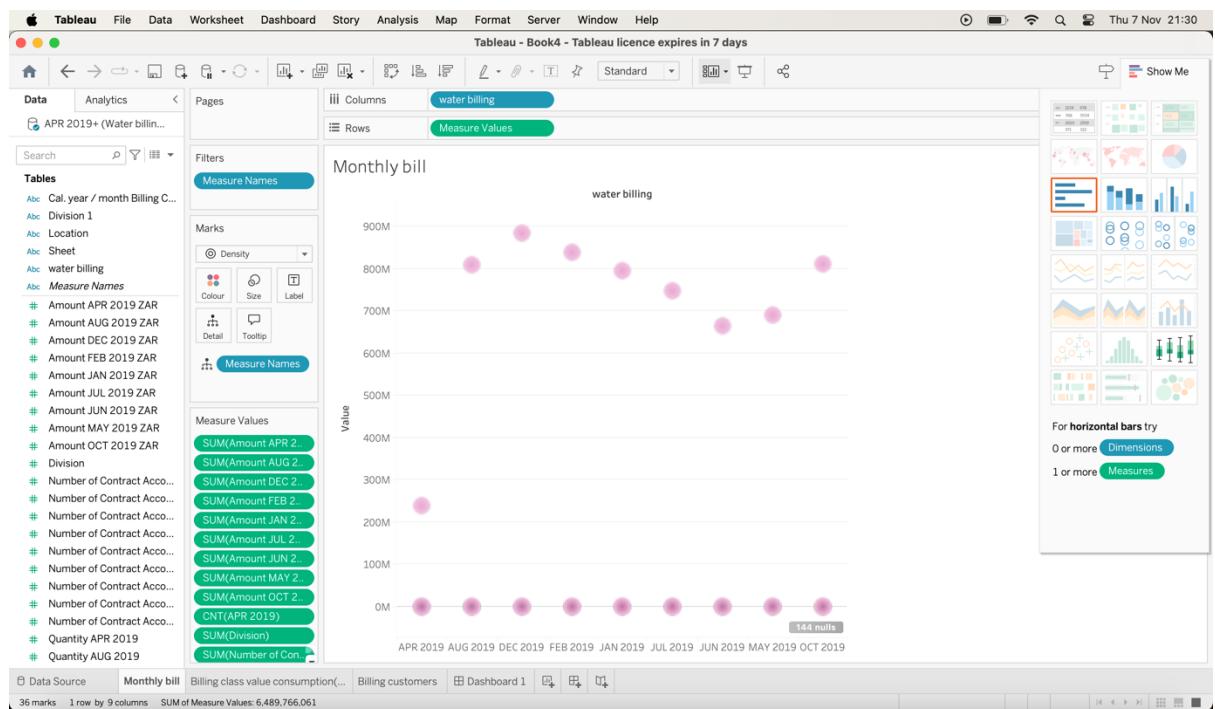
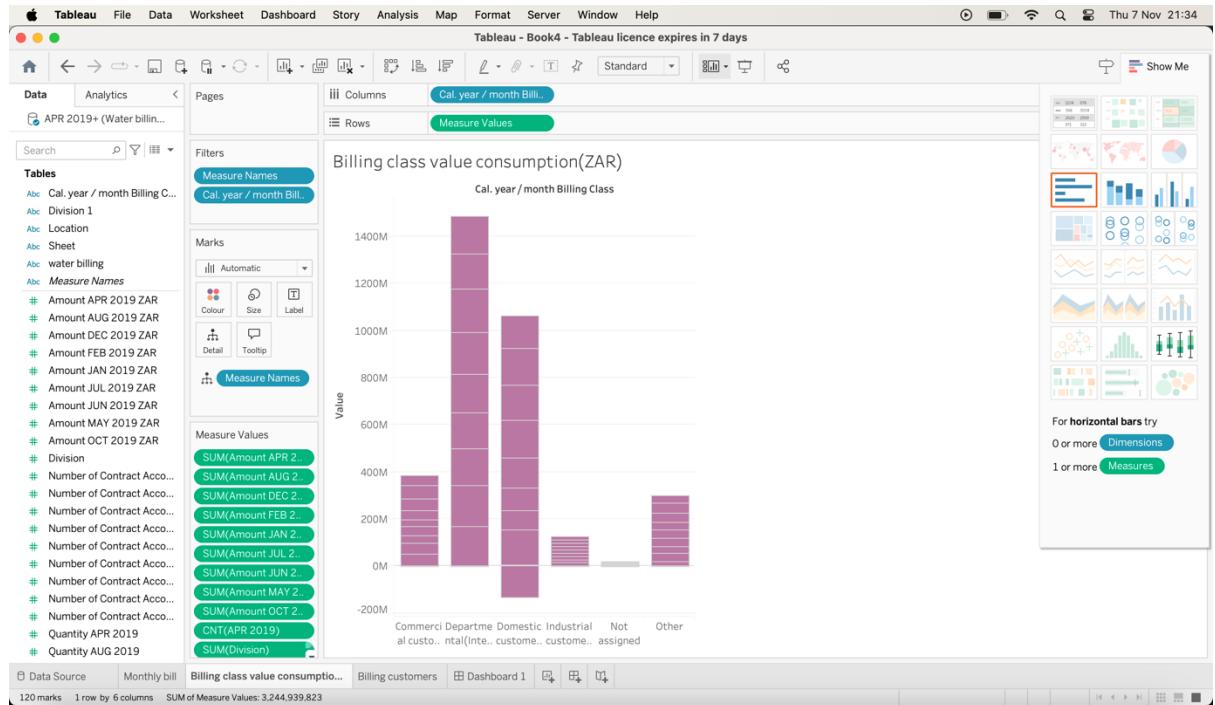


