

Esri Inc.

# Exercise 4 – Comparing and Evaluating Alternatives

GeoPlanner<sup>SM</sup> for ArcGIS<sup>®</sup>

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# Exercise 4 – Comparing and Evaluating Alternatives

## Introduction

In the previous exercise, you sketched two scenarios that presented alternative redevelopment plans. These plans include a mix of land use types and a proposed light rail line. Now you must evaluate the quality of your plans. If decision makers, stakeholders, or even the general public believe that your plans are poor or based on bad assumptions, they will oppose your ideas.

How do you evaluate your plans? You refine your study area and then reclassify it based on an assessment range of 1 (low) to 9 (high). You then visualize your plan against these ranges. This will give you a spatial and quantitative picture of the quality of your proposal relative to your planning goals and criteria.

## Evaluating your scenario

Evaluate shows how a scenario relates to assessed data. Scenarios represent your plan. Assessments are visual models of existing conditions at a site. Evaluate allows you to overlay your plan on your assessment to show how your plan performs against those conditions.

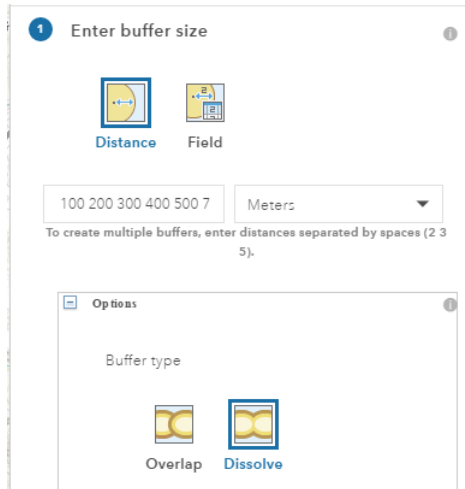
Overlay includes buffer, intersect and union. These analyses produce features on the map. Evaluate is iterative. Once you have run an analysis, you can reassess the output and use a dashboard to understand site quality. This creates a more precise view of your site's performance.

## Using buffer to evaluate your site

A buffer operation creates concentric shapes around a phenomena based on distance. Buffer is a powerful tool to visualize where something is, in a range, in relation to something else.

In the following exercise, you will classify the buffered output of the light rail transportation lines you created in Exercise 3. The classified, or re-assessed, output will depict optimal proximity to proposed light rail lines. You will also use a dashboard to further refine your understanding of your proposed site's quality.


1. Activate the EXPLORE segment.
2. Click the Scenario drop-down and choose "Scenario A". Zoom to the extent of the features in your "Active Scenario – Transportation" layer.
3. In the toolbar, click the "Analysis" drop-down, click "Use Proximity", then select "Create Buffers".
4. In the Create Buffers dialog, click the Select Feature Layer drop-down and choose "Active Scenario – Transportation".
5. In the "Enter buffer size" area, type **100 200 300 400 500 750 1000 1250 1500** into the distance text box. Set the distance units drop-down to Meters.
6. Click Options and choose Dissolve for Buffer type.



7. In the Result layer name text box, type in “Distance to Light Rail (A)”.
  8. Click Run Analysis. In a few moments, the Create Buffers dialog closes.
  9. The buffer process runs remotely on ArcGIS Online. You can check the status of the process by clicking the Jobs tab on the Contents window.
  10. When the process finishes, the status in the Jobs tab changes to “completed”, and the analysis result is added to the layers tab of the Contents window.
  11. Click the Active Scenario drop-down and choose “Scenario B”. Zoom to the extent of the features in your “Active Scenario – Transportation layer”.
  12. Repeat steps 3-10. In step 7, type in “Distance to Light Rail (B)”.
- You have successfully created your distance ranges from a light rail line within your study area. Next, you are going to reinterpret these ranges.

