

# *City of Tomball, TX*

# *Zoning & Land Use Analysis*

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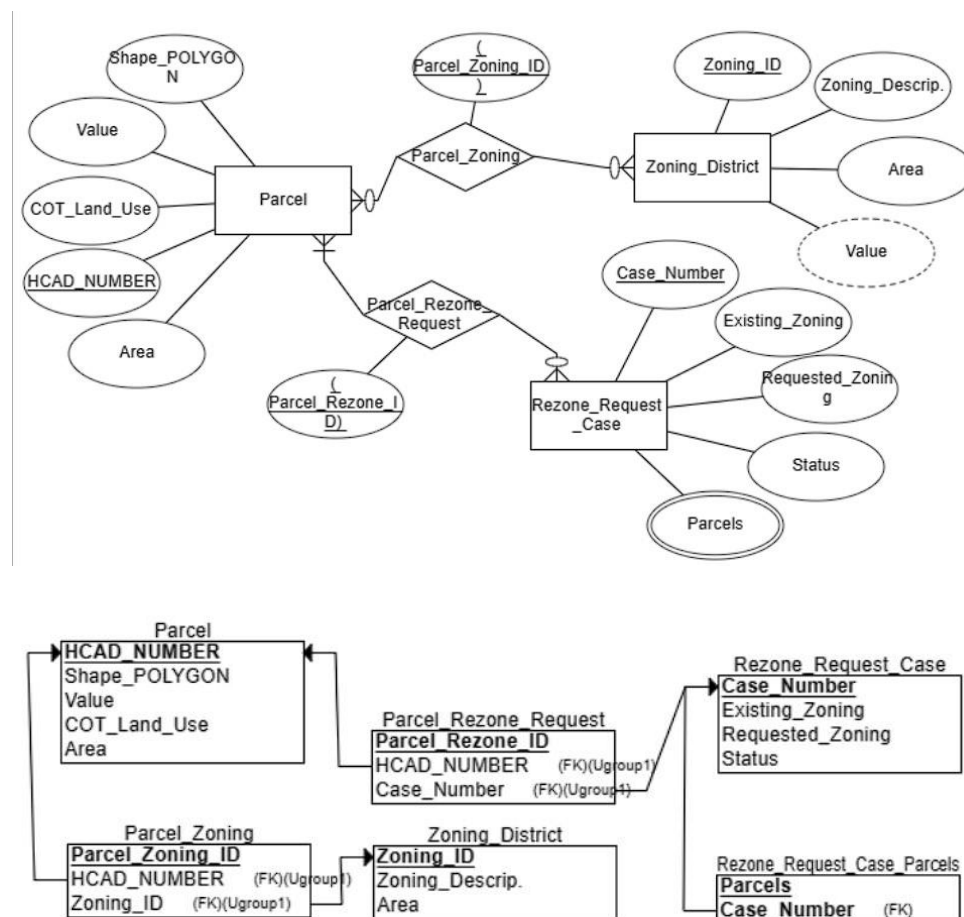
*GEOG: 574*

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Thirty minutes northwest of Houston Texas is the once sleepy town of Tomball. A community historically known as a “bedroom community” has become the epicenter of new growth and development over the past ten years. In 2008 the City of Tomball adopted city wide zoning to govern land use and development. As the pressure of new development grips the community it is becoming increasingly important to understand the existing conditions of the community and identify the potential for future development.

Our project focuses on zoning districts within the City of Tomball and aims to answer questions pertaining to existing conditions such as the distribution of varying zoning districts throughout the city, historic statistics regarding zone change requests, opportunities for future development, identification of legal nonconforming land uses as well as potential to promote transitional land use zoning districts. To help answer these questions we have built a “Tomball” database.

To begin the project, it was necessary to create a conceptual ER model and logical model identifying all necessary entities and their respective relationships within the database.



