

# 7.0 SHUTTLE SERVICE

The Back Bay Restoration Foundation (BBRF) operates the Blue Goose Tram as an interpretive amenity and a transportation mode within BBNWR and into FCSP. For \$8.00, riders tour along gravel roads and learn from the driver about the flora, fauna, and management of the Refuge and Park. This tram service inspired the idea of a larger shuttle service that could bring people into the Refuge and thus reduce the need to use personal vehicles to travel into the Refuge. This is an important consideration as additional development along Sandpiper Road has resulted in higher levels of traffic congestion during the summer months. Transportation alternatives that can reduce the number of vehicles traveling into the Refuge and other destinations along Sandpiper Road are viewed as a benefit to not just the Refuge but to the residential areas surrounding the Refuge as well.

## ◆ Scoping/Planning

Three shuttle concepts were considered as part of this alternatives assessment:

- future Visitor Contact Station to existing Visitor Contact Station;
- Virginia Aquarium to Future Contact Visitor Station; and
- future Visitor Contact Station to Mill Landing water taxi.

## Contact Station Shuttle

The Contact Station Shuttle would provide an alternative to driving between the future Visitor Contact Station and the existing Visitor Contact Station. The relocation of the contact station to the property on the southwest corner of the intersection of Sandbridge Road and New Bridge Road presents an opportunity to capture visitors outside the Refuge and transition them to a shuttle. This alternative would likely not be viable without the future Visitor Contact Station being constructed to attract refuge visitors to stop. This concept assumes that the new facility would provide parking and a building that provides interpretive displays as well as visitor information related to the refuge and potentially FCSP.

The route would utilize Sandbridge Road and Sandpiper Road as illustrated in Figure 7.1. The route is almost nine (9) miles long, and provides numerous benefits to both the Refuge and visitors. The FWS can reduce the amount of traffic flowing into the Refuge and demand on an already limited parking supply. Visitors would be provided with additional information about the Refuge while traveling, making valuable use of their travel time. Sandpiper Road is the most congested segment of the trip into the Refuge due to the local traffic, Refuge traffic, and visitors to Little Island Park. Providing an alternative to sitting in congested traffic provides a benefit to visitors, and also has the potential to remove vehicle trips from an already congested roadway.

Other amenities envisioned for the shuttle include the ability for the shuttle to carry recreational equipment such as bicycles and kayaks. Providing this option would allow visitors to consider the shuttle if they brought outdoor equipment. The addition of stops along the route would provide riders with alternative destinations as well as give residents along Sandpiper Road and visitors to Little Island Park access to the Refuge. Potential locations for stops include:

- The intersection with the Back Bay Refuge Trail near the realty offices;
- Fire Station 17 at Sandbridge Road and Sandpiper Road;
- at Bonita Lane; and
- Little Island Park.

The addition of Little Island Park as a stop along the shuttle route has the potential to capture visitors to that park at the future Visitor Contact Station if advertised as an alternative to driving and parking at Little Island. Parking at the Visitor Contact Station and taking the shuttle would further reduce the number of vehicles traveling along Sandbridge and Sandpiper Roads. Planning for the number of visitors from Little Island Park who might park at the future Visitor Contact Station will need to be a consideration into parking lot design as the current Back Bay National Wildlife Refuge Comprehensive Conservation Plan describes a 100-space parking lot at the future Visitor Contact Station.

## Virginia Aquarium Shuttle

The Virginia Aquarium to Contact Station Shuttle opens the Refuge to visitors who might choose to travel without a car, or are dependent on public transportation. The Virginia Beach Oceanfront is a popular destination for visitors and vacationers. The Oceanfront is approximately 20 miles from the Refuge. The distance and the lack of bicycling infrastructure severely limits opportunities to travel except by automobile unless travellers are the boldest of cyclists. HRT is the regional public transportation provider, but currently does not provide public transportation to the Refuge. HRT does provide a service between the Oceanfront and the Virginia Aquarium and to the Red Mill area.



