

FINAL ENVIRONMENTAL ASSESSMENT

PIER 121 PROJECT DENTON COUNTY, TEXAS

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
APE	area of potential effects
BMP	best management practice
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
dba	A-weighted decibels
DWU	City of Dallas Water Utility
EA	environmental assessment
EO	Executive Order
ER	Engineering Regulation
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GPD	gallons per day
IPaC	Information for Planning and Consultation
LUST	leaking underground storage tank
mg/L	milligrams per liter
NAAQS	National Ambient Air Quality Standards
NCTCOG	North Central Texas Council of Governments
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWP	Nationwide Permit
PEA	programmatic environmental assessment
PWD	preliminary wetlands determination
ROW	right-of-way
RV	recreational vehicle
SHM	Safe Harbor Marinas
SWPPP	Stormwater Pollution Prevention Plan

TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
TES	threatened and endangered species
TPDES	Texas Pollutant Discharge Elimination System
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank

1. INTRODUCTION

This Draft Environmental Assessment (EA) documents the affected environment and analyzes the potential environmental impacts associated with the proposed Pier 121 Project (the Proposed Action). The Proposed Action comprises approximately 250.50 acres on the shores of Lewisville Lake, Lewisville, Denton County, Texas (**Figure 1**). It is approximately 25 miles northwest of the City of Dallas's central business district. As the Dallas-Fort Worth metro area has expanded, Lewisville Lake has become an important location for outdoor recreation, natural resource activities, and conservation.

The U.S. Army Corps of Engineers (USACE), Fort Worth District Manages the federally owned lake, dam, and associated infrastructure, as well as all lands acquired for the Lewisville Lake Project. Lewisville Dam and the associated Lewisville Lake is a multipurpose project used for flood control, water supply, hydropower, fish and wildlife, and recreation. Lewisville Lake is a unit of the Trinity River Basin System, which consists of eight USACE lakes and various channel improvements and levees operated to provide flood protection along the Trinity River.

Pier 121 Marina is one of many marinas and recreation facilities on Lewisville Lake. The marina is operated by Safe Harbor Marinas (SHM), a subsidiary of Sun Communities, Inc., under lease with USACE. The total area leased by USACE to SHM is approximately 365.1 acres and includes lease of both land and water within Lewisville Lake. The Pier 121 Marina is the largest marina on Lewisville Lake, offering wet slips, dry covered storage units as well as a variety of other services, including a restaurant and entertainment venue, ship's store, sail club facility, fuel sales, sewage pump out, boat rentals, boat sales, and boat repair services. SHM proposes to add additional facilities to the Pier 121 Marina (the Proposed Action) (see **Figure 2**). The property boundary depicted on **Figure 2** was used as the Project Area or assessment area for this Final EA.

As a federal entity, USACE is required to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [U.S.C.] 4321 et seq.), which requires that the government examine the environmental, social, historic, and cultural impacts of its proposed actions before it irretrievably commits resources to undertake them. The Final EA analyzes the potential direct, indirect, and cumulative natural, cultural, and social impacts of the Proposed Action (the construction, operation, and maintenance of the expanded facilities proposed under the Proposed Action) and a No Action Alternative. The Final EA also includes information and analyses completed as a result of comments submitted during the scoping period and Draft EA public comment period.

Specifically, USACE conducted a public scoping comment period for the Pier 121 Marina Proposed Action at Lewisville Lake, Texas. A legal notice announcing the proposed development

and a public comment period for the Pier 121 Marina Project was made in two local Lewisville area papers, *The Lakeside Journal* and *The Lewisville Leader*, on August 7, 2022, and were made available in both hard copy and electronic form. USACE sent emails to the potentially affected communities around the Pier 121 Marina property and introduced a link to the Pier 121 project background page on the USACE Fort Worth District's website. The public was invited to review information about the Proposed Action and provide comments for consideration in the NEPA Draft EA. The 30-day public scoping and comment period extended from August 4, 2022, to September 6, 2022. In total, USACE received 68 emails, letters, and comment forms (henceforth referred to as submissions¹), totaling 344 substantive comments, during the public scoping comment period. Senders included state and local government agencies, non-governmental organizations, members of the general public, and local homeowners.

Two years later on May 31, 2024, the Pier 121 Marina Draft EA was published. USACE conducted a second public comment period after publication of the Draft EA. In accordance with 40 Code of Federal Regulations (CFR) §1506.6 and USACE requirements, a legal notice announcing the availability of the Draft EA and a public comment period for the Pier 121 Marina Project was made in two local Lewisville area papers, *The Lakeside Journal* and *The Lewisville Leader*, on May 24, 2024, and were made available in both hard copy and electronic form. The public was invited to review information about the Proposed Action and provide comments on the Draft EA for consideration in the Final EA. The Pier 121 Draft EA public open house was held on June 5, 2024, at the Hedrick House in Lewisville Texas. In total, USACE received 9 submissions (totaling 72 substantive comments) during the Draft EA public comment period. Senders included members of the public and were largely submissions from nearby homeowners.

Feedback received during both the scoping and Draft EA public comment period has been taken into consideration in the preparation of this Final EA.

¹ A "submission" is defined as a single email, letter, or comment form that was submitted on a given date. Emails or letters that include additional items (*i.e.*, an email that also includes a letter and/or comment form) are considered a single submission. Whether submitted on different days or not, submissions that are exactly the same from the same individual that were submitted in multiple formats are treated as a single submission. Comments using the USACE form (without dates) were given the date received.

2. PROPOSED ACTION

The Proposed Action will develop the existing Pier 121 Project into a comprehensive resort destination. It includes the following components: creating a surf beach/surf simulator, building a 390-site recreational vehicle (RV) resort and glamping area, 10 remote lodge units, and building a 150-room lodge. The Proposed Action also includes relocating the existing boat sales building, relocating the existing public boat ramp to a combined public and member boat ramp, conversion of the existing uncovered boat storage to covered storage, removal, and restoration of the old public boat ramp, adding additional parking throughout the Project Area, and adding other recreational amenities described below (**Figure 2**). The Proposed Action involves the expansion of the previously disturbed and developed Pier 121 Marina. **Figure 3** shows a map of the existing on-site and off-site disturbances resulting from past development of the marina and also identifies the footprint of on-site and off-site disturbance related to the Proposed Action.

The Proposed Action includes the following:

- **Surf Simulator/Surf Beach/ Pump Track** — The Proposed Action includes a surf beach that will accommodate surfers of all skill levels on a variety of pneumatically created waves. The facility will focus on providing an enhanced outdoor recreational activity, will have the goal of introducing the general public to surfing, and will serve as a gateway for future wake surfing enthusiasts on Lake Lewisville. It will consist of a 4.9-acre facility that will include a 4.5-acre concrete pool (with 3.4 acres of surface water and 4.7 million gallons of water volume), a mechanical/ wave generation equipment structure, a generous artificial beach area, a welcome center with bathroom and changing facilities, and food and beverage amenities. A new 3.6-acre parking area will service the facility. The design and capacity of the surf beach are still being finalized; the scenario outlined in this Final EA assumes a maximum pool footprint is utilized for the Proposed Action. Therefore, all values based on the estimated pool footprint, including water volume and water demand, are expressed in maximums in the analyses presented. Additionally, associated with the surf simulator and surf beach, a pump track is proposed. Pump tracks are facilities where the terrain has been adapted for learning surfing techniques. Combining the science of surfing with the principals of modern skatepark design, pump tracks are designed to mimic surf waves and represent an evolution in how beginners learn and surfers of all abilities train surf skills. Pump tracks serve as the perfect complimentary amenity to surf simulators and areas where wake surfing takes place. The pump tracks allow both wave and wake surfers to practice the carve techniques utilized on a wave. In addition, surfers are able to perfect their pumping technique required to create speed on both surf simulator waves and boat wakes.

- **Recreational Vehicle (RV) Resort** — The Proposed Action includes a new 88-acre RV resort and glamping area consisting of approximately 390 RV sites spread across a variety of traditional RV sites, park model sites, glamping tents, and other RV resort amenities. The proposed resort includes amenities such as a clubhouse and fitness center complex, integrated walking and biking pathways, various sports courts, and lawn/outdoor gathering areas. Multiple restroom facilities will be located throughout the RV resort. A welcome center will be located at the park entrance to accommodate guest check-in and resort operations. There will be approximately 330 traditional RV sites (a combination of pull-through and back-in sites), 32 park model sites, and 28 glamping tents (Bushtec safari tents). The proposed park model units are small self-contained units that will sleep 2-6 people. These units will have kitchens, and all will have outdoor private space for guests to enjoy. See Figure 2 for more information on the proposed RV Resort design.
- **Lodge/Hotel** — The Proposed Action includes construction of a new 150-room lodge that will include an accessory fitness facility, a restaurant, conference center, and other accessory uses. The lodge will not exceed 6 stories in height or 75 feet tall. The lodge will support guest accommodations for both the current marina and surf beach operations.
- **Remote Lodge Units** — The Proposed Action includes construction of 10 new remote lodge units, which are comprised of either one or two bed units that will function as standalone hotel rooms. A small coffee bar will be included in each unit, but the units will not contain a full kitchen. The two-story units are comprised of a bed and bath on each floor.
- **Existing Public Boat Ramp Removal and Restoration/ Opening of Proposed Combined Public and Member Boat Ramp** — The existing public boat ramp, currently located on the west side of the Proposed Action area, will be relocated to the eastern side of the Project Area and will include a guest boat launch ramp (for both SHM members and the public), accompanied by a trailer back up zone and associated boat trailer parking lot. The proposed boat ramp is projected to have a bottom elevation of 503.5 feet and a top elevation of between 533 and 535 feet (these elevations are comparable to the elevations of the existing public boat ramp and lie above the normal pool elevation). The existing public and marina boat ramps on the western side of the Project Area will remain in-use until the new proposed boat ramp is constructed and fully operational. With the new combined public and member boat ramp online, all public and marina boat traffic will be redirected to this new combined ramp at the eastern side of the Project Area. At that time, the existing public boat ramp on the western side of the Project Area will be removed and restored. The existing members boat ramp on the western side of the Project Area will remain and continue to be maintained by SHM as a low-water/auxiliary use ramp.

- **Parking and Storage** — The Proposed Action includes construction of a new 4-acre paved parking area with valet for marina guests/members, a 460,000 square foot, 1,500 space, 4-story parking garage with approximately 115,000 square feet per floor. The Proposed Action also includes the relocation of 106 existing boat trailer spots (including 76 public boat trailer parking spots and 30-member boat trailer spots) on the west side of the Proposed Action area to the east side of the Proposed Action area. Additionally, the Proposed Action includes the relocation of the existing boat storage area and the conversion of uncovered boat storage areas to covered storage.
- **Marina Boat Sales** — The Proposed Action includes reconstruction and reconfiguration of the existing 11,000-square-foot boat sales facility as a new 11,000-square-foot facility adjacent to the maintenance facility. This will allow the current boat sales area to be repurposed for surf beach operations within one contiguous footprint. The same approach will be used for the boat sales and repair center, so it is within a single area and not divided by a roadway, as is currently the case.
- **Recreational Amenities** — The Proposed Action includes a variety of other recreational amenities, such as improving the beach along the Lewisville Lake shoreline, constructing a trail network of sidewalks and nature trails, and constructing numerous pocket parks. Additionally, the public trail along East Hill Park Road will continue to the public beach area, and the sidewalks will provide accessible paths to many of the planned amenities. SHM is also working with local Parks and Recreation officials and the City Manager's office to assess additional options for future trail access through the proposed development.
- **On-site and off-site upgrades**—The Proposed Action includes a variety of electrical, water, road, and sewer upgrades both on- and off-site to accommodate the additional recreational amenities as detailed further in Section 5.3.5 Infrastructure. Electrical upgrades onsite include the addition of solar panels on existing structures to supplement electricity to amenities throughout the marina. The Proposed Action includes the addition of a primary marina access road via an extension of Leora Lane through the city parkland into the Pier 121 Marina property. The Proposed Action also includes the addition of a right-hand turn lane offsite of the Pier 121 Property along Lake Ridge Road at the intersection of Lake Ridge Road and Leora Lane. This primary marina access road (the extension of Leora Lane) will be built to a width of 36 feet. Likewise, the existing marina access road (East Hill Park Road) will also be improved and expanded to a width of 36 feet. See Figure 3 Site Disturbance Map for information on on-site and off-site improvement related disturbance. Additionally, new, and existing easements and rights-of-way (ROWs) will be constructed and/ or modified along the new and existing marina access roads. Figure 3(a) shows the approximate location of new and existing easements/ROWs which are anticipated for the development including easements constructed for sewer, drainage, and water lines. In summary, the existing East

Hill Park entrance ROW will be widened to a maximum width of 60 feet and is expected to include a trail/sidewalk and drainage easement on each side. The new Leora Lane entrance ROW is proposed as 60 feet wide. Furthermore, the proposed development will include additional temporary disturbances outside each ROW limit for utility and grading efforts. Specifically, waterline and sewer easements are proposed to be constructed running parallel to Lake Ridge road and East Hill Park road (see Figure 3(a) for further detail).

2.1. CONSTRUCTION

Initial clearing operations would include the removal of vegetation, as needed, within the construction footprints and any temporary workspace. The limits of clearing would be identified and flagged prior to any clearing operations. After clearing and before grading activities, erosion controls would be installed at the required locations, as outlined in the Proposed Action Stormwater Pollution Prevention Plan (SWPPP) and maintained until final stabilization has occurred. Temporary erosion and sedimentation controls typically consist of mulch, silt fence, hay bales, or a combination of these measures.

Building footprints would be excavated to the proper depth to allow for the pouring and construction of foundations or slabs. In general, backhoes and other construction equipment would be used to excavate the ground. Should it become necessary to remove water from construction pits, it would be pumped to an off-site stable, vegetated upland area (where practical) and/or filtered through a filter bag or siltation barrier in accordance with the SWPPP.

During backfilling of the pipeline and compressor station piping, the Applicants would minimize erosion potential by restoring the natural contour of the ground and surface drainage patterns as close to pre-construction conditions as practicable. Remaining topsoil would be spread across the graded construction right-of-way. The soil surface would be inspected for compaction and scarified, as necessary.

Once Proposed Action components are completed and/or exteriors are stabilized, construction workspaces would be restored and revegetated. Permanent slope breakers would be constructed and maintained in accordance with the SWPPP. Fences would be restored or repaired, as necessary. Revegetation would be completed in accordance with permit requirements and written recommendations on seeding mixes, rates, and dates obtained from the local soil conservation authority or land management agency in accordance with the SWPPP. Grasses, trees, and other vegetation will be used as applicable in consultation with USACE. Any soil disturbance that occurs outside the permanent seeding season or any bare soil left unstabilized by vegetation would be mulched in accordance with the SWPPP.

The proposed timing and construction of the Proposed Action are demonstrated in **Figure 4**. The entirety of the Proposed Action is expected to start in the fourth quarter of 2024 and be

completed in the second quarter of 2029. Construction is expected in a phased approach; road entry improvements, the surf simulator pool, surf club building, member building, 18 glamping tents, 10 remote lodge units, 12 park models, and a pump track facility would be built first (Phase 1). Phase 1 is expected to start in the fourth quarter of 2024 and conclude in the second quarter of 2026. The restaurant, lodge, and surface parking for the pool (Phase 2) are expected to follow in the second quarter of 2025 and end in the second quarter of 2026. Phase 3 consists of public beach upgrades, the addition of beach parking (~20 spaces), a marina park, a marina member parking lot (~ 60 spaces), and the removal/ abandonment of the existing member boat launch. Phase 3 is expected to start in the second quarter of 2026 and conclude in the second quarter of 2027. Phase 4 would include the addition of space for future structured parking (~ 1,500 spaces), refurbishment to the existing marina maintenance building, the removal or abandonment of the existing public boat launch, and the addition of the new combined public and member guest boat launch and associated boat trailer surface parking (the existing boat launch will not be removed or abandoned until after the new combined guest boat launch is available for use). Phase 4 is expected to start in the second quarter of 2027 and conclude in the fourth quarter of 2027. Phase 5 would include the addition of a check-in/ welcome center parking lot, two pocket parks (~2.3 acres in total), a maintenance area, 10 glamping tents, 20 park models, all transient RV sites (including a mix of back-in & pull-through lots), and an associated amenity center with several comfort stations for the guests utilizing the lodging accommodations. Phase 5 is expected to begin in the fourth quarter of 2027 and conclude in the fourth quarter of 2028. The final phase of the Proposed Action, Phase 6, includes the addition of covered boat storage, a new boat sales building and other grounds/ facility improvements and is expected to begin in the fourth quarter of 2028 and conclude in the second quarter of 2029. This phased approach allows certain components of the Proposed Action to be used while others are still being constructed, while not impacting the enjoyment of the general public.

2.2. OPERATIONS

SHM has stated that they would operate and maintain the newly constructed Proposed Action components in the same manner as they currently operate and maintain their existing facilities. The facilities would be staffed by personnel well-qualified to perform service-based functions, routine maintenance of facilities and infrastructure, grounds upkeep, security, and emergency actions, as appropriate. An active training program for employees in the development of necessary skills and procedures will be implemented and documented. The larger resort property will be open 7 days a week with active business hours from 6 am to 10 pm. Internal operations to address and manage customers are handled by on site security and maintenance staff. Policies and procedures are specifically designed with quiet hours from 10 pm to 6 am, consistent with 36 CFR Part 327. Access to the RV resort is secured by gate and requires access

cards to enter the property as a paying guest. No person or persons are allowed on site other than paying customers. Customers are required to check-in with the Front Desk and obtaining a room or gate access card. These cards are set to deactivate automatically based on a patron's stay. No facilities are provided to guests without first checking into the property, except for the marina. As a RV resort, vehicle traffic is limited as customers park at their RV site. The only time customers are driving on property are during their arrival and departure either in their personal vehicles or RVs. Services may include site utility hookups, pump out stations, restrooms, showers, and laundry facilities. Only emergency repairs to vehicles may be performed in the RV resort. Consistent with 36 CFR Part 327, public sites can be rented for no more than 14 consecutive days during any 30-day period. SHM visitors will adhere to these stipulations.

Pets will be allowed within the RV resort and in outdoor areas. Pet rules will be strictly enforced. Pet waste stations will be placed throughout the property. Troublesome pet policies will clearly be stated to guests and enforced throughout the property. The resort will be a family friendly property; however, alcohol will be available at designated locations (i.e., restaurant, bar, private RV locations, etc.). Alcohol consumption will only be allowed in designated areas and consumption or open transport of alcohol throughout the property will be prohibited. Food and beverage staff members and security will verify the identification of guests drinking at the time of service. Underage drinking or public intoxication will not be tolerated and would be in violation of resort policies, state, and federal law, and the local police will be called. Such behavior will result in dismissal from the resort.

The larger resort property will include security cameras throughout but especially in high activity/use areas for safety and security. To mitigate risk of fire, the property will have fire extinguishers located throughout the resort and in all common areas and buildings. Fire extinguishers and fire mitigation systems will be regularly verified and certified by trained professionals. The maintenance staff will also be trained to prevent the spread of fire throughout the park, including measures to roll out hoses from the pool house for local common areas. Fire Hydrants are located throughout the resort at required city specifications. SHM will provide guests and staff with emergency evacuation and emergency policies and documents. The staff will be trained to immediately react to emergency and escalate issues to the highest-ranking on-site member of management to coordinate with local public safety offices, including fire, police, and emergency medical services. Failure to follow any of the property rules will result in ejection and escort from the resort.

