



The Woodlands
Township Transit Plan

Houston-Galveston Area Council

Final

Our ref: 22611101

March 2015

Client ref: #TDOT.14.0320-01





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Acknowledgements

Thank You - The project team would like to thank all the stakeholders and public officials that contributed their creative ideas and time throughout the development of this plan.

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The preparation of this document was financed in part through grants from the U.S. Department of Transportation under Section 112 of the 1973 Federal Aid Highway Act and Section 8(d) of the Federal Transit act of 1964, as amended. The contents of this document do not necessarily reflect the official views or policy of the Federal Highway Administration, Federal Transit Administration, U.S. Department of Transportation, Texas Department of Transportation, Houston-Galveston Area Council and The Woodlands Township. Acceptance of this report does not in any way constitute a commitment on the part of any of the above agencies to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.



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Executive Summary

Introduction

This executive summary provides an overview of the development and recommendations of The Woodlands Township Transit Plan. In the fall of 2013, the Houston-Galveston Area Council (H-GAC) partnered with The Woodlands Township (the Township) to examine the area's growing mobility challenges. H-GAC supports responsible planning in the region to improve mobility, reduce congestion, improve air quality, and enhance the region's quality of life. The Woodlands and the surrounding area continue to undergo sustained growth in employment and population. The current and future traffic congestion, combined with the demand for transit and more active transportation choices, required a comprehensive look at mobility. Through The Woodlands Township Transit



Transit can provide greater mobility and choice for local residents, visitors, and employees.

Plan, H-GAC and The Township are examining transit and connections to transit for The Woodlands Town Center area, the entire Woodlands Township and surrounding area, and regional transit between The Woodlands and activity centers around the Houston Metropolitan area.

Plan Purpose

The purpose of the Woodlands Township Transit Plan is to provide a comprehensive examination of The Woodlands' existing transit options, as well as the need for future transit choices in and around The Woodlands.

The plan presents various options for consideration by the community to expand existing transit and develop new transit options to serve the local area, as the area continues to grow in population and employment. To encourage success, the plan considers the supporting road network, cycle network, and pedestrian network to provide complete connectivity to transit users from their origin to their destination.

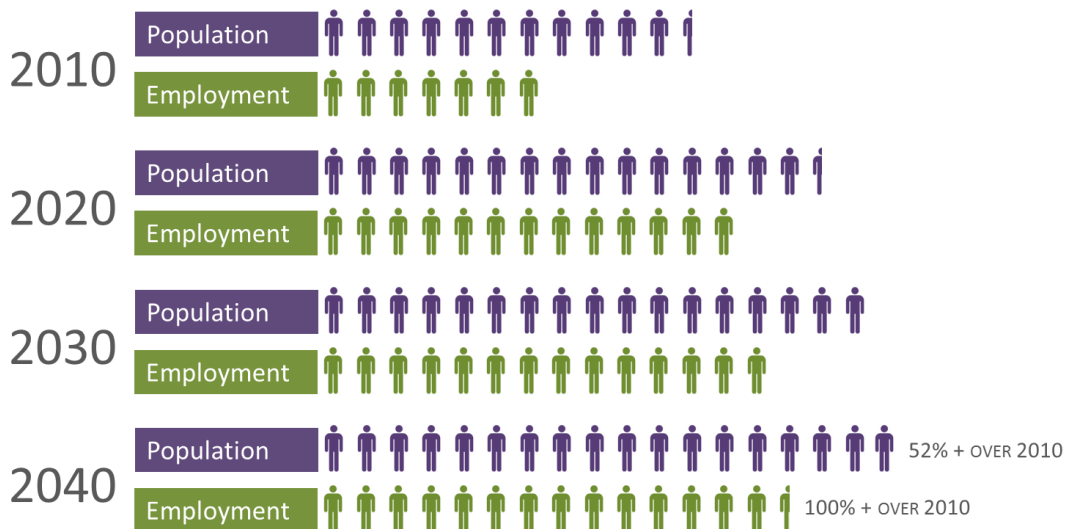
Why a Transit Plan?

The Houston metropolitan area continues to undergo rapid growth in population, employment, and the associated development. Rice University’s annual Kinder Institute Houston Area Survey noted that 29 percent of respondents say traffic (more than the economy or crime) is the Houston area’s top problem. This is an increase of 21 percent for the same survey in 2013.

H-GAC predicts that the total regional population will be 8.8 million by 2035 with projected job growth at a 60% increase.

The Woodlands itself and the surrounding study area are feeling the effects of this regional growth. The study area has sustained employment growth, a positive housing market, and an overall high quality of life as identified in multiple surveys. However, both local and regional traffic are a constant challenge for residents, employees, and visitors to the area. Mobility options within the study area are critical to manage ongoing growth, development, and demand for services. More residents, more employees, more shoppers, more business clients, etc. all require safe, accessible and simple methods to travel to, from, and around the study area. One only needs to experience morning and evening peak traffic around The Woodlands; or a weekend evening in the Town Center, to understand the area’s existing mobility challenges. With planned growth and development, these challenges would be further intensified in the future. The graphic below provides a representation of population and employment growth in the study area.

Study Area Population and Employment



The goal for this plan is to provide mobility choice. For those where transit provides a useful mobility option, they can choose to use it, while others are free to choose to drive, carpool, walk, etc. Transit may not be the choice mode for all; however, the benefits of transit can be felt broadly across the population. Each new transit rider represents one less person potentially in a car or in a parking space.

“If viable alternatives to car-centered sprawl are not made more widely available for the 50 percent of area residents who would choose them, there can be little doubt that much of the region’s remaining farmlands, prairies, forest and marshes will disappear into subdivisions and parking lots, and traffic will continue to worsen.”¹

Transit can provide a more efficient method to move more people, occupying less road space. Mobility and travel time play a large role in attracting and maintaining businesses and employees in an area. Reduced mobility impedes development while greater mobility is a catalyst for development.² Overall, enhanced mobility has the option to provide:

- Freedom of travel choice.
- A competitive advantage to attract new residents, businesses, and services.
- More efficient travel (more people traveling in less road space).
- Options to help accommodate future growth and development.



The Woodlands and the surrounding communities continue to grow.

The Township has identified a variety of priorities that are in line with the concept of mobility choice. The Township has committed to providing high quality services and amenities and maintaining a vibrant business environment. The identification and implementation of multiple mobility choices only strengthens The Township’s ability to advance these priorities.

Existing Transit Provision

The Woodlands currently provides the following transit services (via subcontractors) with the support of Federal grants in collaboration with The District (formerly Brazos Transit District), The

¹ 2014 Houston Area Survey, Rice University’s Kinder Institute for Urban Research.

² *The Geography of Transport Systems*, 3rd Edition. Jean-Paul Rodrigue, Claude Comtois, Brian Slack. Routledge 2013.

Woodlands Convention and Visitors Bureau, Interfaith of The Woodlands, the Friendship Center of Montgomery County, and non-profit organizations:

- The Woodlands Express park and ride services.
- The Town Center trolley service.
- The Waterway cruisers.
- Demand and response transit service for seniors and those with limited mobility.

The Woodlands Express park and ride services has been one of the success stories for providing a regional connection between The Woodlands and various employment destinations in Houston. Between 2008 and 2013, ridership fluctuated but showed an overall net increase of more than 19.7%, to over 720,000 riders in 2013. The Woodlands Express provides an alternative to the expense of driving and parking in central Houston for people who live in The Woodlands, but work in Houston. The service has been successful, despite very little promotion.

The Town Center trolley service is another important link within the Town Center, specifically for visitors. The trolley operates throughout the Town Center and provides access to major attractions, shopping, hotels, venues, and Waterway Square. Between 2008 and 2012 there was a net increase in ridership of 7.9%. The trolley service peaked in 2010, with annual ridership of over 142,000, but since that time has seen some decline. While the trolley provides good service for visitors, who are not sensitive to time, the trolley loop operations are somewhat long and unreliable for area residents who require an efficient trip across the Town Center.

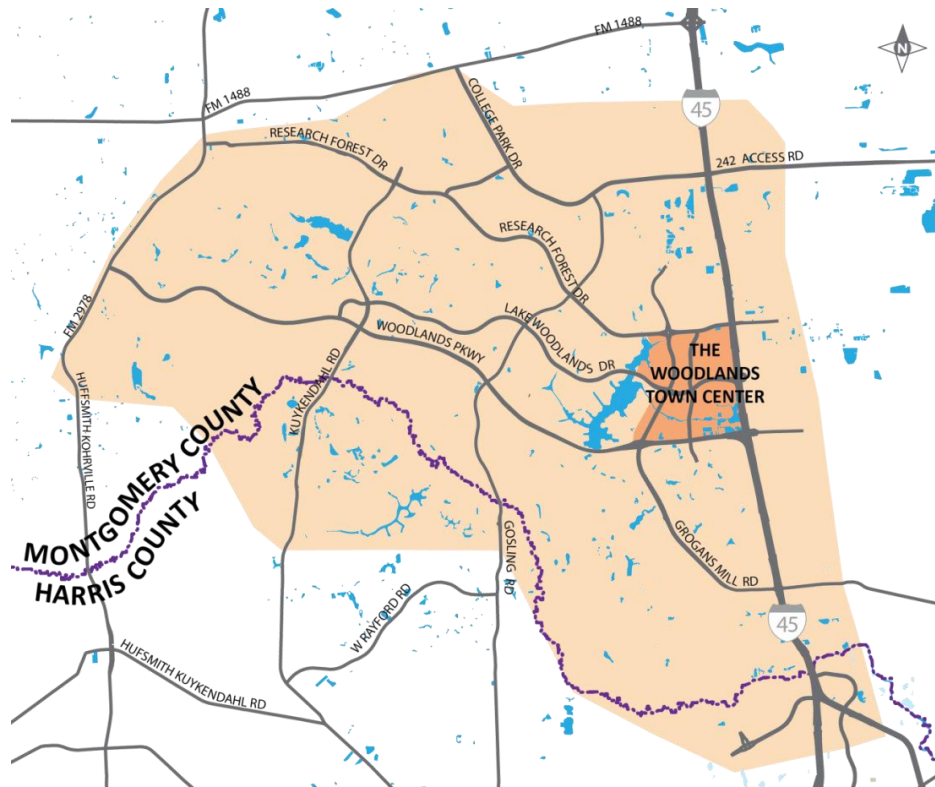
Demand for all transit services provided through The Woodlands Township and by others throughout Montgomery County is projected to grow. Employment and residential growth in The Woodlands, Springwoods Village, Oak Ridge North, the City of Shenandoah, as well as parts of unincorporated Montgomery and Harris counties continues to strain the existing transportation network. This strain will only continue as new residents and employees seek out trip options over the next 20 years. A combination of young families, aging residents, and those seeking active transportation options are influencing transportation demand in the area.

A wide range of mobility options will be needed to meet future mobility demand and transit will need to be a key mode of choice.

Plan Study Area

The study area is located in the northern portion of the Houston metropolitan area along I-45, approximately 27 miles north of the City of Houston. The Township is one of two designated recipients for Federal transit funding in the Conroe – The Woodlands Urbanized Area (UZA). The Township and the City of Conroe entered into an Interlocal Agreement (ILA) for administration of public transit in the UZA. Under this agreement, the Township assumed responsibility for public transit in the southern part of the UZA (generally south of the San Jacinto River).

Plan Study Area



Plan Leadership and Guidance

H-GAC and The Township led The Woodlands Township Transit Plan. A project management committee (PMC) was created as a body to guide the plan development and provide input throughout the process. The PMC members included representatives from H-GAC, The Woodlands Township, The Woodlands Township Board of Directors, TxDOT, and consultant team members. Multiple agencies, local governments, municipalities, special districts, business organizations, non-profits, major employers, developers, and advocacy groups provided input to the plan.

Both staff and elected officials of The Township were involved in the plan development from its inception until the creation of the final recommendations.

The Woodlands Township Board of Directors played a critical role by providing policy guidance, communicating with stakeholders, and ensuring consistency with the goals and values of The Township. The initial meeting with The Woodlands Township Board of Directors was a workshop format to determine the overall project's vision and guiding principles.

The vision of The Woodlands Township Transit Plan is to preserve The Woodlands economic competitiveness through increased mobility in the Town Center, the Villages, and existing/emerging activity centers in the area, creating affordable, reliable, accessible, safe solutions.

This vision is supported by the following guiding principles:

- *Builds partnerships to share costs and benefits.*
- *Provides high quality services.*
- *Preserves the commuting services to Houston.*
- *Supports congestion mitigation.*
- *Enhances the multi-modal transportation network.*
- *Results in actionable projects in the near-term and long-term.*

Plan Process

The plan followed a multi-step process to engage with stakeholders, identify potential transit improvements, and examine those improvements. The transit options that provided the most potential benefit were advanced as recommendations. Review of the potential options included two core levels of examination. The steps included multiple opportunities for input from the residents, business community, major employers, transit users, potential transit users, etc. through focus groups, project questionnaires, and open public meetings.

Process



The two major levels of examination represent the key points where evaluation was completed and transit options or scenarios were advanced in the process.

Evaluation, Prioritization, and Outreach

Examination	Definition	Outreach Activities Completed
Initial Evaluation of Options	The initial evaluation examined the widest range of potential transit options. The goal of the initial evaluation was to narrow the options and advance those with the highest priority and best potential for success.	<ul style="list-style-type: none"> • Stakeholder questionnaire #1 completed. • Multiple PMC meetings for input and direction. • Direction provided by The Woodlands Township Board of Directors through briefing and workshop. • Public outreach meeting #1 completed. • Multiple focus groups with business and special interest groups completed.
Prioritization of Scenarios	The prioritization process refined the options from the initial evaluation, focusing on prioritizing the scenarios into final recommendations and plans for implementation in the near, mid, and long-term.	<ul style="list-style-type: none"> • Stakeholder questionnaire #2 completed. • Multiple PMC meetings for input and direction. • Direction provided by The Woodlands Township Board of Directors through briefing and workshop. • Public outreach meeting #2 completed. • Second round of focus groups completed with business and special interest groups. • Public outreach meeting #3 presenting the plan and recommendations. • Final presentation to The Woodlands Township Board of Directors (plan accepted by the Board 5-0).

Each level of examination included its own set of criteria to compare and contrast the options or scenarios. Development of the criteria was completed with input from the PMC, The Woodlands Township Board of Directors, and public stakeholders. The criteria are organized into various categories referred to as accounts. The accounts tie directly to the plan's vision statement and specifically to the guiding principles.

- Fiscal – Examined the affordability of solutions and the opportunities for partnerships.
- Mobility – Considered increased mobility by residents, visitors, and employees throughout the community.
- Community – Examined the ability to create safe and accessible solutions that support the planning principles of the community.
- Prosperity – Considered the ability to preserve The Woodlands' economic competitiveness through increased mobility.
- Sustainability – Examined congestion mitigation and enhancements to the multi-modal transportation network.
- Deliverability – Identified actionable projects in the near-term and long-term.



Park and ride services have been successful in the Houston area.

Initial Evaluation

The initial evaluation focused on identifying all of the potential transit and transit supportive improvements that could be considered. The improvements in the initial evaluation are referred to as 'options', because they form a wide range of potential choices for initial consideration and examination. The scoping process included significant input from the PMC, The Woodlands Township Board of Directions, and project stakeholders to create a comprehensive list of potential options.

The scoping process resulted in the identification of more than 50 transit options or transit supportive options (transit, roadway, cycle, pedestrian, parking, etc.) for examination.

The initial evaluation applied a series of high-level criteria designed to identify the best performing options. A wide range of options suggested by stakeholders were considered, including new bus services, carshare, light rail and streetcar, monorail, etc. Many options were incorporated with one another and advanced for further examination. Some options were deemed not appropriate once the benefits were compared to the potential impacts and cost. For example, infrastructure

intensive options, like light rail, are attractive but similar service could be provided with high quality bus at much lower cost. The outcome of the initial evaluation determined which options should advance forward for further definition, development, and evaluation in the prioritization of scenarios.

Prioritization of Scenarios - Recommendations

Upon completion of the initial evaluation, the resulting options were combined into potential transit ‘scenarios’. The scenarios combined multiple options from the initial evaluation into complete packages of transit improvements. The scenarios were further defined for design, operations, cost, and implementation, so they could be evaluated in more detail through the prioritization of scenarios phase. The scenarios presented were ultimately prioritized by applying the criteria accounts. Three scenarios were developed and prioritized:

- Town Center Mobility (Town Center Bus).
- The Woodlands Area Mobility (Local Bus).
- Regional Mobility (Express Bus):
 - The Woodlands to Houston.
 - Reverse Commute – Houston to The Woodlands.

Each of the scenarios is supported by various complementary measures that enhance the success of transit. The sections below provide an overview of each scenario and recommendations resulting from their development and examination.

Town Center Mobility (Town Center Bus)



Modern bus service could provide connectivity throughout the community.

Improved mobility in and around the Town Center is critical to the continued growth and development of the area. Limited road space is unlikely to meet demand as new and growing shopping, residential, and employment centers develop throughout the Town Center area. These new developments will also increase the demand placed on Town Center parking. The plan has examined transit mobility throughout the Town Center and how transit is accessed by pedestrians, cyclists, and auto users. The plan’s recommendations integrate with the future transit center planned for the Town Center area. The plan focuses on introducing efficient, frequent, and accessible bus service in the Town Center area.

One goal of the Town Center bus service is to promote a ‘park once’ concept. The new bus service enables people accessing the

Town Center by car to park in an appropriate lot or structure and then access all the key destinations and services via transit.

It is recommended to introduce, over time, three new Town Center bus routes. These routes will serve a range of key destinations, at high frequencies, and will include improved stop infrastructure (shelters, cycle racks, signage, etc.). The new service will focus on the needs of residents and employees in the area to provide efficient and fast connectivity to Town Center destinations. This differs from the existing Town Center trolley's focus on moving visitors in a manner that enhances their visitor experience with the historic replica trolley vehicle.

Each new bus service will require additional infrastructure. Stop locations will be provided with shelters, signage, and cycle racks (where appropriate). Gaps in the pedestrian and cycle network would need to be addressed to provide appropriate access to new transit stops.

Recommendations – Town Center Bus

Town Center Bus Route 1

Route 1 would provide a critical connection between the Town Center's area of highest employment density to the rapidly developing Hughes Landing. Route 1 operations would occur predominantly on street with two-way service. This route provides a stop associated with the proposed transit center. Route 1 would also make use of a portion of the future dedicated trolley busway alongside the Waterway between Lake Woodlands Drive and Grogan's Mill Road. This route would appeal to employees, visitors, and locals moving around the Town Center.

Town Center Bus Route 2

Route 2 is focused on serving areas to the north of the Town Center, providing connections to the retail and medical facilities along the route. These areas were identified as high demand stops through the public outreach efforts undertaken for the project. The route will provide a two way service along Lake Robbins Drive and Pineroft Drive. This route would require additional coordination with adjacent jurisdictions.

Town Center Bus Route 3

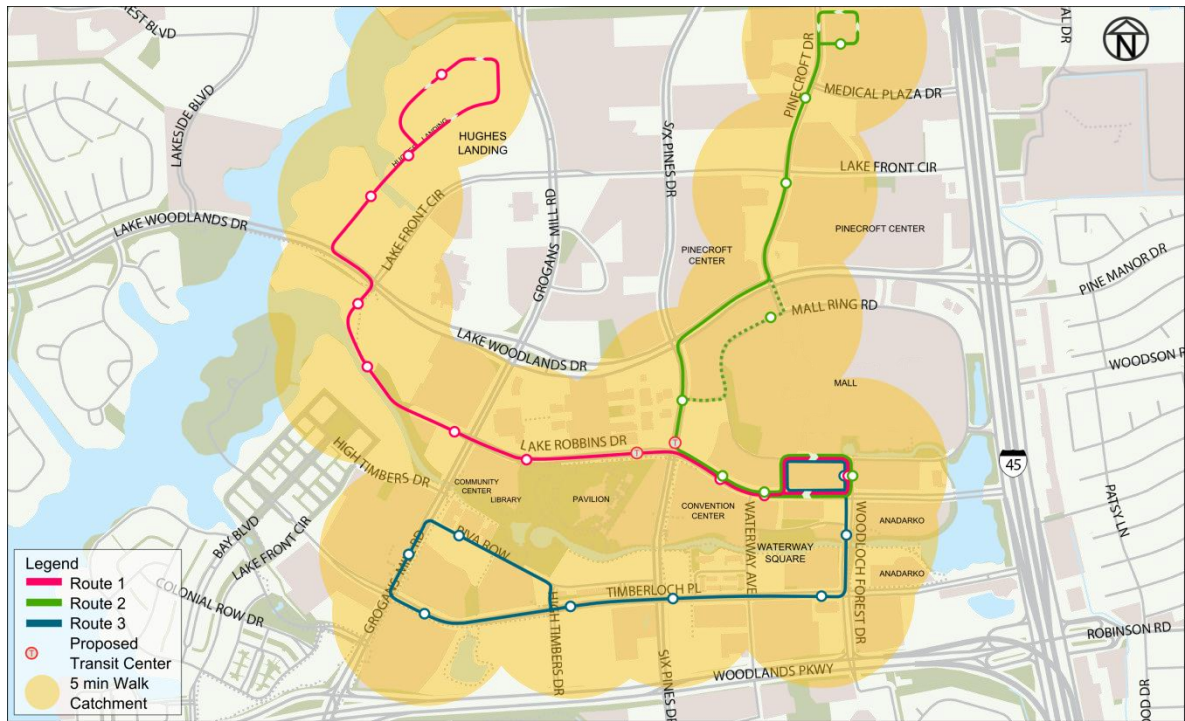
Route 3 is focused on serving the developing areas of the Town Center on the south side of the Waterway. This route could operate as an extension of Route 2. Route 3 would serve new office and commercial areas, as well as higher density residential areas. This route would provide a two way service along the majority of Woodloch Forest Drive and Timberloch Place, with a single direction loop serving the last three stops on the west end.

The project team developed high level capital and operating costs for each scenario based on local unit costs, the potential infrastructure needs, and potential operating schedules of the services. The potential estimates do not account for any funding or revenue to offset the capital or operating expenses.

- Route 1 - Estimated capital cost: \$2.4M and estimated annual operating cost: \$800K.
- Route 2 - Estimated capital cost: \$1.3M and estimated annual operating cost: \$600K.
- Route 3 - Estimated capital cost: \$1.5M and estimated annual operating cost: \$600K.

Each of these new services provides fast and frequent access to major activity points within the Town Center. The combined services would operate on ten minute frequencies all day. The new combined services would connect important destinations including The Woodlands Mall, attractions and employment along Lake Robbins Drive, medical facilities (including Memorial Hermann Hospital), Pineroft commercial, and residential areas south of the waterway. The new transit stops create new accessibility with a simple five minute walk from stops to the majority of the Town Center, as depicted in the recommendations graphic.

Recommendations – Town Center Bus



The Woodlands Area Mobility (Local Bus)

The Woodlands area mobility refers to broader transit service throughout the southern portion of the Conroe-The Woodlands UZA. Mobility needs in this area are varied. The critical connections are primarily between the residential communities / villages to the Town Center area. This area includes populations of seniors and young people who may choose to use transit. While most commuters drive, congestion and changing demographics are creating additional demand for local transit.

Moving from the current situation of no fixed route transit locally to a network of local transit connections would be a significant change away from the area’s traditionally auto-dominated culture.

Making this change and developing a ‘culture of transit’ would take significant time. Proof of concept would be required by developing highly successful, core transit lines, with quality service and appropriate frequencies. The design of The Woodlands’ residential areas, with many cul-de-sac streets and limited connectivity, creates impediments to providing fixed route transit service. It is with these considerations that the team developed the recommendations for transit mobility within the broader The Woodlands area.

The success of the initial local bus services provided will set a precedent for the continued expansion of the service. Therefore, the recommendations reflect a measured implementation of local bus. Once the initial routes prove successful, future expansion can be considered to broader

destinations within the study area. Therefore, the recommendations for local bus service connect either:

- Key mature residential areas with higher density residential and senior citizen communities in Panther Creek and commercial destinations including the Sterling Ridge, Indian Springs, and Panther Creek Village Centers. Additionally, all new services provide a core connection to the Town Center.
- Key employment destinations including the Town Center, Hughes Landing, and Springwoods / ExxonMobil.



The Town Center is a major base of employment for the northern Houston metropolitan area.

The transit plan analysis examined multiple potential local bus destinations within the UZA. The two routes recommended are presented as the potential starting point for a future network (as demand dictates). It is recommended that The Woodlands continue to survey UZA residents in the future to track potential need for the implementation of broader routes throughout the community.

Recommendations – Local Bus

Local Bus Route 10 or Route 10X

Route 10 and 10X proposes testing a fixed route transit connection between the Town Center / Hughes Landing and the Springwoods / ExxonMobil area. This should be timed to coincide with at least 50% occupancy of the ExxonMobil campus. This route would support new area residents' / employees' identification of The Woodlands Town Center area as their main destination for shopping, medical, and other services. It is recommended that only one of these services (either the 10 or 10X) be implemented, not both.

Route 10X

Route 10X provides an express connection between the Town Center / Hughes Landing and Springwoods / ExxonMobil with no stops in between. Route 10X could serve to establish the Town Center as the key destination for ExxonMobil employees for shopping, services, and leisure. It is our understanding that ExxonMobil is considering implementing this type of direct service between ExxonMobil and Hughes Landing. It is recommended that The Woodlands collaborate with ExxonMobil to provide this service and ensure stops in the Town Center area.

Route 10

Route 10 also provides a connection between Springwoods / ExxonMobil and the Town Center / Hughes Landing area with multiple stops along Grogan's Mill Drive. Route 10 would better serve residents in The Woodlands area with more stops and access. However, this would increase travel times and likely attract less riders from Springwoods / ExxonMobil.

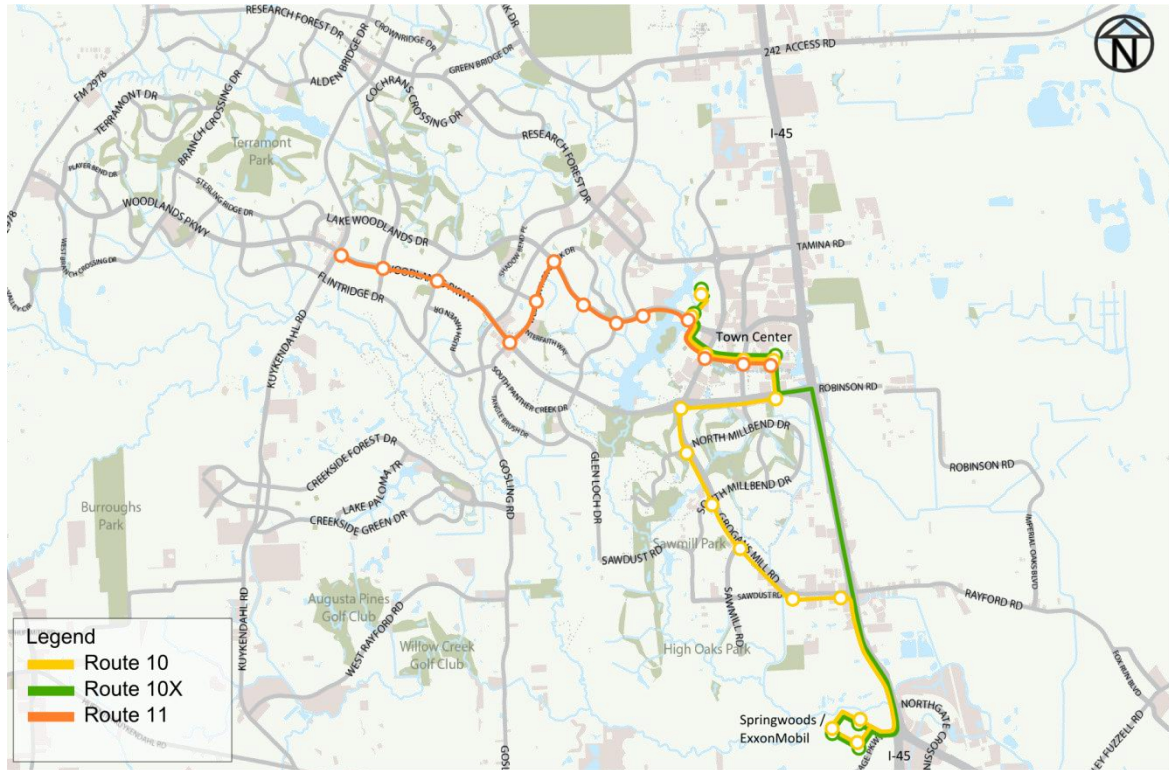
Recommendations – Local Bus

Local Bus Route 11

Route 11 proposes testing a transit route connecting the Town Center to the Indian Springs / Sterling Ridge Village Centers (with a stop in the Panther Creek area). This route would be a mid to longer term priority.

Route 11 could provide a deviated service with some fixed stops. The service would have specific times to meet at fixed route stops; however, it could also deviate to pick up passengers at other locations. Existing groups (like the Friendship Center) could provide calls for deviated stops for their able-bodied users. This service could help alleviate the use of specialized services by those that are able to use a traditional transit service.

Recommendations – Local Bus



The project team developed high level capital and operating costs for each option based on local unit costs, the potential infrastructure needs, and potential operating schedules of the services. The estimates do not account for any potential revenues (from fares) or funding to offset the capital or operating expenses.

- Route 10 - Estimated capital cost: \$2.5M and estimated annual operating cost: \$600K.
- Route 10X - Estimated capital cost: \$1.2M and estimated annual operating cost: \$210K.
- Route 11 - Estimated capital cost: \$2.1M and estimated annual operating cost: \$460K.

Regional Mobility Express Bus (The Woodlands to Houston)

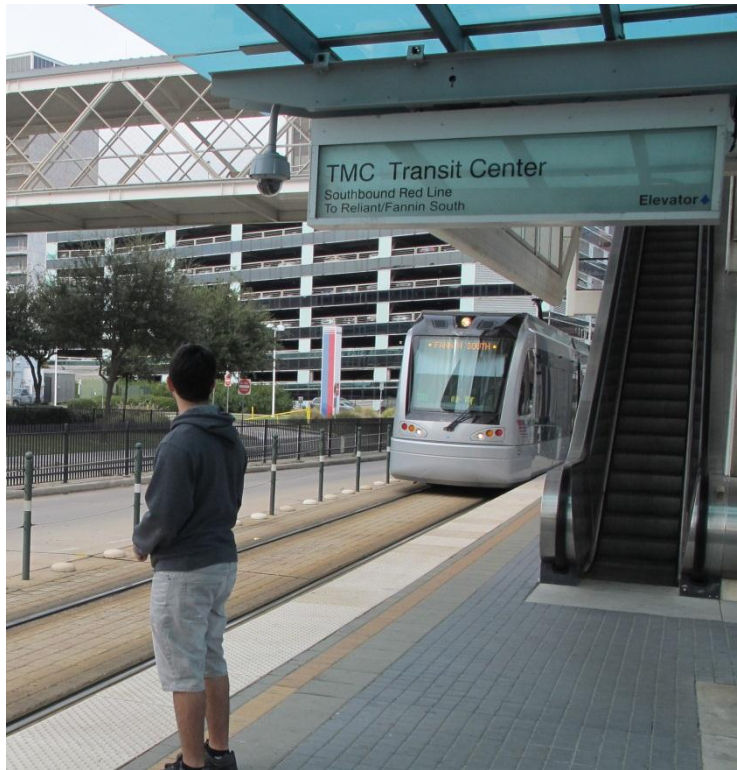
Regional mobility is defined by The Woodlands Express commuter services between The Woodlands and multiple employment centers in the Houston metropolitan area. The plan presents potential recommendations for enhanced services from The Woodlands to Houston, and

also reverse commute bus services originating in the Houston metropolitan area, traveling to key employment destinations in and around The Woodlands.

The existing Woodlands Express service is successful. The plan's recommendations aim to further enhance the system and ultimately grow ridership, revenue, and destinations. The new services described below are generally near-term priorities. These are presented as extensions of the existing service to minimize the risk associated with new investment in the service; it would not require immediate introduction of separate, new services. Based on the success and demand for the new destinations, future separate services could be considered in the longer term. The items below are recommended for all park and ride locations and services originating in The Woodlands and traveling to destinations in the Houston metropolitan area:

- Maintain all current services.
- Fill pedestrian gaps to all park and ride locations.
- Fill cycle gaps and provide cycle racks at all park and ride locations.
- Improve passenger drop-off/pick-up at park and rides.
- Address maintenance issues at park and ride locations - develop and implement ongoing maintenance plans for park and ride facilities.
- Use new marketing / website communications channels to highlight and advertise the changes (and encourage new riders).

The table below details the recommendations for expansion of existing services from the Research Forest, Sawdust, and Sterling Ridge park and ride locations to destinations in metropolitan Houston. These are presented by each individual park and ride origin point.



The Woodlands Express provides access to key employment sites, including the Texas Medical Center.

Recommendations – Express Bus (The Woodlands to Houston)

Research Forest Park and Ride

New destinations – add destinations for services originating at the Research Forest park and ride:

- Research Forest park and ride to Uptown / Galleria as an extension of the current Greenway Plaza services.
- Research Forest park and ride to Midtown as an extension of an existing downtown route.

Later service – add two later pick-up times on the evening return to Research Forest park and ride from:

- Medical Center - add 6:05pm pick-up.
- Greenway Plaza - add 6:30pm pick-up.

Sawdust Park and Ride

New destinations – add destinations for services originating at the Sawdust park and ride:

- Sawdust park and ride to Uptown / Galleria as an extension of the current Greenway Plaza services.
- Sawdust park and ride to Midtown as an extension of an existing downtown route.

Later service – add two new later pick-up times on the evening return to Sawdust park and ride from:

- Medical Center - add 5:40pm pick-up.
- Greenway Plaza - add 6:40pm pick-up.

Sterling Ridge Park and Ride

New destinations – add a pick up point and a destination for services originating at the Sterling Ridge park and ride:

- Sterling Ridge park and ride to Midtown as an extension of an existing downtown route.
- New pick-up – add a pick up point in The Woodlands near Woodlands Parkway @ Grogan’s Mill (walk-up stop) as part of the service originating from the Sterling Ridge park and ride.

Later service – add two new later pick-up times on the evening return to Sterling Ridge park and ride from:

- Medical Center - add 5:40pm pick-up.
- Greenway - add 6:40pm pick-up.

The project team developed high level capital and operating costs for each option based on local unit costs, the potential infrastructure needs, and potential operating schedules of the services. The potential estimates do not account for any potential increases in revenues from fares, or other funding to offset the capital or operating expenses.

- Research Forest Park and Ride - Estimated capital cost: \$300K and estimated annual operating cost: \$565K (in addition to existing operating costs).
- Sawdust Park and Ride - Estimated capital cost: \$1.3M and estimated annual operating cost: \$325K (in addition to existing operating costs).
- Sterling Ridge Park and Ride - Estimated capital cost: \$390K



The Woodlands Express could be expanded to serve more destinations and a reverse commute into the study area.

and estimated annual operating cost: \$270K (in addition to existing operating costs).

More long range and higher risk expansion of The Woodlands Express would include adding completely new routes, as opposed to proposed extensions of the current route structure. New routes would require additional buses and, depending up the destinations, may result in greater non-revenue service hours (bus travel to position with no revenue passengers). Based on future surveys and demand, destination points in the Houston metropolitan area that may be considered include The Woodlands to:

- The Energy Corridor Addicks park and ride (with transit oriented redevelopment) and/or other major employment centers (Shell Oil, ConocoPhillips, BP America).
- The University of Houston - Downtown campus and Burnett Transit Center.

The Woodlands Express (The Woodlands to Houston)



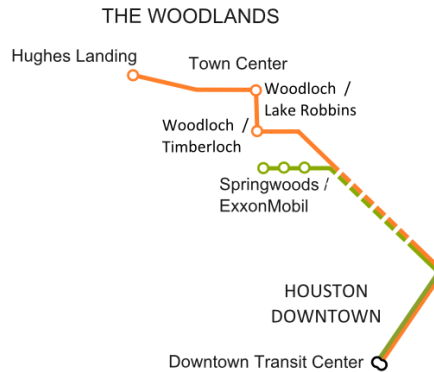
Regional Mobility Reverse Commute Express Bus (Houston to The Woodlands)

Based on the public outreach efforts of the project and recent discussions with major employers, it appears that demand likely exists for reverse commuter services. To minimize overall risk and cost to The Woodlands (and partners), the plan recommends starting with focused service from downtown Houston to key employment destinations including the Town Center / Hughes Landing and the Springwoods / ExxonMobil area.

Multiple origins were examined as a starting point for these services. METRO’s Downtown Transit Center was noted as the most desired starting point compared to other area transit centers and park and ride locations. The Downtown Transit Center is a key intermodal hub and would allow access, via local bus and light rail, from throughout the Houston area. Therefore, this starting point provides the greatest access and good potential for transit riders to avoid using their personal vehicle.

Recommendations – Express Bus (Houston to The Woodlands)
<p>Reverse Commute Woodlands Express (Downtown Houston Transit Center to Town Center / Hughes Landing)</p> <p>New service – add service originating at METRO’s Downtown Transit Center to The Woodlands Town Center (with stops at Woodloch Forest Drive @ Lake Robbins Drive and Woodloch Forest Drive @ Timberloch Drive) and to Hughes Landing (stop central to the developing office complex along Hughes Landing Blvd.).</p>
<p>Reverse Commute Woodlands Express (Downtown Houston Transit Center to Springwoods / ExxonMobil)</p> <p>New service – add service originating at METRO’s Downtown Transit Center to the Springwoods / ExxonMobil area (multiple stops on the campus ring road, if security clearance is granted).</p>

Reverse Commute Woodlands Express (Houston to The Woodlands)



The project team developed high level capital and operating costs for each option based on local unit costs, the potential infrastructure needs, and potential operating schedules of the services. The estimates do not account for any potential revenues (from fares) or funding to offset costs.

- Reverse Commute Woodlands Express (Downtown Houston Transit Center to Town Center / Hughes Landing) - Estimated capital cost: \$5K (signage) and estimated annual operating cost: \$400K.
- Reverse Commute Woodlands Express (Downtown Houston Transit Center to Springwoods / ExxonMobil) - Estimated capital cost: \$5K (signage) and



Local transit can provide connections to important civic spaces.

estimated annual operating cost: \$300K.

Using existing METRO park and ride locations as potential starting points for the reverse service did not receive an exceptionally strong response from stakeholders. However, given the overall success of park and ride in the metropolitan Houston area, this may be considered when testing the service or in the future. One scenario for testing could be adding a single intermediate stop for the service at the North Shepherd park and ride. The service would continue to originate at the Downtown Houston Transit Center, make one stop at the North Shepherd park and ride, and then proceed to The Woodlands or Springwoods / ExxonMobil. This could increase access to the service for those connecting by transit and by auto.

Complementary Strategies

In support of transit, active transportation, parking, and congestion minimization, the plan examined various complementary strategies to support the potential success of the transit scenarios (Town Center Mobility, The Woodlands Area Mobility, and Regional Mobility).

Transit Branding and Promotion

All scenarios considered under this plan should be paired with a comprehensive branding, promotion, and education program for all transportation modes / facilities (transit, active transportation, parking, etc.). This would include the new bus services proposed for the Town Center, as well as all other transportation services (Woodlands Express, local services, etc.). The program would seek to:



Branding and promotion can be comprehensive, as with the Shift mobility campaign for the San Diego region.

- Educate transit users and potential transit users on the existing and new services.
- Develop a clear identity for the various transit services that makes it easy to understand what the services are and how to use them.
- Promote the services and attract new users (focused on specific market segments).
- Build a 'culture of transit' among the community that promotes the high quality services.

The branding, promotion, and education campaign should be a near-term priority to be implemented with the introduction of each new service.

A transit system brand is more than just a graphic image; it is an identity that should reflect the combined attributes of the local community and the transit system.

Online Information

The success of the transit system would also be supported by the development of a single central website to disseminate transit information. Currently, information is provided on a number of different websites, with conflicting or duplicate information presented. A standalone website with a unique URL should be developed to incorporate the new branding and messaging scheme. Information should be easy to access, simple to understand, and the website should be the primary source of information for all transit / transportation choices in the service area. The website could be expanded as the system grows to incorporate an industry-standard interactive journey planner such as Google Transit that displays transit, walking, and cycling options to connect between services. A mobile phone application could be another method to provide simple access to information for potential users.

Building Transit Ridership and Loyalty

The plan details various complementary activities that will support transit usage and multi-modal travel choices. The goal is to make transit attractive and convenient for the segment of the population that can and will use transit for some trips. A number of potential programs are possible; however, those presented below may work best given the limited transit culture within the study area:

Developing ridership loyalty would require building programs over time and continuously encouraging new transit ridership, supporting existing transit users, encouraging rider loyalty, and in return growing transit revenues.

- Online ticketing – providers need to make it simple for someone to buy their product.
- Monthly transit passes – monthly passes improve the ease of transit service.
- Guaranteed ride home – this program provides a taxi service in a case of an emergency.
- Carshare – carshare systems provide hourly car rentals to members.
- Secure bike parking – cyclists feel more comfortable with secure and protected bike parking.

Pedestrian and Cycle Access to Transit

The ease of multi-modal travel in a community is critical to the success of transit. The actual transit ride on a bus or train is only one element of an overall journey. Transit riders arrive in cars, on cycles, and by walking. All of these modes make up a complete journey and it is critical to consider how these modes can be seamlessly integrated with transit in the study area. The most successful transit systems are complemented with robust pedestrian and cycling environments.

In an effort to achieve seamless connectivity, the team has identified a variety of key cycle and pedestrian corridors within the Town Center. This examination generally looked at the gaps and barriers at accessing the Town Center via cycle and walking. These gaps could limit connectivity to transit and therefore the success of any new transit provision. The Town Center's pedestrian facilities are good where there is frontage, streetscape, and business activity. However, where the built environment is more 'inward' facing (for example, to Market Street, The Mall, the Pinecroft area, Waterway Square, etc.) the pedestrian links from major corridors can be less visible or missing altogether. Broader improvements in the cycle and pedestrian network are likely needed,

beyond just those that impact connectivity to transit. Improved multi-modal connectivity throughout the community supports the success of transit, as well as the goals of traffic and parking congestion mitigation. This plan supports the need to undertake a comprehensive examination of the cycle and pedestrian environment throughout the community. The environment could be examined as a network of connections, versus just the connections between transit and active modes.

Town Center Parking

The growth of employment and population in the Town Center, combined with the continued growth of the Town Center as a draw for regional shopping, recreation, and tourists presents significant congestion challenges. Traffic congestion and the associated parking congestion could be a hindrance to the ultimate build out of the Town Center. The availability of convenient parking has been identified as a concern by some stakeholders. To maintain the Town Center's attractiveness as a regional destination, an improved approach to parking should be investigated.



The Woodlands Township Transit plan creates a framework for future mobility options.

Opportunities for auto access and parking must be considered in the mix of mobility choices. Potentially driving to the Town Center, parking and then using transit to access multiple destinations (in the Town Center) supports the overall success of transit and limits congestion. This 'park once' concept would encourage those accessing the Town Center in their car to park in an appropriate location. Longer term parking would be encouraged in appropriate lots or parking structures, while shorter term parking could be on street (where higher parking turnover occurs).

Various strategies should be considered to improve the availability of convenient parking in the Town Center. Convenience is generally defined as readily available parking near one's destination. While this cannot be provided 100% of the time for all drivers that need parking, various strategies can be implemented to support the availability of parking. Parking turnover adjacent to local businesses can also be positive, by providing more visibility and access to adjacent businesses more often. Transit could help facilitate the development of complementary parking strategies.

Next Steps

The Woodlands Township Transit Plan examined a comprehensive number of potential transit options that could benefit mobility within the study area. These recommendations are presented for consideration and application by the local community and decision makers. Communities are

dynamic places, continuously developing and changing. The recommendations included in this plan must also be dynamic. These recommendations provide the community and decision makers with a basis for future implementation of transit options. However, the recommendations should not be perceived as a literal mandate of actions. The intent is that these plans be further refined to reflect the continuously changing needs of The Woodlands and surrounding communities.

Details on the development of the plan, stakeholder involvement, funding considerations, and recommended next steps are further explored in the full plan document. The plan highlights the key recommendations and the time frames for consideration of implementation.

Near Term Implementation

- Town Center bus Route 1 service between the Town Center and Hughes Landing.
- Later pick up times for the existing Woodlands Express routes.
- Pilot the Woodlands Express (The Woodlands to Houston) expansion to Midtown and Uptown / Galleria.
- Pilot reverse commuter Woodlands Express (Houston to The Woodlands / Springwoods) service.
- Complementary strategies, specifically addressing ease of ticketing / sales, online presence and information, and a marketing / branding strategy.

Mid and Long Term Implementation

- Town Center bus Route 2 service between the Town Center and Memorial Hermann Hospital.
- Town Center bus Route 3 service between the Town Center and areas south of the waterway.
- Local bus service Route 10 or 10X between the Town Center / Hughes Landing and Springwoods / ExxonMobil (potential partnership with ExxonMobil).
- Local bus service Route 11 between the Town Center, Panther Creek, and Indian Springs / Sterling Ridge.

Implementation of these new and enhanced services begins to provide broader mobility choice for area residents, employees, and visitors over time. The plan proposes new services and extensions to be piloted or tested to determine their success and how to refine the services over time to best meet the needs of users.

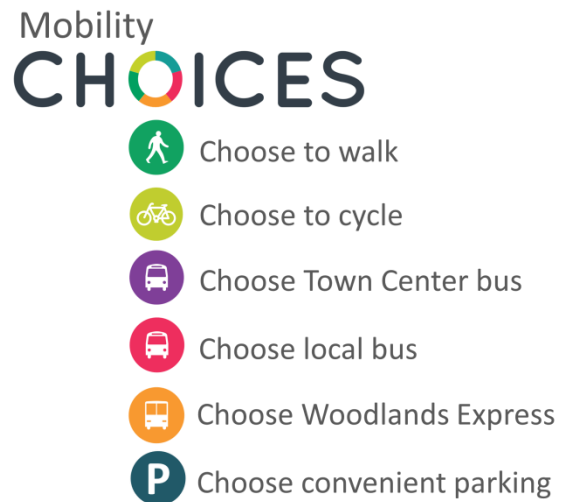
1 Introduction

Preface

In the fall of 2013, the Houston-Galveston Area Council (H-GAC) partnered with The Woodlands Township (the Township) to examine the area’s growing mobility challenges. H-GAC supports responsible planning in the region to improve mobility, reduce congestion, improve air quality, and enhance the region’s quality of life.

The Woodlands and the surrounding area continue to undergo sustained growth in employment and population. The current and future traffic congestion, combined with the demand for transit and more active transportation choices, required a comprehensive look at mobility. The Woodlands Township is one of the fastest growing residential and employment centers in the greater Houston-Galveston region. In fact, if The Woodlands Township were an incorporated municipality, it would be the third-largest city in the region. With such explosive growth comes mobility and congestion challenges, and in order to address these challenges, transit improvements are a very high priority for The Woodlands Township. The priority placed on public transit improvements stems from two factors:

- On October 1, 2012, The Woodlands Township and the City of Conroe was designated a large Urbanized Area (UZA) by the US Census Bureau and are now accountable for the performance and fiscal viability of their transit operations.



| The Woodlands Township Transit Plan project branding.

- Improved transit programs could help to alleviate the increasing congestion that The Township’s Town Center and adjacent commercial and residential areas are experiencing.

The Woodlands Township believes that a long-range transit plan represents a significant opportunity to assess and define the community’s future needs within the context of the larger picture presented by growth within South Montgomery County and North Harris County. This planning effort will help move the community forward in addressing many of The Township’s concerns and help develop a plan for improving local mobility and reducing congestion.

To accomplish a visionary examination of future mobility needs, H-GAC identified three critical planning projects, to be completed from 2013-2015. These projects included:

- The Woodlands Township Transit Plan (2013 to 2014) – H-GAC and The Township examined transit and connections to transit for The Woodlands Town Center area, the entire Woodlands Township and surrounding area, and regional transit between The Woodlands and activity centers around the Houston Metropolitan area.
- The South Montgomery County Mobility Plan (2013 to 2015) – H-GAC is collaborating with local governments and the Texas Department of Transportation (TxDOT) to improve the efficiency of the roadway network in South Montgomery County.
- The Montgomery County Thoroughfare Plan (2014 to 2015) – Montgomery County, the City of Conroe, and H-GAC are developing a long-range thoroughfare plan that will identify the location and type of roadway facilities that are needed to accommodate the future growth within the Montgomery County.



Growth and development in The Woodlands Town Center.

The Woodlands Township Transit Plan is a comprehensive examination of The Woodlands’ existing transit options, as well as the need for future transit choices in and around The Woodlands. Transit is one segment of a journey and the success of transit is directly impacted by the modes of travel that link to transit. Therefore, in order for transit to be successful, the supporting road network, cycle network, and pedestrian network must be sufficiently robust and create simple connections between the systems. Mobility is about moving people from their origin to their destination.

A journey can involve multiple modes of travel and transit can be a significant component.

Plan Study Area

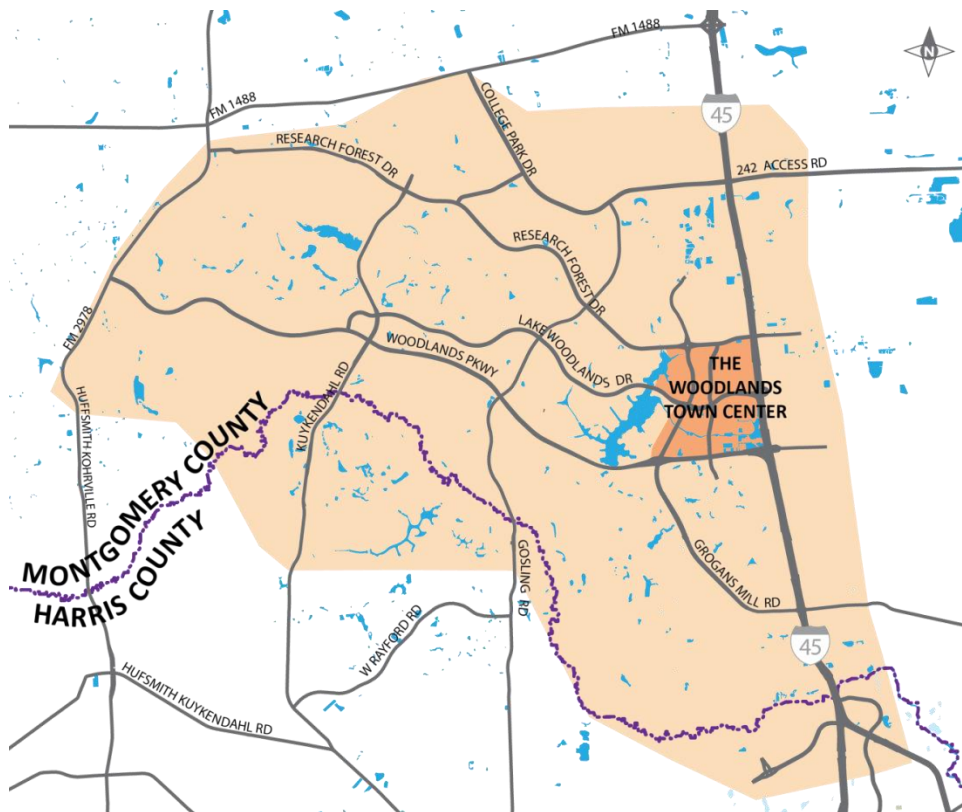
The Township is one of two designated recipients for Federal transit funding in the Conroe – The Woodlands Urbanized Area (UZA). The Township and the City of Conroe entered into an Interlocal Agreement (ILA) for administration of public transit in the UZA. Under this agreement, the Township assumed responsibility for public transit in the southern part of the UZA (generally south of the San Jacinto River). This area encompasses the entire community of The Woodlands, as well as:

- The City of Shenandoah.
- The City of Oak Ridge North.
- Portions of unincorporated Montgomery County.

The southern portion of the UZA formed the study area for The Woodlands Township Transit Plan. A graphic depiction of this area is included in Figure 1.1 below. In general, the plan study area extends to:

- North – Approximately, Farm to Market Road (FM) 1488.
- South – Includes a portion of far northern Harris County (south of Spring Creek).
- East – Approximately, east of Interstate 45 (I-45).
- West – Approximately, FM 2978.

Figure 1.1: Plan Study Area



Existing Transit Provision

Within the southern UZA geography, The Township holds fiscal responsibility for funding public transit services. This includes determining and overseeing all publicly funded transit operations. The Woodlands currently provides the following transit services (via subcontractors) with the support of Federal grants:

- The Woodlands Express park and ride services.
- The Town Center trolley service.
- The Waterway cruisers.
- Demand and response transit service for seniors and those with limited mobility.

Various contractors and non-profit organizations play key roles in delivering the existing transit services through agreements with The Township. The Township is currently contracted with The District (formerly Brazos Transit District) for operations and maintenance of The Woodlands Express, the Town Center trolley, and the Waterway cruiser. The District owns The Woodlands Express park and ride facilities, The Woodlands trolley maintenance facilities, the Town Center trolley vehicles, and the Waterway cruiser maintenance and boat storage facilities. The Waterway cruisers are owned by The Woodlands Convention and Visitors Bureau. The Woodlands Express buses are currently provided by a third party coach contractor; however, the Township has recently received grant monies to begin buying their own fleet of coach buses for part of this service. Organizations including Interfaith of The Woodlands and the Friendship Center of Montgomery County provide demand and response services for seniors. The Friendship Center also provides demand and response service for persons with physical disabilities. These organizations receive funding (in part) through The Woodlands Township to provide the demand and response services.



Example local bus services in Los Angeles.

The Woodlands was conceived in the early 1970's as a master planned community balancing residential needs with employment centers, commercial space, recreational opportunities, and green space. The Woodlands Town Center provides a central core focusing on retail, entertainment, and major employment. Much of the surrounding development includes residential neighborhoods centered on village centers with needed

commercial and service amenities. The area has been linked by core roadways and a system of recreational paths.

The Woodlands Township and surrounding communities have placed considerable thought in the development of desirable communities with amenities for a wide range of residents.

Demand for all transit services provided through The Woodlands Township and by others throughout Montgomery County is projected to grow. Employment and residential growth in The Woodlands, Springwoods Village, Oak Ridge North, the City of Shenandoah, as well as parts of unincorporated Montgomery and Harris counties continues to strain the existing transportation network. This strain will only continue as new residents and employees seek out trip options over the next 20 years. A combination of young families, aging residents, and those seeking active transportation options are influencing transportation demand in the area. A wide range of mobility options will be needed to meet future mobility demand and transit will need to be a key mode of choice.

Organization of the Plan

The scope for this plan included an examination of multiple Town Center, local, and regional transit connections. The plan specifically examines:

- The existing park and ride services.
- Potential regional commuter services into The Woodlands (from other parts of the Houston metropolitan area).
- Consistency with METRO's long-range plan and other regional transit plans.
- Improved mobility in Town Center area.
- Improved connectivity between The Woodlands Township residential Villages and the Town Center area.

This plan document is structured in six core chapters with additional technical backup included in the appendixes. The information in each chapter provides context for the subsequent chapters. A brief description of each chapter is provided below as a preface to the document.

- Chapter 1. Introduction – The first chapter provides general context for the creation of the plan and those decision makers involved. This chapter documents the overarching vision and guiding principles that directed the plan's priorities and recommendations.
- Chapter 2. Process – This chapter defines the step by step process followed for creation of the plan, identification of the issues, identification of the projects or solutions for each issue, ultimately leading to the recommendations in Chapter 6.
- Chapter 3. Area Profile – The third chapter documents the background information researched to fully understand the current and future transportation framework. This chapter provides key background data on local demographics, socioeconomic information, and future projections.
- Chapter 4. Stakeholder Involvement – This chapter documents the range of stakeholders engaged in the project from inception to the final plan. Several major outreach activities were undertaken at key milestones in the project including focus groups, public meetings, public presentations, and two online questionnaires.

- Chapter 5. Development of Options & Evaluation – Chapter five details the identification of various strengths, weaknesses, opportunities, and challenges related to transit service with the study area. With this information as a basis, the team scoped potential transit improvements and conducted multiple layers of evaluation. The evaluation identified the best performing options and the ultimate transit priorities for the plan.
- Chapter 6. The Recommendations – The final chapter sets out the priority actions identified through the evaluation process. The recommendations are arranged in three temporal categories: near-term (one to five years), mid-term (within 10 years), and long-term (within 20 years). Options funding are included in this chapter, focusing on the near-term potential improvements.

Plan Leadership and Guidance

The Woodlands Township Transit Plan is being led by H-GAC and The Woodlands Township. The funding for this study includes a combination of funds from TxDOT (approximately 85%) and The Township (approximately 15%).

Both staff and elected officials (directors) of The Woodlands Township were involved in the plan development from its inception until the creation of the final recommendations.

TxDOT is a key member of the project’s team and is managing the study funds (provided by H-GAC and the Township). The sections below detail the structure of how the team functioned and communicated. Additional details on the specific input provided by each group and how this input directed the development of the plan are included in Chapter 4.

Project Management Committee

A project management committee (PMC) was created as a body to guide the plan development and provide input throughout the process.

The PMC members included representatives from H-GAC, The Woodlands Township, The Woodlands Township Board of Directors, TxDOT, and consultant team members.



Recreational opportunities on Waterway Square.

The PMC met at regular intervals to guide the plan’s development. The PMC acted as a ‘sounding board’ at key decision points in the plan, prior to briefing The Woodlands Township Board of Directors and public stakeholders. Director Bass and Director Long provided a connection to the policy and decision making perspective of The Woodlands Township Board of Directors. Their input and guidance was instrumental to the plan’s development. Both directors were able to convey the perspectives of their constituents and other board members related to transit and mobility within the study area.

Project Partners

Multiple agencies, local governments, and municipalities provided input to the plan as project partners. Each is uniquely influenced or may benefit from the ultimate implementation of the plan’s recommendations. These partners tracked the plan’s progress and provided input for their local jurisdiction/agency through focus groups, outreach activities, and direct meetings. The project partners included:

- The District.
- The Metropolitan Transit Authority of Harris County (METRO).
- Montgomery County.
- Harris County.
- The City of Shenandoah.
- Oak Ridge North.
- The Woodlands Development Company.
- The Woodlands Road Utility District #1.

A number of critical stakeholders were involved throughout the planning process, including major employers (Anadarko, ExxonMobil, etc.), The Woodlands Visitors and Convention Bureau,



Vanpool vehicle parked at Research Forest park and ride.

advocacy groups (cycling, walking, etc.), major developers (The Hughes Corporation, etc.), The Woodlands Road Utility District #1, etc. The details regarding the engagement with all stakeholders are detailed in Chapter 4.

The Woodlands Township Board of Directors

The Woodlands Township Board of Directors played a critical role by providing policy guidance, communicating with stakeholders, and ensuring consistency with the goals and

values of The Township. The project team briefed the board at regular intervals throughout the plan’s development. Typically, briefings were provided to the board at key decision points. These

decision points required input from the board and the public to determine the appropriate direction, and advance the plan to the next stage in the process. The initial meeting with The Woodlands Township Board of Directors was a workshop format to determine the overall project's vision and guiding principles. Having the board's concurrence on the plan's vision and guiding principles early in the process was essential to keeping the ultimate recommendations focused on what was most important to stakeholders and board members.

Vision and Guiding Principles of the Plan

The project kickoff meeting with The Woodlands Township Board of Directors included the development of the overarching plan vision. As the decision makers and representatives of the community at large, the board members were best positioned to help the team create the long-term vision for transit within the study area. The board members considered the current and future mobility issues facing the community. The board also considered the potential transit opportunities that may help address these issues or challenges, currently and in the future. A few of the highest priority issues or opportunities identified by the board members included:

- Maintain existing transit and mobility options.
- Identify new transit opportunities.
- Explore reverse commute services including getting people/employees to the Town Center.
- Create partnerships with major employers, activity center managers, etc. The team also linked this issue with the reverse commute opportunity.
- Maximize sales tax revenue in the Town Center.
- Promote public safety.

These high priority issues and opportunities related to transit formed the basis for the plan's vision statement and guiding principles. The board's vision attempted to define an aspirational description of the community benefits that transit can help to achieve in the future. The vision statement serves as a guide for future actions by the board. The vision statement is also supported by guiding principles with observable and measurable results. The ultimate vision statement unanimously agreed to by The Woodlands Township Board of Directors is stated below.

The vision of The Woodlands Township Transit Plan is to preserve The Woodlands economic competitiveness through increased mobility in the Town Center, the Villages, and existing/emerging activity centers in the area, creating affordable, reliable, accessible, safe solutions.

This vision is supported by the following guiding principles:

- *Builds partnerships to share costs and benefits.*
- *Provides high quality services.*
- *Preserves the commuting services to Houston.*
- *Supports congestion mitigation.*
- *Enhances the multi-modal transportation network.*
- *Results in actionable projects in the near-term and long-term.*

The plan's vision was cited throughout the planning process to maintain the focus of the potential transit improvements on the key transit declarations (vision and guiding principles) that the board and the community deemed most important.