### Assess the output of buffer

The buffer you created shows distance ranges. You can improve your interpretation of these ranges by translating them into a performance scale. This scale has a range of 1 (low) to 9 (high) where higher values (9, 8, 7) indicate a more desirable location than lower (1, 2, 3). There is also a 0 value. This value indicates exclusion – do not consider anything for these locations.

1. In the Contents window, click the gear icon  next to your buffered scenario layer “Distance to Light Rail (A)”. Choose “Classify” from the context menu. The Classify (0-9 scale) dialog opens.
2. Click “Using numeric ranges”.
3. Click the “Field” drop-down and choose “Buffer distance in Meters”.
4. Click the “By” drop-down and choose “Quantile”.
5. Click the “Classes” drop-down and choose “9”. The dialog displays nine color ramps with the following ranges: 100, 100-200, 200-300, 300-400, 400-500, 500-750, 750-1000, 1000-1250, 1250-1500.
6. You will now assign each range a unique value by clicking a color in each color ramp. For range 100, click the furthest right green color to assign it 9. For range 100–200, click the second green color from the right to assign it 8. For range 200-300, click the third green color from the right to assign it 7. Continue this process until you assign 1250 – 1500 a rank of 1. Your dialog should look like the following graphic:



7. Click SAVE AS. A Save dialog appears.
8. In the Title field, type in “Evaluation of Distance to Light Rail (A)”. Add a summary, description and optional tags. Click SAVE.
9. A new layer is added to your Contents window. This layer shows distance classes to your light rail line. The darker the shade of green, the better.
10. Repeat steps 1-9 for layer “Distance to Light Rail (B)”. In step 8, use title “Evaluation of Distance to Light Rail (B)”.



In the preceding steps, you reclassified your buffers into ranges that depict favorable (and less favorable) distances to your proposed light rail. In the next step, you will use a dashboard and the classification ranges to understand where proposed land uses lie in relation to the proposed light rail line.

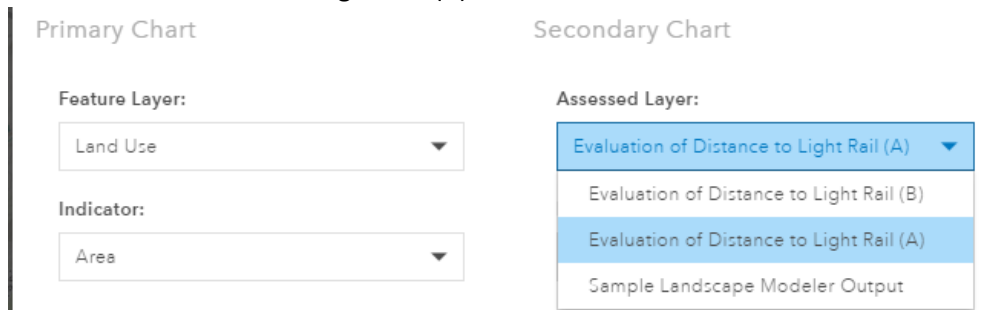
### Using the dashboards to evaluate a site



Dashboards help you understand the quality of a plan by adding a qualitative or quantitative dimension to your analysis. Evaluation dashboards use pie and bar charts to display statistics about your plan. Statistics can include total acreage for Land Use type, lengths for road types, and counts of points. Dashboard charts display aggregations of whatever you model in your plan.

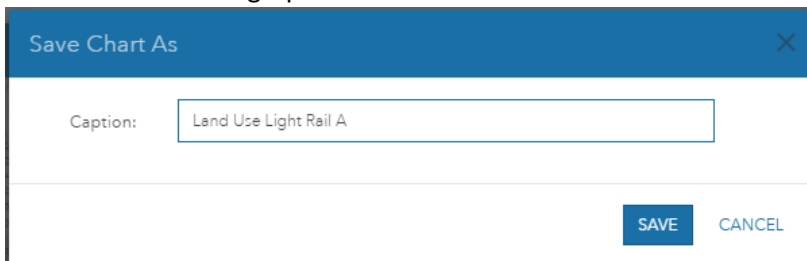
Dashboards contain multiple charts. Secondary charts represent how much specific types in your model overlay assessed features. This allows you to understand how much of your plan lies within specific ranges of your assessments. For example, a secondary chart shows you how much Industrial Light use lies within each assessed distance band, rated 1-9. This helps you understand the quality, or performance, of your plan. Secondary charts always display on the right side of your dashboard.