SHM would maintain vegetation on the property by mowing, cutting, and trimming conforming to resort standards. Areas designated for special revegetation will be maintained in accordance with the SWPPP and Final EA. Noxious weeds and invasive plants will be removed in accordance with an approved landscape plan. Appropriate drainage will be maintained to keep water from

collecting. Areas within aboveground facilities, such as beaches, play areas, trails, RV sites, etc., that would be entirely cleared will be permanently paved, graveled, or maintained with an appropriate ground covering (i.e., sand, mulch, crushed gravel, etc.). Pathways, sidewalks, ramps, steps, and stairs will be well-maintained and unobstructed to avoid tripping and slipping hazards. Sufficient trash containers will be available for customers and guests and will be conveniently located throughout the resort. The property will be sufficiently staffed to ensure that waste does not accumulate in trash containers to the point of overflowing. Recycling containers will also be available. Building, equipment, and facility safety inspections would be accomplished by local operations staff, in accordance with local, county, and state laws and regulations. Facility supervisor(s) would be notified of any conditions that need attention. Prompt corrective measures would be performed as needed in accordance with the SWPPP and local, county, and state laws and regulations. A surf simulator/ surf beach maintenance plan will be provided once a final simulator pool technology has been selected. However, please note that any maintenance plan provided will not include more than a once annual draining and refilling of the surf simulator pool for maintenance.

3. PURPOSE AND NEED FOR THE PROPOSED ACTION

The Program Mission Statement for USACE according to Engineering Regulation (ER) 1130-2-550 page 2-1 is as follows:

The Army Corps of Engineers is the steward of the lands and waters at Corps water resources projects. Its Natural Resources Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.

In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance, and restoration practices. The Corps manages for long-term public access to, and use of, the natural resources in cooperation with other Federal, State, and local agencies as well as the private sector.

The Corps integrates the management of diverse natural resource components such as fish, wildlife, forests, wetlands, grasslands, soil, air, and water with the provision of public recreation opportunities. The Corps conserves natural resources and provides public recreation opportunities that contribute to the quality of American Life. (USACE 1996)

In addition to this Mission Guidance, USACE also has responsibilities pursuant to federal laws to preserve, maintain, manage, and develop the project lands, waters, and associated resources consistent with those laws. USACE accomplishes these requirements through the development of master plans for USACE reservoirs such as Lewisville Lake. The master plan provides direction and authority for project development and use. As such, it is a vital tool for the responsible stewardship of project resources. According to the enacting regulation for master plan development, ER 1130-2-550 page 3-2, a master plan must incorporate environmental considerations and focus on four primary components: “(1) regional and ecosystem needs, (2) project resource capabilities and suitabilities, and (3) expressed public interests that are compatible with project authorized purposes, and (4) environmental sustainability elements” (USACE 1996).

The Lewisville Lake Master Plan was originally published as Design Memorandum No. 1C in 1966 and was updated in 1973. Subsequently, it was completely revised, and the first true master plan for Lewisville Lake was completed in 1985. A major supplement to the master plan was added in 2004 to address new and proposed recreation facilities, land classification, mitigation, and utility corridors. After the 1985 master plan and subsequent supplements were

published, outdoor recreation trends, regional land use, population, legislative requirements, and USACE management policy evolved. Increased urbanization, fragmentation of wildlife habitat, impacts of climate change, and the growing demand for recreational access and natural resources management have affected the region and Lewisville Lake. In response to these escalating pressures, a full revision of the 1985 Master Plan and the 2004 Supplemental Master Plan was completed in 2020 to update land classifications, include new resource management objectives, and describe future plans proposed by key partners and USACE. The plan was designed to inform the management of wildlife and other resource lands for the next 25 years.

3.1. PURPOSE FOR THE PROPOSED ACTION

East Hill Park (the area encompassing the Proposed Action) has been classified as a “High Intensity Recreation” area in the 1985 and subsequent master plans. Consistent with USACE’s Program Statement and this land classification, the purpose of the Proposed Action at the Pier 121 Marina is to provide additional recreational facilities along the periphery of Lewisville Lake and to serve and provide the greater Dallas-Fort Worth population with increased access to enjoyable outdoor activities and amenities, including a lodge, RV resort, glamping, boat sales and storage, surf beach, and other recreational amenities. More specifically, the Proposed Action would increase the breadth and capacity of visitor amenities offered at the existing marina and increase the capacity to support growing recreational boating and outdoor recreation demands. The Proposed Action would fulfill this purpose at the existing Pier 121 Marina.

3.2. NEED FOR THE PROPOSED ACTION

The need for the Proposed Action can be explained by the substantial growth in population in the Dallas-Fort Worth area as this growth has increased the demand for access to recreation and leisure developments both locally in the City of Lewisville and regionally. The steadily increasing demand from existing recreationists and incoming residents for outdoor recreational areas, camping, and lodging opportunities at the area lakes has outpaced the supply of available recreation resources in the Dallas-Fort Worth metro area and the state of Texas overall. This need suggests that there is both strong demand and a supply shortfall.

3.3. AUTHORITY

Consistent with and in addition to Mission Guidance, USACE has responsibilities pursuant to federal laws to preserve, maintain, manage, and develop USACE-managed lands, waters, and associated resources consistent with these laws. This Final EA serves to fulfill the requirements of NEPA and all other environmental and historic preservation laws, regulations, and executive orders (EOs), as well as pertinent USACE regulatory guidance for implementing the procedural

provisions of NEPA found in ER 200-2-2. The Proposed Action will need to comply with all proposal-specific requirements of NEPA, which are included in the preparation, submittal, and review of this Final EA and corresponding decision documentation by the land-managing agency (USACE).

3.4. PROPOSED ACTION LOCATION

The Proposed Action is located at 1481 East Hill Park Road, Lewisville, Denton County, Texas (**Figure 5**). The site is at a latitude of 33° 4'37.78"N and a longitude of 96°55'8.62"W.

Original Texas Land Survey Land Grid Divisions overlapping the site include the following:

- CHOWNING, JW, 121243
- HEDGCOXE, HO, 121533
- JOHNSON, JWJR, 1211609
- MC KINNEY & WILLIAMS, 121938
- HARDIN, RP, 121612
- BARTRAM, J, 12154

4. ALTERNATIVES

The action required to meet the purpose and need for the proposed Pier 121 Marina redevelopment is described as the Preferred Alternative (Proposed Action). Anything less than the Preferred Alternative would not meet the purpose and need of the Proposed Action and, therefore, only the No Action Alternative and Preferred Alternative (Proposed Action) are analyzed in this Final EA.

4.1. PREFERRED ALTERNATIVE (PROPOSED ACTION)

The Preferred Alternative is the Proposed Action assessed in this Final EA. It consists of the implementation of all the individual recreational developments made to support the expansion of recreational activities and facilities offered at the Pier 121 Marina. This is the Preferred Action for the following reasons:

- It balances USACE's Program Mission Statement to conserve natural resources and provide public recreation opportunities that contribute to the quality of American Life.
- It is consistent with the area land classification and proposed expansions presented in the 2020 Master Plan.
- It meets the greater Dallas-Fort Worth area's growing recreation demands.

4.2. NO ACTION ALTERNATIVE

Under the No Action Alternative, USACE would not approve expansion or additional development within the Pier 121 Marina or East Hill Park. The No Action Alternative is not the Preferred Action due to the following reasons:

- The greater Dallas-Fort Worth area would not have access to a "right-sized" marina that offers these types of recreation activities and, therefore, would not benefit from having such recreational amenities in close proximity to the metro area.
- It is inconsistent with the area land classification as designated in the 2020 Master Plan.
- It would not meet the purpose and need of the Proposed Action.

The USACE Program Mission Statement integrates the management of diverse natural resource components with the provision of public recreation opportunities. The USACE mission is not to put one of these components over the other but instead to balance the two. Although the No Action Alternative would not have impacts to natural resources, it would not provide additional public recreation opportunities. The USACE Program Mission Statement attempts to find a balance between recreation and nature, not nature devoid of recreation. As proposed, this development strikes a balance between the two through mitigation, additional shade plantings, and through the effort to leave buffer areas for wildlife and human impacts. Therefore, the No Action Alternative would not meet the purpose and need of the Proposed Action.

5. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

In 1999, a programmatic EA (PEA) was prepared by USACE that discussed the environmental impacts of more than 300 individual development actions being proposed by 18 public and private entities for implementation within the following 10 years on federal lands around Lewisville Lake. The PEA identified the future and foreseeable individual development actions, assessed the potential cumulative impacts from these actions on the human and natural environment, and presented information to be used in the ensuing supplement to the Lewisville Lake Master Plan, Design Memorandum No. 1 C, June 1985. The PEA was prepared in accordance with NEPA and its pertinent implementing regulations. Nine types of activities were addressed in the PEA including: (1) bridges and roadways; (2) water-related recreation use facilities; (3) parks—including enhanced amenities in existing recreational areas; (4) utilities and utility corridors; (5) golf courses; (6) habitable structures, such as hotels, lodges, and cabins; (7) trails; (8) land use classification changes; and (9) other miscellaneous activities. The PEA identified potential impacts that might result from some of the activities as proposed. These activities, such as additional marinas, bridges, golf courses, and a land use reclassification will require additional assessment tiered from the PEA.

In accordance with this requirement, the following sections of this Final EA describe the existing and potentially affected environment of the Proposed Action area and analyze the potential impacts of the Proposed Action. Potential impacts include those generated from construction, operation, and maintenance of the Proposed Action and the No Action Alternative. The categories of impacts have been defined as potentially significant, less than significant, or no impact. The analysis for each resource identifies the range and types of possible impacts on the resource. For instance, a determination of “no impact” means that there will be no potential impacts in magnitude or intensity, geographic extent, and duration or frequency to the resource from the Proposed Action. A determination of “less than significant” means that potential impacts will be minimal or minor in magnitude or intensity, few, isolated or at a local geographic level, and rare, infrequent, or short-term. A determination of “potentially significant” means that potential impacts will be severe, substantial, observable, or highly likely in magnitude or intensity, occur at a large-scale or regional level, and permanent, persistent, chronic, or long-term.² Analysis of the No Action Alternative provides a comparison to the effects of the Proposed Action. Mitigation measures, as defined through permitting and/or consultation with the appropriate resource agency, would be implemented as part of construction and operation of the Proposed Action to help avoid or reduce potential impacts.

² No potentially significant impacts were identified in this Final EA.

5.1. PHYSICAL RESOURCES

5.1.1. Topography

Affected Environment

The Project Area is located within the Blackland Prairies physiographic province of the Gulf Coastal Plains, which is characterized as a low rolling terrain (Bureau of Economic Geology and The University of Texas at Austin 1992). The elevations within the Project Area range from 520 to 565 feet above mean sea level.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

The proposed marina and associated marina attractions would be situated on the approximately 250.5-acre property of the Pier 121 Marina leased by USACE to SHM. The total area proposed for development includes 152.7 acres, which encompasses the proposed recreational amenities and on-site and off-site upgrades to electrical, water, sewer, and road access. Modifications to the topography will be required for grading and excavation for structures, foundations, sidewalks, road transportation, utility infrastructure, and visual and sound mitigation. Excavation required for utility installation and modifications will be backfilled, and the surface will be returned, as closely as reasonably possible, to the original lines and grades. An eight-to-ten-foot earthen berm is proposed to provide noise and visual buffer between the development and the existing adjacent residential neighborhood. The berm will be made up of onsite material, excavated from the lagoon and associated development activities. The berm is not anticipated to include any offsite fill; therefore, no contamination is expected. The berm will be used to raise the topography of the buffer area between the RV section and the existing residential neighborhood and will be vegetated with native trees and grasses and topped with a combination of native coniferous and deciduous trees to provide year-round vegetative screening to reduce potential sound and visual impacts. This earthwork will not alter overall Project Area elevations. Additionally, providing earthen and vegetative buffers is a typical method for reducing sound and visual impacts of development to adjacent properties. Therefore, the associated impacts to the existing topography are not considered significant.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no associated grading and excavation for structures, foundations, sidewalks, landscaping, and road transportation and utility infrastructure would occur. Implementation of the No Action Alternative would result in no impacts to topography and would be consistent with those described in the affected environment section.

5.1.2. Soils and Geology

Affected Environment

The Blackland Prairies physiographic province exhibits low rolling terrain with deep, black, fertile clay soils. The province has a gentle undulating surface cleared of most natural vegetation and is cultivated for crops (Bureau of Economic Geology and The University of Texas at Austin 1992).

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey was utilized to determine the soil types that underlie the Project Area (North Central Texas Council of Governments 2022). The Project Area contains four soil types: Branyon clay (48.7 percent or 178.1 acres of the Project Area), Ferris-Heiden clay (16.1 percent or 58.95 acres of the Project Area), Altoga silty clay (4.5 percent or 16.3 acres of the Project Area), and Heiden clay (< 1 percent or < 1 acre of the Project Area) as shown in **Figure 6**. Altoga silty clay, Heiden clay, and Ferris-Heiden clay soils are classified as well drained, and Branyon clay soil is classified as moderately well drained. According to the USDA NRCS Web Soil Survey, roughly 48.8 percent of the Project Area (178.2 acres) is classified as prime farmland, and 51.2 percent of the Project Area (186.9 acres) is classified as non-prime farmland (USDA 2022).

Geologically, the Project Area is underlain by Cretaceous rocks from the Austin, Eagle Ford, Woodbine, and Upper Washita Groups (Bureau of Economic Geology and The University of Texas at Austin 1992). Additionally, the Project Area is underlain by younger Quaternary Fluvatile terrace deposits. Situated around the periphery of the project property, the Eagle Ford formation consists of shale with some thin platy beds of sandstone and sandy limestone while the Fluvatile terrace deposits, located in the center of the project property, consist of gravel, sand, clay, and silt (USGS 2022a). A Preliminary Geotechnical Data Report performed by Intertek PSI indicated that the depth to bedrock varies on site anywhere from 48 to 60 feet beneath the surface. Generalized subsurface profiles derived from four soil boring logs drilled in August of 2021 from different areas on site indicate that in general, there is roughly 0.5 feet of asphalt/ gravel, 0 to 48 feet of two clay units including a brown to dark brown, stiff to hard, Fat Clay and a tan to gray, stiff to hard, Lean Clay. Finally, occurring from 48-60 feet, is a layer of competent hard, gray shale with thin seams of limestone (Intertek PSI 2021).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Where possible, the Proposed Action would utilize existing topography and soils. However, minor impacts to the soils within the Project Area caused by earth-moving activities necessary to construct the project are anticipated. In addition, implementation of the Proposed Action would cause minor temporary impacts to adjacent lands during construction. Disturbances to

soils from construction would be kept to the minimal amount and size of disturbance possible, and best management practices (BMPs) to reduce soil erosion and runoff will be exercised including the use of silt fences around all areas where disturbance to soil is expected.

Following construction, disturbed soil would be restabilized with native vegetation (see Section 5.2.2 Vegetation). Furthermore, the Project Area is not currently used as farmland; therefore, no loss or conversion of prime agricultural land used for farming practices would occur. Implementation of the Proposed Action would not result in significant adverse impacts to soils due to the application of BMPs to reduce soil erosion. Additionally, no significant adverse impacts to underlying geology are expected as the general depth to bedrock on site is located between 48 and 60 feet beneath the surface and is beyond the depth of the proposed development.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no earth-moving activities to construct the project would occur. Implementation of the No Action Alternative would result in no impacts to soils and geology and would be consistent with the existing soils and geology conditions described in the affected environment section.

5.1.3. Air Quality

Affected Environment

The Texas Commission on Environmental Quality (TCEQ) oversees monitoring and enforcing of air quality regulations in Texas, as delegated by the U.S. Environmental Protection Agency (USEPA) in 1989 in compliance with the Federal Clean Air Act of 1970 and the Clean Air Act amendments of 1977 and 1990 (EPA 2021). The EPA promulgated and adopted the National Ambient Air Quality Standards (NAAQS) to protect public health, safety, and welfare from known or anticipated effects of the six criteria pollutants: ozone, carbon monoxide, lead, nitrogen dioxide, particulate matter, and sulfur dioxide.

The TCEQ has adopted the EPA's NAAQS as criteria pollutants for Texas. The General Conformity Final Rule (40 Code of Federal Regulations [CFR] Part 51) specifies criteria or requirements for conformity determinations for federal projects. The General Conformity Rule ensures that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality.

The TCEQ monitors ambient air concentrations of the six criteria pollutants at stationary monitoring sites across the state and maintains the Texas Air Monitoring Information System to allow users to generate and download ambient air quality data collected at the stations (TCEQ 2022b). The EPA classifies county ambient air with respect to whether the criteria are in

attainment or nonattainment with respect to NAAQS or are unclassifiable. States are also required to submit air quality regions, or portions thereof, that do not meet the NAAQS or cannot be classified due to insufficient data. Portions of air quality control regions that exceed the NAAQS for any criteria pollutant are designated nonattainment areas for that pollutant. When classified as nonattainment or unclassifiable, schedules are established for the state to bring the criteria into attainment with NAAQS. The Project Area is located on the south side of Lewisville Lake in Denton County. Denton County is currently in attainment for all NAAQS other than 8-Hour ozone (2008 and 2015) (EPA 2022).

The state of Texas updated the State Implementation Plan and adopted the Dallas-Fort Worth Serious Classification for 8-Hour Ozone in 2020. The State Implementation Plan provides an analysis of reasonably available control measures, including reasonably available control technology, and contingency measures that provide additional emissions reductions that can be implemented (TCEQ 2020).

USACE established its Climate Change Adaptation Policy Statement and governance structure to support mainstreaming climate change preparedness, resilience, adaptation, and mitigation for all USACE-managed water resources, natural resources, ecosystems, and the communities and economies that depend on them (United States Army Corps of Engineers 2021).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

The Proposed Action would result in the release of criteria pollutants from operation of construction equipment. Construction of the Proposed Action is scheduled from 2024 to 2029 and is designed in a phased approach. Automobile and motorized equipment emissions would temporarily increase during construction activities but have an overall less than significant impact on air quality post construction. Less than significant emissions would occur for all of the criteria pollutants and 8-Hour Ozone exceedances are not anticipated. BMPs and mitigation measures (see Section 7, Mitigation and Monitoring) could help avoid or minimize potential air quality impacts. Additionally, construction teams will consult the Texas State Implementation Plan which provides suggestions for reasonably available control measures, including reasonably available control technology, and contingency measures that provide additional emissions reductions that can be implemented to reduce the release of specific criteria pollutants during development. Dust levels could increase temporarily from construction activities but would not result in substantial increases in regional pollutant levels.

Additional impacts to air quality would be primarily related to recreation vehicle emissions associated with the Proposed Action. Increased capacity of Marina services would allow for increased opportunities for the public to utilize the Marina at any given time, and, therefore,

could also result in an increase in personal vehicles traveling to and from the Marina property on a seasonal basis.

Additionally, routine maintenance of the property and its facilities may temporarily generate small releases of criteria pollutants related to maintenance vehicles and equipment. Long term operation of the Marina is expected to continue to generate low level amounts of criteria pollutants related to boating and recreation vehicle activities in the area because boating activities would be distributed throughout the lake area and recreational vehicles would be primarily parked in place without continuous running of engines. These impacts are not expected to significantly increase due to the proposed additions to the Marina and are not expected to affect local air quality.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, therefore, would not result in the release of criteria pollutants or dust from operation of construction equipment. Likewise, automobile, and motorized equipment emissions would not temporarily increase during construction activities. Additionally, without the Proposed Action, there would likely be no increase in the amount of public visiting the Marina and no subsequent increases in criteria pollutants released from additional boating and recreation vehicle activities.