HRT Routes in Study Area

Providing a connection from the existing HRT service at the Virginia Aquarium to the Refuge would open the Refuge to Oceanfront visitors who do not have a car or would like to travel without a car. This option could also open the Refuge to local residents who are transit-dependent. The concept developed would provide a connection from the Virginia Aquarium to the future Visitor Contact Station. The route would terminate at the future Visitor Contact Station and require a transfer to the Contact Station Shuttle to allow visitors to pay refuge fees. A direct route from the Virginia Aquarium to the existing Visitor Contact Station was not considered because of the logistics required to collect multiple refuge fees at the gate and the impact on shuttle travel times. The Virginia Aquarium is served by both a local transit option and a specialized visitor service.

HRT Route 33 travels from the north end of the Oceanfront (68th Street) to Tidewater Community College (TCC) Monday through Saturday, with limited service on Sunday. The service frequency is low at 60 minutes, but the service operates from 6:30 am to 11:00 pm. HRT also operates the Virginia Beach Wave routes as a means to get around the Virginia Beach Oceanfront by bus. The Wave routes are operated from May until Labor Day with a relatively high frequency (15 - 20 minutes) throughout the day from 8:00 am until 2:00 am. The Wave Route 31 travels from Atlantic Avenue and 2nd Street on the Oceanfront to the Virginia Aquarium and KOA Campgrounds on General Booth Boulevard. The route operates every 20 minutes from 9:30 am until 11:10 pm.

A direct shuttle connection from the Virginia Aquarium to the future Visitor Contact Station would provide visitors with a viable alternative to driving. The shuttle would run closed-door from the Virginia Aquarium to the future Visitor Contact Station, so travel times would be competitive with driving. The route would travel from the Virginia Aquarium down General Booth Boulevard to Princess Anne Road in Red Mill (Figure 7.1) to Sandbridge Road. The route would be about eight miles long each way.

### Water Taxi Shuttle

The Water Taxi Shuttle would provide a connection between the future Visitor Contact Station and a future water taxi. The water taxi is being explored as part of this report and the shuttle is seen as an element of that proposal. Parking at the two landing sites under consideration (Mill Landing and Princess Anne) is limited and during heavy use by boaters may not provide ample parking for Refuge visitors accessing the water taxi. The shuttle would allow visitors to park at the contact station and then travel to the landing site to catch the water taxi. The shuttle would operate only when the water taxi is operating and would be scheduled to meet the water taxi when it arrives/departs. The shuttle for the water taxi will be described in greater detail as part of the water taxi concept in Section 10.0. The two are viewed as connected and would not be operated without the other being implemented. General details about the route will be included as part of this section for comparison with the other shuttle routes.

### Operating Models

Several models for operating shuttle service for the Refuge were considered. One model would be to work in partnership with HRT to provide a public service. This model would require contributions from the City of Virginia Beach as is currently the case for the routes provided to the jurisdictions HRT serves. The refuge may become a contributor as well. HRT would charge passengers fares to cover the remaining costs of the service, which could be a barrier to the success of these routes.

Another model would be for the Refuge to operate the service completely. This option seems unlikely because the Refuge does not currently operate the tram service that travels within the boundaries of the Refuge. Operating the service would require the Refuge to purchase vehicles, hire and train commercially licensed drivers, maintain the vehicles, and all the other facets involved with providing transportation services.

The model that was the assumption for this assessment was contracting with a third party provider of transportation services. Many entities such as parks, airports, universities, and hospitals contract for shuttle services. This model allows the Refuge to focus on its mission and leave the transportation services to a provider who has experience in the field. The contract can be set up with any number of provisions, but the expectation would be that the provider would supply the vehicles, drivers, training, maintenance, and any amenities such as Wi-Fi or GPS vehicle location services. Storage of the vehicles could be determined as part of the negotiation, and depending on the location of the provider's facility it may make sense to store the vehicles at one of the contact station locations to reduce deadhead miles and travel time between the Refuge and the transportation provider.