To create the database, we have chosen to utilize PostgreSQL/PostGIS. To get the entities identified within our models above it was necessary to locate and tailor the necessary data and create shapefiles to be uploaded to PostgreSQL. Shapefiles pertaining to zoning were obtained from the City of Tomball, while shapefiles pertaining to parcels (and associated tables) were obtained from the Harris County Appraisal District. Harris County is the third most populous county in the United States at approximately 4.78 million people according to the United States Census Bureau ([County Population Totals: 2020-2022 \(census.gov\)](https://www.census.gov/popest/totals/2020/states/24000.html)). Subsequently, the Harris County Appraisal District (HCAD) is tasked with handling extremely large volumes of parcel data. Due to this large volume of data much of the data is broken into stand alone .txt tables. In order to create a comprehensive parcel shapefile that would include the information that we are interested in capturing within the database (i.e. HCAD ID (property ID), land values, and existing uses) it required each of these respective attribute tables to be joined to the parcel shapefile based on the HCAD ID. The HCAD ID is the Harris County Appraisal Districts chosen primary key found in the parcel polygon dataset as well as all other associated supporting tables. To create a suitable parcels shapefile to be loaded into our database it was necessary to first join the relevant tables, these joins were executed based on the HCAD primary/foreign keys found within the standalone tables. Further, due to the sheer size of Harris County in comparison to the City of Tomball study area, we have chosen to reduce the parcels dataset (using select by location) to focus solely on parcels that are located within the city limits of Tomball as well as the parcels located within the extraterritorial jurisdiction (ETJ). Given the potential for annexation we've decided to include the ETJ so that the database can scale to accommodate growth that is likely to occur in the future.

Once the necessary shapefiles were created/collected, the database was created within PostgreSQL using the following SQL statement: "CREATE DATABASE tomball WITH OWNER = postgres TEMPLATE = postgres\_32\_sample ENCODING = 'UTF8' CONNECTION LIMIT = -1 IS\_TEMPLATE = False;"

After creating the database, prior to uploading the shapefiles it was necessary to identify the spatial reference ID (SRID). To determine the SRID, we utilized the parcels.prj file and run the following SQL statement to narrow the choices of spatial references: "select srid, srtext, proj4text from spatial\_ref\_sys where srtext LIKE '%NAD\_1983%' and srtext LIKE '%Texas\_South%';" the correct SRID for the database is 102740. To load the shapefile data we utilized the PostGIS Shapefile Import/Export Manager console. After uploading the shapefiles, it was necessary to begin to define the constraints which apply to the data.

The following SQL statements created the associated **constraints** for entities identified within the models.

**PRIMARY & FOREIGN KEYS:** keys used to ensure there are no duplicate primary keys being utilized in a data table as well as foreign keys to join/relate associated entities.

zoning\_districts: "ALTER TABLE IF EXISTS public.zoning\_districts DROP CONSTRAINT IF EXISTS zoning\_id; ALTER TABLE IF EXISTS public.zoning\_districts ADD CONSTRAINT zoning\_id PRIMARY KEY (zoning\_id);"

rezoning\_request\_cases: "ALTER TABLE IF EXISTS public.rezone\_request\_cases DROP CONSTRAINT IF EXISTS rezone\_request\_cases\_pkey; ALTER TABLE IF EXISTS public.rezone\_request\_cases ADD CONSTRAINT "Case\_Number" PRIMARY KEY (case\_numbe); ALTER TABLE IF EXISTS public.rezone\_request\_cases ADD CONSTRAINT initial\_zoning FOREIGN KEY (initial\_zo) REFERENCES public.zoning\_districts (zoning\_id) MATCH SIMPLE ON UPDATE NO ACTION ON DELETE NO ACTION NOT VALID; ALTER TABLE IF EXISTS public.rezone\_request\_cases ADD CONSTRAINT requested\_zoning FOREIGN KEY (requested\_) REFERENCES public.zoning\_districts (zoning\_id) MATCH SIMPLE ON UPDATE NO ACTION ON DELETE NO ACTION NOT VALID;"

parcels: "ALTER TABLE IF EXISTS public.parcels DROP CONSTRAINT IF EXISTS parcels\_pkey; ALTER TABLE IF EXISTS public.parcels ADD CONSTRAINT hcad\_id PRIMARY KEY (hcad\_num);"

