**Getting the required data**

1. Use capacity calculator for each district to determine the best option for the amount of trucks and how many bins each truck should collect (the bins per truck is double the bins per worker).
2. Once bin collection amounts for each truck in the districts are determined, open up the original data from ASK. Create a separate column to the right of the ‘Materiel’ column title it “Beginning of Bin Size”. This column will be used in the calculation of the weighted bins later. Input the following formula to get the number value of the first character of the ‘Materiel’ column:

=VALUE(LEFT(O2,1)).

\*\*O2 refers to the cell directly to the left in the ‘Materiel’ column, and will change to different cells when copied down the whole list\*\*

1. Create a separate column to the right of ‘Beginning of Bin Size’ and title it ‘Weighted Bin Value’. This column uses the first character of the ‘Materiel’ column to differentiate between any bins in the 100, 200, 300, 400, 500 or 600 L capacity and assign a weighted value to each. Input the following nested if/else statement to get the union agreement weighted bin value:

=IF(P2=1,1,IF(P2=2,1,IF(P2=3,1.25,IF(P2=4,1.25,IF(P2=5,1.38,IF(P2=6,1.38))))))

1. Create a separate column to the right of ‘Afhentningsfrekvens’ and title it ‘Frequency Value’. This column will be used in the calculation of weighted week value later. Input the following formula to get the number value of the first character of the ‘Afhentningsfrekvens’ column:

=VALUE(LEFT(W2,1))

1. Create a separate column to the right of ‘Frequency Value’ and title it ‘Week Value’. This column uses the first character of the ‘Afhentningsfrekvens’ column to calculate the weighted value when accounting for multiple pick ups throughout the week. Input the following formula to multiply the weighted bin value by the frequency of collection:

