

Resiliency, Sustainability, and Onsite Wastewater

Where We Are and Where We Are Headed

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Harris County Overview

Harris County Total Population = 4.7 Million

- It would be the 25th largest state if it was one

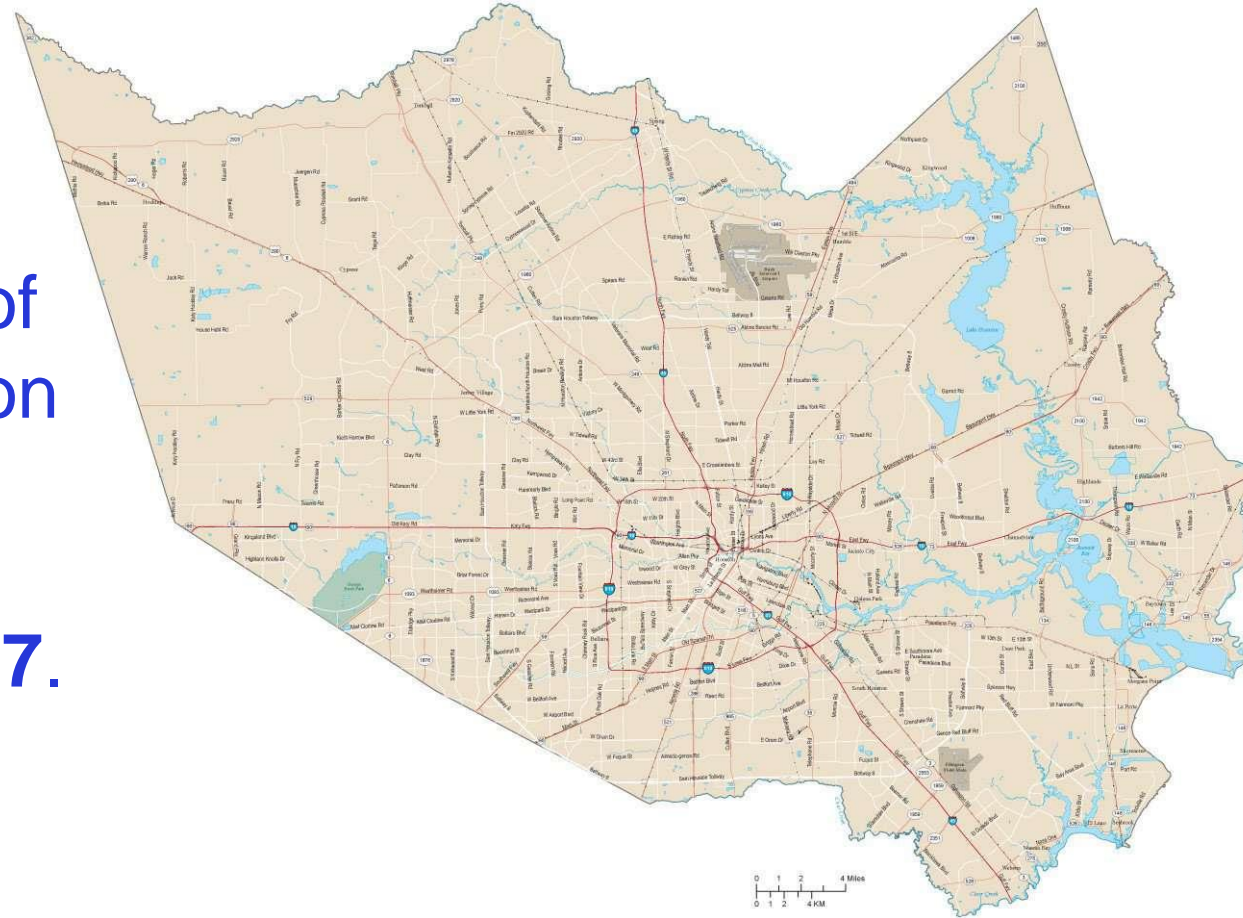
Unincorporated Harris County Population = **2+ Million**