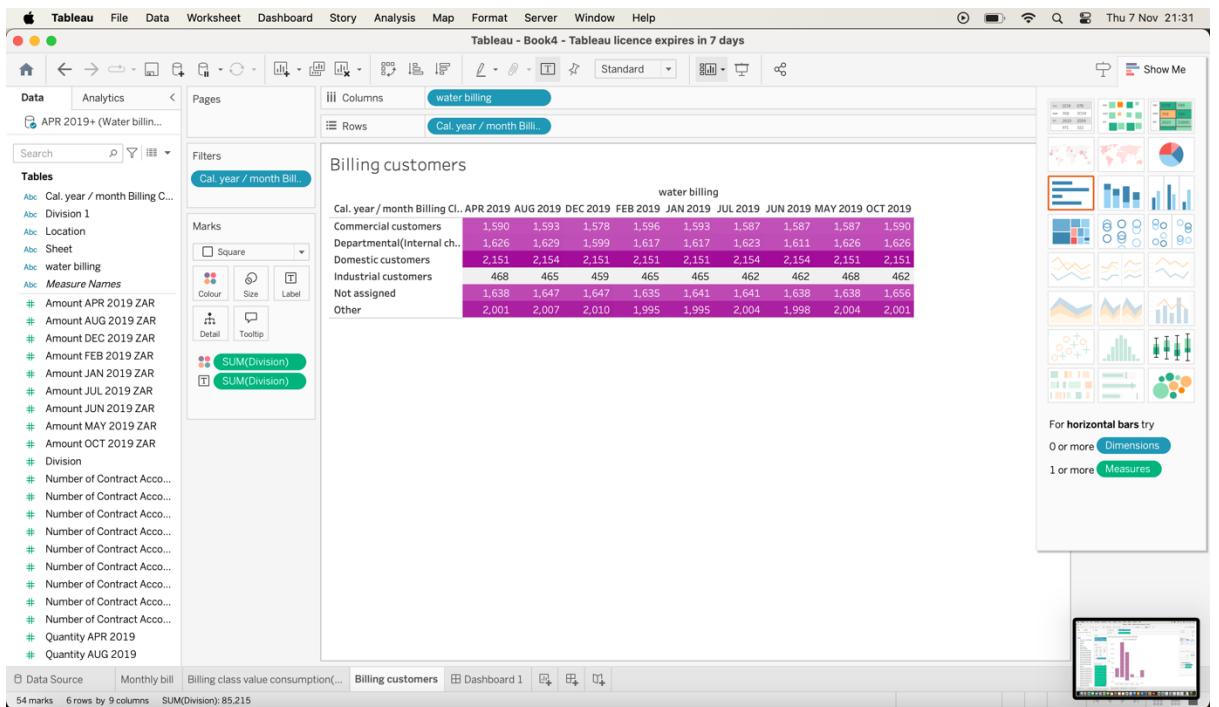
## Task 1

### i. Worksheets 15/25 -lacking comparison of things across the years

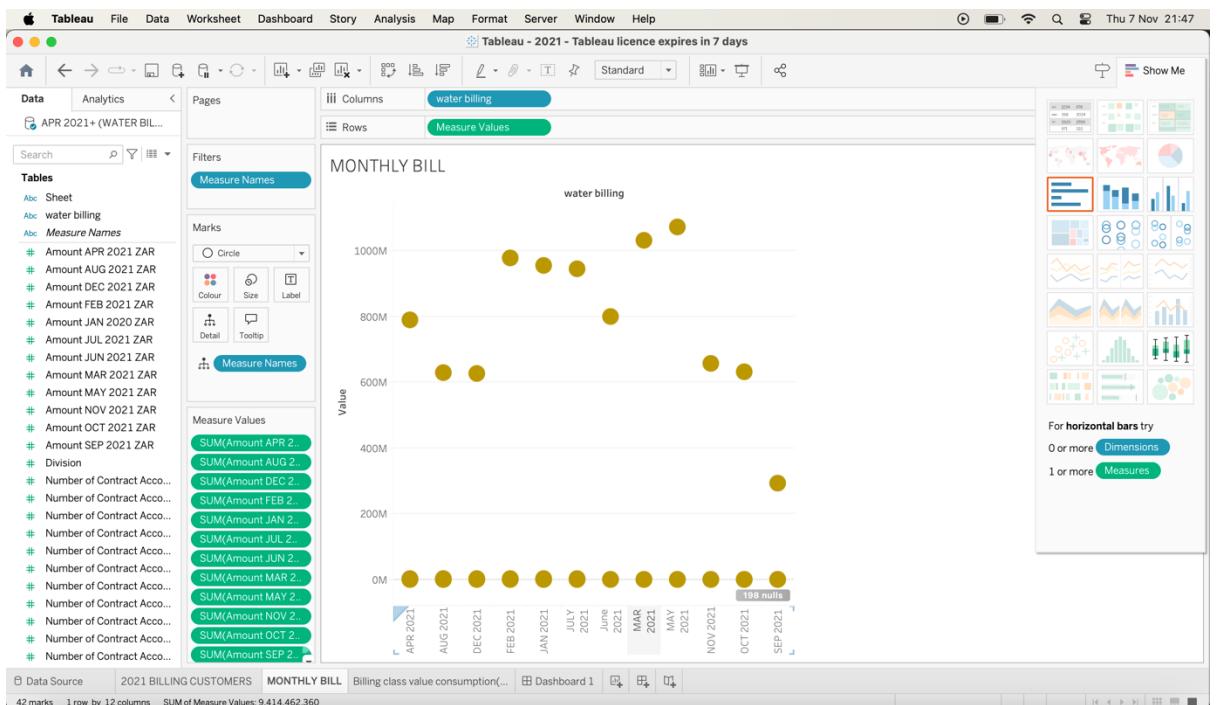
The below work sheets were created in order of year

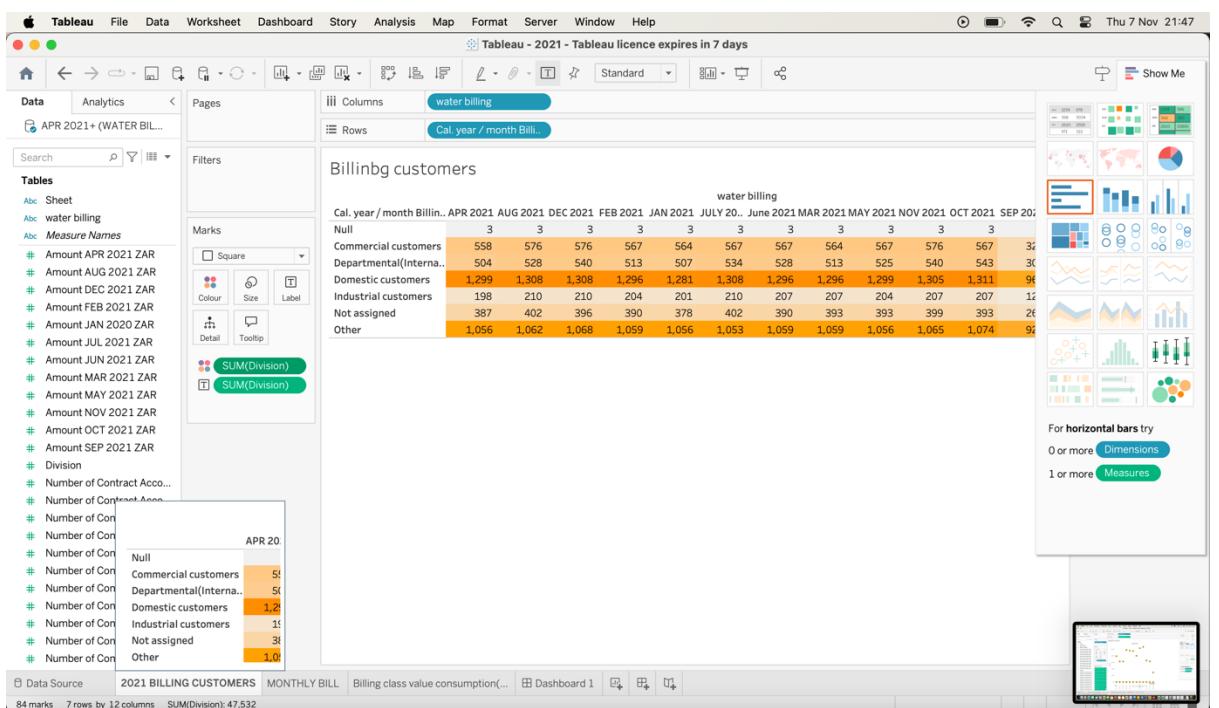
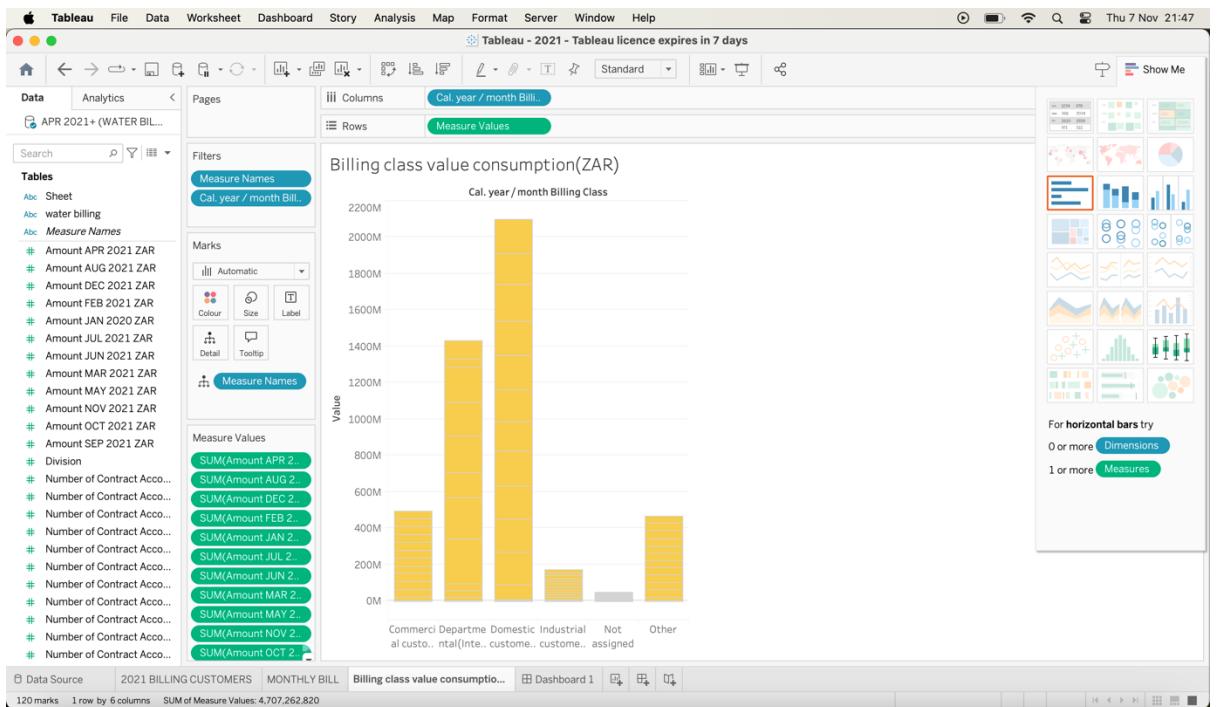
**2019**



