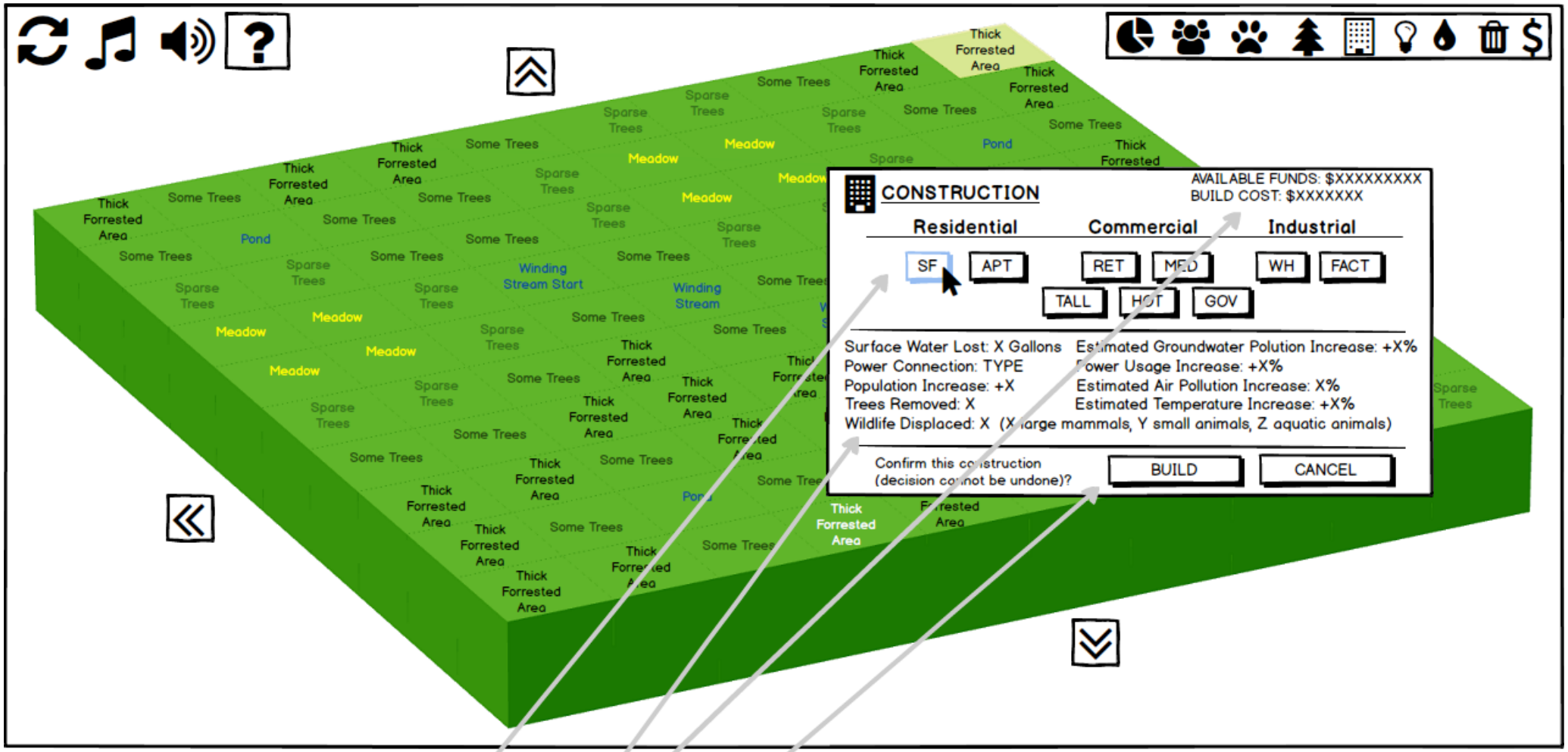
The types of buildings are all shown as clickable buttons or icons. If icons, we might need tooltips that pop up to state the name of the building. Shorthand here is just used since design is not known yet. Note that these buttons (as shown later) will need incactive states.

Information about the environmental impact of the building is shown here.

Two buttons close the modal; one builds the selected building and closes the modal, and the other just closes the modal. Build starts inactive.