2 Process

Introduction

Process Context

This chapter is intended to provide a clear understanding of the process for identification and evaluation of the transit and transit supportive options and scenarios presented in the plan. Details (beyond the process) regarding the specific options, scenarios, and evaluation outcomes are presented in Chapter 5.

The project team began work in mid-October 2013 by initiating the first in a series of PMC meetings and briefings to The Woodlands Township Board of Directors. The goal for these early meetings was to obtain buy-in on the planning process and to guide the development and evaluation of potential transit improvements.



Attendees at the first project open house and presentation.

The team worked closely with the PMC and the board to explain and obtain input on the evaluation process steps, criteria, and general schedule before advancing forward.

Each subsequent PMC meeting then focused on a specific decision point or milestone in the process of identifying the range of potential transit improvements for the near, mid, and long-term. The team, PMC, and The Woodlands Township Board of Directors were always careful to ensure the evaluation process was designed to ultimately meet the vision and guiding principles of the plan.

The evaluation was characterized by a multi-step process with two core levels of examination of the potential transit options and scenarios. The steps included multiple opportunities for input from the residents, business community, major employers, transit users, potential transit users, etc. through focus groups, project surveys, and open public meetings. Figure 2.1 graphically details the general steps in the process, including the guidance of the PMC, The Woodlands Township Board of Directors, and project stakeholders.

Figure 2.1: Process



The two major levels of screening represent the key points where evaluation was completed and transit options or scenarios were advanced in the process. Table 2.1 provides a summary definition of each level of examination.

Table 2.1: Evaluation, Prioritization, and Outreach

Examination	Definition	Outreach Activities Completed
Initial Evaluation of Options	The initial evaluation examined the widest range of potential transit options. The goal of the initial evaluation was to narrow the options and advance those with the highest priority and best potential for success.	<ul style="list-style-type: none"> Stakeholder questionnaire #1 completed. Multiple PMC meetings for input and direction. Direction provided by The Woodlands Township Board of Directors through briefing and workshop. Public outreach meeting #1 completed. Multiple focus groups with business and special interest groups completed.
Prioritization of Scenarios	The prioritization process refined the options from the initial evaluation, focusing on prioritizing the scenarios into final recommendations and plans for implementation in the near, mid, and long-term.	<ul style="list-style-type: none"> Stakeholder questionnaire #2 completed. Multiple PMC meetings for input and direction. Direction provided by The Woodlands Township Board of Directors through briefing and workshop. Public outreach meeting #2 completed. Second round of focus groups completed with business and special interest groups. Public outreach meeting #3 presenting the plan and recommendations. Final presentation to The Woodlands Township Board of Directors (plan accepted by the Board 5-0).

Criteria Accounts

Each level of examination included its own set of criteria to compare and contrast the options or scenarios. Both positive benefits and negative impacts were taken into account though the application of the criteria in each screen. Development of the criteria was completed with input,

initially from the PMC, and then from The Woodlands Township Board of Directors, and ultimately from public stakeholders. The project kickoff workshop with the board allowed the opportunity to review and edit the criteria, while comparing each criterion to the plan’s vision statement and guiding principles.

The criteria are organized into various categories referred to as accounts. The accounts tie directly to the plan’s vision statement and specifically to the guiding principles. Table 2.2 presents each account and a definition of each account for purposes of this plan. The definitions were agreed upon by The Woodlands Township Board of Directors.

Table 2.2: Criteria Accounts

Account	Definition
<i>Fiscal</i>	Creating affordable solutions. Build partnerships to share costs and benefits.
<i>Mobility</i>	Increased mobility in the Town Center, the Villages, and existing/emerging activity centers (to mitigate congestion). Provides high quality services. Preserves the commuting services to Houston. Supports employment within and surrounding the Township.
<i>Community</i>	Creates safe solutions. Creates accessible solutions. Supports the planning principles of the community.
<i>Prosperity</i>	Preserves The Woodlands’ economic competitiveness through increased mobility.
<i>Sustainability</i>	Supports congestion mitigations. Enhances the multi-modal transportation network.
<i>Deliverability</i>	Results in actionable projects in the near-term and long-term.

Initial Evaluation

The initial evaluation focused on scoping all of the potential transit and transit supportive improvements that could be considered. The improvements in the initial evaluation are referred to as ‘options’, because they form a wide range of potential choices for initial consideration and examination. The scoping process included significant input from the PMC, The Woodlands Township Board of Directions, and project stakeholders to create a comprehensive list of potential options.

The scoping process resulted in the identification of more than 50 transit options or transit supportive options (transit, roadway, cycle, pedestrian, parking, etc.) for examination.

All of the options identified through the scoping process were then examined through the initial evaluation. The initial evaluation applied a series of high-level criteria (grouped by account) aimed at identifying the best performing options. The outcome of the initial evaluation was to determine which options should advance forward for further definition, development, and evaluation in the

prioritization of scenarios. While all of the potential transit options identified in initial evaluation have merit, the team was required to narrow the options and focus on the most promising within the prioritization of scenarios. Table 2.3 presents the initial evaluation criteria, organized by account.

Table 2.3: Initial Evaluation Criteria

Account	Initial Evaluation Criteria
<i>Fiscal</i>	<ul style="list-style-type: none"> Reasonable funding availability. Potential revenue recovery.
<i>Mobility</i>	<ul style="list-style-type: none"> Consistent with the vision statement. Provides improved mobility. Enhances the commuting services to Houston. Supports employment within and surrounding the Township.
<i>Community</i>	<ul style="list-style-type: none"> Enhances connectivity & accessibility (major activity centers). Consistent with master and local planning. High level assessment of built environment benefits/impacts.
<i>Prosperity</i>	<ul style="list-style-type: none"> Potential to support economic competitiveness. Other economic benefits (employee retention, etc.).
<i>Sustainability</i>	<ul style="list-style-type: none"> Reduces vehicle miles traveled (VMT).
<i>Deliverability</i>	<ul style="list-style-type: none"> Developed / operated without significant organizational constraints. Utilizes proven technologies / strategies.

Prioritization of Scenarios

Upon completion of the initial evaluation, the remaining options were combined into potential transit ‘scenarios’. The scenarios combined multiple options from the initial evaluation into complete packages of transit improvements. The scenarios were further defined for design, operations, cost, and implementation, so they could be evaluated in more detail through the prioritization of scenarios phase. The scenarios presented were ultimately prioritized by applying the more detailed criteria. Table 2.4 presents the criteria applied in the prioritization of scenarios. The outcome of this process provided information on how well the scenarios performed at providing quality transit improvements for the community. The highest performers were deemed to be the highest priority and were advanced as the recommendations for inclusion in the final plan and for consideration by The Woodlands Township Board of Directors and the project stakeholders.



The Woodlands is a regional retail destination.

Table 2.4: Prioritization of Scenarios Criteria

Account	Prioritization of Scenarios Criteria
<i>Fiscal</i>	<ul style="list-style-type: none"> • Capital cost (based on defined projects). • Revenue recovery. • Phasing opportunities. • Political and stakeholder support. • Funding availability. • Cost effectiveness.
<i>Mobility</i>	<ul style="list-style-type: none"> • Ridership. • Journey time improvement/competitiveness. • Reliability. • Capacity • Improved transportation choices. • Quality of transit provision. • Parking relief. • Traffic impacts/benefits.
<i>Community</i>	<ul style="list-style-type: none"> • Connectivity (destinations). • Consistency with local safety plans and guidelines. • Integration (walking, cycling, active modes). • Assessment of consistency with local/regional plans. • Public benefits/impacts.
<i>Prosperity</i>	<ul style="list-style-type: none"> • Employment catchment. • Population catchment. • Mode shift. • Tax benefits.
<i>Sustainability</i>	<ul style="list-style-type: none"> • Potential reduction in auto trips.
<i>Deliverability</i>	<ul style="list-style-type: none"> • Assessment of technical challenges. • Assessment of ease/efficiency of operations and maintenance. • Extent of use of existing infrastructure. • Expansion capability.



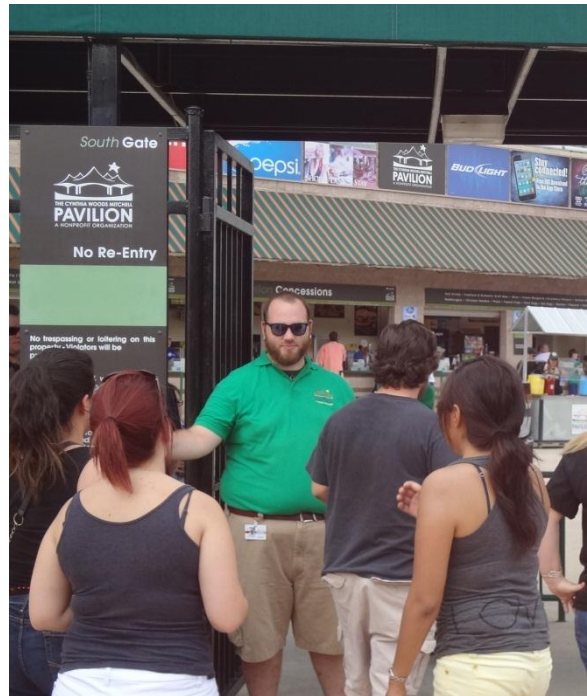
3 Area Profile

Introduction

This chapter of The Woodlands Township Transit Plan provides the basic context and history of the local community, its population, and its development. It is important to understand the community and growth of an area in order to develop transit recommendations that are appropriately tailored to the needs of area residents.

The project team has collected and analyzed background data from a number of sources. The analysis of this data provides the foundation for developing and accessing alternative transit plan scenarios, and ultimately, the transit plan recommendations. Included in this area profile is analysis of the following:

- **Area Overview:** Overview of study area demographics, social and economic characteristics.
- **Current Transport Network:** A look at the modes of transportation currently in use in The Woodlands and their characteristics.
- **Current Network Demand:** Details about existing transit usage.
- **Current and Future Population:** Analysis about existing population characteristics and predicted future population patterns.



Summer concert at the Cynthia Woods Mitchell Pavilion.

- **Existing and Future Employment:** Analysis about existing employment characteristics and predicted future employment patterns.
- **Existing and Future Land Use:** Analysis about existing land use characteristics and predicted future patterns.
- **Gap Analysis:** Overview of gaps in the transportation system based on present and future characteristics of study area.

Purpose of the Area Profile

The purpose of this area profile is to provide a basis for understanding of The Woodlands Township Transit Plan study area and surroundings. This is critical to providing a strong context of the study area's transportation system, demographics, socio-economic factors, growth and development, land use, etc. The area profile formed the baseline for analysis of existing and future transit gaps and needs.

Area Overview

The study area is located in the northern portion of the Houston metropolitan area along I-45, approximately 27 miles north of the City of Houston. The Houston area has sustained rapid economic and population growth in recent years and is expected to continue this significant increase over the next 25 years.

H-GAC predicts that the total regional population will be 8.8 million by 2035 with projected job growth at a 60% increase³.

The southern portion of the Conroe – The Woodlands UZA formed the study area for The Woodlands Township Transit Plan. This study area encompasses:

- The entire community of The Woodlands Township: The Woodlands is a master planned community founded in 1974 that has evolved into a successful planned community. The Woodlands makes up the majority of the study area in terms of both land and population. The Town Center is a key focus of the study where transit alternatives could help alleviate traffic congestion.
- The City of Shenandoah: Shenandoah was incorporated in 1974.⁴ The community has grown due to relatively lower taxes and real estate prices compared to other parts of the metropolitan area. The City is located immediately north of The Woodlands Town Center and straddles both sides of I-45. Due to its proximity to The Woodlands, Shenandoah is experiencing similar travel patterns and congestion.

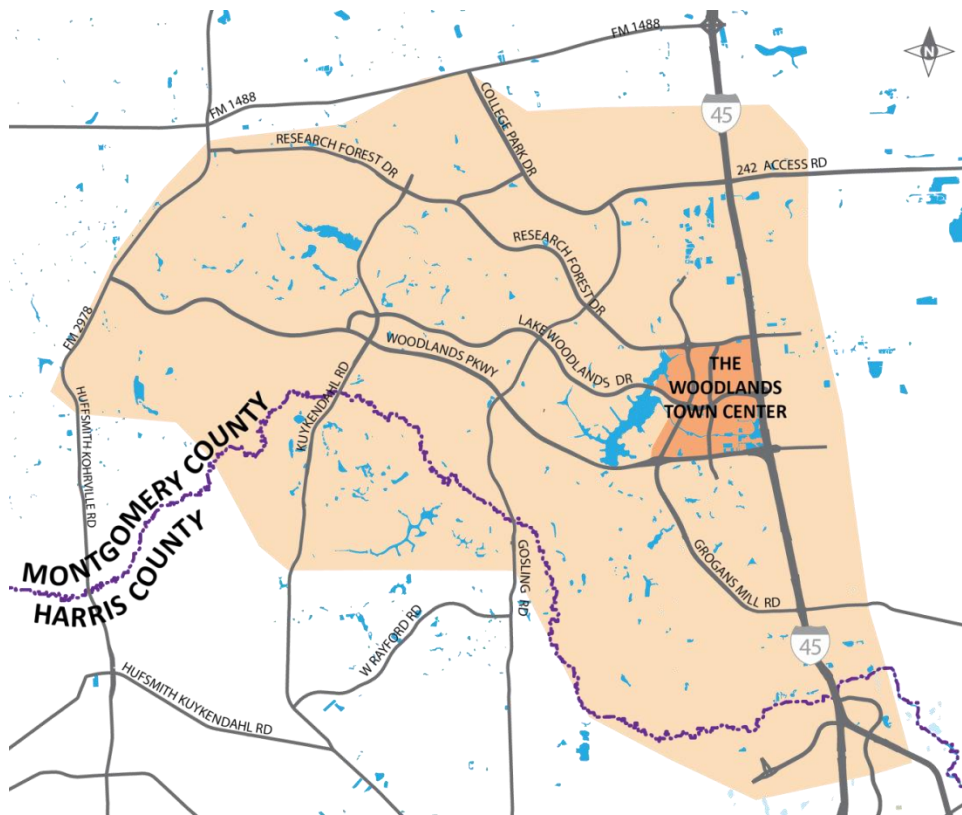
³ Houston-Galveston Area Council. (2010). *2035 Regional Transportation Plan Update*. Retrieved 20-08-2014 from http://www.hgac.com/taq/plan/documents/2035_update/2035%20RTP%20Update%20FINAL%202011-01-21.pdf.

⁴ Texas State Historical Association. (2014). *Shenandoah, TX*. Retrieved 20-08-2014 from <https://www.tshaonline.org/handbook/online/articles/hjsrd>.

- The City of Oak Ridge North: Oak Ridge North was incorporated in 1979⁵ and is located immediately east of The Woodlands Town Center on the opposite side of I-45. Local congestion is a significant challenge for Oak Ridge North.
- A portion of far northern Harris County: Harris County includes the metropolitan area of Houston and extends as far north as the more rural/suburban areas south of The Woodlands. A small portion of northern Harris County is included in the study area.
- Portions of unincorporated Montgomery County: Montgomery County includes the larger communities of Conroe and The Woodlands and makes up the remaining part of the study area.

This area profile chapter provides a range of data and information on the study area and the individual communities within the study area. A graphic depiction of this area is included in Figure 3.1 below.

Figure 3.1: Plan Study Area



The Woodlands Township makes up the majority of study area and is generally the focus of this area profile. The Woodlands is seen as a highly desirable place to live and work for many in the Houston metropolitan area. It is a master-planned community, founded in 1974 with the beginning of home sales. The community was established by George P. Mitchell, a Texas engineer,

⁵ County Gen Web. (2014). *City of Oak Ridge North*. Retrieved 08-20-2014 from http://www.countygenweb.com/txmontgomery/town_oak_ridge_north.htm.

developer and philanthropist. Mr. Mitchell assembled the property, created the vision, and ultimately created the community that is The Woodlands Township today. The goal of The Woodlands was to create a sustainable community that offered multipurpose activity center and over 7,000 acres of green space.⁶ The basis for the master-planned community is found in the township's vision:

“The Woodlands, our dynamic hometown within a natural forest, is known for its balance between man and nature. We are a thriving business community and premier destination for visitors – a place where generations live, work, learn and play.”⁷

The Woodlands is not an incorporated municipality. The community was created as an unincorporated development within Montgomery County, with a special purpose district overlay to address major infrastructure needs and maintenance. Local community associations were also created to enforce deed restrictions and provide a forum for open discussion of residents'



Residential development in the study area.

concerns and interests. The Woodlands was the first community of this type in Texas.

Prior to 2010, the three community associations (The Woodlands Community Association, The Woodlands Association, and The Woodlands Commercial Owners Association) and the special purpose district (Town Center Improvement District) worked together to deliver services such as environmental/recreation, transportation planning, law,

and fire protection to The Woodlands⁸. In 2010, the associations and district came together to form a new special purpose district named The Woodlands Township with a seven member board elected by the residents.

⁶The Woodlands Commercial. (2014). *Community Overview*. Retrieved 20-08-2014 from http://www.thewoodlands-commercial.com/info_overview.html.

⁷ The Woodlands Township. (2013). *About the Township*. Retrieved 05-12-2013 from <http://www.thewoodlandstowship-tx.gov/index.aspx?nid=72>.

⁸ The Woodlands Township. (2013). *About The Woodlands Township 2013-2014*. Retrieved 05-12-2013 from <http://www.thewoodlandstowship-tx.gov/DocumentCenter/Home/View/1332>.

Today, The Woodlands Township maintains its commitment to sustainability and is working to support projected growth by putting key projects and initiatives forward such as transportation and mobility. The Township currently provides some level of local and regional transit connections for residents, visitors, and employees. The Township has an extensive recreational pathways network connecting residential areas to the core Town Center, recreational areas, and other destinations. The Township is working to evolve with the mobility needs of residents and employers. Much has changed since the initial designs for The Woodlands. The importance of autos, transit, cycle, and pedestrian modes must be considered to create a balanced mobility approach. Active transportation (cycle and pedestrian), efficient local connectivity, and the ability to mitigate traffic and parking congestion are key focus areas for The Township.

In the forty years since its inception, the Township population has increased from 125 people to 105,000 people and is anticipated to continue to rise. The Township is made up of eight residential Villages and two business and commercial districts. Each residential Village includes commercial Village Centers with retail and service amenities. The Town Center is the commercial and employment center of The Woodlands. The Town Center is a dense urban environment hosting major local and national employers, residential complexes, restaurants, shops, entertainment, and The Woodlands Mall (regional retail complex).

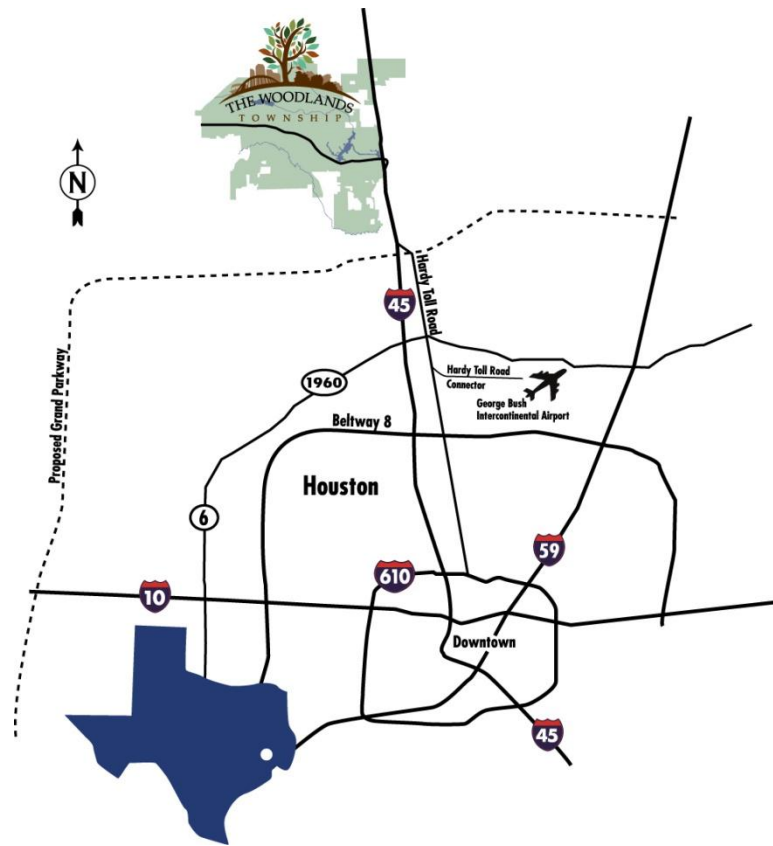
Within project study area, over 52% of households have an income of over \$100,000, while the mean household income is \$135,500. Approximately 70% of households have access to two or more vehicles and 80% of employed adult residents drive to work alone.



Fall afternoon at Northshore Park.

Figure 3.2 shows the location of The Woodlands Township in relation to downtown Houston and other regional destinations.

Figure 3.2: The Woodlands Township in Relation to Houston⁹



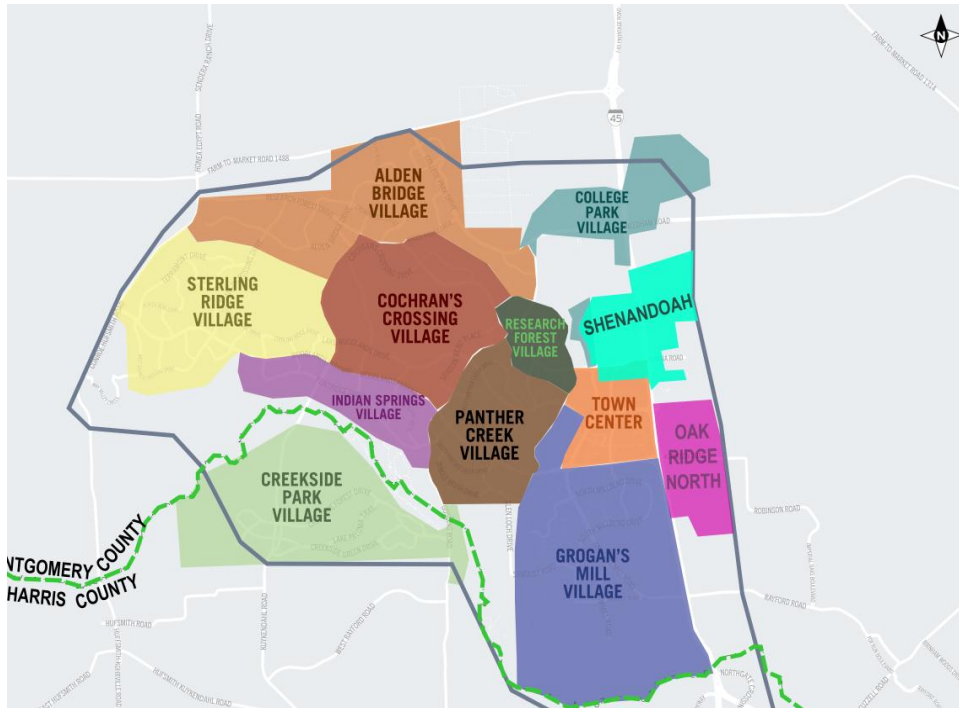
The Woodlands Township itself spans an area of 27,000 acres, or 42 square miles. The City of Shenandoah has an area of approximately 1.3 square miles¹⁰ and Oak Ridge North has 1.15 square miles¹¹. Figure 3.3 graphically presents The Woodlands village boundaries as well as Shenandoah and Oak Ridge North.

⁹ The Woodlands Township. (2013). *About The Woodlands Township 2013-2014*. Retrieved 05-12-2013 from <http://www.thewoodlandstowship-tx.gov/DocumentCenter/Home/View/1332>.

¹⁰ Peyton, L. (2013, December 23). Residential and commercial development sees strong upward trend in 'little gem' of a city. *Houston Chronicle*. Retrieved 14-04-2014 from <http://www.chron.com/neighborhood/woodlands/news/article/Location-key-to-growth-in-Shenandoah-5088646.php>.

¹¹ City Data. (2014). *Oak Ridge North, Texas*. Retrieved 05-12-2013 from <http://www.city-data.com/city/Oak-Ridge-North-Texas.html>

Figure 3.3: Village Boundaries of the Woodlands Township and Surrounding Areas



According to the 2012 American Community Survey¹², 65% of The Woodlands Township residents over the age of 16 were employed.

Figure 3.4 presents a breakdown of the occupational sectors for the study area and Table 3.1 lists the largest employers in The Woodlands. Anadarko Petroleum, headquartered in The Woodlands Town Center, is a Fortune 500 Company.

A large majority of residents are employed in the sector of management, business, science and arts. The energy sector and supporting services is a large component of employment across all of the categories captured in Figure 3.4.

Over 58% of adults over the age of 25 hold a university degree, which is over 30 percentage points higher than the Texas average¹³.

¹² United States Census Bureau. (2013). *2008-2012 American Community Survey – The Woodlands CDP, Texas*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

¹³ United States Census Bureau. (2013). *State & County Quick Facts*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

Figure 3.4: 2012 Occupation Sector - Employed Residents of the Project Study Area¹⁴

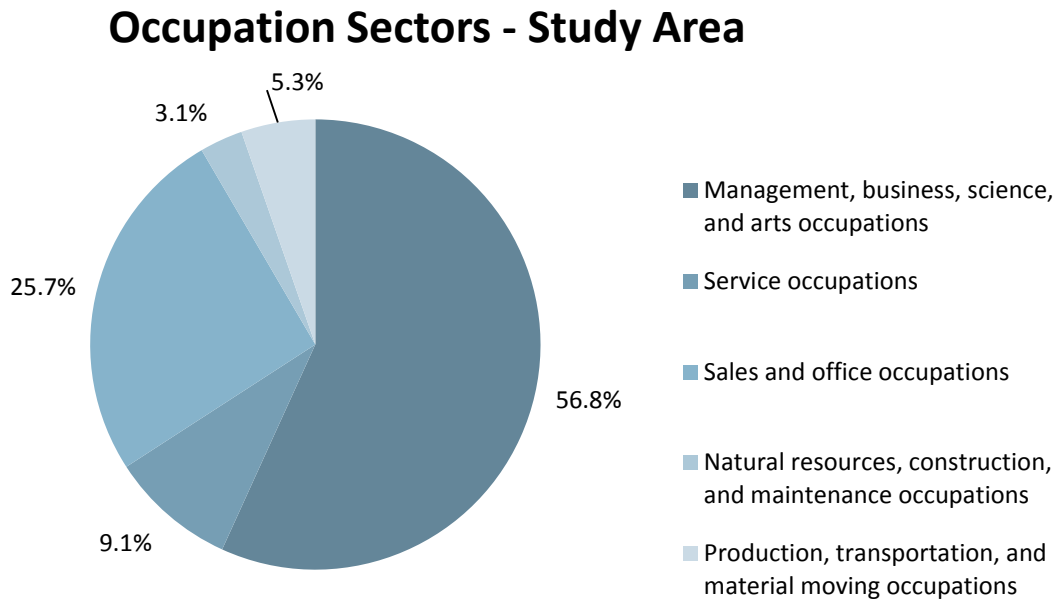


Table 3.1: Largest Employers in The Woodlands¹⁵

#	Business Name	Approximate # of Employees
1	ANADARKO PETROLEUM	2,400
2	HEWITT ASSOCIATES LLC	2,200
3	MEMORIAL HERMANN THE WOODLANDS HOSPITAL	1,800
4	LONE STAR COLLEGE SYSTEM MONTGOMERY COLLEGE	1,500
5	BAKER HUGHES AKA HUGHES CHRISTENSEN	735
6	HUNTSMAN COMPANY LLC	715
7	WOODFOREST NATIONAL BANK	650
8	CHEVRON PHILLIPS CHEMICAL COMPANY	600
9	ST. LUKE’S MEDICAL CENTER – THE WOODLANDS	535
10	MAERSK LINE	525
11	THE WOODLANDS RESORT & CONFERENCE CENTER	520
12	U.S. ONCOLOGY HOLDINGS	500

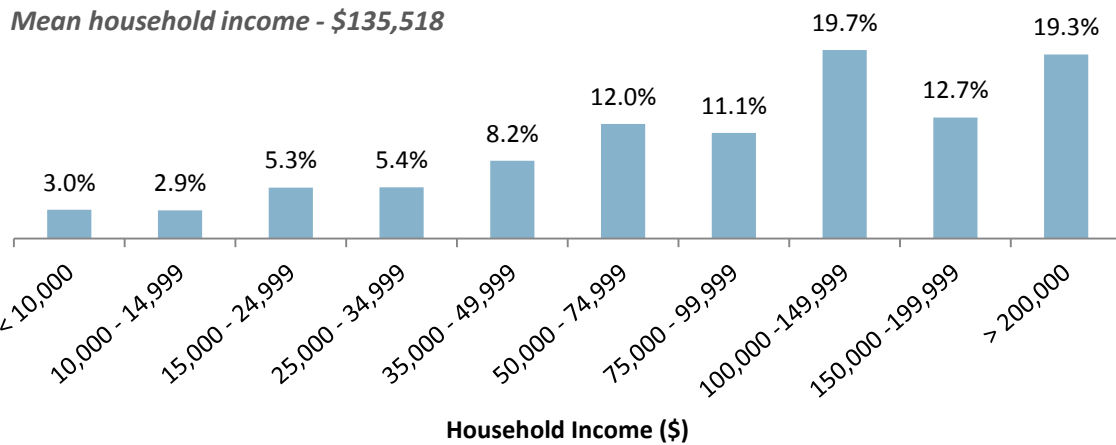
¹⁴ United States Census Bureau. (2013). *2008-2012 American Community Survey*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>

¹⁵ The Woodlands, Texas. (2014). *Top Employers in the Woodlands*. Retrieved 05-10-2014 from <http://www.thewoodlandstx.com/majoremployers/>

In general, area residents have higher incomes than others within the state. Higher income typically correlates with higher auto ownership, which appears to be the case within the project study area. Approximately 52% of study area households have an annual income of over \$100,000, compared to the Texas average of only 22%¹⁶. Similarly, the mean household income in the study area is \$135,500, compared to the Texas state average of \$72,000. Figure 3.5 presents further breakdown of household income in the study area.

Figure 3.5: 2012 Household Income for the Project Study Area¹⁷

Household Income - Study Area



In terms of personal transportation and commuting to work, The Woodlands and surrounding area is heavily dominated by personal automobile use.

Over 70% of households have access to two or more vehicles.

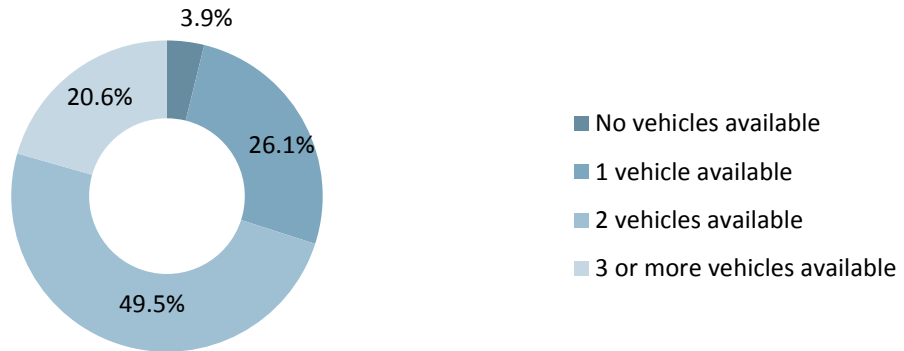
Figure 3.6 presents the vehicle availability by household for the study area.

¹⁶ United States Census Bureau. (2013). *State & County Quick Facts*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

¹⁷ United States Census Bureau. (2013). *2008-2012 American Community Survey*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>

Figure 3.6: 2012 Vehicles Available by Household in the Project Study Area¹⁸

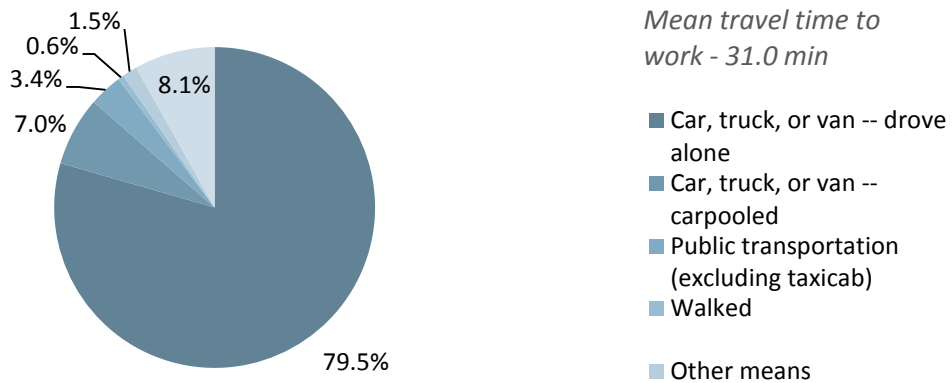
Vehicles Available - Study Area



Of study area residents that are employed, 80% drove to work alone and the mean travel time to work was 31 minutes¹⁹. Figure 3.7 shows the complete commuting mode split for employed residents of The Woodlands.

Figure 3.7: 2012 Commuting Mode Split for the Project Study Area²⁰

Commuting Mode Split - Study Area



Overall, The Woodlands Township and surrounding area is a relatively young community that is heavily car-oriented. The focus on personal auto is likely due to the high available household

¹⁸ United States Census Bureau. (2013). *State & County Quick Facts*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

¹⁹ United States Census Bureau. (2013). *State & County Quick Facts*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

²⁰ United States Census Bureau. (2013). *State & County Quick Facts*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

income compared to the Texas average, as well as the study area’s large footprint and proximity to Houston.

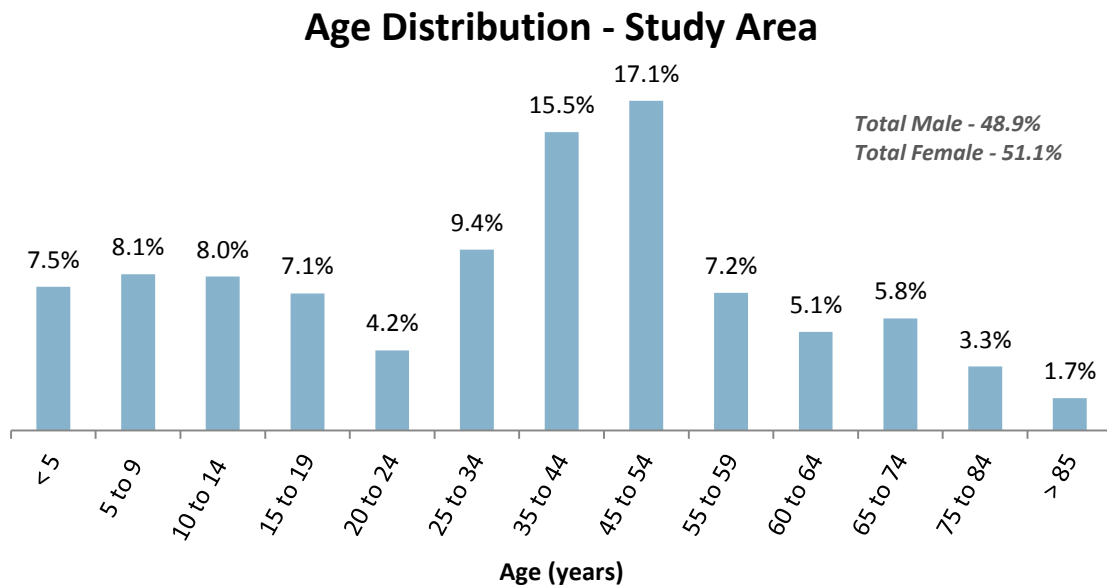
Population

The population of The Woodlands Township and surrounding area has grown over the past 40 years. In the Woodlands Township, population has increased from 125 people at its inception in 1974²¹ to approximately 105,000 people today. The paragraphs below further describe age and gender of the existing population of study area, in addition to analyzing the population distribution and density for both existing and future conditions.

Age and Gender

Figure 3.8 charts the current age distribution for the study area, with children aged 19 years and under making up 30.7%, adults aged 20-64 years making up 58.5% and adults 65 years and older making up 10.8%. Males make up 48.9% of the population, while females represent 51.1%.

Figure 3.8: 2012 Age Distribution for The Study Area Population²²



Population Distribution

Table 3.2 lists each of the Villages, commercial districts, or communities within The Woodlands Township, along with their population in 2012 and projected population in 2017.

²¹ The Woodlands. (2013). *Population of the Woodlands, TX*. Retrieved 12-03-2014 from <http://www.thewoodlandstx.com/demographics/>.

²² United States Census Bureau. (2013). *2008-2012 American Community Survey*. Retrieved 02-01-2014 from <http://quickfacts.census.gov/qfd/states/48/4872656.html>.

The areas that will likely experience the most growth over this 5-year time period are Creekside Park, The Woodlands Town Center, and Sterling Ridge.

The development of Hughes Landing is now underway and it is anticipated to have a population of 1,500 in 2017.

Table 3.2: 2012 & 2017 Population Distribution in The Woodlands Area²³

Village, District, or Community	Population 2012	Percentage of Total Population in 2012	Projected Population 2017	Percentage of Total Population in 2017	Percentage Growth Experienced from 2012 to 2017 Compared to Total Population
Alden Bridge	21,546	20.5%	21,620	18.3%	0.1%
Cochran's Crossing	15,933	15.1%	16,000	13.5%	0.1%
Sterling Ridge	14,662	13.9%	15,645	13.2%	0.9%
Grogan's Mill	14,640	13.9%	15,070	12.7%	0.4%
Panther Creek	14,132	13.4%	14,210	12.0%	0.1%
College Park	6,898	6.6%	6,970	5.9%	0.1%
Indian Springs	6,344	6.0%	6,450	5.5%	0.1%
Creekside Park	5,592	5.3%	12,700	10.7%	6.8%
Town Center	2,669	2.5%	4,500	3.8%	1.7%
Age-Qualified Community (seniors 55+)	1,591	1.5%	1,595	1.3%	0.0%
Carleton Woods	843	0.8%	1200	1.0%	0.3%
East Shore	433	0.4%	1200	1.0%	0.7%

²³ The Woodlands Development Company. (2013). *The Woodlands, Texas Demographics*. Retrieved 12-12-2013 from <http://www.thewoodlandstowship-tx.gov/DocumentCenter/Home/View/667>.

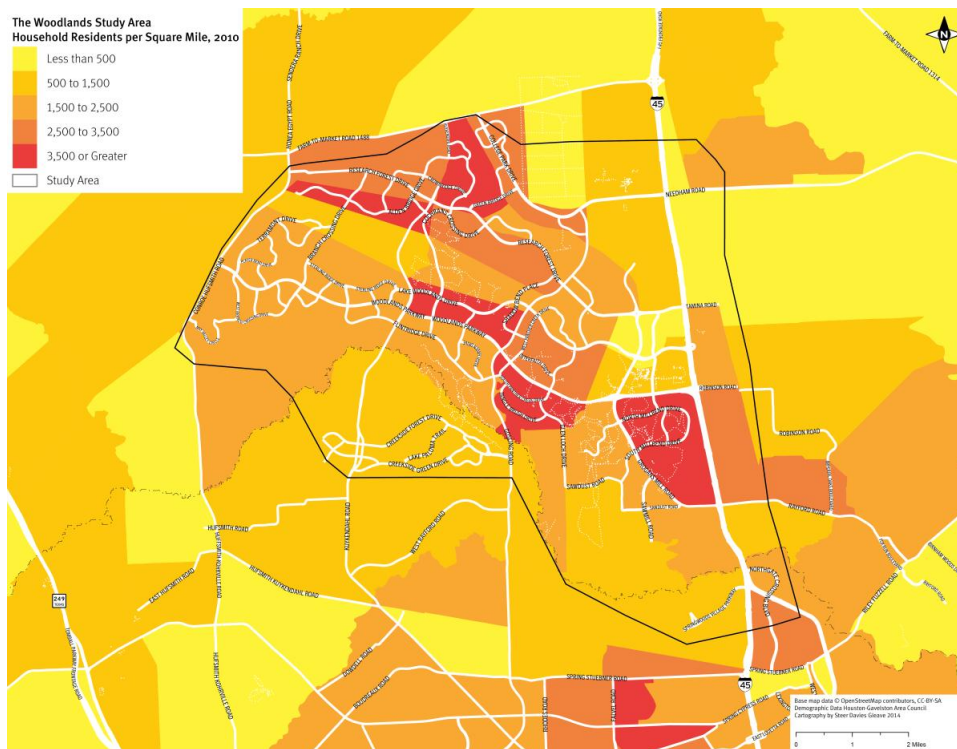
Village, District, or Community	Population 2012	Percentage of Total Population in 2012	Projected Population 2017	Percentage of Total Population in 2017	Percentage Growth Experienced from 2012 to 2017 Compared to Total Population
Hughes Landing	0	0.0%	1150	1.0%	1.1%
Total	105,283	-	118,310	-	-

Current Population Density

The existing (2013) population distribution for the study area (Figure 3.9) shows that the largest population centers are in the Villages of Grogan’s Mill (south of The Woodlands Town Center), Cochran’s Crossing (east of The Woodlands Town Center), Panther Creek (west of The Woodlands Town Center) and Alden Bridge (northwest of The Woodlands Town Center). These villages represent the most established residential developments and multifamily communities in The Woodlands.

The William Goodrich Jones State Forest in the northeast quadrant of the study area and a portion of The Woodlands Town Center are the least populated in 2013.

Figure 3.9: 2013 Population Distribution – Study Area

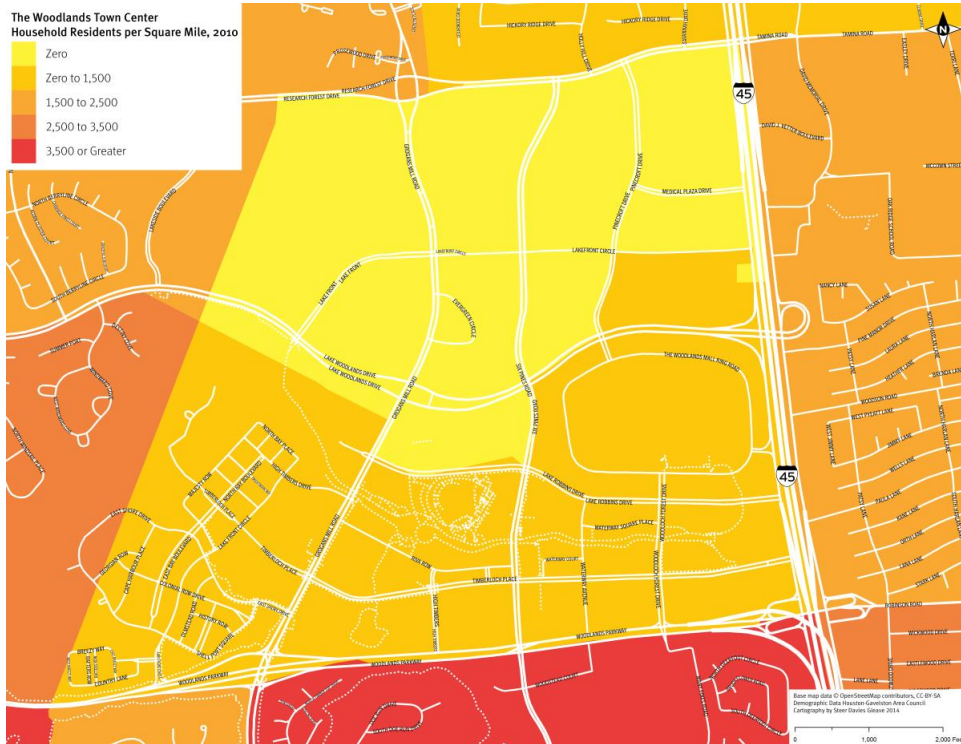


The Woodlands Town Center

A closer view of 2013 The Woodlands Town Center population distribution (Figure 3.10) indicates that the highest population density borders the area, while the center area itself has a relatively low population density as it is primarily commercial.

The northern half of the area, including Memorial Hermann The Woodlands Hospital, various hotels and retail, has no population. The southern half, which is the main activity hub for The Woodlands, has less than 1,500 household residents per square mile.

Figure 3.10: 2013 Population Distribution – The Woodlands Town Center



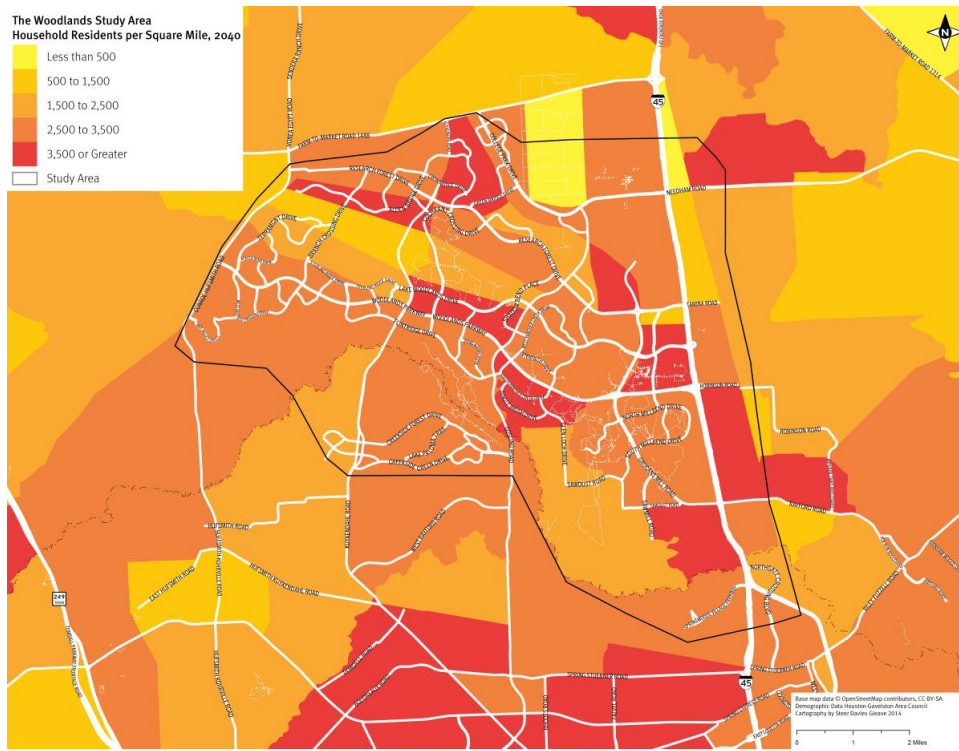
Forecast Population Density

Study Area

The future 2040 population distribution for the study area (Figure 3.11) shows that the largest population centers are in the Villages of Grogan’s Mill, College Park, Cochran’s Crossing, Panther Creek, and Alden Bridge. Significant population density is also forecasted in parts of Research Forest Village and The Woodlands Town Center.

The William Goodrich Jones State Forest in the northeast quadrant of the study area will continue to be the least populated area in 2040.

Figure 3.11: 2040 Population Distribution – Study Area

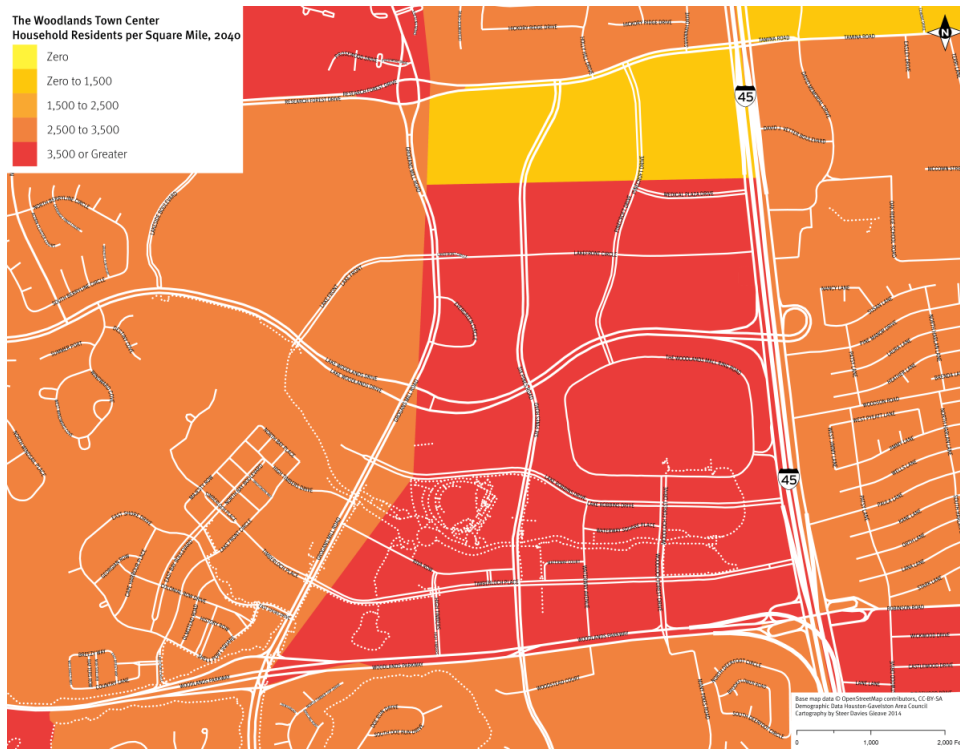


The Woodlands Town Center

A closer view of 2040 The Woodlands Town Center population distribution (Figure 3.12) indicates that higher population concentrations borders the area compared to 2013, while The Woodlands Town Center itself will have significant growth in population (with the development of new residential projects).

The northern part of the Town Center area, near Research Forest Drive, including Memorial Hermann The Woodlands Hospital, will continue to have a low population density (retaining its office/service uses). The remaining Town Center area, will significantly increase to between 3,500 or greater household residents per square mile.

Figure 3.12: 2040 Population Distribution – The Woodlands Town Center



Summary - Population

Both the local and regional data demonstrates a strong population center in the study area. While some residential villages in The Woodlands are currently ‘built out’, additional residential development is set to occur primarily in the Town Center and Creekside areas. Additional development in the Springwoods area (south of the study area) will be a significant influence on roadway congestion and employment within the study area (as The Woodlands is a recognized regional center). The overall trend for population in the study area is increasing over the next 27 years, mainly surrounding the key village centers and The Woodlands Town Center.

Employment

An analysis of the employment distribution in The Woodlands Study Area for both the existing (2013) and future (2040) scenarios has been completed and can be found below.

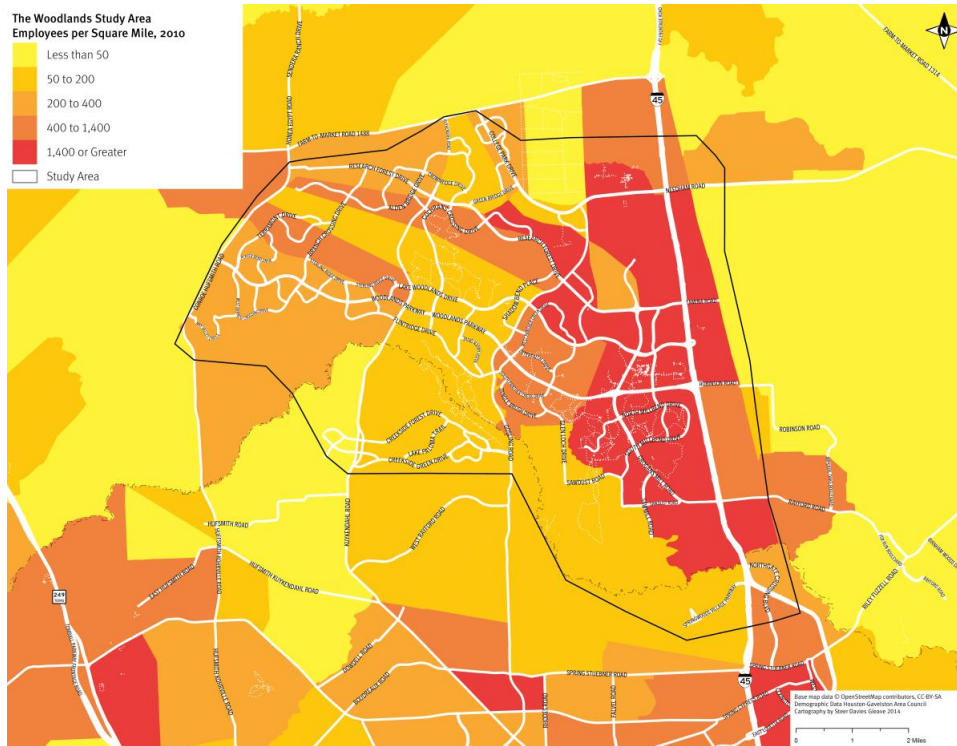
Current Employment Density

Study Area

An analysis of existing employment distribution for study area (Figure 3.13) shows that the largest employment centers with 1,400 or greater employees per square mile are located along the I-45 corridor in the Villages of Grogan’s Mill, Research Forest, The Woodlands Town Center, and College Park, in addition to small sections of Panther Creek, Cochran’s Crossing and Alden Bridge. These locations generally correlate with the larger office complexes and the major employers in the Town Center area.

The areas along the north, west and south study area border have the lowest employees per square mile in 2013. Many of these areas are characterized by primarily residential land uses.

Figure 3.13: 2013 Employment Distribution – Study Area



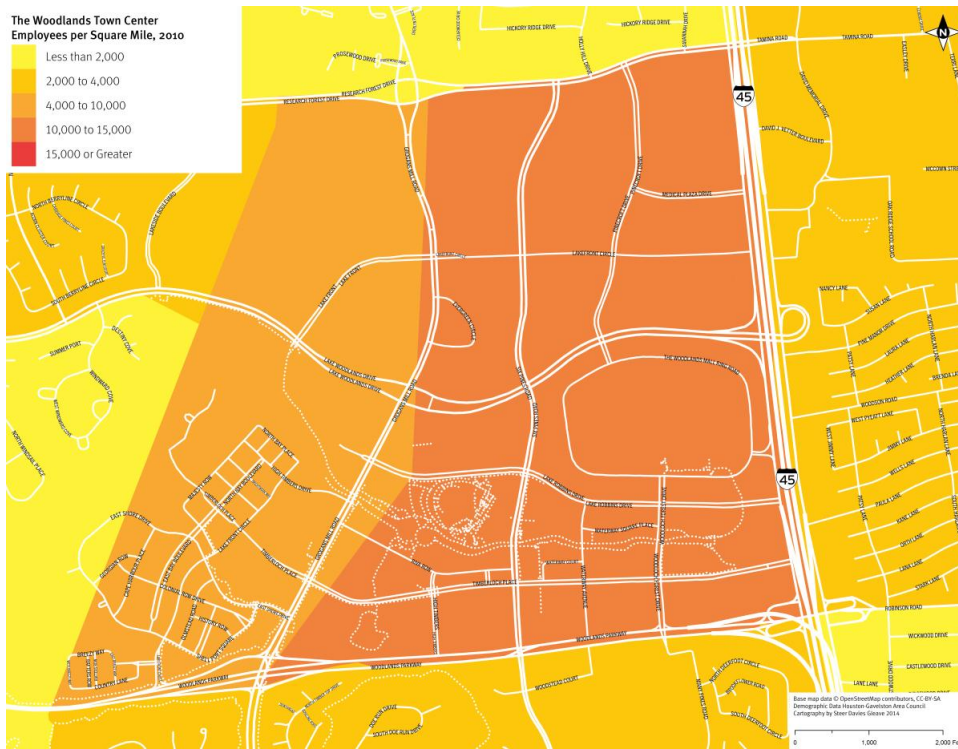
The Woodlands Town Center

A closer view of 2013 The Woodlands Town Center employment distribution (Figure 3.14) indicates that the eastern part of the Town Center area has an employment density of 10,000-15,000 employees per square mile.

The eastern portion of the Town Center includes the main activity hubs for The Woodlands such as the Mall and surrounding commercial establishments.

The western area of The Woodlands Town Center, including Hughes Landing has an employment density of 4,000-10,000 people per square mile.

Figure 3.14: 2013 Employment Distribution – The Woodlands Town Center



Forecast Employment Density

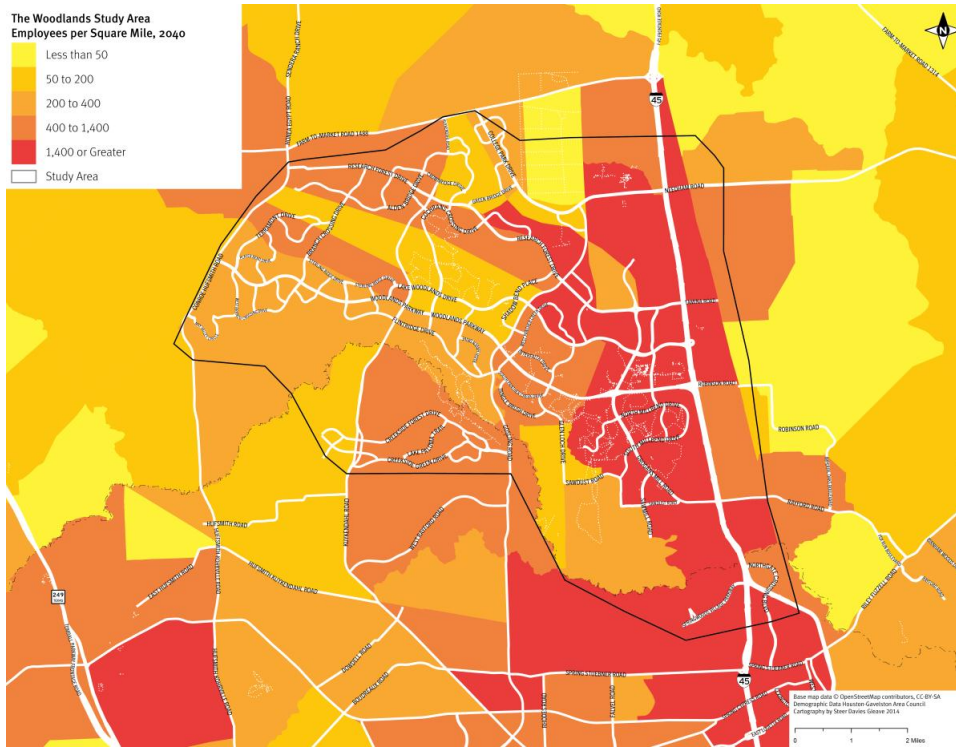
Study Area

The future (2040) employment distribution for the study area (Figure 3.15) shows that the largest employment centers with 1,400 or greater employees per square mile continue to be located along the Interstate 45 corridor in the villages of Grogan’s Mill, Research Forest, The Woodlands Town Center and College Park. In addition, small sections of Panther Creek and Cochran’s Crossing and Alden Bridge villages are anticipated to have high employment density.

The notable increase in employment density is in Grogan’s Mill Village as a larger portion of the Village and the land south of the study area will be in the highest employment density category of 1,400 or more employees per square mile. This is primarily due to the anticipated development of Springwoods Village, including the ExxonMobil campus as an employment site.

The western side of the study area continues to have a lower employment density than the east, however the areas with the higher density tend to be near village centers.

Figure 3.15: 2040 Employment Distribution – Study Area



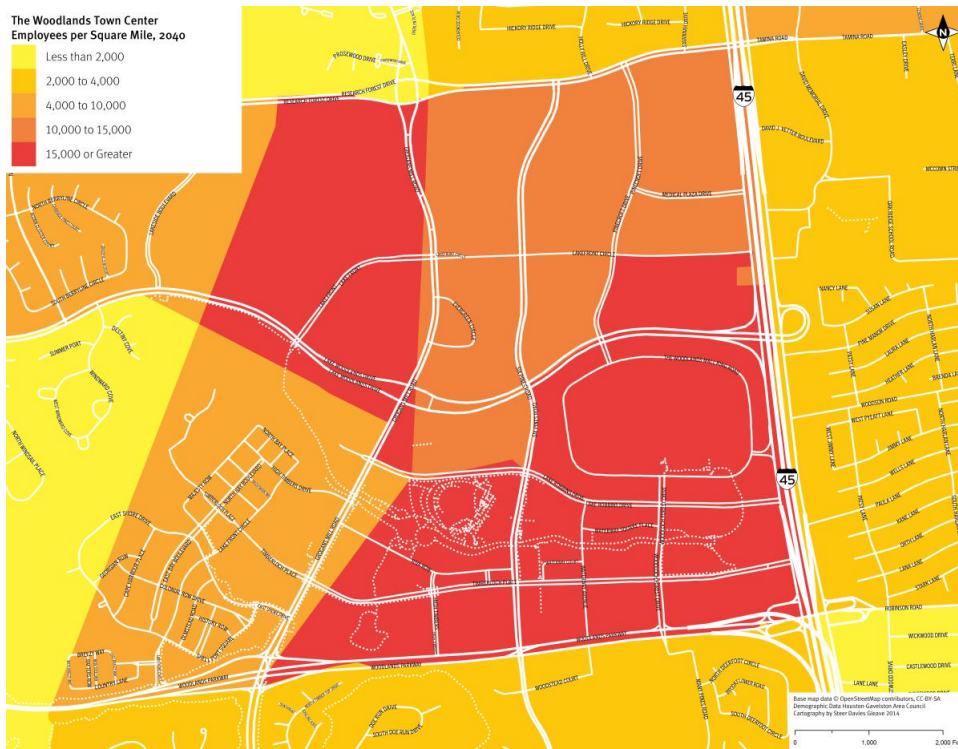
The Woodlands Town Center

A closer view of 2040 Town Center employment distribution (Figure 3.16) indicates that the highest employment density will be in the center of the area, with 15,000 or greater employees per square mile. Major employer (such as Anadarko) will be expanding in the core of the Town Center. This area is also the key activity center for The Woodlands with The Woodlands Mall, major restaurants, shops, and other commercial establishments. Hughes Landing also increases to over 15,000 employees per square mile.