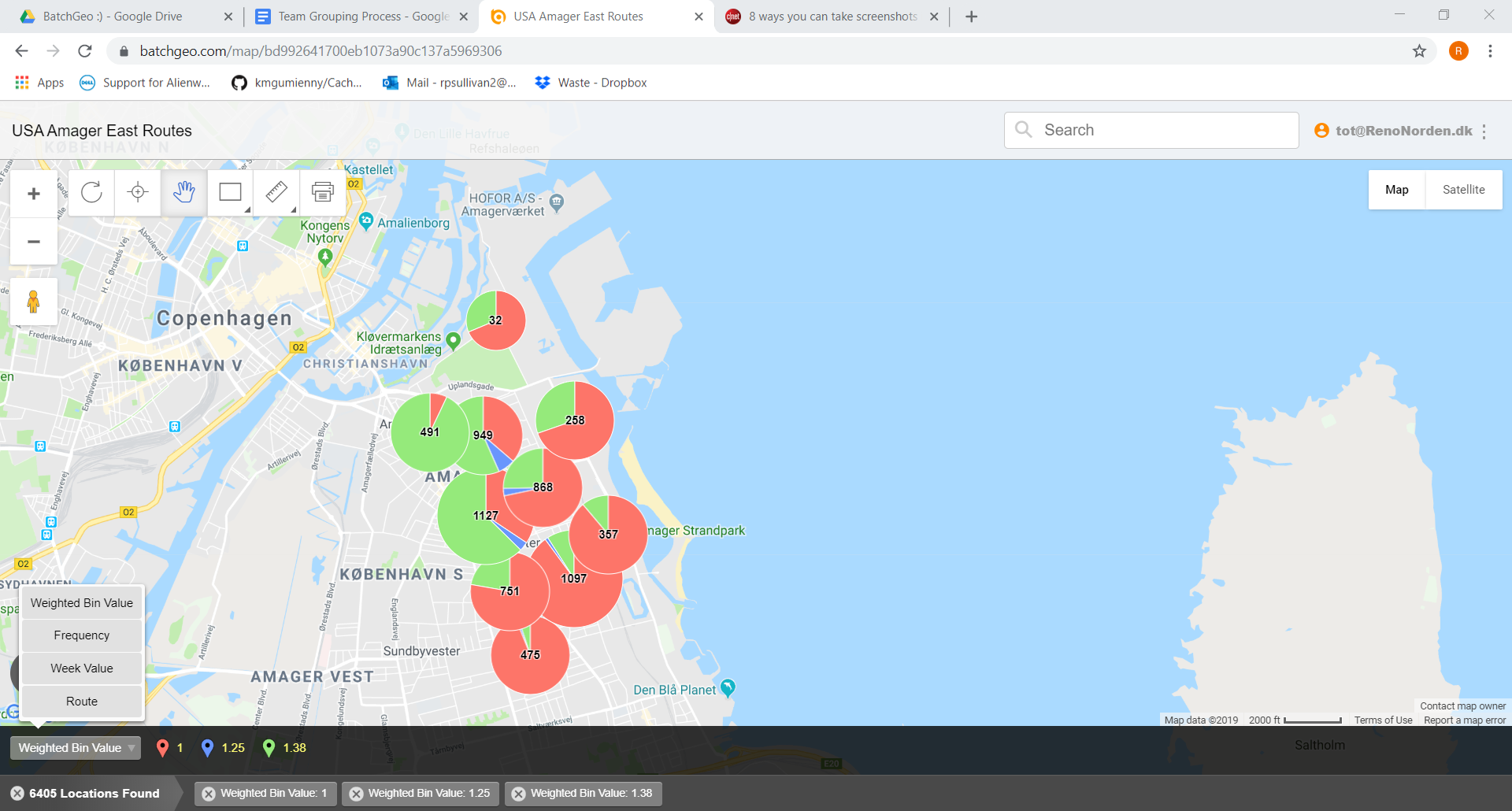
=Q2\*X2

1. To make use of this data in BatchGeo, Select only the data columns that could be useful when planning routes - (Address, Weighted Bin Value, Frequency, Week Value, etc) - and create a new spreadsheet with only this data