5.1.4. Climate and Climate Change

The National Climatic Data Center divides Texas into 10 major climate divisions based on similar characteristics such as vegetation, temperature, humidity, rainfall, and seasonal weather changes (Vaughan et al. 2012). The Project Area falls within Division three, the Cross Timbers division, and is characterized by sub-tropical to subhumid conditions with mixed savannas and woodlands as the predominant vegetation types (Vaughan et al. 2012). The mean annual temperature for Denton County Texas is approximately 65.6 degrees Fahrenheit and the average annual precipitation is approximately 41.94 inches per year according to climate data from 2000 through 2021 (NOAA 2022).

Human (anthropogenic) activities such as the burning of fossil fuels (i.e., adding more greenhouse gas emissions to the atmosphere) and clearing of forests (i.e., removing a natural sink for carbon dioxide) have intensified the natural greenhouse effect, causing global climate change. Carbon dioxide emissions from the burning of fossil fuels are the most substantial source of anthropogenic greenhouse gas emissions (OCCRI 2010).

USACE established its Climate Change Adaptation Policy Statement and governance structure to support mainstreaming climate change preparedness, resilience, adaptation, and mitigation for all USACE-managed water resources, natural resources, ecosystems, and the communities and

economies that depend on them (United States Army Corps of Engineers 2021). USACE aims to reduce the negative impacts of climate change to its portfolio of water resources, natural resources, and ecosystems (and assist Department of Defense Services with aligned actions) while supporting community goals. Managing lands and waters for increased resilience may also allow reductions in power and water use, for an overall decrease in carbon emissions (United States Army Corps of Engineers 2021).

Environmental Consequences of the Alternatives

Preferred Action Alternative (Proposed Action)

Under the Preferred Action Alternative, the Proposed Action would occur, therefore, there would be temporary nominal increases in greenhouse gas levels in the atmosphere (most notably carbon dioxide) during construction and operations due to equipment emissions. Construction would also include use of land-based construction equipment including, but not limited to, bulldozers, cranes, excavators, front end loaders, and various trucks. Greenhouse gas emissions from these types of construction equipment and transport vehicles is also anticipated to be minimal. Proposed additions to the Marina would be designed in alignment with USACE Climate Change Adaptation Policy governance.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no activities generating fugitive dust or criteria pollutant emissions from motorized equipment would occur. Likewise, if the Proposed Action does not occur, then no measurable increase in the public utilizing the facility on a given day would occur, and thus no additional automobile or boat emissions would be generated. Implementation of the No Action Alternative would result in no impacts to local air quality and would be consistent with the air quality designations assigned to Denton County described in the affected environment section.

5.1.5. Noise

Affected Environment

Texas does not have any statewide noise regulations that would apply to the Proposed Action. The U.S. Army Corps of Engineers rules and regulations, Title 36 CFR, Chapter II; Part 327 administers and enforces nationwide rules on all Corps of Engineers water resource development projects. According to Part 327.12 Restrictions, quiet hours shall be maintained in all public use areas between the hours of 10:00 p.m. and 6:00 a.m., or those hours designated by the District Commander. Excessive noise occurring during these quiet hours which unreasonably disturbs persons is prohibited. The City of Lewisville does not have a specific noise ordinance, but it limits the time of day/year when construction can occur. The ordinance

states the following activities are prohibited, “The erection, excavation, demolition, alteration, or repair work on any building at any time other than between the hours of 6:00 a.m. and 8:30 p.m. Monday through Friday from June 1 to September 30; between 7:00 a.m. and 8:30 p.m. Monday through Friday from October 1 to May 31; between 8:00 a.m. and 8:30 p.m. on Saturday; and between 10:00 a.m. and 8:30 p.m. on Sunday; provided, however, that the city building official may issue special permits for such work at other hours in case of urgent necessity and in the interest of public safety and convenience”(City Council of the City of Lewisville 2022).

The range and level of ambient noise in Texas varies widely based on the area and surrounding environment. Local businesses, homes, schools, and commercial recreational areas are in the surrounding area. Current noise sources around the Project Area may include noise from vehicles, watercraft, aircraft, wind/birds, and activities in local homes, schools, and businesses. Urban/suburban areas are likely to have higher noise levels on a daily basis due to traffic (70 to 90 A-weighted decibels [dBA]), construction noise (90 to 120 dBA), and outdoor conversations among small or large groups of people (60 to 90 dBA) (DOI 2008). Parks and natural areas are likely to have lower than average ambient noise levels given their size and location in wilderness areas. These areas typically have lower noise levels, as low as 30 to 40 dBA (BLM 2014).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Short-term noise impacts are anticipated because construction activities have the potential to increase ambient noise levels in their immediate vicinity. The noise associated with the operation of machinery on construction sites is typically short-term, intermittent, and highly localized. Long-term noise impacts from the increase of auto traffic, marina operations, and recreational camping, surfing, and boating activities are anticipated due to the increased capacity of the marina but would be negligible as the surrounding areas contains dock charters, outfitters, golf courses, campgrounds, and parks where similar activities occur (Carter & Burgess, Inc. 1999). Additionally, SHM has committed to establishing quiet hours in the RV park and campground between 10:00 pm and 6:00 am CST consistent with Title 36 CFR, Chapter II Part 327.12 Restrictions on developments involving water resource development projects. Activity and noise regulations enforced at the lodge, surf area, pump track, and maintenance buildings would be consistent with local ordinance requirements; these activities would include the noise generated from facility-installed radios and speakers playing music in the surf park. SHM has also committed to maintaining a 100-foot vegetative buffer and an earthen berm with a maximum height of ten feet, providing noise and visual buffer between the new development and the single-family development to the east. This buffer may be improved on behalf of the

city to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. The addition of the open space and vegetative buffers will aid in noise cancellation and provide a level of sound screening to the adjacent properties.

Additionally, construction of the Proposed Action is scheduled to occur in varying phases within different regions of the Project Area from 2024 to 2029 as shown in **Figure 4**. Noise derived from the proposed construction activities will be present for the entire five-year development duration, although it will have differing impacts on the surrounding areas due to differing levels of noise (resulting from varying magnitudes of noise created during different construction phases or due to construction taking place at varying distances from potential receptors, such as the surrounding neighborhoods). Therefore, while construction of the Proposed Action is scheduled for five years, different receptors are expected to experience less than significant impacts from noise intermittently and at varying degrees.

Additionally, RVs equipped with air conditioning units within the resort park have the potential to generate noise in differing amounts depending on the air conditioner age, type, and condition, and can emit up to around 55 dBA of sound (Daikin 2024). It is important to recognize the way in which sound ratings are evaluated. For instance, sound pressure takes into account diminishing perceived noise as you move away, which is usually calculated between 1 and 5 meters from the unit (Daikin 2024). In reality, other ambient sounds from the surroundings will blend with the outdoor unit's sound and also affect the level of sound heard. Furthermore, it has been shown that for each doubling of distance from a point source (for example an air conditioning unit), the sound pressure level decreases by approximately 6 decibels (WKC Group Environmental Consultants 2024). Since the closest RVs in the resort park are greater than 50 feet (15.24 meters) away, the maximum sound pressure experienced by local homeowners will likely be much less than the rated sound pressure for the given air conditioning unit. Lastly, SHM has incorporated a 10-foot earthen berm bordering the adjacent housing communities. This earthen berm will also be topped with native trees and grasses to provide year-round sound screening from the RV resort park, further reducing the sound heard from activities in the resort park.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction activities generating noise from motorized equipment would occur. Likewise, if the Proposed Action does not occur, no RV park or campsites would be constructed; therefore, no additional recreational noise would be emitted from these areas. Implementation of the No Action Alternative would result in no impacts to noise and would be consistent with the existing noise conditions described in the affected environment section.

5.1.6. Surface Water Quality

Affected Environment

Section 303(d) of the Clean Water Act (CWA), as amended in 1977, authorizes the USEPA to assist states, territories, and authorized tribes in listing impaired waters and developing Total Maximum Daily Loads (TMDLs) for waterbodies. A TMDL establishes the maximum amount of a pollutant allowed in a waterbody and serves as the starting point or planning tool for restoring water quality. Based on a review of the 2022 Texas Integrated Report - Texas 303(d) List, dated July 7, 2022, published by the TCEQ, Lewisville Lake is not listed as an impaired water. The Texas Department of State Health Services (TDSHS) monitors fish in the state for the presence of environmental contaminants and alerts the public through bans and advisories when a threat to human health may occur from the consumption of contaminated fish. According to review of the 2022 Texas Fish Consumption Advisory Viewer on the TDSHS website, there are no reported fish consumption advisories for Lewisville Lake (TCEQ 2022). Under Section 401 of the CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certificate is issued, or certification is waived.

In Texas, TCEQ administers Section 401 Water Quality Certification under the CWA. Activities requiring a Section 404 permit including activities involving discharges of dredged or fill material to waters of the United States, including wetlands, lakes, and streams, would require Section 401 Water Quality Certification from the TCEQ.

The TCEQ has established surface water quality standards for the following uses: domestic water supply, propagation of fish and wildlife, contact recreation, and non-contact recreation. Texas surface water quality standards for Lewisville Lake (Segment 0823), the reservoir used by the Pier 121 Marina for the previously mentioned uses, are listed below (TCEQ 2016).

- Chlorides, maximum annual average (not to exceed) 80 milligrams per liter (mg/l)
- Sulfates, maximum annual average (not to exceed) 60 mg/l
- Total dissolved solids, maximum annual average (not to exceed) 500 mg/l
- Dissolved oxygen, minimum 24-hour mean 5.0 mg/l
- pH, allowable range 6.5 to 9.0
- Fecal coliforms, log average (not to exceed) 126/100 milliliters
- Temperature, maximum 90°F

Additionally, The TCEQ has established Water Quality Certification BMPs for Nationwide Permits (NWP) and has determined that when utilizing a NWP, a contractor must utilize at least

one BMP from each of the applicable categories of on-site water quality management. For NWP 14 and 29, this consists of erosion control, sedimentation control, and post-construction total suspended solids control. And more specifically for NWP 29, the TCEQ has stated that stream bed losses must be limited to 1,500 linear feet. A stormwater pollution prevention plan (SWPPP) would be required to remain in compliance with National Pollution Discharge Elimination System (NPDES) standards and permits.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Impacts on surface water quality associated with construction and caused by erosion, sedimentation, and siltation are expected to be limited in extent and duration with less than significant impacts occurring temporarily at the subwatershed level. Sedimentation plans and stormwater management plans (Section 402 of the CWA) will be prepared for the development to ensure proper mitigation and BMPs are put in place to minimize sediment loads into nearby water bodies and properties. Typical BMPs used to reduce outfall velocities and prevent erosion include rock riprap, rock check dams, slope stabilization using both seeding and Curlex as needed, and silt-fence around all disturbed boundaries. Temporary sedimentation basins may be utilized where drainage areas greater than 10 acres are disturbed. Long-term detention will not be required for this site. SHM will minimize the total area of bare soil at any one time as much as possible by constructing the project in phases and restabilizing areas with vegetation as progressively and quickly as practicable to minimize increased turbidity.

Landscape maintenance at the Marina could result in localized effects to subwatershed surface water quality due to the use of pesticides, herbicides, and fertilizers that may run off into the lake; however, these impacts would be infrequent and likely negligible. SHM has indicated that they will coordinate with USACE on fertilizer usage within the Proposed Development area and will utilize proper application and mitigation techniques for this activity.

Impacts on surface water quality associated with localized increases in turbidity caused by in-water construction and associated dredging for the guest boat ramp are expected to be limited in extent and duration with less than significant impacts on Lewisville Lake. At this time, based on Project understanding, the need for a 404 permit is not anticipated and these activities would likely be covered under NWP 36- Boat Ramps. Therefore, the requirement for a Section 401 Water Quality Certification is also not anticipated. If a 404 permit is needed, soil erosion and all construction activities and operations will require approval and Section 401 Water Quality Certification from the TCEQ. SHM will comply with all required NWP processes applicable to this activity prior to commencing construction. In general, NWPs are a type of general permit designed to authorize certain activities that have no more than minimal individual and cumulative adverse environmental effects and generally comply with the related

laws cited in 33 CFR 320.3. SHM will comply with the recommended mitigation techniques associated with applicable NWP.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction-related erosion, sedimentation, or siltation would occur. Likewise, if the Proposed Action does not occur, then no additional landscaping maintenance associated with the Proposed Action would occur; thus, no potential additional sources of pesticides, herbicides, and fertilizers would run off these areas into the lake. Implementation of the No Action Alternative would result in no impacts to surface water quality and would be consistent with the water quality standards required by the TCEQ as described in the affected environment section.

5.1.7. Groundwater Quality

Affected Environment

North Texas Groundwater Conservation District Rules are adopted under the authority of Sections 36.101 and 36.1071(f), Texas Water Code, and the District Act for the purpose of conserving, preserving, protecting, and recharging groundwater in the District in order to prevent subsidence, prevent degradation of water quality, prevent waste of groundwater, and to carry out the powers and duties of Chapter 36, Texas Water Code, and the District Act.

The City of Lewisville and most of Denton County is underlain by the Woodbine Aquifer. The aquifer overlies the greater Trinity Aquifer and consists of fine to coarse sand rich in iron oxide, sandstone, clay, and shale/sandy shale, with lesser amounts of lignite and gypsum. The sediment layers form three distinct water-bearing zones (USGS 2022b). The Woodbine Aquifer reaches 600 feet in thickness and has an average freshwater thickness of 160 feet. Water quality and yield vary with the depth of the aquifer. The lower zones of the aquifer typically yield the most water, and the upper zones yield limited water with high concentrations of iron. In general, water to a depth of 1,500 feet has a total dissolved solids concentration of about 1,000 mg/l, and water at depths below 1,500 feet have total dissolved solids concentrations ranging from 1,000–4,000 mg/l and is generally characterized as slightly to moderately saline (Bruun et al. 2016).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Impacts to groundwater quality as a result of the Proposed Action are not expected. The Proposed Action will likely result in surficial changes to the soil and landscape above the water table. No changes in sedimentation or water temperature or the addition of water pollutants or

nutrients are expected in the Woodbine Aquifer. The Proposed Action will involve the diversion of water from different sources to various uses on site. More specifically, all non-potable water uses (surf beach/ pool, irrigation) will be served by the existing well located on site and the potable uses (lodge, welcome center, maintenance center, restaurant, RV and glamping park, and boat sales building) will be served by city water. The water demand needed to serve the existing uses on site is estimated at approximately 34,000 gallons per day (GPD). Under the Proposed Action, the water demand needed to serve the uses on site is estimated at approximately 440,000 GPD with 152,000 GPD going toward potable uses serviced by the City of Lewisville and 288,000 GPD going toward non-potable uses serviced by the on-site well. The increased demand in city water needed to serve the Proposed Action will impact water demand in this area and may push the volume requirement past the city's current agreement threshold with the City of Dallas Water Utility (DWU); however, the Proposed Action's impact on the overall water demand for this area is minimal, and the purchase of additional water from DWU will be necessary regardless of the potential impact of the Proposed Action due to other current and proposed developments in the area. Therefore, the increased demand for water caused by the Proposed Action is not expected to cause significant direct impacts, but rather will contribute to an existing issue that may be exacerbated by the Proposed Action. The increased demand for on-site well water needed to serve the proposed non-potable uses is not expected to significantly affect groundwater availability in the area. The demand will be greatest for the initial fill of the surf simulator/ surf beach and may create a temporary localized cone of depression within the underlying minor aquifer but is expected to recharge quickly through natural processes. On-site well water demand for maintenance of the Proposed Action is not expected to significantly affect the availability of groundwater on site.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction or activities with the opportunity to recharge contaminated water into the Woodbine Aquifer would occur. Implementation of the No Action Alternative would result in no impacts to ground water quality and would be consistent with the water quality standards required by the North Texas Groundwater Conservation District as described in the affected environment section.

5.2. BIOLOGICAL RESOURCES

5.2.1. Aquatic Resources

Affected Environment

The aquatic resources affected environment includes aquatic habitat and species such as fish, marine mammals, seabirds, and shellfish known to occur or that are likely to occur given the presence of suitable habitat and known distribution in waters around the Proposed Action area.

Lewisville Lake, with a surface area of 28,529 acres, has designated water uses of Contact Recreation, High Quality Aquatic Habitat, and Public Water Supply (TPWD 2022a).

Lake Lewisville is a popular fishing location. Predominant fish species include largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), white and hybrid striped bass (*Morone chrysops*), white crappie (*Pomoxis annularis*), and the blue and channel catfish (*Ictalurus punctatus*) (TPWD 2022a). Lake Lewisville is also home to a variety of freshwater mussels, salamanders, frogs, and toad species (LLELA 2022).

The dominant aquatic vegetation types at Lewisville Lake include various species of pondweed (TPWD 2022a). Pondweed and other aquatic vegetation generally occur at or below the ordinary high-water level of a body of water. For reservoirs, the ordinary high-water level is the operating elevation of the normal summer pool. Fish, mussels, and other aquatic species are sensitive to changing water quality conditions, particularly those involving the flux of sediment, nutrients, and dissolved oxygen loads in waterbodies.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative the proposed construction will not likely result in long term adverse impacts to fish, wildlife, and aquatic vegetation in the area. Most likely, less than significant impacts resulting from erosion and sedimentation occurring during the construction phase of the project will be observed, although these impacts are expected to be short-term in nature and limited in extent. These temporary impacts could include increased turbidity in the vicinity of the development during the construction process due to soil erosion, sedimentation, and localized dredging related to boat ramp construction.

Sedimentation plans and Stormwater Management Plans (consistent with requirements of Section 402 of the CWA) will be prepared for the development to ensure proper mitigation and BMPs are put in place to minimize sediment loads into nearby water bodies and properties. Typical BMPs used to reduce outfall velocities and prevent erosion include rock riprap, rock check dams, slope stabilization using both seeding and Curlex as needed, and silt-fence around

all disturbed boundaries. Temporary sedimentation basins may be utilized where drainage areas greater than 10 acres are disturbed. Long-term detention will not be required for this site. SHM will also establish a 15-foot buffer around wetlands to prevent potential impacts to sensitive habitat. SHM will also implement an emergency response plan for fuel spills and environmental emergencies. Additionally, at this time, based on Project understanding, the need for a 404 permit for boat ramp related dredging is not anticipated and these activities would likely be covered under NWP 36- Boat Ramps. SHM will comply with all required NWP processes and associated mitigation techniques as applicable to this activity prior to commencing construction. Therefore, it is not anticipated that aquatic resources would experience long-term construction related displacement. However, in the event that any aquatic resources are displaced it is anticipated that all organisms would return and reestablish after project construction is complete.

Furthermore, nutrients in the form of fertilizers applied for routine maintenance of the landscaping vegetation have the potential to run off into nearby bodies of water and affect the dissolved oxygen and general water quality of nearby bodies of water. Likewise, direct discharges of wastewater runoff can lead to changes in the concentrations of these parameters in aquatic ecosystems. With the application of proper construction and water quality BMPs, the potential impacts to fish and other aquatic species can be greatly minimized. Additionally, SHM will utilize USACE approved fertilizers for any routine maintenance of the Marina grounds. Therefore, it is not anticipated that construction, maintenance, and routine operation of these facilities would result in significant long-term impacts to water quality and subsequent aquatic species habitat.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction-related erosion, sedimentation, or wildlife displacement would occur. Likewise, if the Proposed Action does not occur, then no additional landscaping maintenance associated with the Proposed Action would be needed, and no additional sources of pesticides, herbicides, and fertilizers with the potential to run off into the lake would be present. Implementation of the No Action Alternative would result in no impacts to aquatic resources. The species present would be consistent with the species described in the affected environment section.