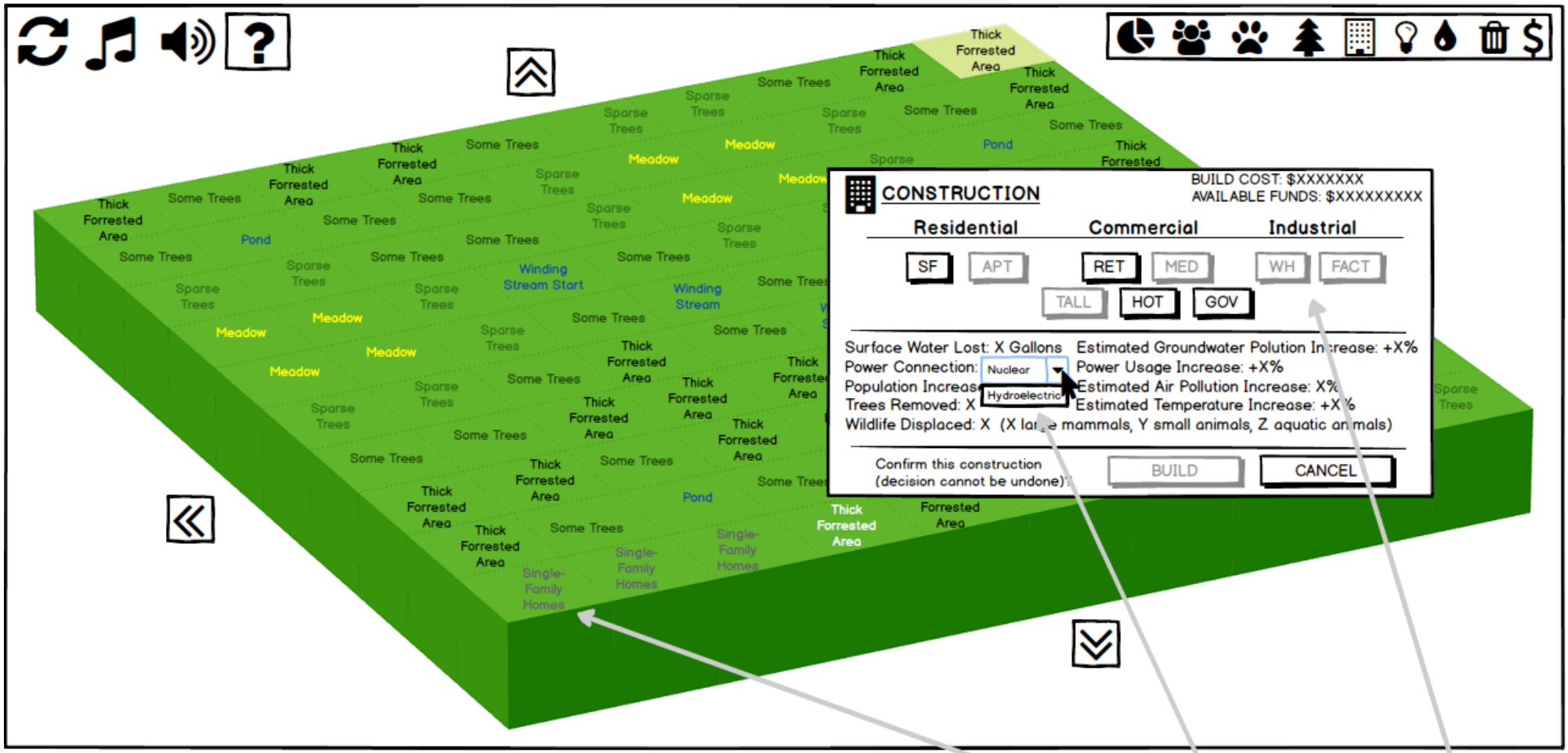
If you hit cancel on this (or other build menu modals), the information should be reset if you click the same parcel again (i.e., it should always open clean).

Select Construction Type



Once a building type is selected, the build cost in the upper right updates, and all the data points update. The Build icon becomes active.

Select Construction Option Changes



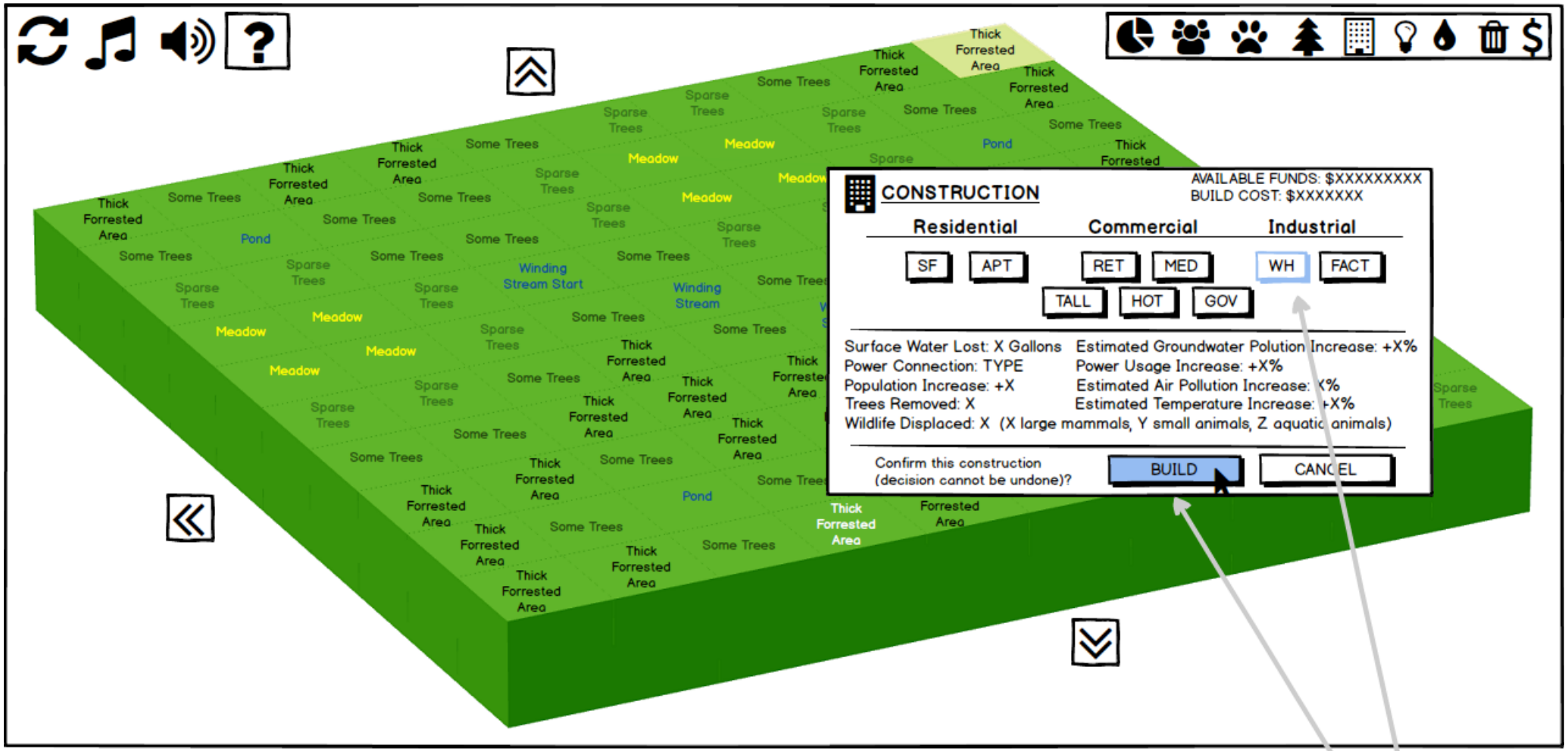
Building Rules:

- You cannot built apartments, medium or tall office buildings, warehouses, and factories next to single-famiy homes.
- You cannot build warehouses or factories next to apartment buildings.
- You cannot build factories next to retail centers.
- You cannot build SF homes or factories next to medium office buildings.
- You cannot build SF homes or factories next to tall office buildings. Must be connected to side with a transportation hub.
- You cannot build factories next to hotels.
- You cannot build factories next to government buildings.
- You can only built factories next to warehouses or nature preserves.

