

8- HAZARD MITIGATION



League City is susceptible to both human and natural events including hazardous spills, hurricanes, and flooding that can result in people and structures being in harm's way. The City's low lying location near the Gulf Coast makes it especially vulnerable to severe weather, particularly tropical storms and hurricanes. While League City has relatively minimal industrial activity, it enjoys proximity to the Port of Houston and virtually all aspects of the petrochemical industry, including refineries, numerous pipelines and a few remaining pockets of oil and gas that rest below the ground. Hazards arising from spills or problems with the network of pipelines, as well as the occasional well sites are unlikely but remotely possible. As development continues and more people come to League City to take advantage of the community's tremendous assets, the impact of potential events and associated losses will increase without vigilance and intervention. League City residents, employees and guests may not be able to completely avoid hazards. However, by mitigating issues in advance and planning in advance for events, it is very possible to protect people and structures and, in doing so, minimize potential loss of lives, damage to property and infrastructure, and the costs associated with recovery.

Natural disasters can be mitigated by "getting out of the way", protecting and enhancing natural features, making structures more resistant to flood and wind damage, and managing the development and redevelopment of land. Risks associated with the petrochemical industry can be minimized

by appropriately managing and monitoring the system of wells, pipelines, transport vehicles and other features within League City. In the case of both potential natural and man-made events, appropriate land use strategies and best management practices can help reduce, if not nearly eliminate, hazards and substantially reduce the community's overall vulnerability. Doing so, however, will require a willingness on the part of the community to understand risks and accept solutions.

The Comprehensive Plan has shown that, in many cases, what is seen as a weakness can also be a more powerful asset if appropriately addressed. Hazard mitigation is certainly no different. The policies in the Community Character chapter that recognize the importance of the waterfront, sensitive sites, natural areas, and tree canopy to the marketability of the community can also serve to mitigate hazards and buffer potentially incompatible uses. Similarly, the Economic Development chapter recognizes the importance of building upon the community's relationship with the petrochemical industry and its greater family, the overall energy industry, but in a manner that doesn't diminish the community's marketability through undue negative impacts. This chapter complements these and other goals and policies throughout the plan in order to ensure that the growth of League City occurs in a way that limits the potential for damage to property and public facilities, avoids development in hazardous areas, provides for adequate public shelters (in the event that it may be needed), facilitates the ability to move

people safely out of harm’s way, and reduces recovery time and cost.

As with the majority of chapters of the Comprehensive Plan, the Hazard Mitigation chapter builds upon a document intended to address emergency planning in detail, the 2010 City of League City Local Hazard Mitigation Plan. In doing so, it weaves the recommendations of the Local Hazard Mitigation Plan directly into the goals and policies that guide growth in League City while also expanding the scope of what is traditionally considered hazard mitigation.

Land Development Tools That Can Be Used For Hazard Mitigation

- Zoning regulations;
- Overlay districts;
- Setbacks and buffers;
- Subdivision and PUD regulations;
- Cluster development;
- Site design regulations and performance standards;
- Incentive zoning;
- Fee-simple property acquisition;
- Purchase-and-sellback or leaseback;
- Transfer of development rights;
- Capital expenditure policies; and
- Education and information.

2010 League City Local Hazard Mitigation Plan

The Local Hazard Mitigation Plan is developed in response to requirements established by the Disaster Mitigation Act of 2000, in recognition that each year disasters kill hundreds of people and injure thousands more throughout the United States. Taxpayers pay billions of dollars annually to help communities, organizations, businesses and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and non-governmental organizations are not reimbursed by tax dollars. The Federal Emergency Management Agency (FEMA) has made a priority of reducing losses from disasters and determined that hazard mitigation planning and subsequent

implementation of projects, measures, and policies developed through hazard analysis and mitigation plans can have a major impact if appropriately developed and utilized. An acceptable Local Hazard Mitigation Plan allows League City to remain eligible for certain federal disaster assistance and hazard mitigation funding programs. Additionally, proactive mitigation planning at the local level can help reduce the cost of disaster response and recovery to property owners and governments, by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption.

The 2010 Local Mitigation Plan (LMP) is an update to the 2005 Hazard Assessment and Mitigation Plan and is intended to mitigate hazards classified as “moderate” or “highly likely” in occurrence and risk. Classification was determined through a detailed risk assessment conducted in the 2005 Hazard Assessment and Mitigation Plan. Hazards classified as “unlikely” of occurring or with “limited” risk were not cited for mitigation. Rather, those hazards are to be monitored and evaluated during future updates of the Local Hazard Mitigation Plan for future action in the event that they become elevated to a higher risk level. This enables the city to prioritize mitigation actions based on those hazards understood to present the greatest risk to lives and property.