5.2.2. Vegetation

Affected Environment

The Project Area and the majority of the City of Lewisville are in the Ecoregion known as the Texas Blackland Prairie Vegetational Area (TPWD 2022b). This Vegetational Area is distinguished by a black clay-loam soil that developed under prairie grass-forb vegetation. The

original native vegetation for this region included grasses such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), silver bluestem (*Bothriochloa laguroides*), and Texas winter grass (*Nassella leucotricha*) (USDA and Texas Agricultural Experiment Station – Texas Agricultural Extension Service 1960).

The majority of this vegetational area has been cultivated, and only small plots of meadowland with original tall grass vegetation remain. In heavily grazed pastures, much of the tall bunchgrasses have been replaced by Johnson grass (*Sorghum halepense*), King Ranch bluestem (*Bothriochloa ischaemum*), Bermudagrass (*Cynodon dactylon*) and eastern red cedar (*Juniperus virginiana*). Past grazing and crop production were the major past land uses in the region before the Lake Lewisville was constructed (per emails between Martin Underwood, USACE Natural Resources Manager, and Atwell staff on December 9, 2022).

In Texas, less than 20,000 acres of native prairie remain out of 12 million historic acres that were observed prior to cultivation, grazing, and other land use practices, the 20,000 remaining acres account for less than 1 percent of native prairie vegetation remaining in Texas today (Native Prairies Association of Texas 2022). Only a few remnants of Blackland Prairie are protected as hay meadows or conservancy land today (Carter & Burgess, Inc. 1999). Several species of native Blackland Prairie grass are in the Project Area.

The field observations made during a site-specific wetland delineation determination and delineation and threatened and endangered species (TES) evaluation conducted in early 2022 indicated that the site today is mainly made up of native pastures with scattered trees including invasive Eastern red cedar (invasive to pasture and croplands) and wooded riparian corridors associated with Lake Lewisville. Ecologically, the site can be broken up into three main community types: Upland Native Pasture and Scattered Trees Complex, Ephemeral Drainages and the Lake Lewisville and Upland Stock Ponds Complex, and an Emergent Wetlands complex. These community types are described below.

Upland Native Pasture and Scattered Trees Complex

Species occurring throughout the native pastures include mesquite (*Prosopis glandulosa*), eastern red cedar (*Juniperus virginiana*), Johnson grass (*Sorghum halepense*), chickweed (*Stellaria media*), woolly croton (*Croton capitatus*), Chickasaw plum (*Prunus angustifolia*), Osage-orange (*Maclura pomifera*), sugarberry (*Celtis laevigata*), honey-locust (*Gleditsia triacanthos*), Illinois bundleflower (*Desmanthus illinoensis*), giant ragweed (*Ambrosia trifida*), narrow-leaf gayfeather (*Liatris mucronata*), broomweed (*Amphiachyrus dracunculoides*), coralberry (*Symphoricarpos orbiculatus*), poison ivy (*Toxicodendron radicans*), soapberry (*Sapindus saponaria*), snow-on-the-prairie (*Euphorbia bicolor*), cheatgrass (*Bromus tectorum*),

cedar elm (*Ulmus crassifolia*), Texas wintergrass (*Nassella leucotricha*), purpletop (*Tridens flavus*), horse-nettle (*Solanum carolinense*), hedge-parsley (*Torilis arvensis*), brown-eyed Susan (*Rudbeckia hirta*), white heath aster (*Symphyotrichum ericoides*), cane bluestem (*Bothriochloa barbinodis*), broomsedge bluestem (*Andropogon virginicus*), King Ranch bluestem (*Bothriochloa ischaemum*), silver bluestem (*Bothriochloa laguroides*), ragweed (*Ambrosia artemisiifolia*), Maximillian sunflower (*Helianthus maximiliani*), green milkweed (*Asclepias viridis*), common sunflower (*Helianthus annuus*), goldenrod (*Solidago* spp.), and saw greenbrier (*Smilax bona-nox*).

Ephemeral Drainages, Lake Lewisville, and Upland Stock Ponds Complex

Various species comprise the overstory of the wooded riparian areas adjacent to the lake and along the ephemeral drainages, including cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), pecan (*Carya illinoensis*), cedar elm, American elm (*Ulmus americana*), sugarberry, gum bumelia (*Bumelia lanuginosa*), eastern red cedar, Osage-orange, boxelder (*Acer negundo*) and honey-locust. Midstory and understory species were found to include bristly greenbrier (*Smilax hispida*), Chinese privet (*Ligustrum sinense*), creek-oats (*Chasmanthium latifolium*), coralberry, white avens (*Geum canadense*), rough-leaf dogwood (*Cornus drummondii*), giant ragweed, Canada sanicle (*Sanicula canadensis*), Japanese honeysuckle (*Lonicera japonica*), poison ivy, Virginia creeper (*Parthenocissus quinquefolia*), and saw greenbrier. Areas along the lake and ponds edges include some of the above species as well as Virginia wildrye (*Elymus virginicus*), possumhaw (*Ilex decidua*), switchgrass (*Panicum virgatum*), cocklebur (*Xanthium strumarium*), sumpweed (*Iva annua*), black willow (*Salix nigra*), common buttonbush (*Cephalanthus occidentalis*), morning glory (*Ipomoea lacunosa*), panicked aster (*Symphyotrichum lanceolatum*), and bushy bluestem (*Andropogon glomeratus*).

Emergent Wetlands Complex

Herbaceous/understory species within this complex are somewhat consistent with the understory vegetation around the lake and pond edges (listed above). They included sand spikerush (*Eleocharis montevidensis*), compressed spikerush (*Eleocharis compressa*), toothcup (*Ammannia coccinea*), giant ragweed, common buttonbush, cocklebur, curly dock (*Rumex crispus*), Virginia wildrye, raven's foot sedge (*Carex crux-corvi*), sumpweed, creeping love grass (*Eragrostis hypnoides*), balloon-vine (*Cardiospermum halicacabum*), hispid buttercup (*Ranunculus hispidus*), morning glory, coffee-bean (*Sesbania herbacea*), salt heliotrope (*Heliotropium curassavicum*), and saltmarsh aster (*Symphyotrichum dumosum*).

Additionally, review of Texas Parks and Wildlife Texas Ecosystems Analytical Mapper (TEAM) Report indicates four main wildlife habitat types including non-native pasture, native rangeland/brush, bottomland/riparian, and other. Using the TEAM Study Area Analysis Tool, it was determined that there are approximately 108.18 acres of non-native pasture, 83.12 acres

of native rangeland/brush, 2.36 acres of bottomland/riparian, and 171.56 acres classified as other wildlife habitat type (TPWD 2023a).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Because the Proposed Action would occur within the existing Marina property, some of the actions involve impacts to previously disturbed vegetation. Periodic maintenance (such as regular mowing intervals) is done on the property and has caused previous disturbance of the natural midstory and understory; therefore, the vegetation impact resulting from the Proposed Action in already developed portions of the Project Area would be minimal. Long-term effects would occur in previously undisturbed areas with proposed new structures such as buildings, pools, and RV / camping areas. Short-term effects would occur in areas with temporary construction but would be restored to their previous conditions via recontouring and replanting. The effects would be limited to the area of the Proposed Action because the vegetation population is widely distributed and not concentrated in the affected area. Impacts are anticipated to be less than significant as long as the project is designed to adhere to applicable regulations, policies, BMPs, mitigation requirements, and guidelines. Additionally, SHM will take steps to prevent the introduction and spread of invasive species and to support efforts to eradicate and control invasive species that are already established in the Project Area. Because the Proposed Action area lies within the Blackland Prairies Ecoregion of Texas, SHM will mitigate impacted and disturbed areas by reintroducing native vegetation wherever possible, such as Texas native prairie grasses, turf grasses (including buffalograss), and native woody species plantings. SHM will also look to incorporate the planting and seeding of native milkweed and other nectar plants during these revegetation efforts. The total existing vegetative cover within the Project Area may decrease due to development; however, the total area of native Texas grasslands and quantity of other pollinator vegetative species will be greater than it was prior to development.

More specifically, Blackland Prairie mitigation will consist of either a larger native grassland and/or pocket prairies within the lease area. These areas will be seeded during dormant periods occurring in either the late winter or early spring. Vegetation will be watered weekly until it is established, and from that point will then be watered bi-weekly through the first summer season. During the second year, SHM will manage for invasive vegetation species like Johnsongrass and King Ranch bluestem, the herbicide Plateau will target Johnsongrass. In the third year SHM will continue management of the grassland vegetation and maintain a vegetation ratio of at least 65 percent native species within three years.

In areas planted with turfgrass, SHM will seed with buffalograss or bring in buffalograss sod to ensure the vegetation establishes readily with success. As with the native prairie grass,

approximately 65 percent of the turf grass should be established buffalograss within three years.

Regarding woody vegetation plantings, SHM will plant a native tree at each of the proposed RV and campsites, this not only is beneficial to natural resources, but is also great for USACE's recreation mission to provide shade, and aesthetics to the area. Planted trees will be native to North Central Texas and sourced from local nurseries. SHM will utilize USACE recommended native tree species, including bur oak, Shumard oak, pecan, Mexican plum, common persimmon, and redbud. In addition to be native species, these species establish very well and provide additional wildlife habitat. All planted trees will be mulched, staked, and watered regularly for one year to ensure at least 80 percent tree survivability at the end of the three-year period.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no short-term impacts would be caused by temporary construction activities that would require recontouring and replanting, and no long-term impacts would be caused by the conversion of natural areas to new structures such as buildings, pools, and RV / camping areas. Likewise, if the Proposed Action does not occur, then no additional landscaping maintenance associated with the Proposed Action would occur; thus, no additional sources of pesticides, herbicides, and fertilizers with the potential to run off into the lake would be present. Implementation of the No Action Alternative would result in no impacts to vegetation, and the species present would be consistent with the species described in the affected environment section.

5.2.3. Floodplains

Affected Environment

Executive Order (EO) 11988, "Floodplain Management," was issued in May of 1977, in furtherance of NEPA, as amended (42 U.S.C. 4321 et seq.); the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 et seq.); and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Statute 975). EO 11988 directs federal agencies to reduce flood losses and losses to environmental values served by floodplains, to minimize the impact of floods on human safety, to avoid actions located in or adversely affecting floodplains unless there is no practicable alternative, and to take action to mitigate losses if avoidance is not practicable (FEMA 2021).

Floodplain management around Lewisville Lake is discussed in the 1999 PEA. USACE requires that there be no net loss of flood storage at Lewisville Lake (Carter & Burgess, Inc. 1999). Therefore, any fill placed within the 100-year floodplain as a result of project construction must

be mitigated with excavation in another area of the floodplain with disposal above flood pool elevation of 537 above mean sea level (amsl) in an area approved by USACE.

Based upon the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Panel No. 48121C0560G, the majority of the Proposed Action is located above the 500-year and 100-year floodplains. Areas along the shoreline are designated as FEMA Zone AE (areas within the 100-year floodplain based on flood elevation determinations). Areas at higher elevations, bordering Zone AE, are designated as FEMA Zone X shaded (areas of 0.2 percent annual chance flood), as shown in **Figure 7**.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Proposed Action, less than significant impacts would be observed due to the implementation of specific project BMPs and mitigation measures to protect floodplains and floodplain storage. SHM will ensure that no fill below the 522-foot amsl contour will be placed within the Proposed Action area. Likewise, SHM will avoid fill between 522 feet and 537 feet amsl wherever possible. In the event that fill between 537 feet amsl and 522 feet amsl occurs, it will be balanced with cut and fill activities to maintain preconstruction flood storage levels. Please refer to **Figure 8** Floodplain Fill, for a diagram showing proposed floodplain fill areas and the mitigation area. Using the mitigation techniques described above, no net loss of flood storage for the Project Area along Lewisville Lake would occur.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no impacts would result from fill below the 522-foot contour line or cut from between the 522-foot and 537-foot contour lines. Implementation of the No Action Alternative would result in no minimization of flood storage within the Project Area and would be consistent with the requirements established by USACE as described in the affected environment section.

5.2.4. Wetlands

Affected Environment

Wetlands and other waters of the United States are regulated under Section 404 of the CWA, as amended, and EO 11990, Protection of Wetlands. A Preliminary Wetlands Delineation and Wetlands Determination and Threatened and Endangered Species Investigation was conducted on 351 acres of land encompassing the Pier 121 project site to identify and physically delineate areas that appear to exhibit physical characteristics typical of jurisdictional wetlands (wetlands that are waters of the United States) and/or jurisdictional other waters of the United States (specific streams or ponds). A preliminary wetlands determination (PWD) was prepared based

on the results of the delineation. The wetlands delineation and PWD involved review of U.S. Geological Survey topographic maps and aerial photographs and the completion of investigative field work (See Appendix B for more details).

See **Figure 9** for a summary of emergent wetlands and ephemeral drainages identified by the Preliminary Wetlands Delineation and Wetlands Determination and Threatened and Endangered Species Investigation conducted by Jones and Ridenour (2022).

Based on the wetland delineation and PWD, two ephemeral drainages and two emergent wetland features in the Project Area fall under the jurisdiction of USACE as other waters of the United States and wetlands that are waters of the United States, respectively. The Fort Worth District of USACE has jurisdiction over local aquatic features of these types.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Proposed Action, impacts are not likely to be significant because SHM will avoid the identified jurisdictional other waters of the United States and the wetland that is a Waters of the United States (WOTUS). USACE has not established standards for the mitigation of jurisdictional wetlands or waters of the United States. In addition to avoiding these features, SHM will implement a 15-foot no development buffer around each identified jurisdictional feature. SHM will ensure that soil erosion and sediment controls are properly installed and maintained. All jurisdictional features will have boundaries clearly marked by flags so that wetland areas are avoided during construction. All flag markers will be maintained until construction is complete as applicable. SHM will also develop management plans such as storm water protection plans and sediment control plans for the management of wetland water quality and soils/erosion control. Additionally, any foot paths or trails that may cross these jurisdictional features will be equipped with walking bridges to minimize the affected area in these zones.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no direct impacts resulting from construction activities occurring within these features or indirect impacts resulting from nearby construction activities that would introduce sediment or runoff into nearby protected waterbodies would occur. Implementation of the No Action Alternative would result in no impacts to the ephemeral drainages and emergent wetland features present within the Project Area and would be consistent with those identified in the PWD as described in the affected environment section.

5.2.5. Wildlife

Affected Environment

The Lewisville Lake area has a diverse assortment of wildlife species that rely on the prairie, woodland, and wetland habitats around the lake. Lewisville Lake and its associated wetlands offer important feeding, staging, and roosting areas for migrating birds, including species such as ducks, coots, grebes, pelicans, herons, egrets, gulls, terns, and hawks that migrate through this area and use the wetlands and riparian vegetation for feeding, perching, and roosting (Carter & Burgess, Inc. 1999).

The typical resident bird populations that utilize this area include great blue heron (*Ardea herodias*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida asiatica*), red-tailed hawk (*Buteo jamaicensis*), northern bob-white (*Colinus virginianus*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), northern cardinal (*Richmondia cardinalis*), field sparrow (*Spizella pusilla*), red-winged blackbird (*Agelaius phoeniceus*), northern mockingbird (*Mimus polyglottos*), owls (families Tytonidae and Strigidae), and red-bellied woodpecker (*Melanerpes carolinus*) (Carter & Burgess, Inc. 1999).

Common endemic mammals in the Lake Lewisville area include species such as raccoons (*Procyon lotor*), bobcats (*Lynx rufus*), mink (*Mustela vison*), opossums (*Didelphis virginiana*), squirrels (*Sciurus niger*), rabbits (*Sylvilagus floridanus*), deer (*Odocoileus virginianus*), and various species of moles, shrews, bats, skunks, and mice (Carter & Burgess, Inc. 1999).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Proposed Action, increased activity and infrastructure development on the Marina property may result in the reduction of habitat and the displacement of wildlife. Wildlife habitat could be impacted during construction activities, but impacts would be minor and temporary. Noise disturbances from heavy equipment and construction crews may cause terrestrial species to temporarily move away from construction zones. Mobile wildlife species such as birds may relocate from these temporary disturbance locations to nearby areas during construction. Species with limited mobility, such as small mammals, would not be able to move away quickly from construction but would likely avoid the area to the extent practicable. Small mammals typically do not appear to be adversely affected by road noise (FHWA 2004). General construction noise could temporarily disrupt or mask communication necessary for mating and predator avoidance but is unlikely to reach thresholds for mortality. These impacts would be temporary and would end once construction is complete. Additionally, SHM has committed to maintaining a 100-foot vegetative buffer between the new developments and the single-family

development to the east as well as to maintaining and improving a 50-foot minimum buffer between the new developments and the parkland to the south. These buffers would act as a wildlife passage area that could maintain a connection between wildlife management areas to the north and east and environmentally sensitive areas to the south and west. Furthermore, SHM will work to avoid construction in areas with sensitive vegetation, unique habitat, designated natural resources, if practical. SHM will develop and maintain “good housekeeping” procedures to ensure that sites would be kept clean of debris, garbage, and fugitive trash or waste during operation, including microtrash. SHM would also instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive seasons. SHM will minimize herbicide and pesticide use during maintenance activities to the extent possible and utilize site-appropriate native plants and invasive free materials (seed mixes, rock, mulch, soil) for revegetation and restoration efforts. Additionally, the Proposed Action would require additional on-site lighting to support the safety of guests on-site. Sky glow because of light pollution can have negative impacts on wildlife and ecosystems by disrupting natural diurnal and nocturnal behaviors such as migration, reproduction, nourishment, rest, and cover from predators. However, since all lighting on-site will be down shielded, the impacts of lighting on the wildlife and ecosystems by disrupting migration, reproduction, nourishment, rest, and cover from predators will be less than significant. Furthermore, as a BMP to protect migratory birds, pursuant to TPWD recommendations, SHM will utilize the minimum amount of night-time lighting needed for safety and security for lighted structures. SHM will minimize the Project’s contribution to skyglow by focusing light downward, with cutoff luminaries to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, fully shielded, as bright as needed, and minimizes blue light emissions.

Therefore, based on currently available project information, and knowledge of the proposed wildlife BMPs, the Proposed Action is not anticipated to create a significant adverse impact on wildlife.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction activities producing noise or contributing to the removal of habitat within the Project Area would occur. No reduction of the existing habitat within the Project Area and the subsequent displacement of wildlife would occur, and species present would be consistent with the wildlife conditions described in the affected environment section.

5.2.6. Threatened and Endangered Species

Affected Environment

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) protects designated TES from extinction. The ESA makes it unlawful to harm a species listed as threatened and endangered by organizing, funding, or performing actions that may affect the species itself or its Designated Critical Habitat. Doing so would be considered “take” (i.e., harming, harassing, or wanton killing) of a listed species without a permit. Provisions under the ESA allow for the authorized “incidental” take of listed species while conducting otherwise lawful activities under certain terms and conditions.

For the purposes of this Final EA, special status wildlife species include those listed under the ESA or listed as threatened or endangered by the Official Species list provided by the Arlington Ecological Services Field Office and accessed through the U.S. Fish and Wildlife Service’s (USFWS’s) Information for Planning and Consultation (IPaC) project planning tool.

USFWS’s IPaC System was reviewed for information regarding official ESA-listed TES and critical habitat for the Project Area in Denton County, Texas (See Appendix C). The Official Species list results identified three ESA-listed species for this area of Texas (**Table 5-1**). The Official Species review revealed that no critical habitats have been recorded within the assessment area. The alligator snapping turtle (proposed threatened species) and the monarch butterfly (candidate species) are listed for Denton County, Texas. Candidate and proposed species are not afforded statutory protection under the ESA. However, the USFWS recommends taking these species into consideration during environmental planning because they could be listed in the future.