Virginia Aquarium

◆ Schematic Design

Schedule

The shuttle services would operate during the busiest times of the year to take advantage of the higher visitation and to offer the most relief to the traffic congestion around the Refuge. The shuttles will operate daily approximately 100 days of the year from Memorial Day through Labor Day. Table 7.1 shows estimated operating characteristics for the two shuttle options under consideration. A detailed explanation of the Mill Landing Shuttle to the water taxi is included as part of the water taxi alternative in Chapter 10.0.

Vehicles

The shuttle concepts assume the use of a body-on-chassis vehicle. Body-on-chassis vehicles utilize a truck or van chassis with a shuttle body mounted to the chassis. This type of vehicle can be designed to carry anywhere from 10 to 45 passengers. The benefit of this type of vehicle is the smaller size makes it easier to operate on narrow roads. They are typically not as loud as a traditional city bus, making them ideal for operation in residential areas. The capital, operating, and maintenance costs for these vehicles are lower than traditional buses, but the useful life is typically shorter. The body can often be recycled and used on new chassis as they reach the end of their useful life.

Vehicle size was determined based on the ridership estimates. Assuming there is a peak period for daily park visitation, the vehicles could accommodate up to 15% of the daily ridership figure. Table 7.2 shows the estimated peak demand and corresponding daily ridership estimate. The study team developed these figures using a combination of data on transit use at parks and refuges as well as survey figures from the visitor survey completed in 2012. The Appendix of this document includes a detailed discussion of the methodology used.



Example of Body-on-Chassis Shuttle Bus



Example of Cutaway Shuttle Bus

TABLE 7.1: SHUTTLE OPERATING CHARACTERISTICS

	CONTACT STATION SHUTTLE	VIRGINIA AQUARIUM TO CONTACT STATION SHUTTLE	WATER TAXI SHUTTLE
Round Trip Length (miles)	17.2	15.8	21.2
Speed Assumption (mph) <sup>1</sup>	19	28	32
Round Trip Travel Time (min) <sup>2</sup>	82	54	60
Vehicles in Service	3	1	1
Frequency (min)	30	50	60
Start Time	8:20 am	9:30 am	8:00 am
End Time	9:20 pm	10:00 pm	6:00 pm
Start Stop	Future VCS	Virginia Aquarium	Future VCS
End Stop	Existing VC	New VC	Mill Landing

<sup>1</sup>Assumption of 2 minutes boarding at any intermediate stops.

<sup>2</sup>Assumption of 5 minutes for boarding and alighting at ends of the route.

TABLE 7.2 ESTIMATED SHUTTLE PEAK DEMAND

ROUTE	ESTIMATE DAILY RIDERSHIP	ESTIMATE PEAK RIDERSHIP	VEHICLE SIZE
Contact Station	50-100	8-15	15-25 Passenger
Virginia Aquarium	25-75	4-12	12-15 Passenger
Water Taxi	25-75	4-12	12-15 Passenger

**Other Capital Needs**

There are few other capital needs that would be required in addition to the new shuttle service. The study team identified the Contact Station Shuttle as a route that could support intermediate stops at four locations: Nimmo Parkway, Fire Station #17, Bonita Lane, and Little Island Park. These locations could have signs to identify the stop. The stops could be simple to minimize costs and maintenance needs. Other than the contact station locations, the stops would just entail a sign on a pole and a pedestrian waiting area.

Other capital costs associated with a Refuge shuttle program would include shelters to provide protection for waiting riders from both the weather and sun and pedestrian pads or waiting areas for universal accessibility. Pedestrian pads could be constructed anywhere there is a shuttle stop. The minimum requirement for a pad is a 5' x 8' level waiting area that is clear of obstructions for the deployment of a ramp or lift from the bus. These would need to be constructed at each of the locations proposed for a bus stop. The shuttle at the Virginia Aquarium can likely take advantage of existing facilities. The existing Visitor Contact Station has a suitable area for passengers to board and alight.