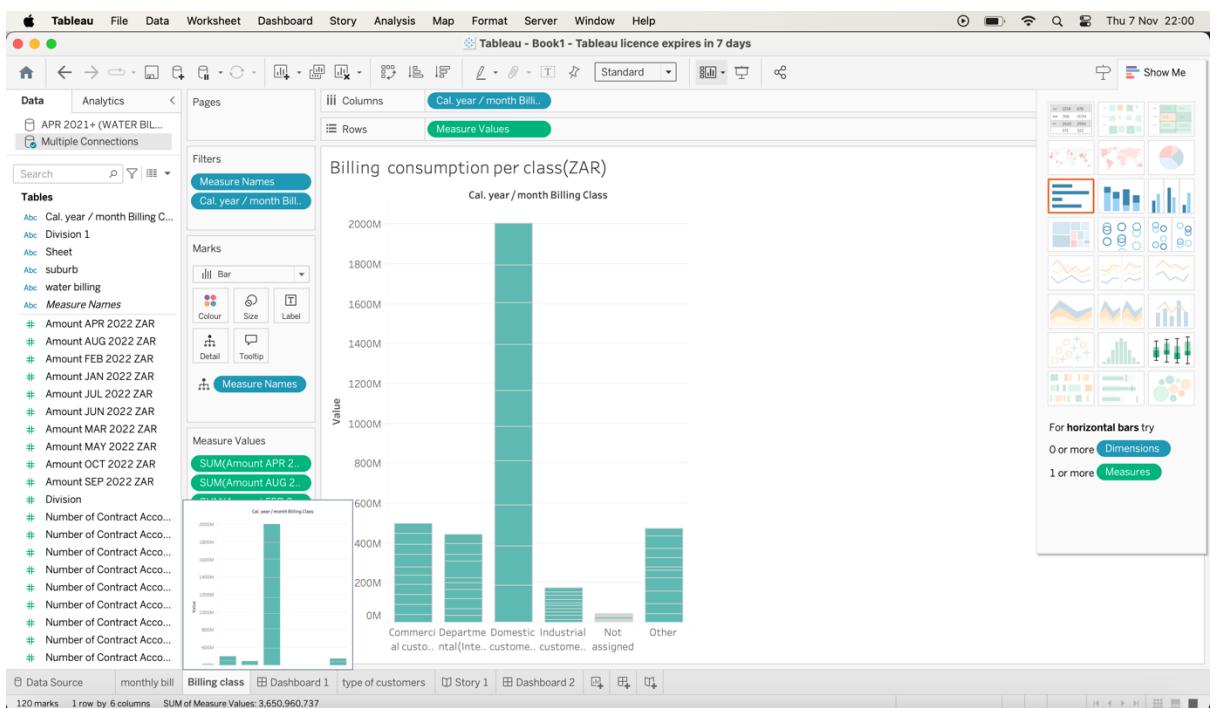
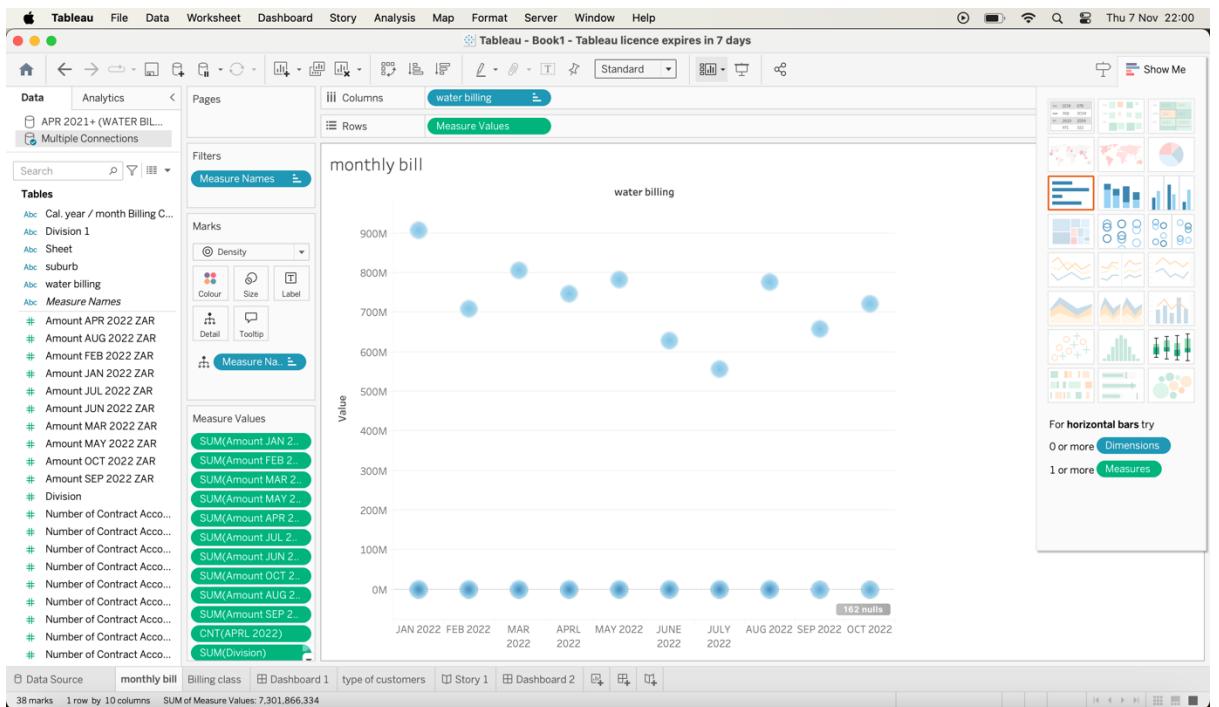