Because we are building next to structures connecting to another side, we have the option to switch which kind of energy grid we are puling from.

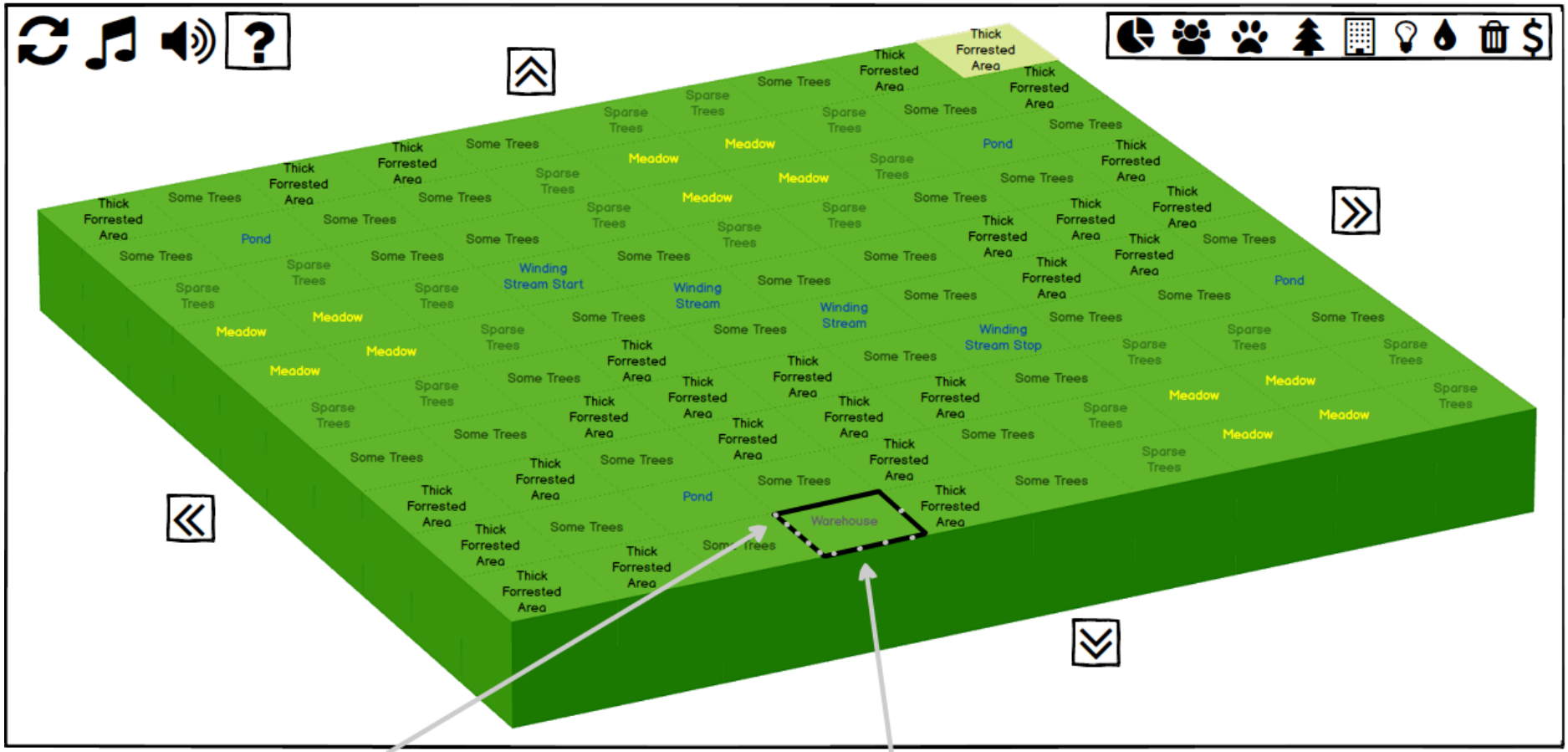
Depending on adjacency, you may have restrictions on what can be built. In this case, we are adjacent to single-family homes. If unavailable to build, the buttons/icons should be disabled.

Build



With a building type selected (only one can be selected at a time; clicking another option will simply change your choice), press Build to start the building.

Post Build



Buildings are constructed immediately. If we are able to show some form of animation, this is ideal, but this can be workshopped.