Note: Not all residencies inside city limits are served by municipal sewer

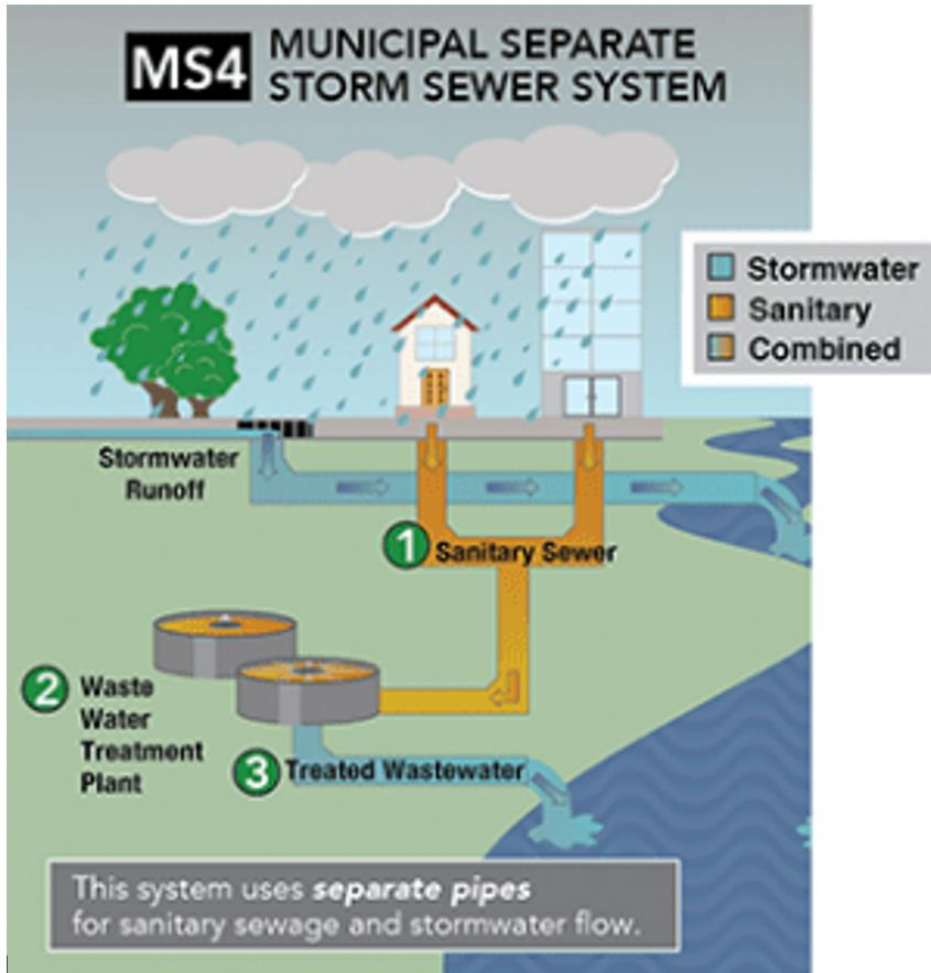
Unincorporated Harris County is estimated to have **137,000** onsite sewage facilities.

Harris County

Harris County
includes the City of
Houston Population
of **2.3 Million** and
Southside Place
population of **1,907**.



Municipal Separate Storm Sewer System



Harris County has a Municipal separate storm-sewer system, MS4, permit from the EPA due to the size and makeup of the unincorporated area.