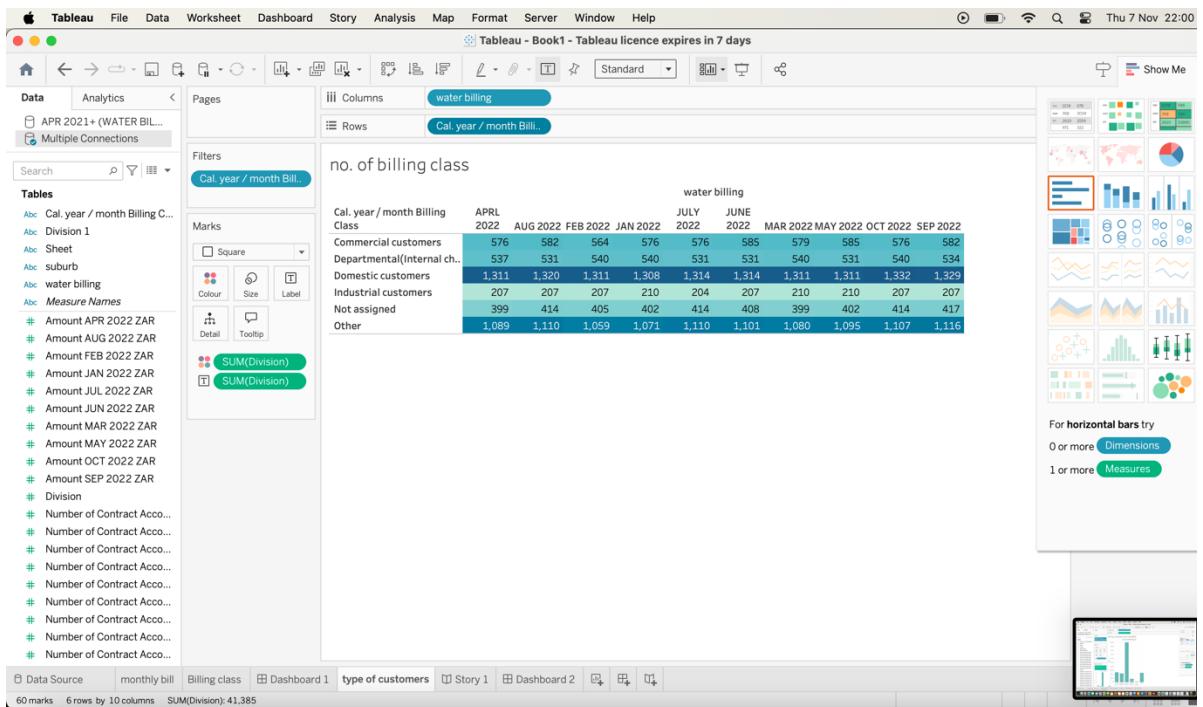
## 2021





**2022**

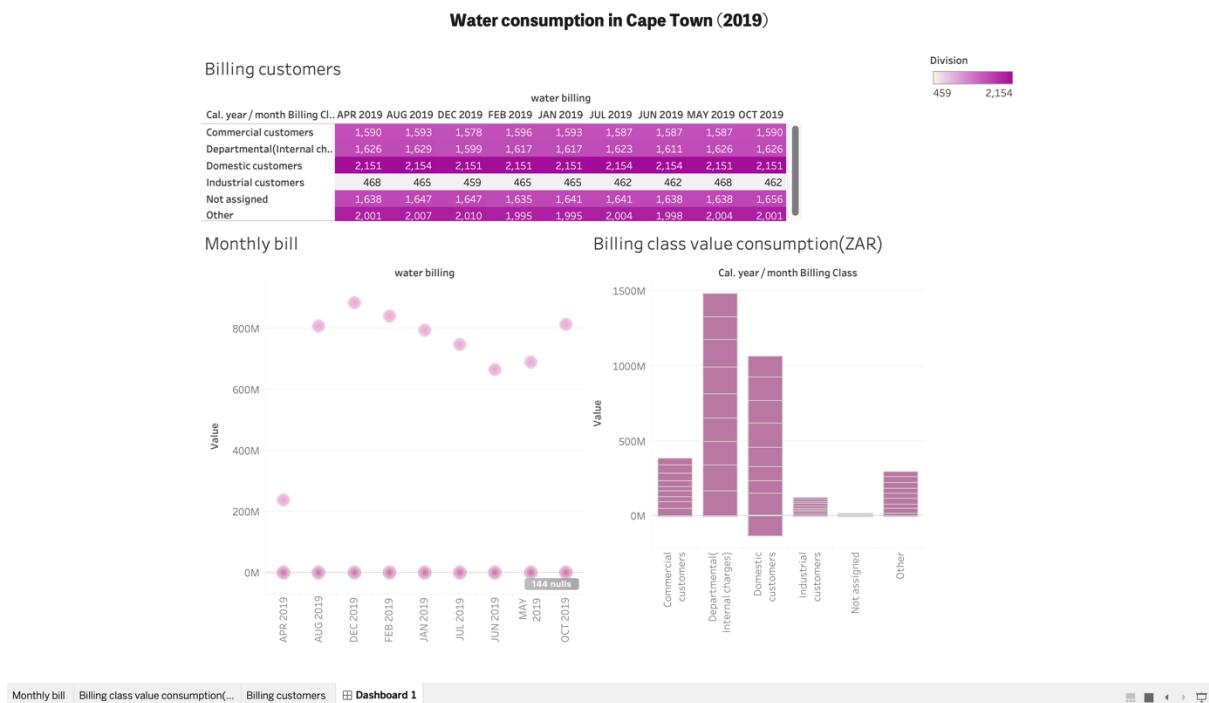




## ii. Dashboard

6/10

-lacking coverage of 2019, 2021,2022 in a single dashboard





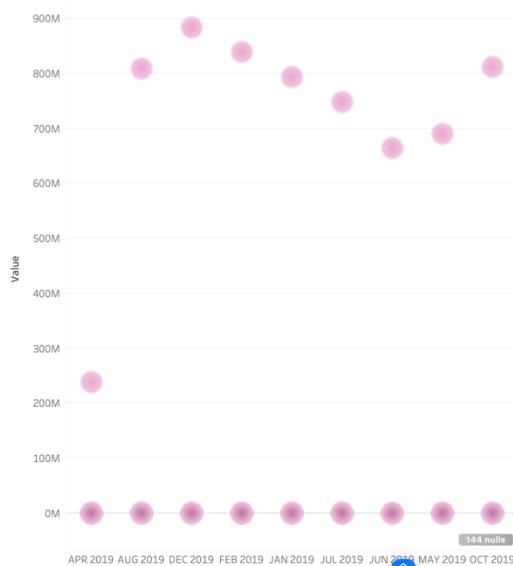
iii. Story 10/10

2019

### Analysis for 2019 water billing for city of Cape Town

< August had the highest value and April the least >  
 Departmental(internal charges) were the highest  
 Domestic customers were the highest with over 2100 each

water billing



December had the highest value of over 900M and the least was for April with over 200M. Value was in the range of 900 and over 200M

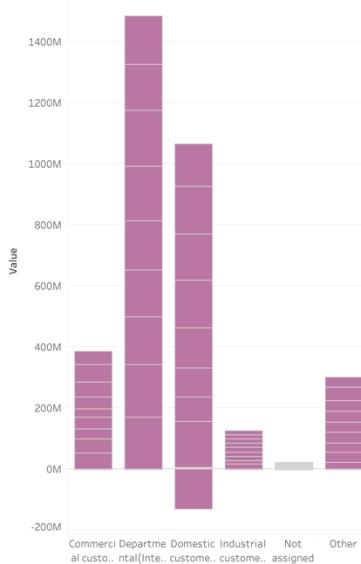
Monthly bill Billing class value consumption(... Billing customers Dashboard 1 Story 1



### Analysis for 2019 water billing for city of Cape Town

< August had the highest value and April the least >  
 Departmental(internal charges) were the highest  
 Domestic customers were the highest with over 2100 each

Cal. year / month Billing Class



Departmental(internal charges) were the highest with over 1400M and the least being Industrial customers of over 100M

Monthly bill Billing class value consumption(... Billing customers Dashboard 1 Story 1



### Analysis for 2019 water billing for city of Cape Town

< August had the highest value and April the least >

Cal. year / month	Billing Cl.	APR 2019	AUG 2019	DEC 2019	FEB 2019	JAN 2019	JUL 2019	JUN 2019	MAY 2019	OCT 2019
Commercial customers		1,590	1,593	1,578	1,594	1,593	1,587	1,587	1,587	1,590
Departmental/internal ch..		1,626	1,629	1,599	1,617	1,617	1,623	1,611	1,626	1,626
Domestic customers		2,151	2,154	2,151	2,151	2,151	2,154	2,154	2,151	2,151
Industrial customers		468	465	459	465	465	462	462	468	462
Not assigned		1,638	1,647	1,647	1,635	1,641	1,641	1,638	1,638	1,656
Other		2,001	2,007	2,010	1,995	1,995	2,004	1,998	2,004	2,001

Division  
459 2,154

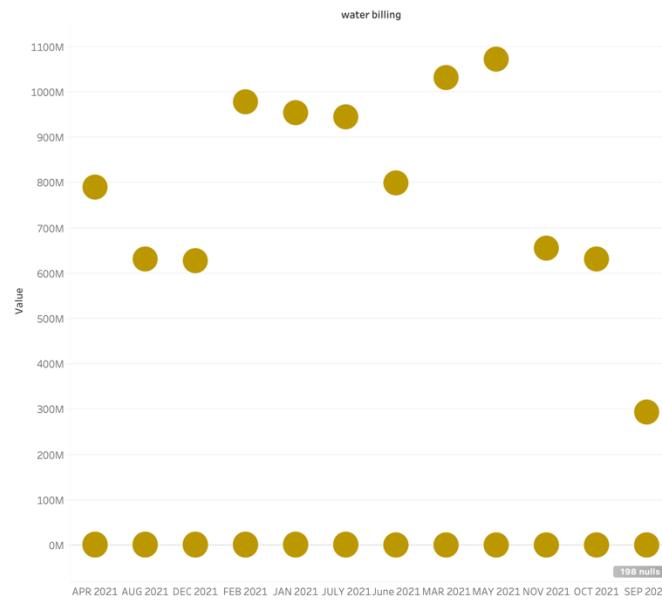
domestic customers highest consumers of water usage for the 2019 year however a large amount of not assigned and other users also is one of the highest consumers

Monthly bill Billing class value consumption(... Billing customers Dashboard 1 Story 1

## 2021

### Analysis for 2021 water billing for City of Cape Town

< May had the highest value of and September had the lowest >



May had the highest water bill consumption with over 1000M and September had the least of around 300M. 2021 Consumption value was between 1000M to 300M

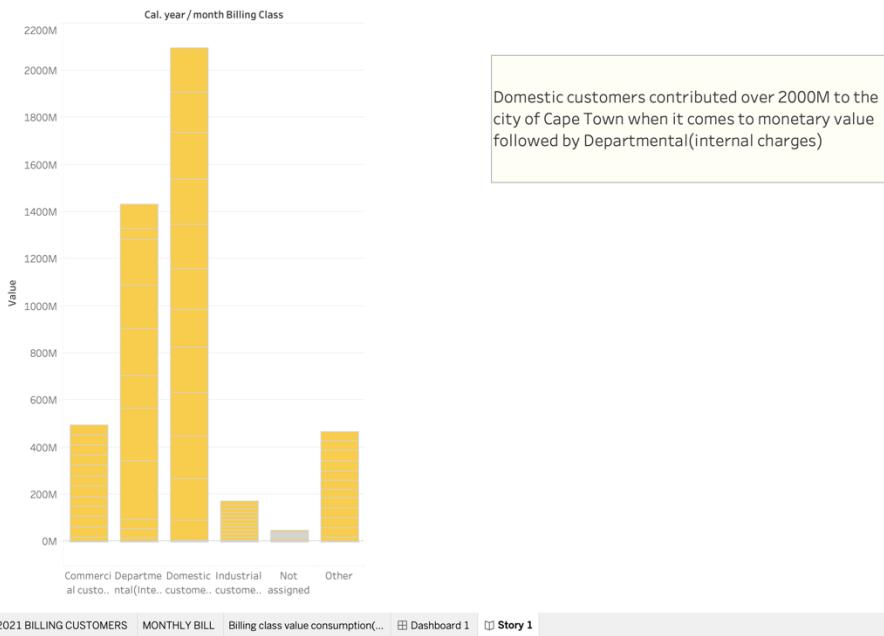
2021 BILLING CUSTOMERS MONTHLY BILL Billing class value consumption(... Dashboard 1 Story 1

Analysis for 2021 water billing for City of Cape Town

May had the highest value of and September had the

Domestic customers  
are the highest

Domestic customer  
are the key  
customers of City



Domestic customers contributed over 2000M to the city of Cape Town when it comes to monetary value followed by Departmental(internal charges)