The initial City of League City 2005 Hazard Assessment and Mitigation Plan was prepared in accordance with guidelines provided by FEMA, advice from the Texas Division of Emergency Management (TDEM), and support from the Texas Water Development Board (TWDB). The 2010 Local Hazard Mitigation Plan update meets requirements to update the hazard mitigation plan every five (5) years.

This 2010 Local Hazard Mitigation Plan was developed to assist local officials meet the following four objectives:

- Protect life and property by reducing the potential for damages and economic losses resulting from natural disasters.
- Qualify for pre- and post-disaster grant funding.
- Increase recovery and redevelopment efforts following disaster events.
- Comply with state and federal legislative requirements for local hazard mitigation plans.

Local Hazard Mitigation Plan defines mitigation goals and identifies current risk reduction efforts, risk reduction strategies for each of the significant hazards that threaten the city, future risk reduction efforts, cost of efforts, a source of funding options to implement the action items, and individuals

responsible for the entire process. By its very nature, the plan is intended to address natural hazards. As a result it does not address potential man-made hazards. The 2010 Local Hazard Mitigation Plan specifically addresses circumstances caused by hurricanes and tropical storms (considered to be highly likely), flood events, thunderstorms (including hail and lightning), tornadoes, and extreme heat.

League City has approximately 4,614 acres of land located in the 100-year floodplain. The total acreage includes 481.68 acres of parkland, which leaves 4,132.74 acres of developed (or potentially developed) land in the 100-year floodplain. While properties within the 100-year floodplain are more likely to experience flooding, all of League City is prone to flash flooding.

LOCAL HAZARD MITIGATION PLAN GOALS AND OBJECTIVES

Goal 1 - Reduce flooding by continuing to maintain a capital improvement fund (CIP)

Objectives

- Maintain and enhance security at city wastewater and water facilities so as to remain compliant with TCEQ and Homeland Security guidelines and requirements.
- Continue conversion of open ditch roadways to internal curb and gutter roadways to improve flood protection.
- Continue to support local developers in facilitating inter-local and cooperative efforts to improve and maintain downstream drainage structures in small, adjacent jurisdictions and nearby unincorporated areas.