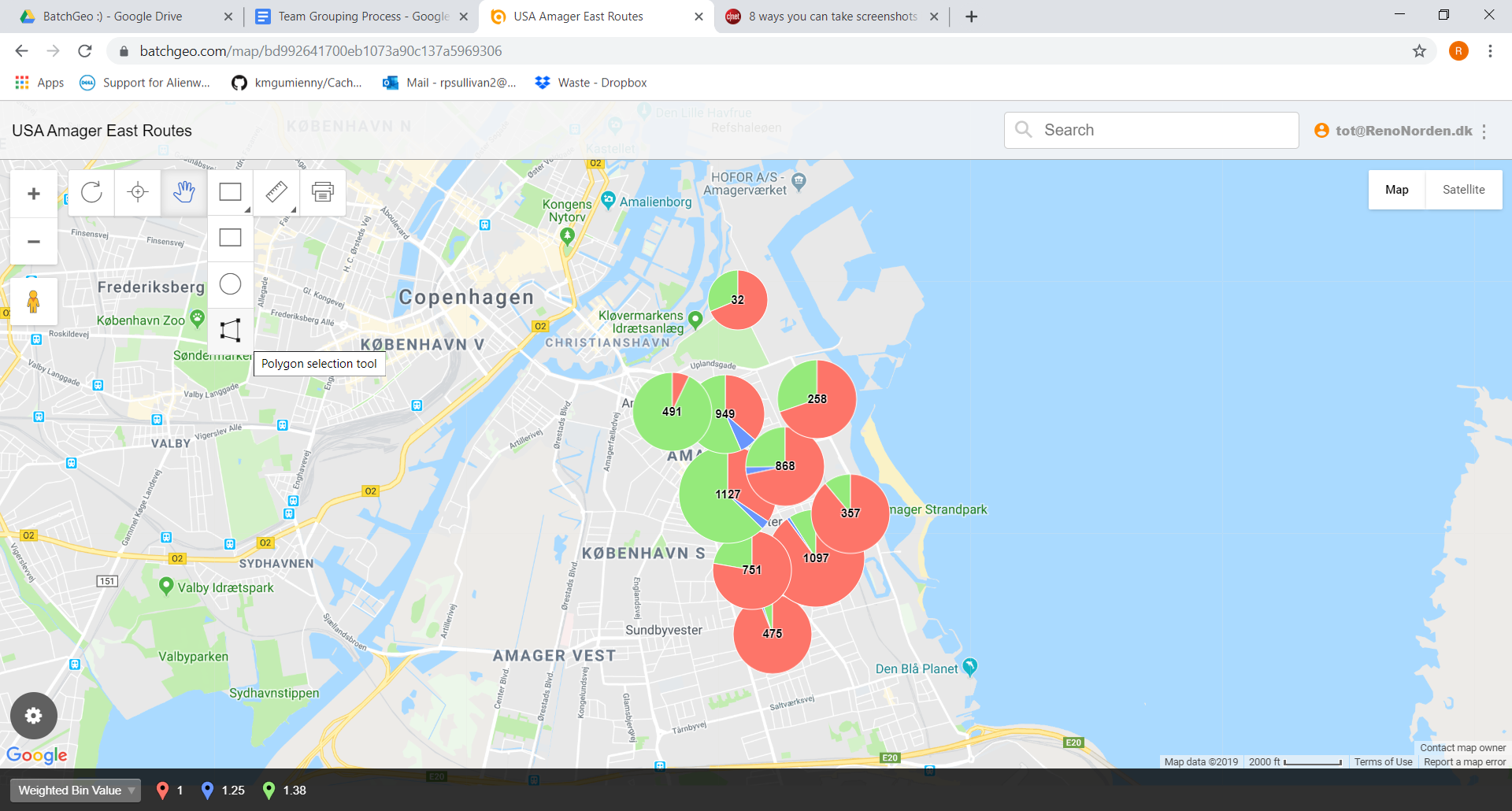
|  |
| --- |
| At this point, you should have the data from the created spreadsheet, and you should know the amount of truck’s the district will require as well as the bin collection range each truck in the district will need to collect. |