Hughes Landing is a significant office, hotel, and residential development, with a significant portion of future office space leased to ExxonMobil.

The northeast quadrant of the Town Center including Memorial Hermann The Woodlands Hospital remains stable with employment between 10,000-15,000 people per square mile in the future.

Figure 3.16: 2040 Employment Distribution – The Woodlands Town Center



Summary - Employment

Overall, there is an increasing employment density trend forecasted for the study area over the next 27 years, mainly surrounding the key travel corridor of I-45. The Town Center area and southern portions of the study area show noticeable increases in future employment. The employment density of The Woodlands Town Center is likely increased by 2040 as planned employment hubs/office towers are constructed, and the Hughes Landing development comes online. Growth in the southern portion of the study area is potentially attributable to the Springwoods Village development.

Land Use

This section provides an existing (2013) and future (2040) land use conditions of project study area. H-GAC land use sets formed the source of this data. The range of land uses described include:

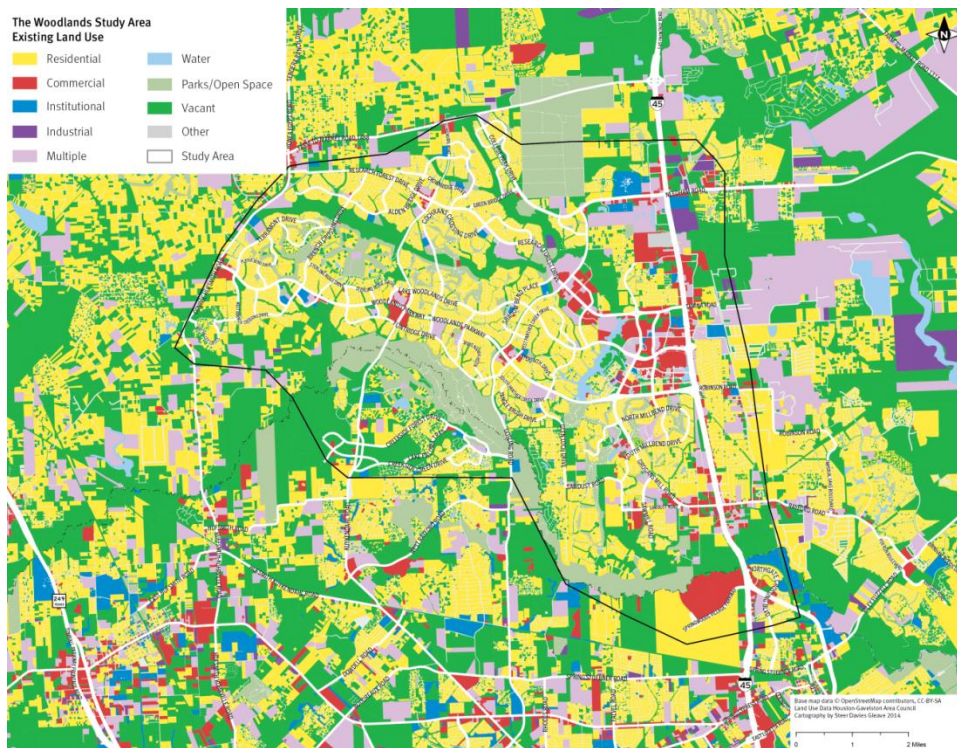
- Residential.
- Commercial.
- Institutional.
- Industrial.
- Water.
- Parks and open space.
- Vacant.
- Multiple use.
- Other.

Current Land Use

Study Area

The existing land use analysis for the study area (Figure 3.17) shows that the largest current land use category is vacant, with the next largest land use type being residential. Vacant land is primarily located along the perimeter of the study area. Some vacant land may be restricted from development based on the area land use plans. Much of the vacant land is located in drainages or other geographic areas that would limit development. Most of the commercial land uses are located at village centers and at The Woodlands Town Center. Institutional and parks/open space land uses are evenly scattered throughout the study area, with one State Park located in the north of The Woodlands. Industrial land use areas are located on the periphery of the study area, with the primary industrial area located in the south near the intersection of College Park Drive and I-45. Some industrial uses in the area include high tech and medical device development.

Figure 3.17: 2013 Land Use – Study Area

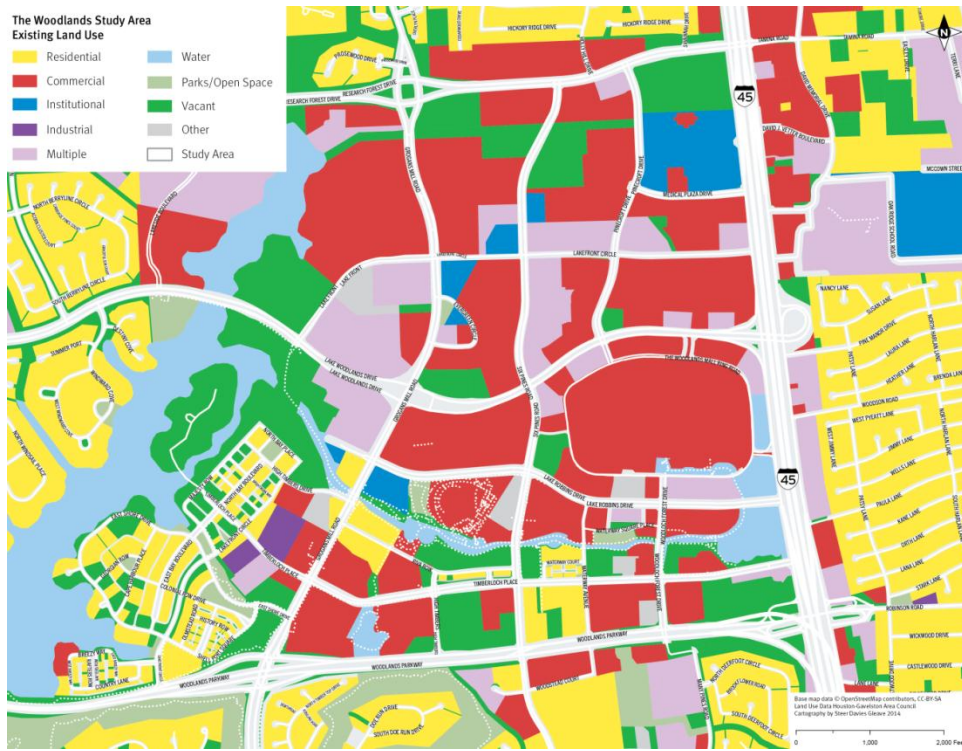


The Woodlands Town Center

A closer view of 2013 The Woodlands Town Center land use (Figure 3.18) indicates that the Town Center is a mix of commercial and vacant/developable land use, with some industrial uses, which are likely going to be allocated to office space²⁴. The area surrounding the Town Center is generally residential.

²⁴ The Woodlands Town Center. (2012). *The Woodlands Urban Design Plan*. Retrieved 05-10-2014 from <http://www.thewoodlands-commercial.com/pdf/UrbanDesignPlan.pdf>

Figure 3.18: 2013 Land Use – The Woodlands Town Center

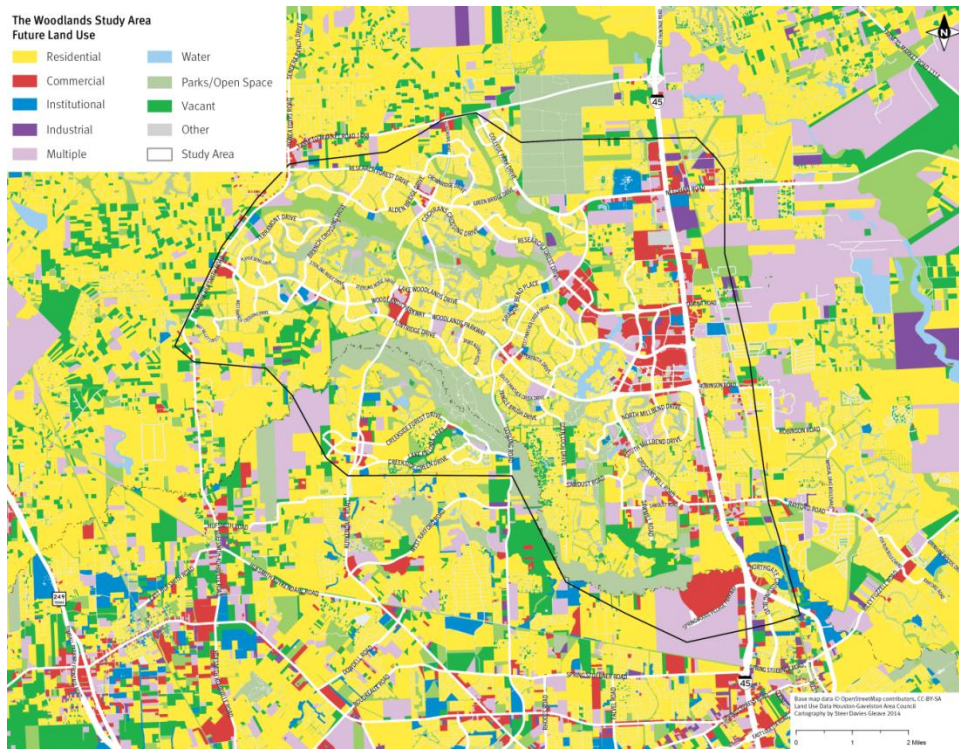


Future Land Use

The Woodlands Study Area

The 2040 land use for The Woodlands Study Area (Figure 3.19) shows that the largest land use category is residential, while vacant land stock diminishes. The primary commercial land use is located at village centers and at The Woodlands Town Center; however, a large new commercial area is anticipated to be developed in Grogan’s Mill Village near I-45 north of its interchange with the Hardy Toll Road. This area also includes a large track of multiple use land corresponding with the Springwoods Village development.

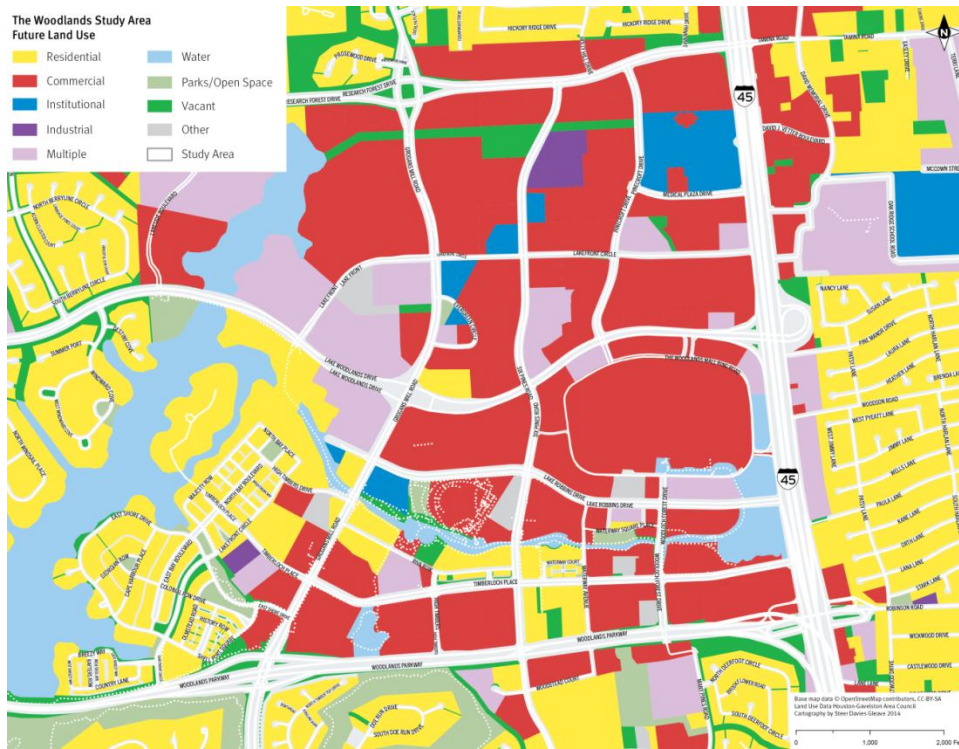
Figure 3.19: 2040 Land Use – Study Area



The Woodlands Town Center

A closer view of land use in 2040 at The Woodlands Town Center (Figure 3.20) indicates the area will continue to include a mix of commercial and vacant land uses, with minor industrial areas. The amount of land designated as commercial is expected to increase and more residential land use is also planned for the Town Center area. The area surrounding The Woodlands Town Center will remain primarily residential.

Figure 3.20: 2040 Land Use – The Woodlands Town Center



Summary – Land Use

In general, the study area will continue to build out further residential and commercial uses. The Creekside area of The Woodlands has additional planned residential neighborhoods. Commercial and office infill will also continue, where vacant / developable land exists within the community. Future land use demonstrates the increase in residential in the study area from 2013 to 2040. Additionally, new commercial zones in The Woodlands Town Center will also be developed. New commercial development is planned to occur in Grogan’s Mill area in the southeast section of the study area.

Current Transportation Network

This section presents the context of the current transportation network of The Woodlands Township and surrounding areas. Specifically, this section examines the roadway network, transit systems within the Township itself, as well as the wider transit network for the Houston metropolitan area. Additionally, this section provides information on active transportation modes, such as pedestrian and bicycle networks.

The Woodlands Township Roadway Network

The existing road network in the study area is based on a traditional road hierarchy – from a regional interstate connection to local or neighborhood roads.

Interstate 45 runs along the east side of The Woodlands Township and provides a direct connection between Dallas and Houston. This highway is generally four lanes in each direction, with a concrete barrier median and a 65 mph speed limit. Alongside I-45 are frontage roads

varying from two to four lanes with a posted speed limit of 45 mph. The study area is served by 11 exits from I-45. I-45 is the major north / south connector for the region, linking the study area to the City of Houston. I-45 is both a positive and a negative aspect of the study area. The



Roadway intersection in the study area.

interstate is a major access point for commerce and commuters in the area. However, I-45 also presents a barrier, limiting east / west mobility within the study area. North / south congestion continues to grow, placing strain on local roads. One of the few continuous north / south connections is I-45.

Within The Woodlands Township, arterial roads are typically two to three lanes in each direction separated by a large landscaped median.

Arterial intersections are typically signalized with turn bays and signalized pedestrian crossings. The posted speed limits vary from 35 to 45 mph. There are limited pedestrian facilities along arterial roads. Examples of arterial roadways include The Woodlands Parkway and Research Forest Drive. It is possible that, based on the large width of center medians on arterial roads, these roads are being protected for future widening. Local decision makers have noted that shoulders and adjacent right of way would be used for additional lanes before reducing the size of medians. The center median design could also be attributed to urban planning style of The Woodlands Township.

Collector roads within the study area are divided into two categories: major and minor. Typically, major collectors have two lanes in each direction and a landscaped median. Intersections are typically unsignalized with limited turnbays and pedestrian crossing facilities are available at intersections. Major collectors tend to have a



I-45 has a significant presence in the study area.

posted speed limit of 35 mph. Minor collectors are typically two lanes, undivided, bi-directional roads with unsignalized intersections and posted speed limits of 30 mph. There are limited

pedestrian facilities along collector roads in the residential Villages. An example of a major collector road is Six Pines Drive, while an example of a minor collector is Waterway Avenue.

Local roads typically have one lane in each direction. Intersections are generally unsignalized and there are often no pedestrian crossing facilities. The speed limit is assumed to be 30 mph. There are limited pedestrian facilities along local roads and occasional traffic calming measures such as landscaped roundabouts are utilized. There is a curvilinear street pattern that often utilizes cul-de-sacs serving the areas residential communities.

Roadways within The Woodlands Town Center differ from the suburban nature of most of the study area.

The Woodlands Town Center is characterized by an urban grid system, providing better mobility and connectivity for autos, pedestrians, and cyclists.

The Woodlands Township Active Travel Network

Transit is one element in the range of modes that typically moves a person from their origin to their destination. Access to transit is enhanced by strong pedestrian and cycle connectivity. The following sections provide an overview of the existing conditions of active transportation within the study area, with a key focus on potential access to and from transit. The analysis of active



The local pathways network traveling through an area intersection.

transportation and connectivity to transit is presented later in the document. The analysis focuses on The Woodlands Town Center as the most urbanized portion of the study area.

Pedestrian and Cycle Pathways

The Woodlands has an extensive trail (pathways) network, with 210 miles of paved trails between the Villages for pedestrians and cyclists, as seen in Figure 3.21. These pathways often parallel arterial and collector roads, and are set back from the roads and

separated by trees to provide a comfortable walking and biking experience. The pathways are segregated from the motorized traffic network and include intersection crossing facilities. The pathways are for joint cyclist and pedestrian use. The network is crucial to cyclist and pedestrian movements throughout The Woodlands (and connections to the broader study area). The existing

roadway network can be a major barrier to cycling and walking with limited shoulder space and higher travel speeds.

Although the pathways network is extensive, it is primarily used for recreation. There are opportunities to link cyclist and pedestrian infrastructure to the existing network to encourage utility trips using active modes both within and to access The Woodlands Town Center.

A key issue regarding the pathways network is that the pathways exist only on one side of the roadways. This creates difficulties where cyclists and pedestrians need to access a destination on the other side of a roadway from where the pathway is situated.

The Woodlands Town Center has been developed as an urban center with strong pedestrian connectivity, based generally on a grid road structure. There are a number of intersections with pedestrian improvements in the Town Center, such the intersection of Mall Ring Road and Woodloch Forest Drive. Major pathways providing access into the Town Center include pathways adjacent to (but not limited to):

- Woodlands Parkway.
- Lake Woodlands Drive.
- Six Pines Drive.
- Lake Robbins Drive.
- Woodloch Forest Drive.
- Grogan's Mill Road.
- Timberloch Place.

On-Street Cycle Environment

While the pathway network serves many recreational needs for cyclists, the current roadway network within the study area varies in its accommodation for cyclists as a mode of transportation. Similar to auto traffic, those cycling as a means of transportation (not recreation) desire the most direct, fastest, and least congested route to travel. In



The local pathways network.

most cases, these routes for cyclists are also along area roadways. High speeds, inconsistent shoulder widths, and no formal provision for on-street cycling creates a challenging environment for even skilled on-road cyclists. This environment can create a barrier to the use of active transportation modes. Major roadways that have high motorized vehicle capacity, speed and large crossing distances create the greatest barriers.

The Woodlands Town Center is a major activity point for the community and cycle connectivity to the Town Center supports reduction in auto trips and demand for parking. However, cycle access to the Town Center area is limited. Major barriers to accessing the Town Center include (but are not limited to):

- Woodlands Parkway.
- Grogan's Mill Road.
- Research Forest Drive.
- Lake Woodlands Drive.
- I-45 is a major east/west barrier, further exacerbated by the existence of I-45 frontage roads.

The major routes providing access to the Town Center are prioritized for auto travel and are not conducive to cyclists. Area roads have limited shoulders and no protections or priority for cyclists. Interstate-45 and the associated frontage roads act as a significant barrier to east / west travel for cyclists and pedestrians in the study area. This is compounded by the distances between signalized intersections on the I-45 frontage roads. Existing and future development west of I-45 will likely increase demand for access to The Woodlands Town Center for employment, recreation, and shopping. Improved safety and cycling options at existing crossings of I-45 are needed. Vehicle (car) turning movements and signal timing generally conflict with cycle movements through the existing east-west crossings of I-45. Future connections should include appropriate access and timing for cyclists and pedestrians. Additionally, cycle and pedestrian only crossings of I-45 should be examined, specifically for access into the Town Center area. A recent 2013 report by the Bicycle Advisory Task Force outlines measures to improve cycling quality, including increasing the number of bicycling-friendly roads, developing programs to increase awareness about cycling, and creating a more comprehensive bicycling strategy.²⁵

²⁵ Bicycle Advisory Task Force. (2013). *Report on Bicycle Friendly Community Priorities*. Retrieved 06-01-2014 from http://bikethewoodlands.org/Site/Coalition_Recommendations_files/Priority%20Report%20to%20AHTC%20v2.pdf.

Figure 3.21: The Woodlands Parks and Pathways Map²⁶



Pedestrian

For the majority of the study area, there are limited sidewalk facilities directly alongside roads. Much of the study area is served by the pathway network that emerges at intersections for pedestrians to cross. Sloped sidewalk corners at intersections, compatible with Americans with Disabilities Act requirements, accommodate for wheeled devices and allow bicyclists to move from one pathway to another easily.

As noted previously for cyclists, pedestrians walking as a mode of travel (as opposed to recreation) want direct, visible, and safe access to their destinations.

The pathways network does provide connectivity, but not always in a direct and visible manner. In the study area, the Town Center is the only location where consistent sidewalks are provided. The Town Center is designed with a strong pedestrian environment in an urban grid that is conducive

²⁶ The Woodlands. (2013). *Maps of the Woodlands*. Retrieved 05-12-2013 from <http://www.thewoodlandstx.com/maps/>.

to walking as a means of transportation. The pedestrian environment in the Town Center typically provides eight foot wide sidewalks on both sides of the roadway and pedestrian-scaled amenities such as lighting, trash receptacles, and benches. Way-finding signage exists, however most signage is intended for automobile traffic.

Challenges to walking do exist within the Town Center. The Woodlands Mall and adjacent strip commercial (Pinecroft, etc.) are prioritized for vehicle access. Portions of these areas provide pedestrian access, most notably the strong pedestrian environmental on the south entrance of The Woodlands Mall. However, they do not fully accommodate all the desired pedestrian paths. This was directly observed by pedestrians informally crossing the Mall Ring Road and walking across landscaped areas at the edge of The Woodlands Mall parking areas to access the main mall entrances.



The Waterway cruiser service.

Town Center Trolley

The trolley service is a free loop through The Woodlands Town Center running from 11:00am-8:00pm daily.²⁷ The service frequency (headway) is 20-30 minutes and the trolleys have an average monthly ridership of 10,000 passengers.²⁸ The trolleys are compliant with the Americans with Disabilities Act (ADA). While the trolleys are operated by The District, the system is funded by a partnership between The District, The Woodlands Township, and H-GAC. The Town Center trolley serves a variety of trips for visitors and shopping trips throughout the Town Center.

There are two trolley vehicles with the capacity for 35 people each. Major stops include The Woodlands Mall, Market Street, the Cynthia Woods Mitchell Pavilion, and the Convention Center. The trolley route includes segments that are on local streets, accessing private commercial / services through parking lots, but also follows a dedicated trolley busway, constructed in conjunction with the waterway. The Woodlands Township is currently examining an extension of the trolley to provide service to the new Hughes Landing development, as well as increased frequencies for the service. A map of the route can be found in Figure 3.22.

²⁷ The Woodlands Convention and Visitors Bureau. (2013). *The Woodlands Waterway Trolley*. Retrieved 03-12-2013 from <http://www.thewoodlandscvb.com/pages/HelpCenter/WaterwayTrolley/tabid/78/Default.aspx>.

²⁸ H-GAC. (2010) *H-GAC Ridership Report*.

Figure 3.22: The Woodlands Trolley and Waterway Cruiser²⁹



Waterway Cruiser

A Waterway cruiser service operates along the 1.4 mile canal system through the Woodlands Town Center. The Waterway cruiser operates Friday through Sunday between approximately 11:00am to between 8:00pm–10:00pm in the evening (depending on the day), with a frequency of 45-60 minutes.

²⁹ The Woodlands Convention and Visitors Bureau. (2013). The Woodlands *Waterway Trolley*. Retrieved 03-12-2013 from <http://www.thewoodlandscvb.com/pages/HelpCenter/WaterwayTrolley/tabid/78/Default.aspx>.

The cost of travel is \$5.00 for adults and \$2.50 for children and seniors.³⁰ Based on public feedback received throughout the study, the Waterway cruiser is perceived by locals as a nice amenity for

visitors and is positive aspect of the Town Center. However, the Waterway cruiser is not perceived as a formal transit option given its limited service frequencies. Figure 3.22 also highlights the route of the Waterway cruisers, which stops at key locations such as The Woodlands Mall, the Convention Center and the Cynthia Wood Mitchell Pavilion.



The Town Center Trolley.

The Woodlands Township Transit Network

The current transit system in The Woodlands Township is comprised of three main components: The Woodlands Express park and ride services, the Town Center trolley and the Waterway cruiser. Additionally, demand response and paratransit services are also available. Demand response and paratransit services are also available in the cities of Shenandoah or Oak Ridge North, but no other transit options are present in these communities.

The Woodlands Express – Park and Ride Service

The Woodlands Township currently contracts with The District to operate The Woodlands Express. The Woodlands Express is an express, coach bus service between The Woodlands and central Houston. Three park and ride facilities are located within study area, as described below and shown in Figure 3.23:

- Sawdust park and ride: located approximately 4 miles



Town Center trolley stop.

³⁰ The Woodlands. (2013). *The Waterway Cruisers / Waterway Taxi*. Retrieved 03-12-2013 from <http://www.thewoodlandstx.com/waterwaytaxi/index.php>.

southwest of The Woodlands Town Center in Spring.

- Research Forest park and ride: located approximately 2.5 miles northwest of The Woodlands Town Center (within the Research Forest Village boundaries).
- Sterling Ridge park and ride: located approximately 7 miles west of The Woodlands Town Center (within the Sterling Ridge Village boundaries).

Figure 3.23: Park & Ride Locations – The Woodlands Township



Express service destinations include Downtown Houston, the Texas Medical Center and Greenway Plaza. Table 3.3 provides information on the number of parking spaces at each location as well as the number of AM and PM buses serving each park and ride. The fare for using the service is currently \$12 round trip.

Table 3.3: Park and Ride Services Between The Woodlands and Houston

Park & Ride location	Sawdust	Research Forest	Sterling Ridge
Parking Spaces	1,000	1,000	1,200
# of AM Services (5:15 AM -8:15 AM) from The Woodlands Park and Rides to Houston	13	18	8
# of PM Services (12:30 PM -6:40 PM) from Houston to The Woodlands Park and Rides	14	20	7

The park and ride facilities each provide the range of required facilities to accommodate the express services. The facilities are of varying age and physical condition, with the Sterling Ridge park and ride constructed most recently in 2011. Each park and ride facility typically includes:

- Free parking.
- Separated bus access and loading.
- Weather protected bus shelter areas (with seating).
- On site management and ticket sales.
- Posted schedules.
- On site security.

Sterling Ridge park and ride also includes outdoor cycle racks and formal kiss and ride (drop-off / pick-up) drive aisles. Research Forest and Sawdust have limited outdoor cycle parking and no formal kiss and ride facilities.



Woodlands Express service at Sawdust park and ride.

None of the park and ride facilities have complete pedestrian access via paths or sidewalks.

The park and rides are only accessible by cycle, on street. However, no cycle lanes or other formal cycle facilities are provided for access.



Woodlands Express park and ride lot.

Demand Response Services

A demand response transportation system is one where passenger trips are generated by calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick the passengers up and transport them to their destinations. In

most cases these trips are scheduled in advance and a fare is paid (depending upon the user). Users of the demand response services vary from seniors to persons with disabilities, or others

with limited mobility. Riders generally have no access to other public transit services or would not be able to access public transit because of limited mobility.

Multiple organizations offer demand response services in Montgomery County, including within the study area. This service is typically used for trips that are not covered by public transportation or for clients that have mobility limitations. These organizations communicate with each other when necessary to refer clients, share information about operations and to share resources.

Of the organizations that provide this service, The District, The Friendship Center, and Interfaith of The Woodlands provide the bulk of demand response transportation within the study area. This includes providing transportation services for seniors and people with disabilities. These services are critical to those residents with limited mobility within the community, given that no other public transportation options exist in the study area.

The District's demand response service generally provides transit for all trip origins and destinations greater than three quarters of a mile from a fixed transit route and will travel



Current park and ride signage.

anywhere within Montgomery, County³¹. The District fares within Montgomery County are \$3.50 one way and \$7.00 round trip, while trips between counties are \$4.00 one way and \$8.00 round trip. Ticket books with multiple tickets are also available. The District's demand response service runs weekdays from 5:00am to 7:00pm and requires a reservation 24 hours in advance.

The Friendship Center, a smaller demand response organization, operates within

Montgomery County. The Friendship Center's services are typically free to users, but donations are encouraged to help support the services. The Friendship Center focuses their services on six major activity centers within Montgomery County or demand response service for medical, grocery, or other essential errands. The Friendship Center also provides a weekly trip to the VA Hospital in Houston. Typical destinations of Friendship Center clients include medical centers,

³¹ The District . (2014). *Demand & Response*. Retrieved 20-08-2014 from <http://www.btd.org/DemandResponse.htm>.

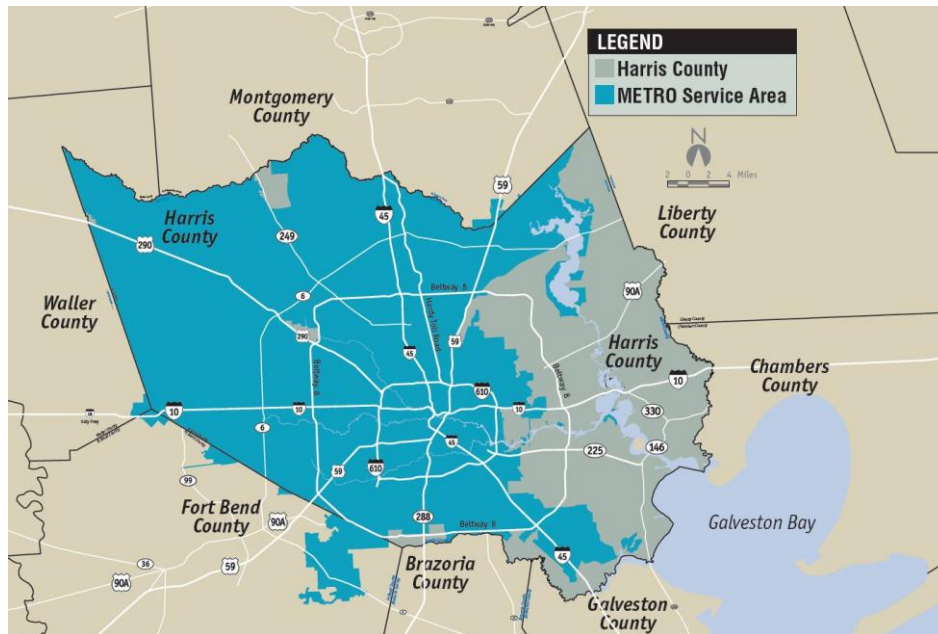
social service or community centers and retail locations.³² The Friendship Center service is provided from 8:00am-4:00pm weekdays with three business days' notice³³.

Interfaith of The Woodlands provides social services for residents of The Woodlands and south Montgomery County (within their service area). Interfaith of the Woodlands is a non-profit social service agency providing transportation services for seniors to access trips such as appointments, grocery store visits, etc. Services must be scheduled in advance and are typically free for charge (funded through donations). However, donations from clients are also encouraged (if possible).

Regional Transit Network

The Metropolitan Transit Authority of Harris County (METRO) was created in 1978 and operates throughout Harris County, including Houston.³⁴ METRO is the largest transit provider within the metropolitan area. METRO's service area does not extend into Montgomery County; however, the regional services do influence mobility within the study area through adjacent bus services, HOV lane management, and nearby park and ride services. METRO operates and maintains the HOV lanes located along I-45, approximately between downtown Houston and FM 1960. Project planning is underway to extend the HOV lanes further north. The METRO / Harris County boundary is approximately four miles south of The Woodlands Town Center. The METRO system map can be seen in Figure 3.24. Springwoods Village and the ExxonMobil campus are located within METRO's service area.

Figure 3.24: METRO Service Area Map



³² The Friendship Center (2014).

³³ The Friendship Center. (2014). *Transportation*. Retrieved 20-08-2014 from <http://www.thefriendshipcenter.com/programs/transportation>.

³⁴ Metropolitan Transit Authority of Harris County. (2013). *About METRO*. Retrieved 03-12-2013 from <http://www.ridemetro.org/AboutUs/Default.aspx>.

METRO services include a local bus fleet of 1,230 vehicles as well as high occupancy vehicle (HOV) lanes for express bus services which connect to 28 park and ride facilities around the county with



Houston METRO bus service in the Galleria area.

33,000 parking spaces. In addition to the HOV lanes, METRO operates paratransit and vanpool services. METRO operates 12.8 miles of light rail with 24 stations open and another 26 miles in construction or in planning.

Fares on the METRO network are differentiated by zones of travel. Full fare local trips are priced at \$1.25 while park and ride one-way fares range between \$2.00 and \$4.50 depending on location.

The nearest METRO park and ride to The Woodlands Town Center is located in Spring, approximately 12 miles to the

south. This park and ride is located in Zone 3 of the METRO park and ride system and therefore a one-way fare to Houston would cost \$3.75. Express bus services from this park and ride to downtown can be seen in Table 3.4 below.

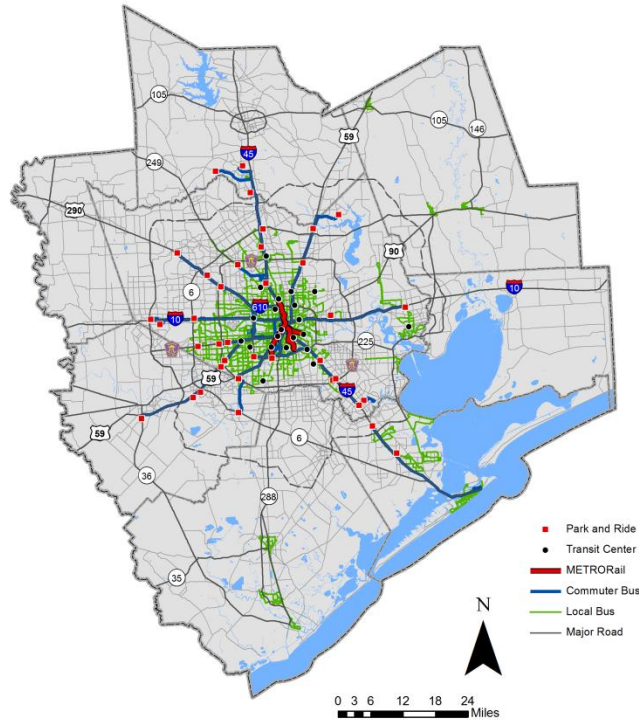
Table 3.4: Downtown Houston Express Service from Spring Park and Ride

Route	AM Service (4:00 AM - 8:40 AM)		Mid-day (8:41 AM - 3:30 PM)		PM Service (3:31 PM - 10:05PM)	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
202 – Kuykendahl	5	0	0	0	0	0
204 - Spring	27	10	0	0	8	21
209 – Kuykendahl/Spring	0	0	12	11	5	7
Total	32	10	12	11	13	28

2040 Regional Transportation Plan (RTP)

H-GAC is responsible for producing the 2040 Regional Transportation Plan (RTP) which outlines the area’s transportation policies, in addition to needs and goals for the following 25 years. The plan encompasses all modes of transportation and funding strategies for projects in addition to providing a comprehensive analysis of the surrounding area in terms of environmental impacts of transportation, goods movement and emergency evacuation. Figure 3.25 maps the major transit lines within the region, including links from The Woodlands to Houston and surrounding areas.

Figure 3.25: Houston-Galveston Area Transit Map³⁵



The 2040 RTP highlights the fact that trips by transit in the Houston-Galveston Area have decreased over the past decades and hit a low of 2.6% in 2010, which is 2.1% below the US national average of 4.7%.³⁶

Funding for transit in 2012 was split almost 50/50 between local sources and the federal government at approximately \$325,000,000 each, while in 2012, roadways were funded with approximately \$1,050,000,000 through a combination of local, state and federal funding.

The priorities for the next 20 years allocate \$25.6 billion to road projects and \$11.9 billion to transit projects, broken down by corridor and the bus replacement project. This includes allocation of funds for METRO’s North Corridor Light Rail Transit (LRT) project that parallels I-45, the primary connection between The Woodlands and Houston. A portion of the North Corridor LRT was completed in late 2013 and terminates approximately 25 miles south of The Woodlands. Additionally, \$300 million will be spent on active transportation for pedestrians and bicycle infrastructure, divided by city.

³⁵ Houston-Galveston Area Council. (2013). *System Overview*. Retrieved 09-12-2013 from <http://www.h-gac.com/taq/plan/2040/system.aspx>.

³⁶ Houston-Galveston Area Council. (2013). *System Overview*. Retrieved 09-12-2013 from <http://www.h-gac.com/taq/plan/2040/system.aspx>.

The H-GAC 2040 RTP is generally focused on the needs of the region as a whole by analyzing the area, determining needs and then prioritizing and allocating funding to projects and initiatives. In this context, The Woodlands Township Transit Plan study area is one of many populated areas surrounding Houston, with Houston receiving the majority of funding for transportation projects due to its population.

As of 2012, The Woodlands Township (along with the City of Conroe) was designated a large Urbanized Area by the US Census Bureau and is responsible for performance of transit operations. The 2040 RTP can serve as a base and The Woodlands can plan and evolve to match the RTP goals for more accessible local transit, improved connectivity both for active transport and transit, potential reverse commute programs and long-term transit fare compatibility across the region. Potential for long term, improved high capacity transit corridors planned by H-GAC may also be beneficial to The Woodlands Township.

2013 Downtown Commute Survey (Central Houston, Inc.)

A main employment attractor for The Woodlands Township Study Area is downtown Houston. In 2013, a commuter survey³⁷ noted that 57% of trips into downtown Houston for employment purposes were made by single occupancy vehicles, while 26% were made using suburban park and ride, 9% by car / van pool and 8% by other modes (including local bus or rail). It may be speculated that the time taken to commute to work has a large impact on the choice to use a single occupancy vehicle as the majority of single occupancy vehicle trips were approximately 20 minutes faster per direction than the majority of park and ride trips. It is estimated that approximately 97% of single occupancy vehicle commuters park in garages and lots, therefore parking in downtown Houston is likely ample. Of those who drove to work alone, 41% of had 100% employer subsidized parking and 31% paid full cost to park, while the remaining drivers had varying parking subsidy. The Woodlands is approximately 27 miles north of Houston and of Downtown employees surveyed who live 30-39 miles from their work, 41% drove alone and 45% use the park and ride, with 11% car/vanpooling and 2% utilizing the METRO local network.



Downtown Houston METRO light rail.

When single occupancy vehicle users were asked what would prompt them to change their travel mode, the top reasons were increased prices (13%), more convenient rail line near home (10%), increased parking costs (9%), and more convenient park and ride locations (8%). Increased prices

³⁷ Central Houston, Inc.(2013). *Downtown Commute Survey*.

generally refer to the varying price of fuel and vehicle cost / maintenance. When park and ride users were asked why they prefer their mode, 81% mentioned avoiding driving in traffic and 56% mentioned lower cost of commute as a primary reason.

Finally, the study notes that compared to 2009, there is a 9% increase in single occupancy vehicle use.

Summary – Current Transportation Network

For transportation overall, study area is well served by a road network both internally and with external connections. The study area includes a significant recreational trail system. Nevertheless, the study area has few options in terms of local transit and does not connect to the METRO transit network (in the Harris County portion of the study area). Limited transit connections are provided with the commuter service (The Woodlands Express), primarily to central Houston. The current Town Center trolley and Waterway cruiser services are seen as a tourist amenity for the Town Center area, but not as a formal transit option for locals, employees, or visitors with time constraints.

Growth and development within the study area will likely increase demand for mobility options within the study area and between the study area and regional activity centers (downtown, etc.).

Current Transportation Network Demand

The current transportation network demand serves as a key indicator for the overall need for mobility options within the study area. Demand, combined with existing and future land use, provides the best picture for future transportation needs. This section outlines the current demand for transit, active transportation, and traffic within the study area.

Transit

This section describes current transit ridership for the park and ride service, the Town Center trolley and the Waterway cruiser.

Woodlands Express Park and Ride

Table 3.5 contains ridership data for the three park and rides within the Study area. Between 2008 and 2013, ridership fluctuated but showed an overall net increase of 118,449 trips over six years, or a 19.7% increase, to 720,378 riders in 2013.

Of the three park and rides, Sawdust was the only one to see a decrease in ridership from 2008 to 2013, while both Research and Sterling Ridge both had net increases.

Both 2009, 2010 and 2013 saw a decrease in total ridership. However, gas and parking prices may influence the choices made by riders of the service. The services are not promoted or advertised and information is generally provided across multiple website sources. Route information and timetable may be difficult to decipher for those who do not currently use the services.

Table 3.5: Park and Ride Ridership Data – 2008-2013

Year	Park and Ride			Total	% difference from previous year
	Sawdust	Research Forest	Sterling Ridge		
2008	229,048	372,881	-	601,929	-
2009	213,960	359,466	-	573,426	-4.7%
2010	200,476	365,560	-	566,036	-1.3%
2011	222,893	387,651	108,659	719,203	27.1% ³⁸
2012	220,372	388,119	115,240	723,731	0.6%
2013	220,071	378,369	121,938	720,378	0.5%

The Town Center Trolley

Table 3.6 contains ridership data for the Town Center trolley between 2008 and 2012. In this timeframe, there was a net increase in ridership of 7.9% between 2008 and 2012. It is interesting to note that in 2010 there was a peak in ridership with almost 143,000 riders. It is unclear why this peak occurred.

Table 3.6: Town Center Trolley Ridership Data – 2008-2012

Year	Ridership	% difference from previous year
2008	96,019	-
2009	112,833	17.5%
2010	142,759	26.5%
2011	127,326	-10.8%
2012	103,600	-22.9%

The Waterway Cruiser

Table 3.7 contains ridership data for The Waterway cruiser between 2008 and 2012. In this timeframe, there was a net decrease in ridership of 15,163 riders, or 28.3%, to 38,245 passengers in 2012. Between 2008 and 2012 the Waterway cruiser reduced its hours of operation from 6,783 down to 3,629, which is reflected in the decrease in ridership over the same time period.

Table 3.7: The Waterway Cruiser Ridership Data – 2008-2012

Year	Ridership	% difference from previous year
2008	53,408	-
2009	44,238	-20.7%
2010	34,001	-30.1%
2011	27,563	-23.4%

³⁸ Sterling Ridge Park and Ride opened.

Year	Ridership	% difference from previous year
2012	38,245	38.7%

Demand Response Services

The Friendship Center estimates their annual clients at approximately 500. This equates to approximately 27,000 annual trips made by the Friendship Center³⁹. In 2012, The District recorded approximately 73,000 demand response trips total within their service area⁴⁰.

Active Transportation

No data was found to quantify active travel; however, it can be assumed that active travel does not make up a significant portion of trips taken in The Woodlands. Those residents living within



Cycling and walking create critical connections for transit.

the Town Center or with 1,300 feet (a five-minute walk) of a Village Center could use walking as a mode of transportation to access retail or services, if reasonable sidewalk or pathway connections were available; however, the automobile-oriented design of The Woodlands makes this impractical for many of its residents. Cycling plans and reports detailing prioritizations for future cycling infrastructure are being undertaken and will

likely lead to new infrastructure to support an increase in this mode of travel.

Traffic

Traffic counts for 2013 indicate that the morning peak period for The Woodlands is typically between 7:00-10:00am, with a peak hour occurring between 7:00-8:00am. The evening peak is typically between 4:00-7:00pm, with a peak hour occurring between 5:00-6:00pm. A ‘school’ peak was also observed at many locations between 1:00-3:00pm.

³⁹ The Friendship Center.(2014)

⁴⁰National Transit Database. (2012). *The District*. Retrieved 20-08-2014 from http://www.ntdprogram.gov/ntdprogram/pubs/profiles/2012/agency_profiles/6059.pdf.

Summary – Transit Demand

Based on the ridership data available for transit services in The Woodlands from 2008 to 2012, it appears as though all services are prone to fluctuate in ridership.

The park and ride service and trolley services saw net increases in ridership of fewer than 10% between 2008 and 2012, while the Waterway cruiser had a net loss of 28.3% ridership in the same period.

Data available for demand response services demonstrate the strong need for this type of service in the study area.

Area Profile Conclusions

This area profile has the purpose of outlining the existing conditions in The Woodlands Study Area, as well as conditions anticipated in 2040. General demographic information was presented which demonstrated that The Woodlands and surrounding areas have a high dependency on personal vehicles and a higher-than-state-average mean household income. Also outlined was the regional transportation plan of H-GAC (2040 Regional Transportation Plan), which includes benefits to The Woodlands Township.

Currently, the study area has no true transit system outside of the park and ride services to Houston and the limited local Town Center trolley and the Waterway cruiser services. Federal, state, and local funding do not cover the cost of currently available transit. This presents a challenge which needs to be addressed.



Frequent, reliable, and high quality transit service builds ridership.

The land use pattern in 2013 supports a personal vehicle-centric city with residential areas spread out between undeveloped land and parks; however, population density is highest along major arterial roads and the oldest Villages within The Woodlands. The main commercial center is The Woodlands Town Center, which is not accessible from most Villages without the use of a vehicle. Employment was mainly concentrated along the I-45 corridor.

Over the next 25-30 years, The Woodlands and surrounding areas will have a major land use shift, with large amounts of developable land transformed into residential use.

Commercial land use will also increase in The Woodlands Town Center, and to the south at Grogan's Mill Village. The future land use and population distribution in the study area does highlight beneficial change to The Woodlands Town Center by increasing residential population density, increased employment and increased commercial land use.

Additionally, employment density will remain along the Interstate 45 corridor; however, there will be increased employment density in the southeast area of the Study area, as well as south of the Study area. The western part of the Study area will probably not see large increases in employment density or commercial land use.

Gap Analysis & Findings

High-level analysis was performed based on the characteristics described in this area profile in order to highlight gaps within the transportation network of the study area. This analysis is presented below:

- Land use forecasts for the western side of the study area show increased residential land use in 2040 along with a large population increase. Additionally, land use and employment density forecasts for 2040 predict increased commercial and employment on the eastern side of the study area. There seems to be a large gap between the population increase on the western side of the study area and the amount of commercial land use to service this increased population.
- Future commercial land use is heavily focused on the I-45 corridor, which could be beneficial for creating reverse commutes from Houston and other neighboring cities.
- Pedestrian facilities seem inadequate to support transit. This includes the setback of the paths from the road which reduces security, lack of lighting and street furniture, crossings, etc.
- There is no transit connection from The Woodlands to the METRO transit system in Harris County for travel to Houston. The only option is the limited weekday park and ride service.

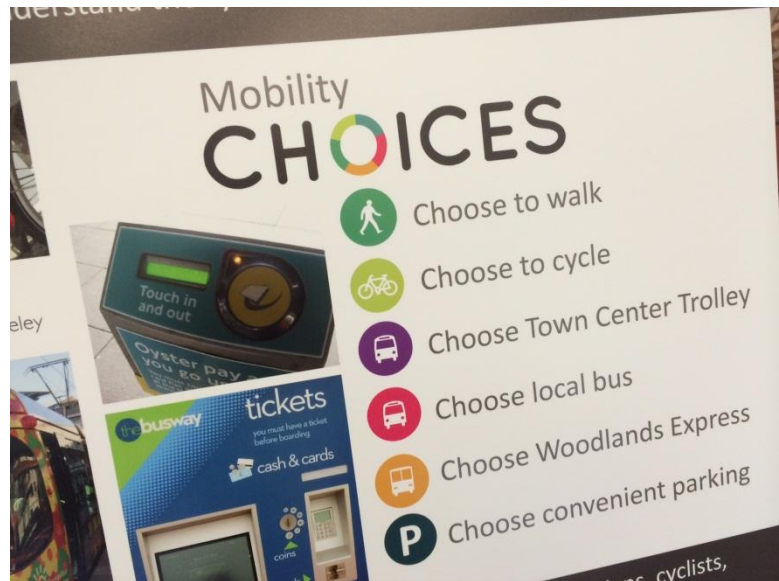
4 Stakeholder Involvement

Purpose

A critical component of moving the study area towards a comprehensive transit strategy is a community-driven road map of implementable improvement strategies. To that end, community engagement and dialogue were essential. The Woodlands Township Transit Plan's Stakeholder Involvement Plan fostered the dialogue needed to create this framework for transit through focus group activities, online education and community outreach events. This process supported early and continued participation with a broad range of stakeholders that live, work and play in the study area.

Involvement Goals and Objectives

The goals and objectives associated with stakeholder involvement built off the vision created by the Board of Directors.



Information board from public open house #2.

The vision of The Woodlands Township Transit Plan is to preserve The Woodlands economic competitiveness through increased mobility in the Town Center, the Villages, and existing/emerging activity centers in the area, creating affordable, reliable, accessible, safe solutions.

This vision is supported by the following guiding principles:

- *Builds partnerships to share costs and benefits.*
- *Provides high quality services.*
- *Preserves the commuting services to Houston.*
- *Supports congestion mitigation.*
- *Enhances the multi-modal transportation network.*
- *Results in actionable projects in the near-term and long-term.*

Involving the public was critical to gaining focused feedback from the key stakeholders throughout the process to help guide The Woodlands Township Transit Plan. Every effort was made to effectively involve the community in the project. Particular attention was given to obtaining input from representative segments of the community, such as transit providers, governmental agencies, cycling and athletic groups and the Village associations. In-depth interviews were conducted at various locations and times convenient to the groups. A webinar and online questionnaires were used to reach a broad audience and make the project content available at times convenient to the taker. In areas such as The Woodlands where traffic congestion is a massive issue, making the project information available at times other than the usual public meeting time is ever more important.



Discussions following public open house #1.

The critical success factors as they pertain to public involvement were as follows:

- Build support for The Woodlands Township Board of Directors' vision for the study as stated above.
- Implement a public involvement plan that provides appropriate stakeholder input and informs the Board of Directors' decision making.
- Engage with existing transit users.
- Engage with potential new transit users.
- Engage with residents.
- Engage with business / retail community in general.

- Develop relationships with transit supportive employers and activity center managers to serve as a conduit of information to potential transit users.
- Brief the Board of Directors at regular intervals in the project and seek their guidance.
- Implement a transparent stakeholder involvement process that provides appropriate opportunities for a diverse range of stakeholders to provide input.

Community workshops featuring in-person focus group dialogues supplemented by online input opportunities were integral to this process. During a community workshop held in January of 2014, stakeholders received an overview of the project process, vision, and potential outputs and weighed in on the strengths, weaknesses, opportunities and challenges of potential transit service improvements. A second workshop held in June of 2014 to solicit input from stakeholders about plan scenarios developed to date and specific implementation opportunities that help to achieve the vision. This workshop was paired with an online webinar and questionnaire, which allowed people to view the project content and respond to specific questions at their convenience. An open house was held at the same time as the June focus group meetings. It was important to the Board of Directors and H-GAC that this opportunity be made available; however, attendance at the open house was low, but the online engagement was successful.

The key stakeholder groups were structured so as to target information gathering from affected and interested user groups and influencers. Table 4.1 provides a summary of the stakeholder groups and associated outreach approach for each.

Table 4.1: Stakeholder Groups

No.	Groups and Outreach
1.	The Woodlands Township Board of Directors. <ul style="list-style-type: none"> • Project updates were given at monthly TWTBD meetings.
2.	PMC. <ul style="list-style-type: none"> • Members of the PMC include: <ul style="list-style-type: none"> • Representatives from the Board of Directors and staff. • TxDOT staff. • H-GAC staff. • Consultant team. • Project updates were given at regular intervals.
3.	Focus groups and interviews. <ul style="list-style-type: none"> • Focus groups including: <ul style="list-style-type: none"> • Residents through existing organizations such as the Village associations, churches and civic clubs. • Employers through existing organization such as the Economic Development Partnership, Convention and Visitors Bureau and the Chamber of Commerce. • Park and ride users (existing and potential) through direct outreach to groups and individuals. • Bicycle riders through existing organizations such as The Woodlands Bike Coalition and The Woodlands Cycling Club. • Transit providers through The District and the Metropolitan Transit Authority of Harris County (METRO). • Other potential partners such as The Woodlands Road Utility District #1, developers, the Friendship Center, Interfaith of The Woodlands and H-GAC Commute Solutions. • Two three-day focus groups were held at key points in the process – one in January and one in June.

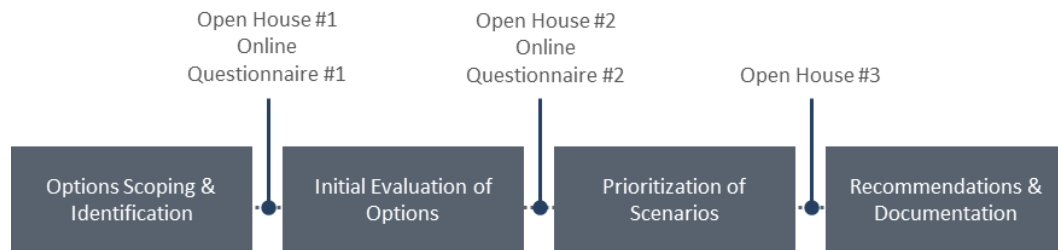
No.	Groups and Outreach
4.	<p>General public.</p> <ul style="list-style-type: none"> • Presentation at The Woodlands Township Town Hall annual meeting. • Website and social media. • Three public open houses (over multiple days). • Two online questionnaires to better understand potential transit user preferences.

Stakeholder Involvement Plan

The Stakeholder Involvement Plan for the study ensured a high level of communication throughout the process by considering early the best methods of informing the stakeholders and involving them. Regular and ongoing communication with stakeholders created a solid foundation for the plan’s development, thereby increasing the likelihood of implementation. The Stakeholder Involvement Plan provided the framework for all engagement activities, public education, and community outreach.

This involvement approach was approved by the PMC early in the process. This helped to ensure buy-in and to gain approval of the overall process and tools for gathering feedback from both internal and external stakeholders. Stakeholder input was actively sought out at key milestones within the project. Figure 4.1 outlines key input opportunities and milestones included in the Stakeholder Involvement Plan.

Figure 4.1: Project Process



It is important to note that stakeholders (both internal and external to The Woodlands) had an opportunity to be directly involved in the plan’s creation and development of alternatives. Additional stakeholder involvement was encouraged throughout the project through the project website, online surveys and webinar.

Every effort was made to involve the community in the project. Particular attention was given to obtaining input from representative segments of the community.

Periodic reviews of involvement levels were conducted, and outreach at locations and times convenient to underrepresented groups to have equal opportunities for their voices to be heard were pursued.

The following list represents critical success factors as they pertained to stakeholder involvement:

- Build support for the study vision.

- Implement a Stakeholder Involvement Plan that provides appropriate stakeholder input and informs the decision making.
- Engage with existing transit users.
- Engage with potential new transit users.
- Engage with residents.
- Engage with business/retail community.
- Develop relationships with transit supportive employers and activity center managers to serve as a conduit of information to potential transit users.
- Brief the Board of Directors at regular intervals in the project and seek their guidance.
- Implement a transparent stakeholder involvement process that provides appropriate opportunities for a diverse range of stakeholders to provide input.



Public open house on November 3, 2014.

Involvement Activities

Project Management Team

As noted in Chapter 2, The Woodlands Township Transit Plan effort was guided by the PMC. They met monthly to provide input and guide the technical development of the plan, thereby helping to ensure quality outcomes of the plan from visioning, to the exploration and refinement of alternatives, through to the final plan.

The Woodlands Township Board of Directors

Multiple briefings and workshops were conducted with the Board of Directors to update them on the status and key findings of project. Detailed review and discussions occurred with the Board of Directors at each project milestone, so they understood the information being developed and shared with public stakeholders. The Board of Directors provided key policy input on the study and will be responsible to taking the plan forward and implementing as appropriate with the community.

Focus Groups

The plan engaged a range of targeted stakeholders through focus group discussions. The outcomes of these meetings had three major purposes. First, they created an understanding of the plan and its vision and encouraged stakeholders to visit the project's website to complete online questionnaires. Second, these meetings helped to develop an understanding of the range of issues and potential options related to transit that informed the development of transit options and scenarios. Finally, focus group participants acted as conduits of information back to the larger groups that they represent.

The Village association leaders shared information on the project status, outreach events, and the study's progress at their own meetings and in their association materials.

The following focus groups were included in plan's community engagement effort:

- Cycling and athletic interests.
- Developers.
- Government officials.
- Mobility committee of The Woodlands Chamber of Commerce.
- Hotels and conventions interests.
- Major employers.
- Transit interests.
- Village associations' leaders.



Focus groups were very successful in helping the project team to better understand key challenges and opportunities for improving transit in the study area. Attendance at focus groups was targeted to ensure an environment in which everyone had a chance to share ideas. Key findings from focus groups that were the foundation of transit alternatives created included the following:

Clear and concise information is essential for public engagement.

- Providing better connectivity to wider area activities (shopping, leisure, employment).
- Improved transit service and mobility within Town Center.
- Overcoming regional traffic congestion barriers by increased pedestrian and bicycle mobility to park and ride centers.
- Meeting demands for new local and express bus service that connect Town Center, Hughes Landing, ExxonMobil campus, Lone Star College and St. Luke's Hospital in The Woodlands.

Open Houses

Open house #1 was conducted to introduce the study to stakeholders. This open house was combined with an informational presentation at The Woodlands Township Biannual Town Hall meeting on January 22, 2014. The consultant team answered questions and shared information about the project. An overview of the study, schedule, input opportunities and project website were provided and the consultant team received great feedback from the community regarding the opportunities and challenges related to transit in the study area.

In-person and virtual online open houses (#2) on June 3rd and 4th of 2014 focused on the plan's transit scenarios, their evaluation and identification of specific implementation opportunities to achieve the project vision. Despite offering open house times throughout the day and evening

hours, attendance during the open houses tended to be lower than participation in online engagement activities due to traffic challenges in the study area. The planning team did, however, receive feedback that informed the development of options through stakeholder brainstorming exercises. Key findings from open houses included the following:

- Increased east west and north south pedestrian and bicycle connectivity.
- Additional transit stop locations within The Woodlands near key destinations.
- Better communication tools (including ticketing systems, marketing outreach and signage) for increasing awareness of potential transit services and ridership.

Open house #3 was conducted on November 5th of 2014 to review the final recommendations of the plan and obtain feedback from both the Board of Directors and stakeholders. The team provided detailed information with boards and a presentation detailing the project process that ultimately led to the final recommendations. The team received key points of feedback on the recommendations from stakeholders, including:

- Transit should focus on those with key needs in the community (seniors, people with disabilities, parents, etc.).
- Transit should be for the public and not for supporting major corporations.
- Businesses benefiting from new transit should provide direct financial support.
- Connections to key employment destinations, like the Town Center and ExxonMobil, are important.
- Transit should work in conjunction with other modes including park and rides, cycles, and walking.



Comment board for public open house #2.

A final public event was held on February 25, 2015 with a presentation at The Woodlands Township Board of Directors regular meeting. The team presented the final, revised recommendations for consideration. The Board of Directors accepted the plan document at this meeting (5-0). Further discussions and decisions by the Board of Directors will be necessary before elements of the plan are advanced further.

Online Questionnaire #1

Given that no local transit service currently exists within the study area, there is an absence of data regarding its potential demand and stakeholders' opinions on specific transit improvements. The range of outreach activities helped to provide some information on the desire for transit within the study area. One mechanism used to guide the study was the implementation of two online questionnaires. The questionnaires were not statistical surveys and only intended as a means of public outreach. The input from these questionnaires helped to guide the study, in the

absence of transit specific data for the study area. No one source of input dictated the study outcomes.

A combination of information received from the questionnaires, focus groups, open houses, other outreach presentation, the PMC, the Board of Directors, and the professional experience of the team all helped to guide the development of the study recommendations.

During the months of February and March of 2014, nearly 1,000 community members accessed an online questionnaire to provide input on which transit improvements would most likely encourage



What is your choice for traveling to, from and around The Woodlands?

Two convenient options to provide input:

Open House

Come by The Woodlands Township office June 4 or 5 to view the webinar and talk with the planning team.

Wednesday, June 4, 9 a.m. – 8 p.m.
Thursday, June 5, 9 a.m. – 5 p.m.

The Woodlands Township Board Chambers Lobby
2801 Technology Forest Blvd.
The Woodlands, TX 77381

Online Webinar and Survey

Watch the webinar at your leisure and take a survey to note your preferences for expanding existing choices to better connect to employment and activity centers.

Available June 4 - 25:

<http://montgomerycountymobility.com/woodlands-transit-plan/get-involved/>



For more information, please visit:
<http://montgomerycountymobility.com/woodlands-transit-plan/>

Questions? Contact us at:
Carlene Mullins, Carlene.Mullins@h-gac.com
Thomas Gray, Thomas.Gray@h-gac.com

Online questionnaire #2.

increased transit usage to, from and within the community. This first online questionnaire was very successful in helping to gather information regarding the types of transit community members were interested in.