Goal 2 - Fire protection/reduction – lives and loss prevention

Objectives

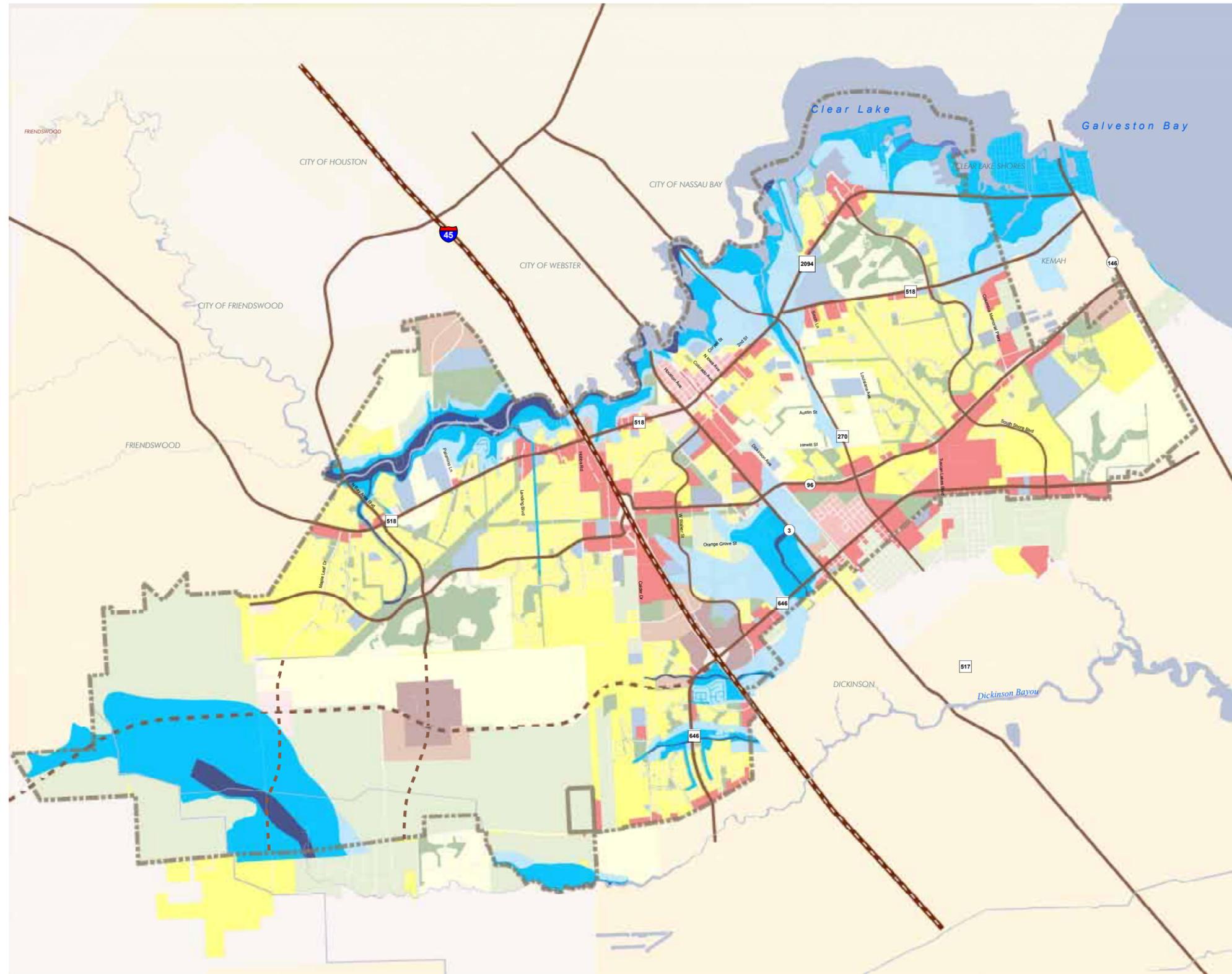
- Increase inter-city communications to continue to alleviate known hazards.
- Prepare quarterly reports to incorporate newly developed areas into the proposed Mitigation Action Plan (MAP) and distribute as is appropriate.

Goal 3 - Reduce flood damage to city/decrease repetitive flood losses

Objectives

- Reduce flood damage to city/decrease repetitive flood losses.
- Continue to update and maintain the Flood Protection and Prevention Regulations.
- Update, as needed, a Repetitive Flood Loss Program that indicates a firm commitment to reduction of flood losses.
- Increase participation in various elements of the Community Rating

Figure 8.1 Floodplain & Future Land Use Plan



The City has 4,614.42 acres of land located in the 100-year floodplain. The total acreage includes 481.68 acres of parkland, which leaves 4,132.74 acres of developed (or potentially developed) land in the 100-year floodplain.

Legend

Community Character

- Rural/Estate Residential
- Suburban Residential
- Suburban Village
- Enhanced Auto Dominant Residential
- Enhanced Auto Dominant Commercial
- Urban High
- Urban Low
- Suburban Commercial
- Public/Institutional
- Park/Open Space/Natural

Floodplain

- Velocity Zone
- Floodway
- 100 Year Floodplain
- 500 Year Floodplain

System Program so that our classification is increased in the next Community Assistance Visit (CAV).

Goal 4 - HAZMAT incident prevention

Objectives

- Increase enforcement efforts by police to ensure the continuation of low or no truck related HAZMAT accidents.
- Increase enforcement efforts to ensure low numbers of accidents by using existing resources and incorporating other existing efforts into an integrated program.

Goal 5 - Minimize flood damage in the city

Objectives

- Expand the GIS Department to the point that allows all city departments to use spatial data in their everyday activities.
- Increase use of interactive maps on the city’s website by public.
- Increase public understanding of flood zones and other data as it relates to their homes or businesses.

Goal 6 - Fire protection and loss prevention

Objectives

- Continue to ensure funds to upgrade existing facilities and water lines.
- Enhance fire protection through Capital Improvement.

2010 MITIGATION GOALS – STATEMENTS

Public Awareness

- Increase public awareness to the risks that are associated with the area’s hazards categorized as having “high priority”, through information dissemination and outreach programs.
- Provide information on funding resources, partnership opportunities and tools to assist in the implementation of mitigation activities.
- Develop educational training programs and materials residents can utilize to protect property against hazards.