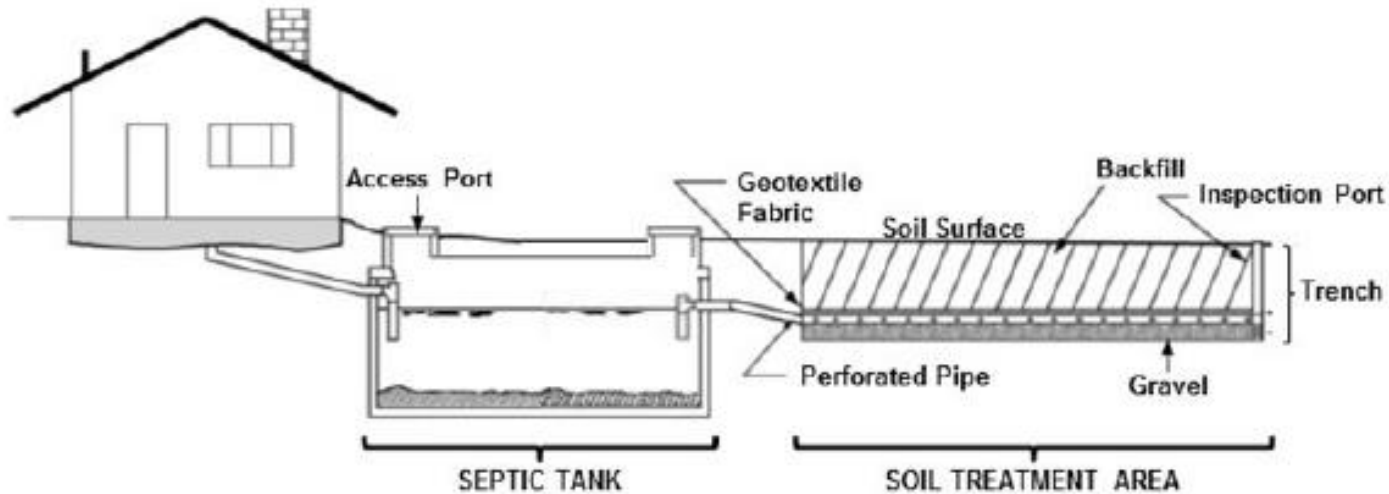
Bacteria is the pollutant of concern in Harris County's MS4.

Excessive bacteria levels are present in Harris County Waterways.



On-Site Sewage

Early studies suggest on-site sewage facilities were part of the problem!



Areas with the highest concentration of on-site sewage facilities had the lowest bacteria levels?



Could it be something else?



Studies conducted by Harris County found the culprit



Wastewater Treatment Plants

The TCEQ managed wastewater treatment plants!



Some Facts to Consider

With no rain occurring for three days in Harris County,
98% of the creeks and bayous are made up of
wastewater effluent.

Sludge Blankets

Studies have shown huge “sludge blankets” form at outfall discharge points of the TCEQ permitted wastewater treatment plants. These sludge blankets are teaming with bacteria. This bacteria is released into bayous of treated wastewater effluent with high nutrient levels.



Harris County, EPA and the TCEQ

Eventually, Harris County and the EPA forced the TCEQ to require bacteria as well as chlorine residential testing at the treatment plants.

Harris County started reviewing wastewater treatment plants for compliance with state requirements, as most plans are approved by the state, due to a time lapse of regulatory review time.

“Onsite” is What Makes it Better

- Pollutants generated and disposed of properly onsite, have a significantly smaller “ecological footprint”
- The waste is disposed of over a couple thousand square feet of land as opposed to being sent in miles of sewer lines, to a sewer plant, then to a bayou to flow miles to the Gulf of Mexico
- Nutrients and pharmaceuticals are transported in the bayou to the Gulf of Mexico, as opposed to being degraded naturally in the soil

History in Harris County

“The discharge of septic tanks into the road, street, alley or other public ditches either directly or indirectly is strictly prohibited”

(Plat Restrictions Started in the 1940's)