Table 5-1. Potential Threatened and Endangered Species within the Project Area

Species	Federal Status
Piping plover (<i>Charadrius melodus</i>)	Threatened
Red knot (<i>Calidris canutus rufa</i>)	Threatened
Whooping crane (<i>Grus americana</i>)	Endangered
Alligator snapping turtle (<i>Macrochelys temminckii</i>)	Proposed Threatened
Monarch butterfly (<i>Danaus plexippus</i>)	Candidate

Source: (USFWS 2024)

The piping plover (*Charadrius melodus*) is a small shorebird. They feed on worms, fly larvae, beetles, crustaceans, and other marine macroinvertebrates. Piping plover are found on open, sandy beaches and on tidal mudflats and sandflats along both the Atlantic and Gulf coasts. Suitable habitat consists of open, sparsely vegetated beaches composed of sand or gravel on islands or shorelines of inland lakes or rivers. Critical habitat for the piping plover has been designated along coastal areas of the state. The piping plover is considered a potential migrant

within Denton County, as it typically winter along the Texas Gulf Coast (USFWS 2023a). Additionally, according to IPaC, the piping plover only needs to be considered in this region in regard to wind energy projects. The Proposed Action is not a wind energy project; therefore, further evaluation and effects determinations are not warranted for this species within the Project Area.

The red knot (*Calidris canutus rufa*) is among the largest of the small sandpipers. The preferred habitat is intertidal marines, estuaries, and bays. Mussel beds are important food sources, and mussels and other mollusks are consumed year-round, although during migration season, horseshoe crab eggs are a staple. The red knot migrates annually from its breeding grounds above the Arctic Circle to the tip of South America where it winters. During spring and fall migration, the red knot travels in non-stop segments of 1,500 miles or more. Red knot is commonly found in the coastal counties of Texas but may be observed sporadically across the state during migration, particularly in eastern central portions of the state. The red knot is considered a potential migrant within Denton County, as it typically winter along the Texas Gulf Coast (USFWS 2023b). Additionally, according to IPaC, the red knot only needs to be considered in this region in regard to wind energy projects. The Proposed Action is not a wind energy project; therefore, further evaluation and effects determinations are not warranted for this species within the Project Area.

The whooping crane (*Grus americana*) is large snowy white plumed bird and is the tallest bird of North America, growing to a height of up to five feet. Suitable habitat for the whooping crane consists of marshes, wet meadows and prairies, riverine habitats, and agricultural fields. The only self-sustaining population of whooping crane nests in Canada and winters in coastal marshes of Aransas, Calhoun and Refugio Counties of Texas, and critical habitat was designated for the species in these wintering grounds. During migration, the species may be observed through much of Texas with the exceptions of the extreme east or extreme west parts of the state (USFWS 2023c). The whooping crane is considered a potential migrant within Denton County; however, the Project Area is largely wooded and has nearby residential and commercial developments. No wetland mosaics have been identified within the Project Area, and no harvested grain fields are present within the Project Area. Therefore, suitable stopover habitats were not found to be present within the Project Area.

The alligator snapping turtle (*Macrochelys temminckii*) is a large, freshwater bottom dwelling turtle. The alligator snapping turtle is characterized by its large head and upper jaw with a strongly hooked beak. Additional defining characteristics include fleshy pointed projections surrounding the neck, three ridges down the upper shell, and algal growth that adds to its camouflage. These turtles are almost exclusively aquatic and, except for egg-laying females, almost never come on land, primarily composing preferred habitats in river systems, lakes, and

wetlands (NWF 2023a). Although it is unlikely for construction activities to directly impact individuals due to their almost exclusively aquatic nature, buried nests could be impacted if ground disturbance occurs during nesting season, commonly February to June in Texas (USFWS 2023d).

The monarch butterfly (*Danaus plexippus*) is a large butterfly known for its characteristic orange and black pattern. Monarchs use obligate milkweed host plants (*Asclepias* spp.) to lay their eggs. The entirety of the developmental/growth stages of the monarch, from egg to larvae to adult, occurs in association with the milkweed plant. Monarchs are found in open grasslands and riparian areas during the summer and migrate south in the winter. In some instances, monarchs can migrate 3,000 km over the course of two months. As adults, the monarch diet consists of nectar from a wide range of flowering plants, including the milkweed (NWF 2023b). Milkweed and flowering plants may occur within the Project Area, though habitat is likely marginal and limited. Habitat is expected to be available outside the Project Area.

The federal Bald and Golden Eagle Protection Act (BGEPA), enacted in 1940, (16 USC 668-668d) prohibits the take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) except as otherwise permitted in the BGEPA. From 1967 to 2007 the bald eagle was federally protected under the ESA as an endangered species. While the bald eagle is no longer listed under the ESA, it remains protected under the BGEPA and is considered a “rare, threatened, and endangered bird species” in Denton County by the Texas Parks and Wildlife Department (TPWD 2023b). In addition, the bald eagle is protected under the Migratory Bird Treaty Act (16 USC 703-712).

Bald eagles are associated with riparian or lacustrine areas for foraging and nesting. They generally nest and roost in large trees or snags with open crowns in areas that are relatively free of disturbance. Nesting territories are most often near open water with a prey base of fish and waterfowl. They feed primarily on fish, but also eat a variety of waterfowl and other birds, small mammals, and turtles, when these foods are readily available. Bald eagles also use upland areas to commonly feed on small mammals and carrion, particularly younger birds. Nests are typically within one mile of permanent water. Roost sites are an important habitat component for bald eagles and include live trees and snags that provide good visibility and that are located near nest sites or foraging areas (National Audubon Society 2023). The USFWS’s Official Species report and IPaC resource list document bald eagle breeding season occurring in Denton County throughout the year, except for August; however, the probability of presence is listed as October through May.

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712) was enacted to ensure protection of migratory bird resources that are shared among the U.S., Canada, Mexico, Japan, and Russia. The MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or

offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. The responsibilities of federal agencies to protect migratory birds are set forth in Executive Order 13186. USFWS is the lead agency for migratory birds. The USFWS issues permits for takes of migratory birds for activities such as scientific research, education, and depredation control, but does not issue permits for incidental take of migratory birds.

Ten USFWS Birds of Conservation Concern (BCC)/migratory birds, including the bald eagle, were identified as having the potential to occur within the Project Area (**Table 5-2**). These birds are listed as having breeding seasons mainly during the spring and summer months. Although breeding and probability of presence was identified in the USFWS's Official Species report and IPaC resource lists, habitat associated with these birds would not include disturbed portions of the Project Area during construction and would not include mowed/maintained areas during operations and maintenance activities, similar to the TES migratory species discussed above.

Table 5-2. Potential Birds of Conservation Concern/Migratory Birds within the Project Area

Species	Federal Status
American golden-plover (<i>Pluvialis dominica</i>)	BCC/Migratory
Bald eagle (<i>Haliaeetus leucocephalus</i>)	BGEPA/BCC/Migratory
Chimney swift (<i>Chaetura pelagica</i>)	BCC/Migratory
Least Tern (<i>Sternula antillarum antillarum</i>)	BCC/Migratory
Lesser yellowlegs (<i>Tringa flavipes</i>)	BCC/Migratory
Little blue heron (<i>Egretta caerulea</i>)	BCC/Migratory
Pectoral Sandpiper (<i>Calidris melanotos</i>)	BCC/Migratory
Prairie Loggerhead Shrike (<i>Lanius ludovicianus excubitorides</i>)	BCC/Migratory
Prothonotary warbler (<i>Protonotaria citrea</i>)	BCC/Migratory
Red-headed woodpecker (<i>Melanerpes erythrocephalus</i>)	BCC/Migratory

Source: (USFWS 2023f)

The Texas Parks and Wildlife Department (TPWD) is the state agency with primary responsibility for protecting the state's fish and wildlife resources, in accordance with the authority granted by Texas Parks and Wildlife Code (PWC) section 12.0011. TPWD maintains the Rare, Threatened, and Endangered Species of Texas (RTEST) on-line resource that identifies threatened and endangered species and other species of greatest conservation need (SGCN) that have potential to occur within each county in Texas based on occurrence and range data. TPWD's RTEST system was reviewed for information regarding state-listed TES and SGCN for the Project Area in Denton County, Texas (See Appendix C). RTEST results identified nine state-

listed species for this area of Texas (**Table 5-3**). RTEST also identified 43 species of greatest conservation need, which included the nine state-listed species.

Table 5-3. Potential State-listed Species within the Project Area

Species	State Status
Black rail (<i>Laterallus jamaicensis</i>)	Threatened/SGCN
Piping plover (<i>Charadrius melodus</i>)	Threatened/SGCN
Red knot (<i>Calidris canutus rufa</i>)	Threatened/SGCN
White-faced ibis (<i>Plegadis chihi</i>)	Threatened/SGCN
Whooping crane (<i>Grus americana</i>)	Endangered/SGCN
Louisiana pigtoe (<i>Pleurobema riddellii</i>)	Threatened/SGCN
Sandbank pocketbook (<i>Lampsilis satura</i>)	Threatened/SGCN
Texas heelsplitter (<i>Potamilus amphichaenus</i>)	Threatened/SGCN
Texas horned lizard (<i>Phrynosoma cornutum</i>)	Threatened/SGCN

Source: (TPWD 2023b)

TPWD also maintains information on Texas rare, threatened, and endangered species, rare and unique native plant communities, and animal aggregations. The goal of the Texas Natural Diversity Database (TXNDD) is to provide observational data and other resources in a timely manner to conservation partners, academic institutions, developers, and other data users. The resources provided by TXNDD facilitate research and conservation actions and assist development project proponents seeking to evaluate their project areas for rare species and wildlife and plant communities so they may minimize impacts to precious Texas resources. TXNDD information was provided on March 30, 2023, by TPWD for the Project Area. The information provided identified only the Texas heelsplitter (*Potamilus amphichaenus*) as having been previously observed within the Project Area. Since no in-water work is planned for the proposed project, impacts to this species are not expected. Although outside the Project Area, occurrences of the eastern box turtle (*Terrapene carolina*) and western box turtle (*Terrapene ornata*) have been observed within a one-mile radius and in the undeveloped area west of the Project Area. This area is of a similar nature to that of the forested, undeveloped eastern portion of the Project Area. In order to demonstrate an abundance of caution and to avoid impacts to these species, SHM will conduct pre-construction surveys for these two species at the same time of survey for the alligator snapping turtle. As a result, impacts to these species, if present within the Project Area, will be avoided. The TXNDD information did not identify any other state-listed species, native plant communities, or animal aggregations within the vicinity of the proposed project.

As part of the project review process, TPWD provided recommendations and informational comments to minimize the Proposed Action's potential adverse impacts to the state's fish and wildlife resources that may be associated with the Project Area. The input provided was to facilitate incorporation of voluntary measures during design, construction, operation, and maintenance that may assist the project in minimizing impacts to state species of concern. Consistent with the TXNDD data, TPWD identified only the Texas heelsplitter as having been observed within the general Project Area. This mollusk occurs in small streams to large rivers in standing to slow-flowing water and is most common in banks, backwaters, and quiet pools. However, it has adapted to some reservoirs, like Lewisville Lake, and is often found in soft substrates such as mud, silt, or sand. Other state-listed species are the same or have similar life histories as the federally-listed species discussed above, although none have been observed within the Proposed Action area. The black rail and white-faced ibis are migratory birds that have similar habitat needs as the whooping crane and would be unlikely to be present within the Project Area. The Louisiana pigtoe and sandbank pocketbook are mollusks and have similar habitat constraints as the Texas heelsplitter. Lastly, the Texas horned lizard occurs in open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush, or scrubby trees. As a result, proper habitat for this reptile species is lacking within the Project Area (RTEST 2023). TPWD also identified the eastern box turtle and western box turtle as SGCN and having the potential to occur at the project site.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur, and a three-year duration of construction would take place that has the potential to impact nearby TES species. Based on the results of the TES assessment and the reasons presented above, it is unlikely that any federally listed TES would be affected during construction or operation.

The piping plover and red knot are not required for consideration because the project is not a wind energy project. Other state-listed migratory species and the whooping crane lack suitable habitat within the Project Area and individuals are unlikely to be present within the Project Area. Because the project is not proposed to include major in-water impacts and BMPs will be used to limit indirect water impacts, the three state-listed mollusk species would not be impacted. Similarly, it is unlikely for construction activities to directly impact the alligator snapping turtle due to its almost exclusively aquatic nature, buried nests could be impacted if ground disturbance occurs during nesting season, commonly February to June in Texas (USFWS 2023d). To assure that nests are not impacted during construction, a preconstruction nest survey will be conducted along with an identification survey for the eastern and western box turtles. If monarch butterflies are encountered, the monarchs would likely relocate to available

habitat in the vicinity and remain unharmed. With implementation of BMPs, rehabilitation with seeding, and available, quality habitat in the Project Area vicinity, the Proposed Action is anticipated to have no effect on monarch butterfly.

Although bald eagle occurrence is probable in the area due to its location adjacent to the lake, existing habitat and tree types within the Project Area are less likely to support breeding bald eagles. To assure that bald eagles or nests are not impacted during construction, a preconstruction nest survey will be conducted. Tree removal will only occur when trees have been identified as not containing nests. Trees with nests will be left in place and/or consultation with USFWS will be necessary. Post construction, appropriate available trees will be less likely within the Project Area. If bald eagles were to occur within the Project Area, it would be for temporary roosting and, if encountered or disturbed, they would likely relocate to a suitable location nearby in the vicinity and remain unharmed.

In the unlikely event that any TES species were to be found within the Project Area, SHM would avoid, as practicable and feasible, any areas during construction, operation, and maintenance activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Furthermore, SHM will develop and maintain “good housekeeping” procedures to ensure that sites would be kept clean of debris, garbage, and fugitive trash or waste during operation, including microtrash. SHM would also instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive seasons. SHM will minimize herbicide and pesticide use during maintenance activities to the extent possible and utilize site-appropriate native plants and invasive free materials (seed mixes, rock, mulch, soil) for revegetation and restoration efforts. Therefore, based on currently available project information, and knowledge of the proposed TES BMPs, the Proposed Action is not anticipated to create a significant adverse impact on TES.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no construction activities producing noise or contributing to the removal of potential habitat within the Project Area would occur. No reduction of existing habitat within the Project Area would occur, and no displacement of wildlife would occur. Species present would be consistent with the wildlife conditions described in the affected environment section.

5.3. SOCIOECONOMIC RESOURCES AND LAND USE

5.3.1. Light and Aesthetics

Affected Environment

No federal policies regarding aesthetics exist, but it is USACE policy to establish architectural themes for facilities on project lands, so they blend with the existing views to the extent practicable. Any facilities or structures proposed to be located within the Lewisville Lake Project Area are required to complement existing structures or comply with lake/park architectural themes.

The 1999 PEA describes the Lewisville Lake area as mostly pasture with scattered dense groves of native and introduced trees. The lake's shoreline includes small stretches of beach area and small portions of the shoreline have recreational areas and parks. The greater Lewisville Lake area has commercialized areas that include parking lots, and numerous businesses, and urbanized areas.

Various businesses line the developed shoreline along the northernmost regions of the lake, and the eastern half of the Project Area includes developed areas with surrounding rural landscapes with agricultural fields, pastures, and dense areas of trees.

The Pier 121 Marina is located in the southernmost regions of Lewisville Lake and is neighbored by various parks, sports outfitters, and the LLELA Nature Preserve. Immediately south of the Project Area are parklands, and to the southeast lies a single-family residential area.

The City of Lewisville Municipal Code Chapter 9 Section 9-3 states that, "It shall be unlawful for any person to locate on his property and use any visible source of illumination which produces intense glare or direct illumination across any bounding property line. No such light shall be of such intensity as to create a nuisance or detract from the normal use and enjoyment of adjacent property. For purposes of this section, a nuisance is defined as 0.4 of one foot-candle of light measured at the property line." The Pier 121 Marina is currently equipped with appropriate lighting to support safety of its guests and to properly illuminate buildings and structures on site. All lighting on site is down-shielded to prevent excessive glare unto nearby properties in compliance with Lewisville City Code. Furthermore, SHM will utilize the minimum amount of night-time lighting needed for safety and security for lighted structures. SHM will minimize the Project's contribution to skyglow by focusing light downward, with cutoff luminaires to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, fully shielded, as bright as needed, and minimizes blue light emissions.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

The Proposed Action would occur in a partially developed park with existing structures and disturbed areas. The Proposed Action involves new facilities that would be viewable from parts of the lake and shoreline that are consistent with other uses and structures in the area. To mitigate impacts to viewsheds from the park and the single-family residential neighborhood, SHM has committed to maintaining a 100-foot vegetative buffer between the new developments and the single-family development to the east. Likewise, this buffer may be improved on behalf of the City of Lewisville to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. With the implementation of the vegetative buffers, and the nature of the uses in the surrounding area, the Proposed Action is not anticipated to cause significant adverse aesthetic impacts. The Proposed Action would require additional on-site lighting to support the safety of guests on-site. However, since all lighting on-site will be down shielded, the impacts of lighting on the adjacent properties are not expected to be significant. Additionally, all solar panels will be designed in compliance with the Federal Aviation Administration requirements to not direct glare toward nearby aircraft.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no development modifications to the Project Area would occur. No reduction in the aesthetic quality of the area would occur, and the area would remain consistent with the visual aesthetics of the surrounding areas as described in the affected environment section.

5.3.2. Land Use

Affected Environment

As stated in the 1999 Lewisville Lake PEA, approximately 16,352 acres of land around Lewisville Lake are under the jurisdiction of USACE. This USACE-managed land is classified by land use. Classifications for land above the conservation pool elevation of 522 feet amsl, described further below, include recreation (4,603 acres, of which 1,190 are developed), wildlife management (6,758 acres), and project operations (1,190 acres). These land use classifications are shown in **Figure 10**.

The surrounding Lewisville Lake area has multiple businesses, including marinas, restaurants, boat rental/storage, and retail storefronts. In addition to Safe Harbor Pier 121, two other marinas are on the same shore of Lake Lewisville: Sail Dallas and Sam's Dock Charters and Boat Rentals. The Project Area includes three boat dealerships: Plano Marine, Aqua Patio

Sweetwater, and Sea Lake Yachts. Plano Marine also offers land-based boat storage. Four parking lots are in the Project Area, along with a Tesla Destination Charger station.

The Lewisville Lake Master Plan categorizes the area as a high-density recreation. High-density recreation areas are defined as land developed for intensive recreational activities by the visiting public, including developed recreation areas and areas for marinas, related concessions, and resorts (USACE 2017).

National USACE policy limits recreation development on USACE lands to activities that depend on the area's natural resources. Such activities typically include water-based activities, overnight use, and day use of marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resorts. Examples of activities that do not depend on an area's natural resources include athletic fields for organized sports, theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, and golf courses. Recreation development by lessees operating on USACE lands must follow policy guidance contained in USACE regulations at ER 1130-2-550, Chapter 16. That policy includes the following statement:

The primary rationale for any future recreation development must be dependent on the project's natural or other resources. This dependency is typically reflected in facilities that accommodate or support water-based activities, overnight use, and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resort facilities. Examples that do not rely on the project's natural or other resources include theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, non-transient trailers, and golf courses. Normally, the recreation facilities that are dependent on the project's natural or other resources and accommodate or support water-based activities, overnight use, and day [use] are approved first as primary facilities followed by those facilities that support them. Any support facilities (e.g., playgrounds, multipurpose sports fields, overnight facilities, restaurants, camp stores, bait shops, comfort stations, boat repair facilities) must also enhance the recreation experience, be dependent on the resource-based facilities, [and] be secondary to the original intent of the recreation development.... (USACE 1996: 16-1)

Lands classified as high-density recreation areas are suitable for the development of comprehensive resorts. Comprehensive resorts are defined in USACE regulations as multifaceted developments with facilities such as marinas, lodging, conference centers, golf courses, tennis courts, restaurants, and other similar facilities (USACE 2017). The Proposed Action meets this definition; therefore, the Proposed Action aligns with USACE land classification for the

Project Area. National Land Cover Database Landcover types were analyzed for the Project Area and are shown in **Table 5-4**.