Analysis for 2021 water billing for City of Cape Town

May had the highest  
value of and  
September had the

Domestic customers  
are the highest

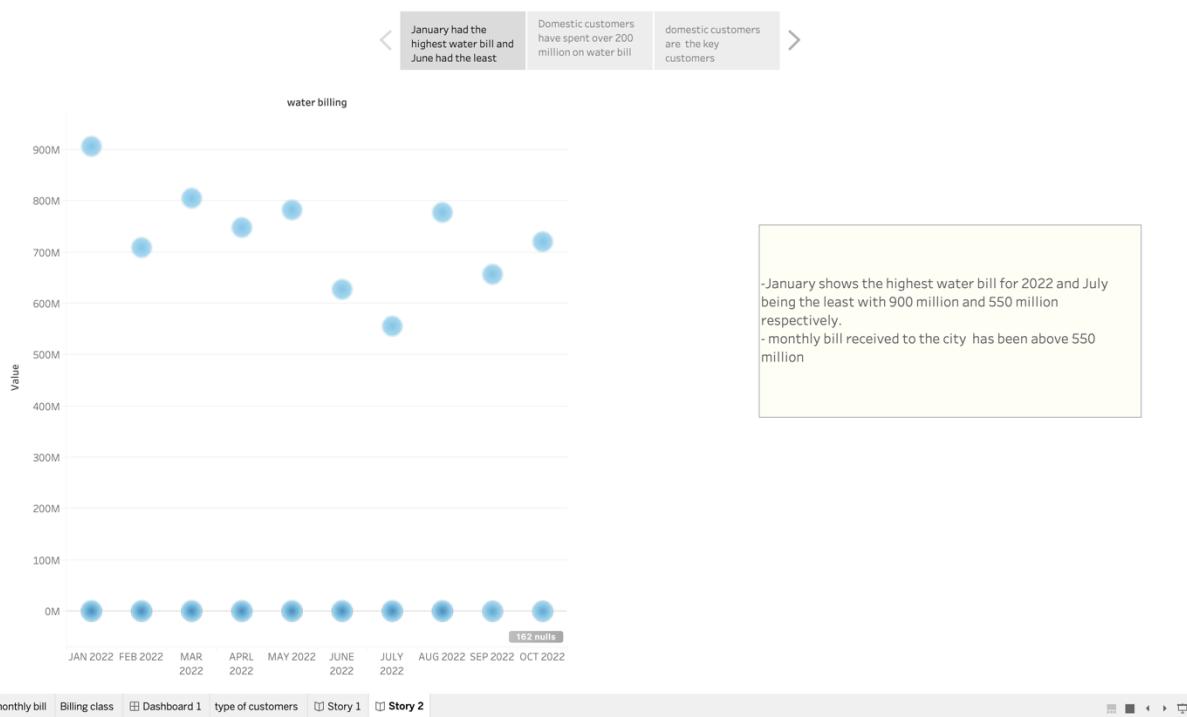
Domestic customer  
are the key  
customers of City

water billing														
Cal. year / month	Billing	Cl.	APR 2021	AUG 2021	DEC 2021	FEB 2021	JAN 2021	JULY 2020	JUN 2021	MAR 2021	MAY 2021	NOV 2021	OCT 2021	SEP 2021
Null			3	3	3	3	3	3	3	3	3	3	3	
Commercial customers			558	576	576	567	564	567	567	564	567	576	567	
Departmental/internal ch.			504	528	540	513	507	534	528	513	525	540	543	
Domestic customers			1,299	1,308	1,308	1,296	1,281	1,308	1,296	1,296	1,299	1,305	1,311	
Industrial customers			198	210	210	204	201	210	207	207	204	207	207	
Not assigned			387	402	396	399	378	402	390	393	393	399	361	
Other			1,056	1,062	1,068	1,059	1,056	1,053	1,050	1,059	1,056	1,074	927	

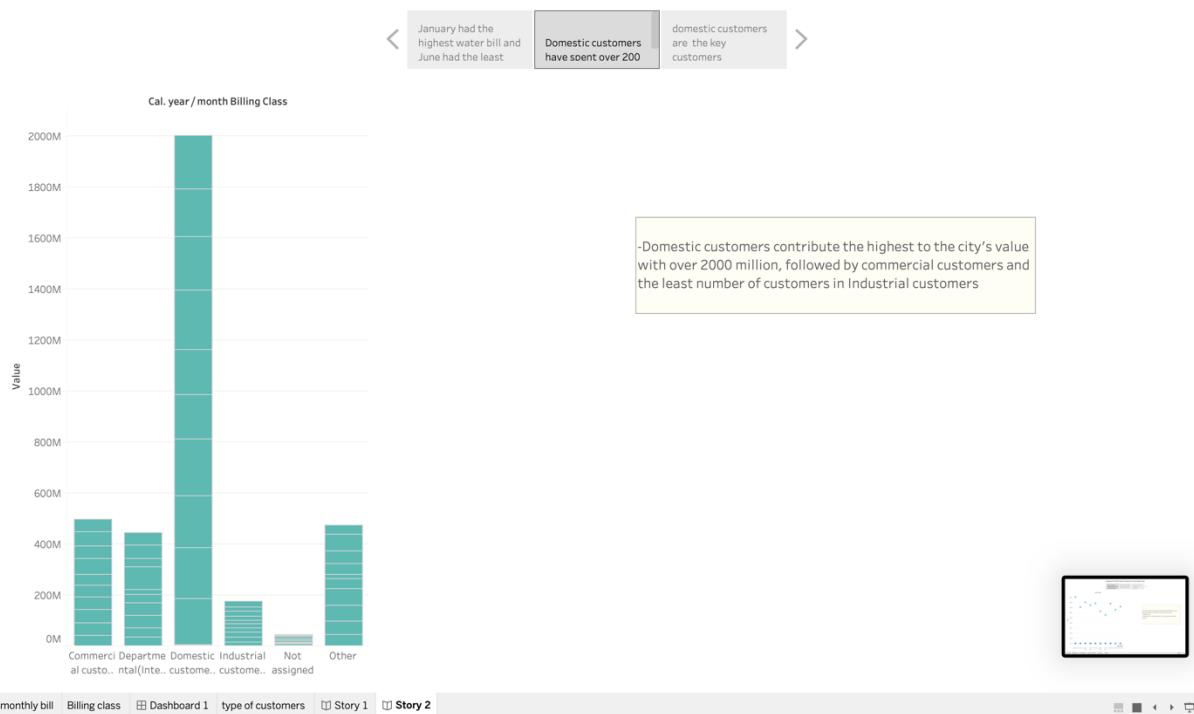
domestic customers are the highest with industrial customers being the least.