In the following exercise, you will use dashboards to view statistics on your light rail evaluation.

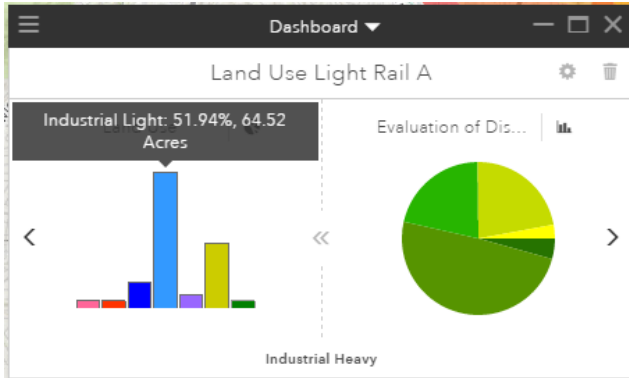
1. Click the Scenario drop-down choose “Scenario A”.
2. In the Contents window, verify that the “Evaluation of Distance to Light Rail (A)”, “Active Scenario – Points of Interest”, “Active Scenario – Transportation”, “Active Scenario – LandUse” and basemap layers are all turned on. Zoom to the features in “Active Scenario - Land Use”.
3. Click the Dashboard button  from the Common Tools. The Dashboard opens.
4. On the Dashboard widget, click the Settings gear  to open the dashboard configuration dialog.
5. Set Primary Chart Feature Layer to “Land Use” and Secondary Chart Assessed Layer to “Evaluation of Distance to Light Rail (A)”.




6. Click UPDATE.
7. Click the Column button  in the primary chart to change from a pie to a column chart.
8. On the dashboard, click the Save Chart As button .
9. In the Save Chart As dialog, set the caption as “Land Use Light Rail A”. Your Save Chart As dialog should look like this graphic:

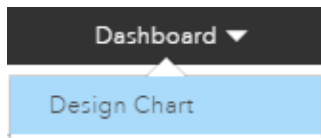





10. Click SAVE.
11. Click the light blue column in the primary chart of the dashboard. The secondary pie chart updates. The primary chart displays the amount of Land Use within each assessed range in “Evaluation of Distance to Light Rail (A)”. You can hover over several pie wedges to see the amount of land within each light rail assessed range. In the following graphic, hovering over a column in the primary bar chart indicates that 51.94% (64.52 acres) of land in Scenario A is dedicated to an Industrial Light land use. The secondary pie chart shows how much of this acreage lies within each assessed range of “Evaluation of Distance to Light Rail (A)”. In this case, the majority of Industrial Light land use lies within ranges (9, 8, 7) assessed as favorable, or close to the proposed light rail.

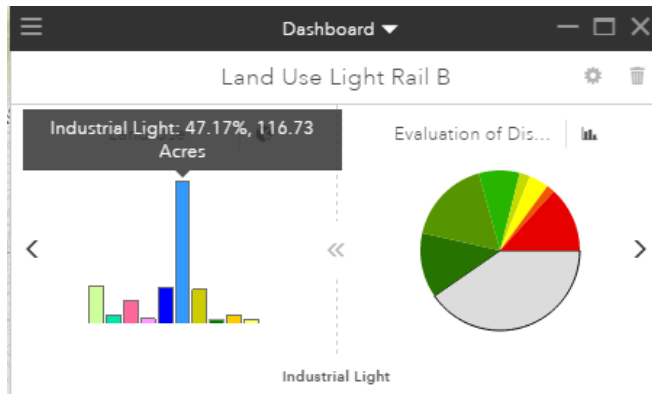


Next, you will repeat the same process for the “Evaluation of Distance to Light Rail (B)” layer.