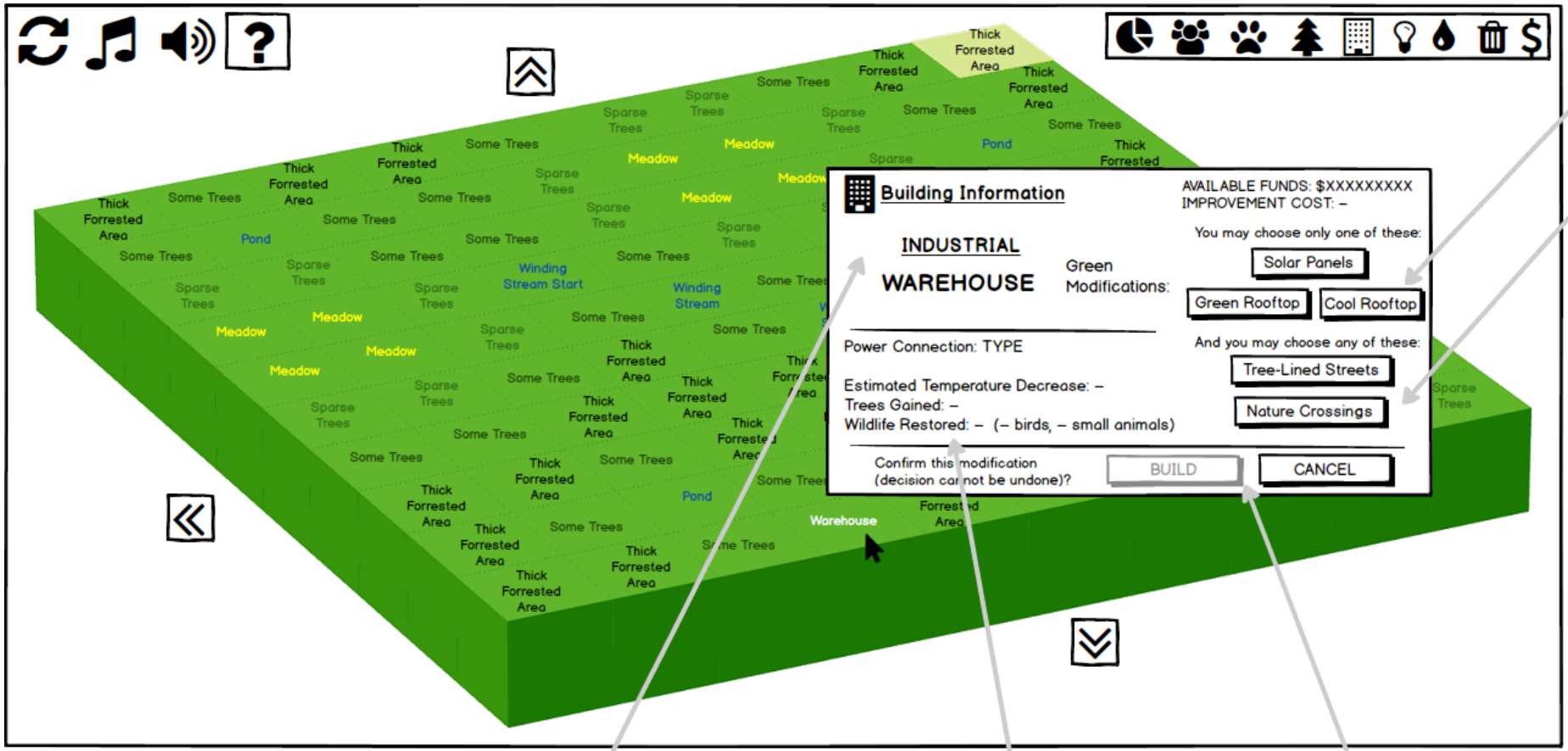
Loss of wildlife and trees will be recorded, and new data based on the building type will be applied to all relevant tracked statistics.

Ideally, to both show population and to add visual movement to the screen, showing roads and cars is optimal, but it can be largely symbolic.

My initial suggestion is to have every constructed tile have a road around all sides (this it will appear like 2 lanes when next to another constructed building). Each building will have a car rating (how many cars it brings with it), and this could be represented by animated dots on the road, circling the building clockwise (this will allow for the appearance of opposing traffic on neighboring parcels).

If it's few cars, it's far-spaced dots. If it's more cars, it's closer-spaced dots. If it's many cars, it's very close dots. These would continue on loop around each building. We would be reusing 3 animations.

Green Modifications Menu



Once a building is constructed (and you have not yet added any green improvements), if you click it again, you get this modal. It provides basic information about it, as well as information on how you can improve it with green modifications (and what the impact of those will be).

This information updates as you select options.

As before, Build button is inactive until you make a selection. Cancel closes the modal and resets it.

Certain options are either/or, you can only select one of them.

Other options, you can select multiple options at once.

Visual Guidance:

Solar Panels: Add solar panels to the roofs of the building(s).