Partnerships and Implementation

- Conduct studies and implement planning processes to increase the resident’s understanding of the city’s hazard vulnerability.
- Strengthen communication and coordinate participation among and within public agencies, residents, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Emergency Services

- Improve evacuation procedures.
- Install auxiliary power generators for all city-owned critical facilities.
- Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Mitigation Planning

- Improve hazard assessment: propose recommendations for mitigating new development and encourage preventative measures for existing development in areas vulnerable to natural hazards.
- Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.
- Evaluate and update the City of League City’s Local Mitigation Plan on an annual basis.

Public Works and Capital Improvement Projects

- Support the development of a new Master Drainage Plan for the City of League City.
- Prioritize drainage projects identified in the Capital Improvements Program according to the number of Repetitive Loss Properties they will benefit.
- Support the design and construction of the Galveston County Consolidated Drainage District (GCCDD) Regional Detention Ponds.
- Support the design and construction of the US Army Corps of Engineers (USACE) Clear Creek Federal Flood Protection Project.

Floodplain Management

- Support the development of a Floodplain Management Plan.
- Improve the city’s Community Rating System Classification.
- Maintain up-to-date records of Repetitive Loss Properties for future FEMA/TWDB Mitigation Grant Programs.
- Encourage all League City property owners, especially those located within the Special Flood Hazard Area (SFHA), to purchase flood insurance.

The Petrochemical Industry

To date, there has been no detailed study on petrochemical industry related activity in League City. Without question the industry has been integral to the success of the entire region. However, recent activity related to oil and gas wells and pipelines have raised awareness of the associated hazards and negative impacts. The result has been substantial discussion about the

relationship between mineral rights and surface rights, safety of operations, and incompatibilities generated by negative impacts such as noise and truck traffic. Other regions of the state have been forced to recently address these issues. However, while some of the information they have gained is applicable to League City, other critical elements are starkly different. For example, sites in the Metroplex are generally focused on gas production in a geology that is entirely different from League City. At the same time, noise impacts are largely similar.

Goals and policies related to oil and gas wells and pipelines represent the result of initial investigations into the manner in which such uses can be managed. What is known about the ability to manage the oil and gas wells, as well as pipelines is as follows:

- League City can address safety, but should also respect the jurisdiction of the Texas Railroad Commission (TRRC) and the Texas Center for Environmental Quality (TCEQ).
- The city can take proactive steps toward managing safety.
- The city may regulate “nuisance” issues created by the construction and operation of oil and gas wells and pipelines.