A general rule of thumb is to provide a shelter at stops that see more than 200 boardings per week. Likely locations for shelters include the future and existing Visitor Contact Stations. It would make sense that any shelters installed at

the future Visitor Contact Station be included in the construction of the site. It was determined that the existing Contact Station could provide sufficient shelter. The covered information area just outside the existing Contact Station also provides seating and protection from the sun. The addition of a trash can near the information area would be desirable to provide a place for people to dispose of items when they exit or board the shuttle. As demand for the services grow, it may be necessary to add other amenities like shelters at some of the other stops.

◆ **Cost Estimate**

A third-party provider would operate the shuttle service, meaning all the operating and maintenance costs would be the responsibility of the provider. The Refuge would be responsible for paying the provider's contract price. Capital costs for the shuttle service are associated with installing shuttle stops to the Refuge.

**Capital Costs**

Capital costs for the shuttle service will entail the purchase and installation of shuttle stop signs for the Contact Station Shuttle. Table 7.3 shows the quantities and the costs associated with the capital needs of the shuttle service. The costs include the sign post, the sign, a shelter foundation, bench shelter, trash cans, and a 20% contingency.

**Operating Costs**

The majority of the operating and maintenance costs would be the responsibility of the transportation provider. The Refuge would pay a contract rate for transportation service which covers the provider's operating and maintenance costs. These costs cover the driver's salary, training, licensing, fuel, maintenance costs for the vehicles, and depreciation of the vehicles themselves. Additional costs that could be included involve special livery on the vehicles for the Refuge as well as technology additions, like GPS tracking systems.

Table 7.4 shows a range of operating and maintenance costs based on rates collected from local providers. The providers did not provide a quoted price, but an approximate cost by service hour. Typically, labor is around 60% of the cost; depreciation, maintenance, fuel and overhead is around 30%; and a 10% markup for profit. These costs were applied to the estimated service hours for the routes described above and a reasonable service program. The details of the service plan can be found in a table in the Appendix. The benefit of using a third-party transportation provider is that they can often scale the service based on the demand more easily than a public provider could. This would allow them to add service to a route if demand began to exceed capacity.

Six stops with shelters are expected for the Nimmo Parkway stop Fire Station #17, Bonita Lane, Little Island Park, existing Visitor Contact Station, and at Mill Landing. The future Visitor Contact Station stop would be incorporated into the sign design. Each stop would cost approximately \$3,000 to maintain annually.



Kayak Trailer

TABLE 7.3: SHUTTLE CAPITAL COSTS ESTIMATE

ITEM	QUANTITY	UNIT COST	TOTAL COST
Shuttle Stops	6	\$15,000	\$90,000

TABLE 7.4: ANNUAL SHUTTLE OPERATING COST ESTIMATE

ROUTE	ANNUAL HOURS OF SERVICE	OPERATING COST (\$80/HR - \$100/HR)
Contact Station Shuttle	4,485	\$359,000 - \$449,000
Aquarium Shuttle	1,495	\$89,700 - \$149,500
Water Taxi	1,265	\$75,900 - \$126,500

◆ **Benefit Analysis**

As depicted in Table 7.5, the shuttle service either mostly meets or completely meets most of the MOEs, and slightly meets one MOE. The scores represent averaged values from the TAC pre-screening and final screening described in Chapters 3 and 4.

**Visitor Mobility**

• **Reduce Traffic Congestion**

The shuttles would provide modest benefits to visitor mobility. The likely reduction in vehicle trips into the Refuge will be moderate and along Sandpiper Road will be minimal. The study team estimates that 25-75 daily visitors would use the Virginia Aquarium Shuttle, while the Contact Station Shuttle and Mill Landing Shuttle would each see 50-100 daily users. The shuttle service could create a 10-20% shift in mode split for refuge visitors. During peak season, an average of 255 cars enter Back Bay Refuge daily, so the proposed facilities could reduce that number by 25-50 cars per day.