This questionnaire explored locations in which people generally live, work and play to help the study team confirm the vision and guiding principles established by the PMC. It also served as the initial basis of understanding for creating options and scenarios for potential transit stops and routes. Many questionnaire respondents noted interest in express bus service originating in downtown Houston, the Texas Medical Center, Greenway Plaza or the Uptown / Galleria area with an ultimate destination in the Town Center, or at one of the three Woodlands Express park and ride lots. Specific recommendations for bus improvements included:

- The creation of a local bus service connecting residential areas and Villages to the Town Center / Memorial Hermann Hospital / St Luke's Hospital / Lone Star College area.
- Additional express bus runs at Sterling Ridge (both in the morning and later in the evening), and additional express bus routes.

The identification of challenges, such as a lack of opportunities for biking and walking within the study area, and desired improvements to transit / trolley services (such as new destinations, quality of vehicles, and frequency of service times) was also explored. Individuals not using the trolley cited unfamiliarity with trolley services, long waiting times, and inconvenient stops as the top reasons for lack of use. Written feedback indicated that others prefer driving around Town Center because parking is available and travel time by car is less than by trolley. Written feedback from survey participants suggested the need for additional future corridor- and area-specific studies and considerations for addressing the challenges of aging in place and accessibility for people with limited mobility.

A summary of the results of questionnaire #1 is included in Appendix A.

Online Questionnaire #2

A second online questionnaire, conducted during the months of May and June 2014, gathered feedback from more than 4,500 community members regarding transit scenarios created to date. While the first online questionnaire explored desired improvements for transit more generally, the second online questionnaire identified potential preferences regarding trolley stops, express bus routes and service times, and park and ride journeys to and from employment opportunities. Key findings from the second online questionnaire are summarized below:

- More than half of respondents would use the Town Center trolley if it served activity centers and service was more frequent.
- Most respondents are likely to use local bus services during peak commute times in the morning and evening.
- More than half of indicated that they would use new Woodlands Express bus services if available. They would like additional Woodlands Express service to downtown Houston (particularly if they facilitate reverse commute journeys to The Woodlands from the Houston Downtown Transit Center).
- Individuals are most likely to travel to the Hughes Landing stop or the Springwoods / ExxonMobil stops.

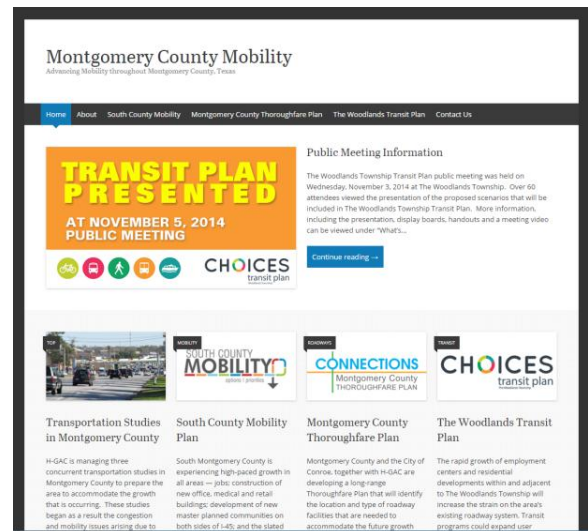
A summary of the results of questionnaire #2 is included in Appendix B.

Informational Webinar

An informational webinar was provided during the last community workshop to inform and solicit feedback regarding transit scenarios from a broad audience. From June 4th to the 25th of 2014, stakeholders were able to view the online webinar at their convenience and then complete the second online questionnaire to note preferences for expanding existing choices to better connect to employment and activity centers. Stakeholders could also come by anytime during the second open house (held from June 4th through June 5th) to view the webinar at The Woodlands Township offices and speak in-person with the study team about the different transit scenarios for traveling to, from and around the study area.

Website

Stakeholder involvement efforts, such as focus groups, open houses, the Town Hall presentation and online questionnaires provided an opportunity to publicize the project's website.



The project website.

The website served as community stakeholders' one-stop location for current project information.

The site also provided direct access to online questionnaires that sought guidance from stakeholders about transit improvements, increasing transit usage in the community and the evaluation of plan options and scenarios.

Invitations to participate in community workshops, online polls and the webinar were provided to stakeholders through a variety of outreach mediums, including through the website and through features in newsletters, local newspapers, social media posts, e-mails and in-person flyer handouts at park and ride centers in the study area. The website contributed success to the project in that stakeholders were able to post comments that the planning team could integrate into the designs for transit alternatives.

Table 4.2 summarizes many of the project’s formal outreach activities.

Table 4.2: Stakeholder Participation

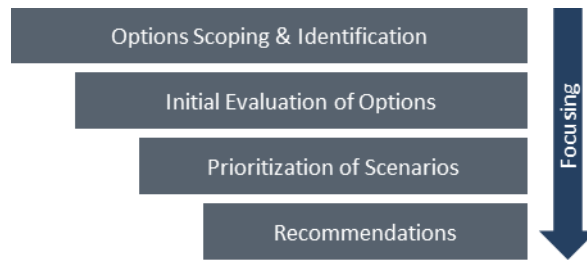
Community Engagement Event	Date	Attendees/Participants
Multiple focus group meetings #1	Winter 2014	40
Open house #1 and town hall presentation	Winter 2014	33
Online questionnaire #1	Winter 2014	926
Multiple focus group meetings #2	Summer 2014	26
Open house #2	Summer 2014	32
Online questionnaire #2	Summer 2014	4,603
Virtual webinar	Summer 2014	747
Open house #3 and presentation	Fall 2014	60
Final public presentation to The Woodlands Township Board of Directors	Winter 2015	67
Total Stakeholder Attendance		6,534

Results and Key Involvement Themes

Figure 4.2 explores how all of the elements from the Stakeholder Involvement Plan activities created a process for gaining input on the vision from both internal (Board of Directors, PMC) and external stakeholders (focus groups, the community at-large). Gaining consensus on a vision that reflected desires for transit choices was considered an essential ingredient for the potential transit future of the study area. Through broad input, the study team was able to explore and refine challenges, opportunities and goals to narrow the transit options and scenarios. Then the team explored alternative systems, services and connections both within The Woodlands, the broader study area, and the region.

With additional input gathered through in-person meetings and online questionnaires, these options were further refined into formal transit scenarios that integrated transit into one holistic network. The final step was to create transit recommendations that addressed, to the greatest extent possible, the concerns and desires of the community as established at the beginning of the process. This framework for narrowing the options and scenarios ensured inclusiveness and transparency.

Figure 4.2: Stakeholder Involvement - Narrowing the Possibilities



The transit recommendations that resulted from this process involved several key themes. Stakeholders expressed the importance of building partnerships, providing high quality services, preserving commuting services and enhancing multi-modal transportation. The following summarizes these topics in more detail.

Build partnerships to share the costs and benefits

- Identify funding options from a combination of taxes, businesses, and government.
- Explore potential partnerships between Springwoods Village and The Woodlands Township.
- Partner with retail areas to allow for more transit connectivity.

Provide high quality services

- Improve or change trolley and water taxi to create a true transit system serving the needs of the Town Center or other areas (expanded destinations, hours, and frequencies). These services are not currently perceived as an efficient mode of transit.
- Implement dependability and frequent transit to promote ridership.
- Promote transit and help stakeholders understand how to use it. Stakeholders not using the current trolley cited unfamiliarity with services and inconvenient stops as the top reasons why.
- Consider shuttle services for businesses needing to provide guests, employees, and customers with additional connectivity.
- Focus on key transit users, including seniors. Accessibility for aging in place and people with disabilities is important. There are challenges with low income seniors that do not have access to a vehicle who may utilize services for public transportation (shopping, medical care, etc.).

Preserve commuting services to Houston

- Expand The Woodlands Express. Many stakeholders would consider using park and ride service to go to downtown Houston, the Texas Medical Center, Greenway Plaza, or the Uptown / Galleria area if the services worked with their schedules.
- Explore reverse express bus services from Houston to the study area. Many stakeholders expressed interest in express services originating in Downtown Houston, the Texas Medical Center, Greenway Plaza or the Uptown / Galleria area with an ultimate destination in the Town Center and Springwoods / ExxonMobil campus.

Support congestion mitigation

- Advance planning and implement improvements ASAP. Stakeholders expressed concern regarding the need for additional corridor specific studies and the time to implement (build) congestion improvements.
- Provide connection to key destinations. Peak bus or trolley service between major employment centers in The Woodlands and the surrounding cities of Oak Ridge North/Shenandoah/Imperial

Oaks should be considered to alleviate auto traffic coming from / through those areas to The Woodlands.

Enhance the multi-modal transportation network

- Create a culture of transit by improving transit knowledge and promoting high quality transit services. Visible, modern, and well maintained transit vehicles and facilities will help to improve perceptions of safety.
- Create a comprehensive multi-modal transportation network in the study area (transit, cycling, walking, driving). Many stakeholders do not currently walk or cycle to destinations within the study area. Even though some destinations, such as the mall and Town Center are fairly close, perceptions of major connectivity barriers (such as highways or disjointed sidewalk and bike lane segments) and unsafe pedestrian and bicycle spaces discourage people from walking or cycling to transit opportunities.
- Create a visible and attractive service. Clear signage would help people understand transit connections, pedestrian pathways, and cycle links.
- Explore alternative modes such as carshare or bikeshare services.

5 Development of Options & Evaluation

Introduction

One of the major purposes of The Woodlands Township Transit Plan is to identify the current and long-term needs for transit mobility throughout the study area. The plan provides the local community and elected officials with a framework for potential transit opportunities on which to base future decisions about mobility funding, projects, and benefits.

Multiple transit ideas were generated by project stakeholders, elected officials, project partners, and the project team. The sheer number and range of ideas to consider required a structured



Example of a high quality transit system.

approach to test and ultimately narrow the potential transit options to those with the most benefits and potential for success. Chapter 5 presents the details of the transit options and how they were evaluated to determine the best performers. This chapter also details the prioritization of the final recommendations.

The generation of ideas (options) took into consideration both current and future conditions of the study area. Ongoing growth and development of residential

areas, employment centers, commercial properties, and recreational amenities creates added stress on the area's transportation network. For most people living, working, or recreating within

the study area, the private auto is the primary means of mobility. Roadways are constrained and the ability to expand or build new roadways can result in high costs. Roadway expansion may also result in impacts to the local community with limited benefits to the transportation system capacity. In other words:

We cannot build enough road space to address all of our traffic congestion.

The Woodlands Township Transit Plan presents ideas to provide additional mobility choice in a more efficient manner. While the auto is currently the core mode of travel in the project study area, segments of the population either require or are requesting alternative means of mobility. Some seniors and people with limited mobility may not be able to drive, but desire a mobile lifestyle to enjoy the benefits of living in vibrant communities like The Woodlands, Shenandoah, Oak Ridge North, and the surround areas. Others may not have access to a vehicle or have the means to own a vehicle. Additionally, new attitudes are emerging from younger generations, with a desire to not drive or limit driving. However, these positions do not overshadow a comment heard regularly from stakeholders throughout this planning process:

This is Texas and we love our cars.

It is important to recognize the attitudes towards transit in the local study area. Convenience and comfort play a significant role in mobility, specifically in commuting choices in the Houston metropolitan area. High temperatures, wet weather, comfort, and easy access all seem to be key factors in choosing to drive, even though significant congestion and slow speeds are encountered at peak travel periods. Given that limited transit exists within the study area, local residents and employees have little direct experience with the potential benefits of transit. There is a very limited 'culture of transit' through the existing Woodlands Express park and ride services, and exposure to transit in greater Houston or other cities. If someone has never used or experienced a high quality transit service, it can be difficult to understand the potential benefits. Building the culture of transit takes time.



Transit serves a wide range of citizens in communities across the country.

The aim of this plan will be to provide a framework for transit that can be implemented over time, as desired and determined by the local community and decision makers.

The project team took these factors into consideration when examining the study area’s existing conditions, developing potential transit options, and evaluating those options. The team reviewed the existing transit and mobility needs within the study area to identify both the missing gaps in the provision of transit, and the potential ways in which existing transit could be improved. The development and evaluation of options has been further informed by the review of the existing conditions, stakeholder involvement, and the input of the PMC and the Board of Directors.

Figure 5.1 graphically presents the general process followed for the identification and evaluation of potential transit options for the plan.

Figure 5.1: Development of Options and Evaluation



Initial Options – Needs Based Plan

Scoping the Full Range of Options

One of the first activities in the study process involved scoping all of the potential transit related modes and opportunities to create a long list of options for consideration. The project team, the PMC, the Board of Directors, project partners, and stakeholders all had a role in identifying mobility issues and transit needs to form the long list of potential transit options (to address the needs). Options were always considered in the context of the vision for The Woodlands Township Transit Plan that provides overarching guidance for the study.

The vision of The Woodlands Township Transit Plan is to preserve The Woodlands economic competitiveness through increased mobility in the Town Center, the Villages, and existing/emerging activity centers in the area, creating affordable, reliable, accessible, safe solutions.

This vision is supported by the following guiding principles:

- *Builds partnerships to share costs and benefits.*
- *Provides high quality services.*
- *Preserves the commuting services to Houston.*
- *Supports congestion mitigation.*
- *Enhances the multi-modal transportation network.*
- *Results in actionable projects in the near-term and long-term.*

The PMC and the Board of Directors initially identified various opportunities and issues to help shape the creation of options. Table 5.1 provides examples of the key opportunities and issues noted in the initial PMC discussions and first briefing with the Board of Directors.

Table 5.1: Example Issues and Opportunities

Issues and Opportunities
Attract new users to transit (and bring potential transit users into the study process).
Support a reduction in auto travel to (and within) the Town Center.
Provide better connections at the existing Woodlands Express park and ride for pedestrians and cyclists.
Expand regional connectivity through transit.
Consider a modern and attractive fleet of transit vehicles.
Use the web, social media, and other outreach means to better communicate with stakeholders, residents, and businesses.
Build effective people mover system for town center.
Support commuter travel into the study area with transit.
Improve quality of life through reduced congestion.
Continue economic growth (present the study area as ‘the’ place to live, work, play & learn).
Consider bus connections or shuttle between ExxonMobil / Springwoods and the Town Center.
Examine expansion of existing Woodlands Express routes with added service frequencies and potentially new destinations.
Examine potential transit access between The Villages and the Town Center.
Integrate any new transit facilities with pedestrian and cycle links (expand the reach of transit).
Move people within the study area without moving a vehicle.

Long List of Transit Options

The project team worked to identify the full range of potential transit options based on input from the PMC and project stakeholders through a variety of team meetings, multiple focus groups, discussions with local business groups, public presentations to Board of Directors, and an online questionnaire. The outreach used to identify the options occurred throughout late 2013 and early 2014. These efforts resulted in an extensive list of potential options for consideration.



Strong transit information and wayfinding supports the system.

The scoping process resulted in more than 50 potential options for consideration through the initial evaluation. The options included multiple transit and transportation improvements for consideration such as local bus, express bus, rail transit, cycling infrastructure, pedestrian improvements, transportation demand management (TDM) solutions, marketing/branding and wayfinding improvements, parking strategies, etc. All options for the initial evaluation were organized into a matrix and categorized by mode or specific technology. Many of these options are not transit specific. The multi-modal aspects of the options demonstrate the need for a balanced transportation system as each mode influences the success of others and ultimately provides more mobility choice. Table 5.2 lists the wide range of options for consideration through the initial evaluation.

Table 5.2: Initial Evaluation Options

Modes or Technology	Options
Walking	Town Center pedestrian connectivity.
	Pedestrian connectivity to park and ride locations.
	Pedestrian connectivity to transit.
Cycling	Cycle connections and facilities at park and ride locations.
	Cycle connectivity in the Town Center (connectivity, directness, safety).
	Cycle connectivity to transit.
	Provide cycle racks and cycle share programs.
	Implement cycle marketing to educate (cyclists/drivers) and encourage cycle use.
	Signage and wayfinding.
Bus	Town center trolley – review, identify improvements, evaluate expansion and/or adjustments.
	New service between ExxonMobil and the Town Center/Hughes Landing/ park and rides/the Villages/other major destinations.
	New service between the Village Centers and the Town Center.
	New service between Town Center and Conroe.
Bus Rapid Transit (BRT)	Service between major activity centers (hospitals, Lone Star College, etc.).
	BRT/priority measures for service between the Town Center and ExxonMobil.
Express Bus	Express bus branding.
	Express bus capacity increases.

Modes or Technology	Options
	Express bus connection to other key destinations (or Park and Ride locations). Reverse Express bus connectivity. Car pool incentives. Drop off / kiss and ride. Signage - more visible to the wider community. Marketing of the service. Countdown space indicators.
Streetcar/ Tramway	Town Center streetcar – wider circulator.
Light Rail Transit (LRT)	Local LRT connectivity.
Metro (subway)	Heavy rail metro service.
Commuter Rail/High Speed Rail	Commuter Rail service.
Water Transit	Wider connectivity (lake). Long term viability of the Waterway cruiser.
Air	Town Center helipad.
Monorail	Town Center monorail circulator.
Personal Rapid Transit (PRT)	Town Center PRT circulator.
Maglev	Regional Maglev connector.
People Mover	Town Center People Mover circulator.
Transportation Demand Management (TDM) Strategies	Carpooling/ Vanpooling. Car sharing programs. Incentives. Fare strategies. Marketing branding.
Electric Vehicles	Electric vehicles (as they relate to other solutions).
Accessible Transit	Accessible options.
On Demand Service	On demand bus/van.
Taxis	Taxi services.
Driverless Cars	Fully-automated vehicles.

Modes or Technology	Options
Traffic	Traffic considerations.
Parking	Parking strategies.
New Transit Facilities	Dedicated transit priority.
	High Occupancy Vehicle (HOV) lanes.
	Town Center transit center.
	Mini park and ride facilities.

Initial Evaluation

This initial evaluation of the long list of transit options was conducted by the project team to clarify the key transit opportunities to be advanced for development, detailed evaluation, planning, and funding analysis. The initial evaluation was an exercise to identify fatal flaws in specific options or options that may be lower priorities (with less chance for funding or implementation). In many cases the options were advanced, but were combined with others to form complete alternatives. For example, many of the pedestrian and cycle related options were combined with other transit options to strengthen the overall access to transit and to support greater potential for success.

The initial evaluation criteria are presented in Table 5.3 by general categories referred to as accounts. The initial evaluation involved considering the criteria at a conceptual (high) level. The primary goal of the criteria was to identify those options that potentially have the greatest impact in achieving the overall vision of the plan. Additionally, the criteria helped to focus the next phase of the planning process on specific alternatives for further refinement and analysis.

Table 5.3: Initial Evaluation Criteria

Account Descriptions	Initial Evaluation Criteria
Fiscal	<ul style="list-style-type: none"> Reasonable funding availability. Revenue recovery.
Mobility	<ul style="list-style-type: none"> Consistent with the vision statement. Provides improved mobility. Enhances the commuting services to Houston. Supports employment within and surrounding the Township.
Community	<ul style="list-style-type: none"> Enhances connectivity & accessibility (major activity centers). Consistent with master and local planning. High level assessment of built environment benefits/impacts.
Prosperity	<ul style="list-style-type: none"> Potential to support economic competitiveness. Other economic benefits (employee retention, etc.).
Sustainability	<ul style="list-style-type: none"> Potential reduction in auto trips.

Account Descriptions	Initial Evaluation Criteria
Deliverability	<ul style="list-style-type: none"> • Assessment of technical challenges. • Assessment of ease/efficiency of operations and maintenance. • Extent of use of existing infrastructure. • Expansion capability.

Each option was examined qualitatively against the accounts, specifically for potential fatal flaws. The evaluation was organized into a matrix that is included in Appendix C with the outcomes for each option. In general, core options including bus, express bus, cycle, pedestrian, and other complementary strategies (parking, Transportation Demand Management (TDM), etc.) were advanced for further consideration and evaluation. These options were packaged into complete transit alternatives, referred to as scenarios. All of the initial evaluation options had merit; however, the team considered the appropriateness of options in the context of the study area and feedback from stakeholders and elected officials. The performance of those options advanced through the initial evaluation against the accounts is generally described below. Appendix C includes additional details on all initial evaluation options.



Multimodal transportation options create a balanced network.

- Initial Evaluation Bus Options – Bus options for both the Town Center area and the broader study area performed well under most accounts. Bus options specifically support the mobility, community, and prosperity accounts by providing broader mobility options, reinforcing cycle and pedestrian connectivity, and supporting the economic development of the study area (residential, employment, and commercial).
- Initial Evaluation Express Bus Options – The express bus options could provide stronger regional mobility through enhanced Woodlands Express services (including new destinations). In the initial evaluation, these options performed well under the mobility, fiscal, prosperity, and deliverability accounts. Given that the Woodlands Express service currently exists, the ability to expand the services includes lesser financial risks than introducing new services. The service also has the potential to support local businesses and residents, by providing regional mobility options and greater choice of employment locations.

- Initial Evaluation Complementary Strategies – Other strategies such as the implementation of TDM programs, parking management in the Town Center, branding/promotion of transit were all examined through the initial evaluation. These options generally did not stand alone and were considered in conjunction with other transit options. These programs are a critical element to the overall success of transit and performed well under the fiscal, community, mobility, and deliverability accounts. These strategies support the financial and ridership success of transit by educating, promoting, and enhancing the effectiveness of transit for users.

Upon the completion of the initial evaluation, the options were packaged into complete transit alternatives, referred to as ‘scenarios’. The scenarios typically combined potential transit elements with cycle and pedestrian connectivity measures, as well as multiple complementary measures to support transit’s successful operations. The sections below detail the transit scenarios and further describe the additional level of evaluation conducted.

Initial Evaluation Options Advanced

Table 5.4 provides additional details on the formation of transit scenarios, resulting from the initial evaluation.

Table 5.4: Scenarios Resulting from the Initial Evaluation

Scenarios Resulting from the Initial Evaluation
Town Center Mobility Scenario
<p>This scenario examined the transit mobility needs of the Town Center, specifically the potential for new bus services within the Town Center. The scenario includes the following elements and considerations:</p> <ul style="list-style-type: none"> • Potential for new bus services within the Town Center area to allow mobility without using an auto. • Progress a ‘park once’ concept, where those traveling to the Town Center can park in an appropriate lot or structure and then could use the new bus service as a means to travel around the Town Center. • Potential to accommodate a Town Center transit center. • Integration of pedestrian and cycle connectivity to new Town Center transit. • Consideration of the existing Town Center trolley service, including proposed changes to the alignment, stops, and new destinations.
The Woodlands Area (Local) Mobility Scenario
<p>This scenario examined the potential for a local bus network linking key destinations within the study area. The scenario includes the following elements and considerations:</p> <ul style="list-style-type: none"> • Potential for new bus services between the Town Center and surrounding destinations (hospitals, colleges, Villages, major employment centers, etc.). • Staging of services to allow ridership to develop over time to improve the viability and success of each route. • Focus on connecting key destinations within the study area; while future phases considered broader service as far as Springwoods or Conroe. • Integration of pedestrian, cycle, and auto connectivity to transit.

Scenarios Resulting from the Initial Evaluation

Regional Mobility Scenario

This scenario builds off of the existing success of the Woodlands Express park and ride services with potential new services, destinations, and reverse service into study area. The scenario includes the following elements and considerations:

- Potential for expanded services (based on existing park and rides to Houston services).
- Examination of park and ride facilities, the operations, and ease of use for passengers.
- Integration of pedestrian, cycle, and auto connectivity to park and ride locations.
- Examination of reverse commute services from Houston to the study area.

Complementary Strategies

In support of the individual scenarios complementary strategies were identified to enhance the success of current and future transit. The scenario includes the following elements and considerations:

- Creation of a transit education, branding, and promotional campaign to clearly identify the services and help users understand how to access the new transit.
- Examination of cycle and pedestrian connectivity to transit; essentially considering the entire trip and not just the segment of the trip that is transit.
- Consideration of high level Town Center parking strategies to provide parking convenience (through parking turn over).

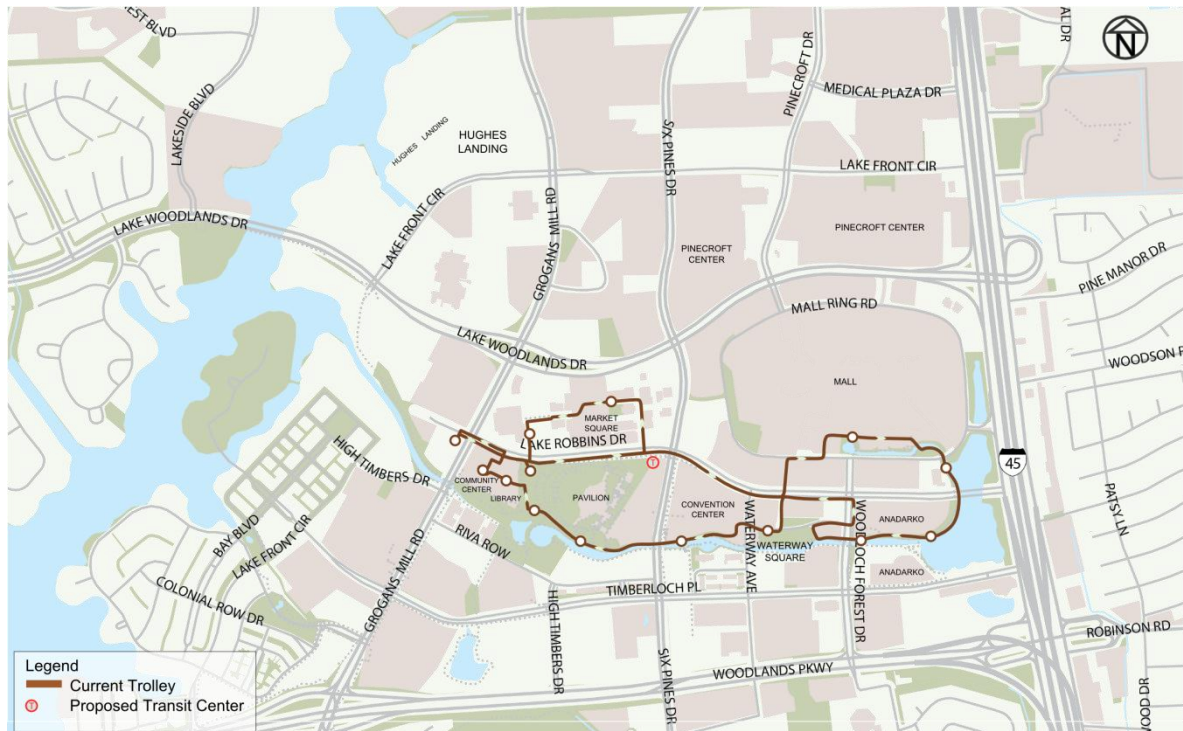
Town Center Mobility Scenario

The scenarios resulting from the initial evaluation were further developed to understand their potential operations, costs, benefits, and impacts through the final level of evaluation and prioritization (described later in the document). Each scenario is presented in the subsequent sections with a summary of the existing conditions (context) to understand the current transit challenges for each scenario. The detailed transit scenario proposals follow the context section.

Context

The Woodlands Township currently contracts with The District to operate the existing trolley service within the Town Center. The trolley service was developed by The District and the Woodlands Development Company during the planning and development of the Town Center. The trolley service and facilities were created using funding made available by the Federal Transit Administration (FTA) to support the purchase of vehicles and the construction of the dedicated right of way / busway infrastructure (located adjacent to the waterway). The service links multiple destinations using replica trolley buses. The service operates within the existing street network and along the dedicated busway. The route of the existing trolley is shown in Figure 5.2. The route is adjusted to accommodate special events.

Figure 5.2: Existing Town Center Trolley



The daily service typically includes two vehicles with a capacity of 35 people each to provide service between 11:00am to 8:00pm (seven days a week). The service operates on a clockwise loop without a timetable, one vehicle operating between 11:00am and 6:00pm, with a second vehicle supplementing (doubling) the service between 1:00pm and 6:00pm. The service is provided free of charge. The route of the trolley is approximately 3.5 miles long. Current ridership is in the order of 103,000 trips per year, this equates to approximately 10 passenger trips per each trolley services round trip.

Expansion of the existing trolley is currently planned to the Hughes Landing area (west of the Town Center). In addition, The Woodlands Township is planning development of a new transit center and an associated parking structure near the intersection of Lake Robbins Drive and Six Pines Drive. The existing trolley will serve the new transit center.

Current Issues

The current routing of the existing trolley provides front door service to several destinations. This requires passing through parking lots, access roads, and valet parking queues, generally resulting in long and circuitous routing.

The operation of the existing trolley as a one way loop also results in extended journey time at least in one direction of travel.

The journey time required to navigate the trolley’s one way loop reduces the competitiveness of the system when compared to other modes. In general, the trolley service is attractive to visitors

with few time constraints, but is not perceived as a mode of transport for employees or locals to move throughout the Town Center.

The lack of a trolley timetable results in significant randomness of the time a trolley will arrive at any stop. This increases the wait times significantly for users. The current circuitous route also



Modern transit facilities can be designed to fit the communities served.

increases the trolley user's journey time and eliminates the opportunity to maximize the use of the vehicles to improve service frequency.

The stakeholder outreach activities were instrumental in obtaining information on the current perceptions of transit and mobility within the Town Center. As noted earlier in the document, the team engaged a wide range of stakeholders through multiple focus group discussions, project open houses, the PMC, the Board of Directors, the project website, and two online questionnaires.

The stakeholder outreach helped the team identify the following benefits and issues related to Town Center mobility and specifically the current trolley services:

- The first questionnaire identified that 83% of the 900+ questionnaire respondents do not use the current trolley service.
- Stakeholders cited their unfamiliarity of the trolley service and the inconvenience of stops as the key reason why they did not use the service.
- Stakeholders also commented that travel time by car is less than the trolley.
- Stakeholders concurred that the trolley service was primarily of benefit to tourists and convention attendees.

The first questionnaire also provided good general information about current mobility and transportation, relevant to the development of local forms of public transit.

- Approximately 72% of those that completed the first questionnaire live in the study area.
- The majority of residents within the study area have access to two or more cars (98% having access to one car and 84% having access to two or more).
- The questionnaire identified that the majority of respondents would not typically walk or cycle to the Town Center.
- Approximately 30% of those that completed the questionnaire travel to The Woodlands Town Center 5-10 times a month.
- Congestion and parking availability during peak times in the Town Center were concerns for many stakeholders (particularly on weekends and holidays).

The Town Center today is approximately 60% built out, with significant development planned on the south side of the Waterway and within the Hughes Landing area. The Town Center suffers from congestion during peak periods. Providing an alternative to auto usage could support the variety of goals outlined for this study, including congestion mitigation in the Town Center.

An important element in any transit network is the connectivity to and from passenger points of accessing the transit system to their intended destination. This is the active element of their trip and can be either walking or cycling. In reviewing walking and cycling connectivity within the Town Center, walking facilities were generally found to be of high quality. However, the broader network for both pedestrians and cyclists is incomplete.

Transit Opportunity

The Town Center has been developed as the core of the community for the study area. The Town Center is a walkable destination, hosting the majority of restaurants, shopping, venues, and urban recreational amenities (such as the waterway area). The Town Center is a destination for area residents as well as a major center of employment. These factors create an opportunity to provide frequent, high-quality, and easy to use transit service to move people throughout the Town Center area (avoiding some auto trips). As development and the associated congestion increases, the ease of driving and parking (even outside of peak times) will become challenging.

The goal of reducing vehicle trips and congestion within the Town Center is possible through the concept of ‘park once’. Those accessing the Town Center via auto would park in an appropriate lot or structure and then use comprehensive transit connections to move throughout the Town Center. While the Town Center trolley service is not seen by many as a means of transportation, it does carry more than 100,000 people annually. Additional modern bus service could complement or replace the trolley by providing frequent, high quality service, on a specific timetable, acting as a true transit system within the Town Center. Such a system offers an opportunity to help support economic development and continued addition of employees, residents, and visitors to the Town Center area by helping to reduce additional auto trips and congestion. The new bus system should focus on increasing transit ridership beyond visitors and convention attendees.

Proposed Future Town Center Bus Service

The future of mobility within the Town Center will focus on choice. Town Center employees, residents, and visitors would benefit from a range of mobility options including walking, cycling, driving, and transit in the near and long term. The development of new transit services for the Town Center proposes a customer focused bus service linking key activity points throughout the Town Center. This service would require visibility, education, and promotion of the new bus service (and to differentiate the new bus service as a transit system vs. the existing Town Center trolley). Convenience, comfort, and reasonable journey times must be achieved for the bus service to be competitive when compared to one’s car, driving, and then parking multiple times to access several destinations in the Town Center area. The new bus service is planned to operate primarily on street to deliver the following objectives:

- Improving routing and connectivity to destinations.
- Providing two way transit operations which reduces wait and journey times, compared to one-way loops.

- Increasing transit service frequency.
- Connecting to more destinations.
- Increasing visibility for a transit option.
- Facilitating a ‘park once’ strategy enabling employees, residents, and visitors to travel efficiently around the Town Center using the bus.
- Supporting peak congestion reduction.

Based upon feedback from the project’s stakeholders, the PMC, the project team, and best practice, the routes described in the following sections were identified to ultimately form a comprehensive bus network for the Town Center area. The routes would provide connectivity to locations that stakeholders have identified as important connection points (places they want to go), such as major employers (Anadarko, etc.), Pinecroft Center, The Woodlands Mall, Memorial Hermann, Hughes Landing, and Riva Row. The new bus service would not preclude the continued operations of the existing trolley and connections could be made between the two systems, if desired.

The core difference between the existing trolley and the potential future bus service is that the new bus would operate as a formal, timetabled transit system to create more frequent, comfortable, reliable, and faster connections throughout the Town Center.

The plan identifies the opportunity to introduce, over time, three new Town Center bus routes. These routes will serve a range of key destinations, at high frequencies (every 10 minutes), and will include improved stop

infrastructure (shelters, cycle racks, signage, etc.). The three route recommendations are detailed in the following sections. Each new bus service will require additional infrastructure. Gaps in the pedestrian and cycle network are identified and will need to be addressed to provide appropriate access to new transit stops. Some stop locations propose new bus turn-outs that allow the bus to move out of the lane of travel to avoid traffic disruptions. The service would operate from 7:30am to 10:00pm (Monday through Friday) and from 11:00am to 10:00pm (Saturday and Sunday). Service frequency could be truncated in the evenings, depending on the demand.



Modern transit vehicles provide visibility for new services.

The focus of the new bus services would be riders that are more sensitive to time constraints including:

- Town Center residents and employees – to avoid auto trips.
- Area and regional residents driving to the Town Center – to ‘park once’ and use transit to move throughout the Town Center for services, work, recreation, shopping, etc.

The potential future bus network and stops are presented in Figure 5.3 and Table 5.5 as the full system build out. Three specific routes are proposed (Figure 5.4) and detailed in the following sections. The three routes are proposed for phasing over time, as development and transit demand grows within the Town Center. The proposed system connects directly with the future transit center, located at the core of the proposed bus system.

Figure 5.3: Proposed Town Center Bus Routes

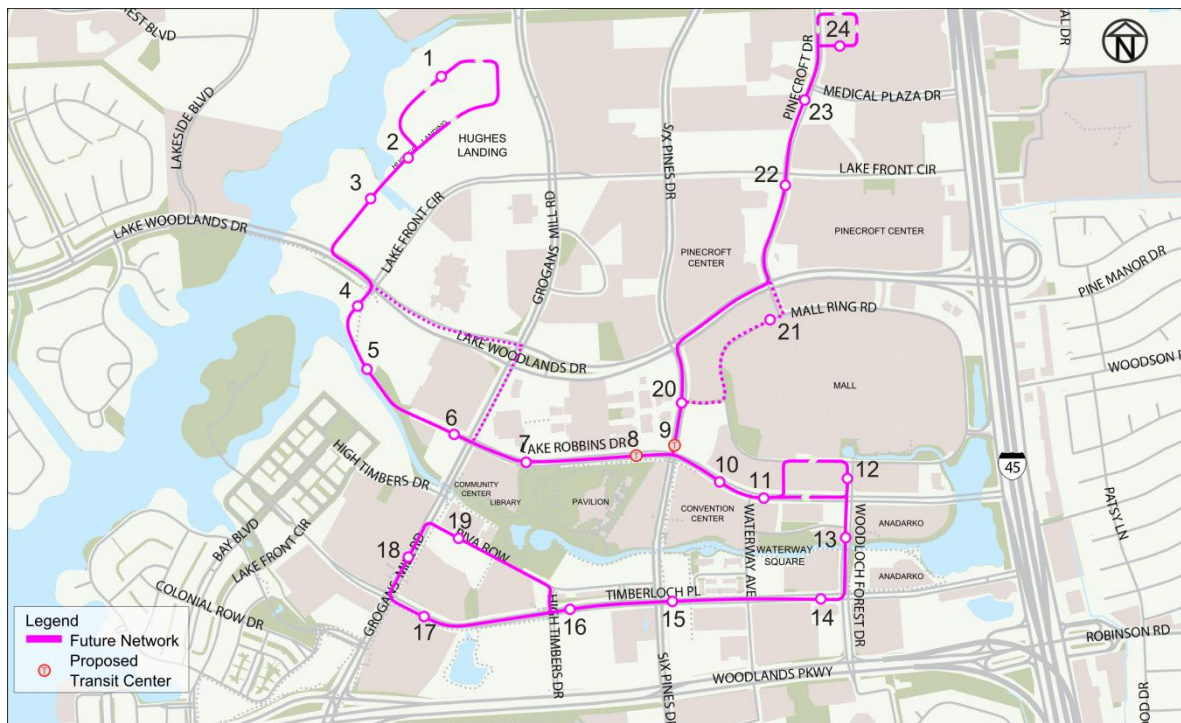
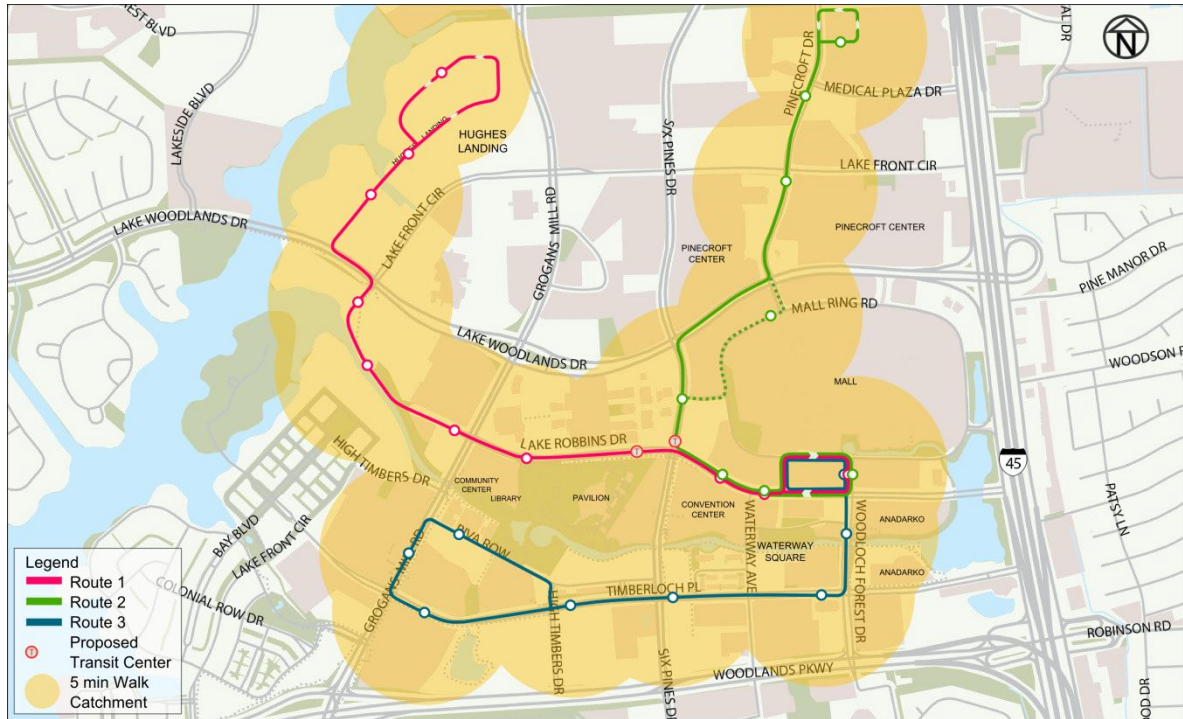


Table 5.5: Proposed Town Center Bus Stops

Proposed Town Center Bus Stops	
1. Hughes Landing	8. Transit Center - Lake Robbins / Pavilion
2. Hughes Landing Boulevard	9. Six Pines Drive / Lake Robbins
3. Hughes Landing	10. Lake Robbins / Convention Center
4. Land Woodlands / Lake Front Circle	11. Lake Robbins / Waterway Ave
5. Lake Robbins Drive	12. The Woodlands Mall (South) - Lake Robbins
6. Lake Robbins / Grogan’s Mill Road	13. Woodloch Forest / Waterway Square
7. Lake Robbins / Library / HEB	14. Timberloch Place / Woodloch Forest

Proposed Town Center Bus Stops	
15. Timberloch Place / Six Pines	20. Six Pines Drive / Market Street
16. Timberloch Place / High Timbers Drive	21. The Woodlands Mall (North) / Mall Ring Road
17. Timberloch Place	22. Pinecroft Drive / Lake Front Circle
18. Grogan’s Mill Road	23. Pinecroft Drive / Medical Plaza Drive
19. Riva Road	24. Memorial Hermann Hospital

Figure 5.4: Proposed Routes of the Town Center Bus System



To aid the development and evaluation of proposed Town Center bus system, the team further utilized input received from multiple outreach activities including discussions with focus groups (Village associations, cycle interests, major employers, The Woodlands Area Chamber of Commerce, public agencies, etc.), public open houses, and two online questionnaires.

Given that no formal transit is provided within the study area, there is no current data to understand the potential demand for such service. In the absence of this data, the project team used the stakeholder input to help guide the development of options. The stakeholder input was considered equally, in combination with guidance from the PMC, the Board of Directors, and the project team’s professional experience, and best practices within the transit industry to form the ultimate recommendations for the plan.

The focus group discussions and online questionnaires provided important insight on the thoughts of area residents and employees within the study area. Questionnaire #2 asked where people would like to board the system and where they would like to travel to (or alight). This question helped to identify the general popularity of potential stops and the likely success of each route. The routes are shown in order of the response rates below:

- Route 1 between the Town Center and Hughes Landing performed best when asked about the potential to board or alight at stops. This is likely due to the potential demand of existing and future employment centers (near Woodloch Forest and Lake Robbins Drive), attractions along Lake Robbins Drive, The Woodlands Mall, and new employees that will ultimately be based in office developments in Hughes Landing. An average of 530 questionnaire respondents identified the desire to use each stop along Route 1.
- Route 2 between the Town Center and Memorial Hermann Hospital received on average of 408 respondents to each stop location. The key destinations again include existing and future employment centers (near Woodloch Forest and Lake Robbins Drive), attractions along Lake Robbins Drive, The Woodlands Mall, Pinecroft Center shops, and medical offices at or near Memorial Hermann.
- Route 3 between the Town Center and Riva Road received on average of 200 respondents to each stop location. This area includes existing residential and office space, with plans to add more in the near future. Given residents have chosen to live in the most urban environment within the study area, it is likely they would be more inclined to use urban style transit services and active transportation modes, if they were available.

The proposed stop locations for all three routes received sufficient positive feedback to suggest they provided good coverage and would aid in the development of mobility within the Town Center. Table 5.6 details a few of the key points expressed by stakeholders regarding the potential for a Town Center bus system through the second online questionnaire.

Table 5.6: Stakeholder Feedback – Town Center Bus System

Stakeholder Feedback – Town Center Bus System	
Of the top ten zip codes for participants in the online questionnaire #2, seven were in the study area, the three remaining areas were on the north side of Houston. This would indicate many of the second online questionnaire participants reside within the study area.	
Would you use The Woodlands Town Center trolley, if it served more activity centers and was more frequent?	
Yes	65.1%
How many trolley trips (round trips) would you likely make per month?	
0-5	59.2%
6-10	22.1%
11-15	6.6%
more than 15	12.2%
What time of day would you most likely use the Town Center trolley?	
Peak work commute times (morning/evening)	36.3%
Midday	55.5%
Evening	40.3%

The sections below set out the details of each of the proposed Town Center bus routes, taking into account the stakeholder feedback received at each milestone of the study.

Route 1 – Town Center Bus (Hughes Landing to Town Center)

Route 1 would provide a critical connection between the Town Center’s area of highest employment density to the rapidly developing Hughes Landing. Route 1 operations would occur predominantly on street with two-way service. This route provides a stop associated with the proposed transit center. Route 1 would also make use of a portion of the future dedicated trolley busway alongside the Waterway between Lake Woodlands Drive and Grogan’s Mill Road. This provides a dedicated connection to stops in the Hughes Landing area. Prior to this segment of the busway being completed, the bus could follow a temporary alignment between Grogan’s Mill Road and Hughes Landing. This route would appeal to employees, visitors, and locals moving around the Town Center. A graphic of Route 1 is shown in Figure 5.5. The service diagram and stop locations are shown in Figure 5.6. Table 5.7 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.5: Town Center Bus Route 1 – Hughes Landing to Town Center

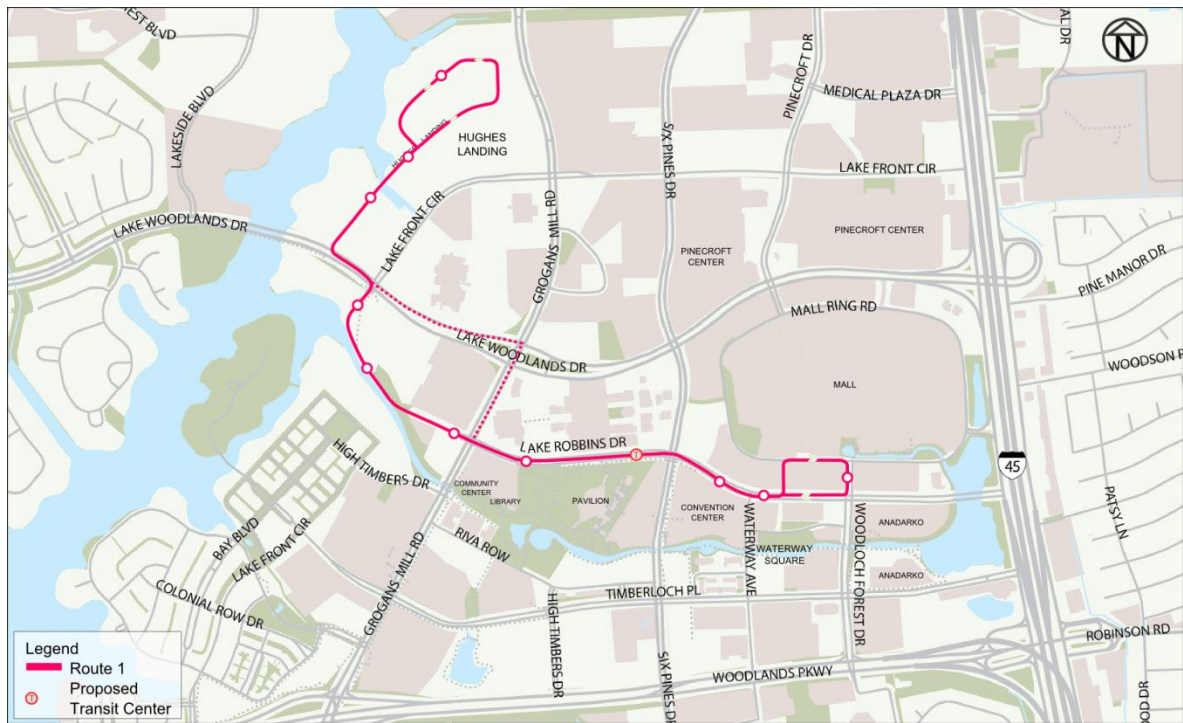


Figure 5.6: Town Center Bus Route 1 – Service Diagram



Table 5.7: Town Center Bus Route 1 - Metrics

Metric	Details	
Route 1:	Town Center to Hughes Landing (two way service, primarily on-street)	
Frequency:	10 minute service (all day)	
Hours of operations:	7:30am to 10:00pm (M-F) and 11:00am-10:00pm (S-S)	
Capital cost:	\$940K	\$940,000
Annual operating cost:	\$800K	\$800,000
Vehicles:	Assumes 5 new buses (30-35' long/ accessible): \$1.5M	\$1,500,000
Measure of success:	Target annual ridership: 132,000	
Priority	Near-term	

Route 1 resulted in strong stakeholder feedback from outreach events and the online questionnaire. Additionally, Route 1 could build on the patronage developed by the existing trolley service. This approach would help reduce the risks to implementation and enhance the potential for success of the service. The route’s stops are within a close walk catchment of major destinations and activity centers within the Town Center.

The second online questionnaire inquired where Route 1 users would likely start and end their journeys. The general response figures are provided in Table 5.8. Stops associated with Hughes Landing and many activity points in the Town Center performed best. This is likely due to a number of new employers preparing to occupy space in Hughes Landing and the attractiveness of other Town Center activity points (shopping, restaurants, etc.). The Route 1 stops generating positive feedback included Hughes Landing, Tinseltown, Library / HEB, Cynthia Woods Mitchell Pavilion and Hughes Landing Boulevard.

Table 5.8: Route 1 Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
Hughes Landing	422	407	829
Hughes Landing Boulevard	240	366	606
Hughes Landing	188	302	490
Land Woodlands / Lake Front Circle	134	214	348
Lake Robbins Drive	31	114	145
Lake Robbins / Grogan’s Mill Road	54	160	214
Lake Robbins / Library / HEB	158	513	671
Transit Center - Lake Robbins / Pavilion	121	527	648
Lake Robbins / Convention Center	100	454	554
Lake Robbins / Waterway Ave	160	607	767
The Woodlands Mall (South) - Lake Robbins / Woodloch Forest	126	387	513

By the end of 2015, the Hughes Landing area will include a 205 bed hotel, restaurants and retail, and three offices towers. Two of the planned office towers will house 1,430 ExxonMobil employees. A further eight office towers are planned with additional retail and leisure facilities.

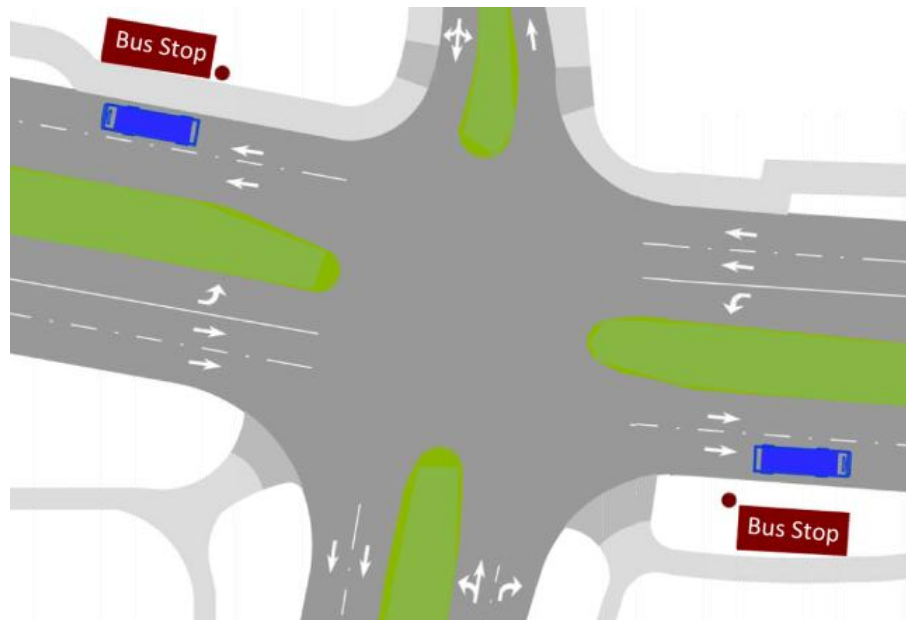
The extension of the bus service to the Hughes Landing area would therefore be dependent on the timing for the completion of the existing and future projects, undertaken as part of the phased development of the bus service.

Route 1 - Infrastructure Required

Each new Town Center bus route would require basic capital improvements to implement the services. The Town Center currently has a strong walking environment and this existing infrastructure will serve as a good basis to develop new, high quality transit stops.

To aid the development and operation of each route, including Route 1, the stop infrastructure is proposed to be provided at all new stop locations. In most locations this would be on both sides of the particular street to facilitate two way service operations. A typical arrangement of the stops with no bus bays is shown in Figure 5.7.

Figure 5.7: Typical Stop Arrangement (Without Bus Bays)



Within the Town Center, most stops would be on street, with the stop directly adjacent to the existing sidewalk. Some sidewalk improvements may be needed to accommodate the new stops and ensure the flow of pedestrians. In most cases, new Town Center buses would stop within the shoulder of the existing travel lanes to pick up passengers. On roadways with higher speeds and higher volumes of traffic, bus turn outs are proposed to avoid significant disruption to traffic. In general, buses would stop for a brief period of time (typically 15 seconds at a standard stop) to allow passengers to board / alight and then continue. Bus driver training provides the knowledge and experience to operate the bus consistent with the timetable. Drivers will adjust their driving to account for specific conditions to ensure they arrive at each specific stop at the required time,

meeting the expectations of riders and limiting dwell time at the stop (and the potential disruption to traffic).

Route 1 would also require the construction of a new connection to the Waterway busway at the west end of Lake Robbins Drive. This connection would allow the route to seamlessly link to the future extension of the Waterway busway towards Hughes Landing. Prior to this connection being complete, Route 1 could temporarily connect to Hughes Landing on-street, via Grogan's Mill Road and Lake Woodlands Drive.

Each bus stop would have a consistent set of elements to create a comfortable and safe environment for bus users. Each stop location is proposed to include:

- Bus shelter (rain / sun protection).
- Seating.
- Route map and timetable information.
- Stop flag / transit branding.
- Provision for cycles (cycle racks or storage).

A typical stop layout with a bus bay and amenities is shown in Figure 5.8.

Figure 5.8: Typical Bus Stop Layout (With Bus Bay)



It is proposed that new transit vehicles be introduced for use on the new Town Center bus routes. The current replica trolley vehicles used for the Town Center trolley service are generally perceived as a tourist amenity (based on stakeholder feedback received throughout the study). The trolley vehicle's wooden seating does not provide the expected level of comfort for most transit riders (as a formal mode of transportation). The trolley vehicles include lifts to provide full accessibility; however, the lifts take considerable time to deploy and load passengers in wheelchairs. The current two step / single door trolley entry also extends loading times and can be

difficult for seniors or those with limited mobility to maneuver. Given that the current trolley does not run to a specific timetable and focuses generally on visitors, loading times and comfort for regular riders is not currently a significant issue.

Developing a formal transit service that successfully attracts repeat and regular riders from the local community and employees will require modern and comfortable transit vehicles.

The Woodlands should strive to introduce vehicles focused on passenger comfort, faster boarding, and with appropriate seats / space. New vehicles with simple low-floor boarding allow quick and easy access for riders with various levels of mobility. These vehicles will support the reliability of the service by creating fast and predictable boarding that allows the drivers to meet the timetable schedule.

A specific vehicle would ultimately be determined based on price and the ability to meet the needs of the new routes. However, the project team identified an example vehicle for costing purposes: the New Flyer MiDi.

The MiDi is a medium-sized, low-floor bus constructed in Minnesota. The low-floor configuration is designed for simple accessibility by passengers of varying mobility, combined with a sloping wheelchair ramp for full accessibility. These vehicles are readily available in the marketplace and certain elements (interiors, doors, etc.) may be tailored for specific needs. The vehicles are medium sized, generally 30-35 feet long. This is shorter than the typical



Modern transit vehicles can be used for smaller communities.

Houston METRO bus of 40 feet in length. The MiDi is maneuverable through urban streets with a tight turning radius. The vehicle seats 24-35 passengers, depending on the configuration, and can have a full capacity of 53-66 passengers, including standees. These vehicles could be purchased or leased. However, for purposes of the study, the team assumed any vehicles for the Town Center bus or local area buses would be purchased. This allows for a conservative presentation of vehicle costs.

Route 1 – Capital Costs

Capital and operating costs have been estimated to support the development and evaluation of the proposed transit scenarios in this plan. The capital cost estimates are based upon local unit costs for each element of infrastructure identified. Transit vehicle costs are based on manufacture pricing. The cost estimates are based upon a high level assessment of the potential infrastructure

and construction work required. Further project development and cost estimation would be required if any proposals are to be progressed. The local cost rates used for estimates in the plan are presented in Table 5.9.

Table 5.9: Capital Cost Assumptions

Element	Unit Cost
Stops / Park and Ride	
Specialized bus shelter	\$22,500 (each)
Pedestrian LED fixture	\$3,195 (each)
Pedestrian light foundations	\$975 (each)
Bench (integrated within shelter)	\$1,000 (each)
Cycle rack 10' (park and ride)	\$400 (each)
Cycle rack (bus stops)	\$300 (each)
Vehicles	
Accessible bus vehicles (New Flyer MiDi as example bus)	\$300,000 (each)
General Infrastructure	
Roadway / pavement	\$8.50 (per square foot)
Sidewalk	\$5.00 (per square foot)
Project management / design / contingencies	30%

Planning level cost estimates for Route 1 are presented in Table 5.10. The operation of the route would require the procurement of five accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$2,440,000. Within the Town Center, bus turnouts would displace only ten on street parking spaces.

Table 5.10: Route 1 - Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$540,000
Connection to Waterway busway	\$110,000
Bus turn outs	\$45,000
Cycle and pedestrian connections	\$35,000
Project management / design / contingencies	\$210,000
Accessible bus vehicles	\$1,500,000
Total	\$2,440,000

Route 1 – Operations

The project team developed time timetables for each proposed route, to ensure the operations were achievable. The team examined the distances between stops, dwell time assumptions for stops, and general variations for traffic and conditions to create Town Center bus timetable operating with 10 minute frequencies. The proposed timetable for Route 1 is detailed in Figure 5.9.

Figure 5.9: Route 1 - Weekday Timetable



Bus Route 1										
Town Center to Hughes Landing										
<i>Monday through Friday</i>										
<i>Timepoint (see Map)</i>										
1	2	3	4	5	6	7	8	9	10	11
Town Center	Lake Robbins/ Waterway Ave	Lake Robbins/ Convention Ctr	Lake Robbins/ Pavilion	Lake Robbins/ Library/HEB	Lake Robbins/ Grogan's Mill Rd	Lake Robbins Dr	Lake Woodlands/ Lake Front Cir	Hughes Landing	Hughes Landing Blvd	Hughes Landing
MORNING TRIPS										
7:30 AM	7:31 AM	7:32 AM	7:33 AM	7:34 AM	7:35 AM	7:36 AM	7:37 AM	7:38 AM	7:39 AM	7:40 AM
<i>Every 10 minutes</i>										
11:50 AM	11:51 AM	11:52 AM	11:53 AM	11:54 AM	11:55 AM	11:56 AM	11:57 AM	11:58 AM	11:59 AM	12:00 PM
AFTERNOON / EVENING TRIPS										
12:00 PM	12:01 PM	12:02 PM	12:03 PM	12:04 PM	12:05 PM	12:06 PM	12:07 PM	12:08 PM	12:09 PM	12:10 PM
<i>Every 10 minutes</i>										
9:50 PM	9:51 PM	9:52 PM	9:53 PM	9:54 PM	9:55 PM	9:56 PM	9:57 PM	9:58 PM	9:59 PM	10:00 PM

A summary of the service frequencies are detailed below.

- Weekdays – 7:30am to 10:00pm – 10 minute service.
- Weekend – 8:00am to 10:00pm – 10 minute service (later service could be considered to accommodate evening attractions and restaurants).

Route 1 - Operating Costs

The operating cost estimates are based upon the current costs associated with the provision of the Town Center trolley and The Woodlands Express services for the bus and express services respectively. The bus service cost estimates assume vehicles would be purchased, with the costs included in the capital cost estimate. The express bus services assume the fixed cost of operation related to the individual park and rides services would not increase. The operating costs for express bus services also assume buses would be provided by the service provider, with the associated cost included in the hourly service rate.

Table 5.11: Operational Cost Assumptions

Element	Cost Rate (cost per revenue hour)
Town Center Bus Service	\$62.34
Local Bus Services	\$62.34
Express Bus Services	\$207.75

The cost information presented in this section is the total for operations and capital items. These costs make no assumptions about the potential for grants, revenues, or other funding means. Costs are presented in this manner to allow project stakeholders, partners, and decision makers to understand the full cost for such improvements. Grants, revenue, and other funding mechanisms are currently supporting mobility within the study area and would likely support a significant portion of the proposed transit improvements. Potential funding sources for all proposed improvements is discussed in Chapter 6.