2022

### Analysis for 2022 water billing for city of Cape Town



### Analysis for 2022 water billing for city of Cape Town

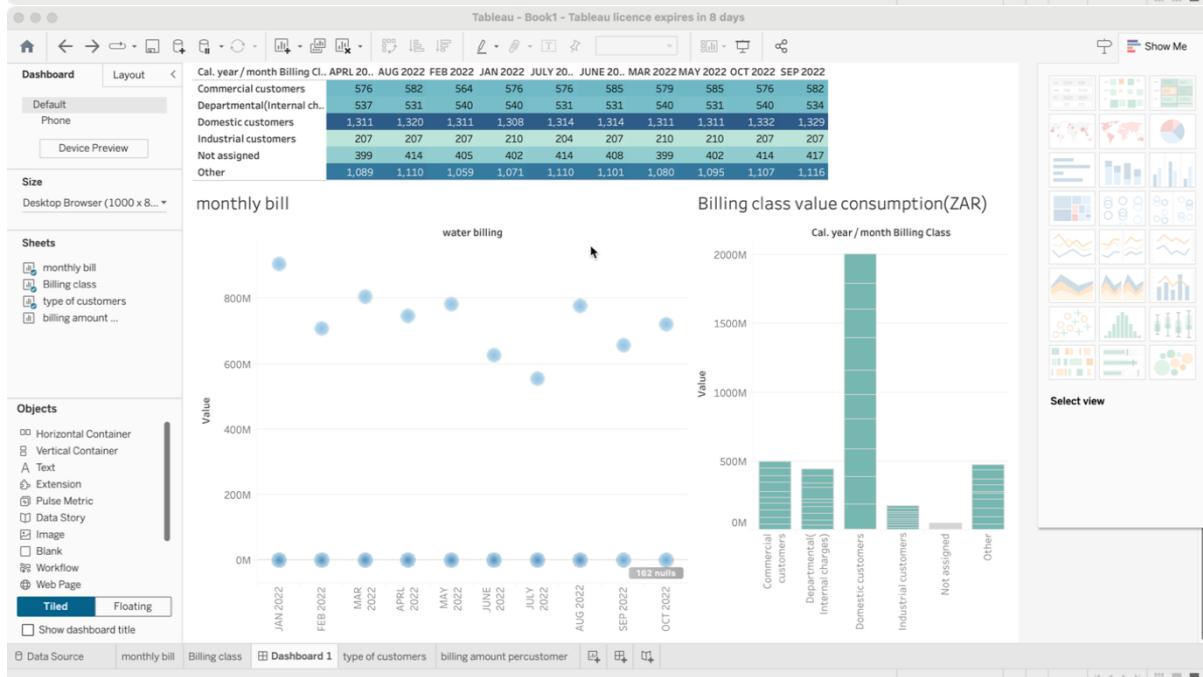
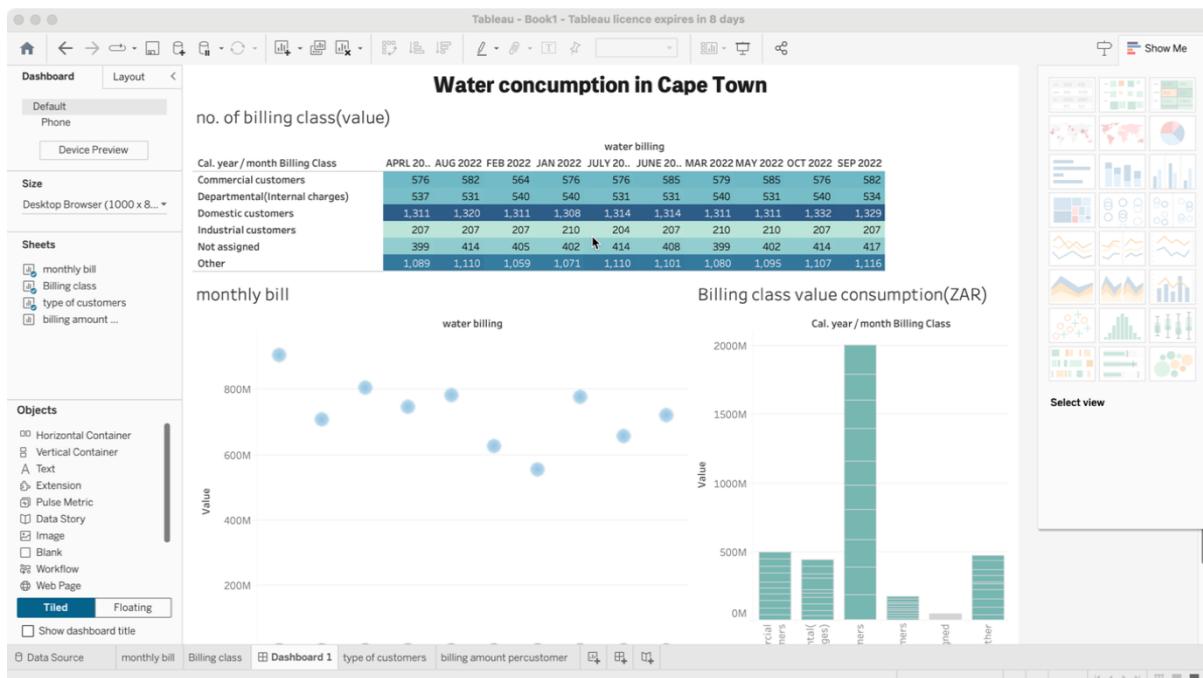


### Analysis for 2022 water billing for city of Cape Town

<
January had the highest water bill and June had the least
>

Cal. year / month Billing Class	water billing									
	APRL 2022	AUG 2022	FEB 2022	JAN 2022	JULY 2022	JUNE 2022	MAR 2022	MAY 2022	OCT 2022	SEP 2022
Commercial customers	576	582	564	576	576	585	579	585	576	582
Departmental/internal ch..	537	531	540	540	531	531	540	531	540	534
Domestic customers	1,311	1,320	1,311	1,308	1,314	1,314	1,311	1,311	1,332	1,329
Industrial customers	207	207	207	210	204	207	210	210	207	207
Not assigned	399	414	405	402	414	408	399	402	414	417
Other	1,089	1,110	1,059	1,071	1,110	1,101	1,080	1,095	1,107	1,116

domestic customers are the most consumers followed by "others" with industrial customers being the least



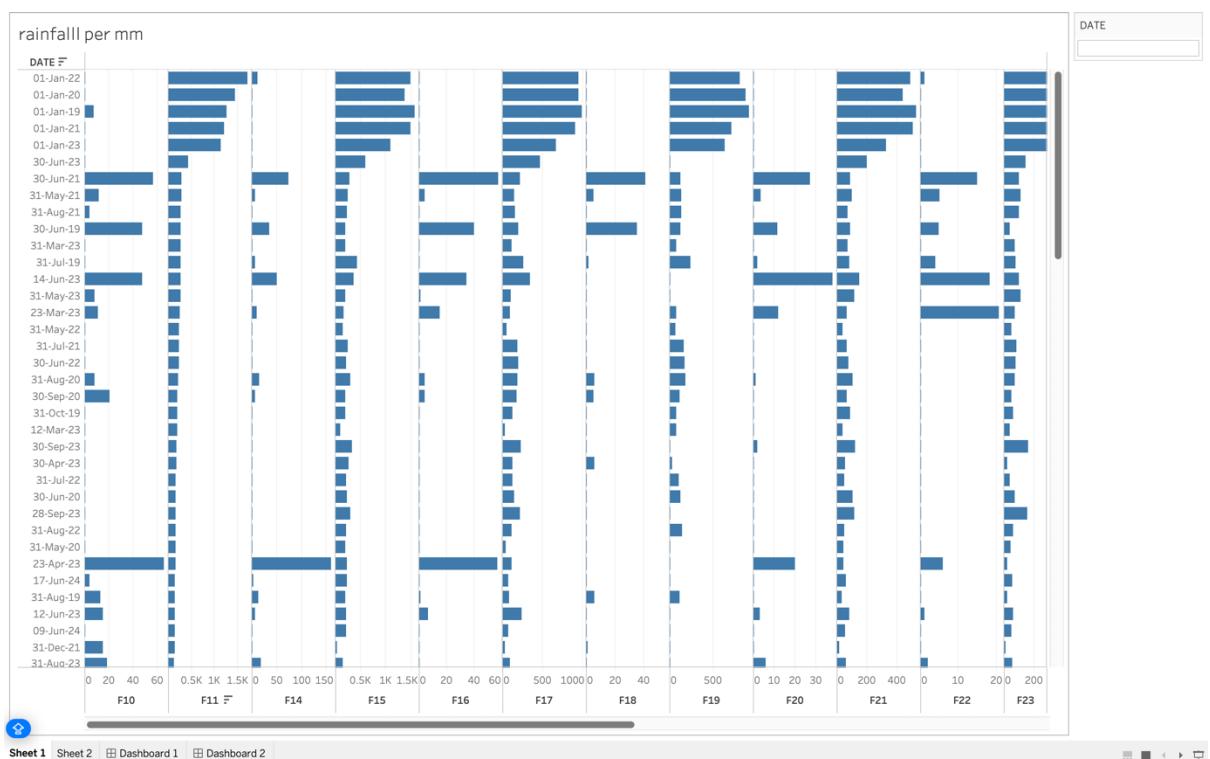
## **TASK 2**

11/20  
-lacking augmentation of data

The dataset used is rainfall data from 2000-2024 from the city of Cape Town website. The Data was then filtered for 2019-2024 only as that is the area of interest.

As per below sheet it shows that rainfall is usually experienced in the early months of the year showing a direct correlation with water consumption being its highest in January and early months. Furthermore, Summer is usually experienced in the early months of the year hence making sense why rainfall is highest in January to April. Hot season further require a lot of water as people generally use water to cool off as most recreational facilities are open during the beginning of the year and the use of swimming pools and other recreational facilities that require water is mostly used in summer. Most households use their pools in summer hence increasing the use of water during these times.