1. Click the Scenario drop-down and choose “Scenario B”.
2. In the Contents window, verify that the “Evaluation of Distance to Light Rail (B)”, “Active Scenario - Points of Interest”, “Active Scenario - Transportation”, “Active Scenario - Land Use” and basemap layers are all turned on. Zoom to the features in “Active Scenario - Land Use”.
3. If you closed your dashboard, click the Dashboard button  to reopen it. Click the drop-down arrow on the title bar of the dashboard and choose “Design Chart”.



4. On the Dashboard widget, click the Settings gear  to open the dashboard configuration dialog.
5. Set the Primary Chart Feature Layer to “Land Use” and the Secondary Chart Assessed Layer to “Evaluation of Distance to Light Rail (B)”.
6. Click UPDATE.
7. If your primary side chart is a pie chart, click the Column  button to change from a pie to a column chart.
8. On the dashboard, click the Save Chart As button .
9. In the Save Chart As dialog, set the caption as “Land Use Light Rail B”. Click SAVE.
10. Click the light blue column in the primary chart of the dashboard. The secondary pie chart updates. You can hover over several pie wedges to see the amount of land within each light rail assessed range. In the following graphic, hovering over a column in the primary chart indicates that over 47.17% (116.73 acres) of land in Scenario B is dedicated to an Industrial Light land use. The secondary pie chart shows how much of this acreage lies within each assessed range of “Evaluation of Distance to Light Rail (B)”. In this case, the majority of Industrial Light land use that doesn’t fall under “No data” lies within ranges (9, 8, 7) assessed as favorable, or close to the proposed light rail.



So far, you have explored the spatial and qualitative relationship between your plan and an evaluation area that you have configured with assessment ranges. Think of the assessment ranges as performance indicators, where higher values (9, 8, 7) indicate a better location than lower (1, 2, 3). From the graphics above, you know that Industrial Light land use occupies the majority of land use in both plans. You also know that much of this land use lies within a favorable distance to your proposed light rail lines.



You may not understand how well each plan compares to the other. You may also want to visualize your plan against a variable background. In the next exercises, you'll learn how GeoPlanner<sup>SM</sup> for ArcGIS<sup>®</sup> supports plan comparison.

## Comparing your plan scenarios

Compare depicts how a plan differs from another plan. It also shows the impact and difference that a plan can have on an area. Compare shows visual and statistical differences between plans.



### Side by side comparison

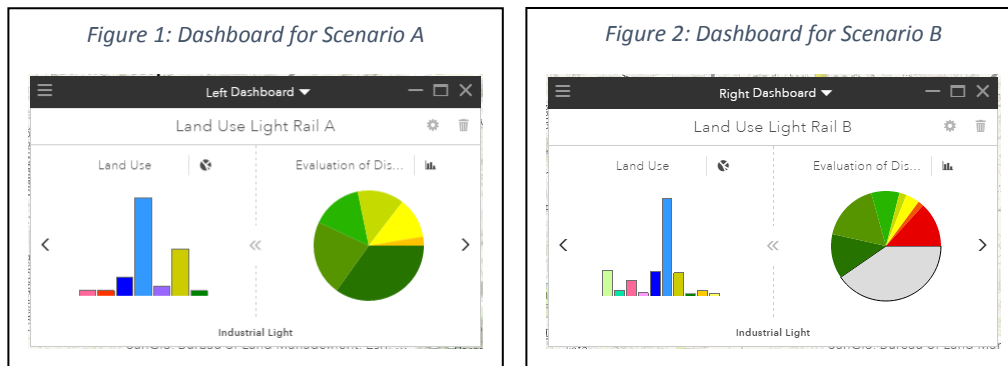
Side by side comparison allows you to view two maps simultaneously. One map displays the active scenario and the other a comparison scenario. This comparison shows the differences between two plans in an easily understood format.