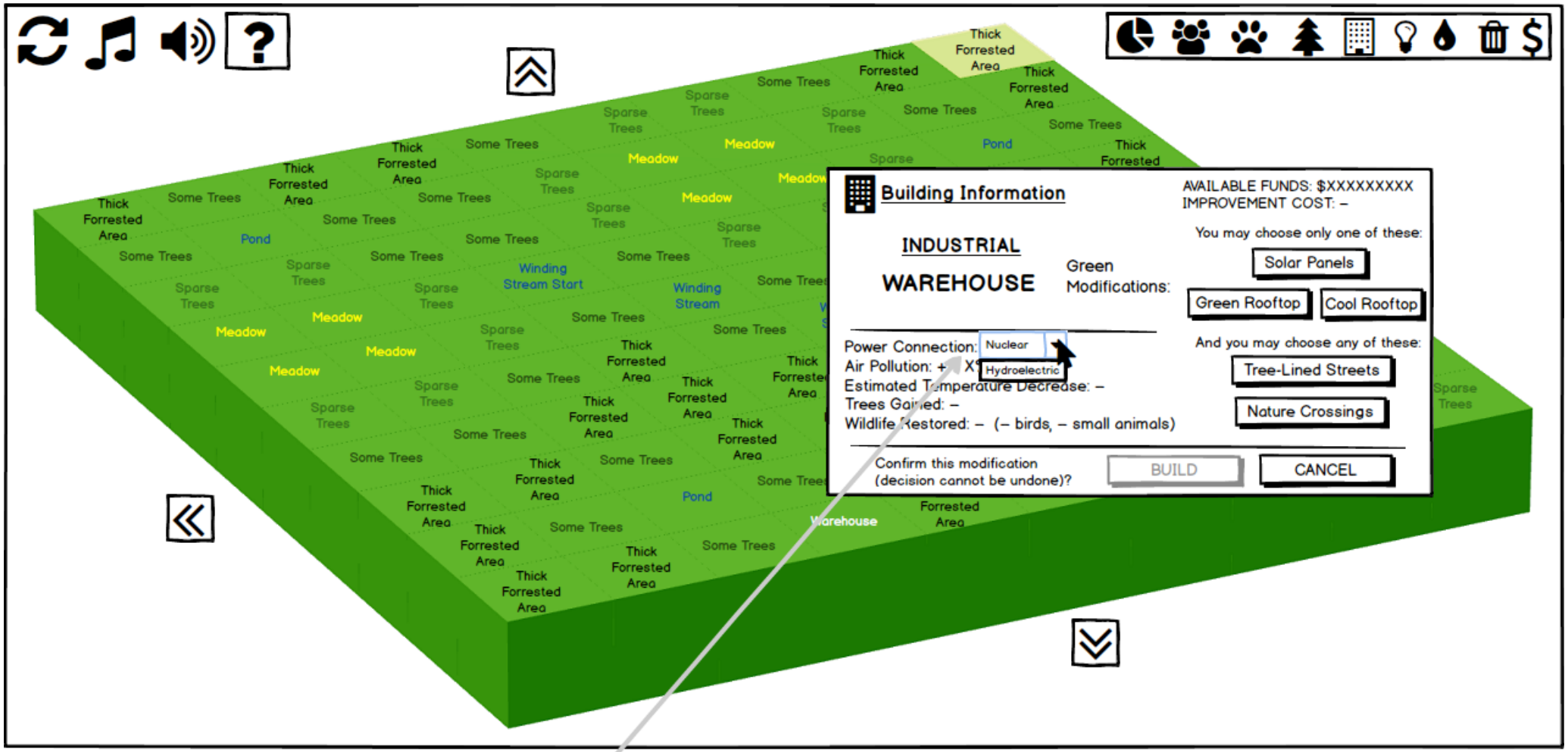
Green Rooftops: Rooftop should be covered with some form of garden/ greenery.

Cool Rooftops: Reflective paint added to the top.

Tree-lined streets: Adds trees to the bottom edge, along the road.

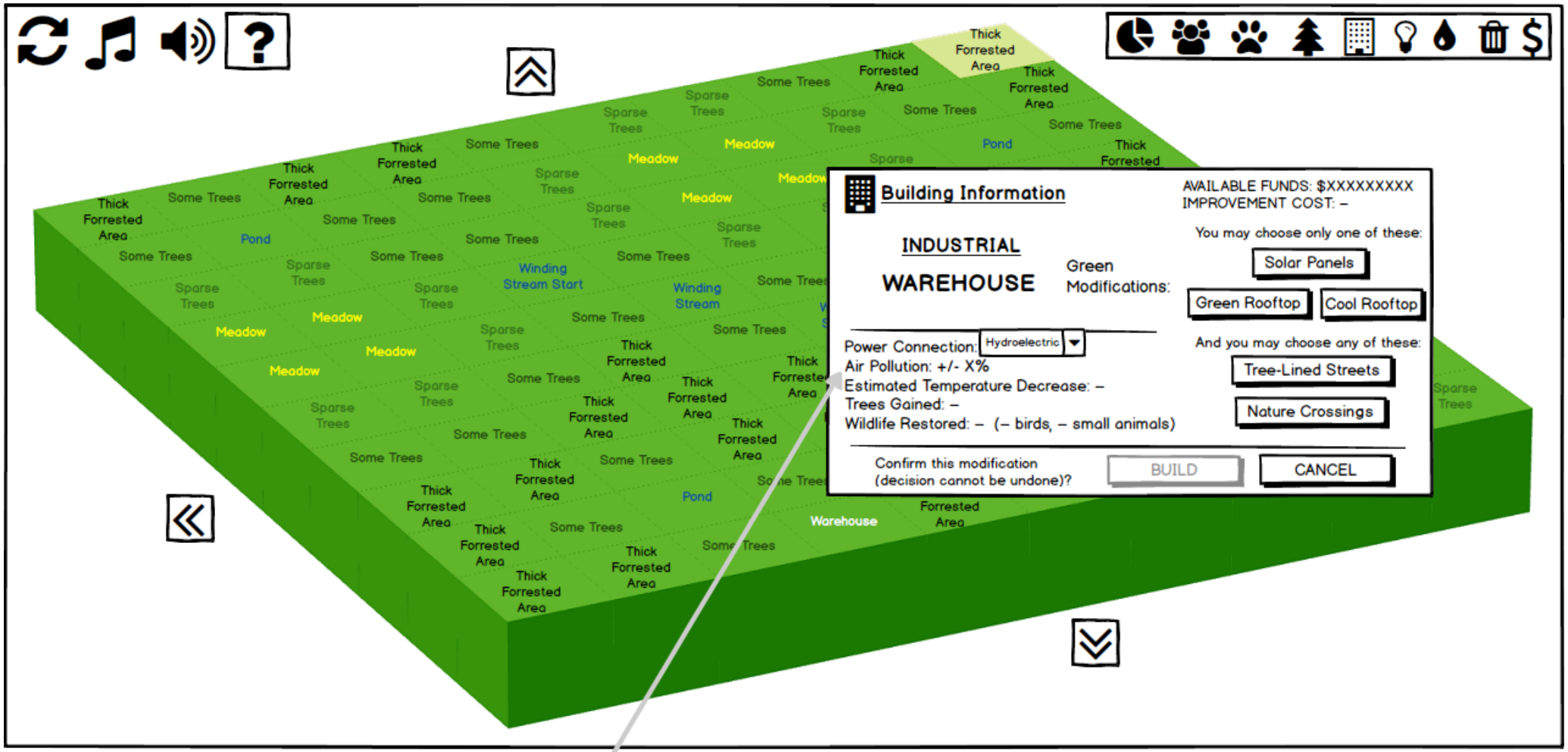
Nature crossing: Ideally this is a bridge over the road connecting to nature preserves next to it (so up to 3 bridges per parcel).