parcel\_zoning: "ALTER TABLE IF EXISTS public.parcel\_zoning DROP CONSTRAINT IF EXISTS parcel\_zoning\_pkey; ALTER TABLE IF EXISTS public.parcel\_zoning ADD CONSTRAINT parcel\_zoning\_id PRIMARY KEY (parcel\_zoning\_id); ALTER TABLE IF EXISTS public.parcel\_zoning ADD CONSTRAINT hcad\_number FOREIGN KEY (hcad\_num) REFERENCES public.parcels (hcad\_num) MATCH SIMPLE ON UPDATE NO ACTION ON DELETE NO ACTION NOT VALID; ALTER TABLE IF EXISTS public.parcel\_zoning ADD CONSTRAINT zoning\_district FOREIGN KEY (zoning\_district) REFERENCES public.zoning\_districts (zoning\_id) MATCH SIMPLE ON UPDATE NO ACTION ON DELETE NO ACTION NOT VALID;"

**NOT NULL:** Constraint preventing NULL values

rezoning\_request\_cases:

- All rezoning request cases MUST include an initial zoning, requested zoning & case status:
- "ALTER TABLE IF EXISTS public.rezone\_request\_cases ALTER COLUMN initial\_zo SET NOT NULL; ALTER TABLE IF EXISTS public.rezone\_request\_cases ALTER COLUMN requested\_ SET NOT NULL; ALTER TABLE IF EXISTS public.rezone\_request\_cases ALTER COLUMN case\_status SET NOT NULL;"

## ZONING

Once all necessary data and associated constraints have been established, we have a fully functional database that we can begin to run queries on to answer our study questions. The first thing we wanted to do was establish an understanding of the existing zoning conditions in the City of Tomball. Specifically setting out to answer the following:

1. What are the percentages of each respective zoning district?
  - a. There are approximately **8803 acres** of zoned property in the City of Tomball
2. How many total acres of each zoning district currently exists?

To help determine the answers to these questions we executed the following SQL queries:

## VIEWS

**total zoning district acreage:** "CREATE VIEW zoning\_acres AS SELECT SUM((shape\_area)\*0.00002296) from parcel\_zoning where zoning\_district NOT IN ('ETJ')"

**zoning district stats:** "CREATE VIEW zoning\_district\_stats AS SELECT DISTINCT(zoning\_district)as zoning, COUNT(zoning\_district) as zoning\_count, SUM(shape\_area\*0.00002296) as acres FROM parcel\_zoning GROUP BY zoning\_district HAVING zoning\_district NOT IN('ETJ');"

## ANALYSIS:

"SELECT zoning\_district\_stats.zoning, zoning\_district\_stats.acres, SUM((zoning\_district\_stats.acres/zoning\_acres.sum)\*100) FROM zoning\_district\_stats, zoning\_acres GROUP BY zoning\_district\_stats.zoning, zoning\_district\_stats.acres ORDER BY zoning\_district\_stats.acres DESC ;"

The above views and associated "ANALYSIS" SQL statement produced the following results:

Zoning	Acres	% of Zoning District
SF20	2378.739	27.02043348
C	1557.164	17.68805037
LI	1006.676	11.43497802
AG	962.5154	10.93334992
SF9	860.8391	9.778393977
D	27.85947	0.316459684
PD	542.3732	6.160894268
GR	541.5077	6.151062811
SF6	519.6629	5.902925204
MF	162.6286	1.847321885
OTMU	159.0405	1.806563532
MHP	49.06114	0.557292472
O	35.41415	0.402274375

## **CONCLUSION**

As suggested in the data above, Single Family Residential – 20 (SF-20) comprises the greatest majority of zoning in the City of Tomball, with Commercial (C) zoning coming in a distant second. Office (O) zoning comprises the smallest amount of area in the City of Tomball.

## **LAND VALUE**

Next, we wanted to determine the average taxable land values for each zoning district per acre.