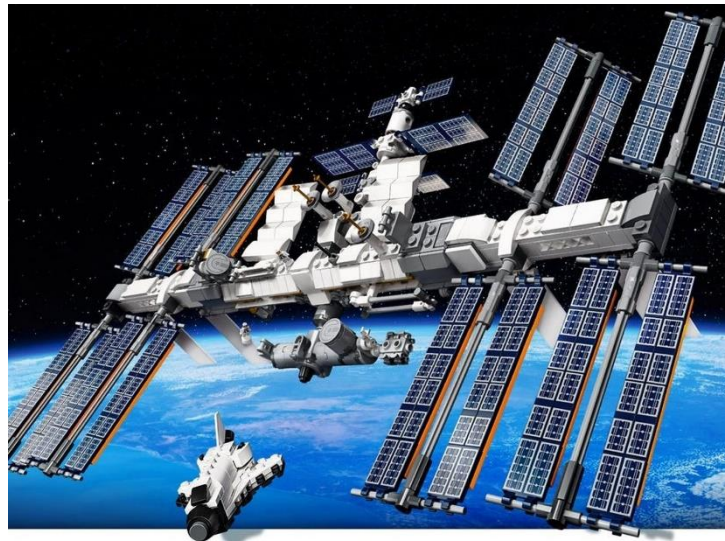
- First On-Site Sewage Facility Rules (OSSF) were adopted on September 6, 1973, for structures in the floodplain
- First County wide OSSF Rules were adopted March 30, 1978
- First “spray” system permit was issued on February 21, 1989
- First indoor reuse system was permitted on March 27, 1996, and operated until July 2014

Facts Not to Forget

Since 2008, the space station has recycled urine into drinking water!

(Direct Onsite Reuse)

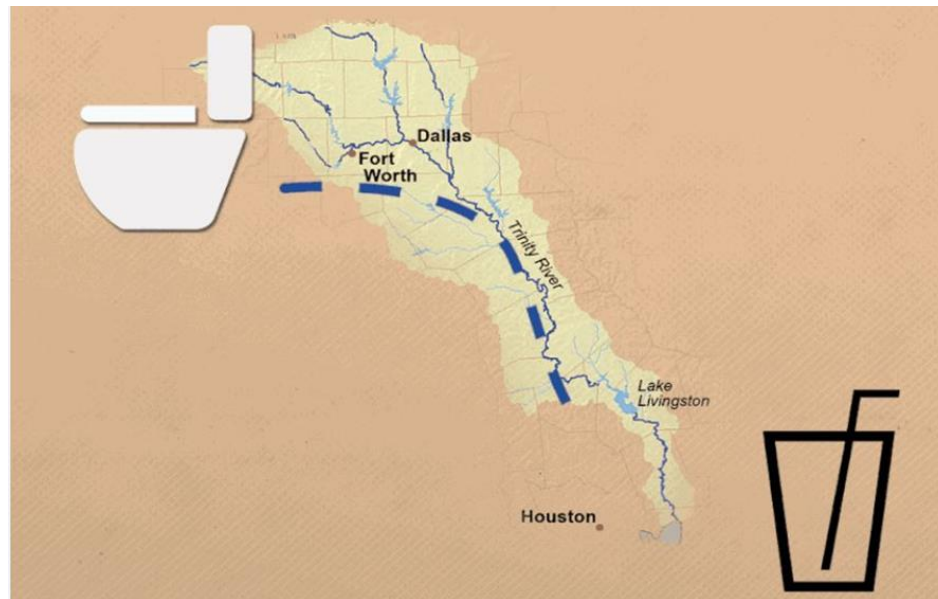
Note:It costs \$83,000 a gallon to transport water to the space station



Facts Not to Forget




Continued

Dallas, Fort Worth's wastewater supplies Houston's
drinking water!
(Indirect Reuse)



City of Houston produces 163.9 Billion
gallons of water yearly

Where Are We Now?