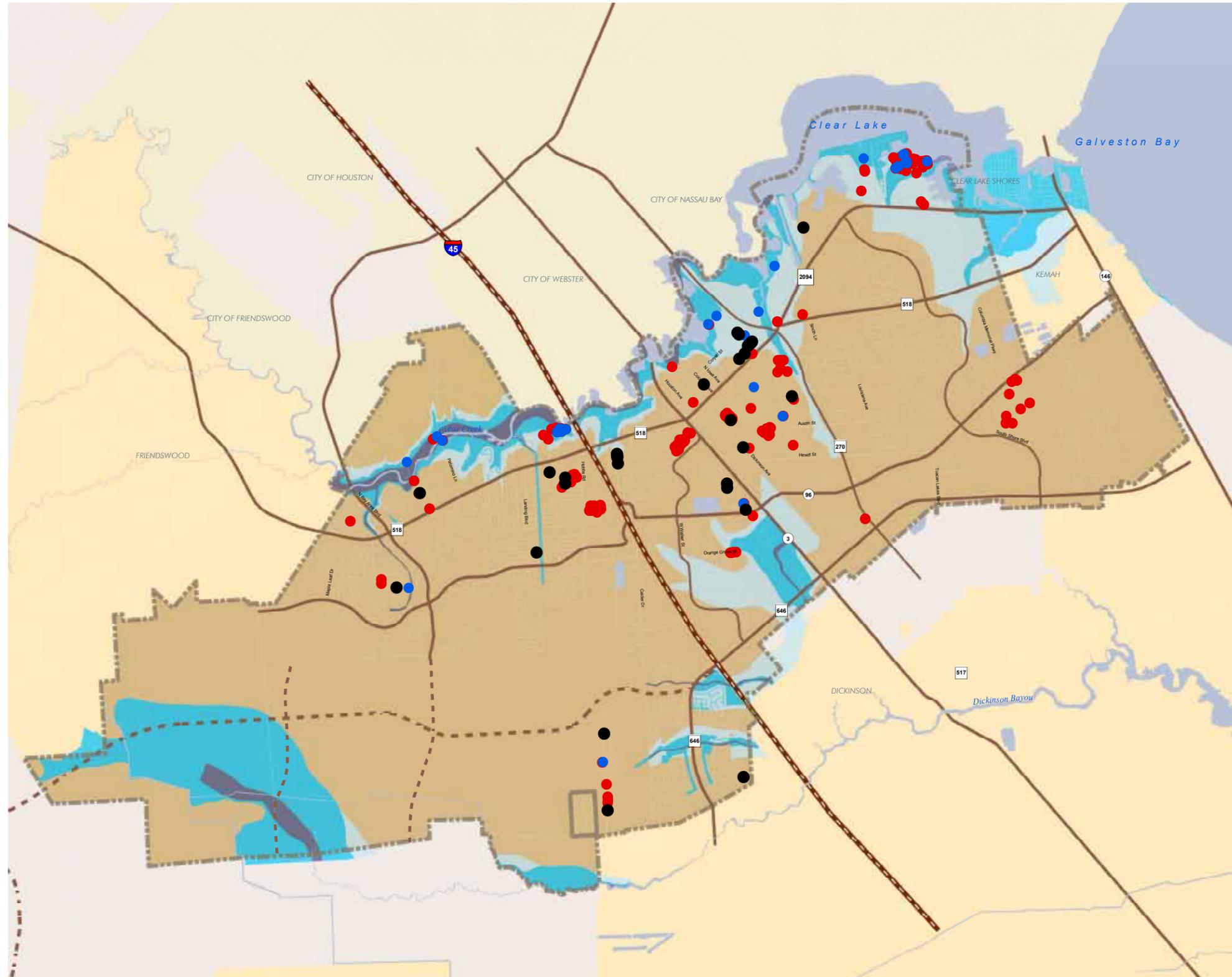


Estimated losses in League City from Hurricane Ike included:

- 648 residential units substantially damaged or destroyed
- \$5.5 million in commercial damage
- \$5.4 million in damage to infrastructure and facilities
- 2,500 employees out of work

Source: LMP, FEMA’s 2008 Hurricane Ike Impact Report

Figure 8.2 Repetitive Loss Properties



Numerous repetitive loss properties are not located within designated FEMA flood zones. The city's low flow (buried conduit) system fills at 2 inches (2") of rainfall per hour. During tropical events and/or severe thunderstorms with heavy rains, the city's drainage system is often overwhelmed, resulting in sporadic flooding.

Legend

- FEMA 04 2009 Repetitive Losses
- FEMA Ike Repetitive Losses
- Flood Damage

Goals & Policies

The following goals and policies provide direction in making land development decisions that minimize threats to public safety and lessen the potential impacts from potentially hazardous events.

GOALS:

- ❖ Protect and enhance natural areas, particularly along the waterfront, as a means of managing the impacts of coastal storms and flooding.
- ❖ Keep future development out of known hazard areas and protect existing developed areas.
- ❖ Protect existing critical community facilities to the extent practical and appropriately site and “harden” future facilities to ensure performance during both an event and recovery.
- ❖ Mitigate existing structures and infrastructure systems from repetitive disaster losses.
- ❖ Ensure a mobility system that allows that is responsive to needs in the event a natural or man-made hazard occurs.
- ❖ Manage and mitigate, to the extent practical and appropriate, the impacts raised through pipelines and oil and gas wells within the boundaries of League City.

Land Development

- Restrict or limit development, to the extent practical, in primary conservation areas such as wetlands, the 100 year floodplain, and other sensitive sites.
- Completely prohibit construction of government buildings and special needs facilities like medical facilities, nursing homes, schools, and day cares within the 100 year floodplain.
- Cluster development outside of the 100 year floodplain (and other primary conservation areas) through the use of conservation subdivision design techniques.
- Consider introduction of innovative techniques such as transfer of development rights as a tool to compensate property owners that are deprived of the ability to build to the fullest extent possible as a result of requirements for preserving sensitive areas.
- Preserve secondary conservation areas including the 500 year floodplain, native habitat areas, and other open spaces to the extent possible.
- Encourage clustering, large-lot development or other creative development patterns in secondary conservation areas, including the possible use of conservation easements as a preservation tool.