Table 5-4. Project Area Land Cover Classification

Land Cover Type	Acres	% Cover
Open Water	73.90	20.2
Developed, Open Space	11.61	3.2
Developed, Low Intensity	10.55	2.9
Open Water	73.90	20.24
Developed Open Space	11.61	3.18
Developed, Low Intensity	10.55	2.89
Developed, Medium Intensity	23.96	6.56
Developed, High Intensity	51.14	14.01
Barren Land	0.44	0.12
Deciduous Forest	79.28	21.71
Mixed Forest	1.78	0.49
Shrub/Scrub	9.21	2.52
Herbaceous	101.01	27.66
Emergent Herbaceous Wetlands	2.26	0.62
Total	365.13	100.00

Source: (MRLC 2021)

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur; therefore, recreation development would be expanded on USACE-managed land located above the conservation pool elevation of 522 feet amsl. USACE land use category for USACE-managed land around Lewisville Lake located above this elevation allows uses such as recreation, wildlife management, and project operations. USACE master plan allows recreational uses on the entire Pier 121 property, as shown in **Figure 10**. Development associated with the Proposed Action would fall entirely under the category of recreation. Land use would be consistent with USACE's land use classification and would remain consistent with the general character of the surrounding area, which currently has multiple businesses such as marinas, restaurants, boat rental/storage, and retail storefronts.

Within the Project Area, development will occur on previously developed land and within undeveloped herbaceous, forested, and open space areas. The percentages of land cover types within the Project Area will change, but these changes are not expected to negatively impact the uses of the surrounding area.

Under the Preferred Alternative, the Pier 121 Project Area falls within the *Green Centerpiece Master Strategy Update* proposed strategy footprint. The proposed development is consistent with the goals of the Green Centerpiece Master Strategy. Specifically, Section 14 of the Green Centerpiece Master Strategy identifies Recreation and Education as a key component of the strategy. The plan lists a number of intended recreational uses of the Green Centerpiece area including camping, dining, lodging, boating, and “other meaningful and engaging outdoor recreation experiences for visitors.” The proposed development meets the strategy goals of this plan by adding trails, a surf skills training facility, and opportunities for camping, dining, lodging, and boating.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no changes to the existing land uses within Project Area would be made. Therefore, the land uses would remain as described in the affected environment section. Additionally, under the No Action alternative, the Proposed Action would not occur; therefore, the Green Centerpiece Master Strategy goals would not be accomplished within the Project Area footprint that overlaps the Green Centerpiece Master Strategy.

5.3.3. Farmlands

Affected Environment

According to the USDA NRCS Web Soil Survey, roughly 48.8 percent of the Project Area (178.2 acres) is classified as prime farmland, and 22.2 percent of the Project Area (186.98 acres) is classified as non-prime farmland (USDA 2022). None of the land on the Pier 121 property has been or is currently being used as farmland. According to the 2020 Lewisville master plan, the Project Area is zoned as a high-density recreation area specifically set aside by USACE for intensive recreational use for the public. Therefore, coordination with the USDA NRCS under the Farmland Protection Policy Act is not required.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur, and some of the land classified as prime farmland (according to the USDA NRCS Web Soil Survey) would be modified for recreational use. The Project Area is not currently used as farmland; therefore, no loss or conversion of prime agricultural land used for farming practices would occur. The Farmland Protection Policy Act does not apply to the Proposed Action and does not require coordination with the USDA NRCS.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no conversions from, or removal of, any prime agricultural land or prime soils within the Project Area would occur. Because the land is zoned as a high-density recreation area specifically set aside for intensive recreational use, the Project Area would remain zoned for its intended purpose as described in the affected environment section.

5.3.4. Socioeconomic Resources

Affected Environment

The EPA requires consideration of socioeconomics in NEPA analysis. Specifically, Section 102(A) of NEPA requires federal agencies to “insure the integrated use of the natural and social sciences...in planning and in decision making” (42 U.S.C. § 4332(A)). Socioeconomics refers to a broad, social science-based approach to understanding a region’s social and economic conditions. It typically includes descriptions of the population, demographic characteristics, economic activity indicators, housing characteristics, property values, and public revenues and expenditures.

Population growth is an important subject for this Final EA given the stated need for increased recreation access to serve growing local populations. Income is a key socioeconomic parameter because income is essential to gauging the relative economic status of individuals or households in the region. More specifically, per capita income is useful as an indicator of the relative income level across two or more areas. Household income is also a useful measure and is often used instead of family income to include the many single-person households and households composed of unrelated individuals. Median household income is the income at which half of all households have higher income, and half have lower income. Employment status is a key socioeconomic parameter because employment is essential to the income of a substantial portion of the adult population. The federal government calculates the unemployment rate as the number of unemployed individuals who are looking for work divided by the total number of individuals in the labor force. The following subsections evaluate the above parameters for Denton County and the state of Texas.

Population Growth

In 2010 Denton County had a total population of 662,614 in 2010 and 933,220 in 2021 (U.S. Census Bureau 2021a) an increase of 40.8 percent from 2010 to 2021 (North Central Texas Council of Governments 2022). The state of Texas had a population of 25,145,561 in 2010 (U.S. Census Bureau 2010) and 29,527,941 in 2021—an overall population increase of 17.4 percent from 2010 to 2021. These statistics show that Denton County is growing in population at a

much higher rate than the state of Texas as a whole. See **Table 5-5** for a comparison of population growth throughout the region.

Table 5-5. Regional Population Growth

Area	2010	2021	% Growth 2010–2021
The City of Lewisville	95,290	109,270	14.7
Denton County	662,614	933,220	40.8
Texas	25,145,561	29,527,941	17.4

Sources: (U.S. Census Bureau 2010; North Central Texas Council of Governments 2022).

Income

According to the 2021 U.S. Census, Denton County has a per capita income of \$47,126, a median household income of roughly \$97,671, and an average annual unemployment rate of 5.4 percent. The state of Texas had a per capita income of \$34,717, a median household income of \$80,304 and an average annual unemployment rate of 6.2 percent (U.S. Census Bureau 2021b: 03). These statistics show that Denton County has higher per capita income and household income and a lower rate of unemployment than the state of Texas.

Employment by Class of Worker and by Industry

Detailed employment data provide useful insights into the nature of a local, state, or national economy. **Table 5-6** provides figures on employment percentages by type of worker and by industry based on surveys conducted in 2021 by the U.S. Census Bureau. By class of worker (type of worker: private industry, government, self-employed, etc.), the percentage of private wage and salary workers in Denton County was slightly higher than the percentage for Texas. The percentages of government workers and self-employed workers in Denton County were slightly lower than the percentages for Texas.

By industry, Texas has a mixed economic base. In 2021, the percentages of people working in agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; retail trade; transportation and warehousing/ utilities; educational services, health care, and social assistance; arts, entertainment, and recreation; accommodation and food services; public administration, and other services was somewhat higher for the state than for Denton County. The state had somewhat lower percentages of people in wholesale trade; information; finance and insurance; real estate and rental and leasing; professional, scientific, and management; administrative and waste management services than Denton County.

Table 5-6. Employment by Class of Worker and by Industry, 2021

Class of Worker and Industry	Texas		Denton County, Texas	
	Estimate (# of People)	Percent	Estimate (# of People)	Percent
Civilian employed population 16 years and over	13,796,229	N/A	509,534	N/A
Class of Worker				
Private wage and salary workers	10,828,323	78.5	420,523	82.5
Government workers	1,985,990	14.4	60,526	11.9
Self-employed in own, not incorporated, business workers	953,003	6.9	27,041	5.3
Unpaid family workers	28,913	0.2	1,444	0.3
Industry				
Agriculture, forestry, fishing, and hunting; mining	304,046	2.2	3,917	0.8
Construction	1,075,579	8.5	28,731	5.6
Manufacturing	1,195,047	8.7	43,717	8.6
Wholesale trade	341,050	2.5	16,477	3.2
Retail trade	1,538,871	11.2	51,791	10.2
Transportation and warehousing; utilities	904,310	6.6	31,466	6.2
Information	217,088	1.6	15,896	3.1
Finance and insurance; real estate and rental and leasing	978,598	7.1	64,861	12.7
Professional, scientific, and management; administrative and waste management services	1,730,616	12.5	71,961	14.1
Educational services, and health care; social assistance	3,001,036	21.8	103,202	20.3
Arts, entertainment, and recreation; accommodation and food services	1,139,063	8.3	40,044	7.9
Other services, except public administration	680,249	4.9	23,068	4.5
Public administration	590,676	4.3	14,403	2.8

Source: (U.S. Census Bureau 2021b)

Housing

The housing stock is an important socioeconomic component of communities. The type, availability, and cost of housing in an area reflect economic conditions and affect quality of life. **Table 5-7** presents data for several common housing indicators for Denton County, Texas, and the state of Texas.

Table 5-7. Selected Housing Indicators, 2021

Selected Housing Indicators	Texas		Denton County, Texas	
	Estimate (# of Units)	Percent	Estimate (# of Units)	Percent
Housing Occupancy				
Total housing units	11,867,820	N/A	362,777	N/A
Occupied housing units	10,796,247	91.0	350,081	96.5
Vacant housing units	1,071,573	9.0	12,696	3.5
Homeowner vacancy rate	0.9	N/A	0.3	N/A
Rental vacancy rate	6.5	N/A	4.5	N/A
Units in Structure				
Total housing units	11,867,820	N/A	362,777	N/A
1-unit, detached	7,698,136	64.9	247,777	68.3
1-unit, attached	357,804	3.0	6,751	2.6

Source: (U.S. Census Bureau 2021a)

As shown in **Table 5-5**, in 2021, Denton County had a higher percentage of occupied housing units (96.5 percent) than the state of Texas (91.0 percent). Denton County had a lower percentage of vacant housing units (3.5 percent) than the state of Texas (9.0 percent). Additionally, the percentage of detached single-unit housing (also known as single-family homes) in Denton in 2021 (68.3 percent) was higher than the state of Texas (64.9 percent). The rental vacancy rate in Denton County (4.5 percent) was lower than the rate for the state (6.5 percent). This rate reflects “vacant units that are ‘for sale only.’”

Property Values

Property values have important relationships to both the wealth and affordability of housing in communities. **Table 5-8** presents median residential property values for Denton County and compares them to values for the state of Texas. The table shows that the median value of owner-occupied units in Denton County in 2020 (\$297,100) was higher than the corresponding value for the state (\$187,200).

Table 5-8. Residential Property Values, 2021

Residential Property Values	Texas Estimate	Denton County, Texas Estimate
Owner-occupied units (# of units)	6,761,002	228,352
Median Value (dollars)	237,400	361,600

Source: (U.S. Census Bureau 2021a).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur; therefore, additions to the Pier 121 Marina would have the potential to impact the socioeconomics of the region. In combination with future recreational development around Lewisville Lake, the Proposed Action would have positive impacts on the area's socioeconomic resources. Tax revenue generated by the facility would be used by local governments that serve the growing populations of Denton County and the City of Lewisville. Large increases in population in Denton County highlight the need for increased recreation in the area, and the Proposed Action would provide this to the local population of Lewisville. Therefore, the Proposed Action does have the potential to positively impact the socioeconomics of the region by increasing tax revenues and providing in demand recreational activities to a growing regional population.

It is inconclusive as to whether property values would be impacted negatively or positively by the Proposed Action as there are varying tradeoffs between natural resource benefits and recreational opportunities and an individual's personal preferences and perceptions. Some homeowners may prefer the natural setting of the current Project Area, and others may be interested in the recreational opportunities the Preferred Action proposes. Studies have shown that many factors affect residential property values in very specific contexts from general to local housing availability, urban form, transport systems, setting and feeling, and consumer preferences (OECD 2021). It would be difficult to evaluate the impacts of the Preferred Action on housing in the context of natural resources versus recreation. Property values would be expected to mirror those of the broader area, and no long-term significant impacts would be expected as there would be a balance between perceived negative and positive impacts, which can be largely subjective. Ultimately, there would be a trade-off between the two, and the role of contextual matters would be a factor for individual homeowners and property users.

Construction of the Proposed Action is scheduled to take place from 2024-2029 and is designed in a phased approach. The Proposed Action will likely result in construction related traffic throughout the duration of this period. In addition to construction related traffic, it is also expected that general traffic to the area would increase due to the expansion of recreation opportunities offered at the Pier 121 Marina. However, results from a Traffic Impact Analysis done by Traffic Impact Group, LLC (Traffic Impact Group) conducted in January of 2022, concluded that the Pier 121 Marina Proposed Development is expected to have an overall minimal impact to the intersection of Lake Ridge Road & Leora Lane (the main road leading to the Marina entrance) with the addition of the new project access road as shown in **Figure 11**. Furthermore, the Traffic Impact Group conducted an additional Traffic Impact Analysis in January of 2023 based on comments received from the City of Lewisville highlighting that the

Turn Lane/Access Management Analysis conducted in the January 2022 report was not up to date and was based on old traffic volume estimates. After analysis of the updated January 2023 Traffic Report, it was determined that there is a need for a right-hand turn lane on Lake Ridge Road turning into the Pier 121 Marina Property. See Appendix D for the full January 2022 and January 2023 Traffic Impact Analysis Reports. As a result of the report findings, SHM will design and construct the right-hand turn lane, thus reducing traffic potentially resulting from Pier 121 Marina guests waiting to turn into the Marina property.

Therefore, the Pier 121 Marina is not expected to significantly adversely affect the surrounding communities by increasing overall traffic in the area.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no additions to the recreational amenities offered at the Pier 121 Marina would occur and no additional permanent or temporary jobs would be created from construction and operation of the park. If the Proposed Action does not occur, there would be no effect on nearby populations as a result of the development and the socioeconomic indicators of the region would be consistent with those listed in the affected environment section.

5.3.5. Infrastructure

Affected Environment

The Project Area is served by existing road and drainage, water, electrical, and sanitary sewer infrastructure. This infrastructure is summarized below:

Existing Road Access and Drainages

The current site is serviced by a varied-width asphalt road named East Hill Park Road. This road is the only access to the Pier 121 Marina from the intersection of East Hill Park Road and Lake Ridge Road. This road runs through the entire Project Area, and other roads lead from it to a boat sale establishment, multiple maintenance buildings, and various parking areas. Drainage in the Project Area is minimal and mostly consist of ditches and culverts to divert sheet flow water away from the site directly into Lake Lewisville.

Existing Water Services

The site receives water service from the City of Lewisville Public Water System and uses around 34,000 GPD. An existing 12-inch water main running along East Hill Park Road provides water to all existing buildings, marina structures, and fire hydrants in the Project Area, which are individually metered. The Pier 121 Marina development is less than 1 mile from one of the city's

water treatment and distribution plants, and a 24-inch transmission main which is located along Lake Ridge Road.

Existing Electrical Services

The existing electrical is provided by CoServe Electric via underground utility mains with individual meters to each existing structure. The primary electric mains will require an upgrade to support the Proposed Action.

Existing Sanitary Sewer Services

The site is served by the City of Lewisville public sanitary sewer system. Currently, sanitary sewer services at the site consist of an existing lift station and 4-inch force main running along East Hill Park Road. This force main discharges into an existing 4-foot-diameter manhole on the north side of the intersection of East Hill Park Road and Lake Ridge Road. The on-site sewer system is adequately sized for existing flows but will require upgrades to support the Proposed Action.

Off-site, large portions of the existing downstream sanitary sewer system are currently undersized for existing City of Lewisville flows. At present, when the sewer system fills, it stops acting as a gravity main and begins acting as a pressure pipe system. When this happens, manholes can fill with effluent, creating a head pressure that forces the sewage through the pipes at higher rates, effectively increasing the capacity of the system (surcharging the system). This surcharging allows the system to handle greater demand flows than if it remained in gravity flow. The City of Lewisville has accepted surcharging as a reasonable temporary solution while other off-site improvements are planned, designed, and constructed by the city to handle existing and proposed development throughout their sewer system.

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur, which would require SHM to make several internal infrastructural improvements within the Project Area to accommodate the Proposed Action. These improvements are summarized below:

Upgrades to Road Access and Drainages

East Hill Park Road will be widened to a width of 36 feet and realigned in some areas to service the new facilities and provide room for a fire lane. A future secondary connection is proposed at the existing intersection of Lake Ridge Road and Leora Lane for access into the proposed glamping and RV area. Additionally, SHM proposes to construct a right-hand turn lane offsite of the Pier 121 Property along Lake Ridge Road at the intersection of Lake Ridge Road and Leora Lane to facilitate traffic flow into the marina. SHM employees, contractors, and the public at

large will utilize all of the proposed road improvements. See **Figure 11** for a diagram showing the proposed road upgrades and their intended access for private or public use. These upgrades to road access and drainages are being proposed to help alleviate traffic and to allow larger vehicles in and out of the property during both construction and eventual use of the property.

Upgrades to Water Services

As previously mentioned, the Pre-proposed Development flow of the Pier 121 Marina is 34,000 GPD and is provided by the City of Lewisville. The water demand required under the Preferred Alternative, the Proposed Development, is 440,000 GPD. Approximately 152,000 GPD will be serviced by the City of Lewisville and 288,000 GPD will be serviced by a private well located on the Pier 121 Marina property. The City of Lewisville will service potable water to the lodge, boats Sales office, and any other potable water needs, while the on-site well will be servicing the surf simulator pool refill, irrigation, and all other non-potable uses.

Due to the increased water demand on site, a portion of the existing aforementioned 12-inch water main will remain to service the future development, but the rest of the main will be removed to make way for new water infrastructure to accommodate the additional flow and the number of sites and structures requiring water on site. Additionally, a 12-inch water stub at the intersection of East Hill Park Road and Lake Ridge Road is currently not servicing any area; this water stub will be utilized to service the future glamping and RV area.

The City of Lewisville has performed a water modeling study for the Proposed Action and determined that the existing 24-inch transmission main will be able to provide adequate pressure to the new development. However, this will require looping public water mains of 8–12 inches throughout the development, which is included in the proposed water system design. No off-site improvements are expected to be needed to maintain acceptable pressures within the City of Lewisville’s existing system and the new development, but the city may need to purchase additional water from its supplier, the DWU, to meet yearly volume needs. The City of Lewisville has indicated that it is nearing its current yearly volume allotments for water provided by DWU. Once The City of Lewisville reaches the limit of its current agreement, it will be required to purchase additional water from the DWU. The City of Lewisville is continuing to investigate the water demand models to determine whether and when this trigger will occur.

Therefore, the Proposed Action will impact water demand in this area and may push the volume requirement past the city's current agreement threshold; however, the Proposed Action’s impact on the overall water demand for this area is minimal, and the purchase of additional water from DWU will soon be necessary regardless of the potential impact of the Proposed Action. Therefore, the upgrades included in the Proposed Action are not expected to cause significant direct impacts, but rather will contribute to an existing issue that may be exacerbated by the Proposed Action.