Because there are properties which have taxable land values of \$0 due to it being owned by government entities or nonprofit entities (such as churches), it was necessary to omit said records from analysis. To obtain a single table which included taxable land value data as well as the zoning district data, it was necessary to execute a JOIN between the “parcels” entity and “parcel\_zoning” entity using the HCAD number field from each entity type. To determine the average taxable land value by acreage for each respective zoning district the following SQL statements were executed:

## **VIEWS**

**zoning\_value:** “CREATE VIEW zoning\_value AS SELECT acreage, land\_val, zoning\_district FROM parcels AS P, parcel\_zoning AS Z WHERE P.hcad\_num = Z.hcad\_num AND land\_val NOT IN (0);”

**gross\_zoning\_value:** “CREATE VIEW gross\_zoning\_value SELECT zoning\_district, SUM(acreage) as gross\_acres, SUM(land\_val) as gross\_value FROM zoning\_value GROUP BY zoning\_district HAVING zoning\_district NOT IN ('ETJ');”

## **ANALYSIS:**

“SELECT zoning\_district, SUM(gross\_value/gross\_acres)as value\_per\_acre FROM gross\_zoning\_value GROUP BY zoning\_district ORDER BY value\_per\_acre DESC;”

The above views and associated “ANALYSIS” SQL statement produced the following results:

zoning_district	value_per_acre
OTMU	280825.8953
GR	225460.2648
D	187629.5462
SF6	179758.0861
MF	170924.862
C	159719.2401
PD	116019.7993
SF9	110119.7134

O	100266.1605
LI	88242.55405
MHP	66387.61974
AG	66351.26169
SF20	64750.26334

## **CONCLUSION**

As suggested in the data above, Old Town & Mixed Use (OTMU) zoning is the most valuable taxable land value per acre in the City of Tomball, with General Retail being the next most valuable. Single Family Residential 20 (SF20) is the least valuable zoning district in terms of taxable land value.

## **DEVELOPMENT AND LAND USAGE**

Finally, we wanted to identify the total amount of vacant developable land available within the City of Tomball as well as the respective zoning districts for the vacant developable land to gain a better understanding of the potential future development projects that the City may expect.

To determine the amount of developable land available it was necessary to collect and populate parcels within the “parcels” shapefile with a “vac” (vacant) attribute prior to uploading the shapefile into the database. This was achieved by cross-referencing the most recent aerial imagery available to the City of Tomball (collected in 2022) with current permit/project records.

To begin we created a view which included each vacant parcels hcad number, zoning & each parcels respective size (in acres) it was necessary to execute a JOIN between the “parcels” entity and “parcel\_zoning” entity using the HCAD number field from each entity type. To determine the total acreage of developable land for each respective zoning district the following SQL statements were executed:

## **VIEWS**

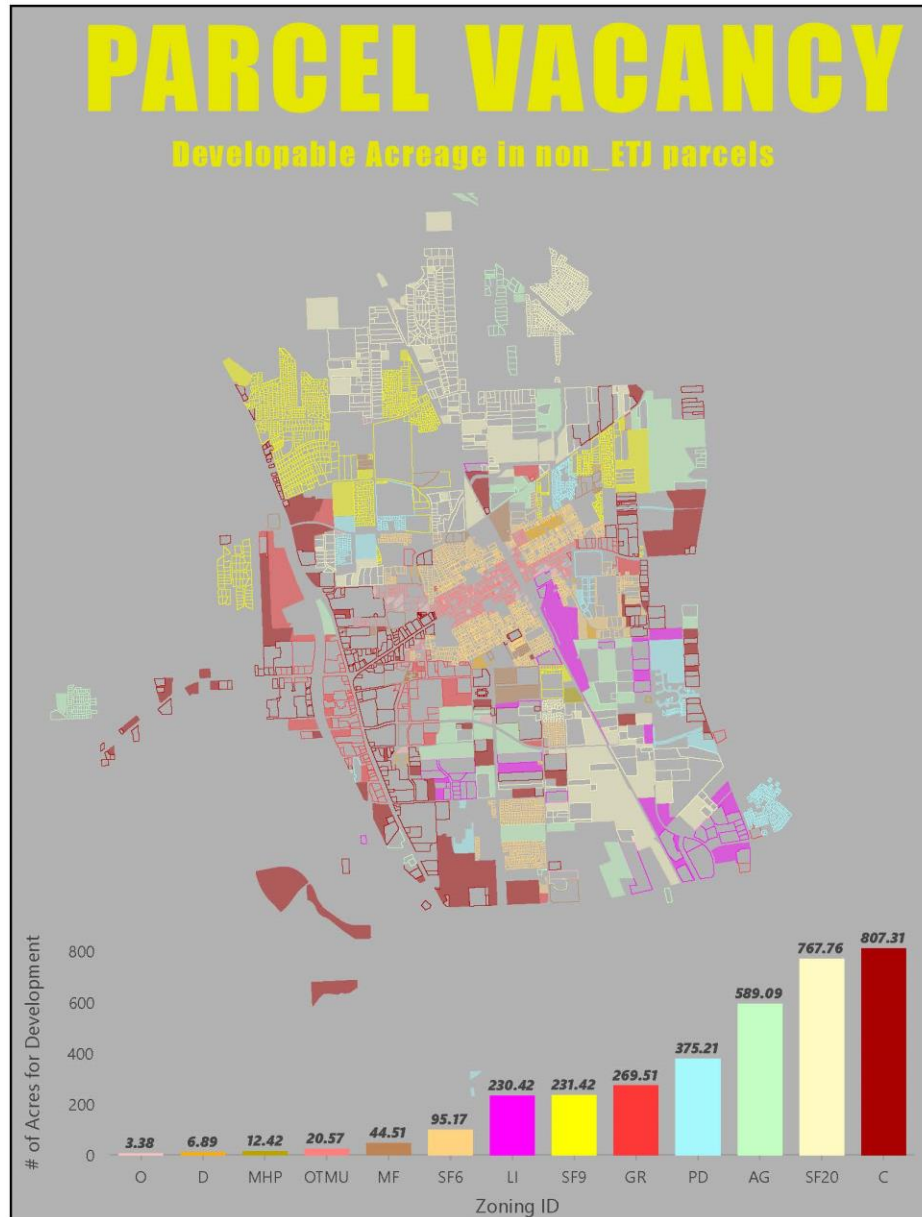
vacant developable parcel zoning: “CREATE VIEW vacant\_developable\_parcel\_zoning AS SELECT zoning\_district, SUM(acreage) as acreage, P.hcad\_num FROM parcels AS P, parcel\_zoning AS Z GROUP BY Z.zoning\_district, P.hcad\_num, Z.hcad\_num HAVING P.hcad\_num = Z.hcad\_num AND P.parcel\_sta ='Vac';”

**ANALYSIS:**

“SELECT zoning\_district, SUM(acreage)as acreage\_available\_for\_development FROM  
vacant\_developable\_parcel\_zoning GROUP BY zoning\_district HAVING zoning\_district NOT IN ('ETJ')  
ORDER BY acreage\_available\_for\_development DESC;”

zoning_district	acreage_available_for_development
C	807.31
SF20	767.755
AG	589.0933
PD	375.2148
GR	269.5134
SF9	231.4237
LI	230.8427
SF6	95.1723
MF	44.5132
OTMU	20.5704
MHP	12.421
D	6.8907
O	3.3769





## **CONCLUSION**

As suggested in the data above, the most widely available land for development in the City of Tomball is currently within the Commercial (C) zoning district. Single Family Residential – 20 (SF20) is the second most widely available land for development. While Office (O) zoning is the least available land for development.

Next, we wanted to investigate historic records regarding requested changes of zoning in the City of Tomball. All zone change requests must be considered during public hearings and ultimately voted on by the City Council to approve or deny the requested zoning district. When evaluating these historic requests, we set out to determine how many rezoning requests have been processed since the adoption of zoning in 2008. Of the total number of cases processed, what is the percent approval rate overall and what are the percent of approval/denials for each requested zoning district type?