- Restore and enhance natural areas and features for purposes of drainage, storm water detention, and retention.
- Promote restoration of natural areas during new development and, to the extent possible, redevelopment.
- Protect Clear Creek from development through preservation requirements, open space standards, buffer yard requirements, setbacks or other regulatory mechanisms.
- Require documentation and steps to avoid complete destruction or removal of vegetation during the development process.
- Utilize open space requirements and performance standards to require preservation or establishment of natural areas.
- Existing native vegetation should be disturbed to the least degree possible and used to meet open space requirements.
- A buffer zone of native plants should be required around wetlands.
- Landscape standards should promote use of storm-resistant vegetation in all new private construction and re-landscaping of existing private property.
- Encourage and, if possible, acquire conservation easements on currently developed land on which the undeveloped portion is within primary conservation areas, particularly wetlands, 100-year floodplains and any other sensitive area that can provide significant storm water management functions and where they are not protected by existing land development regulations.
- Actively promote voluntary retrofit of existing lawns and landscaped areas with native and storm-resistant vegetation.
- Promote and participate in development of storm water detention at critical locations to reduce the possibility of flash floods and, to the extent possible, minimize the impact of major storm events.

Structures:

- Building codes should continue to require all structures to meet or exceed recommended requirements related to wind, debris, flood elevation and “hardening”.
- Owners of older structures should be encouraged to retrofit for purposes of becoming more resistant to damage caused by natural events including the possibilities of wind damage, water/surge damage, fire and, to the extent possible, mold. Cost effective measures such as storm shutters are particularly encouraged.
- Public facilities should be retrofitted to the extent practical to become more resistant to natural disasters, beginning with those that do not currently meet the building code.

- Infrastructure, including the mobility, water and wastewater systems should be designed and “hardened” to withstand the effects of flooding, storm surge, high winds, debris and resulting impacts such as power outage and line breaks.
- Elevate or otherwise creatively flood-proof existing structures that frequently flood.
- If development currently exists in the floodplain, or if development is permitted to a very limited extent, then steps should be taken, to the extent practical, to ensure that the potential for flooding will be minimized, including natural means, elevation of the habitable structure above the Base Flood Elevation (preferably 2 feet above BFE), or other creative methods of flood prevention.
- Appropriate steps should be taken to ensure the most adequate means of fire prevention, particularly in habitable structures.
- Creative architectural techniques and styles that, by design, are more storm resistant, are encouraged.

Evacuation and Emergency Routes

- Emergency routes should be considered to start deep within residential and commercial areas and should extend into arterials and freeways.
- Each new development should include emergency routes as part of development review.
- Emergency routes should be designed accordingly, and, to the extent practical, remain free of obstructions such as street humps.
- Consideration should be given to the impact of each new development, or application to increase density, on evacuation plans and effectiveness of emergency routes.
- Emergency routes and other facilities and programs for managed evacuation should be well publicized and clearly demarcated.
- Travel demand modeling and traffic impact assessments should fully consider any impact on traffic routes.
- Hazard mitigation planning should fully consider recognition, response and recovery related to a chemical spill along League City’s roadways.
- Maintain a Level of Service “D” on all designated emergency routes, to the extent practical.
- Critical weaknesses in the emergency route system should be recognized and, to the extent possible, ameliorated through improvements to the area or establishment of alternative routes.
- Capital improvements associated with establishing and maintaining an effective emergency route network should be given strong consideration when selecting projects for incorporation into the Capital Improvements

Program and in selecting projects for submission for non local funding (including county, state and federal resources).

- Context sensitive design of mobility improvements should include the ability to “harden” the emergency route system.
- Post-storm shelters should be in place and available for League City residents returning to the community but unable to reach or reside in their homes.
- Creative application of remedies such as traffic signalization, ITS and contraflow may bolster the efficiency of local emergency routes during evacuation events.

Oil and Gas Wells and Pipelines

- Mitigation considerations related to wells and pipelines should include nuisance impacts during drilling/construction, use and removal (when removal is considered necessary or required). Impacts should include noise, noxious odors, dust, lighting, traffic congestion and damage, hours of operation, storm water flow, and view shed protection.
- Approval of any application to initiate or expand operation of a well or pipeline should require a Special Use Permit rather than a zoning change to ensure that decisions are fully focused on the ability to ameliorate or minimize impacts to the satisfaction of the City.
- Solutions may be different for addressing temporary issues related to drilling/construction, use and removal.
- Solutions such as buffer yard/screening, distance, noise abatement techniques, among other, should allow for flexibility and, to the extent practical, should be founded on facts. For example, an applicant may be able to reduce distance requirements related to noise if sound-absorbing walls are installed with the appropriate height, materials and surrounding landscaping needed to be as, if not more, effective, while not diminishing visual character of the area.
- Distance requirements established by the City of League City should be related to habitable structures and actively used facilities, but they should also consider actively used portions of a site such as a back yard or park, particularly as it relates to nuisance issues such as noise, odor and visual impact.
- Applications for approval of a well or pipeline should indicate alternative locations or otherwise prove that no other location is appropriate.
- Protection of view sheds and sensitive sites are legitimate factors for consideration of approval of an oil and gas well or pipeline.
- Truck traffic generated by operation of an oil and gas well is not appropriate for local roadways and should be carefully considered