With approximately 12,800 service hours annually, the operating costs for Route 1 would be in the order of \$800,000 per year. The operating cost estimates are based upon the operation of the modern, accessible style of bus and the timetable outlined above. The operation of the route would require four operating vehicles with an additional spare vehicle. Table 5.12 presents the planning level operating cost estimates for Route 1.

Table 5.12: Route 1 – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
12,800	\$62.34	\$800,000

In the absence of an established forecasting tool for transit ridership for The Woodlands, an estimated target ridership for the service has been developed. The targets are based on the current trolley service parameters and ridership performance, extrapolated with the proposed bus service improvements and service parameters. Currently the trolley service has 103,000 riders per year, equating to a cost per rider of \$2.31. The service is free to the rider and this cost is addressed through a variety of grants and local hotel occupancy fees (paid by visitors). The new bus routes would include increased frequencies and longer shoulder hours (periods outside of peak times, where less ridership will be generated). The advantage of increased shoulder hours is improved customer perception and usability, which over time will help reinforce the use of the system and its overall success. In simple terms, many people will choose to ride the system because they know it will be available if they need it at off times (early morning, mid-day, later evening), even though the majority of passengers will only use the service during peak periods.

The service must be available throughout the shoulder times to encourage ridership (and rider confidence) during the peaks.

The future Route 1 target ridership should be in the order of 132,000 riders per year, which would equate to a cost per rider of \$6.00. The increase in cost per rider is due to the significant improvements in the service quality proposed, which includes increased service frequency and

two-way operation. It is expected that ridership would increase over the first few years of operation, reducing the cost per rider. It is recommended that the Town Center bus service remain free to riders to encourage its success. Alleviating congestion and parking demand now and in the future can be supported with a successful Town Center bus system. It is in the best interest of Township to support congestion mitigation through mobility choice as a means to continue the development and growth of the Town Center area. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.

Route 2 – Town Center Bus (Memorial Herman to Town Center)

Route 2 is focused on serving areas to the north of the Town Center, providing connections to the retail and medical facilities along the route. These areas were identified as high demand stops through the public outreach efforts undertaken for the project. The route will provide a two way service along Lake Robbins Drive and Pinecroft Drive. This route provides a stop associated with the proposed transit center for transfer among Town Center bus routes (multiple shared stops allow transfer at several points). Based on feedback received, an additional stop is being considered along the Mall Ring Road on the north side of The Woodlands Mall.

Route 2 crosses jurisdictional boundaries between The Woodlands Township and the City of Shenandoah, where the Memorial Hermann Hospital is located. Both of these communities are included in the study area and fall within the area of transit provision for the Conroe-The



The Woodlands Town Center is a major destination for work, recreation, and retail.

Woodlands UZA. The area around Memorial Hermann is continuing to grow, adding more commercial, office, and hotel uses now and in the future. The users of this area will desire a simple connection to the amenities provided in the core of the Town Center. Currently those staying in hotels or using the medical facilities will need to travel the short distance by car and park to access the Town Center. The new bus connection would support avoiding these auto trips and the associated demand on parking. It would

also support employees, visitors and locals that are parked in the Town Center to park once and use the bus to access the shopping and service along the route. It is in the best interest of both communities to support the Route 2 connection to enhance the areas commerce and support congestion relief now and in the future.

A graphic of Route 2 is shown in Figure 5.10. The service diagram and stop locations are shown in Figure 5.11. Table 5.13 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.10: Town Center Bus Route 2 – Memorial Hermann to Town Center



Figure 5.11: Town Center Bus Route 2 – Service Diagram



Table 5.13: Town Center Bus Route 2 – Metrics

Metric	Details	
Route 2:	Memorial Hermann to Town Center (two way service, on-street)	
Frequency:	10 minute service (all day)	
Hours of operations:	7:30am to 10:00pm (M-F) and 11:00am-10:00pm (S-S)	
Capital cost:		\$450,000
Annual operating cost:		\$600,000
Vehicles:	Assumes 3 new buses (30-35' long/ accessible):	\$900,000
Measure of success:	Target annual ridership: 100,000	
Priority	Mid-term	

Route 2 resulted in the second highest performance based on input from project stakeholders. This route’s connectivity between the medical facilities and popular retail areas north of the Town Center were identified as key destinations where stakeholders would likely travel. This connection

would allow medical workers to access the retail centers along Pinecroft, Lake Robbins and at the Mall. These areas are currently auto oriented developments with ample parking. However, continued urban style development within the Town Center may cause a “spillover” effect, making these sites attractive for more intensive development. As demand for developable land increases in prime areas of the Town Center, parking areas may be desirable for conversion to development sites to support increased economic development. Additionally, those with limited mobility or no access to vehicles also desire access to the medical and retail areas along Six Pines Drive, north of the core of the Town Center.

The second online questionnaire inquired where Route 2 users would likely start and end their journeys. Many of the stops combined with Route 1 in the core of the Town Center performed well (for example, The Woodlands Mall (South), Lake Robbins / Waterway Avenue, etc.). Those stops unique to Route 2 and the stakeholder feedback received through questionnaire #2 are presented in Table 5.14. Stops that garnered significant interest were focused on the Market Street area, Pinecroft retail area, and the Memorial Hermann Hospital.

Stakeholders also identified the desire for a stop to access the north side of The Woodlands Mall. The route has been adapted to follow the Mall Ring Road and allow for a stop in this area. This stop location would need to consider walking connectivity between the stop and the mall entrance across the parking lot.

A clear and safe pedestrian route would need to be provided for transit users alighting at The Woodlands Mall (north) stop to provide walking access to the entrance on the mall’s north side.

Moving the stop closer to the mall entrance was considered; however, maneuvering the bus through the mall parking lot congestion would likely create longer and unpredictable travel times, impacting the reliability of the route. While this stop may be attractive to some users, most potential Town Center bus users accessing the mall would likely use the main entrance on the south side. The southern mall access provides the most attractive and comfortable walking environment.

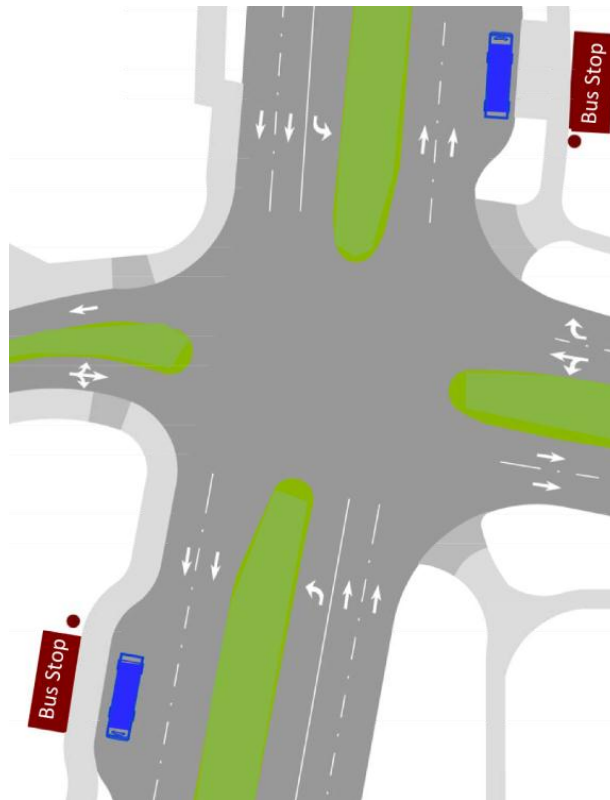
Table 5.14: Route 2 Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
Transit Center - Lake Robbins / Six Pines Drive	111	442	553
Six Pines Drive / Market Street	169	555	724
The Woodlands Mall (North) / Mall Ring Road	N/A (stop added later based on feedback)		
Pinecroft Drive / Lake Front Circle	49	171	220
Pinecroft Drive / Medical Plaza Drive	46	202	248
Memorial Hermann Hospital	125	317	442

Route 2 – Infrastructure Required

New Town Center bus routes would require basic capital improvements to implement the services. Bus stop infrastructure is proposed to be provided at all new stop locations. In most locations this would be on both sides of the particular street to facilitate two way operations. Potential stops along Pinecroft Drive would include bus turnouts to aid in the efficient operations of the bus services. The turnouts would allow space for the bus to move out of the lane of travel so passengers can board and alight. Turnouts are desirable along the route at some stops where the space exists and traffic impacts may be a concern. Turnouts are not proposed at all stops, specifically in more urban parts of the Town Center where traffic is generally slower, limited sidewalk space exists, and stopping would result in only momentary impact to traffic. A typical stop arrangement with a bus bay is presented in Figure 5.12.

Figure 5.12: Typical Stop Arrangement



Each bus stop would have a consistent set of elements to create a comfortable and safe environment for bus users. Each stop location is proposed to include:

- Bus shelter (rain / sun protection).
- Seating.
- Route map and timetable information.
- Stop flag / transit branding.
- Provision for cycles (cycle racks or storage).

Route 2 – Capital Costs

Planning level cost estimates for Route 2 is presented in Table 5.15. The assumptions for local unit costs were previously presented in Table 5.9. The operation of Route 2 would require the procurement of three accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$1,340,000.

Table 5.15: Route 2 - Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$250,000
Bus turn outs	\$15,000
Cycle and pedestrian connections	\$65,000
Project management / design / contingencies	\$110,000
Accessible bus vehicles	\$900,000
Total	\$1,340,000

Route 2 – Operations

The project team developed timetables for each proposed route, to ensure the operations were achievable. The team examined the distances between stops, dwell time assumptions for stops, and general variations for traffic and conditions to create Town Center bus timetables operating with 10 minute frequencies. The proposed timetable for Route 2 is detailed in Figure 5.13 below.

Figure 5.13: Route 2 - Weekday Timetable



Bus Route 2							
Town Center to Memorial Hermann							
<i>Monday through Friday</i>							
<i>Timepoint (see Map)</i>							
1	2	3	4	5	6	7	8
Town Center	Lake Robbins Dr/ Waterway Ave/Inseltown	Lake Robbins Dr/ Convention Ctr	Lake Robbins Dr/ Six Pines Dr	Six Pines Dr/ Market St	Pinecroft Dr/ Lake Front Cir	Pinecroft Dr/ Medical Plaza Dr	Memorial Hermann
MORNING TRIPS							
7:26 AM	7:27 AM	7:28 AM	7:30 AM	7:31 AM	7:32 AM	7:33 AM	7:34 AM
<i>Every 10 minutes</i>							
11:46 AM	11:47 AM	11:48 AM	11:50 AM	11:51 AM	11:52 AM	11:53 AM	11:54 AM
AFTERNOON TRIPS							
12:00 PM	12:01 PM	12:02 PM	12:04 PM	12:05 PM	12:06 PM	12:07 PM	12:08 PM
9:50 PM	9:51 PM	9:52 PM	9:54 PM	9:55 PM	9:56 PM	9:57 PM	9:58 PM

A summary of the service frequencies are detailed below.

- Weekdays – 7:30am to 10:00pm – 10 minute service.
- Weekends – 8:00am to 10:00pm – 10 minute service.

Route 2 - Operating Costs

With approximately 9,600 service hours annually, the operating costs for Route 2 would be in the order of \$600,000 per year. The operating cost estimates are based upon the operation of the modern, accessible style of bus and the timetable outlined above. The operation of the route would require two operating vehicles with an additional spare vehicle. Table 5.16 presents the planning level operating cost estimates for Route 2.

Table 5.16: Route 2 – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
9,600	\$62.34	\$600,000

The future Route 2 target ridership should be in the order of 100,000 riders per year, which would equate to a cost per rider of \$6.00. As noted for Route 1, it is recommended that the Town Center bus service remain free to riders to encourage it success. Alleviating congestion and parking demand now and in the future can be supported with a successful Town Center bus system. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.



Route 3 – Town Center Bus (Riva Row to Town Center)

Route 3 focuses on connecting the core of the Town Center to the rapidly developing areas on the south side of the Waterway. The area south of the Waterway along Woodloch Forest Drive and Timberloch Place includes both existing and planned residential and office space. This area includes plans for future dense residential development (apartments, condos, and townhomes). Anadarko is advancing plans to develop their third office tower along this route. Route 3 would operate as an extension of Route 2. The combined operations of routes 1 and 2 would provide seamless connections along the extent of the route from Riva Row, through the core of the Town Center, to Memorial Hermann Hospital. The route would provide a two way service along the majority of Woodloch Forest Drive and Timberloch Place, with a single direction loop serving the last three stops to the west (Timberloch Place, Grogan’s Mill Road and Riva Row).

Route 3 is more of a residentially-focused route. One goal of this route is for those living within the Town Center to avoid auto trips and parking. Currently, those living within the Town Center but outside of walking distance to its core (less than one-quarter to one-half mile) are likely to drive into the core of the Town Center. The



Safe and strong pedestrian links are critical to transit connectivity.

The lack of a transit connection or direct pedestrian and cycle connections creates an environment that encourages auto travel for very short distances. Unless new mobility options are created as the residential areas south of the Waterway develop, this pattern of driving will only increase, further compounding the congestion and parking challenges in the Town Center. A combination of transit as well as direct pedestrian and cycle connections would provide the widest range of choice over auto travel. The Woodlands Development Company is currently considering a new pedestrian bridge connecting Timberloch Place to the Waterway Square area, as part of broader improvements to Waterway Square. This connection is a good start, but additional improvements must continue to address the mobility needs of residents and broader connections throughout the Town Center.

A graphic of Route 3 is shown in Figure 5.14. The service diagram and stop locations are shown in Figure 5.15. Table 5.17 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.14: Town Center Bus Route 3 – Riva Row to Town Center



Figure 5.15: Town Center Bus Route 3 – Service Diagram

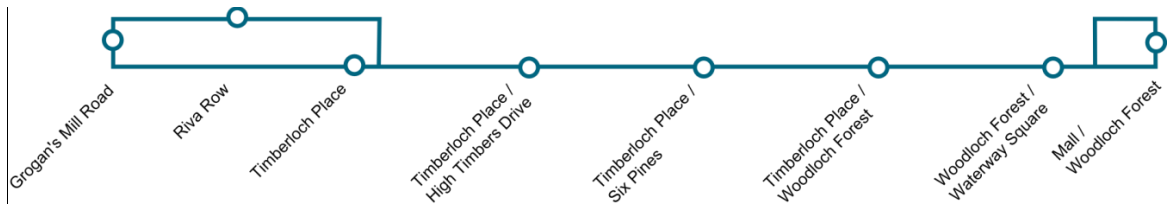


Table 5.17: Town Center Bus Route 3 – Metrics

Metric	Details	
Route 3:	Riva Row residential to Town Center (two way service, on-street) as an extension of Route 2	
Frequency:	10 minute service (all day)	
Hours of operations:	7:30am to 10:00pm (M-F) and 11:00am-10:00pm (S-S)	
Capital cost:		\$550,000
Annual operating cost:		\$600,000
Vehicles:	Assumes 3 new buses (30-35' long/ accessible):	\$900,000
Measure of success:	Target annual ridership: 100,000	
Priority	Mid-term	

Of the three Town Center bus routes proposed, this route received the least response through the public outreach efforts and the online questionnaires. This is likely due to the fact that, although significant future development is planned for the area this route is intended to serve, there is relatively little existing development in this area. Future demand is likely to have significant impact on the viability of Route 3. The implementation of this route should be timed to appropriately coincide with future development in the area.

The second online questionnaire inquired where Route 3 users would likely start and end their journeys. Those stops unique to Route 3 and the stakeholder feedback received through questionnaire #2 are presented in Table 5.18. The stop at Woodloch Forest Drive and Waterway Square Place generated higher interest from stakeholders. This is likely due to the existing office towers at this location. With the development of Anadarko’s third tower, this area (and south) will likely increase in popularity as a destination for employees.

Much of the future multi-family residential development planned for the Town Center would occur along Riva Row between the Waterway and Timberloch Place.

While stakeholders did not currently identify the Riva Row area as a key origin or destination point, this will likely evolve as development in the area is realized.

Table 5.18: Route 3 Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
Woodloch Forest / Waterway Square	69	294	363
Timberloch Place / Woodloch Forest	59	134	193
Timberloch Place / Six Pines	55	139	194
Timberloch Place / High Timbers Drive	20	89	109
Timberloch Place	32	98	130
Grogan’s Mill Road	88	165	253
Riva Road	42	145	187

Route 3 – Capital Costs

Planning level cost estimates for Route 3 are presented in Table 5.19. The assumptions for local unit costs were previously presented in Table 5.9. The operation of Route 3 would require the procurement of three accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$1,450,000.

Table 5.19: Route 3 - Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$420,000
Bus turn outs	\$0
Cycle and pedestrian connections	\$10,000

Capital Item	Estimated Cost
Project management / design / contingencies	\$120,000
Accessible bus vehicles	\$900,000
Total	\$1,450,000

Route 3 – Operations

The project team developed timetables for each proposed route, to ensure the operations were achievable. The team examined the distances between stops, dwell time assumptions for stops, and general variations for traffic and conditions to create Town Center bus timetables operating with 10 minute frequencies. The proposed timetable for Route 3 is detailed in Figure 5.16 below.

Figure 5.16: Route 3 - Weekday Timetable



Bus Route 3							
Riva Row to Town Center							
<i>Monday through Friday</i>							
<i>Timepoint (see Map)</i>							
1	2	3	4	5	6	7	8
Town Center	Woodloch Forest/ Anadarko	Timberloch Pl/ Waterway Sq	Timberloch Pl/ Six Pines Dr	Timberloch Pl/ High Timbers	Timberloch Pl/ Grogan's Mill Rd	Grogan's Mill Rd/ Parkwood	Riva Row/ Grogan's Mill
MORNING TRIPS							
7:30 AM	7:31 AM	7:32 AM	7:34 AM	7:35 AM	7:36 AM	7:37 AM	7:38 AM
<i>Every 10 minutes</i>							
11:52 AM	11:53 AM	11:54 AM	11:56 AM	11:57 AM	11:58 AM	11:59 AM	12:00 PM
AFTERNOON TRIPS							
12:02 PM	12:03 PM	12:04 PM	12:06 PM	12:07 PM	12:08 PM	12:09 PM	12:10 PM
9:52 PM	9:53 PM	9:54 PM	9:56 PM	9:57 PM	9:58 PM	9:59 PM	10:00 PM

A summary of the service frequencies are detailed below.

- Weekdays – 7:30am to 10:00pm – 10 minute service.
- Weekend – 8:00am to 10:00pm – 10 minute service.

Route 3 - Operating Costs

Similar to Route 2, Route 3 would require approximately 9,600 service hours annually. This would equate to an annual operating cost in the order of \$600,000 per year. The operating cost estimates are based upon the operation of the modern, accessible style of bus and the timetable outlined above. The operation of the route would require two operating vehicles with an additional spare vehicle. Table 5.20 presents the planning level operating cost estimates for Route 3.

Table 5.20: Route 3 – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
9,600	\$62.34	\$600,000

The future Route 3 target ridership should be in the order of 100,000 riders per year, which would equate to a cost per rider of \$6.00. As noted previously for Routes 1 and 2, it is recommended that the Town Center bus service remain free to riders to encourage its success. Alleviating congestion and parking demand now and in the future can be supported with a successful Town Center bus system. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.

Complementary Strategies

In support of transit, active transportation, parking, and congestion minimization, the plan examined various complementary strategies to support the potential success of the transit



Branding of transit creates an identity and association for riders.

scenarios. These strategies are typically referred to as Transportation Demand Management (TDM) tools to support mobility choices. The complementary strategies presented here are aimed at enhancing the success of transit while expanding the mobility choices for area residents, employees, and visitors. These complementary strategies cross all of the scenarios (Town Center Mobility, The Woodlands Area Mobility, and Regional Mobility). These complementary strategies

examined are detailed below. Additional details are provided in Chapter 6 in the branding, marketing, and communications section.

Transit Branding and Promotion

All scenarios considered under this plan should be paired with a comprehensive branding, promotion, and education program for all transportation modes/facilities (transit, active transportation, parking, etc.). This would include the new bus services proposed for the Town Center, as well as all other transportation services (Woodlands Express, local services, etc.). The program would seek to:

- Educate transit users and potential transit users on the existing and new services.
- Develop a clear identity for the various transit services that makes it easy to understand what the services are and how to use them.
- Promote the services and attract new users (focused on specific market segments).
- Build a ‘culture of transit’ among the community that promotes the high quality services.

The branding, promotion, and education campaign should be a near-term priority to be implemented with the introduction of each new service.

The development of a recognizable brand for each transit/transportation option would support the project’s goal of reducing congestion, supporting convenient parking, and providing transportation choice for area residents, employees, and visitors. The brand could be applied to the Town Center bus service, The Woodlands Express, cycle facilities, pedestrian facilities, parking, other local bus lines, etc. The CHOICES brand developed for this study could serve as a basis for branding a new multi-modal system within the study area.

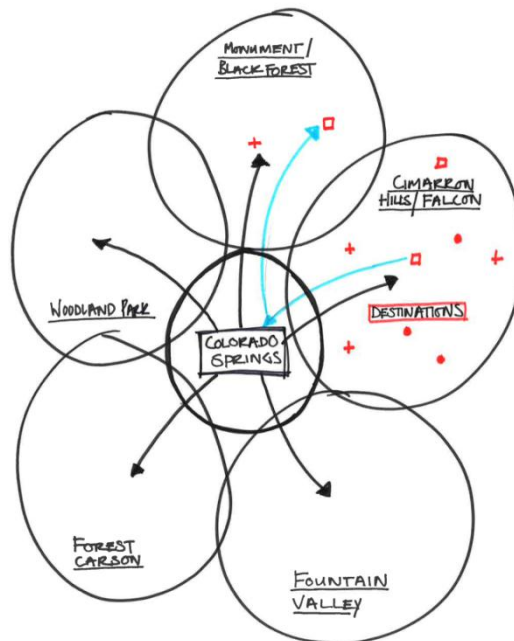
A transit system brand is more than just a graphic image; it is an identity that should reflect the combined attributes of the local community and the transit system.

Typically, a brand is built with input from the local community to identify the key features and important aspects of the area (and how they integrate with transit and mobility). In the case of The Woodlands Township Transit Plan, this could include statements like:

- History of comprehensive planning
- Building a strong sense of community.
- Integrating development and nature (trees, lakes, etc.).
- Fast, frequent, and high quality transit.
- Vitality and activity of the Town Center.

The bullets above are simply examples of the types of statements that could inform the development of a multi-modal transportation brand. It is from community generated topics that a brand and style could be created that clearly represent transit. Figure 5.17 presents the start of a branding and wayfinding charrette effort. The style and branding is then used to identify transit throughout the community. As with major companies, people ultimately identify the brand with the service or product provided. This is the same for transit and other modes. A recognizable brand is powerful and can be used in a range of promotions to help build ridership.

Figure 5.17: Example Branding / Wayfinding Design Charrette Graphic



This study team has been involved in the development of multiple branding campaigns. The team recently developed and implemented the SHIFT campaign for the San Diego Association of Governments (SANDAG). The SHIFT campaign is a new brand for SANDAG’s TDM programs aimed at transit education and encouraging multi-modal travel. Additionally, the team developed a brand (GoGlendale) for the City of Glendale in the Los Angeles area. Both the SHIFT and GoGlendale brands are being used on all manner of outreach materials, online promotions, billboards and advertising, etc.

The detailed style guide developed for the CHOICES brand for The Woodlands Township Transit Plan is included in Appendix D.

Online Information

The success of the transit system would also be supported by the development of a single central website to disseminate transit information. Currently information is provided on a number of different websites, with conflicting or duplicate information presented. A standalone website with a unique URL should be developed to incorporate the new branding and messaging scheme. Information should be easy to access, simple to understand, and the website should be the primary source of information for all transit/transportation choices in the service area. Some initial information may include:

- Information on using all modes (transit, cycle, pedestrian, parking, etc.).
- User-friendly guides on how to use the services.
- Simple schedules and maps (printable, downloadable) that are updated regularly.
- Alerts about upcoming and recent schedule changes or expanded services.
- Mechanism to purchase transit fares online (including monthly passes).
- Future transit plans.

- Sign up for e-blasts on service updates.

The website could be expanded as the system grows to incorporate an industry-standard interactive journey planner such as Google Transit that display transit, walking, and cycling options to connect between services. The goal of the journey planner is to provide complete trip instructions to a user, versus simply providing the one transit segment of their trip.

Links to two example transit agency websites and journey planners are provided below. These websites were developed and maintained by the project team.

The transit website examples show the power of providing transit information in a simple manner that is easily accessible via the web.

The EMBARK site was launched as part of a re-branding of the Oklahoma City transit system in 2014. This is a relatively simple site with core transit information and critical links to interactive bus route maps. This basic style of website could be a starting point as a transit portal for The Woodlands. The Dundee Travel Info site goes further by providing a fully functional journey planner (all modes) and real time information for bus services. This level of information could be a longer term aspiration.

- Central Oklahoma Transportation and Parking Authority (now EMBARK).

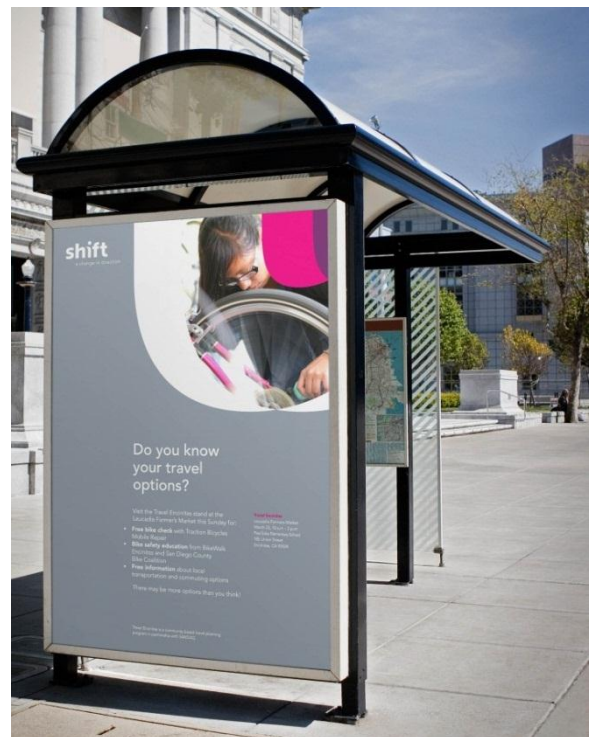
www.embarkok.com

- Dundee Travel Info – Dundee City Council.

www.dundeetravelinfo.com

Building Transit Ridership and Loyalty

When addressing transportation issues, planners and policy makers generally target both the supply and demand side of transportation. The supply side includes capital improvements (like development / enhancement of transit for the study area). Impacting the demand side of transportation can have significant benefits as well, many times with lower cost. In most cases, solutions target both types of improvements for a balanced approach. In the case of The Woodlands Township Transit Plan, TDM related proposals focus on the potential to implement complementary activities that will support transit usage and multi-modal travel choices. The goal is to make transit attractive and convenient for the segment of the population that can and will use transit for some trips. Several opportunities exist to enhance transit usage in the study area for the existing Woodlands Express service, as well as the new services proposed through the mobility scenarios. A number of potential programs are



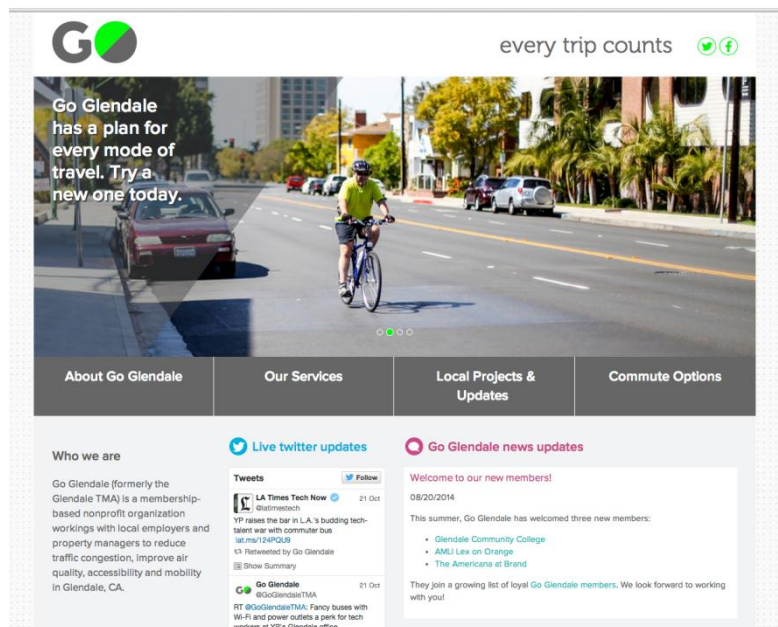
Example brand - SHIFT brand for the San Diego region.

possible; however, those detailed below may work well given the existing transit culture within the study area.

Developing ridership loyalty would require building programs over time and continuously encouraging new transit ridership, supporting existing transit users, encouraging rider loyalty, and in return growing transit revenues.

- Online ticketing – merchants need to make it simple for someone to buy their product. This is no different for transit systems. If it is cumbersome to purchase a bus or express bus ticket, this may push a potential transit rider to drive. Simple ticketing should be the norm for new bus service implemented in the study area. The Woodlands Express service could be the first to implement such a service providing a simple online tool (PayPal, Apple Pay, or other secure method).
- Monthly transit passes – monthly passes create loyalty and the potential for higher use of transit services. If someone invests in a monthly pass, they are more likely to use the service than someone who buys single tickets (or a book of single tickets). Those buying individual tickets can make the choice each day if they elect to use the ticket. Additionally, use of monthly passes could be encouraged through slight discounts for ticketing. Individual tickets would typically be a full price premium.

- Guaranteed ride home programs – this program provides a taxi (or comparable) service back to a commuter’s origin if there is an emergency need to return. This service is typically provided on long-haul commuter routes similar to The Woodlands Express. Some commuters choose to drive, because they fear not having mobility throughout the day if they require a trip home or to their original park and ride (for example, a family emergency or sick child at school, etc.). The guaranteed ride home program can overcome this issue, providing a return service on demand. This service is provided in most major metropolitan areas across the country. METRO provides such a service for some of its park and ride users. The Woodlands Express could encourage additional ridership by adopting such a service. The Woodlands Express provides some midday bus service to park and ride locations; however, no guaranteed ride home is provided on the Woodlands Express.



Go Glendale website and branding.

- Carshare - carshare systems provide connections to places outside a walkable or bikeable area or for those who prefer to drive. Usually placed near transit centers, a carshare vehicle allows riders to use transit but have access to a car. Multiple rental car and carshare specific companies are actively seeking out new markets to implement their services. Much of the cost risk is typically borne by the carshare firm, with regulatory support from the local jurisdiction. This may include agreeing upon providing public parking for carshare vehicles, etc. The Energy Corridor District is currently piloting a carshare program in partnership with Enterprise.
- Secure bike parking – bike riders feel more comfortable leaving their bike outside during the day if it is secure and protected from the elements (sun, rain, etc.). Secure parking may range from formal bike parking facilities to secured bike lockers.

Pedestrian and Cycle Access to Transit

The ease of multi-modal travel in a community is critical to the success of transit. The actual transit ride on a bus or train is only one element of an overall journey. Transit riders arrive in cars, on cycles, and by walking. All of these modes make up a complete journey and it is critical to



Carshare could provide broad mobility throughout the study area.

consider how these modes can be seamlessly integrated with transit in the study area. The most successful transit systems are complemented with robust pedestrian and cycling environments.

Pedestrian and cycling connections are provided within the Town Center. The pedestrian facilities are good where there is frontage streetscape and business activity. Where the built

environment is more 'inward' facing, however – for example, Market Street, The Mall, the Pinecroft area, Waterway Square, etc. – the pedestrian links from major corridors can be less visible or missing altogether. A gap analysis of the pedestrian network is suggested to review current conditions and to identify and prioritize improvements. Any proposed improvements should work outward from the central well developed pedestrian network.

Drivers and passengers, upon leaving their car, become pedestrians.

Providing driver and passengers leaving their cars with connected, convenient and comfortable walking routes will aid their access to their destination and wider environment, helping to reduce multiple car journeys of shorter distances in the Town Center.

Cycling and pedestrian connectivity to and from the Town Center is primarily via the pathway system adjacent to major roadway connections. The pathways are focused on recreational use and do not provide a direct and quick connection for cyclists or pedestrians looking to access the

Town Center through active travel as a mode of transportation. The roadways in and out of the Town Center (and inside the Town Center) currently have no designated cycle facilities (cycletracks, priority measures, striping, etc.). Similar to the broader study area, cyclists attempting to access the Town Center on street encounter higher auto speeds, inconsistent shoulder widths, and no formal on-street cycling facilities. In comparison, cycling along the pathway system or the Waterway presents limited continued connectivity or could result in longer distance journeys for cyclists.

Cycle and pedestrian connectivity will play a key role in supporting the development and success of transit. In an effort to achieve seamless connectivity, the team has identified a variety of key cycle



Limited cycle infrastructure is provided at park and rides.

and pedestrian corridors within the Town Center. This examination generally looked at the gaps and barriers at accessing the Town Center via cycle and walking. These gaps could limit connectivity to transit and therefore the success of any new transit provision.

The Woodlands Town Center is a major activity point for the community and cycle connectivity to the Town Center supports reduction in auto trips and reduction in demand for parking. However, cycle access to the Town Center area is limited. Major barriers to accessing the Town Center include, but are not limited to:

- Woodlands Parkway.
- Grogan's Mill Road.
- Research Forest Drive.
- Lake Woodlands Drive.
- I-45 is a major east / west barrier, further exacerbated by the existence of I-45 frontage roads.

The major roads providing access to and from the Town Center are prioritized for auto travel and are not conducive to cyclists.

Area roads have limited shoulders and no protections or priority for cyclists. I-45 and the associated frontage roads act as a significant barrier to east-west travel for cyclists and pedestrians in the study area. Existing and future development east of I-45 will likely increase demand for access to The Woodlands Town Center for employment, recreation, and shopping. Improved safety and cycling options at existing crossings of I-45 are needed. Vehicle turning

movements and signal timing generally conflict with cycle movements through the existing east-west crossings of I-45. Future connections should include appropriate access and signal timing for cyclists and pedestrians. Additionally, cycle and pedestrian only crossings of I-45 should be examined, specifically for access into the Town Center area.

Figure 5.18 represents the major desired access / egress points of the Town Center for both cyclists and autos. Not all of these connection points exist today (for example an east / west connection across I-45 for cyclists and pedestrians). Similar to motorists, those traveling by cycle as a mode of transportation (access to work, etc.) typically find the simplest and most direct cycle connection possible. Many times this will be on street and not on the recreational pathways, where conflicts with pedestrians may exist. Cycling on the recreational pathways and on street cycle connections are important. They each serve different cycling abilities and needs for the local community. The pathways system is extensive and provides strong connectivity throughout the community. Expansion of the pathways system and better on street accommodations for cyclists will provide the strongest connectivity to future transit options (and overall improved mobility).

Figure 5.18: Major Desired Town Center Access / Egress Points



In examining the connections between the three proposed Town Center bus routes and active modes (cycle and pedestrian) the project team identified gaps in some infrastructure. The existing cycle and pedestrian infrastructure was examined immediately surrounding each of the proposed

stops. The missing critical links were identified and improvements have been included in the plans and capital cost estimates for stops. These infrastructure improvements would need to be addressed (at a minimum) to support the ease of connection between the new Town Center bus, cycling, walking, and connections to the Town Center’s key destinations. Table 5.21 provides details on the cycle and pedestrian infrastructure improvements proposed.

Table 5.21: Infrastructure Improvements – Transit Connectivity

Improvement and Location	Notes	Improvements (included in capital cost estimates)
Route 1 - Lake Robbins Drive / Convention Center stop	Pedestrian sidewalks and pathways exist on both sides of Lake Robbins Drive at this stop. However, connectivity to users’ ultimate destinations (Convention Center Marriott, etc.) is not clear and direct. Visual cues, signage, and better connectivity to surrounding activity centers is needed. Future development on the northeast corner of Six Pines and Lake Robbins Drive will want to accommodate connectivity for those arriving via transit. Given the nearby activity centers (Pavilion, etc.), ongoing construction, and undeveloped lands (surface parking), this area is likely to become another key node in the Town Center.	<ul style="list-style-type: none"> • Widen sidewalk surrounding the new transit stop. • Develop pedestrian connectivity with surrounding development (now and in the future). • Provide cycle storage. • Provide cycle racks on new Town Center buses and the Woodlands Express.
Route 1 - Lake Robbins Drive / Waterway Avenue stop	Pedestrian sidewalks and pathways exist on both sides of Lake Robbins Drive at this stop. However, the auto drop off area at the Tinseltown Theater creates pedestrian and auto conflicts at peak times. Clear connectivity to Waterway Square could be improved with better visual cues and signage.	<ul style="list-style-type: none"> • Widen sidewalk surrounding the new transit stop. • Develop pedestrian connectivity with surrounding development (now and in the future). • Provide cycle storage. • Provide cycle racks on new Town Center buses.
Route 1 - Lake Robbins Drive / Woodloch Forest Drive stop	Pedestrian connectivity at this stop is generally good with ample sidewalks and protected pedestrian crossings and nearby intersections. Signal timing for pedestrians could be improved, given the long walking distances. With the introduction of transit at this location, it is anticipated to be a heavily traveled area (given the significant employment nearby). Cyclists may have issue navigating the adjacent pathway at peak times with pedestrians. Cycle connectivity is challenging. Both Lake Robbins Drive and Woodloch Forest Drive have limited shoulder space and no accommodation for cycle priority. This stop would likely be shared with the proposed Woodlands Express reverse commute service (discussed later in this document).	<ul style="list-style-type: none"> • Widen sidewalk surrounding the new transit stop. • Provide cycle storage. • Stripe cycle access to the transit stop. • Provide cycle racks on new Town Center buses and the Woodlands Express.
Route 2 - Six Pines / Market Street stop	Pedestrian connectivity at this stop is generally good with ample sidewalks. Pedestrians generally have a direct connection to the west with the Market Street retail area. Both cyclists and pedestrians may encounter challenges in this stop	<ul style="list-style-type: none"> • Widen sidewalk surrounding the new transit stop. • Amend sidewalk crossings to remove free right turns in and

Improvement and Location	Notes	Improvements (included in capital cost estimates)
Route 2 – Six Pines / Market Street Stop (continued)	area. The roadway connection along Market Street to the west is narrow with no shoulder or ability to accommodate cyclists. Additionally, free right turns at the Market Street and Pinecroft Drive intersection creates potential conflicts between cyclists, pedestrians, and vehicles. Signal timings to cross Pinecroft Drive may require adjustment to better accommodate pedestrians.	out of Market Street, east of Pinecroft Drive. <ul style="list-style-type: none"> • Provide cycle storage. • Provide cycle racks on new Town Center buses.
Cycle storage	Bike storage is proposed at all new Town Center transit stops. These are typically cycle racks. Enhanced storage (potentially cycle lockers with weather protection) is needed at the larger stops (Woodloch Forest and Hughes Landing stops) that would be shared between the Town Center bus and the Woodlands Express reverse commute services.	<ul style="list-style-type: none"> • Provide cycle racks. • Provide cycle lockers (weather protected) at two shared stops.
Stop shelters	All transit stops include appropriately sized shelters to provide a comfortable and protected environment for users.	<ul style="list-style-type: none"> • Shelters designed for weather protection from sun and rain.
Stop signage and information	Information is critical to provide easy connections between transit, walking, and cycling. All stops would include clearly branded signage and relevant information on the services provided to each stop.	<ul style="list-style-type: none"> • Branded transit signage. • Current service information and timetables.

Broader improvements in the cycle and pedestrian network are likely needed, beyond just those that impact connectivity to transit. Improved multi-modal connectivity throughout the community supports the success of transit, as well as the goals of traffic and parking congestion mitigation. This plan supports the need to undertake a comprehensive examination of the cycle and pedestrian environment throughout the community. The environment could be examined as a network of connections, versus just the connections between transit and active modes (the scope of this plan). The bullets below provide a list of high level considerations for any future examination of the cycle and pedestrian network. Further study of these suggestions would be required



Bikeshare programs can support a complete trip for transit users.

to determine their effectiveness and priority. The considerations are included here as a starting point for future analysis and discussion. Further investigation should be considered for:

- Pedestrian and cycling level wayfinding. – Expand upon the pathways signage to consider pedestrian level wayfinding and on street cycle level wayfinding. The needs for these two groups are different and should be considered separately. Much of the current on street wayfinding is directed at drivers.
- Cycle, pedestrian, and driving focused education. – Consider a broader promotion and education program to help drivers, cyclists, and pedestrians understand current laws and more effectively ‘share the road’.
- Consideration of on street cycletracks (with physical separation) and bike lanes (with striping / makers) as appropriate. – Improved cycle facilities can create a safer and more predictable environment for cyclists and drivers. These facilities provide clarity around where cycles will be in the roadway and how they move with traffic. Lake Woodlands Drive, Woodlands Parkway, Research Forest Drive, and Timberloch Place all have potential for strong east / west cycle connectivity between the Town Center, major employers, and residential areas. North / south considerations should be given to Woodloch Forest Drive, Six Pines Drive, and Grogan’s Mill Road.
- Consider broader cycle and pedestrian links between the residential Villages, Oak Ridge North, and Shenandoah, focusing on the Town Center as a key destination for the area.
- Consider major connection points across I-45. – Provide appropriate on street cycle connections and pedestrian pathway links at current routes under I-45. Priority measures, signal timing, and free vehicle turning movements would require further investigation and coordination with TxDOT.
- Consider pedestrian and cycle only connections across I-45. – This could create a key east / west link for access to the core of the Town Center (possibly along Timberloch Place or Lake Robbins Drive).
- Bike sharing programs. - Hotels and other tourist focused locations could provide bike borrowing for visitors.



Multiple parking options exist within the Town Center, but could be used more efficiently.

Town Center Parking

Improved mobility within the Town Center includes a better balance of modes. Transit, cycle, pedestrian, and auto all have a role to play in moving around the Town Center. The growth of employment and population in the Town Center, combined with the continued growth of the Town Center as a draw for regional shopping, recreation, and tourists presents significant congestion challenges. Traffic congestion and the

associated parking congestion could be a hindrance to the ultimate build out of the Town Center. The availability of convenient parking has been identified as a concern by some stakeholders. To maintain the Town Center's attractiveness as a regional destination, an improved approach to parking should be investigated.

Opportunities for auto access and parking must be considered in the mix of mobility choices. Potentially driving to the Town Center, parking and then using transit to access multiple destinations (in the Town Center) supports the overall success of transit and limits congestion.

One of the proposals of this plan is to promote a 'park once' concept.

The 'park once' concept would encourage those accessing the Town Center in their car to park in an appropriate location. Longer term parking would be encouraged in appropriate lots or parking structures, while shorter term parking could be on street (where higher parking turnover occurs).

Various strategies should be considered to improve the availability of convenient parking in the Town Center. Convenience is generally defined as readily available parking near one's destination. While this cannot be provided 100% of the time for all drivers that need parking, various strategies can be implemented to support the availability of parking for more drivers. Parking turnover adjacent to local businesses can also be positive, by providing more visibility and access to adjacent businesses more often.

Transit could help facilitate the development of complementary parking strategies. A comprehensive examination of parking strategies within the Town Center should be undertaken. This could include a comprehensive review to understand the real conditions and issues associated with parking. While parking is a critical consideration, the community would not want to build for the worst case parking scenario (such as during peak holiday periods), as that would result in large areas of underutilized parking / property much of the year. This would be counter to the walkable, urban environment of the Town Center that makes it attractive to many. Parking should be examined for the most efficient use of the available parking spaces. This may include a combination of public and private parking providers. A future comprehensive examination of parking in the Town Center could include review of:

- Available parking (both public and private).
- Current parking costs.
- Survey of parking turnover.
- General parking availability (peak and non-peak times).
- Existing on street parking policies (if any).
- General parking demand (typical daily, evenings, weekends, and peak times – holidays / special events).

Specific concepts that could be considered in future study to most efficiently utilize parking include:

- On street parking. – Areas of on street parking could be focused on supporting adjacent businesses. A common approach to achieve this is to limit the length of time a person can park at these highly desirable parking spaces, in order to create turnover.

- Identify and dedicate key parking locations that would be of greatest benefit to those with limited mobility. Ensuring these spaces have sufficient space, and provide good accessible sidewalk connectivity to the surrounding facilities (meeting ADA requirements).
- Off street parking (provided by The Township). – Ensure parking is well connected to the Town Center bus network to help reinforce the ‘park once’ strategy.
- Off street parking (provided by private owners/developers). – Work with the existing property owners and businesses with parking to help achieve common benefits of prioritizing close proximity parking. The goal would be to promote parking turnover and to aid users with mobility issues. Currently some of these more desirable locations are used for valet parking, which generates revenue, but limits turnover and support for adjacent businesses.
 - Work together with employers that provide parking to promote the use of the Town Center bus services for local connectivity to Town Center services and facilities.
 - Work with property owners to improve pedestrian access from stops across surface parking to help support access and the ‘park once’ strategy.

Prioritization of Scenarios – Town Center Bus

The transit scenarios for the Town Center bus presented in the previous sections were informed by the second phase of evaluation, the prioritization exercise and ultimate phasing suggestions for the recommendations. The outcome of this process provided information on how well the scenarios performed at providing quality transit improvements for the community. The highest performers were deemed to be the highest priority and were advanced as the recommendations. Table 5.22 provides a summary of the evaluation of the scenarios, when compared to the criteria for this level of examination. The original prioritization information matrix is included in Appendix E, populated with the data for each criterion.

Table 5.22: Town Center Mobility – Prioritization of Scenarios Summary

Criteria - Prioritization of Scenarios	Town Center Bus Route 1	Town Center Bus Route 2	Town Center Bus Route 3
<i>Fiscal</i>	<p>The capital cost for the complete implementation with new vehicle would be in the order of \$2.44M. The development of the route could be phased to match funding availability and demand.</p> <p>Operating cost would be around \$800K, with zero revenue recovery as the service would continue to be free.</p> <p>With a target ridership of 130K trips the cost per rider would be approximately \$6.00.</p>	<p>The route would need to be delivered as a single project at a cost of \$1.3M with vehicles.</p> <p>The operating costs would be in the order of \$600K.</p> <p>With a target ridership of 100K trips the cost per rider would be approximately \$6.00.</p>	<p>The route would need to be delivered as a single project at a cost of \$1.4M with vehicles.</p> <p>The operating costs would be in the order of \$600K.</p> <p>With a target ridership of 100K trips the cost per rider would be approximately \$6.00.</p>
<i>Mobility</i>	<p>The use of a new high quality accessible bus would provide a capacity of 300 passengers per hour per direction, four times existing trolley service provision.</p> <p>The service would be timetabled and operated at a 10 minute frequency to provide a reliable</p>	<p>The use of a new high quality accessible bus would provide a capacity of 300 passengers per hour per direction.</p> <p>The service would be timetabled and operated at a 10 minute frequency to provide a reliable passenger focused service.</p>	<p>The use of a new high quality accessible bus would provide a capacity of 300 passengers per hour per direction.</p> <p>The service would be timetabled and operated at a 10 minute frequency to provide a reliable passenger focused service.</p>

Criteria - Prioritization of Scenarios	Town Center Bus Route 1	Town Center Bus Route 2	Town Center Bus Route 3
	<p>passenger focused service.</p> <p>It would improve mobility within the Town Center, supporting the opportunity to ‘park once’.</p>	<p>It would improve mobility to the amenities and services on the north side of the Town Center, supporting the opportunity to ‘park once’.</p>	<p>It would improve mobility to and from the residential and areas of business on the south side of The Waterway, supporting the opportunity to ‘park once’.</p>
<i>Community</i>	<p>The route would provide new connectivity between the Town Center amenities and Hughes Landing.</p> <p>Route would be integrated with existing and new walk and cycle links.</p>	<p>The route would provide new connectivity between the Town Center and the shopping and medical services to the north.</p> <p>Route would be integrated with existing and new walk and cycle links.</p>	<p>The route would provide new connectivity between the Town Center and the residential and employment on the south side of the Town Center.</p> <p>Route would be integrated with existing and new walk and cycle links.</p>
<i>Prosperity</i>	<p>The provision of a Town Center bus would help maximize the use of parking by allowing people to park once. This will support the economic prosperity and development of the Town Center.</p> <p>The route will connect the rapidly developing commercial Hughes Land area to the Town Center, supporting development in this area.</p>	<p>The provision of a Town Center bus would help maximize the use of parking by allowing people to park once.</p> <p>The route would provide increased connectivity to shopping and medical services, supporting these businesses and Town Center employment.</p>	<p>The provision of a Town Center bus would help maximize the use of parking by allowing people to park once.</p> <p>The route would provide an increased number of business and their employees, along with the residents on the South side of the Town Center with increased mobility choice.</p>
<i>Sustainability</i>	<p>The route in providing improved mobility options will allow people to park once and use the bus service to move around the Town Center.</p> <p>The passenger journeys will decrease car use and associated emissions.</p>	<p>The route in providing improved mobility options will allow people to park once and use the bus service to move around the Town Center.</p> <p>The passenger journeys will decrease car use and associated emissions.</p>	<p>The route in providing improved mobility options will allow people to park once and use the bus service to move around the Town Center.</p> <p>The passenger journeys will decrease car use and associated emissions.</p>
<i>Deliverability</i>	<p>The route will operate on existing street, with a minor reduction in on street parking.</p> <p>Stop infrastructure could be provided as funding becomes available.</p>	<p>The route will operate on existing street, and will need a small number of bus pull outs to be provided.</p> <p>Stop infrastructure could be provided as funding becomes available.</p>	<p>The route will operate on existing streets.</p> <p>Stop infrastructure could be provided as funding becomes available.</p>

The Woodlands Area Mobility - Local Bus Service

Context

The Woodlands area mobility refers to broader transit service throughout the southern portion of the Conroe-The Woodlands UZA. The Woodlands is responsible for transit within this portion of the UZA. Mobility needs in this area are varied. The likely primary connections are between the residential communities / villages to the Town Center area. Seniors that no longer drive (but are mobile) require transport to shopping, appointments, etc. Young people need transport to school, events, employment, etc. While most commuters drive, congestion and changing demographics are creating additional demand for local transit. However, moving from the current situation of no fixed route transit locally to a network of local transit connections would be a significant change

away from the area's traditionally auto-dominated transportation culture. Making this change and developing a 'culture of transit' usage could take significant time. Proof of concept would be required by developing highly successful, core transit lines, with quality service and appropriate



Local bus can serve all members of the community.

frequencies. The design of the residential areas with many cul-de-sac streets and limited connectivity create impediments to providing fixed route transit service. It is with these considerations that the team developed the recommendations for transit mobility within broader Woodlands area.

The Woodlands currently has no local transit serving the area. The high level of car ownership and the quality of the road network limits the potential demand and therefore the potential need. The Woodlands Township has

considered how the Town Center trolley routes could be extended or a dedicated service could be provided to Village Centers, especially those within close proximity of the Town Center.

An important charge for this study was to examine the connectivity between the Town Center and the broader residential areas and Villages within the study area.

Both growth in young families and seniors in the community present a potential need for mobility for those with access to an auto. A strong road network and the pathway networks provide connectivity between the residential areas and the Town Center. However, for those with no vehicle or limited mobility, they generally must rely on family, friends, or specialized transportation services within the community.

A difficulty in providing this type of service is with no comparable service provided today the potential ridership, required service frequencies, and required service hours are unknown. It is therefore more difficult to understand if a new service would be successful. The provision of a fixed route transit service would also result in the obligation, under the ADA, to provide complementary paratransit services within ¼ mile of any fixed route bus corridor.

To help understand the opportunities for bus service in the wider study area, the team conducted multiple outreach efforts through public open houses, focus group discussions, and two online questionnaires. These efforts helped identify the broader appeal for local bus service. Additionally,

the questionnaire was used to generally understand the locations where people might wish to travel from and to.

The first questionnaire indicated that approximately 75% of questionnaire respondents travel to the Town Center five or more times a month. Car ownership is also a useful measure on the potential for transit service. Households with access to a car in The Woodlands is high. Nearly 98% of respondents to the first questionnaire have access to a car, with the majority of households responding having two or more cars. Census data shows approximately 70% of householders within the entire study area have access to a vehicle (2010 data); which is still high when compared to most metropolitan areas. When asked if a bus service were to be provided from where they live to the Town Center, 28% of those who completed the first online questionnaire said they would use it, 45% responded they would likely not.



Local bus may provide connectivity between residential areas and commercial / employment centers.

The high car ownership identifies the potential risk to providing bus services within the wider study area. Stakeholders also

expressed greater concerns with the provision of local bus services, questioning the viability, the levels of patronage, the potential cost effectiveness, and how it would be accessed given the cul-de-sac design of most residential areas (limited connections to adjacent major routes).

The responses to the first online questionnaire, along with the feedback received from stakeholders suggested the viability of wider area mobility may be limited and may be a longer term ambition.

The demand for such a service will likely continue to grow over time. Alternative methods for providing bus services outside of the typical fixed route could be considered. Further work was therefore undertaken to better understand these issues and to help identify potential future bus scenarios.

Current Issues

Provision of bus service would need to consider access to the services, walking / active access. Bus service may be more difficult in the study area due to the curvilinear nature of the local street network and the more limited connectivity to the main road network. Previous discussions on extending service from the Town Center to Village Centers raised concerns that the Village Center

parking would be used as park and ride locations. This would impact on the parking available to support the normal daily activities in these Village Centers, which could be a key concern for local businesses. At the time, local business owners expressed concern with allowing public transit stops on private commercial property. The Panther Creek area was specifically considered for service because of the range of seniors' facilities, some higher density residential, and the established commercial uses. However, this service did not advance, given the challenges.

Park and ride service between the residential areas and the Town Center was identified as a possible option by stakeholders.

A short distance park and ride (from the Villages to the Town Center) is unlikely to be successful in study area's environment.

Once people are in a car they are unlikely to drive to a park and ride location, particularly if this means driving in a reverse direction to then wait to catch a bus. This would be particularly true



Simple ticketing provides easy and fast access to transit.

within The Woodlands when the travel time to the Town Center in a car is so competitive. A short distance park and ride service is not recommended, unless the Town Center road network encounters worse than predicted congestion in the future.

The provision of any dedicated service would place a requirement on the local jurisdictions to provide ADA paratransit services within a ¼ mile radius of the length of the route. ADA paratransit is a type of demand response service provided for those with mobility limitations that make them unable to access regular fixed-route service. The users are typically previously registered and deemed eligible by the agency providing the service. The user typically contacts the agency the day prior (or, for regular trips, has set a daily pick-up schedule with the agency) and is provided a scheduled transportation option within an hour (plus or minus) of their desired trip time. At a minimum, these times must be within the

service hours operated by the fixed route service. The user would need to be going to a destination served by the bus route or within a broader service area dictated by the provider. It is possible that the fixed route service and the specialized service could work in cooperation to provide more efficient and broader mobility for specialized users. The specialized services could feed potential users into the fixed route service. The local bus service could employ a different structure, such as a deviated service. The deviated service could coordinate directly with the specialized service providers to 'deviate' from its fixed route to collect specialized riders (if the

timing is acceptable). The fixed route would need to hit its fixed stops at scheduled times, but enough slack would be provided in the service schedule to allow for additional specialized deviations. These are simply additional service models that could be considered and may be more efficient, given the significant challenges to local bus service within the broader study area.

Transit Opportunity

The provision of local bus services could start to provide increased journey opportunities and provide improved connectivity for elements of the community that do not have access to a car or would prefer to not use a car to access the Town Center amenities. New services could help reduce traffic in the Town Center and support the continued development of the area. The services would be targeted at area residents and would charge a fare.

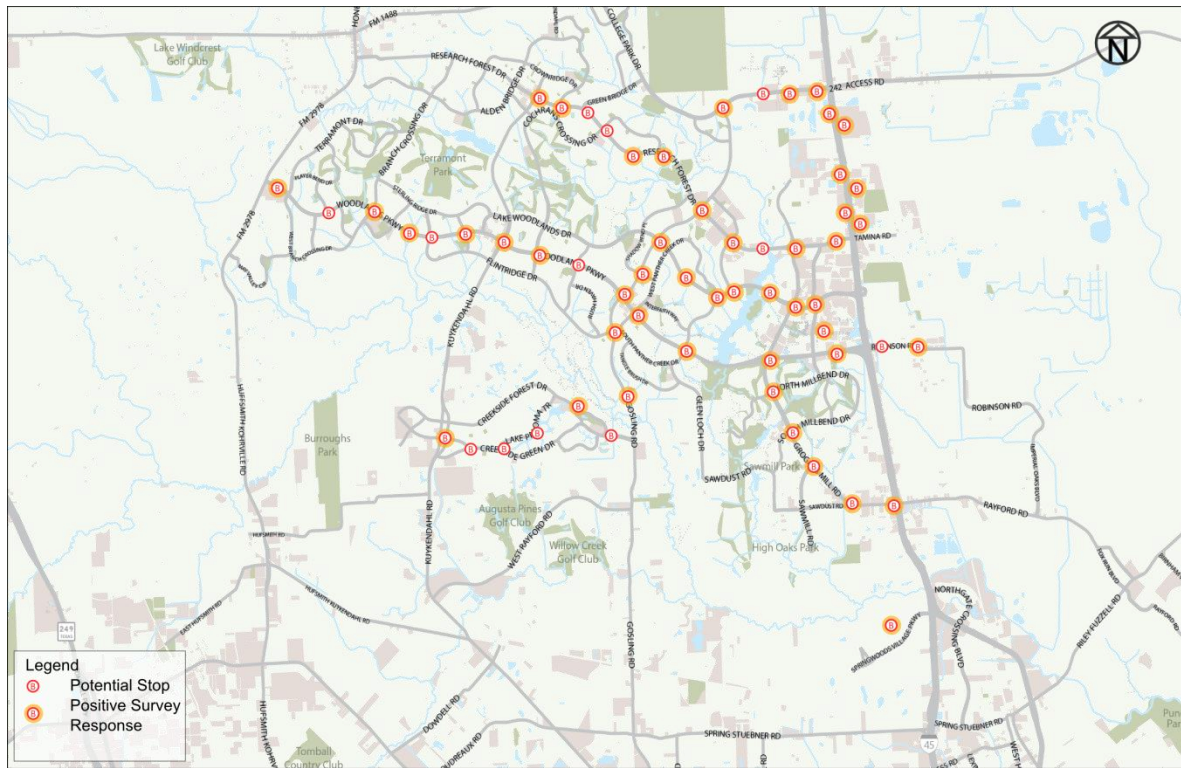
The service would be supported by the proposed improvements to the Town Center bus services Routes 1, 2, 3) and connectivity to the future Town Center transit center.

Proposed Future Development of Local Bus Services

The identification and further development of potential bus routes for consideration takes account of the issues discussed above to attempt to identify those routes that could have ridership potential while minimizing the costs and therefore the potential risk. The second round of stakeholder outreach and the second online questionnaire were used to ask more targeted questions regarding potential local bus routes, such as the locations potential users would use to access a service and where they would like to go.

The second online questionnaire identified 51% of respondents would use a local bus service. This was a significant increase compared to the 28% response rate in the first questionnaire. Additionally, the total response to the second online questionnaire was four times higher than the first. This is likely due to wider contacts and increased awareness of the study. When asked how many times they would use a local bus service in a month, 70% of respondents identified they would use bus services six or more times per month. The locations that people identified more strongly as stops they would either board or alight at are shown in Figure 5.19.

Figure 5.19: Online Questionnaire #2 Boarding and Alighting Locations

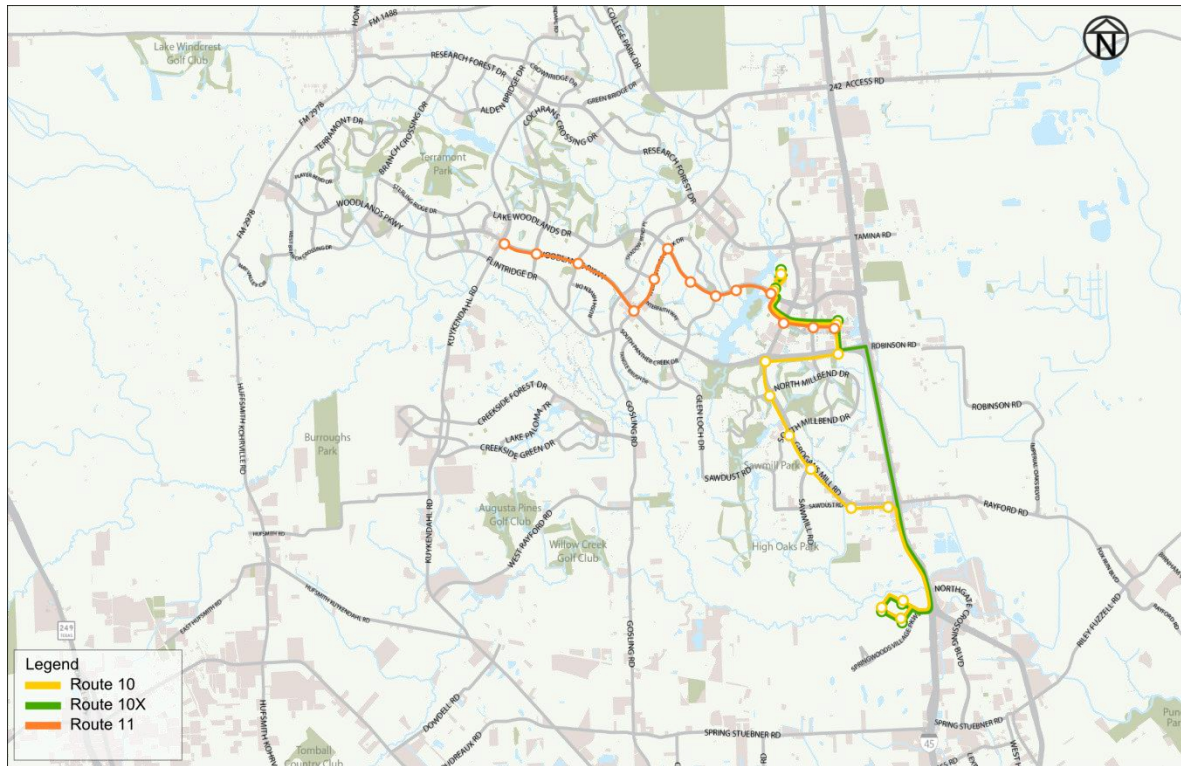


The response rates for the individual stops and the difficulty and length of potential bus routes were reviewed further to identify the potential route options for consideration. Three route options were identified:

- Route 10X – Express Service between the Town Center and Springwoods / ExxonMobil.
- Route 10 – Town Center to Springwoods / ExxonMobil.
- Route 11 – Town Center to Panther Creek and the Indian Springs / Sterling Ridge Village Centers.