1. Activate the EVALUATE segment, then click on the Side by Side tool  Side by Side. Notice that the screen splits into two maps.
2. In the upper-right corner of the left map, click the Scenario drop-down button and choose "Scenario A".
3. In the upper-right corner of the right map, click the Scenario drop-down button and choose "Scenario B".
4. Pan and zoom the left map so that your plan is centered. Notice that the right map moves to the same extent. If the Synchronize Map Extents switch  Synchronize Map Extents is turned on (green), both map extents will move together when panned and zoomed. If Synchronize Map Extents is switched off (red), the maps will pan and zoom independently.

You can now easily see the spatial differences between two plans. You can add a statistical dimension to this comparison by displaying the dashboards. With a dashboard displayed in side by side mode, you can see the differences spatially and qualitatively between two plans.



1. In the Contents window, turn on both “Evaluation of Distance to Light Rail (A)” and “Evaluation of Distance to Light Rail (B)”.
2. In the Contents window, click the gear icon  next to “Evaluation of Distance to Light Rail (A)” and choose Transparency from the context menu.
3. Slide the bar to 100%.
4. Repeat steps 2-3 for “Evaluation of Distance to Light Rail (B)”.
5. Click the Dashboard button . A dashboard opens within each pane of the side by side comparison.
6. Click the drop-down arrow on the title bar of the Left Dashboard. Choose “Land Use Light Rail A”.
7. Click the drop-down arrow on the title bar of the Right Dashboard. Choose “Land Use Light Rail B”.
8. You should now have two dashboards open, one in either comparison pane. The charts should display different values, one for land uses sketched in Scenario A that overlay features in “Evaluation of Distance to Light Rail (A)” and the other for land uses sketched in Scenario B that overlay features in “Evaluation of Distance to Light Rail (B)”. The following graphic displays two dashboards from a side by side comparison of Scenario A and Scenario B. The Left Dashboard displays Industrial Light land use coverage and its assessed values in “Evaluation of Distance to Light Rail (A)”. The Right Dashboard displays Industrial Light land use coverage and its assessed values within “Evaluation of Distance to Light Rail (B)”.





The dashboards show that Scenario B has a higher percentage of land dedicated to Industrial Light land use than Scenario A. Compare the darker shades of green in the pie charts in each dashboard. The darker shades of green equate to more favorable assessment values (9, 8, 7). Based on this visual comparison of colors in the pie charts, Scenario A also has more Industrial Light land use within a favorable distance to the proposed light rail line.

### Swipe comparison

Swipe comparison allows you to reveal a background layer by moving a vertical separator between two maps. As you move the separator, a swipe layer is revealed on one side of the map and hidden on the other side. Swipe is useful for understanding before and after conditions for an area of interest. It can also help you visualize your plan against different background layers.

In the following exercise, you will configure a swipe layer created by GeoPlanner’s Modeler tool.

1. In the Contents window, turn on the “Sample Landscape Modeler Output layer” layer.
2. Activate the EVALUATE segment, then click on the Swipe tool . The icon is a blue button with a white double-headed arrow and the word 'Swipe' in white text.
3. In the upper-right corner of the map, click the layer drop-down button and choose “Sample Landscape Modeler Output”.
4. Close the Contents window and click and hold the separator  to drag it left and right on your map. Notice that the left side of the separator reveals features from the “Sample Landscape Modeler Output” layer. The right side hides them. The icon is a grey button with two vertical bars on each side.

## Summary

In this tutorial, you were able to evaluate two plans based on assessment criteria. This evaluation allowed you to understand how well a plan performs against those assessment criteria. You were able to compare the plans spatially and quantitatively.

Evaluation and comparison are critical tools for decision making. Analyzing a plan through multiple criteria allows you improve the precision and accuracy of the assumptions that underlie your decisions.