- Spray Irrigation System 
- Grey-water Reuse 
- Downsizing of Black-water Systems 
- Alternative On-site Wastewater Reuse 
- Real Sustainable Practices 

The Future of Harris County is Imagination Zones

Imagination Zones require the use of sustainable engineering practices, including water reuse and other similar practices



Harris County Residential Green Infrastructure Design Standards “Imagination Zones”

**HARRIS COUNTY ENGINEERING DEPARTMENT
HARRIS COUNTY COMMUNITY SERVICES DEPARTMENT**

May 2021

**Lina Hidalgo
Harris County Judge**

**Rodney Ellis
Commissioner Precinct 1**

**Adrian Garcia
Commissioner Precinct 2**

**Tom S. Ramsey, P.E.
Commissioner Precinct 3**

**Jack Cagle
Commissioner Precinct 4**

6.0 Utilities

This section provides information on utilities and how they should be addressed in Imagination Zones. Utilities covered include:

- Water
- Wastewater
- Power
- Chilled Water / Heat

6.1 Water

Potable water in Imagination Zones will be provided by the appropriate utility district. It is imperative that water conservation measures be implemented. All residential fixtures should be listed in the Environmental Protection Agency's WaterSense program. Potable water should not be used for landscape irrigation, toilet flushing, or other activities where water of a lower, but acceptable standard, can be used.

6.2 Wastewater

Wastewater service in Imagination Zones will be provided by and managed by the applicable utility district. The use of reclaimed wastewater to irrigate landscape, flush toilets, and other appropriate uses, is highly encouraged. The use of onsite waste disposal is the preferred method if site and soils are suitable. Onsite wastewater provides the smallest environmental footprint. Fixtures should be EPA WaterSense labeled to reduce wastewater production.

6.3 Power

Power will be provided by CenterPoint Energy and billed by the appropriate energy company. The purchase of renewable energy should be a priority. Installation of photoelectric systems should be encouraged and considered in lot and structure layout. Use of low energy use products such as Energy Star rated equipment should be used. Street lighting in the subdivisions should be LED, and preferably solar powered LED.

6.4 Chilled Water / Heat

Whenever possible each Imagination Zone should be evaluated for the feasibility of community geothermal systems. Much like a central plant in business districts, chilled or heated water is provided to each resident from a central geothermal plant. This is particularly effective in dense developments by the elimination of noise and space consuming outside air conditioning condensers.

When community geothermal isn't used, the use of ductless mini splits should be considered. They offer the advantage of being small and allowing flexibility in conditioning multiple zones individually, as higher efficiency ratings, as well as no duct loss.

Current Criteria

Let us assume a three-bedroom house with four occupants

(First bedroom has two occupants – the others one per bedroom, TCEQ 75 gpp non “water-saving” 60 gpp with “water-saving”)

Assume Harris County

Spray 240 gallons \div 0.045 = 5333 sf

Drip 240 gallons \div 0.1 = 2400 sf

What We Could Do

- **Toilet:** Flushes at 1 pint x 4 persons = 4 gallons gpd
- **Dishwasher:** 110 loads at 4 gpL = $440 \div 365 = 1.2$ gpd
- **Shower:** 4 persons x 8 mins = 32 mins at .5 = 16 gpd
- **Laundry:** 1 load per day at 7 gpL = 7 gpd
- **Faucets:** 4 persons at 9 gallons = $36 \div 2 = 18$ gpd

TOTAL FLOW = 46.2 GPD

- **Treat and reuse** shower water for laundry and toilets
35.2 gpd
- So spray area now 782 sf and drip area now 350 sf

Something To Think About!

Current design theory assume 3 BR and public water
20 homes – 10 acres of lot area, based on .5 acre per lot
 $20 \times 240 \text{ gpd} = 4800 \text{ gpd}$

Spray= 117,073 sf

Drip= 48,000 sf

Future assume same 20 homes only producing 35.2 gpd
 $20 \times 35.2 \text{ gpd} = 704 \text{ gpd}$