The potential starting network of local bus routes is shown in Figure 5.20.

Figure 5.20: Potential Local Bus Network



Additional stakeholder outreach was undertaken on the proposals for the potential local bus routes. Feedback continued to express concern at the viability of any wider bus routes within the study area. Concerns were also raised regarding the 10X service as this was focused primarily on the ExxonMobil campuses, with stakeholders suggesting this should be provided and paid for by ExxonMobil.

Stakeholders concurred that if any route were to be developed, Route 11 could be more successful. Route 11 provides service to seniors’ communities and higher density development. All three local bus routes are presented in detail in the following sections.

Local Bus Route 10X and Route 10

Both Route 10 and Route 10X would provide a dedicated connection between Springwoods / ExxonMobil, the Town Center, and Hughes Landing. The difference between the two is that Route 10 would make multiple stops within the community (along Grogan’s Mill Road, etc.), while the Route 10X would provide express service with limited stops.

With the development of the Springwoods / ExxonMobil area, an opportunity exists to create a bus service that could be beneficial to The Woodlands.

Either the Route 10 or 10X could bring increased economic activity by ExxonMobil employees in the Town Center area. As new ExxonMobil employees move to (or travel to) this area, the Town

Center could be positioned as their key destination for shopping, leisure, and services (medical, etc.). The Town Center is currently in a strong position to serve as the key destination for ExxonMobil (and other area) employees. Creating patterns for shopping, leisure, and services would be important in the near term, before competition from other commercial developments is fully operational. Only one of either Route 10 or 10X is likely needed. However, the framework for both is provided here. It is possible that a partnership with ExxonMobil could support either service and should be pursued. The ultimate decision of which service is appropriate will be dictated by the desires of the local community and the potential for partnerships to advance one of the services. The framework of both the Route 10 and 10X are presented below.



ExxonMobil campus under construction.

Route 10X – Local Bus (Express Town Center to Springwoods / ExxonMobil)

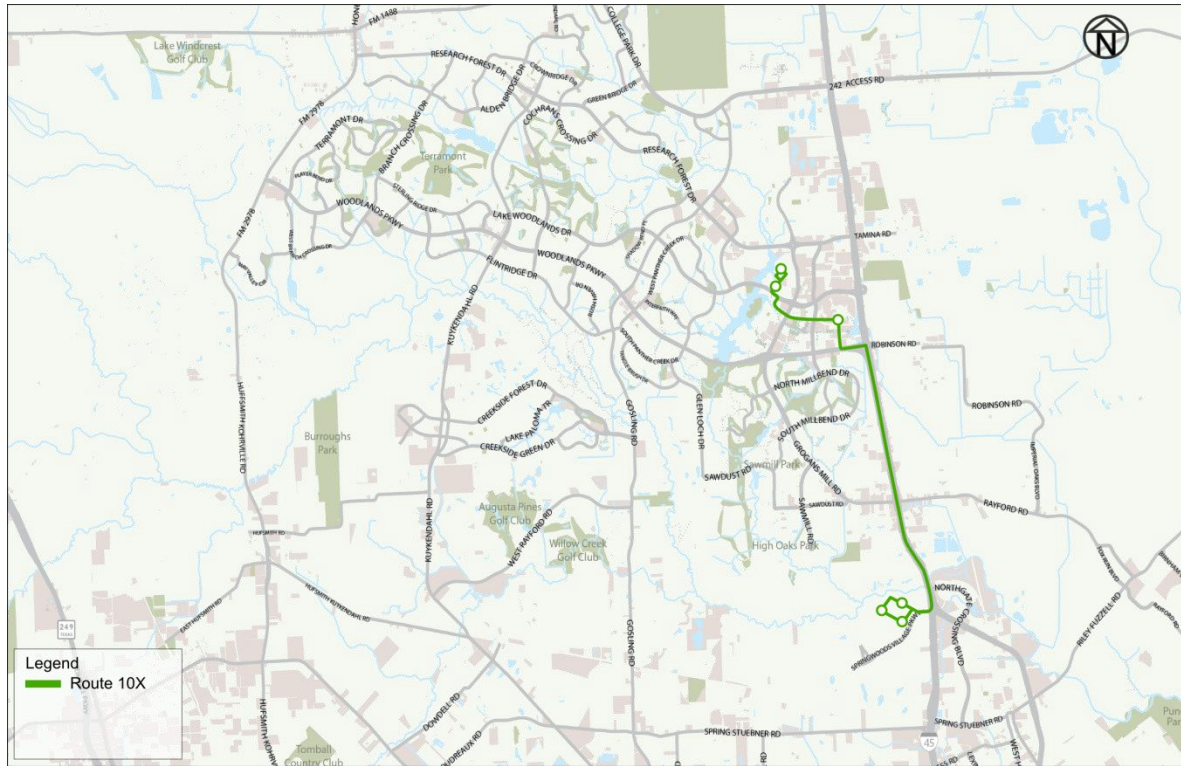
Route 10X would provide a dedicated connection between Springwoods / ExxonMobil, the Town Center, and Hughes Landing. The goal of this service is to provide ExxonMobil employees with access to the shops and services within Town Center (and the associated economic benefits for the Town Center). The service could potentially be private, dedicated to ExxonMobil to alleviate the potential security issue and provide campus wide access. However, as a private service the route would not form part of The Woodlands’ public transit network and would not be eligible for FTA funding.

ExxonMobil is currently considering implementing this type of direct service between ExxonMobil and Hughes Landing, to connect ExxonMobil offices.

It is recommended that The Woodlands collaborate with ExxonMobil to provide this service and ensure it stops in the Town Center area. At a minimum, The Woodlands could provide ExxonMobil the Route 10X timetables, costs, etc. as an encouragement for ExxonMobil to implement the service.

A graphic of route 10X is shown in Figure 5.21. The service diagram and stop locations are shown in Table 5.23 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.21: Route 10X – Hughes Landing to ExxonMobil



The service diagram and stop locations are shown in

Figure 5.22: Local Bus Route 10X – Service Diagram



Table 5.23: Local Bus Route 10X – Metrics

Metric	Details
Route 10X:	Springwoods / ExxonMobil to Town Center / Hughes Landing (Only one service, 10 or 10X recommended)
Frequency:	15 minute peak / 30 minute off-peak
Hours of operations:	6:00am to 7:00pm (M-F)
Capital cost:	Stop development, cycle/pedestrian connections
Annual operating cost:	
Vehicles:	Assumes 3 new buses (30-35' long / accessible):
Measure of success:	Target annual ridership: additional 80,000 (300 per day)

Metric	Details
Priority	Near-term

The second online questionnaire enquired where respondents that would use the local bus service would start and end their journey.

Table 5.24: Route 10X Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
Springwoods / ExxonMobil Campus	577	678	1,255

Route 10X – Infrastructure Required and Capital Costs

Planning level cost estimates for Route 10X are presented in Table 5.25. The assumptions for local unit costs were previously presented in Table 5.9. Dedicated stop locations would need to be provided around the ExxonMobil campus. Stops would be shared with the Town Center bus in the Town Center and Hughes Landing. The stops would include a shelter (rain / sun), seating, timetable information, stop flag / branding and provision for cycles. The operation of Route 10X would require the procurement of three accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$1,220,000.

Table 5.25: Route 10X - Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$170,000
Bus turn outs	\$50,000
Cycle and pedestrian connections	\$20,000
Project management / design / contingencies	\$80,000
Accessible bus vehicles	\$900,000
Total	\$1,220,000

Route 10X – Operations

For the local bus service scenarios, the project team developed service frequencies that are reasonable for a local level service traveling similar distances. The team took into consideration the distances between stops, dwell time assumptions, and general variations for traffic and conditions to propose reasonable frequencies. The proposed service frequencies for Route 10X are detailed in Figure 5.13 below.

- Weekdays.
 - 7:30am to 6:00pm - 20 minute peak service.
- Saturday / Sunday.
 - No service.

Route 10X - Operating Costs

With approximately 3,400 service hours annually, the operating costs for Route 10X would be in the order of \$210,000 per year. The operating cost estimates are based upon the operation of the

modern, accessible style of bus and the frequencies outlined above. The existing trolley style of vehicle could not be used on routes that access I-45. The operation of the route would require two vehicles with an additional spare vehicle. Table 5.26 presents the planning level operating cost estimates for Route 10X.

Table 5.26: Route 10X – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
3,400	\$62.34	\$210,000

The future Route 10X target ridership should be in the order of 80,000 riders per year (300 per day). The route is assumed to be provided free of charge to ExxonMobil employees, if the company agreed to fund the system. If this service were to be implemented, it should be timed with the completion of construction and transfer of employment. It is important to provide options to potential riders just as they are beginning to set their patterns for mobility within the community. This window of opportunity is early and likely just as the campus begins to open. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.

The ExxonMobil campus is proposed to be a secure employee only site, which could affect the ability of any proposed bus route serving the campus development. ExxonMobil, in addition to the dedicated campus, will have extensive office accommodation within the Hughes Landing development on the edge of The Woodlands Town Center.

Route 10 – Local Bus (Town Center to Springwoods / ExxonMobil)

Route 10 would also provide a dedicated connection between Springwoods / ExxonMobil, the Town Center, and Hughes Landing. However, Route 10 would follow local roads and provide additional stops within the local communities between the Town Center and Springwoods / ExxonMobil. The Route 10 would follow Grogan’s Mill Road, Sawdust Road, and then run for a short distance on the I-45 to connect with Springwoods / ExxonMobil. The route would provide connectivity for staff working at ExxonMobil with the amenities within Town Center but also provide The Woodlands residents local connectivity to the Town Center, Hughes Landing, and Springwoods / ExxonMobil. This service provides additional benefits to local residents, but the tradeoff is that the travel time from Springwoods / ExxonMobil to the Town Center is much longer (20 minutes for the Route 10X and 50 minutes for the Route 10). The desire to implement this service will depend on the needs of the local community, as well as the desire of ExxonMobil to support either the Route 10X or Route 10.

It is likely that employees of ExxonMobil would prefer the faster travel times provided by Route 10X and The Woodlands residents would prefer the local connectivity provided by Route 10.

A graphic of Route 10 is shown in Figure 5.23 The service diagram and stop locations are shown in Figure 5.24. Table 5.27 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.23: Route 10 – Town Center to ExxonMobil

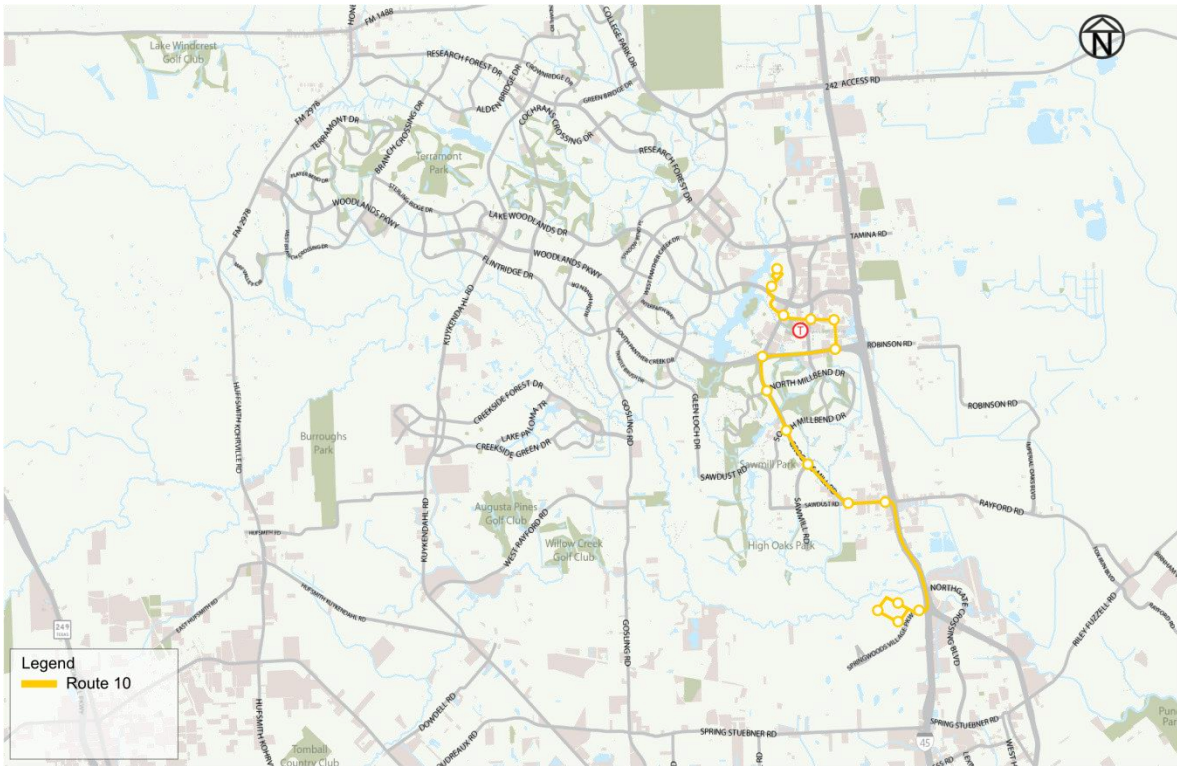


Figure 5.24: Local Bus Route 10 – Service Diagram



Table 5.27: Local Bus Route 10 – Metrics

Metric	Details	
Route 10:	Springwoods / ExxonMobil to Town Center / Hughes Landing Only one service, 10 or 10X recommended	
Frequency:	15 minute peak / 30 minute off-peak	
Hours of operations:	6:00am to 7:00pm (M-F)	
Capital cost:	Stop development, cycle/pedestrian connections:	\$1,000,000
Annual operating cost:		\$600,000
Vehicles:	Assumes 5 new buses (30-35' long/ accessible):	\$1,500,000
Measure of success:	Target annual ridership: additional 50,000 (190 per day)	
Priority	Long-term	

The second online questionnaire enquired where respondents that would use the local bus service would start and end their journey for local bus service.

Table 5.28: Route 10 Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
ExxonMobil Campus	577	678	1,255
I-45 Frontage Road / Sawdust Road	82	175	197
Sawdust Road / Grogan’s Mill Road	47	150	139
Grogan’s Mill Road / Sawmill Road	43	96	163
Grogan’s Mill Road / South Millbend Drive	49	114	197
Grogan’s Mill Road / North Millbend Drive	67	130	197
Woodlands Parkway / Grogan’s Mill Road	80	135	215
Woodlands Parkway / Woodloch Forest Drive	43	154	197
Town Center	182	500	682

Route 10 – Infrastructure Required and Capital Costs

Planning level cost estimates for Route 10 are presented in Table 5.29. The assumptions for local unit costs were previously presented in Table 5.9. Dedicated stop locations would need to be provided outside of those in the Town Center and Hughes Landing shared with the Town Center bus service. The construction of 14 bus turnouts would need to be provided at seven of the stop locations. Each stop would include a shelter (rain / sun), seating, timetable information, stop flag / branding and storage for cycles. Stops would also require connectivity to the local trail network or sidewalks. The operation of the route would require the procurement of five accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$2,500,000.

Table 5.29: Route 10 – Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$560,000
Bus turn outs	\$150,000
Cycle and pedestrian connections	\$70,000
Project management / design / contingencies	\$240,000
Accessible bus vehicles	\$1,500,000
Total	\$2,500,000

Route 10 – Operations

For the local bus service scenarios, the project team developed service frequencies that are reasonable for a local level service traveling similar distances. The team took into considerations the distances between stops, dwell time assumptions, and general variations for traffic and conditions to propose reasonable frequencies. The proposed service frequencies for Route 10 are detailed below.

- Weekdays.

- 7:30am to 9:00am and 4:30pm to 6:00pm - 15 minute peak service.
- 9:00am to 4:30pm - 30 minute off peak service.
- Saturday / Sunday.
 - 8:00am to 6:00pm - 30 minute service

Route 10 - Operating Costs

With approximately 9,600 service hours annually, the operating costs for Route 10 would be in the order of \$600,000 per year. The operating cost estimates are based upon the operation of the modern, accessible style of bus and the frequencies outlined above. The operation of the route would require two operating vehicles with an additional spare vehicle. Table 5.30 presents the planning level operating cost estimates for Route 10.

Table 5.30: Route 10 – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
9,600	\$62.34	\$600,000

In the absence of an established forecasting tool for transit ridership for The Woodlands, an estimated target ridership for the service has been developed. This is based upon the route, allowing for the buildup of ridership providing a level of cost effectiveness.

The future Route 10 target ridership should be in the order of 50,000 riders per year (190 per day). Assuming a fare of \$1.25 the resulting potential revenue would be \$62,500. Revenues would reduce the operating cost to \$537,500, equating to a cost per rider of \$10.75. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.

Route 11 – Local Bus (Town Center to Panther Creek and Indian Springs / Sterling Ridge Village Centers)

Route 11 would be focused on providing connectivity between the Village Centers and the Town Center, with the route serving the business area on the west side of the lake, Panther Creek, Indian Springs and Sterling Ridge. The route is proposed to



Panther Creek Village Center.

follow the Town Center bus Route 1 within the Town Center. However, fewer stop locations are proposed. The service would follow Woodloch Forest Drive and Lake Robbins Drive. Route 11 would use the new section of the dedicated busway alongside the Waterway to access Lake Woodlands Drive, continuing on West Panther Creek Drive and Woodlands Parkway to Kuykendahl Road. The route would serve three Village Centers, including many seniors’ facilities in the Panther Creek area. The route attempts to strike a balance between connectivity and overall travel time. The route serves key areas of demand (seniors’ communities, multifamily communities, including several subsidized housing complexes, retail, etc.) and is as direct as possible (not too circuitous and long). The route could be extended to the Sterling Ridge park and ride, if demand dictated.

The route could also operate as a two way deviating service. This would operate along a fixed route, but when a rider requests a dedicated pickup within a two block radius of the route, the bus would deviate from its fixed route and make the dedicated pickup (if time allows). The deviated pickups would be requested of a central control at least an hour before a required journey, and the central bus dispatcher would coordinate with the bus operator to identify if the pickup is possible and arranging this with the passenger. This type of arrangement helps reduce the potential calls for supporting demand response service. The route would use a standard accessible vehicle suitable for accessing the local neighborhoods.

A graphic of Route 11 is shown in Figure 5.25. The service diagram and stop locations are shown in Figure 5.26. Table 5.31 provides a summary of the key metrics of this route. The key metrics are explained in detail later in this section.

Figure 5.25: Route 11 – Town Center to Indian Springs / Sterling Ridge

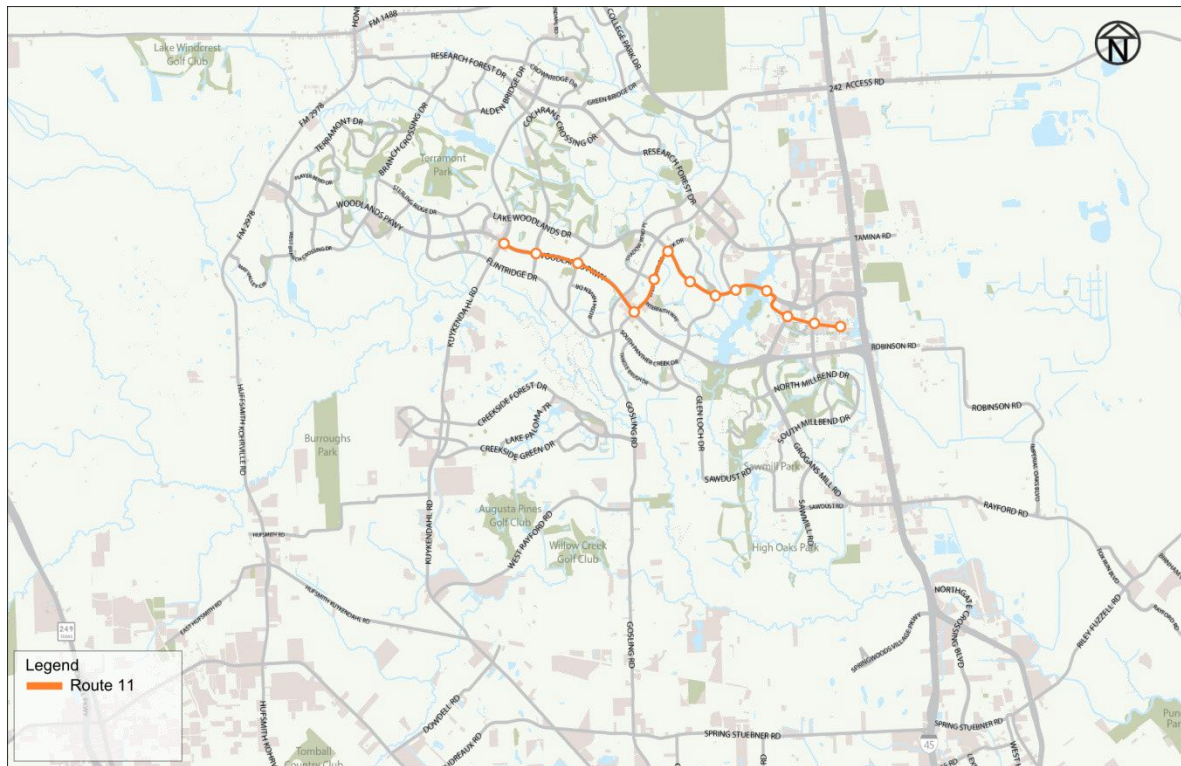


Figure 5.26: Local Bus Route 11 – Service Diagram



Table 5.31: Local Bus Route 11 – Metrics

Metric	Details
Route 11:	Town Center to Indian Springs / Sterling Ridge
Frequency:	15 minute peak / 30 minute off-peak
Hours of operations:	6:00am to 7:00pm (M-F)
Capital cost:	Stop development, cycle/pedestrian connections: \$910,000
Annual operating cost:	\$460,000
Vehicles:	Assumes 4 new buses (30-35' long/ accessible): \$1,200,000
Measure of success:	Target annual ridership: additional 80,000 (300 per day)
Priority	Mid-term

The second online questionnaire enquired where respondents that would use the local bus service would start and end their journey for local bus service.

Table 5.32: Route 11 Stop Performance – Questionnaire #2

Stop Location	Start Journey	End Journey	Total
Woodlands Parkway / Sterling Ridge Park and Ride	59	100	1,255
Woodlands Parkway / Carlton Woods Drive	35	55	90
Woodlands Parkway / North Forestgate Drive	31	62	93
Woodlands Parkway / Kuykendahl Road	103	199	202
Woodlands Parkway / Cochran's Crossing Road	39	78	117
Woodlands Parkway / Falcon Wing Drive	26	53	79
Woodlands Parkway / Gosling Road	49	110	159
Gosling Road / Shadow Bend Place	33	64	97
Gosling Road / Lake Woodlands Drive	59	99	158
Lake Woodlands Drive / Split Rock Road	31	60	91
Lake Woodlands Drive / North Panther Creek Drive	36	64	100
Lake Woodlands Drive @ New Trails Drive	29	71	100
Lake Woodlands Drive @ Lake Front Circle	50	141	191
Town Center	182	500	682

Route 11 – Infrastructure Required and Capital Costs

Planning level cost estimates for Route 11 is presented in Table 5.33. The assumptions for local unit costs were previously presented in Table 5.9. Dedicated stop locations would need to be provided outside of those in the Town Center and Hughes Landing shared with the Town Center bus service. The construction of 20 bus turnouts would need to be provided at ten of the stop locations. Each stop would include a shelter (rain / sun), seating, timetable information, stop flag / branding and storage for cycles. Stops would also require connectivity to the local trail network or sidewalks. The operation of the route would require the procurement of four accessible vehicles. The infrastructure and vehicles identified would cost in the order of \$2,110,000.

Table 5.33: Route 11 – Capital Cost Estimates

Capital Item	Estimated Cost
Stop infrastructure	\$510,000
Bus turn outs	\$130,000
Cycle and pedestrian connections	\$60,000
Project management / design / contingencies	\$210,000
Accessible bus vehicles	\$1,200,000
Total	\$2,110,000

Route 11 – Operations

For the local bus service scenarios, the project team developed service frequencies that are reasonable for a local level service traveling similar distances. The team took into considerations the distances between stops, dwell time assumptions, and general variations for traffic and conditions to propose reasonable frequencies. The proposed service frequencies for Route 11 are detailed below.

- Weekdays.
 - 7:30am to 9:00am and 4:30pm to 6:00pm - 15 minute peak service.
 - 9:00am to 4:30pm - 30 minute off peak service.
- Saturday / Sunday.
 - 8:00am to 6:00pm - 30 minute service.

Route 11 – Operating Costs

With approximately 7,400 service hours annually, the operating costs for Route 11 would be in the order of \$460,000 per year. The operating cost estimates are based upon the operation of the modern, accessible style of bus and the frequencies outlined above. The operation of the route would require three operating vehicles with an additional spare vehicle. Table 5.34 presents the planning level operating cost estimates for Route 11.

Table 5.34: Route 11 – Operating Cost Estimates

Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
7,400	\$62.34	\$460,000

In the absence of an established forecasting tool for transit ridership for The Woodlands, an estimated target ridership for the service has been developed. This is based upon the route, allowing for the buildup of ridership providing a level of cost effectiveness.

The future Route 11 target ridership should be in the order of 80,000 riders per year, with a fare of \$1.25 per trip this would result in potential revenue of \$100,000. Revenues would reduce the operating cost to \$360,000, equating to a cost per rider of \$4.50. The target ridership will need time to develop with a potential increase in ridership occurring over a three year period.

Prioritization of Scenarios – Local Bus

The transit scenarios for the local bus services presented in the previous sections were informed by the second phase of evaluation, the prioritization exercise and ultimate phasing suggestions for the recommendations. The outcome of this process provided information on how well the scenarios performed at providing quality transit improvements for the community.

The highest performers were deemed to be the highest priority and were advanced as the recommendations.

Table 5.35 provides a summary of the evaluation of the scenarios, when compared to the criteria for this level of examination. The prioritization information matrix is included in Appendix E, populated with the data for each criterion.

Table 5.35: The Woodlands Area Mobility – Prioritization of Scenarios Summary

Criteria - Prioritization of Scenarios	Bus Route 10X	Bus Route 10	Bus Route11
<i>Fiscal</i>	The capital cost for the complete implementation with new vehicles would be in the order of \$1.22M. Operating cost would be around \$210K. The route would need to be a partnership between ExxonMobil and The Woodlands, potentially as a dedicated ExxonMobil service. No revenue recovery is expected on this basis.	The capital cost for the complete implementation with new vehicles would be in the order of \$2.5M. Operating cost would be around \$600K. With a target ridership of 50k trips, fare revenues would be in the order of \$62.5K based on a \$1.25 fare. The cost per rider would be approximately \$10.75 after fare revenue.	The capital cost for the complete implementation with new vehicles would be in the order of \$2.1M. Operating cost would be around \$460 K. With a target ridership of 80k trips, fare revenues would be in the order of \$100K based on a \$1.25 fare. The cost per rider would be approximately \$4.50 after fare revenue.
<i>Mobility</i>	A dedicated service between ExxonMobil’s Springwoods and Hughes Landing offices is being considered by ExxonMobil. The opportunity exists to have this service stop in the Town Center, providing Exxon employees with additional mobility options, potentially reducing the demand on parking.	The use of a new high quality accessible bus would provide a capacity of 200 passengers per hour per direction in peak periods. The service would be timetabled and operated at a 15 minute frequency to provide a reliable passenger focused service. The service would provide a new mobility option for residents travelling to the Town Center. The route could reduce demand on Town Center parking.	The use of a new high quality accessible bus would provide a capacity of 200 passengers per hour per direction in peak periods. The service would be timetabled and operated at a 15 minute frequency to provide a reliable passenger focused service. The service would provide a new mobility option for residents travelling to the Town Center. The route could reduce demand on Town Center parking.

Criteria - Prioritization of Scenarios	Bus Route 10X	Bus Route 10	Bus Route11
<i>Community</i>	Connectivity to the Town Center would allow ExxonMobil employees to easily access the shops and services, helping to support the economy within The Woodlands.	The route would provide a new mobility option for residents and business along the proposed route. With the proposed regular timetable service, it would help develop a new transit culture within the community. Route would be integrated with existing and new walk and cycle links.	The route would connect the Panther Creek, Indian Springs and sterling Ridge Village centers with the Town Center, in order to provide a new mobility option for residents and business along the proposed route. With the proposed regular timetable service, it would help develop a new transit culture within the community, and allow less mobile residents to access the Village centers and Town Center. Route would be integrated with existing and new walk and cycle links.
<i>Prosperity</i>	Connectivity to the Town Center would allow ExxonMobil employees to easily access the shops and services, helping to support the economy within The Woodlands.	The route in providing a new mode of travel could reduce parking demand within the Town Center, the improved mobility options would help support the businesses on the route and within the Town Center. This would support economic development and the ongoing success of The Woodlands.	The provision of new connections to the Village centers and the Town Center would improve accessibility and help support businesses on the corridor. Developing a wider bus service would reduce parking demand and could help support further development in the Town Center.
<i>Sustainability</i>	The route will improve mobility and allow people to access the Town Center without the need of a car. The passenger journeys will decrease car use and associated emissions.	The route, in providing improved mobility options, will allow people to move around The Woodlands without the need of a car. The passenger journeys will decrease car use and associated emissions.	The route, in providing improved mobility options, will allow people to move around The Woodlands without the need of a car. The passenger journeys will decrease car use and associated emissions.
<i>Deliverability</i>	No infrastructure would be required to support the service.	The route will operate on existing streets, with bus pull outs provide where required. Stop infrastructure could be provided as funding becomes available.	The route will operate on existing streets, with bus pull outs provided where required. Stop infrastructure could be provided as funding becomes available.

Regional Mobility - The Woodlands Express Service

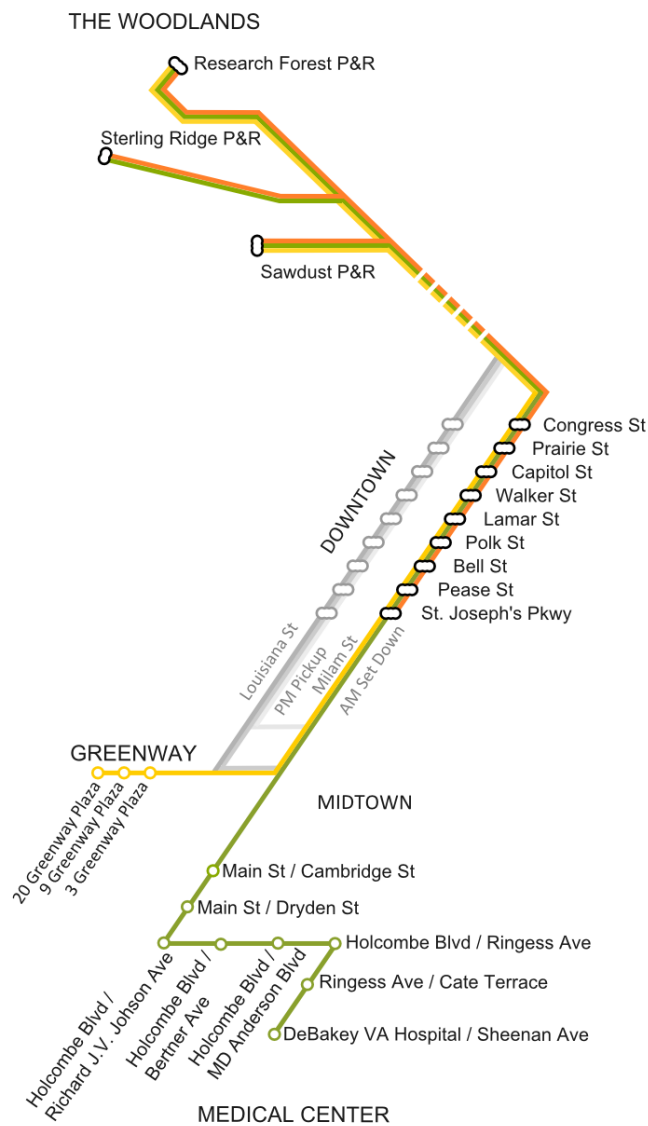
Context

Regional mobility is defined by The Woodlands Express commuter services between The Woodlands and multiple locations in the Houston metropolitan area. The plan examined potential scenarios for enhanced services from The Woodlands to Houston, as well as reverse commute bus services originating in the Houston metropolitan area and traveling to key employment destinations in (and around) The Woodlands. The sections below provide details on the express bus scenarios examined.



The Woodlands Express service currently operates from three existing park and ride facilities. Each location provides express bus services to multiple stops in downtown Houston, the Texas Medical Center, and Greenway Plaza areas. The majority of the services use 56 seat coaches. The services are supplemented by a number of higher capacity 84 seat double deck coaches. The larger coaches provide additional capacity at peak times at the busier park and ride locations. The service is well used, charging a round trip fare of \$12. The current ticketing arrangement allows users to buy either single tickets or books of twenty tickets, which can be used on any service at any time. No discount is provided for advance purchase. Figure 5.27 depicts the current Woodlands Express services in a thematic graphic. The graphic shows each of the current services and all stop locations.

Figure 5.27: Current Woodlands Express Services



The Woodlands Express service is administered by The District, under contract with The Woodlands Township. The District owns and manages the park and ride locations. Coaches and drivers are currently provided through contract operators.

The Woodlands Township is in the process of purchasing coaches (over time) to help reduce the cost of operations, which currently includes vehicles.

The project team focused various outreach efforts on the current and potential express bus riders to better understand their needs. The first project questionnaire noted that 60% of respondents would consider using the express bus services from the park and rides to go to downtown Houston, the Texas Medical Center, Greenway Plaza, or the Uptown / Galleria area. The



The Woodlands Express currently moves passengers successfully from The Woodlands to central Houston.

questionnaire also noted a potential preference for vehicles with greater seating than those that are currently provided and a preference for more frequent services. The questionnaire respondents specifically identified the desire for 10 minute frequencies to downtown Houston and 30 minute frequencies to the Texas Medical Center, Greenway Plaza, and the Uptown / Galleria area. An important take away from the questionnaire was that riders generally were prepared to pay a higher fare of \$14 if improvements in the service were implemented.

Current Issues

The services provided during the morning commuter period have a more even distribution of riders due to fairly uniform work morning start times. The opposite is true of the evening return services, where the distribution of riders can differ day to day as people's needs dictate. Occasionally, the uneven distribution of riders on the evening return services can result in crowding on various coaches.

The first online questionnaire and associated comments revealed a relative lack of awareness of the express bus service, including the routes operated from each facility, outside of the existing user base. While online information is provided, it is not well-presented and clear to a potential new user of the service. Additionally, the schedule information presented online is only for each park and ride and not for each

The first online questionnaire and

destination. Outside of The District's website there appears to be no formal promotion of the system to develop new ridership. The Woodlands Express is identified as an area amenity through materials encouraging business development and home sales in the area (for example, the Economic Development Partnership and area realtors / home builders). However, these are not targeted programs that are actively focused on developing new ridership. A potential rider must learn of the service through word of mouth and investigate how to use the system on their own or by contacting The District or The Woodlands Township.

The locations of the park and ride facilities are not as evident as they could be. Park and ride signage is minimal and provided only immediately adjacent to each location or at the main vehicle access points. Based on discussions with stakeholders at the park and ride locations and through public outreach events, crowding and standing were raised as issues.

Although flexible for users, the current ticketing arrangement does not incentivize loyalty.

Riders can make a daily choice to use the service with individual tickets. Discounted monthly ticket passes would likely incentivize more consistent ridership by key customers. The lack of online ticketing also creates a barrier for new riders that may not be familiar with how the service works.

Regional Mobility – Express Services (The Woodlands to Houston)

Opportunity

The current service is well used, with a regular user base. The opportunity exists to build of this to provide additional services and new more journey opportunities.

Services to alternate destinations may expand the user base and help support increased service frequency.

The current advertising and information could be improved to provide potential users a clearer understanding of the services provided and the times they operate. The ticketing system could also be adjusted to incentivize regular use, with a discount given for dedicated weekly or monthly ticketing, which would help to capture more regular ridership.

Proposed Future Enhancement of Existing Express Services

To aid the identification and development of opportunities, the second online questionnaire was used along with stakeholder engagement. The questionnaire helped to identify potential express service enhancements to be tested with the stakeholders. The input received helped to refine the transit scenarios for the express services.

The second online questionnaire asked respondents if they currently use or would use The Woodlands Express. Of the 4,600 responses to the questionnaire, the result was equally split 49.6% 'yes' to 50.4% 'no'. Not all area residents work within a location accessible by the

Woodlands Express and therefore would not take advantage of a commuter service like the Woodlands Express.

The feedback that was received from the second online questionnaire (relevant to The Woodlands to Houston express services) is provided in Table 5.36. This information helped to inform the development of the potential opportunities to enhance the express bus scenarios. Through the second online questionnaire the team tested the desire for a potential new Woodlands Express pick up / drop off point (outside of the current park and ride locations). This potential stop would be located on the south side of the Town Center, adjacent to an area of denser residential development. This was presented as a ‘walk up’ stop and would not be a park and ride location. The potential desire to use the park and rides and the potential ‘walk up’ stop are presented in Table 5.36.

Table 5.36: The Woodlands Express Park and Rides / Stop Starting Points Performance – Questionnaire #2

Park and Ride / Stop Location	At which Woodlands Express park and ride or stop do you start (or would you most likely start) your journey?
Sterling Ridge Park and Ride (Ashlane Way @ Woodlands Parkway)	256
Sawdust Park and Ride (Westridge Rd. @ Budde Rd.)	310
Research Forest Park and Ride (Gosling Rd. between Research Forest Dr. and College Park Dr.)	292
Town Center South - Potential Walk-up Stop (Woodlands Pkwy @ Grogan’s Mill)	244

In general, the proposed (new) south Town Center stop performed well against the existing park and ride locations with 244 respondents. Only a small portion of the planned residential for this area is currently in place. Because of the amenities that make The Woodlands a desirable place to live, new urban residents would likely be attracted to live in the Town Center. Therefore, demand could increase for such an express bus service. The south Town Center residential area is one of the most urban in The Woodlands; therefore new residents that desire an urban lifestyle may be more inclined to use the Woodlands Express to maintain jobs in other parts of the metropolitan area while choosing to live in The Woodlands.

Respondents to questionnaire #2 were also asked if they would travel to new destinations, if such service were provided. The new destinations tested were based on the initial scoping of potential transit services desired throughout the public outreach efforts. The University of Houston downtown campus, the Energy Corridor, Uptown / Galleria area, and the Midtown area were all identified by stakeholders as potential destinations (and tested through the questionnaire). Table 5.37 provides the results. The information gained from the questionnaire was used to guide the development of the ultimate options and recommendations. Those transit options with the greatest potential for success were considered and advanced. The more successful the mobility option, the more revenue that could be gained to support or sustain it.

Table 5.37: The Woodlands Express Stop Destination Points Performance – Questionnaire #2

Park and Ride / Stop Location	Do you or would you travel to this location?
University of Houston - Downtown	
University of Houston - Downtown Campus (N. Main St. / Girard St.)	182
Future Burnett Transit Center/METRO Rail (N. Main St. / Burnett St.)	125
Midtown	
Midtown – Milam Street / Elgin Street (HCC Administration)	225
Midtown – Milam Street / Berry Street (HCC Central Campus)	138
Uptown / Galleria	
Uptown / Galleria – Post Oak Blvd. / San Felipe Street	292
Uptown / Galleria – Post Oak Blvd. / Ambassador Way	177
Uptown / Galleria – Westheimer Rd. / Post Oak Blvd.	367
Energy Corridor	
Energy Corridor – Addicks Park and Ride (north of the Katy Fwy., east of State Highway 6)	174
Energy Corridor – BP America (Grisby Rd. / Westlake Park Blvd.)	119
Energy Corridor – ConocoPhillips (Dairy Ashford Rd. / Eldridge Pkwy.)	122
Energy Corridor – Shell Oil (Dairy Ashford Rd. / Katy Freeway)	140

The Uptown / Galleria area gained the highest response rate followed by the Energy Corridor, Midtown, and University of Houston - Downtown. New services could be provided to the Uptown



The Uptown / Galleria area was consistently noted as a key destination for stakeholders.

/ Galleria, Midtown, or the University of Houston - Downtown as extensions of the existing services to downtown Houston and Greenway Plaza, because they are only slightly beyond the existing stop locations. Adding new destinations as extensions of existing services creates the least financial risk, because they can easily be adjusted and have limited additional investment, should the service not attract the

number of riders needed to sustain it. Serving stops further afield from the existing Woodlands

Express destinations would require completely separate, new services to be created with the necessary investment of separate buses and drivers.

Another consideration would be the ability of potential riders to access their ultimate destinations (from the stop to their work location, etc.). A strong pedestrian, cycle, or local transit environment would be important to delivering people to their ultimate destination, once they alight the Woodlands Express buses. The Uptown / Galleria and Midtown areas have the strongest urban connectivity (walking, local transit, etc.). With the addition of the planned Post Oak bus rapid transit, the Uptown / Galleria area would provide potential riders the broadest connectivity throughout the area. The University of Houston - Downtown has good connectivity to Houston METRO bus and light rail. In contrast, the Energy Corridor would be the hardest to serve. The Energy Corridor is far west of any existing Woodlands Express services and couldn't be served simply by extending an existing route. The Energy Corridor would require a new, dedicated service, which would not be able to make stops within downtown Houston. Additionally, this area has developed in an office park setting with limited connectivity between business campuses, which creates challenges for timely bus service and pedestrian connectivity. The questionnaire also did not provide details of the potential journey time, but in the case of a direct service to the Energy corridor it might be difficult to provide a competitive journey time compared to a car. The Energy Corridor District is working hard to ultimately address these challenges, through improved urban design and connectivity. Local and regional transit in the Energy Corridor will be an important element in the area's continued success. Additionally, there are likely significant relationships between many of the energy companies in The Woodlands area and the Energy Corridor that could benefit from better connectivity. Based on the potential challenges and risks, new service to the Energy Corridor is not recommended at this time, but should be maintained as an option and tracked for future demand.

Additional general questions were posed in the second questionnaire. The results of these are provided in Table 5.38. In general, stakeholder input indicated the need to build off of the existing service and to identify opportunities that would enhance the existing system, while limiting the risk involved.

Table 5.38: The Woodlands Express Additional Questions – Questionnaire #2

Questions	
How many Woodlands to Houston trips (round trips) would you likely make per month?	
0-5	22.4%
6-10	11.5%
11-15	10.1%
More than 15	56.0%
What time of day would you most likely use The Woodlands Express?	
Peak work commute times (morning/evening)	88.0%
Mid-day	19.0%
Evening	22.4%

Enhancements – The Woodlands Express (The Woodlands to Houston)

The sections below details the potential Woodlands Express transit scenarios considered for the service from The Woodlands to Houston. Details are provided related to frequencies, infrastructure improvements, and new destinations. These scenarios are presented by each of the origination points (park and ride locations) in The Woodlands.

Existing Services & New Destinations

The input and analysis of options resulted in the potential viability of extending the existing service that terminates in downtown Houston and Greenway Plaza respectively to Midtown and the Uptown / Galleria areas. These two locations were consistently identified by stakeholders as important new destinations, have strong local connectivity, and could be delivered through the extension of existing routes. Extension of the existing services limits the costs and risks in testing these two services.

In addition to the new destinations, stakeholders noted the desire for later evening services from the Greenway Plaza and the Texas Medical Center stop locations. Many of the last evening return services are before 5pm on weekdays. Stakeholders noted the difficulty adjusting their work schedules to meet the final pickup and others stated it simply stopped them from using the service altogether. It is proposed that one later evening service be provided from each of the destinations served. This would provide more return journey opportunities and increase the certainty of a return trip.



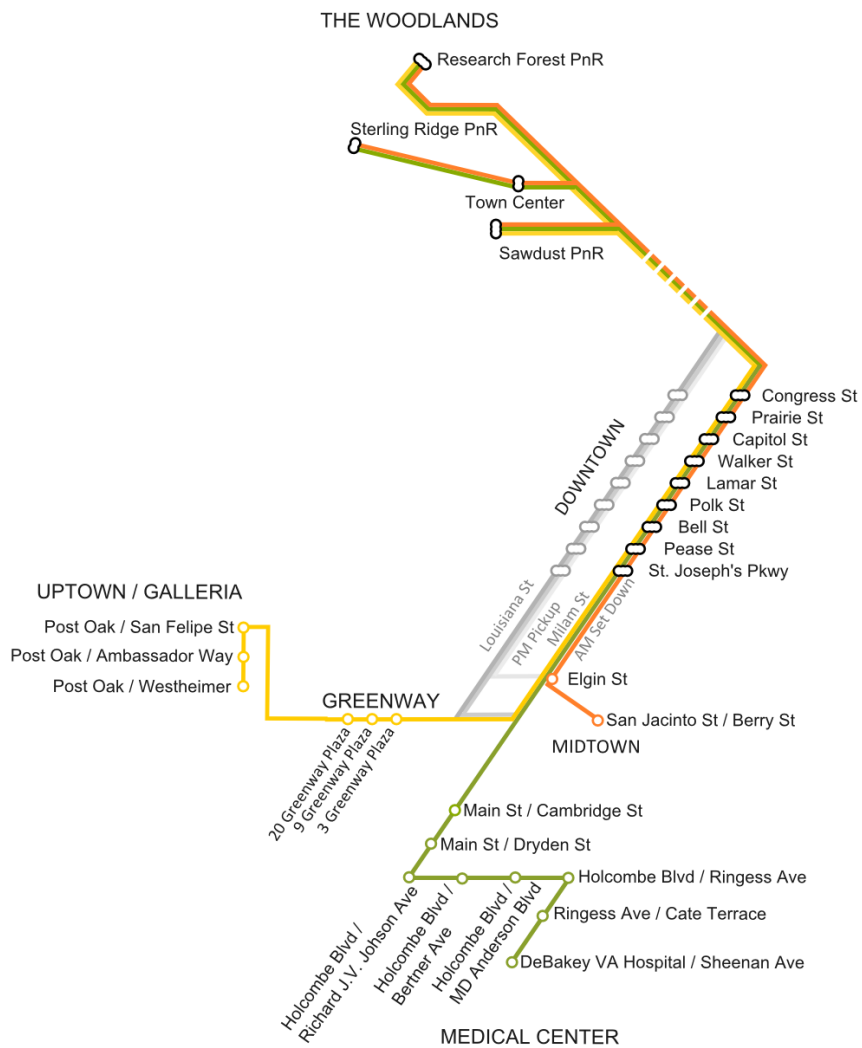
The Texas Medical Center is a major employment center that is served by the Woodlands Express.

Currently, midday services are provided from the Texas Medical Center and downtown Houston to Sawdust and Research Forest park and rides. Mid-day service is important to many riders, even if they do not use the service on a regular basis. Many riders simply want the option of a midday trip home, in case of a schedule change, family needs, etc. A potential cost effective way to increase the service provision would be to have each of the services go to both the Sawdust and Research Forest park and rides (instead of only one). This would allow the services operated to cover a greater period of time and provide additional journey opportunities for both park and ride locations.

Park and Ride / Stop Locations

The addition of a south Town Center pickup location resulted in positive stakeholder feedback. This new ‘walk up’ stop would be served by coaches starting their service at the Sterling Ridge park and ride. These services would make one stop at the new south Town Center walk up and then continue to I-45 and into Houston. Stopping at this location would add minimal travel time and would allow the service to increase ridership without the need for additional park and ride investment. Infrastructure improvements have also been identified at each of the existing park and ride locations. Improvements include providing pedestrian and cycle connectivity, as well as improved kiss and ride drop off locations at each park and ride. An ongoing maintenance program for each park and ride facility is also needed. The revisions to the service and the addition of the new Town Center ‘walk up’ location are shown in the service diagram in Figure 5.28. The diagram displays the potential extension of services to the Uptown / Galleria area and Midtown destinations.

Figure 5.28: Enhancements – The Woodlands Express (The Woodlands to Houston)

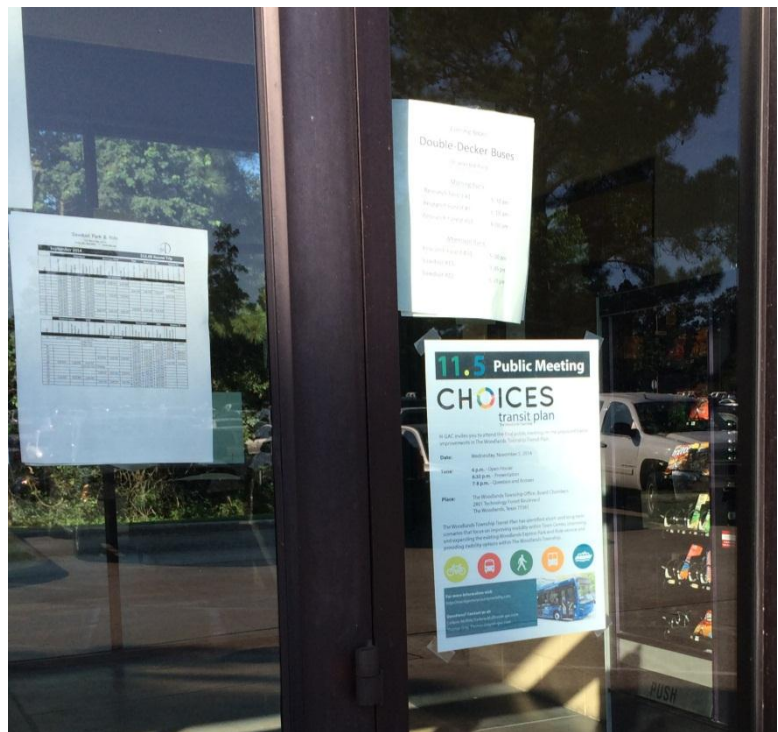


The following sections detail the potential extension of services from the Research Forest, Sawdust, and Sterling Ridge park and ride locations to proposed destinations in metropolitan Houston. These are presented by each individual park and ride origin point. The team has developed amended Woodlands Express timetables to accommodate the extended services. The new timetables have been developed to maximize the efficient use of Woodlands Express buses across the network and to minimize non-revenue service time (buses positioning with no revenue passengers). The new timetables take into account new reverse commute services (discussed later in this summary document). Additional travel time improvements would be anticipated for the bus services with the completion of the high occupancy vehicle (HOV) lane extension north from FM 1960 to Conroe.

Research Forest Park and Ride - Woodlands Express Service (The Woodlands to Houston)

The plan proposes adding two new destinations for services from the Research Forest park and ride. Figure 5.28 graphically displays the proposed extensions. These new destinations include:

- Research Forest park and ride to Uptown/Galleria (with stops at Post Oak Boulevard @ San Felipe Street, Post Oak Boulevard @ Ambassador Way, and Post Oak Boulevard @ Westheimer Road) as an extension of the current Greenway Plaza services.
- Research Forest park and ride to Midtown (with stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route.



Public open house advertising at a park and ride location.

Additionally, this scenario would propose later pick-up times on the evening return to Research Forest park and ride from:

- Medical Center - add 6:05pm pick-up.
- Greenway - add 6:30pm pick-up.

The services call at all the stops in the downtown, providing additional later pickup opportunities for all the users in downtown. The proposal responds to user comments for later service, will help ensure passengers finding they have to work later have an increased opportunity to use the return services and improve the perception of the service.

Table 5.39 provides a summary of the key metrics of this route.

Table 5.39: Research Forest Park and Ride - Metrics

Metric	Details
Service:	Extended services: <ul style="list-style-type: none"> • Downtown service to Midtown • Greenway service to Uptown / Galleria Later return services: <ul style="list-style-type: none"> • Medical Center - add 6:05pm pick-up • Greenway - add 6:30pm pick-up
Capital cost:	P&R, cycle/pedestrian improvements: \$300,000
Annual operating cost:	Current operating cost: \$2,400,000
	Current fixed cost: (maintenance, security, etc.) \$400,000
	Additional annual operating cost: \$565,000
Measure of success:	Target annual ridership: additional 47,000 (+190 per day)
Priority	Mid-term

The enhanced existing services and new extensions from Research Forest park and ride provide new choices for potential riders. The services open up new destinations for employment or travel destinations in the region (Uptown / Galleria, etc.). Also, the additional of new later return times may fit better with more people’s schedules, allowing them to utilize the Woodlands Express service (where the current schedule may not work for them). Research Forest is one of the most highly utilized park and rides. Expanding service not only provides additional choices, but helps free up roadway space that would otherwise be taken by these drivers individually.

Research Forest – Infrastructure and Capital Costs

Planning level cost estimates for the Research Forest park and ride are presented in Table 5.40. The assumptions for local unit costs were previously presented in Table 5.9. The potential improvements to the Research Forest park and ride site includes creating a dedicated passenger drop off/pick up location, often referred to as a ‘kiss and ride.’ Additionally, the Research Forest park and ride requires the addition of sidewalk / pathway connections to the site to provide a safe route for pedestrians and cyclists. Several sideways and pathways are near the Research Forest park and ride, but do not current physically connect to the site.



Informal kiss and ride at Research Forest park and ride.

Pedestrians and cyclists currently walk in the roadway to access the park and ride. Secure cycle storage would also be proposed at Research Forest because it was observed that some cyclists using this facility were chaining their bikes to trees and light poles. The cost of the improvements would be in the order of \$300,000.

The park and ride site is one of the older facilities, with some maintenance activities having been deferred. The park and ride canopy is weathered and deteriorating. The location would benefit from a long term budgeted maintenance strategy that may help leverage funding and support the long term maintenance and repair of the facilities.

Table 5.40: Research Forest – Capital Cost Estimates

Capital Item	Estimated Cost
Kiss and ride / signage, infrastructure	\$5,000
Cycle and pedestrian connections	\$225,000
Project management / design / contingencies	\$70,000
Total	\$300,000

Research Forest – Operations

The project team developed revised Woodlands Express timetables to incorporate the proposed service changes and new destinations. All of the existing services have been retained; however, some scheduled times may have shifted slightly to maximize the efficiency of the overall service. The revised timetables were also needed to identify the increase in service hours. The timetable for the revised services is shown in Table 5.41 and Table 5.42.

Table 5.41: Research Forest Morning Outbound Service

RESEARCH FOREST PARK & RIDE AM												
Toward Downtown Houston												
<i>Monday through Friday</i>												
The Woodlands	Downtown			Greenway Plaza			Uptown/Galleria			Midtown	Medical Center	
Research P&R	Milam / Congress	Milam / St. Josephs Pkwy	Louisiana / St. Josephs Pkwy	Twenty Greenway	Nine Greenway	Three Greenway	Post Oak/ San Felipe	Post Oak/ Ambassador Way	Westheimer/ Post Oak	Milam / Elgin	San Jacinto/ Berry	Main / Cambridge Holcombe / VA Hospital
MORNING TRIPS												
5:20	5:55	6:05	--	--	--	--	--	--	--	6:10	6:15	
5:30	6:05	6:15	--	--	--	--	--	--	--	6:20	6:25	
5:40	6:15	6:25	--	--	--	--	--	--	--	6:30	--	6:35 6:40
5:50	6:25	6:35	--	--	--	--	--	--	--	6:40	6:45	
5:50	6:30	6:40	--	6:55	7:00	7:05	7:15	7:17	7:20	--	--	
6:00	6:40	6:50	--	--	--	--	--	--	--	6:55	7:00	
6:10	6:50	7:00	--	--	--	--	--	--	--	7:05	7:10	
6:15	>>>>>> Medical Center Express Trip >>>>>>						--	--	--	7:05	--	7:15
6:20	7:00	7:10	--	--	--	--	--	--	--	7:15	7:20	
6:30	7:15	7:25	--	7:40	7:45	7:50	8:00	8:02	8:05	--	--	
6:40	7:25	7:35	--	--	--	--	--	--	--	7:40	7:45	
6:50	7:35	7:45	--	--	--	--	--	--	--	7:50	7:55	
7:00	7:45	7:55	--	8:10	8:15	8:20	8:30	8:32	8:35	--	--	
7:20	8:05	8:15	--	--	--	--	--	--	--	8:20	--	8:25 8:30
7:40	8:25	8:35	--	--	--	--	--	--	--	8:40	8:45	
7:50	8:35	8:45	--	--	--	--	--	--	--	8:50	8:55	
8:00	8:45	8:55	--	--	--	--	--	--	--	9:00	9:05	
8:10	8:55	9:05	--	--	--	--	--	--	--	9:10	9:15	
8:20	9:05	9:15	--	--	--	--	--	--	--	9:20	9:25	



Table 5.42: Research Forest Evening Inbound Services

RESEARCH FOREST PARK & RIDE PM													
Toward The Woodlands													
Monday through Friday													
Medical Center		Midtown		Uptown/Galleria			Greenway Plaza			Downtown			Research Forest P&R
Holcombe / VA Hospital Main / MH Medical Plaza	San Jacinto/ Berry Milam / Elgin	Westheimer/ Post Oak Post Oak/ Ambassador Way Post Oak/ San Felipe	Twenty Greenway Nine Greenway Three Greenway	Milam / St. Josephs Pkwy Louisiana / St. Josephs Pkwy Louisiana/ Prairie									
AFTERNOON TRIPS													
12:00	12:10	--	12:25	--	--	--	--	--	--	12:30	12:35	13:30	
		12:50	12:55	--	--	--	--	--	--	1:00	1:10	1:50	
		3:05	3:10	--	--	--	--	--	--	3:15	3:25	4:05	
		3:30	3:35	--	--	--	--	--	--	3:40	3:50	4:30	
3:20	3:30	--	3:45	>>>>>> Medical Center Express Trip >>>>>>								4:40	
		3:40	3:45	--	--	--	--	--	--	3:50	4:00	4:40	
		3:50	3:55	--	--	--	--	--	--	4:00	4:10	4:55	
				3:10	3:13	3:15	3:25	3:30	3:35	3:50	4:00	4:40	
		4:20	4:25	--	--	--	--	--	--	4:30	4:40	5:20	
		4:30	4:35	--	--	--	--	--	--	4:40	4:50	5:30	
				4:10	4:13	4:15	4:25	4:30	4:35	4:50	5:00	5:40	
		4:50	4:55	--	--	--	--	--	--	5:00	5:10	5:50	
4:35	4:45	--	5:00	>>>>>> Medical Center Express Trip >>>>>>								5:55	
		5:00	5:05	--	--	--	--	--	--	5:10	5:20	6:00	
		5:15	5:20	--	--	--	--	--	--	5:25	5:35	6:15	
				4:50	4:53	4:55	5:05	5:10	5:15	5:30	5:40	6:20	
		5:25	5:30	--	--	--	--	--	--	5:35	5:45	6:25	
		5:35	5:40	--	--	--	--	--	--	5:45	5:55	6:35	
		5:40	5:45	--	--	--	--	--	--	5:50	6:00	6:40	
5:30	5:40	--	5:55	--	--	--	--	--	--	6:00	6:10	6:50	
		5:50	17:55	--	--	--	--	--	--	6:00	6:10	6:50	
				5:50	5:53	5:55	6:05	6:10	6:15	6:30	6:40	7:20	
		5:55	6:00	--	--	--	--	--	--	6:05	6:15	6:55	
6:35	--	--	--	--	--	--	--	--	--	7:05	7:15	7:55	

Research Forest – Operating Costs

The current operation of the service includes a fixed cost of \$400,000 to manage the service and operate the park and ride location. The current express bus services cost \$2,400,000 to operate. The extension of the services would increase the service miles and service hours, increasing the cost by approximately \$565,000. The overall cost of service provision would be approximately \$3,365,000 per year. Table 5.43 presents the potential operating costs.