**BatchGeo:**

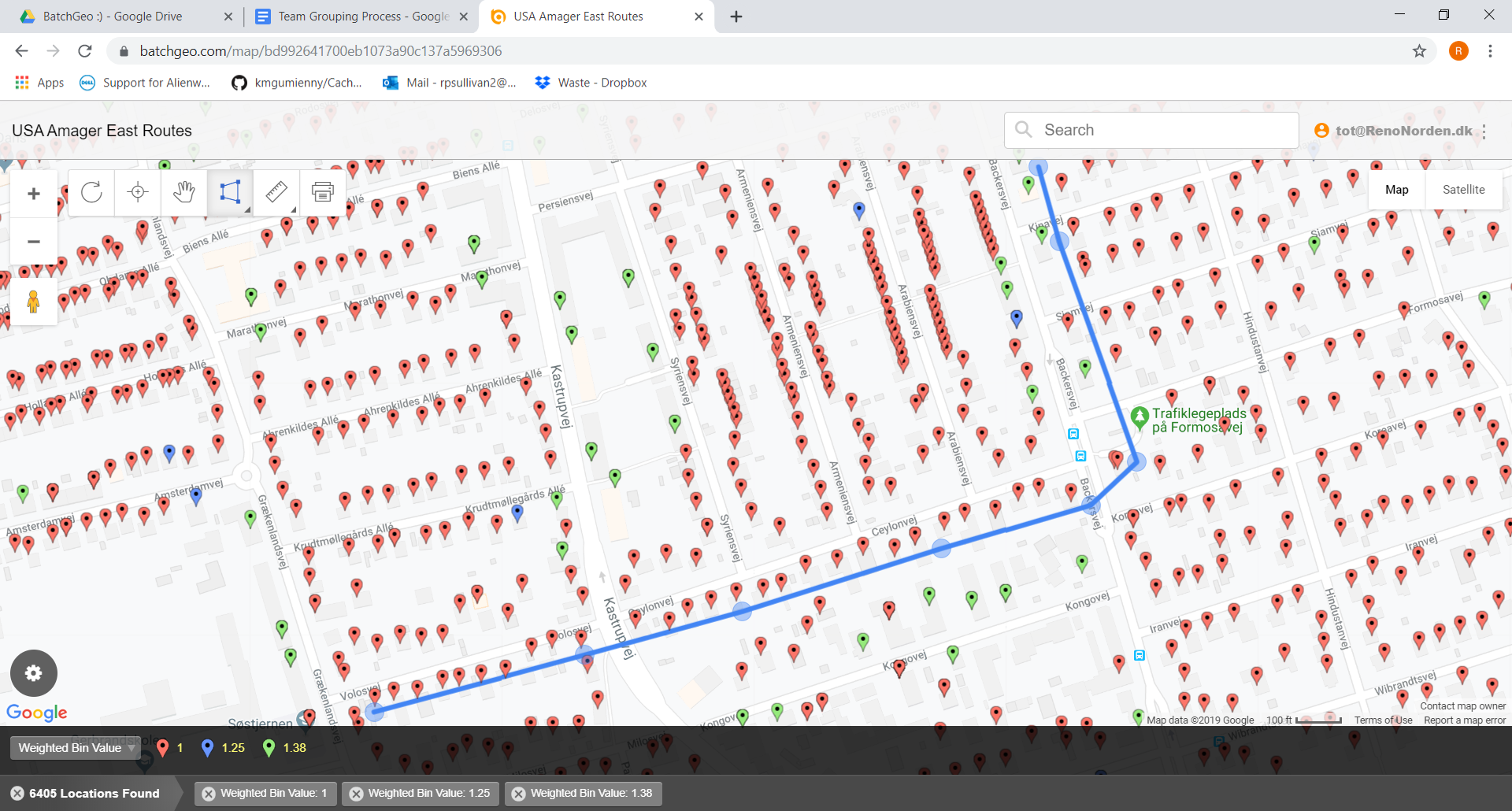
1. Import the data from the created spreadsheet into BatchGeo. Name the map based on the fraction and district. For example residual waste collection in Amager East would be “Residual Waste\_Amager East.”
2. Once the collection bins are all plotted, we will need to select the data to be displayed on the map. In the bottom left dropdown menu, select ‘Weighted Bin Value’. Then, ensure that all three types of weighted bins are selected by selecting the colored pins in the bottom menu. After this process, the map should look similar to that displayed below.