Moreover, generally the intake of beverages is taken in high quantities in summer due to the hot conditions and weather thus increasing the consumption of water during these times. Including soft drinks



### **TASK 3**

**3.1 Explain any preprocessing / data cleaning / transformation that you applied on the data to accomplish Task 1 and/or Task 2.**

Task 1 preprocessing 5/5

For each month of the year, the dataset was in its own excel sheet. I then combined all the sheets with different months in one workbook and saved the workbook per year as per below

Water billing 2019.xls - Compatibility Mode

Billing Data Report Current Year

			Amount Cal. year / month APR. 2019	Quantity APR. 2019	Number of Contract Accounts APR. 2019
3	4	5	6	7	8
Division	Location	Billing Class	ZAR		
5	WATER ACACIA PARK	Commercial customers	162 122,33	6 163 000 Ml	3
6	WATER ACACIA PARK	Domestic customers	156,700	0,000	
7	WATER ACACIA PARK	Other	209 000,00	7 980 000 L	2
8	WATER ADMIRALS PARK	Domestic customers	59 336,96	2 254 765,558 L	262
9	WATER ADMIRALS PARK	Other	178,350	0,000 Ml	1
10	WATER ADMIRALS PARK	Commercial customers	1 075,300	37 000 000 L	46
11	WATER ADRIANNAISE	Commercial customers	1 075,300	39 000 000 L	3
12	WATER ADRIANNAISE	Departmental/internal charges)	741 226,400	*	117
13	WATER ADRIANNAISE	Domestic customers	71 625,710	2 765 083,918 L	372
14	WATER ADRIANNAISE	Other	8 314,300	*	9
15	WATER ADRIANNAISE	Not assigned	286,070	11 000,000 L	1
16	WATER AIRPORT CITY	Commercial customers	146 000,00	-5 743 000 Ml	38
17	WATER AIRPORT CITY	Domestic customers	21 007,710	*	32
18	WATER AIRPORT CITY	Industrial customers	52 304,140	*	18
19	WATER AIRPORT CITY	Other	8 925,610	18 000 Ml	18
20	WATER AMANDA GLEN - Belville	Commercial customers	2 076,260	78 000 Ml	2
21	WATER AMANDA GLEN - Belville	Departmental/internal charges)	1 075,260	71 000 Ml	2
22	WATER AMANDA GLEN - Belville	Domestic customers	625,000	0,000 Ml	1
23	WATER AMANDA GLEN - Durbanville	Commercial customers	42 522,150	1 807 016,804 L	196
24	WATER AMANDA GLEN - Durbanville	Departmental/internal charges)	5 000,120	267 000 Ml	2
25	WATER AMANDA GLEN - Durbanville	Domestic customers	63 000	3 000 Ml	1
26	WATER AMANDA GLEN - Durbanville	Domestic customers	63 743,570	2 274 701,752 L	217
27	WATER AMANDA GLEN - Durbanville	Other	78,350	0,000	1
28	WATER AMANDA GLEN - Durbanville	Not assigned	400,000	0,000 L	1
29	WATER ANCHORAGE PARK	Departmental/internal charges)	92 000,00	0,000 L	1
30	WATER AMANDERLUG	Domestic customers	75 938,450	3 079 723,872 L	348
31	WATER AMANDERLUG	Other	1 036,510	36 000 Ml	2
32	WATER AMANDELSIG	Departmental/internal charges)	168,000	0,000 Ml	1
33	WATER AMANDELSIG	Domestic customers	86 761,160	3 429 000,165 L	291
34	WATER AMANDELSIG	Other	1 034,545	98 000 L	1
35	WATER AMANDELSIG	Not assigned	1 111,180	30 000,000 L	3
36	WATER ANCHORAGE PARK	Domestic customers	104 824,320	3 781 055,917 L	405
37	WATER ANCHORAGE PARK	Other	3 069,950	120 000,000 L	25
38	WATER ANNANDALE	Domestic customers	22 220,000	22 000 Ml	4
39	WATER ANNANDALE	Domestic customers	38 651,390	1 447 683,826 L	177
40	WATER ANNANDALE	Other	156,700	0,000	2
41	WATER ANNANDALE	Not assigned	241,110	11 000,000 L	1
42	WATER ANNANDALE FARM	Commercial customers	894,610	32 000 Ml	7
43	WATER ANTILLES/CAYMAN BEACH	Domestic customers	20 841,700	746 962,298 L	7

Ready Accessibility: Unavailable

In Tableau I further selected the “cleaned with data interpreter” box as it assisted with converting blank areas with a zero especially in the numeric columns like quantity and amount.

Tableau - Book4 - Tableau licence expires in 6 days

APR 2019+ (Water billing 2019)

Connection: Live | Extract | Filters: 0 | Add

Sheets: APR 2019, AUG 2019, DEC 2019, FEB 2019, JAN 2019, JUL 2019, JUN 2019, MAY 2019, OCT 2019, Sheet11, Sheet7, Sheet9, New Union, New Table Extension

APR 2019 | 33 fields 28414 rows | 100 rows

Name	Division	Division 1	Location	Cal. year / month Billing C	Amount APR 2019 ZAR
APR 2019+	3	WATER	ACACIA PARK	Commercial customers	162,122,33
APR 2019+	3	WATER	ACACIA PARK	Domestic customers	156,70
APR 2019+	3	WATER	ACACIA PARK	Other	205,682,15
APR 2019+	3	WATER	ADMIRALS PARK	Domestic customers	59,336,96
APR 2019+	3	WATER	ADMIRALS PARK	Other	178,35
APR 2019+	3	WATER	ADMIRALS PARK	Not assigned	1,075,30

I have done the above for all the years of 2021 and 2022 which I later then joined the months in Tableau as a union to ensure further processing in Tableau. Furthermore, location attribute was changed into geographical role to ensure visualization using a map.

### Preprocessing for task 2

Task 2 dataset was from 2000-2024. The time of interest was of 2019, 2021 and 2022. I then filtered data from 2019-2024 current year as I wanted to see the flow of data till to date. As each month of the years rainfalls per mm was recorded per day. In Tableau I then

further processed the data to aggregate rainfall per day into months. Hence visualization showing months for each year.

**3.2 Outline and briefly explain some of the non-trivial questions that can be answered by your visualisations presented in Task 1. Make explicit reference to specific visualisations. Mention at least three (3)** 10/15

-lacking non-trivial question  
-lacking reference to visualisation

Non-trivial questions

- What is the total monthly water bill for each year in Cape town
- Which group of consumers use the water
- How many consumers use water?

Trivial questions

- How has the water usage changed over the years? this was given as an example
- Which group of consumers is mostly billed?
- Has the consumers of water usage changed over the years?

**3.3) Outline and briefly explain some of the non-trivial questions that can be answered by your visualisations presented in Task 2. Mention at least two (2).** 5/10

-lacking two different questions

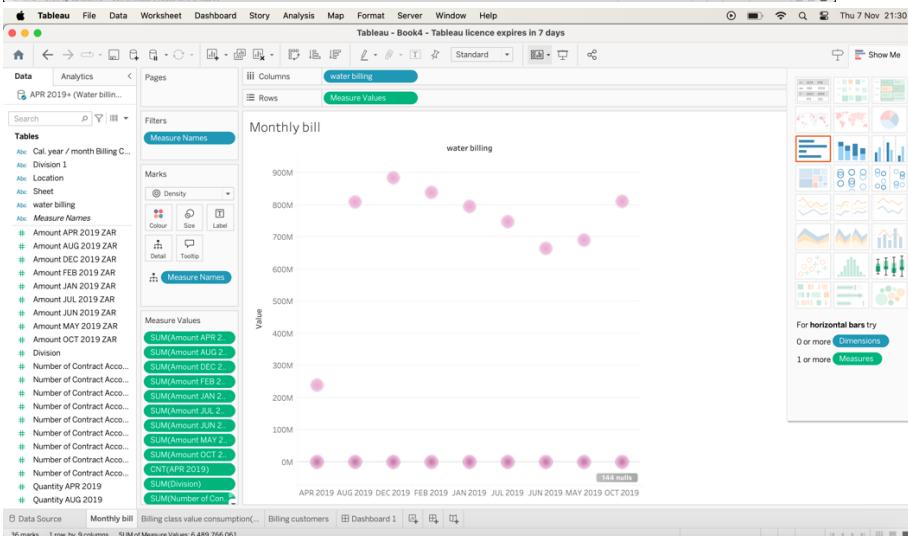
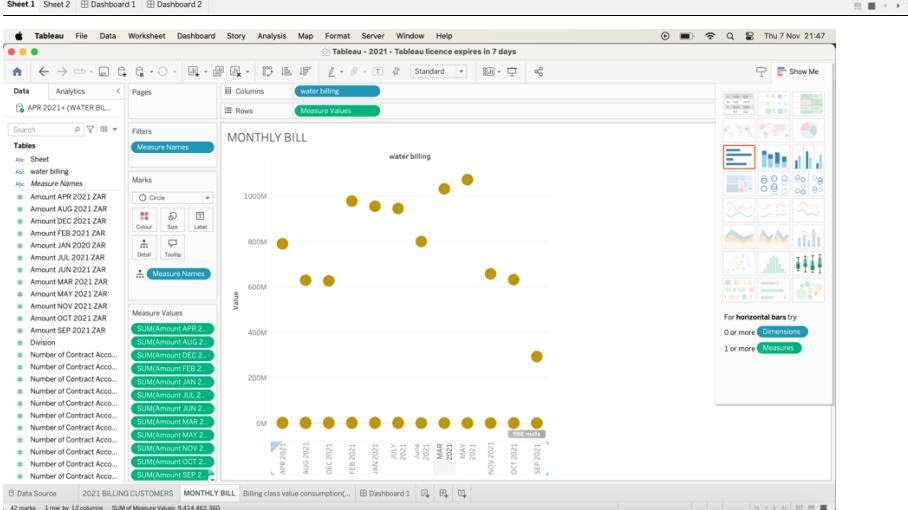
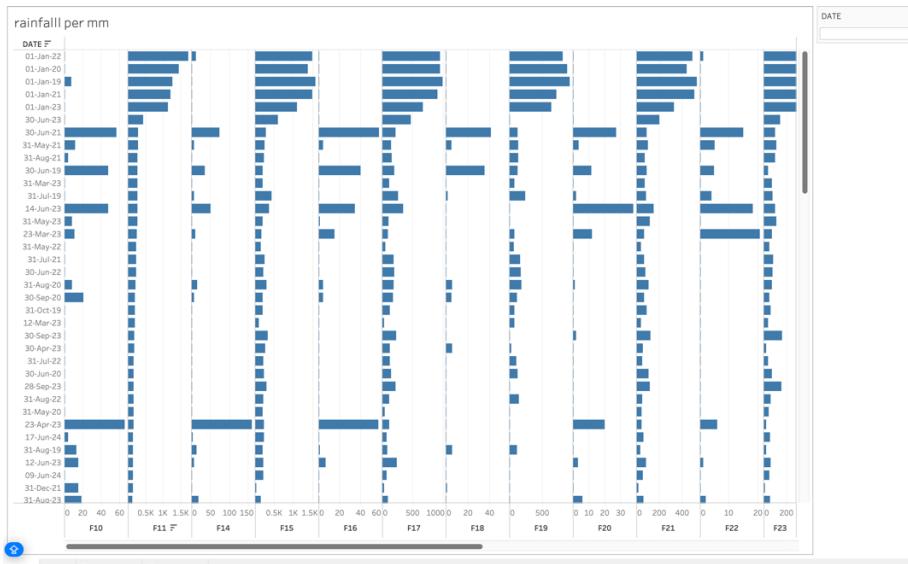
Non-trivial questions