Spray= 17,171 sf

Drip= 7,040 sf

Figure A: Cottage Housing Layout

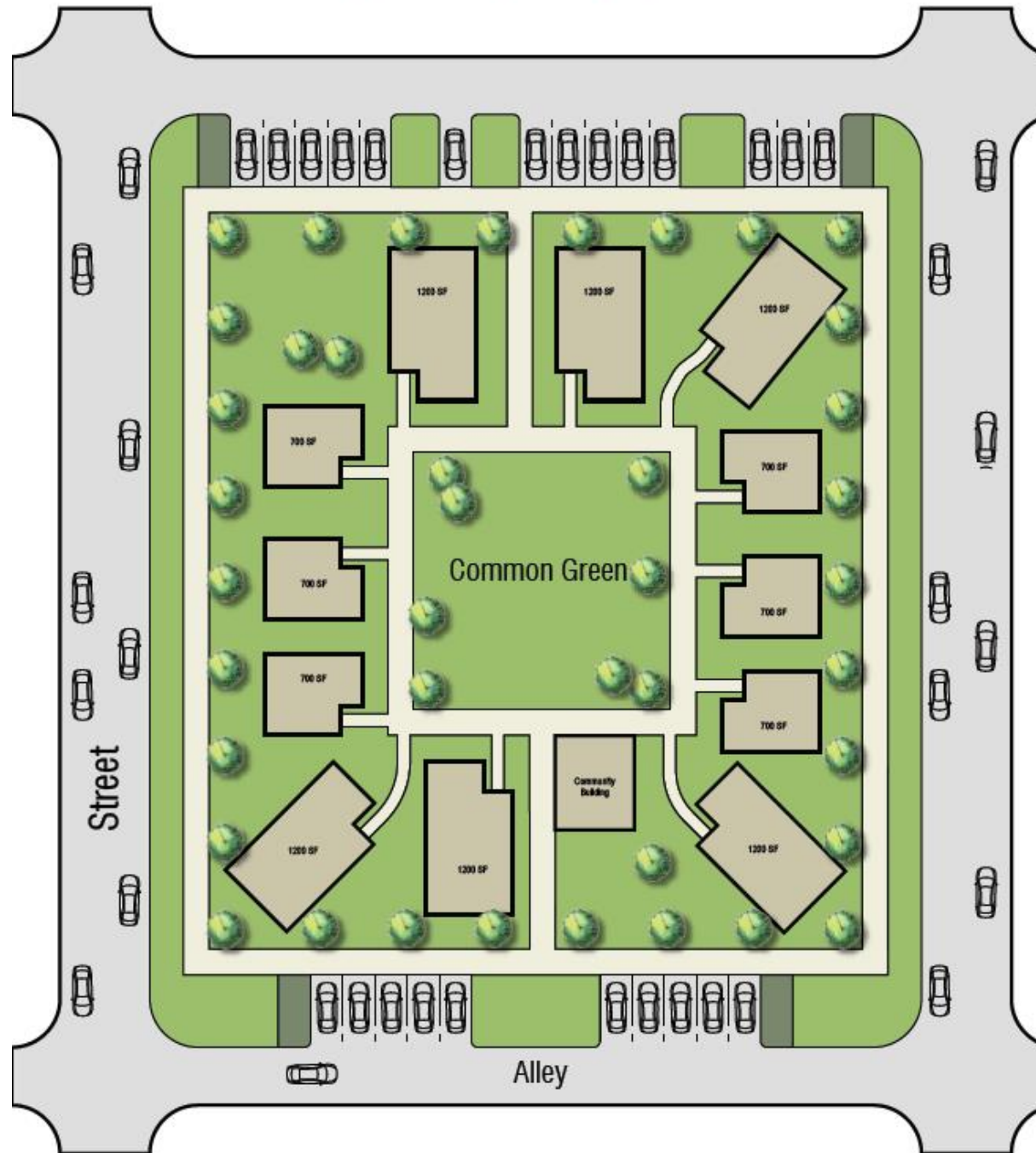


Figure A: Garden Court Lot Layout



Important Things to Consider:

- Centralize management of system
- Hydraulic loading
- Organic loading
- Nutrient loading

Questions?

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