1. Select the ‘Polygon selection tool’

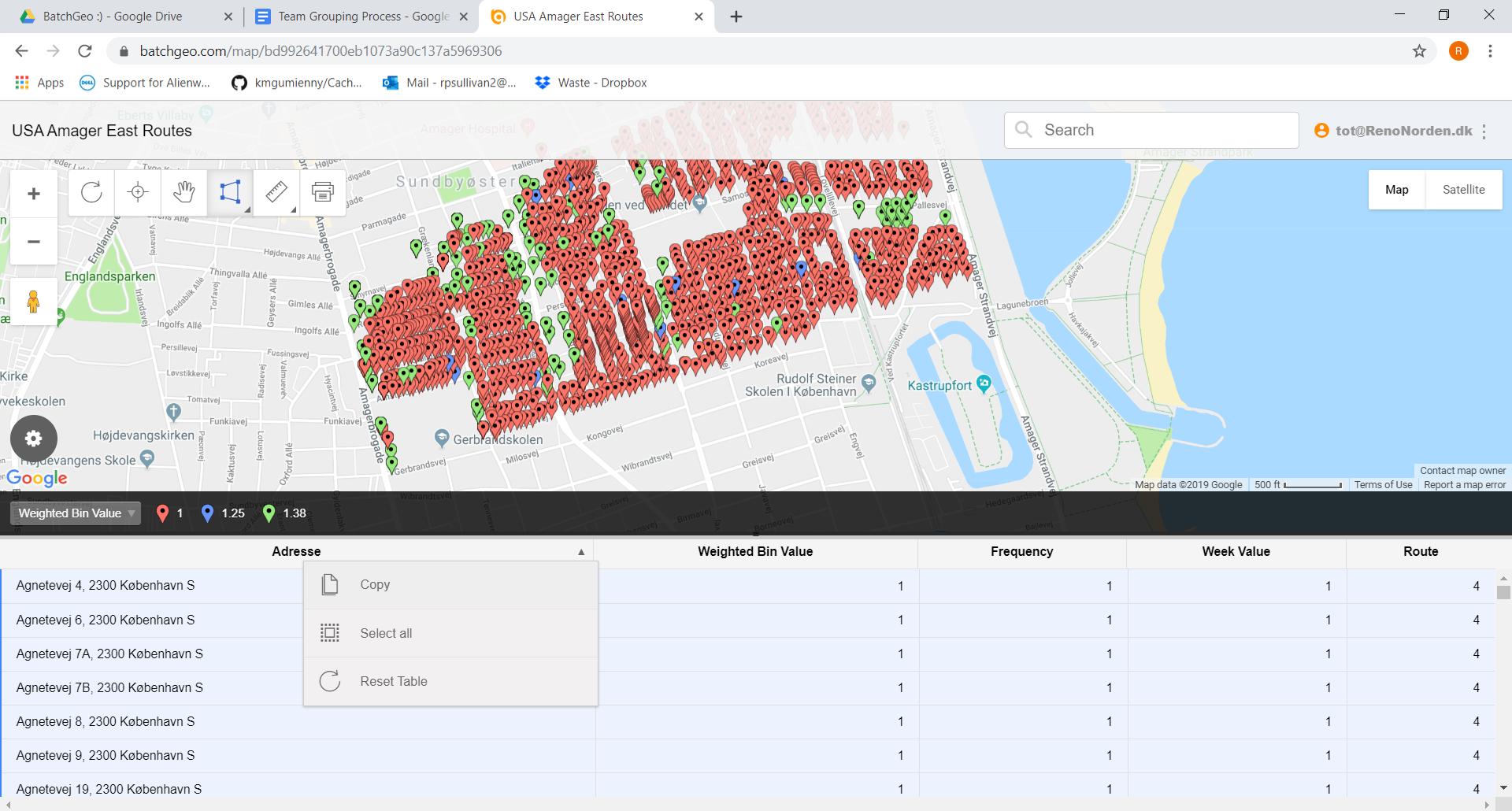


1. Now it is time to begin the grouping process. This first selection should just be an estimate of how many weighted bins you think will make up the bin collection amount you had previously determined a truck will need to collect. Zoom in on an area to create the first grouping. We found the process easiest when you start your selection in the bottom left corner of all displayed bins. From there, move right, up, left, and back down to close off your selection.
   1. Keep track of the roads you create your selection along. You might need to come back later and add and remove streets along this selection line.
   2. Make sure when selecting, you zoom enough see the roads you are selecting along. Additionally, we found it best to not create your selections directly on the road, as this will exclude collections on one side of the street. Instead, select just past the road, including bins that can be picked up on both sides of the street as shown in the figure below.



* 1. Be careful of including bins that would require your driver to go lengthy distances to get around obstacles in order to collect the bin. Examples might be bins on streets that are not connected to any other streets in your grouping, or one way streets (which you can see in BatchGeo as roads with one way arrows on top of them). This can sometimes be seen better through a satellite view of the map. To see a satellite view, click on the “satellite” button located at the top right of the screen.

1. Once a polygon selection has been made, a list should be visible on the bottom of the screen of all the excel data for the specific selection you have made. Right click on the ‘Adresse’ tab and select ‘Copy’



1. You can now paste this data in an excel sheet. From there, you can select the column titled ‘Week value’. On the bottom right of excel, you can see the ‘Count’ of bins, as well as the ‘Sum’, or weighted value of the bins. The goal is to get the ‘Sum’ value be in the range of how many bins you determined each truck should collect. If it is not in the range, you must re-select the area, adding or removing streets depending on weather you ‘Sum’ value was over or under how many bins each truck should have.
2. Once the ‘Sum’ value is in the range of bins a truck in your region should be collecting in, you have one grouping for a truck complete. You must repeat this process for each truck your region requires.

**Assigning Waste Collection Days Based on Frequencies**

1. Filter the “Frequency” column to “3”
2. Insert a new column to the left of the “Frequency” column and name it “Collection Days”
3. Assign Monday, Wednesday, Friday to these addresses
   1. Repeat steps 3 and 4 for frequencies that intuitively have assigned days such “6 times a week except Sunday”
4. Filter the data per “Route”
5. Filter the “Frequency” data to “2”
6. Select the “Bin Value” column and notice the “Sum” value on the lower right corner
7. Assign the addresses which coincide to half the number of the summed value, to “Monday, Thursday” and the other half to “Tuesday, Friday”
8. Filter “Collection Days” to select each day
9. For each day, add up the “Bin Value” and compare to the summed totals for every other day
10. The goal is to assign approximately 430-450 bins to each day based on the two regions of Vesterbro and Amager East
    1. This number will change as the areas change
11. Filter the “Frequency” data to “1”
12. Assign bins to each day based on how far each total is from 430-450
13. Filter the “Collection Days” column and check the total for each day again
14. If one day has substantially more bins than others, take the extra number and split it amongst the rest of the days.
15. Repeat this process for each Route in the ASK data