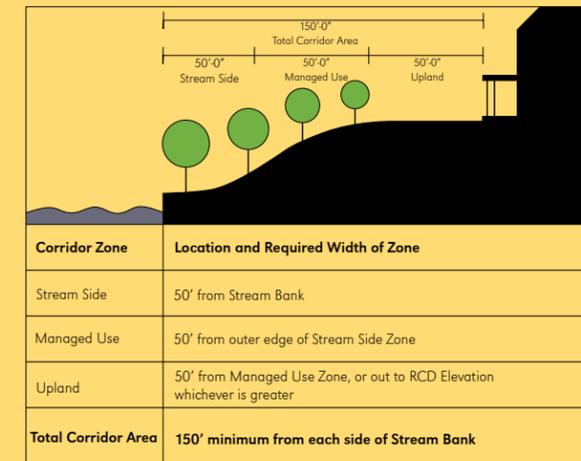
along collector roadways.

- Applicants should be fully expected to cover costs related to damage to roadways resulting from truck traffic generated by an oil and gas well.
- League City should complement safety efforts and regulations performed by state agencies rather than attempting to supersede state requirements.
- League City should establish a means of testing for potential environmental problems, including inspection for potential gas leaks, by first establishing baseline measures as a source of comparison. Staff should maintain a report of findings and notify the appropriate state agency in the event that a potential problem is noted.
- An adequate emergency response plan should be required for approval of a permit related to oil and gas wells and pipelines.
- Operators of oil and gas wells and pipelines should ensure that League City maintains records related to the specific well or pipeline in the event of an emergency, including a full emergency response plan.
- City staff should maintain a current inventory of active and inactive oil and gas wells, as well as all pipelines, and should require operators to provide information, including regular updates, as deemed essential.
- Pipelines should be routed or rerouted to avoid significant risk to populated areas and to minimize negative impacts to the greatest extent possible. Preservation of primary conservation areas and, to the extent practical, secondary conservation areas, should be considered legitimate factors in consideration of an application for approval.
- Ensure proper mitigation if a proposed pipeline is to be located within proximity to another pipeline.
- Coordinate with the Texas Railroad Commission to ensure that applications for oil and gas wells and pipelines are utilizing the most advanced and safest technology available.
- Any applicant for development, including the City of League City, should consult with applicable pipeline operators, including public utilities, during the preparation of development plans and during the early development stages of properties that contain, or are adjacent to gas or oil pipelines.
- The City shall require a minimum setback from the centerline (or possibly the nearest edge) of gas and oil pipelines to prevent damage to pipelines by external forces and to permit operators access for repair, maintenance, survey, and emergency response.
- New pipelines, or relocation of existing pipelines, should include measures to warn outside parties about the presence of a pipeline or inactive well, including proper marking of the right-of-way with signage.