Post-Build Power Options



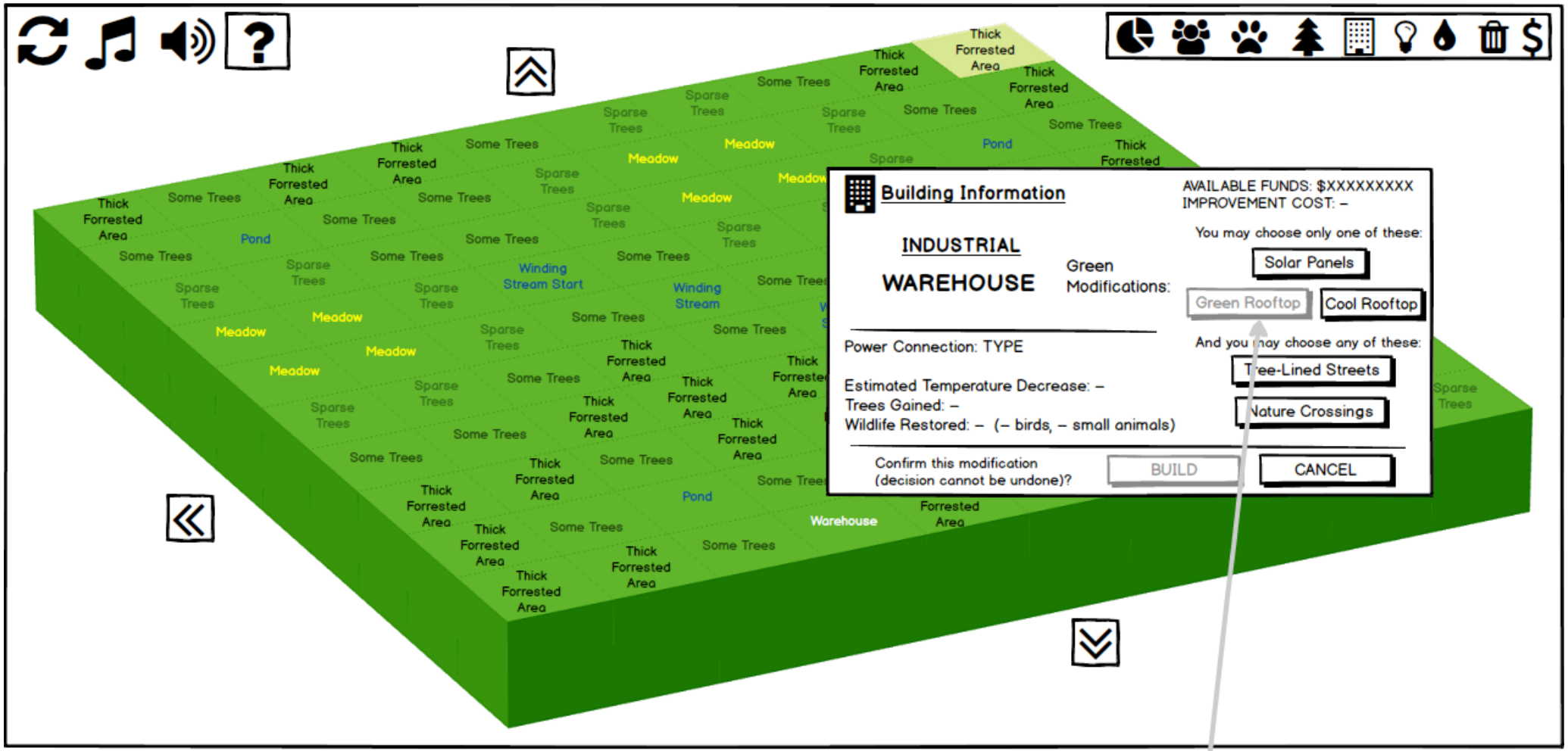
If at any point a building is touching 2, 3, or 4 sides of the map (via a continuous chain of buildings), the other types of power grids become available. You can change these at any time to change what type of power this building consumes.

Post-Build Power Polution Change



When power changes options are available, this line gets added under it, which shows you at a glance whether your current electricity source is increasing or decreasing the amount of air pollution caused (and by how much) compared to what was previously selected.