To begin we needed to determine the total number of cases that have been processed. The following SQL statement created a view to establish the total number of zoning cases processed by the City of Tomball:

**VIEWS:**

**total\_rezone\_cases:** “CREATE VIEW total\_rezone\_request AS SELECT COUNT(case\_numbe) AS total\_cases FROM rezone\_request\_cases;”

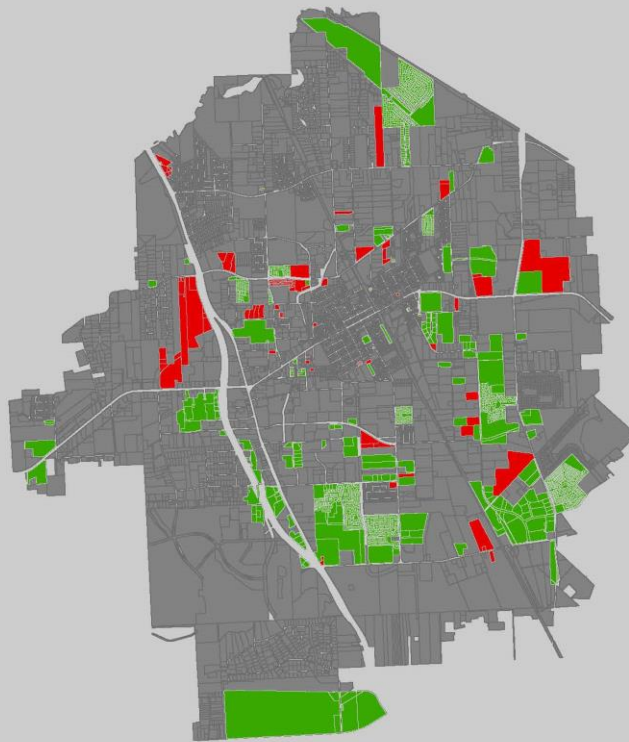
**total\_approved\_rezone\_request:** “CREATE VIEW total\_approved\_rezone\_request AS SELECT COUNT(case\_numbe) AS total\_cases FROM rezone\_request\_cases WHERE status='Approved';”

**ANALYSIS:**

“SELECT A.total\_cases as approved\_cases, R.total\_cases as total\_requests, SUM((CAST(A.total\_cases AS numeric)/CAST(R.total\_cases AS numeric))\*100) as percent\_approved FROM total\_approved\_rezone\_request as A, total\_rezone\_request as R GROUP BY A.total\_cases, R.total\_cases;”

approved_cases	total_requests	percent_approved
116	165	70.3030303

# Zoning Change Requests



**APPROVED**

**DENIED**

**OTHER**

## **CONCLUSION:**

As suggested in the data above, since the adoption of zoning in 2008, the City of Tomball has received 165 total rezoning requests, 116 of which have been approved, amounting to approximately a 70% approval rate.

In addition to an aggregate analysis, we broke request approval and denial down by zoning district to better understand the transience of certain zones.

## **VIEWS:**

**Rezoning request zoning total:** "CREATE VIEW rezoning\_request\_zoning\_total AS SELECT COUNT(case\_numbe) as total\_requested, requested\_ as zoning FROM rezoning\_request\_cases GROUP BY requested\_;"

**approved rezoning request zoning:** "CREATE VIEW approved\_rezoning\_requests\_zoning AS SELECT requested\_ as zoning, COUNT(case\_numbe) total\_approved FROM rezoning\_request\_cases GROUP BY requested\_, status HAVING status = 'Approved';"

**denied rezoning requests zoning:** "CREATE VIEW denied\_rezoning\_requests\_zoning AS SELECT requested\_ as zoning, COUNT(case\_numbe) total\_denied FROM rezoning\_request\_cases GROUP BY requested\_, status HAVING status = 'Denied';"

## **ANALYSIS:**

zone	percent_approved	percent_denied
C	69	31
SF20	100	0
LI	86	14
GR	56	44
AG	67	33
PD	68	32
SF9	75	25
D	67	33
SF6	70	30
OTMU	65	35
O	89	11

"SELECT ROUND((CAST(a.total\_approved as numeric)/CAST(t.total\_requested as numeric)),2)\*100 as percent\_approved, ROUND((CAST(d.total\_denied as numeric)/CAST(t.total\_requested as numeric)),2)\*100 as percent\_denied, t.zoning as zone FROM approved\_rezoning\_requests\_zoning as a LEFT OUTER JOIN rezoning\_request\_zoning\_total as t ON a.zoning = t.zoning LEFT OUTER JOIN denied\_rezoning\_requests\_zoning as d ON d.zoning = t.zoning;"

## **CONCLUSION:**

As can be seen by the table above, most districts near the 70% aggregate average, albeit with a few exceptions. GR has the lowest approval rate, implying it may be the most difficult to change. Among the most fluid include the SF20 zone, which so far has 100% approval.