• **Enhanced Visitor Mobility, Accessibility and Safety**

The Contact Station Shuttle would allow visitors an alternative to their personal automobiles for the most congested part of the trip into the Refuge. Efforts to capture visitors to Little Island Park would also contribute to improvements in travel along Sandpiper Road. Ensuring adequate parking at the future Visitor Contact Station and capacity on the shuttle will be important.

The Virginia Aquarium Shuttle would provide visitors with an alternative to driving to the Refuge from the Oceanfront. It also connects with the region’s transit

system, giving transit-dependent population an opportunity to access the Refuge.

The Mill Landing Shuttle would give visitors using the water taxi an alternative to driving to the parking lot at Mill Landing. Anecdotally, the parking area nears capacity during the summer months, which would limit access to water taxi users. An added benefit is the shuttle reduces the number of vehicles traveling on narrow, rural roads.

• **Improve Visitor Education, Recreation and Health Benefits**

The shuttles provide a high benefit to the visitor experience by eliminating the stress of driving certain segments of the trip. The shuttles could also provide additional information about the Refuge during the trip through the addition of pre-recorded information or the use of a ranger or volunteer to share information and answer questions. The system also expands the reach of the Refuge experience to users not currently able to access the park.

**Environmental Benefits**

• **Protection of Sensitive Natural, Cultural and Historical Resources**

The overall environmental benefits of the shuttle system would be positive, but the scale of the impact would depend upon the type of vehicle used and ridership realized.

• **Reduced Pollution**

The shuttles will remove a small number of vehicles from the road, reducing impacts of vehicle emissions. The amount of the impact would depend upon the

type of vehicle used. There were no natural gas fueling stations currently identified in the Hampton Roads region, meaning the vehicles would have to use gasoline or diesel fuel. This condition may change in the future. Alternatively, the vehicles could be hybrid, meaning that they would reduce the amount of petroleum fuel utilized, thus reducing emissions.

**TABLE 7.5: MEASURES OF EFFECTIVENESS - SHUTTLE SERVICE**

MEASURES OF EFFECTIVENESS - SHUTTLE SERVICE	SCORE
<b>VISITOR MOBILITY</b>	
Reduce Traffic Congestion	1
Enhanced Visitor Mobility, Accessibility and Safety	3
Improve Visitor Education, Recreation and Health Benefits	3
<b>ENVIRONMENTAL BENEFITS</b>	
Protection of Sensitive Natural, Cultural and Historical Resources	3
Reduced Pollution	2
<b>OPERATIONAL EFFICIENCY AND FINANCIAL SUSTAINABILITY OF ALTERNATIVES</b>	
Effectiveness in meeting BBNWR Goals	3
Financial Plan - Development and Operational Costs	1
Potential Funding Sources	2
<b>CONSTRUCTION/OPERABILITY</b>	
Project Phasing and Sequence Limitations Project Phasing and Sequence Limitations	3
Limitations on Transportation Operation	2
<b>SCORING SYSTEM: 0=DOES NOT MEET CRITERIA, 1=SLIGHTLY MEETS CRITERIA, 2=MOSTLY MEETS CRITERIA, 3=COMPLETELY MEETS CRITERIA</b>	

◆ Operational Efficiency and Financial Sustainability of Alternatives

• Effectiveness in meeting BBNWR Goals

BBNWR goals are identified in the September 2010 Comprehensive Conservation Plan. By providing a sustainable alternative means of access to the refuge, the shuttle service would support BBNWR goals for habitat preservation, and would especially support goals for enhanced opportunities for wildlife viewing and appreciation of natural resources and conservation.