Post-Build Modification Limitations

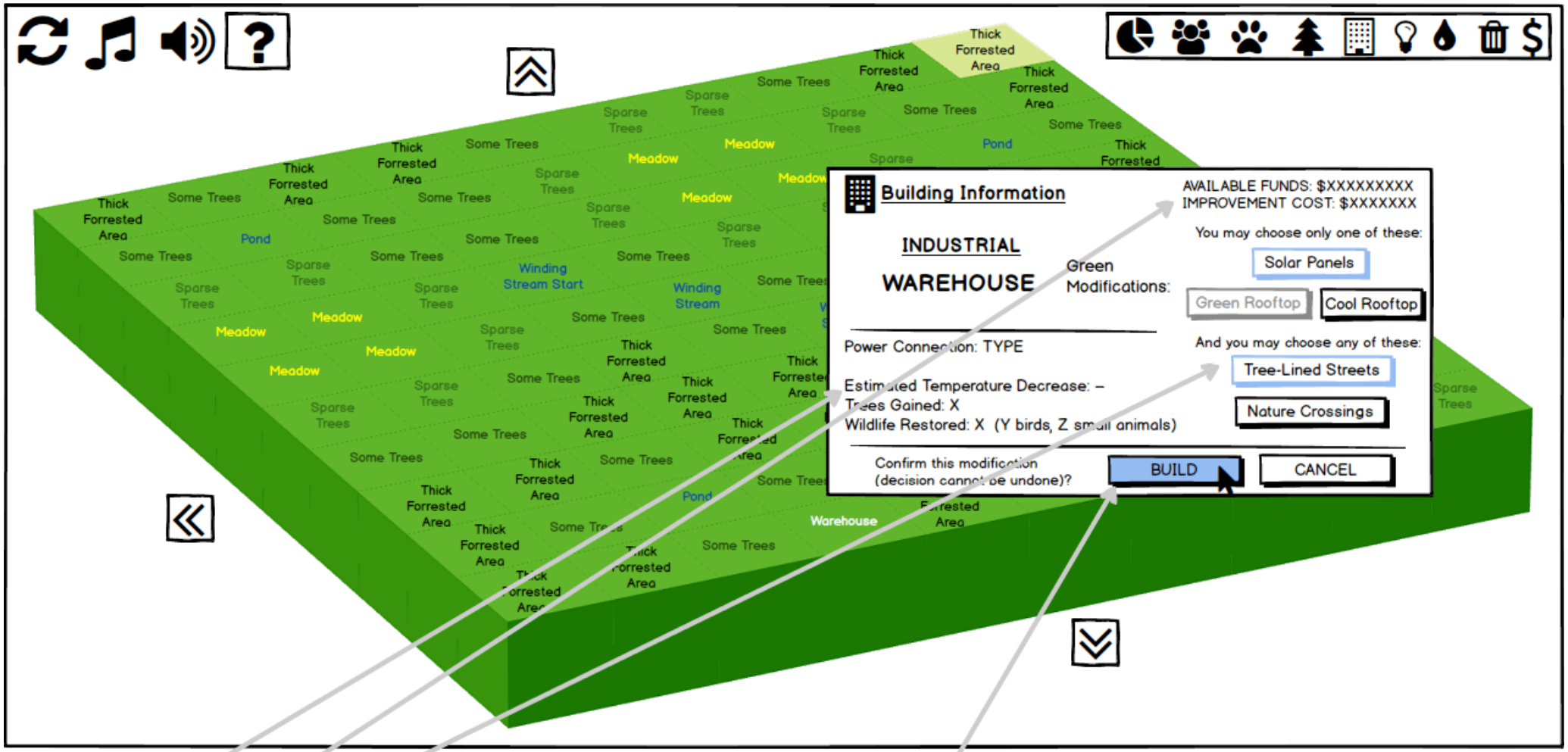


In some cases, due to location or building type, certain green modifications will be disabled.

SF Homes: green rooftops disabled
Factories: green rooftops disabled

Nature crossings can only be built if at least one side is adjacent to a natural preserve.
NOTE: By installing nature crossings, you are committing to not build on any adjacent parcels that are nature preserves at the time that you build the nature crossing.