CASE STUDY - HAZARD MITIGATION & PLANNING IMPLEMENTATION TOOLS

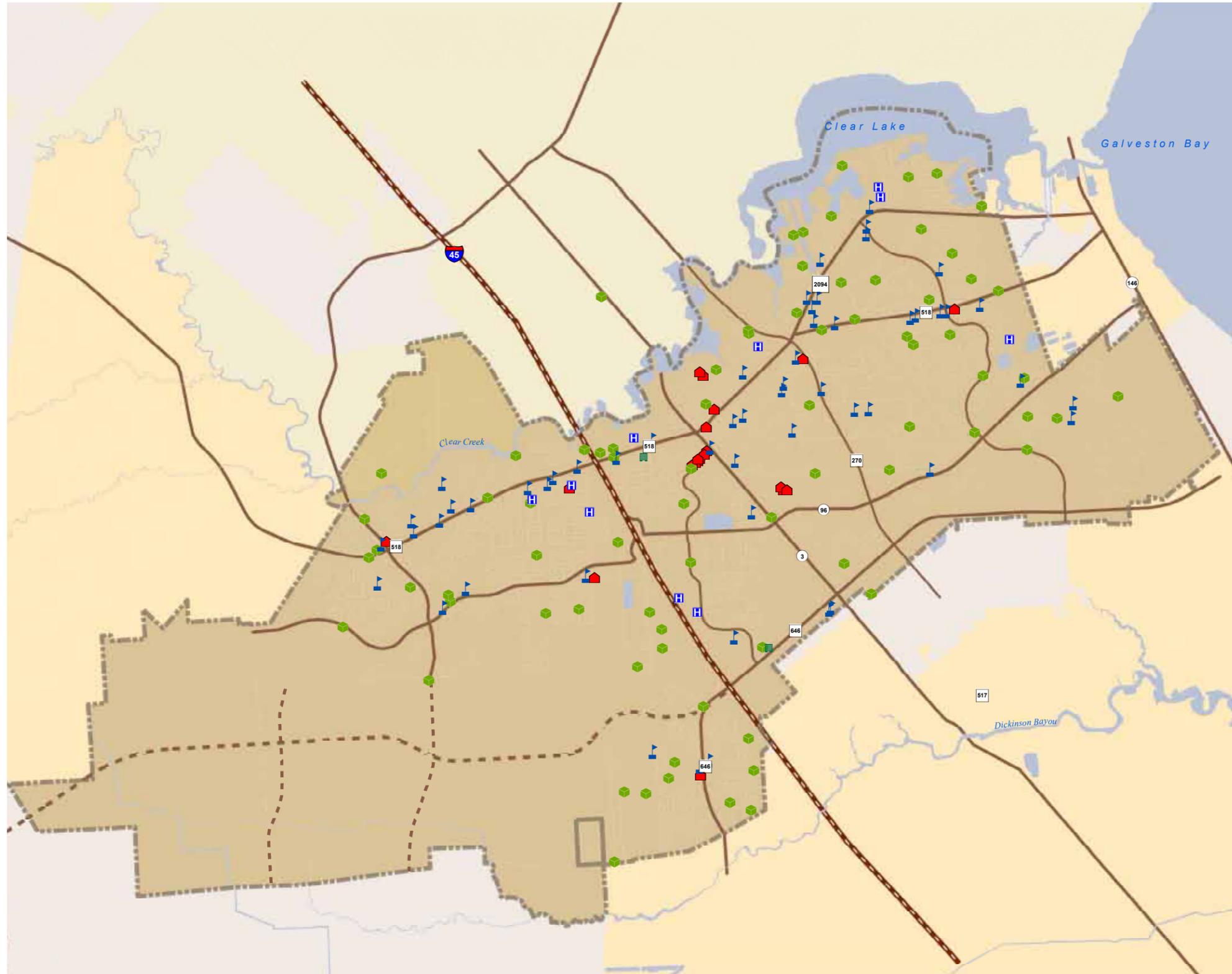
Integrating hazard mitigation into planning implementation tools can help a community achieve its hazard mitigation goals. Zoning ordinances, subdivision regulations and capital improvement programs are all effective tools for limiting damage from hazards. Zoning ordinances can restrict hazardous areas to land uses that would not suffer extensive damage and can encourage growth in safe locations. Subdivision regulations can be used to promote flexible designs such as cluster or conservation subdivisions, which can protect floodplains and other hazardous areas from development.

Chapel Hill Resource Conservation District, Chapel Hill, North Carolina
Chapel Hill created a Resource Conservation District as an overlay zone which is applied to all areas along the watercourses in the town. The intent of this district is to preserve the water quality and carrying capacity of the watercourses, minimize impacts from flooding, retain open spaces and greenways, and preserve and maintain the aesthetic qualities and appearance of the town. The overlay zone restricts permitted uses in the district based upon on location within the three Stream Corridor Zones as shown in the illustration below.



Source: Hazard Mitigation: Integrating Best Practices into Planning, APA 2010

Figure 8.3 Critical and Vulnerable Facilities



The following facilities are designated as critical facilities with their relation to flood zones, delivering essential services, housing essential city documents and personnel:

- all city buildings (City Hall and annexes, police, fire and EMS services)
- water/wastewater facilities
- lift stations
- pump house, ground water tanks, sewer treatment plant, waste water pump stations, etc.
- utilities
- medical and assisted living facilities
- schools and daycare centers
- transportation systems
- water tanks
- communications systems
- hazardous material facilities
- historical and cultural facilities

Legend

-  City Buildings
-  Galveston County Buildings
-  Medical and Assisted Living
-  School/Daycares
-  Water/Wastewater Facilities