Upgrades to Electrical Services

The Proposed Action will require expanded and improved electrical upgrades throughout the Project Area. Much of the existing underground electric system will be removed when the roads are relocated and excavation for the new facilities is underway. Additionally, SHM proposes to install solar panels on existing structures within the marina to supplement power to on-site recreation amenities. The proposed electrical infrastructure will be sized to accommodate the increased demand loads from the wave pool, lodge, and RV park. All proposed electrical infrastructure will be underground. No off-site electrical improvements are expected to serve the new facilities. The necessary upgrades to on-site electrical infrastructure are not expected to create significant impacts on the surrounding areas.

Sanitary Sewer Services

The Proposed Action will require several upgrades to sewage and wastewater disposal infrastructure within the Project Area. The existing on-site sewer system is served by the existing lift station and 4-inch force main and currently discharges into the public gravity system at Lake Ridge Road. This existing system does not have capacity for the Proposed Action and will be removed and replaced during the initial phase of development.

A new lift station and force main to service both the existing and proposed uses of the Project Area will be built. The new force main will connect to the existing 4-foot-diameter manhole and will be gravity fed the rest of the way through the City of Lewisville sanitary sewer system. See **Figure 12** for an overview of the proposed sewer infrastructure. After existing connections to the existing lift station have been connected to the new lift station, the existing lift station and force main will be demolished or abandoned in place.

The on-site sewer system will be expanded during subsequent phases of the Proposed Action. The receiving sewer main immediately downstream has capacity for the Proposed Action flows and will not require an upgrade.

As discussed in the existing Sanitary Sewer Services section, further offsite the downstream gravity sewer system is over capacity for both existing and proposed conditions. By allowing the sewer system manholes to surcharge, the sewer system has capacity for the current flows. The additional flows from the Proposed Action will exacerbate the surcharging of the system. This is deemed acceptable so long as the elevation of the effluent does not fill a manhole above the rim elevation, which would result in sewage potentially escaping the top of the manhole and releasing to the surface. This system was modeled with the added flows of the Proposed Action, and it was found that one manhole has the potential to surcharge above the rim elevation. Raising this manhole rim elevation would prevent effluent release and keep all surcharging to

acceptable levels. Therefore, raising this manhole is included with the initial phase of development.

Given the planned modifications to the sewer infrastructure and surficial manholes, the Proposed Action is not expected to cause any short-term or long-term adverse effects to the Project Area or surrounding areas.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no upgrades to the existing road, water, electrical, or sewer infrastructure at the Pier 121 Marina would be needed. The Project Area infrastructure would be consistent with the infrastructure described in the affected environment section.

5.3.6. Recreation

Affected Environment

National USACE policy limits recreation development on USACE lands to activities that depend on the area's natural resources. This typically includes water-based activities, overnight use, and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resorts. Examples of activities that do not depend on an area's natural resources include athletic fields for organized sports, theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, and golf courses.

Recreation development by lessees operating on USACE lands must follow policy guidance contained in USACE regulations at ER 1130-2-550, Chapter 16. That policy includes future recreation development that accommodate or supports water-based activities, overnight use, and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resort facilities.

Lands classified as high-density recreation areas are suitable for the development of comprehensive resorts. The regulation cited above defines a comprehensive resort as "multi-faceted developments with facilities such as marinas, lodging, conference centers, golf courses, tennis courts, restaurants, and other similar facilities" (USACE 1996: 16-2).

Existing recreational opportunities around Lewisville Lake in Denton County include numerous water-related and outdoor activities, including boating, camping, swimming, and outdoor sports. The Pier 121 property is located on the edge of the southernmost part of Lewisville Lake and is categorized as a high-density recreation area according to the 1985 USACE Master Plan and its subsequent versions (see **Figure 10**). High-density recreation areas are defined as land

developed for intensive recreational activities by the visiting public, including developed recreation areas, areas for marinas and related concessions, and resorts (USACE 1985).

Urban counties with populations greater than 500,000 (including Bexar, Collin, Dallas, Denton, El Paso, Fort Bend, Harris, Hidalgo, Tarrant, and Travis) within Texas account for 58 percent of the state's population but they contain only 8.4 percent of recreation and conservation lands available to the public; therefore, people in urban counties typically have to find recreation opportunities outside their immediate areas of residence (Cushman & Wakefield 2020). In contrast, according to the 2020 Lewisville Lake Master Plan the majority of visitors to Lewisville Lake come from Denton, Collin, Tarrant, and Dallas counties. Between 2013 through 2017, approximately 76 percent of visitors came from within 50 miles of the lake. This speaks to the importance of Lewisville Lake as an important recreational area for local residents.

According to a Feasibility Study conducted by Cushman and Wakefield in 2020, the tremendous growth in the region's population in recent years has resulted in a considerable increase in the types and numbers of land use requests from entities around Lewisville Lake and other lakes such as Grapevine, Lavon, and Ray Roberts. This growth has led to the revision of master plans for multiple USACE lakes and reservoirs, as well as major park systems in the Dallas-Fort Worth metro area. Currently, Lewisville Lake has 21 recreation areas, and modifications or additions to these existing facilities are proposed for 15 of them.

Table 5-9 presents an inventory of recreation facilities for the Pier 121 Marina. This table is based on the existing recreation areas and facilities available at the Pier 121 Marina.

Table 5-9. Existing Recreation Areas and Facilities at the Pier 121 Marina

Recreation Amenities	Quantity of Existing Recreation Amenities at Pier 121 Marina	Quantity of Amenities with the Proposed Development at the Pier 121 Marina	Quantity of Existing Recreation Amenities in the Lewisville Lake Area
Wet Boat Slips	1,350	1,350	2,708
Restaurants/ bars	1	> 5	3
Surf Simulator/Surf Beach/Pump Park	0	1	0
Splash Pad Area-Tot Area	0	1	0
Boat Launches	4	4	23
Private Volleyball Courts	0	2–6	19
RV sites	0	330	N/A
Campsites and/or glamping sites	0	28	N/A
Cabins/ Park models on wheels	0	32	N/A
Lodge/Inn/Hotel/Motel (the number of rooms)	0	150	8

Private Walking and Biking Trail	0	> 1.5 miles	31.2 miles
Sailing Center	1	1	1

Per USACE’s 1999 PEA, no more marinas are planned for Lewisville Lake other than those allowed in the 1999 PEA, which included the Proposed Action. The number of boat slips for marinas was determined in the 1999 PEA, in accordance with the findings of the Water-Related Recreation Use Study. Therefore, the overall number of boats in a given zone of the lake is not expected to increase above levels prescribed and discussed in either the 1999 PEA (Carter & Burgess, Inc. 1999) or the Water-Related Recreation Use Study (USACE 2000).

Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur, therefore the enhancement of many on-site recreational amenities would occur including the addition of a surf beach, the addition of a guest lodge, an overnight RV park and glamping campground. The increased facility capacity would increase the recreation opportunities available to the local population consistent with USACE policy guidance contained in USACE regulations at ER 1130-2-550, Chapter 16 on the use of USACE owned high density recreation classified land.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no upgrades to the existing recreational amenities offered at the Pier 121 Marina would be made, including the lodge, surf beach, RV park, and campground. The Project Area recreational amenities would remain consistent with those described in the affected environment section.

5.4. ENVIRONMENTAL JUSTICE

5.4.1. Affected Environment

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address, to the greatest extent possible, disproportionately high, and adverse human health or environmental effects of federal programs, policies, and actions on minority and low-income populations.

Pursuant to the EPA guidance provided in Promising Practices for EJ Methodologies in NEPA Reviews, the EJScreen Environmental Justice Mapping and Screening Tool was used to preliminarily evaluate the Pier 121 Marina Project Area surroundings and to identify potential at risk low-income or minority populations. To conduct this preliminary analysis in EJScreen, a geographic area encompassing one census block that overlaps the Project Area and one census block group that directly abuts the Project Area were selected (block groups 481210215171 and

481210215172, Texas, EPA Region 6, respectively). The tool provided all available demographic and environmental information for these census block groups.

The index scores for the selected census block groups were compared to the index scores for the state of Texas and are expressed in terms of percentile.³ It should be noted that no populations permanently live within the Project Area or within the Marina property. Outside of the Project Area, within the selected census blocks overlapping or directly abutting the Project Area, people of color account for 71 percent of the total population. This is within the 61st percentile for the state, meaning the percentage of people of color in the selected census block groups is equal to or higher than 61 percent of the areas within the state of Texas. Low-income populations accounted for approximately 10 percent of both census block groups, which is within the 16th percentile for the state compared to the state low-income population data. Likewise, the unemployment rate for the census block groups is approximately 1 percent, which is within the 31st percentile for the state. The state unemployment average is approximately 5 percent.

An analysis of environmental justice indexes for the 12 environmental indicators (particulate matter 2.5, ozone, diesel particulate matter, air toxics cancer risk, air toxics respiratory hard index, traffic proximity, lead paint, risk management plan facility proximity, hazardous waste proximity, superfund proximity, underground storage tanks (USTs)/ leaking underground storage tanks (LUSTs), and wastewater discharge) showed that the census block groups above are in the 55th percentile for particulate matter 2.5, ozone, diesel particulate matter, air toxics cancer risk, air toxics respiratory hard index, and wastewater discharge and are below the 55th percentile for traffic proximity, lead paint, risk management plan facility proximity, hazardous waste proximity, superfund proximity, and USTs/ LUSTs compared to the state environmental data (USEPA 2022). EJScreen is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location.

³ Interpreting percentile in EJScreen: If percentile results indicate that a specific area's minority population falls within the 56th percentile of the state, this means that the minority population in this area has an equal or higher percentage of minority groups than 56% of areas within the State of Texas.

5.4.2. Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

While the EJ Screening Tool indicates that populations of color live in the surrounding areas at an equal or greater percentage than 61 percent of all other census block groups in the state of Texas, the effects of the Proposed Action are not expected to negatively impact these communities. Instead, the Proposed Action will provide access to additional outdoor recreation and enjoyment activities to better serve these populations. Additionally, the EJ Screening tool indicated that low-income populations accounted for approximately 10 percent of both census block groups and, furthermore, these census block groups have an estimated rate of unemployment of 1 percent. This, coupled with the fact that tax-generated revenue from the facility will be directed to the surrounding communities, means that local residents will benefit from access to the increased opportunities for outdoor recreation activities and from the additional revenue that will flow into their communities and fund a variety of public services.

Finally, although this area has increased levels of existing air and particulate pollution as compared to the State of Texas, under the Proposed Action less than significant emissions would occur for all of the EPA NAAQS criteria pollutants, and 8-Hour ozone exceedances are not anticipated. Therefore, additional impacts to environmental impacts to minority populations and underserved communities are not likely as a result of the Proposed Action.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, construction on the property would not occur and would not cause disproportionately high or adverse human health or environmental effects on minority and low-income populations. The potential risk to low-income or minority populations near the site would remain consistent with those described in the affected environment section.

5.5. HISTORIC AND CULTURAL RESOURCES

5.5.1. Affected Environment

According to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, federal agencies are required to consider the effects on historical properties of the projects or undertakings they carry out, assist, fund, permit, license, or approve. If a federally assisted project has the potential to affect historic properties that are within “the proposed area of potential effects” (APE), then a Section 106 review is required. More specifically, this review process requires federal agencies to consider the effect of an undertaking on any district, site, building, structure, or object that is listed on, or eligible for listing on, the National Register of Historic Places (NRHP) before issuance of federal licenses and permits, or before the

expenditure of federal funds. Properties that are either listed on, or eligible for listing on the NRHP, are provided the same measure of protection under Section 106.

Since the City of Fort Worth is a sub-entity of the State of Texas, this project is subject to the Antiquities Code of Texas. The project also has a federal nexus due to the USACE CWA Section 408 permitting process. As such, the project will be conducted in compliance with Section 106 of the NHPA.

An Archeological Investigation was initially completed in April of 2022. Follow-up visits occurred in October of 2022 to investigate a potential 1925 historical road feature identified based on lidar and infrared imagery archival research and to perform a Historic Resources Survey. The archaeological survey and background study identified extensive disturbance to the northern section of the project APE and less disturbed areas of terraced grassland/ wooded areas south of the lake shoreline. Most of the disturbances within the Project Area were located near the existing Marina and were related to the construction of storage facilities, roads, boat docks, and utility corridors. The survey identified two new historic-age sites during the survey, 41DN636 and 41DN639, both of which are recommended as not eligible for listing in the NRHP under Criteria D. Additionally, the previously recorded site 41DN471 was not relocated and is considered destroyed. No additional cultural material was observed on the surface or subsurface of the project APE.

According to a Built Environment Survey conducted in September of 2022, Lewisville Lake Marina contains 3 historic-age buildings, 30 historic-age structures, and 1 historic-age road. Building 1 is a storage warehouse, Building 2 is an office, and Building 3 is a garage. The 30 structures are open-air pavilions used for lakeside recreation. The road is East Hill Park Road, which accesses the lakeside recreation. Other buildings in the Project Area are not historic age and were not found to have exceptional significance under Criteria Consideration G. Results of the survey findings indicate that no identified properties or districts are recommended eligible for the NRHP as a result of the built environment survey.

As part of the Section 106 process, USACE also conducted tribal consultation with federally recognized tribes that have an ancestral interest in the general Project Area. On September 6, 2022, a letter was mailed to these local tribes. No comments, concerns, or issues were raised by any of the local tribes as part of the tribal consultation process, and no traditional cultural properties or tribal resources were identified.

5.5.2. Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the preferred alternative, the proposed action would occur, therefore construction would occur in areas with potential to contain historic or archeological resources. However, due to the determination of both identified sites (41DN636 and 41DN639) as not eligible for listing in the NRHP under Criteria D, and due to the confirmation that existing site 41DN471 was destroyed, the Proposed Action is highly unlikely to impact directly or indirectly any known or unknown archeological resources eligible for the NRHP or eligible to be a Texas State Antiquities Landmark. In addition, no known NRHP-eligible properties or districts have been identified within the APE. Therefore, the Proposed Action would not cause direct or indirect visual effects to any above-ground historic properties. For this reason, it was determined that no additional archeological investigations are warranted, and that SHM may proceed with their development plans.

However, if any unanticipated cultural materials or deposits are found at any stage of clearing, preparation, or construction, the work will cease, and USACE personnel will be notified immediately. The project has a low probability of encountering human burials; however, if burials are found, work will stop, and USACE, Denton County, and the Texas Historical Commission will be notified immediately, and all requirements of 8 THSC 711 will be followed. If any unanticipated cultural materials or deposits are found at any stage of clearing, preparation, or construction, the work will cease, and USACE personnel will be notified immediately. The project has a low probability of encountering human burials; however, if burials are found, work will stop, and USACE, Denton County, and the Texas Historical Commission will be notified immediately. All requirements of Title 8, Chapter 711 of the Texas Health and Safety Code will be followed.

No Action Alternative

Under the no action alternative, the proposed action would not occur, therefore construction of the previously undisturbed area on the property would not occur and would not affect any potential historic or archeological resources located on site. Therefore, the historical and cultural resources on site would remain consistent with those described in the affected environment section.

5.6. HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

5.6.1. Affected Environment

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund

Amendments and Reauthorization Act, and the Toxic Substances Control Act. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, which was further amended by the Hazardous and Solid Waste Amendments, defines hazardous wastes. In general, both hazardous materials and hazardous wastes include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or to the environment when released or otherwise improperly managed.

Unless otherwise exempted by CERCLA regulations, the Resource Conservation and Recovery Act Subtitle C (40 CFR Parts 260 through 270) regulations are administered by the TCEQ and are applicable to the management of hazardous wastes. Hazardous waste must be handled, stored, transported, disposed of, or recycled in accordance with these regulations. The Pier 121 Marina currently does not generate hazardous waste as part of its operation.

The EPA has delegated to the TCEQ the responsibility of tracking hazardous waste generation and disposal within the state of Texas. A review of the USEPA Facility Registry System and the TCEQ online databases was performed to identify the presence or absence of locations of potential environmental concern within the Project Area. The USEPA database contains facilities information regarding pollutant air releases, toxic releases, hazardous wastes, water discharge permits, and superfund sites. The TCEQ databases contain information regarding facilities listed under Part 201, Environmental Remediation; Part 213, Leaking Underground Storage Tanks; Part 211, Regulated Underground Storage Tanks (UST); Part 115, Solid Waste Management; and Part 111, Hazardous Waste Treatment, Storage, and Disposal Facilities, of the Natural Resources and Environmental Protection Act, as amended.

Due to the nature of these databases, the difficulty of interpreting the datasets, and the available details, the information provided herein is preliminary. According to the 1999 PEA, the Pier 121 Marina has three registered USTs that are regulated by the TCEQ. Each underground storage tank contains gasoline and has a capacity of 4,000 gallons. This site is not a listed underground leaking petroleum storage tank site. No additional regulated sites were identified within the ASTM specified radius used in the PEA, and no environmental concerns were identified during the site reconnaissance that was performed. The ASTM radius used in the 1999 PEA consisted of an investigation into all areas within 1 mile of USACE-owned lands. The 1999 PEA area extends beyond the spatial extent of the focused Project Area used in this Final EA.

At the time of preparation of this Final EA, a more detailed investigation of the Project Area used for the evaluation of this Final EA showed one USEPA database listed facility associated with three underground storage tanks located within the Project Area and 57 facilities within the 1-mile buffer (USEPA 2021). In addition, at the time of preparation of this Final EA, the

TCEQ database indicated that no active USTs, closed USTs, open LUSTs, or closed LUSTs are located within the Project Area. The discrepancy between the 1999 PEA findings and the findings from the detailed project investigation may be due to a difference in classification of the three underground storage tanks on site as they are accounted for in both databases but classified differently in each analysis. Additionally, at the time of preparation of this Final EA, the TCEQ database indicated four active USTs are located within the 1-mile buffer (EGLE 2022). Additionally, one Industrial and Hazardous Waste Corrective Action related to an Office Warehouse Storage Facility was identified outside of the Project Area, within the 1-mile buffer; it is at 100 Lake Ridge Rd (see **Figure 13**).

For further review of potential environmental constraints associated with TCEQ database sites, a database search through a supplier, such as an Environmental Data Resources radius report, would be required. Additionally, users of the Marina property likely have petroleum, oils, and lubricants used in the personal vehicles and boats brought on site, however, contamination from these sources are not recorded in any EPA or TCEQ databases.

5.6.2. Environmental Consequences of the Alternatives

Preferred Alternative (Proposed Action)

Under the Preferred Alternative, the Proposed Action would occur, and construction of the lodge, surf beach, the RV and glamping park, and upgrades to the existing park would occur. Although not expected and unlikely to occur, soil contamination in the Project Area could potentially result from two sources: (1) hazardous material or fuel spills during construction and (2) pre-existing contaminated areas that are encountered during construction. Analysis of both the EPA and TCEQ databases indicate prior existing contamination on site, however, the extent of prior contamination is unclear. Furthermore, it is likely that users of the Marina would have petroleum, oils, and lubricants in their personal vehicles that could have or will potentially contribute to past or future contamination. However, contamination resulting from such sources has not been recorded in either the EPA or TCEQ databases and has not been deemed a significant source of contamination within the Project Area. Additionally, the Pier 121 Marina operations do not currently generate, and do not intend to generate under the Proposed Action, any hazardous waste as part of its operations. Therefore, there is no anticipated significant adverse impacts expected as a result of hazardous, toxic, or radioactive waste.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; therefore, no upgrades to the existing recreational amenities offered at the Pier 121 Marina would be made, including the lodge, surf beach, RV park, glamping campground, etc. As a result, no additional construction activities, or facility operations with the potential to produce hazardous waste

would occur. Thus, the existing hazardous, toxic, and radioactive waste conditions would remain consistent with those described in the affected environment section.