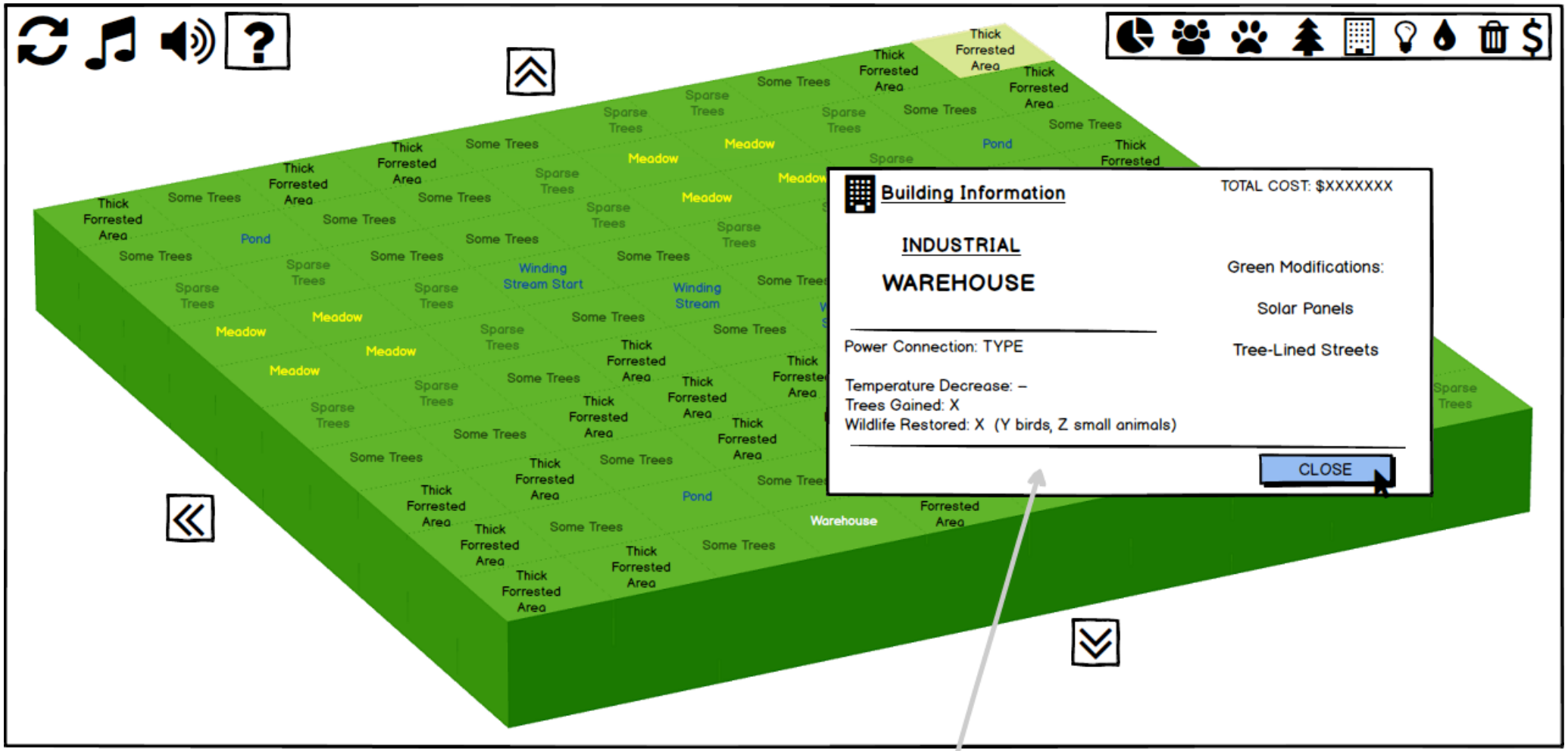
Post-Build Modifications Confirmation



As selections are made, the information here is dynamically updated to tell you about what gains you will get. The improvement cost is also displayed at the top right.

Once at least one selection is made (in this case, 3 could have been selected), the Build button becomes active.

Post Improvement Modal



Once green modifications have been made on a building, you can no longer make changes (except changing the power connection type, if available), so the modal only displays the final information (updated environmental impact, total cost spent on the building, and which modifications were made). The Close button closes the modal.

Start Over Modal

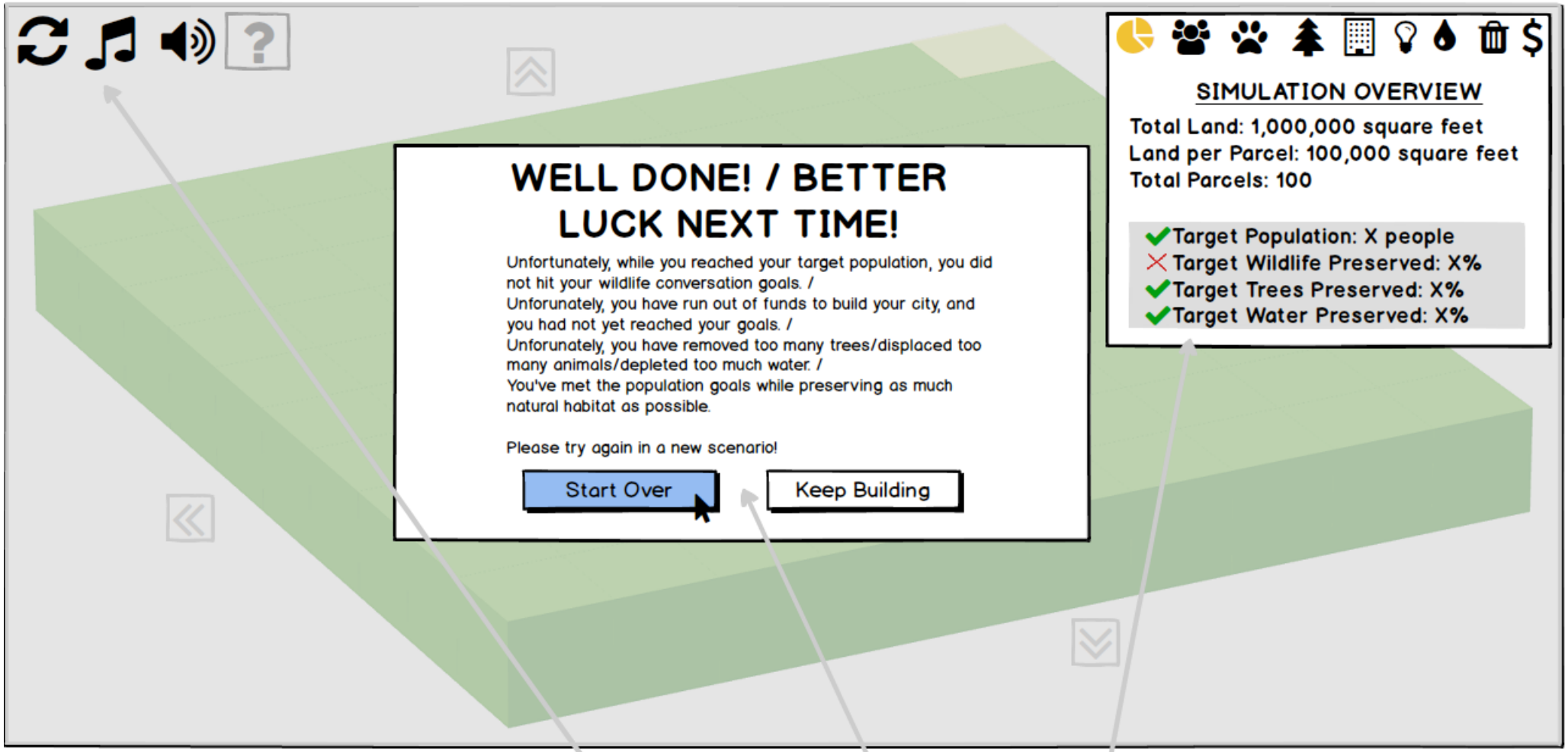
If the Reset button is clicked, we are presented with a standard Reset modal.

Resetting clears all data and creates a new randomized map setup.

Only the sound buttons remain active.

Except as noted, everything else is grayed out/inactive to the user while this modal is up.

Game End



If at any point you win the game (all objectives are complete) or lose (e.g., you hit target population without preserving other aspects of the land, or you run out of money), the game will pause, with most click points deactivated (except those noted on the screen). The top right menu remains active so you can review why you won or lost, as well as all of your final stats. The game end modal text provides relevant wording for your win/loss.

Clicking Start Over resets the game (to the Start Screen). If desired, you can continue playing by pressing Keep Building. This puts you back in the game, and everything continues to update (including goals), but no win/lose screen will appear again, regardless of whether you hit the goals a second time or fail them again. Play can continue until there is nothing left to do. They student will need to manually reset.