Table 5.43: Research Forest – Operating Cost Estimates

	Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
Current fixed operating costs (park and ride management, security, etc.)	n/a	n/a	\$400,000
Current operating costs (bus services)	11,600	\$207.75	\$2,400,000
Additional operating cost (with proposed services)	2,700	\$207.75	\$565,000
Total			\$3,365,000

The H-GAC regional transportation model was run with the new express bus services to identify the ridership potential for the route extensions. In reviewing the modeled ridership results,



however, it was evident the results were of limited value. This is because ridership models are developed and calibrated based upon existing travel patterns. Because of this, the model likely



Stakeholders noted the importance of cycle racks on all new buses.

cannot assign riders without additional information and surveys. The model results have therefore not been used and ridership targets have been developed based on past ridership and the desired revenue targets.

In the absence of established ridership forecasting, an estimated target ridership for the service has been developed. This is based upon the ridership covering the costs incurred, at a \$12 (round trip) fare. The target ridership for the service revisions at Research Forest would be in

the order of 47,000, approximately 190 additional daily passengers. The cost per new rider would be \$0, although ridership would need time to develop with a potential increase in ridership occurring over a three year period.

Sawdust Park and Ride - Woodland Express Service (The Woodlands to Houston)

The plan proposes adding two new destinations for services from the Sawdust park and ride. Figure 5.28 graphically displays the proposed extensions. These new destinations include:

- Sawdust park and ride to Uptown/Galleria (with stops at Post Oak Boulevard @ San Felipe Street, Post Oak Boulevard @ Ambassador Way, and Post Oak Boulevard @ Westheimer Road) as an extension of the current Greenway Plaza services.
- Sawdust park and ride to Midtown (with stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route.

Additionally, this scenario would propose later pick-up times on the evening return to Sawdust park and ride from:

- Medical Center - add 5:40pm pick-up.
- Greenway - add 6:40pm pick-up.

The services call at all the stops in the downtown, providing additional later pickup opportunities for all the users in downtown. The proposal responds to user comments for later service, will help ensure passengers finding they have to work later have an increased opportunity to use the return services and improve the perception of the service.

Table 5.44 provides a summary of the key metrics of this route.

Table 5.44: Sawdust Park and Ride - Metrics

Metric	Details	
Service:	Extended services:	
	<ul style="list-style-type: none"> Downtown service to Midtown Greenway service to Uptown / Galleria 	
	Later return services:	
	<ul style="list-style-type: none"> Medical Center - add 5:40pm pick-up Greenway - add 6:40pm pick-up 	
Capital cost:	P&R, cycle/pedestrian improvements:	\$1,300,000
Annual operating cost:	Current operating cost:	\$1,900,000
	Current fixed cost: (maintenance, security, etc.)	\$400,000
	Additional annual operating cost:	\$325,000
Measure of success:	Target annual ridership: additional 27,000 (+110 per day)	
Priority	Near-term	

Sawdust has the potential for additional growth and capacity for users. Drawing users from around the region increases revenue for the services. Growth in the southern portion of the study area could continue to add to the development of riders at the Sawdust park and ride. Where these services are self-sustaining or make a profit, the revenues can be used to support additional mobility enhancements or services for the community. The enhanced existing services and new extensions from Sawdust park and ride provide new choices for potential riders. The services open up new destinations for employment or travel destinations in the region (Uptown / Galleria, etc.). Also, the additional of new later return times may fit better with more people’s schedules, allowing them to utilize the Woodlands Express service (where the current schedule may not work for them).

Sawdust – Infrastructure and Capital Costs

Planning level cost estimates for the Sawdust park and ride are presented in Table 5.45. The assumptions for local unit costs were previously presented in Table 5.9. The potential improvements to the Sawdust park and ride site include creating a dedicated passenger drop off/pick up location, also referred to as kiss and ride. Additionally, the Sawdust park and ride requires the addition of sidewalk / pathway connections to the site to provide a safe route for pedestrians and cyclists. Very limited cycle and pedestrian connections exist to the Sawdust park



Some park and ride infrastructure requires upgrading and maintenance.

and ride. During site visits, it was observed that some cyclists use the facility but are required to ride in mixed traffic and have to lock their cycles to trees and poles, due to the lack of cycle storage facilities. Completion of the sidewalk and trail connections would be more significant at this location due to the distance to existing provisions. The cost of the improvements would be in the order of \$1,300,000.

This park and ride site is one of the older facilities, with some maintenance activities having been deferred. The park and ride canopy is weathered and deteriorating. The location would benefit from a long term budgeted maintenance strategy that may help leverage funding and support the long term maintenance and repair of the facilities.

Table 5.45: Sawdust – Capital Cost Estimates

Capital Item	Estimated Cost
Kiss and ride / signage, infrastructure	\$5,000
Cycle and pedestrian connections	\$935,000
Project management / design / contingencies	\$360,000
Total	\$1,300,000

Active mode (walking and cycling) connections are currently not provided to the Sawdust park and ride. Figure 5.29 shows the proposed new active mode connections to the existing sidewalk network.

Figure 5.29: Sawdust Cycle and Pedestrian Connections



Sawdust – Operations

The project team developed revised Woodlands Express timetables to incorporate the proposed service changes and new destinations. All of the existing services have been retained; however, some scheduled times may have shifted slightly to maximize the efficiency of the overall service.

A timetable based upon the existing services has been developed to show the potential changes to services and to identify the increase in service hours. The timetable for the revised services is shown in Table 5.46 and Table 5.47.

Table 5.46: Sawdust Morning Outbound Service

SAWDUST PARK & RIDE AM													
Toward Downtown Houston													
<i>Monday through Friday</i>													
Sawdust P&R	Downtown			Greenway Plaza			Uptown/Galleria			Midtown		Medical Center	
	Milam / Congress	Milam / St. Josephs Pkwy	Louisiana / St. Josephs Pkwy	Twenty Greenway	Nine Greenway	Three Greenway	Post Oak/ San Felipe	Post Oak/ Ambassador Way	Westheimer/ Post Oak	Milam / Elgin	San Jacinto/ Berry	Main / Cambridge	Holcombe / VA Hospital
MORNING TRIPS													
5:10	5:40	5:50	--	--	--	--	--	--	--	5:55	6:00		
5:40	6:10	6:20	--	6:35	6:40	6:45	6:55	6:57	7:00				
5:30	6:00	6:10	--	--	--	--	--	--	--	6:15	6:20		
6:00	6:30	6:40	--	--	--	--	--	--	--	6:45	--	6:50	6:55
6:10	6:40	6:50	--	--	--	--	--	--	--	6:55	7:00		
6:30	7:00	7:10	--	7:25	7:30	7:35	7:45	7:47	7:50				
6:40	7:10	7:20	--	--	--	--	--	--	--	7:25	7:30		
6:50	7:20	7:30	--	--	--	--	--	--	--	7:35	7:40		
7:00	7:35	7:45	--	--	--	--	--	--	--	7:50	7:55		
7:10	7:40	7:50	--	--	--	--	--	--	--	8:00	--	8:05	8:10
7:20	7:50	8:00	--	8:20	8:25	8:30	8:40	8:42	8:45				
7:45	8:20	8:30	--	--	--	--	--	--	--	8:35	8:40		
7:55	8:30	8:40	--	--	--	--	--	--	--	8:45	8:50		

Table 5.47: Sawdust Evening Inbound Services

SAWDUST PARK & RIDE PM													
Toward The Woodlands													
<i>Monday through Friday</i>													
<i>Medical Center</i>		<i>Midtown</i>		<i>Uptown/Galleria</i>			<i>Greenway Plaza</i>			<i>Downtown</i>			<i>Woodlands</i>
Holcombe / VA Hospital	Main / MH Medical Plaza	San Jacinto / Berry	Milam / Elgin	Westheimer / Post Oak	Post Oak / Ambassador Way	Post Oak / San Felipe	Twenty Greenway	Nine Greenway	Three Greenway	Milam / St. Josephs Pkwy	Louisiana / St. Josephs Pkwy	Louisiana / Prairie	Sawdust P&R
AFTERNOON TRIPS													
12:30	12:40	--	12:55	--	--	--	--	--	--	--	1:00	1:10	1:30
		3:35	3:30	--	--	--	--	--	--	--	3:45	3:55	4:20
		3:55	3:50	--	--	--	--	--	--	--	4:05	4:15	4:40
		4:15	4:10	--	--	--	--	--	--	--	4:25	4:35	5:00
				3:55	3:58	4:00	4:10	4:15	4:20	--	4:35	4:45	5:05
		4:35	4:30	--	--	--	--	--	--	--	4:45	4:55	5:15
4:25	4:35	--	16:50	--	--	--	--	--	--	--	4:55	5:05	5:30
		4:55	4:50	--	--	--	--	--	--	--	5:05	5:15	5:40
		5:05	5:00	--	--	--	--	--	--	--	5:15	5:25	5:50
				4:25	4:28	4:30	4:40	4:45	4:50	--	5:05	5:15	5:40
		5:25	5:20	--	--	--	--	--	--	--	5:35	5:45	6:10
5:15	5:25	--	5:40	--	--	--	--	--	--	--	5:45	5:55	6:20
				5:25	5:28	5:30	5:40	5:45	5:50	--	6:05	6:15	6:35
5:40	--	--	--	--	--	--	--	--	--	--	6:10	6:20	6:40
		5:45	5:40	--	--	--	--	--	--	--	5:55	6:05	6:30
							6:40	--	--	--	7:05	7:15	7:35

The last service at 5:25pm from Uptown/Galleria could experience overcrowding as the service develops. This could potentially be mitigated by commencing the current 6:40 service from Greenway from Uptown/Galleria at 6:25 to provide a later service.

Sawdust – Operating Costs

The current operation of the service includes a fixed cost of \$400,000 to manage the service and operate the park and ride location. The current express bus services cost \$1,900,000 to operate. The extension of the services would increase the service miles and service hours, increasing the cost by approximately \$325,000. The overall cost of service provision would be approximately \$2,625,000 per year. Table 5.48 presents the potential operating costs.

Table 5.48: Sawdust – Operating Cost Estimates

	Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
Current fixed operating costs (park and ride management, security, etc.)	n/a	n/a	\$400,000
Current operating costs (bus services)	9,200	\$207.75	\$1,900,000
Additional operating cost (with proposed services)	1,600	\$207.75	\$325,000
		Total	\$2,625,000



In the absence of established ridership forecasting, an estimated target ridership for the service has been developed. This is based upon the ridership covering the costs incurred, at a \$12 (round trip) fare. The target ridership for the service revisions at Sawdust would be in the order of 27,000, approximately 110 additional daily passengers. The cost per new rider would be \$0, although ridership would need time to develop with a potential increase in ridership occurring over a three year period.

Sterling Ridge Park and Ride - Woodland Express Service (The Woodlands to Houston)

The plan proposes adding one new pick up stop and one new destination for services from the Sterling Ridge park and ride. Figure 5.28 graphically displays the proposed extensions. These new pick up stop and new destinations are:

- Sterling Ridge park and ride to Midtown (new stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route.
- New pick-up – add a new-pick up point in The Woodlands near Woodlands Parkway @ Grogan’s Mill (walk-up stop) as part of the service originating from the Sterling Ridge park and ride.

Additionally, this scenario would propose a later pick-up time on the evening return to Sterling Ridge park and ride from:

- Medical Center - add 5:40pm pick-up.

The services call at all the stops in the downtown, providing additional later pickup opportunities for all the users in downtown. The proposal responds to user comments for later service, will help ensure passengers finding they have to work later have an increased opportunity to use the return services and improve the perception of the service.

Table 5.49 provides a summary of the key metrics of this route.

Table 5.49: Sterling Ridge Park and Ride - Metrics

Metric	Details	
Service:	Extended services: <ul style="list-style-type: none"> • Downtown service to Midtown Later return services: <ul style="list-style-type: none"> • Medical Center - add 5:40pm pick-up 	
Capital cost:	P&R, cycle/pedestrian improvements:	\$260,000
	South Town Center stop:	\$130,000
Annual operating cost:	Current operating cost:	\$1,200,000
	Current fixed cost: (maintenance, security, etc.)	\$400,000
	Additional annual operating cost:	\$270,000
Measure of success:	Target annual ridership: additional 22,000 (+90 per day)	
Priority	Near-term	

Sterling Ridge is the newest of the park and ride locations. Ongoing growth in the western portion of the study area will continue to impact congestions. Providing new and enhanced mobility options for residents in this area that typically drive to jobs throughout the Houston area is critical. The enhanced existing services and new extensions from Sterling Ridge park and ride provide new choices for potential riders. The services open up new destinations for employment or travel destinations in the region (Uptown / Galleria, etc.). Also, the additional of new later return times may fit better with more people’s schedules, allowing them to utilize the Woodlands Express service (where the current schedule may not work for them).

Sterling Ridge – Infrastructure and Capital Costs

Planning level cost estimates for the Sterling Ridge park and ride are presented in Table 5.50. The assumptions for local unit costs were previously presented in Table 5.9. The Sterling Ridge park and ride site is the newest of the three locations and functions well as designed. Limited improvements are proposed which include signage and minor improvements to the drop off / pick up area. Additionally, the Sterling Ridge park and ride requires the addition of sidewalk / pathway connections to the site to provide a safe route for pedestrians and cyclists.

The park and ride site is the newest facility and is generally in a good state of repair. As with the other park and ride sites, the location would benefit from a long term budgeted maintenance strategy that may help leverage funding and support the long term maintenance and repair of the facilities.

An additional Town Center walkup pickup and drop off stop is proposed, with the Sterling Ridge services calling at the stop on route towards I-45. This would include appropriate bus bays to move buses out of the lanes of travel, stop shelter / infrastructure, and pedestrian / cycle connections.

Table 5.50: Sterling Ridge – Capital Cost Estimates

Capital Item	Estimated Cost
Kiss and ride / signage, infrastructure	\$10,000
Cycle and pedestrian connections	\$190,000
Town Center ‘walk up’ stop	\$100,000
Project management / design / contingencies	\$90,000
Total	\$390,000

Sterling Ridge – Operations

The project team developed revised Woodlands Express timetables to incorporate the proposed service changes and new destinations. All of the existing services have been retained; however, some scheduled times may have shifted slightly to maximize the efficiency of the overall service.

It is understood that a service has recently been extended to serve Greenway Plaza from Sterling Ridge. Given this is new service being tested and ridership has generally been low, it is not included within the revised timetables. It would likely be more efficient to encourage Greenway Plaza riders to utilize the existing services from Research Forest or Sawdust. Similarly, service from Sterling Ridge to the Uptown/Galleria is not being proposed at this time.

A timetable based upon the existing services has been developed to show the potential changes to services and to identify the increase in service hours. The timetable for the revised services is shown in Table 5.51 and Table 5.52.

Table 5.51: Sterling Ridge Morning Outbound Service

STERLING RIDGE PARK & RIDE AM							
Toward Downtown Houston							
<i>Monday through Friday</i>							
The Woodlands		Downtown		Midtown		Medical Center	
Sterling Ridge P&R	Woodlands Pkwy/ Grogan's Mill	Milam / Congress	Milam / St. Josephs Pkwy	Milam / Elgin	San Jacinto/ Berry	Main / Cambridge	Holcombe / VA Hospital
MORNING TRIPS							
5:10	5:15	5:55	6:06	6:11	6:16		
5:20	5:25	6:10	6:20	6:25	--	6:35	6:50
5:40	5:45	6:40	6:50	6:55	--	7:05	7:20
6:00	6:05	7:00	7:10	7:15	7:20		
6:20	6:25	7:25	7:35	7:40	--	7:50	8:05
6:40	6:45	7:55	8:10	8:15	8:20		
7:00	7:05	8:00	8:10	8:15	8:20		
7:40	7:45	8:30	8:40	8:45	8:50		

Table 5.52: Sterling Ridge Evening Inbound Services

STERLING RIDGE PARK & RIDE PM								
Toward The Woodlands								
<i>Monday through Friday</i>								
Medical Center		Midtown		Downtown			The Woodlands	
Holcombe / VA Hospital	Main / MH Medical Plaza	San Jacinto/ Berry	Milam / Elgin	Milam / St. Josephs Pkwy	Louisiana / St. Josephs Pkwy	Louisiana / Prairie	Woodlands Pkwy/ Grogan's Mill	Sterling Ridge P&R
AFTERNOON TRIPS								
		3:35	3:40	--	3:50	4:00	4:55	5:00
3:40	3:50	--	4:00	--	4:10	4:20	5:15	5:20
4:00	4:10	--	4:20	--	4:30	4:40	5:35	5:40
		4:35	4:40	--	4:50	5:00	6:00	6:05
4:40	4:50	--	5:00	--	5:10	5:20	6:20	6:25
		5:15	5:20	--	5:30	5:40	6:40	6:45
		5:35	5:40	--	5:50	6:00	7:00	7:05
5:40	--	--	--	--	6:10	6:20	7:20	7:25

Sterling Ridge – Operating Costs

The current operation of the service includes a fixed cost of \$400,000 to manage the service and operate the park and ride location. The current express bus services cost \$1,200,000 to operate. The extension of the services would increase the service miles and service hours, increasing the cost by approximately \$270,000. The overall cost of service provision would be approximately \$1,870,000 per year.



Table 5.55 presents the potential operating costs.

Table 5.53: Sterling Ridge – Operating Cost Estimates

	Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
Current fixed operating costs (park and ride management, security, etc.)	n/a	n/a	\$400,000
Current operating costs (bus services)	5,800	\$207.75	\$1,200,000
Additional operating cost (with proposed services)	1,300	\$207.75	\$270,000
		Total	\$1,870,000

In the absence of established ridership forecasting, an estimated target ridership for the service has been developed. This is based upon the ridership covering the costs incurred, at a \$12 (round trip) fare. The target ridership for the service revisions at Sterling Ridge would be in the order of 22,000, approximately 90 additional daily passengers. The cost per new rider would be \$0, although ridership would need time to develop with a potential increase in ridership occurring over a three year period.

Prioritization of Scenarios – Regional Mobility (The Woodlands to Houston)

The transit scenarios for the regional mobility from The Woodlands to Houston were informed by the second phase of evaluation. This included a prioritization exercise and ultimately the phasing suggestions for the recommendations (presented in Section 6). The outcome of this process provided information on how well the scenarios performed at providing quality transit improvements for the region. Table 5.54 provides a summary of the performance of the scenarios, when compared to the criteria for this level of examination. The original prioritization information matrix is included in Appendix E, populated with the data for each criterion.

Table 5.54: Regional Mobility (Downtown Houston Transit Center to The Woodlands) – Prioritization of Scenarios Summary

Criteria - Prioritization of Scenarios	Express Bus Research Forest	Express Bus Sawdust	Express Bus Sterling Ridge
<i>Fiscal</i>	The capital costs improvement to the existing park and ride site would be in the order of \$300k. The operating costs associated with the expansion of the service would be \$565K. Ridership targets would focus on covering the operating costs based upon a fare of \$12.00. The capital improvements could be undertaken as funding became available.	The capital costs improvement to the existing park and ride site would be in the order of \$1.3m. The operating costs associated with the expansion of the service would be \$325K. Ridership targets would focus on covering the operating costs based upon a fare of \$12.00. The capital improvements could be undertaken as funding became available.	The capital costs improvement to the existing park and ride site would be in the order of \$390k. The operating costs associated with the expansion of the service would be \$270K. Ridership targets would focus on covering the operating costs based upon a fare of \$12.00. The capital improvements could be undertaken as funding became available.
<i>Mobility</i>	The revised service would provide new connections to Midtown and Uptown/Galleria providing new	The revised service would provide new connections to Midtown and Uptown/Galleria providing new	The revised service would provide new connections to Midtown providing new mobility choice for

Criteria - Prioritization of Scenarios	Express Bus Research Forest	Express Bus Sawdust	Express Bus Sterling Ridge
	<p>mobility choice for people working in these locations.</p> <p>The target ridership for the service extension would be an additional 190 daily riders.</p>	<p>mobility choice for people working in these locations.</p> <p>The target ridership for the service extension would be an additional 110 daily riders.</p>	<p>people working in these locations.</p> <p>The target ridership for the service extension would be an additional 90 daily riders.</p>
<i>Community</i>	<p>The route would provide mobility opportunities for resident of The Woodlands and surrounding area to access employment in and around central Houston.</p> <p>This would support the existing residents and help reinforce the area as a place to live.</p>	<p>The route would provide mobility opportunities for resident of The Woodlands and surrounding area to access employment in and around central Houston.</p> <p>This would support the existing residents and help reinforce the area as a place to live.</p>	<p>The route would provide mobility opportunities for resident of The Woodlands and surrounding area to access employment in and around central Houston.</p> <p>This would support the existing residents and help reinforce the area as a place to live.</p>
<i>Prosperity</i>	<p>The extension of service would provide residents with greater mobility choice. This could improve access to employment, and could also support people choice to live in The Woodlands and surrounding area.</p>	<p>The extension of service would provide residents with greater mobility choice. This could improve access to employment, and could also support people choice to live in The Woodlands and surrounding area.</p>	<p>The extension of service would provide residents with greater mobility choice. This could improve access to employment, and could also support people choice to live in The Woodlands and surrounding area.</p>
<i>Sustainability</i>	<p>The route, in providing improved mobility options, will allow people to park closer to home and use the express bus service for the longer distance commute.</p> <p>The increased passenger journeys will decrease car use and associated emissions.</p>	<p>The route, in providing improved mobility options, will allow people to park closer to home and use the express bus service for the longer distance commute.</p> <p>The increased passenger journeys will decrease car use and associated emissions.</p>	<p>The route, in providing improved mobility options, will allow people to park closer to home and use the express bus service for the longer distance commute.</p> <p>The increased passenger journeys will decrease car use and associated emissions.</p>
<i>Deliverability</i>	<p>The proposals are based upon the extension of the current routes served. The new destinations could be phased to further aid delivery and reduce risk and cost.</p>	<p>The proposals are based upon the extension of the current routes served. The new destinations could be phased to further aid delivery and reduce risk and cost.</p>	<p>The proposals are based upon the extension of the current routes served. The new destinations could be phased to further aid delivery and reduce risk and cost.</p>

Regional Mobility – Reverse Service (Houston to The Woodlands)

Opportunity

With the significant growth in employment in and around The Woodlands, the area has become a desirable destination for employees from across the metropolitan Houston area. Currently, the only mobility option for these employees is the auto. In most cases employees of the area are traveling alone in their vehicle with low usage for carpooling and vanpooling. No transit options current exist that bring riders into The Woodlands and the surrounding area. The closest park and ride is provided by Houston METRO on Kuykendahl Road, west of I-45. The Kuykendahl park and ride caters to inbound passengers traveling to Houston or Spring. There are no connections from Kuykendahl park and ride to the study area.

The current Woodlands Express services travel from the various park and rides in The Woodlands to locations in metropolitan Houston. Multiple trips are made during the morning peak period requiring a number of the early coaches to travel back to The Woodlands in order to begin

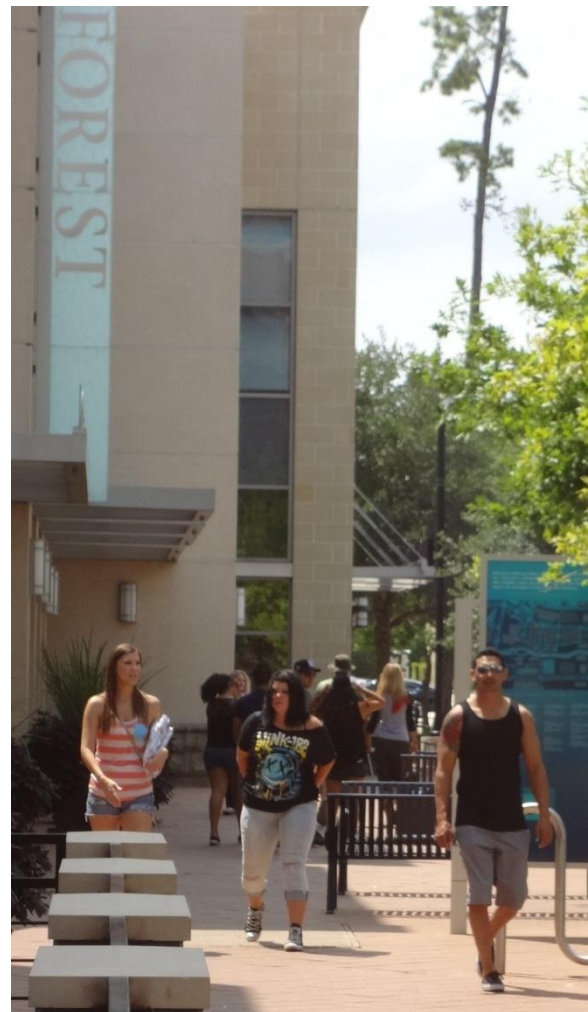
another morning service originating at one of the park and ride locations. Currently, these coaches are returning to The Woodlands empty.

The current Woodlands Express coach utilization could be improved to provide services delivering riders from Houston to The Woodlands. This could support the ever increasing employment in and around the study area. Improved service utilization could take advantage of the empty coaches currently returning to the park and ride locations to begin new services for The Woodlands to Houston routes. These services are generally referred to as 'reverse services' or 'reverse commute'. Building additional services and ridership would contribute to the economic vitality of The Woodlands and potentially improve the revenue recovery across the entire system. Any new riders paying to utilize the reverse service would simply help to support the maintenance and growth of the existing system's connections.

Woodlands Express buses dropping riders in Houston are currently traveling back to The Woodlands park and ride locations empty to begin new services. These reverse trips could be used to deliver passengers into the study area.

The reverse commute pattern that is growing between The Woodlands and Houston is somewhat unique. Some communities around Washington DC also have this pattern, specifically between Washington DC government centers and northern Virginia employment centers. Employees live and work between both centers and create a robust service in both directions.

As the central core of employment and the most walkable and urbanized area of The Woodlands, the Town Center is a natural destination to provide reverse commute service into the study area. Employees traveling to this area via the new reserve service could utilize the proposed local bus service to meet their mobility needs during the day (without a vehicle). While many employees of Town Center companies choose to live in the study area (closer to their employment), not all are able to do so. The number of jobs in the study area will continue to grow and the pool of potential employees will continue to be drawn from the entire metropolitan Houston area. Accommodating these employees with affordable local housing and alternatives to driving along to their jobs will be critical to managing congestion on area



The Town Center could serve as a destination for commuters coming to jobs in The Woodlands.

freeways, local roads, and parking availability. If all employees in the Town Center drive alone and park, gridlock on Town Center streets and parking facilities will be the daily norm. The potential for a reverse commute service dropping employees as close to their employment as possible would encourage ridership and help to manage congestion.

The development of the ExxonMobil campus to the south of the study area could also provide a more commercial opportunity to deliver reverse commute service, to aid their employees' access to their new location. A service could be provided on a commercial basis using the existing empty coaches traveling back to the park and rides to improve cost recovery and support service development. With approximately 10,000 employees ultimately located on the ExxonMobil campus, the potential for strong ridership exists for Woodlands Express services to the campus. These riders could provide revenue that would help to support other Woodlands Express routes that benefit the broader community. Therefore, providing service to ExxonMobil may have broader reaching benefits for area residents. The Woodlands Express could seek out a partnership with ExxonMobil to support this service as a benefit to their employees. The Woodlands is uniquely positioned to provide this service, as the as the only providers of commuter services in the area.

ExxonMobil or other large firms have the ability to provide their own individual transit service for their employees. However, multiple, uncoordinated transit services to various destinations would not provide the most efficient connections. The Woodlands Express is best positioned to provide such a service. Expanding and coordinating the Woodland Express to serve the Town Center, ExxonMobil, or other future destinations could make efficient use of coaches and limit the number of buses needed (as opposed to each employer providing their own services). Those benefiting from the service (like ExxonMobil) could also help to support the service. The entire Woodlands Express system would likely benefit from the revenue generated.

No data currently exists to identify the desire to use express bus services into the study area. In the absence of this data, the project team used the two online questionnaires to gain a basic understanding of stakeholders' potential desire to use reverse commute services. The results of the questionnaire helped to guide the development of the transit scenarios, combined with other outreach efforts, the project management committee, and the Board of Directors.

The second online questionnaire was distributed to the project's stakeholder lists. These included the Village associations, The Woodlands Development Company, cycling groups, seniors groups, developers, other special interests, etc. Additionally, the team reached out to The Woodlands Area Economic Development Partnership and major employers like ExxonMobil and Anadarko to identify the interest of area employees.

Questionnaire #2 generated 4,603 total responses. Out of the top ten zip codes for respondents, seven were for areas within the study area. In relation to a reverse commute service to the Town Center, there were approximately 860 respondents. In relation to a reverse commute service to ExxonMobil, there were approximately 1,200 respondents. Table 5.5 provides information on questionnaire #2 and how many reverse commute trips respondents would likely make a month.

Table 5.55: The Woodlands Express Reverse Commute Questions – Questionnaire #2

Questions	
How many Houston to The Woodlands trips would you likely make per month?	
0-5	9.4%
6-10	7.6%
11-15	11.3%
More than 15	71.7%

The response rate for the number of times per month people would use the reverse commute service was much higher than the equivalent outbound service. The majority (82%) of the respondents answered that they would use the service 11 or more times per month.

The project team examined various starting points and destinations for the reverse commute service. These starting points and destinations were included in the online questionnaire #2 to help inform the development of transit scenarios. The starting points in the metropolitan Houston area included a variety of key transit nodes and park and ride locations. Key transit nodes were typically Houston METRO transit centers. The park and ride locations were located along the I-45 corridor, where many study area employees are currently traveling. There were no data to suggest that a specific neighborhood or area in metropolitan Houston held an overwhelming number of employees that worked in the study area and may use the reverse commute services. Therefore, the team identified key connection points that were well served by transit or park and ride locations to test as the starting points for the new reverse commute service. These locations would provide connectivity to many neighborhoods and potential users of the reverse commute service. The starting points considered included:

- Downtown – Downtown Houston Transit Center (Main Street / St. Josephs Pkwy.).
- Medical Center – The Texas Medical Center Transit Center (Fannin Street / Pressler Street).
- Uptown / Galleria – Northwest Transit Center (Post Oak Road / I-10).
- Energy Corridor – Addicks park and ride (north of the Katy Fwy., east of State Highway 6).
- I-45 Corridor – North Shepherd park and ride (North Shepherd Dr. / Veterans Memorial Dr.
- I-45 Corridor – Kuykendahl park and ride (Kuykendahl Rd., east of I-45).
- I-45 Corridor – Spring park and ride (south of FM 1960, east of I-45 in Spring).
- I-610 Corridor – West Loop park and ride (I-610 West Loop / S. Braeswood Blvd.

The Downtown Houston Transit Center had the strongest response at 487 respondents. The second strongest location with 253 respondents was the Northwest Transit Center in the Uptown / Galleria area.

The team also investigated multiple destinations in the study area for service by the reverse commute coaches. The initial ideas for destinations were based on the early outreach and scoping of potential transit options through the project focus groups and public meetings. Additionally, the team examined existing and future employment and activity centers to identify potential destinations.

The goal was to identify reverse commute destination stops that would drop riders as close to key employment / activity points as possible.

The reverse commuter service would work in parallel with the Town Center bus transit to ultimately riders to their final destinations. The destination points considered include:

- Town Center stop 1 (Woodloch Forest Dr. / Lake Robbins Dr.).
- Town Center stop 2 (Woodloch Forest Dr. / Timberloch Pl.).
- Hughes Landing (Central to the new developing office area).
- St. Luke's Hospital (College Park Dr. / St. Luke's Way).
- Lone Star College (College Park Dr. / Achievement Dr.).
- Research Forest (Research Forest Dr. / Technology Forest Blvd.).
- Springwoods / ExxonMobil (stops on the ExxonMobil campus ring road).

ExxonMobil (1204 responses), Hughes Landing (455), and the Town Center stop 1 (241) performed the strongest based on stakeholder feedback as key destination points for the reverse commute service. These results were considered in conjunction with the planned growth in employment, recreational uses, and commercial land uses in these areas.

Reverse Service - Downtown Houston Transit Center to The Woodlands Route

The initial proposals for the reverse services from Houston to The Woodlands are limited with four outbound services on a morning and six inbound services on an evening. This approach would allow either of the proposed service to be tested, while limiting the investment and risks. The morning capacity would be approximately 200 riders compared to the approximately 860 people that indicated interest through the online questionnaire #2. The capacity has been determined by the ability to maintain the existing number of buses currently used by the Woodlands Express while incorporating the reverse services. No additional buses are anticipated. However, should the service be successful, additional buses / services could be added.

The service is proposed to start at the Downtown Houston Transit Center and provide service at two stops in The Woodlands Town Center and a central stop in Hughes Landing as shown in Figure 5.30. These stops could be adjusted over time to best meet the needs of riders. Table 5.56 provides the basic metrics for this route.

The challenge in developing the reverse service was to provide buses at the times people wanted and needed them (in both directions). This does require adding some buses for return services. However, the overall development of the network and the ability to attract new ridership and revenue has the potential to support the costs (and potentially build additional revenues).

Figure 5.30: Downtown Houston Transit Center to The Woodlands Diagram

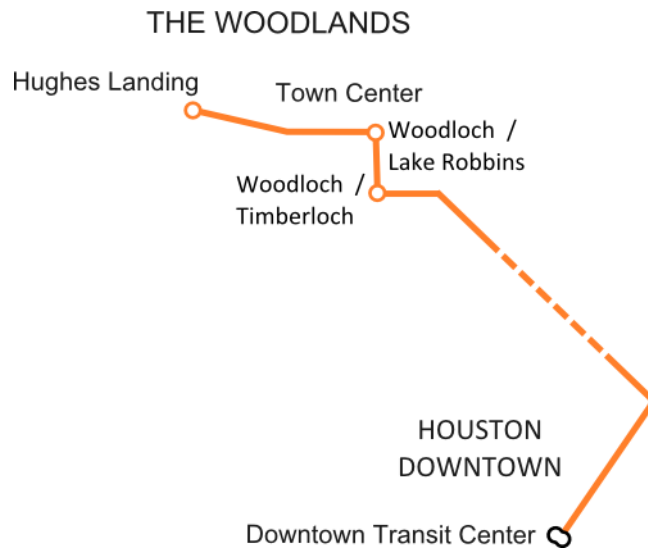


Table 5.56: Downtown Houston Transit Center to The Woodlands - Metrics

Metric	Details
Service:	New services: <ul style="list-style-type: none"> • Originating at Downtown Houston Transit Center • Service to The Woodlands Town Center and Hughes Landing employment Peak hour service <ul style="list-style-type: none"> • (4 morning / 6 evening) • 7:00am to 6:30pm (M-F)
Capital cost:	(signage only) \$5,000
Annual operating cost:	\$400,000
Measure of success:	Target annual ridership: 34,000 (134 per day)
Priority	Near-term

Using potential park and ride locations as starting points for the reserve service did not receive an exceptionally strong response from stakeholders. However, given the overall success of park and ride in the metropolitan Houston area, this may be considered when testing the service or in the future. One scenario for testing could be adding a single interim stop for the service at the North Shepherd park and ride. The service would continue to originate at the Downtown Houston Transit Center, make one stop at the North Shepherd park and ride, and then proceed to The Woodlands. This could increase access to the service for those connecting by transit and by auto. The North Shepherd park and ride is nowhere near its parking capacity and could potentially accommodate the additional service, although it requires an agreement with Houston METRO. Additionally, the North Shepherd park and ride is easily accessible from I-45 and would likely add only minimal travel time to the overall journey (especially when compared to other potential park

and ride locations, many of which do not have sufficient parking capacity to accommodate new services in any case).

Testing the potential riders' sensitivity to the additional travel time would be important to determine the ability to make an interim stop at the park and ride.

Downtown Houston Transit Center to The Woodlands – Infrastructure and Capital Costs

This route requires minimal infrastructure investments. The only associated capital cost identified would be for appropriate signage at the Downtown Houston Transit Center stop. The team assumed that the stop would likely be on-street, outside of the main transit center to provide easy access for the bus and avoid taking a METRO bus bay. The cost of the associated infrastructure would be in the order of \$5,000 for stop signage.



Downtown Houston is an initial starting point for the reverse commute services.

Downtown Houston Transit Center to The Woodlands – Operations

The project team developed revised Woodlands Express timetables to incorporate the proposed reverse commute. The timetable is based upon the making use of the existing services inbound express service and to identify the increase in service hours. The timetable for the revised services is shown Table 5.57 and Table 5.58.

Table 5.57: Downtown Houston Transit Center to The Woodlands Morning Outbound Service

HOUSTON AM			
Toward The Woodlands			
<i>Monday through Friday</i>			
<i>Houston</i>	<i>Town Center</i>		
Downtown Transit Ctr	Woodloch/ Timberloch	Woodloch/ Lake Robbins	Hughes Landing
MORNING TRIPS			
7:30	8:06	8:07	8:15
7:50	8:26	8:27	8:35
8:00	8:36	8:37	8:45
8:10	8:46	8:47	8:55

Table 5.58: The Woodlands to the Downtown Houston Transit Center Evening Inbound Service

TOWN CENTER PM			
Toward Houston			
<i>Monday through Friday</i>			
	<i>Town Center</i>		<i>Houston</i>
Hughes Landing	Woodloch/ Lake Robbins	Woodloch/ Timberloch	Downtown Transit Ctr
AFTERNOON TRIPS			
5:30	5:38	5:39	6:15
5:45	5:53	5:54	6:30
6:00	6:08	6:09	6:45
6:15	6:23	6:24	7:00
6:25	6:33	6:34	7:10
6:35	6:43	6:44	7:20

Downtown Houston Transit Center to The Woodlands – Operating Costs

This reverse commute route would add services to the existing inbound express services increasing operating cost by \$400,000 per year. Additional fixed costs may be incurred for use of the Downtown Houston Transit Center. However, this cost (if any) would be determined in conjunction with Houston METRO. Table 5.59 presents the potential operating costs.

Table 5.59: Downtown Houston Transit Center to The Woodlands – Operating Cost Estimates

	Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
Current fixed operating costs (park and ride management, security, etc.)	n/a	n/a	TBD
Operating cost (with proposed services)	2,000	\$207.75	\$400,000
		Total	\$400,000+



In the absence of established ridership forecasting, an estimated target ridership for the service has been developed. This is based upon the ridership covering the costs incurred, at a \$12 (round trip) fare. The target ridership for this reverse commute route would be in the order of 34,000, approximately 128 daily passengers. The cost per new rider would be \$0, although ridership would need time to develop with a potential increase in ridership occurring over a three year period.

Reverse Service - Downtown Houston Transit Center to Springwoods/ExxonMobil Route



Easy ticket purchasing and monthly passes could help build rider loyalty.

The initial proposals for the reverse services from Houston to Springwoods / ExxonMobil are limited, with four outbound services on a morning and six inbound services on an evening. This approach would allow the proposed service to be tested, while limiting the investment and risks. The morning capacity would be approximately 200 riders compared to the approximately 1,204 people that indicated interest through the online questionnaire #2. The capacity has been determined by the ability to maintain the existing number of buses currently used by the Woodlands Express while incorporating the reverse services. No additional buses are anticipated. However, should the service be successful, additional buses / services could be added.

The service is proposed to start at the Downtown Houston Transit Center and provide service at three stops at Springwoods / ExxonMobil on the corporate campus ring road (assuming security clearance is granted) as shown in Figure 5.31. These stops could be adjusted over time to best meet the needs of riders. Table 5.60 provides the basic metrics for this route.

Figure 5.31: Downtown Houston Transit Center to Springwoods / ExxonMobil Diagram

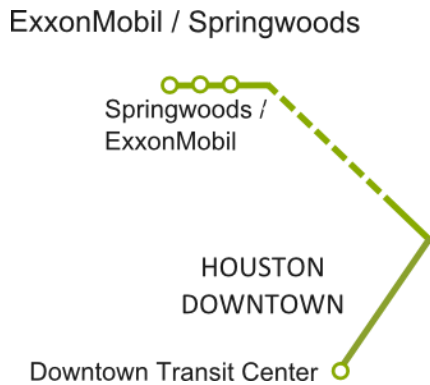


Table 5.60: Downtown Houston Transit Center to Springwoods / ExxonMobil - Metrics

Metric	Details
Service:	New services: <ul style="list-style-type: none"> • Originating at Downtown Houston Transit Center • Service to Springwoods / ExxonMobil employment Peak hour service <ul style="list-style-type: none"> • (4 morning / 6 evening) • 7:00am to 6:30pm (M-F)
Capital cost:	(signage only) \$5,000
Annual operating cost:	\$300,000
Measure of success:	Target annual ridership: 26,000 (103 per day)
Priority	Near-term

Similar to the service to The Woodlands, an interim stop could be tested using the North Shepherd park and ride. The service would continue to originate at the Downtown Houston Transit Center, make one stop at the North Shepherd park and ride, and then proceed to Springwoods / ExxonMobil. This could increase access to the service for those connecting by transit and by auto.

Downtown Houston Transit Center to Springwoods / ExxonMobil – Infrastructure and Capital Costs

This route requires minimal infrastructure investments. The only associated capital cost identified would be for appropriate signage at the Downtown Houston Transit Center stop. The team assumed that the stop would likely be on-street, outside of the main transit center to provide easy access for the bus and avoid taking a METRO bus bay. The cost of the associated infrastructure would be in the order of \$5,000 for stop signage.

If security clearance onto the ExxonMobil ring road is not granted, stop infrastructure could be placed in front of the business / office spaces along Springwoods Village Parkway. ExxonMobil could participate in the capital cost of this stop.

Downtown Houston Transit Center to Springwoods / ExxonMobil – Operations

The project team developed revised Woodlands Express timetables to incorporate the proposed reverse commute. The timetable is based upon the making use of the existing services inbound express service and to identify the increase in service hours. The timetable for the revised services are shown in Table 5.61 and Table 5.62.

Table 5.61: Downtown Houston Transit Center to ExxonMobil/Springwoods Morning Outbound Service

HOUSTON AM			
Toward ExxonMobil			
<i>Monday through Friday</i>			
Houston	ExxonMobil Campus		
Downtown Transit Ctr	ExxonMobil Ring 1	ExxonMobil Ring 2	ExxonMobil Ring 3
MORNING TRIPS			
7:05	7:38	7:39	7:40
7:25	7:58	7:59	8:00
7:35	8:08	8:09	8:10
8:00	8:33	8:34	8:35

Table 5.62: Downtown Houston Transit Center to ExxonMobil/Springwoods Evening Inbound Service

EXXONMOBIL PM			
Toward Houston			
<i>Monday through Friday</i>			
ExxonMobil Campus			Houston
ExxonMobil Ring 3	ExxonMobil Ring 2	ExxonMobil Ring 2	Downtown Transit Ctr
AFTERNOON TRIPS			
3:30	3:31	3:32	4:05
4:05	4:06	4:07	4:40
4:45	4:46	4:47	5:20
5:20	5:21	5:22	5:55
6:00	6:01	6:02	6:35
6:35	6:36	6:37	7:10

Downtown Houston Transit Center to Springwoods / ExxonMobil – Operating Costs

This reverse commute route would add services to the existing inbound express services increasing operating cost by \$300,000 per year. Additional fixed costs may be incurred for use of the Downtown Houston Transit Center. However, this cost (if any) would be determined in conjunction with Houston METRO. Table 5.63 presents the potential operating costs.



Table 5.63: Downtown Houston Transit Center to Springwoods / ExxonMobil – Operating Cost Estimates

	Operating Hours (yearly)	Cost Rate (cost per revenue hour)	Estimated Cost
Current fixed operating costs (park and ride management, security, etc.)	n/a	n/a	TBD
Operating cost (with proposed services)	1,400	\$207.75	\$300,000
		Total	\$300,000+

In the absence of established ridership forecasting, an estimated target ridership for the service has been developed. This is based upon the ridership covering the costs incurred, at a \$12 (round trip) fare. The target ridership for this reverse commute route would be in the order of 26,000, approximately 103 daily passengers. The cost per new rider would be \$0, although ridership would need time to develop with a potential increase in ridership occurring over a three year period. As noted previously, the service to Springwoods / ExxonMobil provides the opportunity to develop a partnership with ExxonMobil to trial the service and cover the potential costs and risks.

Prioritization of Scenarios – Regional Mobility (Downtown Houston Transit Center to Springwoods / ExxonMobil)

The transit scenarios for the regional mobility from Houston to Springwoods / ExxonMobil were informed by the second phase of evaluation. This included a prioritization exercise and ultimately the phasing suggestions for the recommendations (presented in Section 6). The outcome of this process provided information on how well the scenarios performed at providing quality transit improvements for the region. Table 5.64 provides a summary of the performance of the scenarios, when compared to the criteria for this level of examination. The original prioritization information matrix is included in Appendix E, populated with the data for each criterion.

Table 5.64: Regional Mobility (Downtown Houston Transit Center to Springwoods / ExxonMobil) – Prioritization of Scenarios Summary

Criteria - Prioritization of Scenarios	Express Bus (Reverse Commute)	Express Bus (Reverse Commute)
	Springwoods / ExxonMobil	The Woodlands Town Center
<i>Fiscal</i>	<p>The capital cost improvement would be in the order of \$5k.</p> <p>The operating costs associated with the expansion of the service would be \$300K.</p> <p>Ridership targets would focus on covering the operating costs based upon a fare of \$12.00.</p> <p>The ridership required would be approximately 100 per day with a daily capacity of just over 200.</p>	<p>The capital cost improvement would be in the order of \$5k.</p> <p>The operating costs associated with the expansion of the service would be \$400K.</p> <p>Ridership targets would focus on covering the operating costs based upon a fare of \$12.00.</p> <p>The ridership required would be approximately 128 per day with a daily capacity of just over 200.</p>

Criteria - Prioritization of Scenarios	Express Bus (Reverse Commute) Springwoods / ExxonMobil	Express Bus (Reverse Commute) The Woodlands Town Center
<i>Mobility</i>	<p>The ExxonMobil Campus is going to be a significant employer close to the UZA. Access to the location will predominantly be by car, increasing reverse congestion on I-45.</p> <p>The provision of a reverse commute service would provide an additional mobility choice, which would help reduce the use of single occupancy vehicles.</p>	<p>The Woodlands is a major center of employment, with significant additional office and employment planned.</p> <p>The provision of a reverse commute service would provide an additional mobility choice, which would help reduce the use of single occupancy vehicles.</p>
<i>Community</i>	<p>The route would provide new opportunities for people to access ExxonMobil’s campus, and support increased access to employment.</p>	<p>The route would provide new opportunities for people to access The Woodlands, and support increased access to employment.</p>
<i>Prosperity</i>	<p>The provision of the service would increase access to employment.</p>	<p>The provision of the service would increase access to employment within The Woodlands. This in turn would support the economic vitality of the Town Center.</p>
<i>Sustainability</i>	<p>The route by providing improved mobility options, will allow people to park closer to home and use the express bus service for the longer distance commute.</p> <p>The increased passenger journeys will decrease car use and associated emissions.</p>	<p>The route by providing improved mobility options, will allow people to park closer to home and use the express bus service for the longer distance commute.</p> <p>The increased passenger journeys will decrease car use and associated emissions.</p>
<i>Deliverability</i>	<p>The proposals are based upon the use of the existing inbound commute services to provide a two way service, limiting the associated costs and risks.</p> <p>Partnering with ExxonMobil and METRO may also provide additional support to aid deliverability.</p>	<p>The proposals are based upon the use of the existing inbound commute services to provide a two way service, limiting the associated costs and risks.</p>

6 The Recommendations

Chapter 6 forms the final chapter of the plan document. This chapter sets multiple key elements including:

- The recommended transit scenarios and the potential sequence for testing and implementation.
- Summary options for potential funding sources.
- Potential high level supportive measures for education, marketing, and promotional campaign for all transit services.

Recommendations & Implementation

The recommendations are presented by the three transit scenarios described in detail in Chapter 5:

- Town Center Mobility – Town Center bus routes
- The Woodlands Area (Local) Mobility – Study area bus routes
- Regional Mobility – Express bus services

The recommendations are generally arranged in three temporal categories: near-term (one to five years), mid-term (within 10 years), and long-term (within 20 years).



Town Center bus service could provide connectivity throughout the core of The Woodlands.

Recommendations – Town Center Mobility (Town Center Bus)

Improved mobility in and around the Town Center is critical to the continued growth and development of the area. Limited road space is unlikely to meet demand as new (and growing) shopping, residential, and employment centers develop throughout the Town Center area. These new developments will also increase the demand placed on Town Center parking. The plan has examined transit mobility throughout the Town Center and how transit is accessed by pedestrians, cyclists, and auto users. The plan's recommendations integrate with the future transit center planned for the Town Center area.

The plan focuses on introducing efficient, frequent, and accessible bus service in the Town Center area.

The bus service is targeted at the widest range of users (employees, residents, visitors) and will serve as a high-quality transit connector for the Town Center.

One goal of the Town Center bus service is to promote a 'park once' concept. The new bus service enables people accessing the Town Center to park in an appropriate lot or structure and then access all the key destinations and services via transit. This approach seeks to reduce congestion and enhance mobility within the Town Center and Hughes Landing.

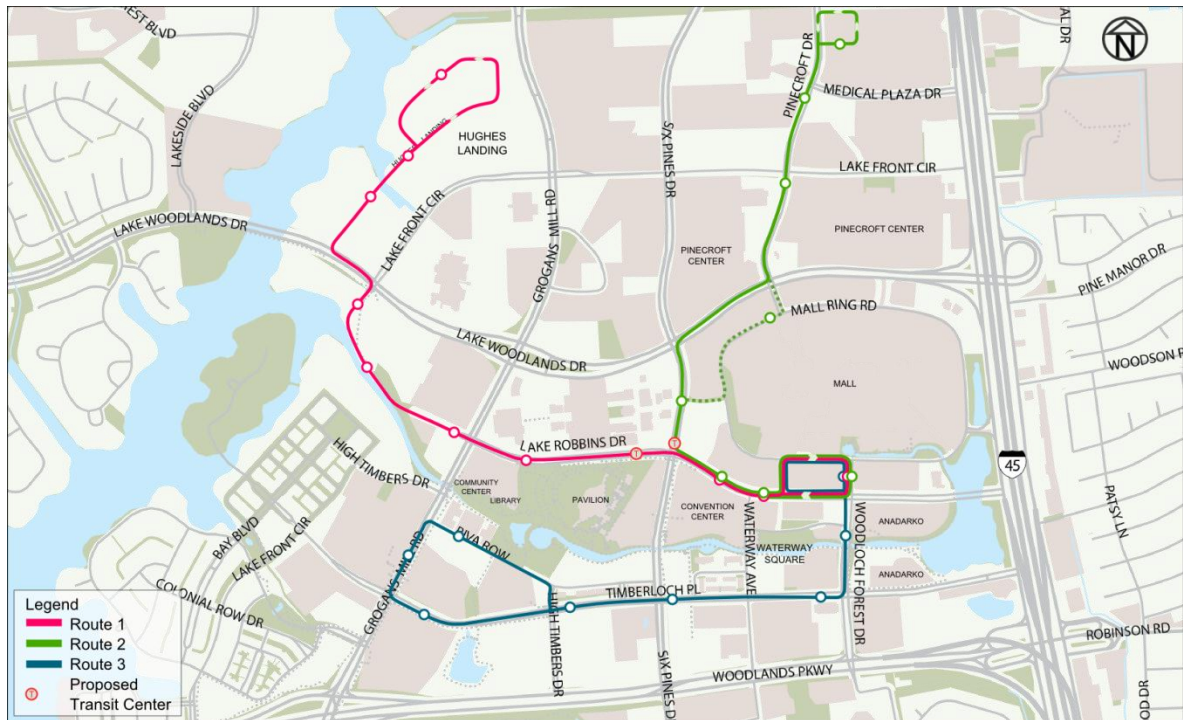
It is recommended to introduce, over time, three new Town Center bus routes. These routes will serve a range of key destinations, at high frequencies, and will include improved stop infrastructure (shelters, cycle racks, signage, etc.). The details of the three route recommendations are noted below. Route 1 would be prioritized for near term implementation (0-3 years) depending on funding. Routes 2 and 3 could be implemented as funding is available (mid-term; 0-5 years). Route 3 should be timed to coincide with additional development south of the Waterway (third Anadarko tower, additional residential, etc.). Each new bus service will require additional infrastructure. Stop locations will be provided with shelters, signage, and cycle racks (where appropriate). Gaps in the pedestrian and cycle network would need to be addressed to provide appropriate access to new transit stops. Some stop locations propose new bus turn-outs that allow the bus to move out of the lane of travel to avoid traffic disruptions. Frequency of the bus service is proposed every 10 minutes (all day). The service would operate from 7:30am to 10:00pm (Monday through Friday) and from 11:00am to 10:00pm (Saturday and Sunday). Service frequencies could be truncated in the evenings or extended on weekends, depending on the demand. Table 6.1 presented a summary of the Town Center bus recommendations. Additional details are provided in Chapter 5.

Table 6.1: Recommendations – Town Center Bus

Recommendations – Town Center Bus
<p>Town Center Bus Route 1</p> <p>Route 1 would provide a critical connection between the Town Center’s area of highest employment density to the rapidly developing Hughes Landing. Route 1 operations would occur predominantly on street with two-way service. This route provides a stop associated with the proposed transit center. Route 1 would also make use of (a portion of) the future dedicated trolley busway alongside the Waterway between Lake Woodlands Drive and Grogan’s Mill Road. This provides a dedicated connection to stops in the Hughes Landing area. Prior to this segment of the busway being completed, the bus could follow a temporary connection between Grogan’s Mill Road and Hughes Landing. This route would appeal to employees, visitors, and locals moving around the Town Center.</p>
<p>Town Center Bus Route 2</p> <p>Route 2 is focused on serving areas to the north of the Town Center, providing connections to the retail and medical facilities along the route. These areas were identified as high demand stops through the public outreach efforts undertaken for the project. The route will provide a two way service along Lake Robbins Drive and Pinecroft Drive. This route provides a stop associated with the proposed transit center for transfer among Town Center bus routes (multiple shared stops allow transfer at several points).</p>
<p>Town Center Bus Route 3</p> <p>Route 3 is focused on serving the developing areas of the Town Center on the south side of the Waterway. This route could operate as an extension of Route 2 (dashed in the graphic below). Route 3 would serve new office and commercial areas, as well as higher density residential areas. This route would provide a two way service along the majority of Woodloch Forest Drive and Timberloch Place, with a single direction loop serving the last three stops on the west end: Timberloch Place, Grogan’s Mill Road and Riva Row.</p>

Figure 6.1 graphically depicts the Town Center bus recommendations.

Figure 6.1: Recommendations – Town Center Bus



Potential Piloting / Phasing – Town Center Bus Recommendations

The prioritization efforts helped identify the potential piloting of service or phases for delivery of the Town Center bus. In developing the long term transit plan and the associated opportunities, it is important to recognize the potential risks to success. The Woodlands currently has limited transit provision and as such a limited transit culture of regular and loyal transit users. The private car is the predominant mode of travel. Census records show 70% of households have one or more car. Of those who completed the study’s online questionnaires, 98% indicated having access to a car and 84% to two or more cars. The development of Town Center mobility opportunities will therefore need to provide an approach that maximizes the likelihood of success while limiting the potential risks. The prioritization of scenarios process helped provide direction on the key priorities for implementing the Town Center mobility scenario. This section presents the key priorities and the suggested phasing for each, to maximize the potential for success.

The proposed approach focuses on building of the current success of the existing trolley route. The goal (over time) would be to:

- Diversify the transit user base from primarily visitors to a broad mix of residents, employees, and visitors.
- Improve the competitiveness of the journey times, though faster and more reliable service.
- Create an identity for transit and promote transit as a high quality mobility option.
- Educate potential users on the transit services and how to access their destinations – via all modes (transit, cycling, walking, driving, parking).
- Provide the high level quality of transit service expected by Woodlands residents, visitors, and employees.
- Provide an alternative to driving (specifically for short trips) between the locations within the Town Center.
- Focus on transit, walking, cycling as a means to promote the ‘park once’ concept within the Town Center.

Implementation should begin simply with the initial testing of transit service for the Town Center area. The method involving the least risk would be to incrementally adjust the existing trolley service to act as a formal transit system, then evaluate the changes to gauge further implementation of the formal recommendations in this plan. A pilot transit program could provide significant information on the demand and speed of implementation required for the formal plan recommendations of three transit routes for the



Walking connections to Town Center bus are important to building ridership.

Town Center. Table 6.2 provides details on the initial transit pilot activities and potential phases for measured implementation of transit.

Table 6.2: Potential Piloting / Phasing – Town Center Bus Recommendations

Step	Description	Elements
A	Pilot - transition the existing trolley service to single corridor route (as a precursor to full implementation of Route 1).	<ul style="list-style-type: none"> • Provide timetabled two way route predominantly on street (Lake Robbins Drive). • Develop stop locations, but not all stop amenities. To minimize cost in the near term, this may include simple restriping of existing parking spaces to form bus bays (as opposed to full construction of bus turn outs). • Provide information totem / signage and timetable information at each stop and online. • Create The Woodlands transit website as a comprehensive portal for all transit and mobility information in the study area. • Promote the service (encourage park once concept) and educate potential users. • Operate the service and evaluate every 6 months. • Survey users and measure success by achieving annual system ridership of 100K or greater.
B	Extension of service to Hughes Landing.	<ul style="list-style-type: none"> • Extend two way operation to Hughes Landing. • Begin implementation of stop infrastructure. • Promote the extension of the service (encourage park once). • Operate the service and evaluate every 6 months. • Survey users and measure success by achieving annual system ridership of 150K or greater.
C	Consolidate first two phases and ensure the completion of the stop infrastructure and brand.	<ul style="list-style-type: none"> • Implement new accessible, branded vehicles. • Complete branded stop infrastructure.
D	Extension (Route 2 or Route 3, depending on demand).	<ul style="list-style-type: none"> • Extend service (following the process set out in Step A). • Develop stop locations, but not all stop amenities. To minimize cost in the near term, this may include simple restriping of existing parking spaces to form bus bays (as opposed to full construction of bus turn outs). • Promote the extension of the service (encourage park once). • Operate the service and evaluate every 6 months. • Survey users and measure success by achieving annual system ridership of 200K or greater.
E	Consolidate.	<ul style="list-style-type: none"> • Complete branded stop infrastructure.
F	Continue system development.	<ul style="list-style-type: none"> • Continue to extend or evaluate options for system development and implementation of the plan recommendation.

Recommendations – The Woodlands Area Mobility (Local Bus)

The Woodlands area mobility refers to broader transit service throughout the southern portion of The Woodlands/Conroe UZA. The Woodlands is responsible for transit within this portion of the UZA. Mobility needs in this area are varied. The critical connections are primarily between the residential communities / villages to the Town Center area. Seniors that no longer drive (but are



mobile) require transport to shopping, appointments, etc. Young people need transportation to school, events, employment, etc. While most commuters drive, congestion and changing demographics are creating additional demand for local transit. However, moving from the current situation of no fixed route transit locally to a network of local transit connections would be a significant change away from the area's traditionally auto-dominated transportation culture.



Passenger information and education will be important to the success of transit improvements.

Making this change and developing a 'culture of transit' would take significant time. Proof of concept would be required by developing highly successful, core transit lines, with quality service and appropriate frequencies. The design of the residential areas with many cul-de-sac streets and limited connectivity create impediments to providing fixed route transit service. It is with these considerations that the team developed the recommendations for transit mobility within the broader The Woodlands area.

The success of the initial local bus services provided will set a precedent for the continued expansion of the service. Therefore, the recommendations reflect a measured implementation of local bus. Once the initial routes prove successful, future expansion can be considered to broader destinations within the study area.

The recommended approach to implementing local bus services maximizes the likelihood of success while limiting the potential risks. The goal is to provide greater journey opportunities to communities with a greater propensity to

use transit, provide competitive journey times, create an identity for transit and provide a high quality of service. Therefore, the recommendations for local bus service connect either:

- Key mature residential areas with higher density residential and senior citizen communities in Panther Creek and commercial destinations including the Sterling Ridge, Indian Springs, and Panther Creek Village Centers. Additionally, all new services provide a core connection to the Town Center.
- Key employment destinations including the Town Center, Hughes Landing, and Springwoods / ExxonMobil.

The plan recommends testing two local bus lines. The first local bus links the Springwoods / ExxonMobil area to the Town Center / Hughes Landing. An additional local bus connection is recommended from the Town Center to the Indian Springs / Sterling Ridge Village Center, with stops in Panther Creek at the senior citizen communities.