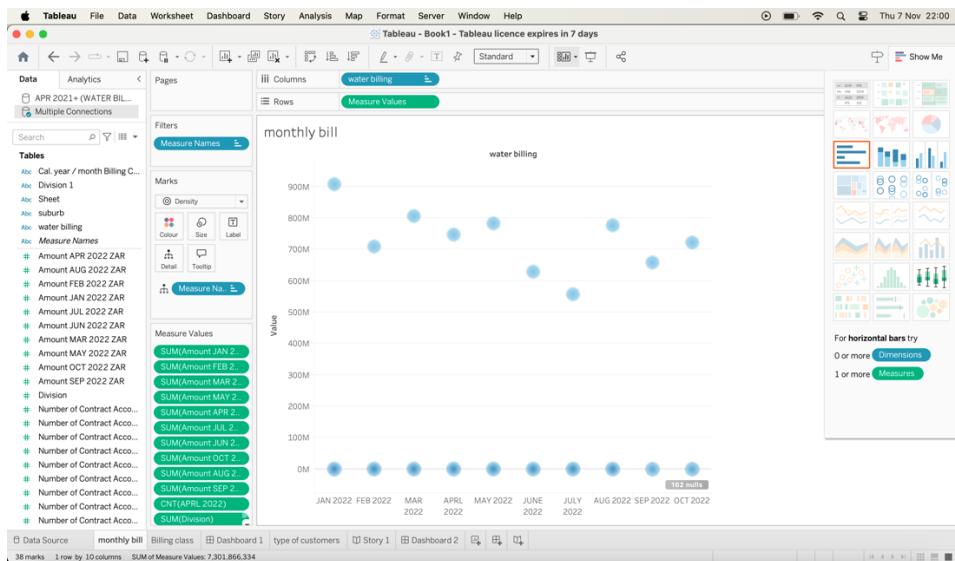
- How does rainfall affect the usage of water in different seasons?

As per below visualisation it is evident that the usage of water is highest during the rainy season as well

- Does a reduction in rainfall increase water usage or lowers it?

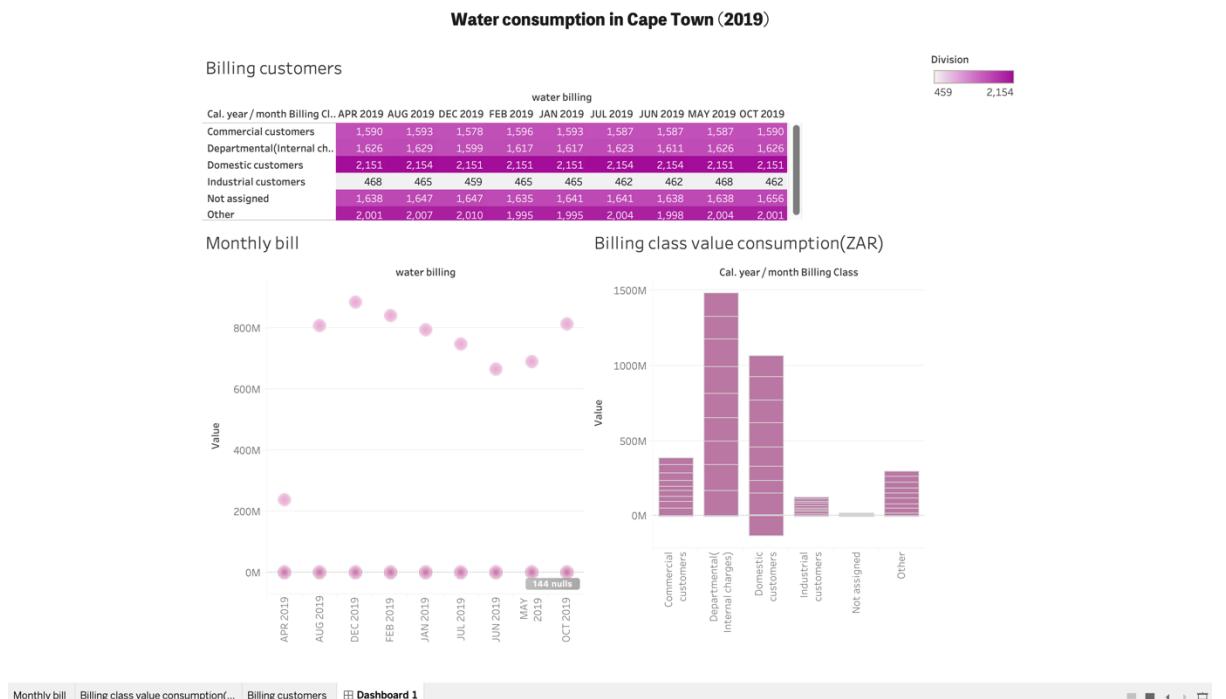
below visualisations indicate that the less rainfall is experienced in a month the less consumption happens as well.





### 3.4 Explain two (2) guidelines/principles that you applied (intentionally or implicitly) in constructing your dashboard in Task 1. 2/2

- When creating my dashboards I used simplicity to ensure that the viewer is not overwhelmed with complex graphs. Where I used density graphs to show the monthly bill and bar graphs to show the value of different types of consumers towards water. I further used a table to clearly show the number of different consumers per year.
- I also used comparative visuals to show the data overtime for example displaying different customers side by side to see how different consumers consume water example domestic customers and industrial customers.



### 3.5 Recommend three (3) of your own visualisations that you have not done (for one reason or the other) but would be great to have and explain their usefulness. 3/3

- Using maps as a form of visualisation- will be able to see which suburb receives the most rain and which suburb uses the most rain via map visualisation would have been pleasing to the eyes.
- Boxplots will assist in showing monthly bills and outliers by using median and quartiles
- Area charts- will show the total consumption and the input of each customer type be it commercial or industrial customer. This will be easy to assess how consumption trends change seasonally and to see which consumer uses the most water concurrently.

## Marksheet

Task	Requirement	Possible mark	Student score
<b>Task 1:</b> individual visualisations/ worksheets	Well/clearly presented [5], Accurate, insightful [5], At least 3 types of graphs (bar, pie, scatterplot, etc.); and each visualisation gives different info [5x3=15]	25	
<b>Task 1:</b> Dashboard	Well laid out [2], Usable/makes sense [2], Uses at least 3 visualisation types [6]	10	
<b>Task 1:</b> Story	At least 3 pages [6], Coherent flow [2], Insightful [2]	10	
<b>Task 2:</b> augment with other data	Augments analysis with additional data [9], Makes sense [5], Explains the analysis [4], Explains source of the data used [2]	20	
<b>Task 3.1:</b> pre-processing	Details some pre-processing either using Tableau or any other tool e.g., rearranging the data, transforming the data, deriving additional columns, etc.	5	
<b>Task 3.2:</b> non-trivial questions answered by visuals in Task 1	Non-trivial, refers to visualisations in Task 1, meaningful, at least three questions [5 x 3]	15	
<b>Task 3.3:</b> non-trivial questions answered by visuals in Task 2	Non-trivial, refers to visualisations in Task 2, meaningful, at least two questions [5 x 2]	10	
<b>Task 3.4:</b> dashboard design principles/guidelines	Applicable guidelines/principles [1 x 2]	2	
<b>Task 3.5:</b> recommend visuals	Makes sense and is appropriate based on the case study, at least three [1 x 3]	3	