Our final aspect of analysis is identifying non-conforming land use. Essentially, what parcels are not appropriately following zoning ordinances? Similar to the above, we join the 'parcels' and 'parcel\_zoning' entities to create the following views. As not on process, the land use values do not distinguish between the differ

## **VIEWS:**

**land\_use\_and\_zoning:** "CREATE VIEW land\_use\_and\_zoning AS SELECT cot\_land\_use, zoning\_district, P.geom FROM parcels AS P, parcel\_zoning AS Z WHERE P.hcad\_num=Z.hcad\_num AND Z.zoning\_district NOT IN ('ETJ','PD') AND cot\_land\_use IS NOT NULL;"

**nonconforming\_land\_use:** "CREATE VIEW nonconforming\_land\_use as SELECT \* FROM land\_use\_and\_zoning WHERE ((cot\_land\_u = 'SF' AND zoning\_dis IN ('MHP', 'O', 'GR', 'C', 'LI')) OR (cot\_land\_u = 'D' AND zoning\_dis IN ('AG', 'SF6', 'SF9', 'SF20', 'MF', 'O', 'GR', 'C', 'LI')) OR (cot\_land\_u = 'MF' AND zoning\_dis IN ('AG', 'SF6', 'SF9', 'SF20', 'D', 'MHP', 'O', 'GR', 'C', 'LI')) OR (cot\_land\_u = 'MHP' AND zoning\_dis IN ('AG', 'SF6', 'SF9', 'SF20', 'D', 'O', 'GR', 'C', 'LI', 'MF')) OR (cot\_land\_u = 'C' AND zoning\_dis IN ('AG', 'SF6', 'SF9', 'SF20', 'D', 'MF', 'MHP')) OR (cot\_land\_u = 'I' AND zoning\_dis IN ('AG', 'SF6', 'SF9', 'SF20', 'D', 'MF', 'MHP', 'O', 'OTMU', 'GR', 'C')))"

**total\_nonconforming\_cases\_by\_zone:** "CREATE VIEW total\_nonconforming\_cases\_by\_zone AS SELECT COUNT(zoning\_dis) as count\_per\_zone, zoning\_dis as zoning\_district FROM nonconforming\_land\_use GROUP BY zoning\_dis;"

**percent\_nonconforming\_by\_zone:** "CREATE VIEW percent\_nonconforming\_by\_zone AS SELECT ROUND(CAST(nc.count\_per\_zone as numeric)/CAST(t.total\_parcel as numeric),2)\*100 as percent\_nonconforming, nc.zoning\_district FROM total\_nonconforming\_cases\_by\_zone as nc INNER JOIN total\_parcel\_by\_zone as t ON nc.zoning\_district = t.zone;"

## **ANALYSIS:**

zoning_district	count_per_zone
C	88
SF20	12
AG	9
GR	19
SF9	13
LI	6

SF6	56
MF	41
OTMU	26
MHP	1
D	7
O	3

zoning_district	percent_nonconforming
C	32.96
SF20	1.68
AG	5.77
GR	16.81
SF9	1.2
LI	12
SF6	4.9
MF	50.62
OTMU	8.75
MHP	100
D	21.88
O	37.5

#### **CONCLUSION:**

It is quickly apparent that a wide range of land use conformity is present among the various zones. District ID MHP is in fact 100% non-conforming, with MF zoning being the next zoning district with the largest percentage of non-conforming uses at approximately 50%, while the various SF zoning districts are near 100% compliant. Identification of this tendency can in turn allow Tomball to assess land use more closely in these problem districts.

#### **SUMMARY:**

The data provided within this report provides a holistic understanding of the existing and historic zoning conditions as well as potential opportunities for future development within the City of Tomball. This information can be utilized and referenced in future projects & proposals that are presented to the City Council to better establish a comprehensive approach to zoning and land use administration.

**REFERENCES:**

Zoning Data – City of Tomball Community Development

Rezoning Case Data – City of Tomball Community Development

Parcel Data – Harris County Appraisal District

United States Census Bureau