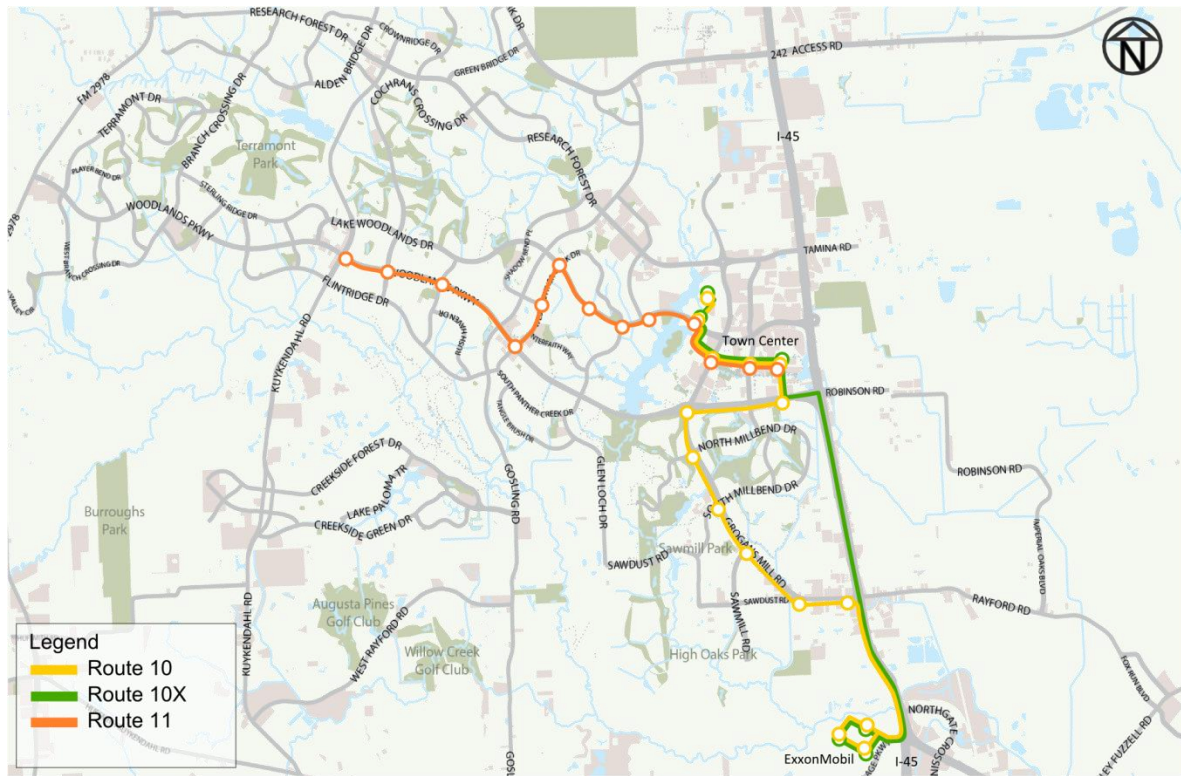
The transit plan analysis examined multiple potential local bus destinations within the UZA. The two routes recommended are presented as the potential starting point for a future network (as demand dictates). It is recommended that The Woodlands continue to survey UZA residents in the future to track potential need for the implementation of broader routes throughout the community. Table 6.3 presents the initial recommendations for local bus service.

Table 6.3: Recommendations – Local Bus

Recommendations – Local Bus
<p>Local Bus Route 10 or Route 10X</p> <p>Route 10 and 10X proposes testing a fixed route transit connection between the Town Center / Hughes Landing and the Springwoods / ExxonMobil area. This should be timed to coincide with the opening of the ExxonMobil campus (or at least 50% occupancy). This route would support new area residents / employees’ identification of The Woodlands Town Center area as their main destination for shopping, medical, and other services. It is recommended that only one of these services (either the 10 or 10X) be implemented, not both.</p> <p>Route 10X</p> <p>Route 10X provides an express connection between the Town Center / Hughes Landing and Springwoods / ExxonMobil with no stops in between. Route 10X could serve to establish the Town Center as the key destination for ExxonMobil employees for shopping, services, and leisure.</p> <p>It is our understanding that ExxonMobil is considering implementing this type of direct service between ExxonMobil and Hughes Landing, to connect ExxonMobil offices. It is recommended that The Woodlands collaborate with ExxonMobil to provide this service and ensure stops in the Town Center area. The Woodlands could provide ExxonMobil the route 10X timetables, costs, etc. as a plan for ExxonMobil to implement the service.</p> <p>This service could be beneficial to The Woodlands through increased economic activity by ExxonMobil employees in the Town Center area. As new ExxonMobil employees move to (or travel to) this area, the Town Center could be positioned as their key destination for shopping, leisure, and services (medical, etc.). The Town Center is currently in a strong position to serve as the key destination for ExxonMobil (and other area) employees. Creating patterns for shopping, leisure, and services would be important in the near term, before competition from Springwoods (or other commercial developments) is fully operational. If this service is successful, its revenue could help support development of additional local bus services for The Woodlands area.</p> <p>Route 10</p> <p>Route 10 also provides a connection between Springwoods / ExxonMobil and the Town Center / Hughes Landing area with multiple stops along Grogan’s Mill Drive. Route 10 would better serve residents in The Woodlands area with more stops and access. However, this would increase travel times and likely attract less riders from Springwoods / ExxonMobil.</p>
<p>Local Bus Route 11</p> <p>Route 11 proposes testing a transit route connecting the Town Center to the Indian Springs / Sterling Ridge Village Centers (with a stop in the Panther Creek area). This route would be a mid to longer term priority.</p> <p>Route 11 could provide a deviated service with some fixed stops. The service would have specific times to meet at fixed route stops; however, it could also deviate to pick up passengers at other locations. The requirement would be that the deviations would not alter the specific stop times for the fixed route service. Existing groups (like the Friendship Center) could provide calls for deviated stops for their able users. This would not be a specialized service like that provided by the Friendship Center. However, this service could help alleviate the use of specialized services by those that are able to use a traditional transit service.</p>

Figure 6.2 graphically depicts the local bus recommendations.

Figure 6.2: Recommendations – Local Bus



Potential Piloting / Phasing – Local Bus Recommendations

To maximize the opportunity for success, to provide the opportunity to monitor the incremental development of the system and to limit the financial risks, a potential piloting / phased implementation approach is presented in Table 6.4.

Table 6.4: Potential Piloting / Phasing – Local Bus Recommendations

Step	Description	Elements
A	Capitalize on ExxonMobil’s current interest in connecting their two campus locations to pilot and test a local connection to the Town Center. This is either Route 10X or 10.	<ul style="list-style-type: none"> • Provide timetabled two way route predominantly on street (Route 10X or 10). • Create partnership with ExxonMobil to support the new service. • Develop stop locations, but not all stop amenities. To minimize cost in the near term, this may include simple restriping to form bus bays (as opposed to full construction of bus turn outs). • Provide information totem / signage and timetable information at each stop and online. • Utilize the new Woodlands transit website as a comprehensive portal for all transit and mobility information for the new service. • Promote the service (focused on potential rides) and educate potential users. • Operate the service and evaluate every 6 months. • Survey users and measure success by achieving annual route ridership of 27K or greater.

Step	Description	Elements
B	Continue to evaluate the opportunities for local transit to the wider Woodlands community.	<ul style="list-style-type: none"> • Survey potential users and measure the demand for implementation of future local bus routes. • Route 11 would be the likely next local bus route for piloting and implementation. Route 11 may form an extension of one of the Town Center bus services. • Continue to extend or evaluate options for system development and implementation of the plan recommendation (such as new destinations beyond Routes 10X / 10 or Route 11).

Recommendations – Regional Mobility Express Bus (The Woodlands to Houston)

Regional mobility is defined by The Woodlands Express commuter services between The Woodlands and multiple locations in the Houston metropolitan area. The plan presents potential recommendations for enhanced services from The Woodlands to Houston, and also reverse commute bus services originating in the Houston metropolitan area, traveling to key employment destinations in (and around) The Woodlands.

The existing Woodlands Express service is successful. The plan’s recommendations aim to further enhance the system and ultimately grow ridership, revenue, and destinations. The new services described below are generally near-term priorities. These are presented as extensions of the existing service to minimize the risk associated with new investment in the service; it would not require immediate introduction of



Promoting the Woodlands Express could increase ridership and revenue.

separate, new services. Based on the success and demand for the new destinations, future separate services could be considered in the longer term.

The items below are recommended for all park and ride locations and services originating in The Woodlands and traveling to destinations in the Houston metropolitan area:

- Maintain all current services.
- Fill pedestrian gaps to all park and ride locations.
- Fill cycle gaps and provide cycle racks at all park and ride locations.
- Improve auto drop-off/pick-up at park and rides.
- Address maintenance issues at park and ride locations - develop and implement ongoing maintenance plans for park and ride facilities.
- Use new marketing/website communications channels to highlight and advertise the changes (and encourage new riders).

The following sections detail the recommendations for expansion of existing services from the Research Forest, Sawdust, and Sterling Ridge park and ride locations to new destinations in metropolitan Houston. These are presented by each individual park and ride origin point. Table 6.5 details the recommendations for express bus from The Woodlands to Houston.

Table 6.5: Recommendations – Express Bus (The Woodlands to Houston)

Recommendations – Express Bus (The Woodlands to Houston)
<p>Research Forest Park and Ride</p> <p>New destinations – add new destinations for services originating at the Research Forest park and ride:</p> <ul style="list-style-type: none"> • Research Forest park and ride to Uptown/Galleria (with stops at Post Oak Boulevard @ San Felipe Street, Post Oak Boulevard @ Ambassador Way, and Post Oak Boulevard @ Westheimer Road) as an extension of the current Greenway Plaza services. • Research Forest park and ride to Midtown (with stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route. <p>Later service – add two new later pick-up times on the evening return to Research Forest park and ride from:</p> <ul style="list-style-type: none"> • Medical Center - add 6:05pm pick-up. • Greenway Plaza - add 6:30pm pick-up.
<p>Sawdust Park and Ride</p> <p>New destinations – add new destinations for services originating at the Sawdust park and ride:</p> <ul style="list-style-type: none"> • Sawdust park and ride to Uptown/Galleria (with stops at Post Oak Boulevard @ San Felipe Street, Post Oak Boulevard @ Ambassador Way, and Post Oak Boulevard @ Westheimer Road) as an extension of the current Greenway Plaza services. • Sawdust park and ride to Midtown (with stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route. <p>Later service – add two new later pick-up times on the evening return to Sawdust park and ride from:</p> <ul style="list-style-type: none"> • Medical Center - add 5:40pm pick-up. • Greenway Plaza - add 6:40pm pick-up.
<p>Sterling Ridge Park and Ride</p> <p>New destinations – add a new pick up point and a new destination for services originating at the Sterling Ridge park and ride:</p> <ul style="list-style-type: none"> • Sterling Ridge park and ride to Midtown (with stops at Milam Street @ Elgin Street and San Jacinto Street @ Berry Street) as an extension of an existing downtown route. • New pick-up – add a new-pick up point in The Woodlands near Woodlands Parkway @ Grogan’s Mill (walk-up stop) as part of the service originating from the Sterling Ridge park and ride. <p>Later service – add two new later pick-up times on the evening return to Sterling Ridge park and ride from:</p> <ul style="list-style-type: none"> • Medical Center - add 5:40pm pick-up. • Greenway - add 6:40pm pick-up.

Potential Piloting / Phasing – Express Bus Recommendations (The Woodlands to Houston)

The existing service utilization provides evidence of the potential success of any service improvements. Importantly the improvements should be considered and implemented incrementally to ensure the potential risks are minimized, each increment being advertised and supported to maximize success and that time is allowed them to be monitored to evaluate their success.

Since the Research Forest park and ride is the busiest location, service improvements are therefore initially proposed at Sawdust and Sterling Ridge park and rides to ensure that parking

and bus capacity for new riders are adequate. Table 6.6 presents the potential piloting / phasing for The Woodlands to Houston express bus improvements.

Table 6.6: Potential Piloting / Phasing – Express Bus Recommendations (The Woodlands to Houston)

Step	Description	Elements
A	Develop a transit brand and single online presence for transit information.	<ul style="list-style-type: none"> • Create the new Woodlands transit website as a comprehensive portal for all transit and mobility information for the new service. • Promote the service (focused on potential riders) and educate potential users. • Provide more user focused information on services. • Incentivize service use through ticketing (monthly passes, etc.)
B	Pilot a temporary stop in the south Town Center area and provide using Sterling Ridge services.	<ul style="list-style-type: none"> • Test the south Town Center stop. • Provide information totem / signage and timetable information at each stop and online. • Continue ongoing promotion and education of the service. • Operate the service and evaluate every 6 months.
C	Formalize south Town Center stop.	<ul style="list-style-type: none"> • Formalize the south Town Center stop and develop stop infrastructure (bus bays, etc.).
D	Extend Sawdust and Sterling Ridge services to either Midtown (commencing at the start of a college semester) or Uptown / Galleria.	<ul style="list-style-type: none"> • Provide information totem / signage and timetable information at each stop and online. • Continue ongoing promotion and education of the service. • Operate the service and evaluate every 6 months.
E	Extend Sawdust and Sterling Ridge services to alternate of the above, Midtown (commencing at the start of a college semester) or Uptown / Galleria.	<ul style="list-style-type: none"> • Provide information totem / signage and timetable information at each stop and online. • Continue ongoing promotion and education of the service. • Operate the service and evaluate every 6 months.
F	Consolidate service and review.	<ul style="list-style-type: none"> • Survey users and revise services as required.

Based on the success of the services noted above, it is recommended The Woodlands conduct future surveys to potentially implement additional new services from The Woodlands to Houston. However, the adjustments to current services presented above were selected because they represent relatively low risk changes to routes that have good potential for success (based on public input received throughout the project). Higher risk expansion of The Woodlands Express would include adding completely new routes, as opposed to proposed extensions of the current route structure. New routes would require additional buses and, depending up the destinations, may result in greater non-revenue service hours (bus travel to position with no revenue passengers).

Based on future surveys and demand, destination points in the Houston metropolitan area that may be considered include The Woodlands to:

- The Energy Corridor Addicks park and ride (with transit-oriented redevelopment) and/or other major employment centers (Shell Oil, ConocoPhillips, BP America).
- The University of Houston - Downtown campus and Burnett Transit Center.

Recommendations – Regional Mobility Reverse Commute Express Bus (Houston to The Woodlands)

Based on the public outreach efforts of the project and recent discussions with ExxonMobil, it appears that demand likely exists for reverse commuter services. To minimize overall risk and cost to The Woodlands (and partners), the plan recommends starting with focused service from downtown Houston to key employment destinations including the Town Center / Hughes Landing and the Springwoods / ExxonMobil area. These locations and the services have been selected to

use the outbound Woodlands Express services (The Woodlands to Houston) coach buses as efficiently as possible for the reverse service, so as to minimize non-revenue service time.

The goal of these services is to address demand by a segment of area employees who wish to not drive for their commute to major employment centers in The Woodlands area. Area employees expressed a desire for these types of services. Additionally, these services have the potential to create revenue that could positively impact the financial aspects of the overall Woodlands Express system.

Multiple origins were examined as a starting point for these services. METRO’s Downtown Transit Center was noted as the most desired started point compared to other area transit centers and park and ride locations. The Downtown Transit Center is a key intermodal hub and would allow access, via local bus and light rail, from throughout the Houston area. Therefore, this starting point provides the greatest access and good potential for transit



Reverse commute service supports congestion mitigation by reducing vehicle trips for area workers.

riders to avoid using their personal vehicle. Table 6.7 details the recommendations for express bus from The Woodlands to Houston.

Table 6.7: Recommendations – Express Bus (The Woodlands to Houston)

Recommendations – Express Bus (Houston to The Woodlands)
<p>Reverse Commute Woodlands Express (Downtown Houston Transit Center to Town Center / Hughes Landing)</p> <p>New service – add new service originating at METRO’s Downtown Transit Center to The Woodlands Town Center (with stops at Woodloch Forest Drive @ Lake Robbins Drive and Woodloch Forest Drive @ Timberloch Drive) and to Hughes Landing (stop central to the developing office complex along Hughes Landing Blvd.).</p>
<p>Reverse Commute Woodlands Express (Downtown Houston Transit Center to Springwoods / ExxonMobil)</p> <p>New service – add new service originating at METRO’s Downtown Transit Center to the Springwoods / ExxonMobil area (multiple stops on the campus ring road, if security clearance is granted).</p>

Using potential park and ride locations as starting points for the reverse service did not receive an exceptionally strong response from stakeholders. However, given the overall success of park and ride in the metropolitan Houston area, this may be considered when testing the service or in the future. One scenario for testing could be adding a single intermediate stop for the service at the North Shepherd park and ride. The service would continue to originate at the Downtown Houston Transit Center, make one stop at the North Shepherd park and ride, and then proceed to The Woodlands or Springwoods / ExxonMobil. This could increase access to the service for those connecting by transit and by auto.

One of key benefits of the enhanced and extended park and ride services is to provide area residents and employees with greater mobility choice, while working to shift those riders that desire from autos to transit. Considering that Houston metropolitan area residents consistently rate congestion and mobility as a top issue, new and enhanced commute choices would continue to provide a competitive edge for The Woodlands area when businesses and individuals are considering new homes or businesses.

Potential Piloting / Phasing – Express Bus Recommendations (Houston to The Woodlands)

The phasing of either of the services would need to consider the priorities in using the current return service from Houston. The ExxonMobil service (through a partnership arrangement) could be considered less risky with costs shared by the partners. The proposed reverse service to the Town Center could have more economic benefit by helping to support the local economy and investment of businesses to The Woodlands. Table 6.8 provides details on the potential piloting / phasing of the reverse services.

Table 6.8: Potential Piloting / Phasing – Express Bus Recommendations (Houston to The Woodlands)

Step	Description	Elements
A	Pilot the return service from Houston to the Town Center.	<ul style="list-style-type: none"> • Integrate service with new Town Center bus stops. • Develop ongoing promotion and education of the service. • Test the intermediate stop at the North Shepherd park and ride. • Operate the service and evaluate every 6 months.
B	Pilot the return service from Houston to Springwoods / ExxonMobil (in partnership with ExxonMobil).	<ul style="list-style-type: none"> • Develop Springwoods / ExxonMobil stops. • Develop ongoing promotion and education of the service. • Test the intermediate stop at the North Shepherd park and ride. • Operate the service and evaluate every 6 months.
C	Consolidate service and review.	<ul style="list-style-type: none"> • Provide information totem / signage and timetable information at each stop and online. • Continue ongoing promotion and education of the service. • Operate the service and evaluate every 6 months.

Potential Funding Options

Introduction

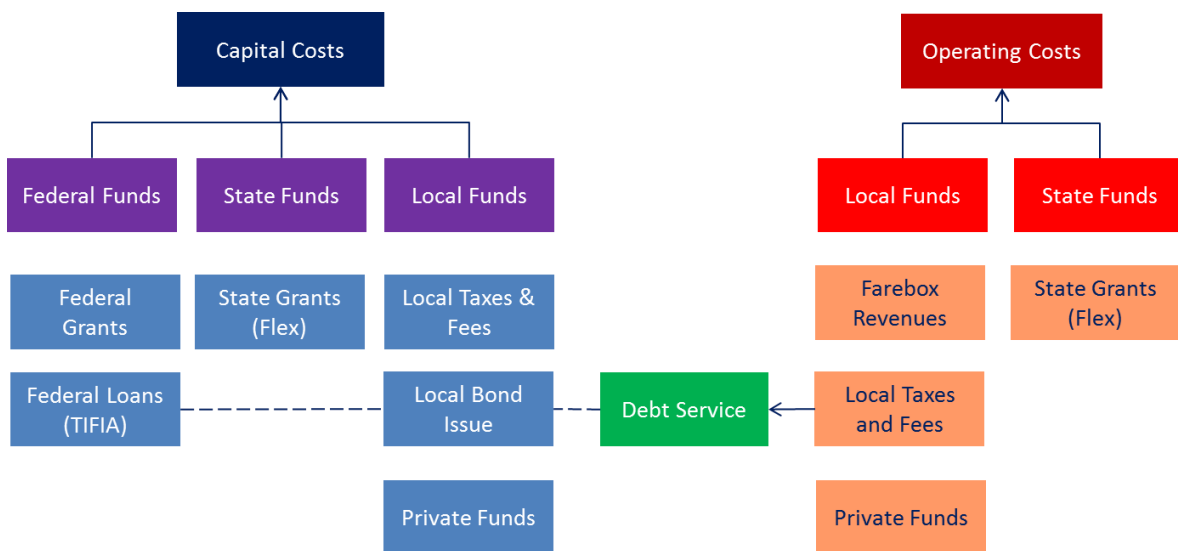
This section documents the range of funding and financing options available to support the multi-modal transportation improvement recommendations of The Woodlands Township Transit Plan. In developing these options, it is important to distinguish between “funding” and “financing.”

Funding is required to support the total capital and operating costs of a project. The most cost-effective solution for funding is for capital and operating costs to be funded by local dedicated sources of funding (such as taxes) and grants from the state and federal government. These typically do not require payback. However, given the uncertainty of the legislative process, both the scale and timing of grants may not always align with capital and operating requirements for transit projects. If that is the case, implementing agencies often seek sources of public or private financing to cover the remaining costs of construction and equipment (including vehicles). Financing requires acceptance of debts that must be serviced and repaid, so it is not appropriate to rely on financing sources to cover ongoing operating expenses.

Any expansion of transportation services requires a significant commitment of capital and operating funds on an ongoing basis.

Figure 6.3 illustrates typical potential sources and uses of funding and financing for capital and operating expenses for transportation improvements. Capital funding and financing (as shown on the left) comes from federal, state, and local revenues and sources of finance to provide investment in infrastructure and equipment. Operating costs (shown on the right) are paid from local and state taxes and contributions to cover operating costs and debt service charges and repayment.

Figure 6.3: Typical Structure of Transportation Capital and Operating Funding and Financing



Along these lines, Table 6.9 summarizes the range of potential funding and financing options and their applicability to capital and operating costs that are available to The Woodlands Township in support of the transportation improvements contained in the plan. Each of these items is described in more detail in the following sections.

Table 6.9: Potential Funding Sources and Financing Mechanisms for Transit Improvements

	Capital Costs	Operating Costs
FUNDING SOURCES		
<i>Direct System Revenues</i>		
Farebox	Usually No	Yes
Non-farebox		
• Advertising	Yes	Yes
• Station/system naming rights	Yes	Yes
• Air rights	Yes	Yes
• Station revenues	Yes	Yes
<i>Other Funding Sources</i>		
Local Government (local taxes/fees, governmental appropriations)	Yes	Yes
State Government (primarily Flex funds)	Yes	Sometimes
Federal Government	Yes	Generally not available for areas over 200,000 though some exceptions are made
Private/Innovative Funding	Yes	Yes
FINANCING SOURCES		
<i>Bonds</i>	Yes	No
<i>Loans and Leases</i>	Yes	No
<i>Public Private Partnerships</i>	Yes	Sometimes

Funding Sources

Direct System Revenues

Direct system revenues are those that come from the day-to-day operations of the transit system itself. The most obvious source of revenues for a transit system comes from farebox revenues - the fares its passengers pay. Farebox revenues typically do not cover the cost of operating and maintaining a transit system. This is not unusual for transportation infrastructure. For example, roadways and rail projects also do not provide revenues sufficient to cover their capital expenditures or operations, but are implemented as critical elements of mobility infrastructure for communities. According to the 2012 National Transit Database, Houston METRO’s farebox recovery rate for all of its bus operations is 11.2%, meaning that fares cover 11.2% of its operating expenses (compared to a nationwide average of 27.9%). Demand response farebox recovery rates are almost always lower; METRO’s is 3.3% (compared with 7.5% nationwide). Alternatively, The District has a bus farebox recovery ratio of 46.6%, higher than the national average.



Regardless of the type of service operated, operators of transit services almost always need to find additional sources of revenue to pay for system operations and construction.

Typical non-farebox sources of direct revenue include:

- Advertising, where the operating entity solicits the sale of advertisements for placement on its vehicles and at its facilities (such as passenger stops or stations). Some innovative advertising concepts seen in recent years include ads on tickets, ads on floor space in transit facilities, and wrapping of transit vehicles. In general, most advertising of this type is aimed at non-transit users (though certainly transit users are exposed to it also). Advertising revenues typically account for no more than 3% of a system's operating costs.
- Naming rights, which often involves sponsorship of transit facilities such as passenger stops and stations by corporate entities, which agree to a financial contribution to the operating entity over a specified period of time. This arrangement is similar to sponsorship arrangements for sports stadiums and teams. Revenues from naming rights typically account for less than 2% of a system's operating costs. A similar arrangement is the sale of air rights above transit facilities to private developers; however, those arrangements are usually focused on major infrastructure improvements and are likely limited for transit infrastructure in the study area.
- Station revenues include concessions and other commercial activities at passenger facilities. This could include leasing space for food and retail operators at one or more facilities and could be as elaborate as development space inside a transit facility building or as simple as leasing space for food trucks or coffee carts in a parking lot to serve commuters. Wrapping the future Town Center transit center in ground floor retail may be one near term opportunity for commercial revenue.

Other Funding Sources

Local Government

Local government funds typically provide the bulk of local transit system support. In Texas, many areas benefit from a dedicated sales and use tax for transit services that has been approved by local voters (as is the case in Houston METRO's service area). However, The Woodlands Township is not in the METRO service area. The current sales and use tax rate in The Woodlands is at the state maximum of 8.25%, of which 6.25% goes to the State of Texas, 1% goes to The Woodlands Township, and another 1% goes to The Woodlands Township Economic Development Zone (for local improvements). Therefore, unless state law is changed to increase the maximum sales tax, The Woodlands Township is not eligible to impose an additional dedicated sales tax for transit by joining the METRO service area or by establishing its own sales-tax-funded transit district. However, additional local funding sources could potentially provide assistance for transit improvements, including:

- Local government appropriations, where local governmental entities (including The Woodlands Township and/or Montgomery County) approve funding specifically for transit projects out of those entities' local revenues (which come largely from local property taxes).

These types of funds are usually subject to an annual approval process and often do not provide long-term funding sustainability. The establishment of interlocal agreements between and among local government entities could provide a structure for long-term funding and regulatory support of transit improvements.

- Lodging or rental car taxes could be used to support transit improvements. Currently, The Woodlands Township levies a hotel occupancy tax rate of 15%, of which 7% percent goes to The Woodlands Township debt service, 2% goes to The Woodlands Convention and Visitors Bureau, and 6% to the State of Texas. The lodging tax could potentially be expanded to help fund transit improvements locally.
- A parking tax could potentially be imposed by The Woodlands Township to help support transit improvements. This could have the double benefit of both providing additional local revenue and discouraging auto usage (and therefore potentially increasing transit ridership). This type of program is most often used in higher-density central business districts, but could be scaled appropriately to generate revenue in The Woodlands Township. This option should be examined as part of the future review of Town Center parking.
- Other local funding mechanisms that may have applicability to transportation improvements in the study area include:
 - A Public Improvement District or Municipal Management District: State law allows any city to levy and collect special assessments on property within the city. A Public Improvement District may be formed to perform many local improvements, including mass transit improvements. A Municipal Management District is a relatively new economic development tool that allows commercial property owners to enhance a defined business area. The district has the power to levy an ad valorem property tax for wastewater, drainage, road, or mass transit improvements that are located inside and outside the district.
 - Tax Increment Financing (TIF) and Tax Increment Reinvestment Zone (TIRZ): Authorized under state law, political subdivisions may create TIF Zones in order to use the increased tax value of land from a proposed development toward financing of the public improvements in the reinvestment zone. TIF districts assist in financing development of unimproved or blighted land by dedicating the real estate property taxes to be generated by the built project to a TIF fund for payment of the principal and interest on TIF bonds. Under a TIF, the property owner pays taxes on the full value of the property, and the taxing entities pay into the TIF fund the taxes attributed to the added value of the land due to the new development. TIF bonds may be issued for a maximum of 20 years and may be used to pay for public improvements associated with a development including but not limited to parking, infrastructure, land acquisition, and utilities. A TIF reinvestment zone must meet set criteria for designation, including substandard or blighted conditions, open area due to obsolete platting or deterioration, or by petition of 50% of property owners in the district. The municipality establishes the TIF reinvestment zone and other taxing entities approve agreements to participate in the TIF district and set forth the percentage of tax increment they are willing to dedicate to the TIF fund, up to a maximum of 100%. A TIF board, consisting of nine to 15 members, is established with representatives from the participating taxing entities and other representatives as set forth in the TIF statute. Either of these mechanisms could potentially be used to finance

transit-related improvements, primarily related to public improvements such as roadways and parking facilities.

- Business Improvement Districts (BID): A BID is an organization of property owners in a commercial district who tax themselves to raise money for neighborhood improvement. Core functions usually include keeping sidewalks and curbs clean, streetscaping, and patrolling the streets. Once a BID is formed, the assessment is mandatory, collected by the city like any other tax. Unlike any other taxes, however, the city returns the assessment to the BID management for use in the district. There are approximately 1,000 to 2,000 such districts nationwide in cities large and small. A BID could potentially be used to assess property and/or business owners in the study area to provide support to transit improvements.

State/Regional Government

As noted in TCRP Report 129 (Local and Regional Funding Mechanisms for Public Transportation, 2009):

In the State of Texas, the tradition and underlying philosophy guiding the provision of public transit is that local governments, cities, and counties should bear the responsibility for raising the funds needed to build and operate transit systems and services. As a result, the state provides little direct funding for public transportation, with the exception of very modest amounts for small urban and rural services.

TxDOT administers federal grant programs in a number of areas, including rural public transportation (areas with 50,000 or less), small urban public transportation (areas between 50,000 and 200,000), none of which would apply the Conroe-The Woodlands UZA (population of approximately 240,000). However, H-GAC administers pass-through funds from the Federal Highway Administration (FHWA) that are distributed to regional Metropolitan Planning Organizations, including H-GAC. The two primary funding programs – also known as “flex” funds because they can be used for a variety of transportation projects - are:

- The Congestion Mitigation and Air Quality (CMAQ) Improvement Program, which is a grant program jointly administered by FHWA and the FTA to fund state transportation programs that meet the National Ambient Air Quality Standards (NAAQS). The FHWA requires states to give priority CMAQ funds to diesel engine retrofit and other cost-effective emission reduction and congestion mitigation activities that provide air quality benefits. H-GAC uses CMAQ grants primarily for clean vehicle programs, focused primarily on heavy trucks and school buses but also aimed at the acquisition of new transit vehicles that will be used to reduce vehicle trips and/or vehicle miles traveled in the region. A total of \$14.4 million in federal funds are available over a three-year period to eligible grantees, with a cash match of 20% of total project cost required. In addition, the program requires a cash contribution of up to 2% of total project costs to H-GAC for administrative costs. The program helps local entities purchase transit vehicles with engines that meet specific clean-air criteria. In addition, H-GAC provides CMAQ funding for implementation projects in its Livable Centers Program, focused on creating walkable, mixed-use neighborhoods in the metropolitan area. Projects eligible for the Livable Centers Program must provide multi-modal transportation options, improve environmental quality, and promote economic development. Livable Centers grants have

been awarded for several projects in the Houston area, including Midtown, the Energy Corridor, the FM 1960 (Cypress Creek Parkway) corridor, and others.

- The Surface Transportation Program (STP) provides the greatest flexibility in the use of funds. Funds from the STP may be used (as capital funding) for public transportation capital improvements, car and vanpool projects, fringe and corridor parking facilities, intercity or intracity bus terminals and bus facilities, and bicycle and pedestrian facilities. STP funds, however, are apportioned to each state and are distributed among various population and programmatic categories. In the case of H-GAC, it is using STP funds for planning studies for its Livable Centers program.
- The Transportation Assistance Program (TAP) is a state program that absorbed several existing initiatives such as Safe Routes to Schools. TAP funding is available for a large number of projects primarily focused on those that enhance and improve access for bicyclists and pedestrians.

Another innovative funding option is from proceeds of the regional toll revenue funding initiative, which was a result of the Texas legislature enabling the TxDOT to consider public- and private-sector partnerships to finance roadways. The best example of regional toll revenue supporting transit investments occurred in North Texas. In exchange for the opportunity to construct, operate and maintain a 26-mile toll road for 52 years, the North Texas Tollway Authority paid the North Central Texas region \$3.2 billion. The Regional Transportation Council (RTC) of the North Central Texas Council of Governments used these funds to expedite 200 transportation projects, one of which was the Denton County Transportation Authority's (DCTA) A-train commuter rail line. In April 2008, the RTC approved funds for the purchase of railcars, and in August 2008, \$190.2 million was approved for the completion of DCTA's A-train.

Toll revenue has not yet been used in the Houston area for transit, but could be a potential source of revenue for new transit improvements.

In addition to those programs, other state funding options could potentially be available:

- State motor vehicle registration fees could be expanded to help pay for transit improvements. Currently, Montgomery County charges an additional \$10 for annual motor vehicle registration on top of the state fee. Harris County levies an additional \$11.50 local fee; Bexar County has an additional \$21.50 above the state fee. Montgomery County could potentially increase its local fee to help support transit programs.
- The current state gasoline tax is \$0.20 per gallon; it could potentially be raised through legislative action to support additional transportation projects, though the state legislature has shown no recent indication of its willingness to increase the tax.

Federal Government

The primary funding mechanisms for transit projects in small to mid-sized transit agencies are FTA's Section 5307 and 5339.

- Section 5307 authorizes recipients in urbanized areas under 200,000 in population to use urbanized area formula program funds for operating assistance at a 50% federal share.

Additionally, recipients in urbanized areas over 200,000 in population that operate a maximum of 100 buses in fixed route service during peak service hours may receive a grant for operating assistance subject to a maximum amount per system. The Woodlands Township has used Section 5307 funds for a variety of operating activities in the recent past, including operating funds for the water taxis and other operating expenses.

- Section 5339 (Bus and Bus Facilities Program) is a capital-only program, and funds are limited to capital projects to replace, rehabilitate, and purchase buses and bus-related equipment, and to construct bus-related facilities. Section 5339 funds cannot be used for operating assistance.

In addition, the FTA's New Starts / Small Starts program funds major transit investments. The New Starts program is for projects costing more than \$250 million, and the Small Starts program is for projects costing less than \$250 million. For most New Starts projects, the federal share typically does not exceed 50% of a project's cost; the larger the local match, the greater chance a project has for New Starts funding. The federal share for a Small Starts project cannot exceed \$75 million regardless of the total cost of the project (which, as noted, cannot exceed \$250 million). This means that the federal share could exceed 50% of a project's cost (up to 80% depending on the size of the project), but as with New Starts, the larger the local match, the greater chance a project has for funding. Houston METRO has been a major recipient of New Starts funding over the years, most recently for its North and Southeast Corridor light rail projects. In recent years, Small Starts funding has been awarded for a variety of bus rapid transit and streetcar projects. While most projects in the New Starts or Small Starts pipeline are relatively large, some smaller projects have been funded, including for example El Paso's Dyer corridor bus rapid transit project (total cost of \$35 million, with a requested Small Starts share of \$20 million). The first step in entering the New Starts or Small Starts process is for a local sponsor with a competitive project (one deemed by a sponsor to be feasible and affordable) to send a request to FTA to enter project development, which allows a sponsor of a project to move into final definition, environmental clearance, and preliminary design.

The US Department of Transportation also allows local sponsors to apply for Transportation Investments Generating Economic Recovery (TIGER) program. This program was created in 2009 as part of the federal stimulus program and was funded in subsequent years. According to the US Department of Transportation web site, TIGER grants provide "federal funding possibilities for large, game-changing multi-modal projects." TIGER grants are generally available for projects that are relatively far along in the NEPA schedule and are often considered the "last dollar" necessary to advance the project. TIGER grants help fund differing modes including roadways and transit and have helped provide construction funds for a variety of streetcar and other urban circulator projects in recent years. The most recent TIGER program (applications in 2014) resulted in requests for projects totaling 15 times the funds available (\$600 million).

In addition, the US Department of Transportation partnered with the Environmental Protection Agency and the US Department of Housing and Urban Development to create the Livable Community Initiative (LCI) to improve mobility and quality of services available to residents of neighborhoods by, among others, strengthening transit links. Eligible recipients of the LCI funds are transit operators, metropolitan planning organizations, city and county governments, state,

planning agencies and other public bodies with the authority to plan or construct transit projects. The last round of grants occurred in 2012, and it is uncertain as to its future status.

Innovative Funding

Transit-Oriented Development (TOD) is a popular urban development concept that focuses on compact, high-density development near transit stations and the zoning, tax, and development regulations needed to implement those developments.

TODs typically consist of a mix of uses including residential, commercial, and retail, are pedestrian- and cycle-friendly, and help in the creation of attractive and useful public and civic spaces near transit facilities and stations.

Transit operators could potentially benefit from value capture, or additional property values on land owned by the transit agency and sold to developers. Joint development occurs when public or private entities are allowed to develop publicly owned land in conjunction with the transit facility or station. For example, a common joint development strategy is for a transit operator to sell or lease a park and ride lot to a developer, allowing the developer to create new development on the property while typically providing structured parking to replace the surface parking previously in place.

Similar to Business Improvement Districts described earlier, Benefit Assessment Districts (BAD) are special tax assessment districts created to support the construction and operation of new transit services. A typical BAD creates a zone or buffer around a station or alignment, often up to a half a mile, with all businesses within the zone paying a tax based on real estate valuation per square foot. Frequently, residential property is exempted. Sometimes, assessments are “tiered” reflecting the fact that properties nearer to the station have higher benefit. BADs are most successful where new transit services can be shown to correlate strongly with increased sales at local businesses. BADs often need a majority or more of property owner approval. Kansas City recently established a benefit assessment district to help fund a new streetcar project.

Another option is the establishment of impact fees as a subset of an assessment district. An impact fee is a fee assessed on new development within a jurisdiction as a means to defray the cost to the jurisdiction of expanding and extending public services to the development. Since it is a one-time fee, it has less benefit from transit, which needs funding for both capital and operating costs.

Transportation Management Associations (TMAs) are a business-focused means to provide financial support for local transportation programs. As noted in the Transportation Demand Management Encyclopedia of the Victoria Transport Policy Institute:

TMAs are non-profit, member-controlled organizations that provide transportation services in a particular area, such as a commercial district, mall, medical center or industrial park. They are generally public-private partnerships, consisting primarily of area businesses with local government support....

TMAs provide an institutional framework for Transportation Demand Management programs. TMAs can provide a variety of services that encourage more efficient use of transportation and parking resources, including commute trip reduction, commuter financial incentives (such as transit pass programs), guaranteed ride home services, parking management, pedestrian and bicycle planning, shuttle services, and other transportation improvements.

Financing Sources

Bonds

Public entities seeking to finance major transportation infrastructure projects traditionally utilize debt or bonds. Tax-exempt debt provides low interest rates, long maturities, and the ability to sculpt principal repayment to match the cash flows of the project. Tax-exempt debt, however, restricts potential private investors because of its lower interest rates. Taxable debt can also be a source of financing for a project and gives project sponsors more flexibility in utilizing a public-private partnership approach. Taxable debt generally has higher interest rates and shorter maturity dates than tax-exempt bonds. Typically, the minimum project issuance size threshold is \$100 million to generate sufficient lender and bondholder interest. Bond types can include general obligation bonds, revenue bonds, and tax increment financing bonds.

Loans and Leases

Capital Leasing can be used to secure buses needed for fleet replacement or expansion. It can be used to smooth cash flow over the life of the assets when there are insufficient funds available from federal grants in the relevant period. The stream of future lease payments (including finance charges) can be paid from a combination of federal (up to 80%) and local funds. However, the option should be viewed as an alternative to a bond issue rather than an addition as the associated contractual lease payments will come from the same grant funding stream. Leasing may also limit future funding available from FTA grants for the duration of the lease period.

The federal government offers loans under the Transportation Infrastructure Finance and Innovation Act (TIFIA).

The TIFIA loan program provides credit assistance to eligible surface transportation projects, including highways and transit, of \$50 million or more. Under TIFIA, the U.S. Department of Transportation may provide three separate forms of credit assistance to eligible projects: secured loans, loan guarantees and standby lines of credit for up to 33% of project value. TIFIA loans must be repaid through dedicated funding sources that secure the obligation, such as tolls, user fees or tax increment financing, and are for up to 35-year terms. The best local example of TIFIA use was on the Grand Parkway project, which received an \$840 million TIFIA loan. TIFIA loans are seen as financing tools with attractive rates and terms. TIFIA loans are flexible and low cost and can finance a major portion of a project at US Treasury rates. Federal authorization for the program has remained steady at \$1 billion per year for the past few years.

The TxDOT administers a State Infrastructure Bank (SIB) to provide innovative financing methods to communities to assist them in meeting their infrastructure needs. The SIB program allows borrowers to access capital funds at or lower-than-market interest rates. According to TxDOT, “An

SIB loan can be granted to a public or private entity that is authorized by law to construct, maintain, or finance an eligible transportation project.” Examples of entities that typically utilize SIB loans are cities, counties, and regional mobility authorities. The SIB operates as a revolving loan fund, where the account balance grows through the monthly interest earned and repaid principal and interest payments. So far, the Texas Transportation Commission has approved 98 loans totaling more than \$483 million from the SIB program. The loans have helped leverage more than \$3.6 billion in transportation projects in Texas. Projects eligible for the program’s funding in Texas includes planning and preliminary studies, feasibility, economic and environmental studies, right of way acquisition, surveying, appraisal and testing, utility relocation, engineering and design, construction, inspection and construction engineering.

Public-Private Partnerships

Public-private partnerships (P3s) provide an alternative means to build and, in some cases, operate a transit investment. A public-private partnership arrangement has a private sector partner injecting capital to undertake construction and (in some cases) operations of a project in return for a stream of future payments from the project sponsor. The US Department of Transportation defines a public-private partnership as “a contractual agreement between a public agency and a private partner that allows the partner to participate in project implementation beyond traditional procurement practices.” This means that the private partner assumes responsibility for many functions and activities that are traditionally implemented by the public agency.

Under a traditional procurement process (known as design-bid-build), the public sponsoring agency has responsibility for providing all funds or issuing bonds, hiring a design, and hiring a constructor. The public entity then carries out all operations and maintenance. A public-private partnership differs from the traditional approach by transferring responsibility for one or more of these core functions to the private sector. According to the 2013 report from Transportation for America, *Thinking Outside the Farebox: Creative Approaches to Financing Transit Projects*:

Under a design-build approach, the project sponsor hires a contractor for both engineering and construction. The recipient of the design-build contract can be a single entity, a consortium, or other joint venture. The design-build approach is at the low end of the P3 continuum. A design-build contract is different from traditional procurement in two significant ways: construction on the project can start before all the design work is completed, and the private sector takes on the risk for designing and delivering the project on time and on budget, reaping financial benefits for finishing faster and accepting penalties or other costs for delays.

The Transportation for America document lists typical benefits and drawbacks of Public-Private Partnerships. Benefits include risk transfer from the public to the private entity; public agency access to private capital that might not otherwise be available; higher assurance of on-time completion for complex, multiyear projects; and the additional of expertise and technical capacity to the public agency.

Drawbacks of public-private partnerships include the relatively high cost of private capital for the public agency.

Another potential drawback includes an experience differential; where the private entity may have more experience in negotiating contracts than the public agency. The public agency may experience loss of control of the project with the direct private sector involvement. Additionally, a public-private partnership may avoid public agency labor policies.

Recent public-private partnership applications include the Denver Eagle project (the East and Gold Line commuter rail lines) and the SH 288 toll lane project in Houston. A public-private partnership approach could conceivably be appropriate for a transit project in The Woodlands, but traditionally public-private partnership arrangements are reserved for large projects (\$500 million or more).

Branding, Marketing, & Communications

Introduction

The existing transit services provided by The Woodlands Township have a number of loyal users. Yet the limited and fractured information provided about current services and upcoming changes can be confusing to even the most regular customers, let alone encourage new ridership. The increased awareness of area transit services that has resulted from conducting The Woodlands Township Transit Plan presents an opportunity to capitalize on this momentum and expand education and outreach on current services as well as create a platform for building new ridership for future services.

This section provides a framework for presenting clear, focused and centralized communications about how to use the overall transit system and each component, now and as services expand in the future. This section also outlines the initial steps recommended for The Woodlands decision makers to take in developing and implementing a plan to:



Branding identifies and differentiates a product or service.

- Encourage transit as an important community benefit.
- Establish a strong identity as a high-quality transit system.
- Educate the public about how to use existing services and keep them informed of changes to existing services.
- Encourage visitors and business within the Town Center and other commercial / entertainment areas.
- Provide guidelines for launching new services as recommended in the Transit Plan.

Branding

From London's iconic Underground logo to Boston's "the T" and the Seattle area's Sound Transit, a recognizable, attractive and relevant brand can firmly entrench transit within a community and provide a clear identity for the system. The American Marketing Association Dictionary defines branding as, "Name, term, design, symbol or any other feature that identifies one seller's good or service as distinct from those of other sellers." Leading communications experts give their thoughts on branding:

To brand something is when a company or person makes descriptive and evocative communications, subtle and overt statements that describe what the company stands for. - Donna Antonucci

Brands are shorthand marketing messages that create emotional bonds with consumers. Brands are composed of intangible elements related to its specific promise, personality and positioning, and tangible components having identifiable representation including logos, graphics, colors and sounds. - Heidi Cohen

A good brand should deliver a clear message, provide credibility, connect with customers emotionally, motivate the buyer and create user loyalty. - Gini Dietrich

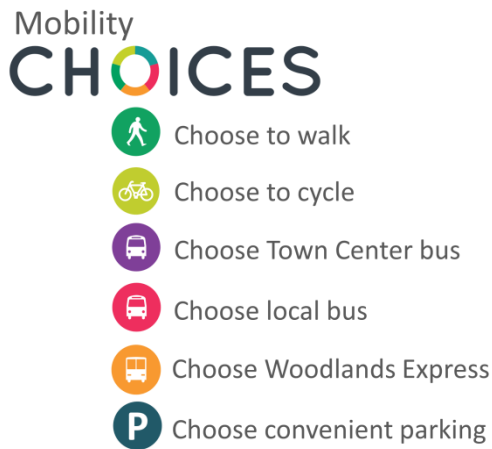
Like an artist finding his or her voice the goal of a branding process should be to always frame in a concise way what makes your endeavor unique; and then apply that message to each medium. - Michael Pinto

Establishing a brand is the essential first step to take prior to initiating education and promotional campaigns about transit services. Branding distributes messaging about the transit system in words, graphics, and infrastructure design to potential users, stakeholders, and influencers. Branding will serve to energize local champions, build and maintain ridership, and demonstrate credibility to funding sources. Branding should comply with any visual or architectural guidelines for the community. A comprehensive branding plan could cover all modes of transportation to highlight the entire system of mobility. Branding could be developed for transit, parking, The Woodlands Express, walking and pathways, cycling, the waterway cruisers, etc. The goal would be to find a brand that could encompass a wide range of mobility options. The formal branding could be applied to:

- Transit vehicles.
- Transit stops / shelters and park and rides.
- Passenger information kiosks and wayfinding signage.
- Passenger information materials including maps and schedules.

- Ticketing and fare collection, such as smart cards and bus passes.
- Driver and employee uniforms.
- Website and electronic communications tools (e-blast or e-newsletter), printed materials, and presentation materials.
- Mobile applications.
- Advertising and promotional campaigns.
- Walking and pathway signage.
- Cycling infrastructure (cycletracks and storage).
- The waterway cruisers.
- Carpool / vanpool.
- Specialized transportation services.

To accomplish a comprehensive branding effort, The Woodlands could use their in-house communications staff. The team could use the initial project branding developed for The Woodlands Township Transit Plan as a foundation for a comprehensive brand for all modes of transportation. The Woodlands Township Transit Plan brand document is included in Appendix D.



The Woodlands Township Transit Plan branding.

Recognizing that in-house staff already has multiple, ongoing commitments, engaging an outside branding consultant could potentially result in more timely completion.

Branding should be a reflection of the community, potentially portraying the area’s natural beauty, amenities, and overall strengths. A brand development committee could be convened to oversee the brand development process and provide critical input to ensure the brand is relatable and relevant to The Woodlands and the study area. Committee members could include representatives of the Board of Directors, communications group, transit operations, and potential transit users.

The committee would be responsible for transactional items such as managing the overall branding process, while also seeking out input to inform the development of the brand. Suggested branding activities are identified in Table 6.10.

Table 6.10: Potential Branding Activities

Item	Details
Set the structure and identify stakeholders.	Identify all constituents to be impacted by the branding, including current transit users (commuters and Town Center visitors); area corporate employers, retailers, hotels, restaurants; residents; transit service employees and suppliers; elected officials; regulators; funders and potential donors; the media; vocal critics.
Organize constituents.	Categorize constituents according to demographics, their perceptions about transit and expectations and potential barriers to transit use. (This report provides a solid basis for research.)

Item	Details
Brand development committee charrette.	Working with stakeholders and the brand development committee, conduct a charrette session to identify the unique attributes of the community (in relation to transportation). These attributes will form the basis for a potential new brand. For example, in The Woodlands, environmental consciousness may be one important community attribute to build from.
Themes and messages.	The community attributes will allow additional brainstorming of potential themes and transit system names and tag lines. The messages must resonate with the majority of constituents, reflect the uniqueness to the region, and provide the flexibility to promote mobility services.
Draft brands.	Present at least three potential system names and themes.
Testing the brand.	Conduct focus groups with constituents and provide summary comments for the committee to select a name.
Graphic representations.	Develop up to three logos and graphic concepts for the selected name and theme for the committee to select the preferred concept. Refine the logo and graphic concept to assure ease of application to all transit system components.
Messaging.	Develop messaging expressing the features (speed, frequency and amenities) and benefits of the system (improved mobility and air quality) as well as promoting its prestige.
Launch.	Present ideas for the initial brand launch campaign as well as for future campaigns promoting expanded or brand-new services such as the local bus system.

Deliverables arising from the branding exercise may include:

- System and component names, logo, color schemes, text themes.
- Logos in 3 iterations (full-color, black and white, reverse).
- Electronic logo files in multiple formats for print and web.
- Graphic style guide for applying branding in print and web format and including suggestions for applying logos to vehicles, ticketing, uniforms and other operational and promotional items.

Numerous communities and transit systems have developed and applied critical branding that is now clearly associated with their organizations or services. A few examples include:

- “Choices” is the brand developed for The Woodlands Township Transit Plan.
- “SHIFT – a change in direction” is the future branding of commuter services for the San Diego Association of Governments.
- “Go Berkeley” is the branding for the City of Berkeley’s Transportation Action Plan (formerly B-TAP).
- “Go Glendale – every trip counts” is the branding for the City of Glendale’s transportation management.

The ‘Choices’ brand developed for The Woodlands could provide a potential base from which to build. If this brand were used, it could be applied to all levels of transportation and mobility in the community.

Online Information Portal

After developing a recognizable brand, the next critical step is to establish a central online portal to disseminate information. A standalone website with a



City of Berkeley Transportation Action Plan branding.

unique URL should be developed to incorporate the new branding and messaging. Initially, the website could post:

- User-friendly guides on how to use the services.
- Schedules and maps, updated regularly.
- Alerts about upcoming and recent schedule changes or expanded services.
- Transit Plan recommendations.
- Sign up for e-blasts on service updates.

The website should be designed to incorporate these features and others as the system grows:

- An industry-standard interactive journey planner such as Google Transit that displays walking and cycling options to connect between services.
- Information on other transit options in the area, such as on-demand services for seniors, people with disabilities, veterans, etc.
- Online ticket purchase system.

The goal would be to create a site that would be a single point for all information transit and mobility related within the study area. All other organizations (The Woodlands Township, The District, etc.) could provide direct links to this site and not duplicate information on their own. Multiple examples of recent, high quality transit websites exist as examples:

Embark – forward together (Oklahoma City’s transit website and journey planner)

<http://embarkok.com/>

Go Berkeley (City of Berkeley’s website for their Transportation Action Plan)

<http://www.goberkeley.info/>

Go Glendale – every trip counts (City of Glendale’s transportation information portal)

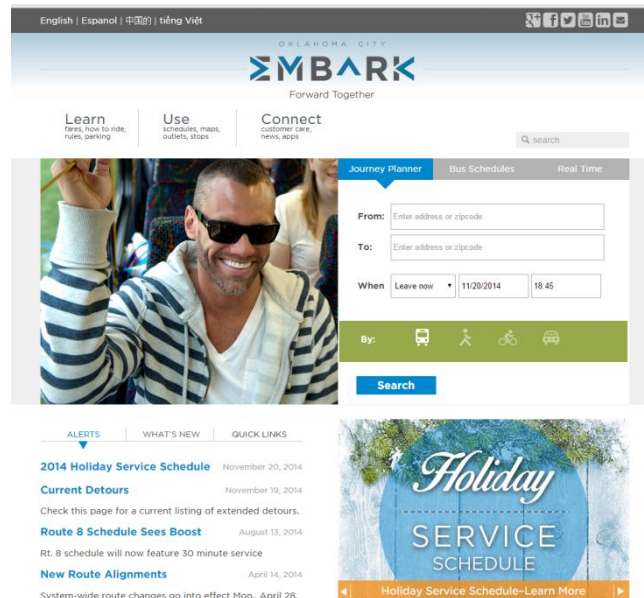
<http://www.goglendale.org/>

Dundee Travel Info (Dundee City Council, Scotland mobility portal)

<http://www.dundeetravelinfo.com/>

Walk Bike Connect (Pikes Peak Regional Council’s non-motorized master plan portal with crowdsourcing public input)

<http://www.walkbikeconnect.org/>



Embark website and journey planner.

Members of the brand development committee could oversee the development of the site. Table 6.11 provides potential activities for development of such a website.

Table 6.11: Potential Website Activities

Item	Details
Scope the needs.	Review existing information, both online and hardcopy materials. Examine the current methods of communication and promotion of the services.
Functionality.	Scope potential website attributes through key stakeholder or focus groups to understand the range of functionality required for the site.
Map the site.	Develop a flow map of site connections, functions.
Develop content.	Create informational content following the agreed upon flow of the site functions (maps, schedules, information, etc.).
Site development.	With client approval, develop the website (using the new branding) coding, applications, etc.
Testing.	Conduct beta testing of the website with a limited number of stakeholders to identify and fix any potential issues prior to launch.
Launch.	Launch the website with appropriate marketing. Continue to refine and add functionality as required (online ticketing, etc.).

Deliverables arising from the website development may include:

- Website structure and flow diagram.
- Website code.
- Summary of testing and adjustments.
- Website hosting (if desired).

Depending on the level of stakeholders involvement including in the process and the functionality required for the site, the website development effort can take 6-8 months.

Marketing, Education, and Communication Strategies

After branding and creating the central information portal, strategies incorporating branding and addressing customer service and crisis communications should be developed to educate the public and promote transit services. A marketing and communication committee could be assembled to oversee the effort, with at least some members carrying over from the brand development committee to assure continuity.

Strategies will focus on the three transit scenarios and resulting services outlined in the plan:

- Town Center Mobility (Town Center bus service)



Branding and information totem to improve mobility in central Toronto.

- The Woodlands Area Mobility (Local bus service)
- Regional Mobility (Woodlands Express service)

Messaging for each service line should reflect the overall brand but be customized to describe each distinct service. The process would begin with identification and categorizations of each target audience likely to use transit services. Communications approaches that may effectively reach each group would be outlined. Example targeted communications approaches include:

- Commuters and area employees — Corporate human resources departments, new-hire welcome packets, company intranets.
- Shift workers (retail, restaurant, healthcare) — The Woodlands Chamber e-mail employers to distribute to their employees.
- Lone Star College students — Posters with QR codes linked to the website and email distribution through the college.
- Seniors — Flyers distributed by The Friendship Center and email distribution.
- The Woodlands residents — Village Association e-blasts and Facebook postings, The Woodlands Community Magazine, The Woodlands Township alerts, etc.

Multiple communications avenues could be explored to disseminate transit options to the public at large. Examples of key marketing, education, and communications concepts are included in the potential tasks in Table 6.12.

Table 6.12: Potential Marketing, Education, and Communications Activities

Item	Details
Identify target audiences.	Determine the key target audiences, open to potential (high quality) transit use. This may include seniors, school age kids, commuters, college students, stay at home parents, etc.
Focused marketing messages.	Based on the branding campaign develop clear marketing campaigns with messaged aimed directly at potential riders.
Educate and promote.	Use all tools (website, branding, information, etc.) to educate potential transit users on how to use the system and its benefits.
Marketing and education team.	<p>Create a mobile marketing and communications team to develop relationships with local businesses, employers, and gathering places. The team could:</p> <ul style="list-style-type: none"> • Provide strategic information and education at special events and directly at area employers’ sites. • Provide fun, but educational events for school age children to build an understanding of transit (and its benefits) from a young age. • Conduction ongoing informational ‘road show’ for target audiences (seniors groups, etc.).
Promotion and education.	<p>Develop and implement an online advertising and focused, local print advertising campaigns. This may include broader marketing with billboards, branded tote bags, or other prize materials for transit users.</p> <p>Organize, educate, and market via social media.</p> <p>Actively promote the potential incentives for transit use (new monthly pass discounts, etc.). Promote incentives through the new transit website. Potentially include transit games where riders are provided small gifts, etc. for their level of usage of the new transit system. Participants could win desirable branded materials such as tote bags, bike locks,</p> <p>Promote service with education, information at popular public events such as Woodlands Walk like MADD (fall), Taste of the Town (winter), Montgomery County Fair and Rodeo (spring).</p>

Deliverables arising from the development of marketing, education, and communications tools may include:

- Detailed marketing and education campaigns.
 - Plan for the mobile marketing team structure, training, and implementation.
 - Focused marketing messages.
- Email and contact lists of potential transit users (target markets).
- Website games to encourage transit usage.
- Branded materials (for use as prizes / incentives).
- Calendar of events for outreach, education, and participation (focused on target markets).

Depending on the level of stakeholder involvement including in the process, the development of focused marketing can take 5-8 months. Implementation would be ongoing.

Ongoing Questionnaires and Feedback

Understanding the desires of the local community, decision makers, and potential transit users is critical to timing implementation of services appropriately. Additionally, questionnaire results can help tailor services to focus on the key aspects that influence those that would choose to use transit.

Regular questionnaires can provide essential information on whether the current services are still satisfying demand, or whether service changes and expansions are needed. The Woodlands Township currently conducts an annual telephone questionnaire of The Woodlands residents. Because the target audiences for transit services extend beyond The Woodlands, a stand-alone transit services questionnaire separate from the annual telephone questionnaire is recommended. On-line questionnaires can be an effective tool to gather information from current and future transit riders. More than 1,000 email addresses collected from the online responses provide an excellent starting point for an email campaign to solicit response. Other suggested outreach avenues:

- Promote questionnaires as part of the overarching transit branding, education, and marketing campaign.
- Utilize corporate connections through human resource departments.
- Utilize distribution by The Woodlands Township, The Woodlands Chamber and the Economic Development Partnership, etc.

Table 6.13 notes the potential activities required to implement ongoing questionnaires.



What is your choice for traveling to, from and around The Woodlands?

Two convenient options to provide input:

<p>Open House Come by The Woodlands Township office June 4 or 5 to view the webinar and talk with the planning team.</p>	<p>Wednesday, June 4, 9 a.m. – 8 p.m. Thursday, June 5, 9 a.m. – 5 p.m.</p> <p>The Woodlands Township Board Chambers Lobby 2801 Technology Forest Blvd. The Woodlands, TX 77381</p>
<p>Online Webinar and Survey Watch the webinar at your leisure and take a survey to note your preferences for expanding existing choices to better connect to employment and activity centers.</p> <p>Available June 4 - 25: http://montgomerycountymobility.com/woodlands-transit-plan/get-involved/</p>	<p>To Do List - Wednesday night</p> <ul style="list-style-type: none"> <input type="checkbox"/> 9:00 p.m. walk dogs <input type="checkbox"/> 9:30 p.m. wash face, brush teeth <input type="checkbox"/> 9:45 p.m. watch webinar on transit alternatives and take survey <input type="checkbox"/> 10:15 p.m. email co-workers to watch webinar and take survey <input type="checkbox"/> 10:30 p.m. dream about improved mobility

For more information, please visit:
<http://montgomerycountymobility.com/woodlands-transit-plan/>

Questions? Contact us at:
Carlene Mullins, Carlene.Mullins@h-gac.com
Thomas Gray, Thomas.Gray@h-gac.com

The Woodlands Township Transit Plan questionnaire.

Table 6.13: Potential Questionnaire Activities

Item	Details
Build questionnaire participants.	Identify key outreach for participation in the annual questionnaires and obtain email lists and / or ability to market the questionnaires directly (through employers, etc.).
Develop questionnaires.	Identify the appropriate questionnaire type and tools to be used, as well as ability to qualify results with appropriate level of accuracy. Create questionnaire questions and online structure.
Promote.	Promote the questionnaire to the appropriate audiences (based on target markets).
Evaluate results.	Provide clear evaluation and levels of certainty around questionnaire results. Link results to potential adjusted or new transit services, based on feedback.
Refine and repeat.	Refine the questionnaire based on each experience. Conduct questionnaires on a regular basis, asking the same (or similar) questions, so the results are comparable over time.

Deliverables arising from the ongoing development of questionnaires may include:

- Questionnaire distribution contacts and lists.
- Questionnaire instruments.
- Online questionnaire development (code).
- Questionnaire results review and interpretation summaries.
- Suggested transit refinements and new services (based on questionnaire results).

Ideally, questionnaires should be conducted on an annual basis to track potential progress and need for new services.

Control Sheet

Document Title

The Woodlands Township Transit Plan

Document Type

Final

Client Contract/Project No.

#TDOT.14.0320-01

SDG Project/Proposal No.

22611101

Issue history

Issue No.

Date

Details

Review

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