• Financial Plan - Development and Operational Costs

The construction costs associated with the shuttle system are small. The operability impacts to the Refuge are very minor. They would need to identify a preferred transportation provider, likely through a competitive bid process. The provider assumes all the operational liabilities.

The financial sustainability of the shuttle services will be dependent on the Refuge and any potential partners to identify adequate funding. Charging a fare can create a barrier to the success of shuttles. Therefore, the Refuge and any funding partners would fully subsidize the cost of the shuttle. The cost or a portion of the cost for a shuttle to the water taxi at Mill Landing could be part of the ticket price of the water taxi.

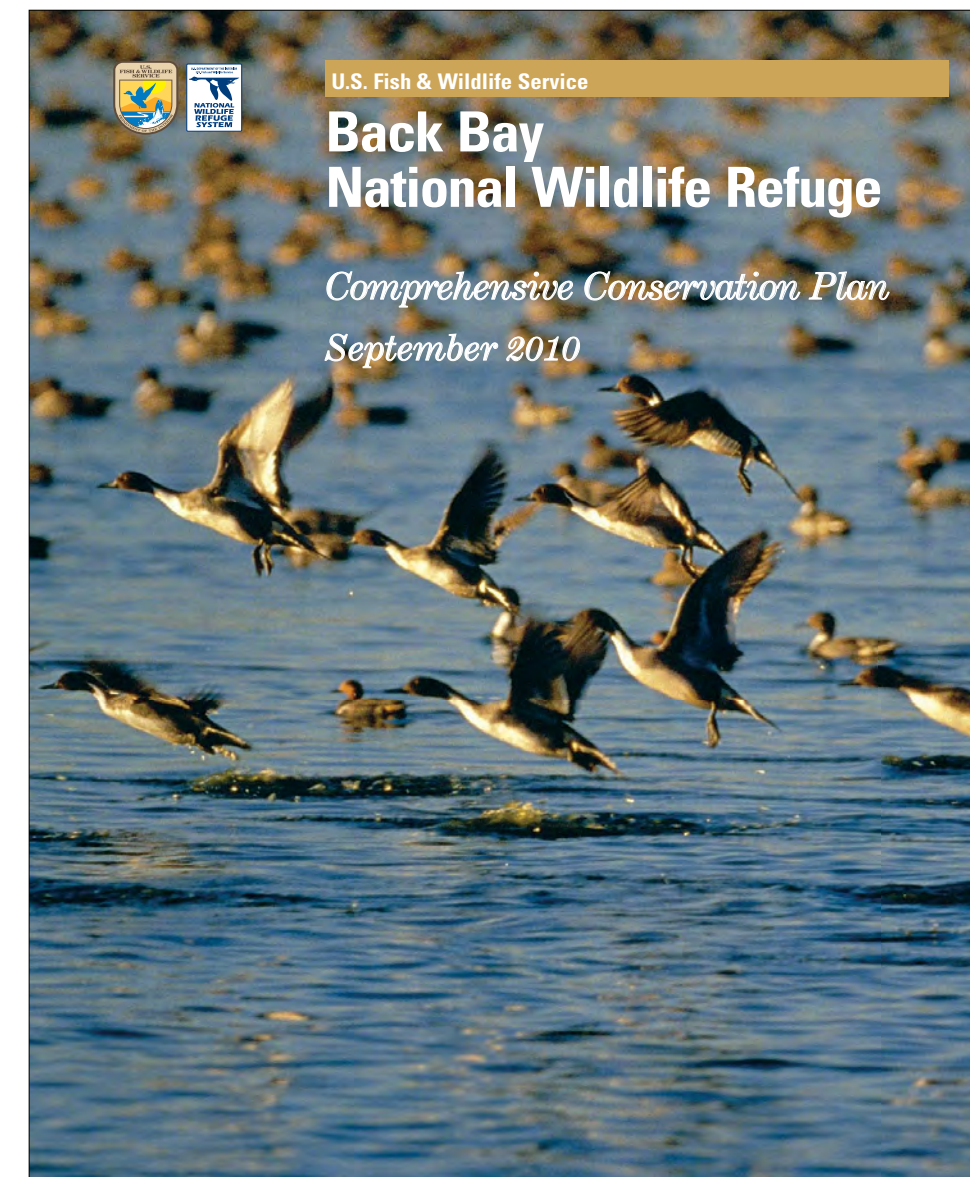
Based on the projected ridership estimates included in the Appendix, the routes would perform poorly based on standard transit industry measures of effectiveness. The passengers per revenue hour of service for the routes would range from 2 to 8. Passengers per mile would be all be below 1.0. The cost per passenger would range from \$12 to \$156 per passenger depending on the ridership and provider cost per hour.

• Potential Funding Sources

Potential funding partners for the shuttle system could include the City of Virginia Beach or the Virginia Aquarium. The Contact Station Shuttle will reduce vehicle trips along Sandbridge Road and Sandpiper Road, benefiting residents and visitors. This route provides access to Little Island Park and the residents along Sandpiper Road. The City and the Refuge could develop a funding arrangement to share costs. The state could also be a potential funding partner.

Providing service between the Virginia Aquarium and the Refuge could provide benefits to both in terms of visitation. There are opportunities to sell joint access passes at a reduced cost. This could include some level of revenue recovery for the shuttle. Similarly, entry fees for the Refuge, Little Island Park, and False Cape State Park could include a modest adjustment to cover a portion of the shuttle costs.

Section 11.1 of this report identifies a range of potential sources that could help fund the shuttle service. In particular, the Congestion Mitigation and Air Quality Improvement Program (CMAQ), and the Federal Lands Access Program (FLAP), and the Transportation Investment Generating Economic Recovery (TIGER) program offer high potential for funding this type of improvement.



◆ Constructability/Operability

• Project Phasing and Sequence Limitations

The Mill Landing shuttle would be implemented only if the water taxi service is initiated, and then only if there is not sufficient parking available at Mill Landing. The Contact Station Shuttle and the Virginia Aquarium Shuttle are contingent upon the construction of the proposed visitor contact station at the southwest corner of the intersection of Sandbridge Road and New Bridge Road.

The phasing of the shuttle implementation is also highly dependent on agreement of funding for the project. The other alternative transportation options evaluated for this study require substantial initial capital investment, but relatively low annual costs to operate. The shuttle services require low initial capital investment and high annual operating subsidies. As is typical for these types of new shuttle services, a pilot program may have to be implemented first, to test the financial effectiveness of the transit services before full funding commitments are made.

• Limitations on Transportation Operation

Implementation of the shuttles would have few noticeable impacts on existing transportation operations. There is little construction activity related to implementing the shuttles. The only physical presence on public property would be bus stop signs and, perhaps, shelters.

◆ Conclusion

The shuttle route would provide benefits to the visitors of BBNWR as well as the public and residents of Sandbridge and Red Mill. An enhanced visitor experience that results in a stress-free trip into the Refuge with added interpretive information about the area and Refuge provides a benefit to visitors to not just the Refuge but Little Island Park, FCSP, and area residents by reducing vehicle trips. The ability to create partnerships between Federal, state, and local entities would share costs and expand benefits. Growth in visitation to the Refuge and other parks will increase traffic and demand for limited parking resources. The shuttle service would allow for growth in visitors without the need to impact the Refuge or Sandbridge area with additional parking facilities.

TABLE 7.6: SHUTTLE PROJECT SCHEDULE

PROJECT MILESTONES	PROJECT SCHEDULE SHUTTLE															
	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Procure Funding																
Design Services																
Permitting																
Capital Equipment Procurement																
Construction																

Project Schedule Notes:  
 1. No ROW acquisition required.  
 2. No utility relocation required.