6. CUMULATIVE ENVIRONMENTAL EFFECTS SUMMARY

NEPA regulations (40 CFR §§ 1500–1508), as issued by the Council on Environmental Quality (CEQ), require addressing the incremental impact of a federal agency’s action (in this case, USACE’s Proposed Action) when added to other past, present, and reasonably foreseeable future actions no matter which agency (federal or non-federal) or person undertakes such other actions. These incremental impacts are referred to as cumulative impacts. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time and carried out various agencies or individuals (40 CFR § 1508.7).

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur, as well as a description of what resources could potentially be cumulatively affected. Cumulative impacts involve the combined, incremental effects of human activity (EPA 1999). In accordance with NEPA and to the extent reasonable and practical, this Final EA considers the combined effects of the No Action Alternative and Preferred Alternative with other past, present, and reasonably foreseeable actions that may affect the resources identified.

Although the Proposed Action may directly impact the local area surrounding the Pier 121 Marina, its impacts could extend beyond its footprint due to its location on and use of Lewisville Lake. Therefore, the geographic extent of the Proposed Action considered for the cumulative impact analysis includes the entirety of Lewisville Lake. USACE’s recent 2020 Master Plan reviewed this area as well. The approach used in this section is similar to the approach used in the master plan and includes the projects reviewed in the 2020 Master Plan as well as some additional projects. The timeframe considered for this analysis is 25 years.

6.1. PAST IMPACTS WITHIN THE ZONE OF INTEREST

Lewisville Lake was originally authorized by the Flood Control Acts of 1941 and 1944. Construction of the Lewisville Lake Dam began on November 28, 1948, and was completed in August 1955. Deliberate impoundment began on November 1, 1954. The total Project Area at Lewisville Lake encompasses 47,137 acres, including the 27,175 acres of surface water (based on the 2007 volumetric survey) at normal pool elevation of 522.0 NGVD29. The entire 46,001 acres were acquired in fee simple title by USACE with perpetual flowage easements on an additional 8,712 acres up to elevation 537.0 NGVD29. After the Lewisville Dam was built, the area around Lewisville Lake was transformed from a mostly agrarian area with abundant ranch homes to a fully urbanized area with a few tall apartment complexes dotting the region.

Three projects have modified the structures and operations of Lewisville Lake for the purpose of improving the environment in the public interest. These projects are governed by

Section 1135 of the 1986 Water Resources Development Act, as amended, and are summarized below.

- **Stewart Creek:** This 268-acre parcel of land is on the east side of the lake and includes the headwaters of Stewart Creek, which are on USACE fee property. The area is managed by USACE. The area consists of a riparian corridor and is adjacent to residential development upstream. Protection and potential restoration of the area are priorities, and maintaining the area as a visual and aesthetic buffer is important for this area. The Stewart Creek project involved construction of shallow marsh areas and restoration of riparian hardwoods. The restoration work involved construction of several wetland cells and the planting of old agricultural fields with several species of bottomland hardwood trees. The City of Frisco envisions maintaining natural surface trails and wildlife observation facilities on the leased premises when a lease is promulgated.
- **Hackberry Creek:** This 25-acre area is located on the headwaters of Hackberry Creek where it enters Lewisville Lake on the west side of FM 423. This location was included in the Frisco Section 1135 Environmental Restoration Project. The work along Hackberry Creek consisted of the construction of shallow wetland cells planted with beneficial aquatic plants.
- **Greenbelt Corridor and City of Denton Wetland Complex:** This area of 3,124 acres north of Highway 380 encompasses periodically flooded areas of the Elm Fork of the Trinity River. It includes mature bottomland hardwoods, mature riparian corridor, and constructed shallow-water wetlands managed by the City of Denton. The Texas Parks and Wildlife Department manages the narrow portion of this area known as the Greenbelt Corridor.

Lewisville Lake was initially built to provide a stable supply of water and for flood control. The flood damages prevented in the Elm Fork Trinity River basin by Lewisville Dam and Lake during fiscal year 2015 were estimated to be more than \$3.6 billion. The cumulative damages prevented since the completion of the project in 1955 through 2015 were more than \$35 billion, with an average savings of \$578 million per year. Lewisville Lake has a spillway; once waters reach the top of the spillway, they spill uncontrollably into the downstream area. Homes and businesses downstream may be flooded by this water or by the accumulated water from other creeks, rivers, and lakes. Homes and businesses that do not cross the flowage easements are not as likely to be flooded around Lewisville Lake.

Recently completed construction activities on Lewisville Lake Dam and associated structures included embankment modifications such as seepage collection systems and earthen berms. Additional modifications to the concrete river outlet structure is also occurring.

Due to safety concerns, visitors were not allowed to access the Lewisville Lake Environmental Learning Area due to the recent construction discussed above east of the river in 2020; this

included fishermen using the east bank access and hikers using the Bittern Marsh Trail. The City of Lewisville staff maintained the Bittern Marsh Trail throughout construction, but it was not available to visitors. All other Lewisville Lake Environmental Learning Area hiking trails remained open for the majority of the dam modification construction, and most programs and activities continued with minor modifications.

6.2. CURRENT AND REASONABLY FORESEEABLE PROJECTS WITHIN AND NEAR THE ZONE OF INTEREST

No more marinas are planned for Lewisville Lake other than the Tribute Marina which was slated for construction and discussed in the 1999 PEA. The number of boat slips for marinas was determined in the 1999 PEA, in accordance with the findings of the Water-Related Recreation Use Study. Therefore, the overall number of boats in a given zone of the lake is not expected to increase above levels prescribed and discussed in either the 1999 PEA (Carter & Burgess, Inc. 1999) or the 1998 Water-Related Recreation Use Study (later revised in 2000) (USACE 2000).

Future management of the 5,746 acres of Flowage Easement Lands at Lewisville Lake includes routine inspection of these areas to ensure that the government's rights specified in the easement deeds are protected. In almost all cases, the government acquired the right to prevent placement of fill material or habitable structures in the easement area. Placement of any structure that may interfere with USACE flood risk management and water conservation missions may also be prohibited.

The North Central Texas Council of Governments (NCTCOG) coordinates with cities, counties, and transportation partners to plan road, transit, bicycle, and pedestrian transportation improvements for the 16 counties comprising the NCTCOG, and it serves as the Metropolitan Planning Organization for the Dallas-Fort Worth Area. NCTCOG's Mobility 2040 plan was used as a reference document for the USACE Lewisville Lake Master Plan. Items recommended for implementation in the Mobility 2040 plan that are of significance to the area surrounding Lewisville Lake include the following actions (dates for all actions listed below have not yet been determined):

- Construct new road for I-35E, a regionally important arterial roadway
- Repair FM 423, a regionally important arterial roadway
- Repair FM 720, a minor arterial roadway
- Construct new road for US 380, a regionally important arterial roadway

National USACE policy set forth in ER 1130-2-550, Appendix H, states that USACE lands will, in most cases, only be made available for roads that are regional arterials or freeways (as defined in ER 1130-2-550:H-3). All other types of proposed roads, including driveways and alleys, are

generally not permitted on USACE lands. The proposed expansion or widening of existing roadways on USACE lands will be considered on a case-by-case basis.

Other local ongoing or future projects in the area include residential developments (particularly on the east side of the lake) associated with the continued growth and expansion of the Dallas-Fort Worth metro area.

As noted above, embankment work on the dam was completed in August 2021, although the last contract related to dam safety concerns was awarded in May 2022. The work is related to the auxiliary spillway at the far-east end of the dam, and it is expected to be completed in early 2027.

6.3. CUMULATIVE EFFECTS ANALYSIS

6.3.1. Topography, Soils, and Geology

Implementation of the Proposed Action is not expected to have any cumulative impacts to topography, geology, or soils since known past, present, and future actions involve shallow, superficial grading.

6.3.2. Air Quality

Implementation of the Proposed Action is unlikely to create significant air pollution emission sources other than those assessed in this Final EA and the 2020 Master Plan, since the Proposed Action would only add additional onsite amenities to an existing marina in the same location. Although increased vehicle and boat traffic in the immediate area would likely occur as a result of construction and operation, construction will be temporary, RVs will be parked in place, and the additional vehicular traffic will be less than significant. Additionally, the 2020 Master Plan factored in the Proposed Action and its increase in number of RVs, and traffic; therefore, no significant cumulative impact to air quality is anticipated as a result of the Proposed Action. Ongoing and future residential development in the area will continue to bring additional people and vehicular traffic into the areas east of the Project Area, which would result in increased emissions in the vicinity of the Proposed Action.

In the event that greenhouse gas emission issues become significant enough to impact the operations of the Proposed Action or the larger Lewisville Lake area, the 2020 USACE Master Plan would be reviewed and revised as necessary, which would potentially affect the operations of the Proposed Action. Therefore, the Proposed Action, when combined with other past, present, and future projects, would result in negligible cumulative impacts on climate change and greenhouse gas emissions.

6.3.3. Climate and Climate Change

Implementation of the Proposed Action has the potential to result in temporary nominal increases in greenhouse gas levels in the atmosphere (most notably carbon dioxide) during construction and operations due to equipment emissions. Construction would also include use of land-based construction equipment including, but not limited to, bulldozers, cranes, excavators, front end loaders, and various trucks. Greenhouse gas emissions from these types of construction equipment and transport vehicles is also anticipated to be minimal. Proposed additions to the Marina would be designed in alignment with USACE Climate Change Adaptation Policy governance. Given the recent increases in development in the area and within the greater Lewisville and Denton County regions, the greenhouse gas levels within the Proposed Action area and surrounding areas have likely increased; however, due to the comparatively small scale of the Pier 121 proposed development in regard to its contributions to accelerating global climate change, it is not expected to be a main contributor. Thus, cumulative impacts to climate and climate change resulting from Proposed Action are not anticipated to be cumulatively significant.

6.3.4. Noise

Implementation of the Proposed Action has the potential to increase noise levels from people and automobiles in the immediate vicinity of the Project Area. The increase in noise would primarily occur during daytime hours. Existing boat and automobile traffic and noise in the park already causes some boat engine noise, and the potential increase in automobile traffic would not raise the noise levels, although it might increase the duration, primarily into evening hours. Given the recent increases in development in the area, the ambient noise levels in the Proposed Action area have likely increased. Thus, cumulative impacts resulting from Proposed Action are not anticipated to be cumulatively significant.

6.3.5. Water Quality

Much of the area on the east side of Lewisville Lake has been developed, mostly with residential construction. Although these types of projects are known to have an impact on water quality, primarily through the introduction of sediments into the lake water, the entities constructing these developments are governed by the Texas Pollutant Discharge Elimination System (TPDES). The TPDES requires the use of BMPs, under a maintained stormwater pollution prevention plan, to reduce the potential effects of sediments and other pollutants. Although implementation of the Proposed Action could result in minor temporary adverse impacts to water quality during construction phases, these impacts would be short-term in nature and would be minimized by the use of BMPs and the incorporation of an erosion and sediment control plan as well as spill prevention, control and countermeasure plans, also under the

direction of the TPDES (EPA 1999). In addition to TPDES oversight, developments with the potential to impact water quality resulting from in-water work such as boat ramp construction are also regulated by the USACE through the NWP process. SHM will comply with all applicable NWPs and their associated mitigation recommendations. Thus, through the TPDES oversight, USACE oversight, and use of appropriate BMPs, cumulative impacts resulting from Proposed Action are not anticipated to be significant.

6.3.6. Aquatic Resources

Currently, no other projects are active or are proposed at Lewisville that will individually or cumulatively have significant impacts to aquatic resources. Additionally, adjacent aquatic resources would not be affected by the Proposed Action or any foreseeable actions. These habitats are available to aquatic organisms that might be temporarily displaced by the Proposed Action. Any displaced aquatic resources are expected to return and reestablish after construction is complete. SHM will utilize typical soil erosion control BMPs and mitigation techniques in compliance with applicable NWP to minimize any potential effects to aquatic resources. Cumulative activities during operations are expected to be consistent with the mission of USACE for management of the water and lands of Lewisville Lake; therefore, cumulative impacts resulting from Proposed Action are not anticipated to be cumulatively significant.

6.3.7. Floodplains

Implementation of the Proposed Action must comply with current floodplain regulations and standards and there must be no net loss of flood storage (Carter & Burgess, Inc. 1999). Since the Proposed Action, as well as surrounding developments, must meet this standard, no significant cumulative impacts to floodplains are anticipated.

6.3.8. Wetlands

The only waters of the United States identified within the Project Area will be avoided during construction and protected during operations and maintenance. Therefore, no cumulative impacts to wetlands are expected as a result of the Proposed Action. Additionally, any impacts to Lewisville Lake are expected to be short-term, temporary, and will be naturally restored to its original state over time.

6.3.9. Vegetation and Wildlife

The Proposed Action would result in impacts to a largely previously disturbed area with limited native vegetation or shoreline. The surrounding areas are experiencing residential development and construction, which impact vegetation and wildlife communities, but the cumulative

impacts from the Proposed Action are expected to be less than significant based on the already disturbed nature of East Hill Park. Additionally, wildlife management areas and environmentally sensitive areas to the east and west of the Proposed Action areas have habitat that can be used by displaced wildlife.

6.3.10. Threatened and Endangered Species

An analysis of the USFWS IPaC and TPWD's RTEST resources lists in comparison to the Proposed Action determined that most federal and state-listed species lack suitable habitat within the Project Area. According to the IPaC species list, no critical habitats are located within the study area. The piping plover and the red knot should be considered in the effects analysis only for wind energy projects; therefore, the piping plover and red knot should not be considered in this cumulative effects analysis. Suitable habitat for federal and state-listed and MBTA migratory bird species was not identified within or near the site. Impacts to state-listed mollusks are not anticipated because major in-water work is not proposed for this project. The Texas horned lizard lacks suitable habitat within the Project Area. The alligator snapping turtle is also unlikely to occur within the Project Area due to habit constraints; however, mitigations are proposed to avoid any potential impacts. Although the monarch butterfly may occur within the Project Area, individuals are unlikely to be impacted due to its transitory nature along with post-construction mitigations to benefit the species. Similarly, bald eagles occur in the project vicinity and could be present on-site, although they are unlikely to be impacted as they would flee the site upon disturbance. Thus, no impacts to listed species are expected as a result of the Proposed Action. As no impacts are expected for the Proposed Action, impacts to species of concern are considered unlikely from other present or future projects due to the lack of suitable habitat.

6.3.11. Light and Aesthetics

The Proposed Action would be in a partially developed park with existing structures equipped with down shielded lighting and disturbed areas. The proposed facilities would be built in a manner consistent with existing facilities and uses to reduce aesthetic impacts and light pollution. USACE controls the land along the shoreline of the lake, and development of these lands is limited. Currently no other projects are active or are proposed at Lewisville Lake that will individually or cumulatively have significant impacts to aesthetics. Additionally, given that the marina is already equipped with lighting for the safety and security of its guests, any new proposed down shielded lighting will be consistent with what lighting currently exists on-site, therefore, cumulative impacts to surrounding areas due to light pollution are expected to be less than significant.

6.3.12. Land Use and Farmlands

Implementation of the Proposed Action is not expected to have any cumulative impacts to land use or farmlands since the Proposed Action would not adversely impact the intended recreational use of the land and would not convert or disturb any active farmlands whether or not combined with past, present, and future projects.

6.3.13. Socioeconomics

No additional marinas are planned for the lake per the USACE 2020 Master Plan, and the number of vessel allocations is not changing for the overall lake or within the Proposed Action area. Cumulative socioeconomic impacts are, therefore, not expected to be noteworthy. Based on the level of residential and commercial development in the surrounding area, the cumulative economic effect of the Proposed Action is expected to be minor.

6.3.14. Recreation

Implementation of the Proposed Action would increase the recreation opportunities in the rapidly growing Dallas-Fort Worth metro area. Vessel allocations are not changing with Lewisville Lake. All proposed vessel/boat slips for the marina are consistent with those allocated in the USACE 2020 Master Plan. Therefore, cumulative impacts related to recreational use of the lake is not expected to be significant.

6.3.15. Environmental Justice

The Proposed Action would not cause the displacement of minority or low-income people as a result of the marina complex expansion and facilities additions. Any impacts caused by the Proposed Action would not be environmentally disproportionate. Therefore, the effects of the Proposed Action on environmental justice, when combined with past, present, or future projects in the Lewisville Lake area, would have no cumulative effect.

6.3.16. Historic and Cultural Resources

Based on the results of the cultural resources surveys of the Project Area, no historic properties are present, and the Proposed Action would have no effect on historic properties. The Texas Historical Commission concurred with that determination. The Proposed Action would not result in impacts to cultural resources; therefore, implementation of the Proposed Action would have no significant cumulative impact on cultural resources.

6.3.17. Hazardous, Toxic, and Radioactive Waste

Users of the existing facility and boaters in the area will have fuels and other petroleum, oils, and lubricants in their personal vehicles and boats. However, the Marina would have a spill prevention, control, and countermeasures plan to reduce the potential impacts from these chemicals. Cumulative impacts could result from increased concentrations of vehicles and runoff from parking areas and traffic on the roads to the lake; however, the facilities would operate under the oversight of TPDES, function under stormwater practices, and use appropriate BMPs. Therefore, cumulative impacts resulting from the Proposed Action are not anticipated to be significant.

7. MITIGATION AND MONITORING

7.1. BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES FOR ALL RESOURCE TYPES

This chapter presents BMPs and mitigation measures that USACE would recommend or require to be implemented during construction, operation, or maintenance of the Proposed Action to help avoid or minimize potential impacts to various resources or potential impacts to infrastructure from various hazards. SHM would be required to implement these mitigation measures, as defined through permitting and/or consultation with appropriate resource agencies. Unlike mitigation measures, BMPs would not necessarily be required in every activity but would be applied as practicable or feasible during construction, operation, or maintenance of the Proposed Action. The BMPs and mitigation measures outlined in this chapter have been developed based on initial consultation with other agencies and through independent research conducted by USACE, SHM, or their environmental contractors. It is possible that other or additional site-specific BMPs and mitigation measures not included in this chapter may be recommended or required to be implemented as a result of consultation with other resource agencies, permit requirements, additional environmental reviews, or the public comment process. **Figure 14** shows a map of various mitigations for noise and vegetation conservation that SHM has agreed to in order to address some of the impacts related to on-site disturbance related to the Proposed Action. Detailed descriptions of these mitigation efforts are discussed below in their relevant sections.

- Mitigation of wetland impacts, defined by the CEQ (40 CFR 1508.20), includes avoiding impacts to wetlands, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts. Each of these aspects (avoidance, minimization, and compensatory mitigation) will be considered in sequential order for the purposes of discussing impacts to wetlands in the Final EA. In addition to avoiding these features, SHM will implement a 15-foot no development buffer around each identified jurisdictional feature and any foot paths or trails that may cross these jurisdictional features will be equipped with walking bridges to minimize the affected area in these zones. SHM will ensure that soil erosion and sediment controls are properly installed and maintained. All jurisdictional features will have boundaries clearly marked by flags so that wetland areas are avoided during construction. All flag markers will be maintained until construction is complete as applicable. SHM will also develop management plans such as storm water protection plans and sediment control plans for the management of wetland water quality and soils/erosion control.
- Mitigation of noise impacts include SHM establishing quiet hours in the RV resort and the vacation rental area from 10:00 pm to 6:00 am CST. Additionally, SHM has committed to providing a 100-foot vegetative buffer and an earthen berm with a maximum height of

10 feet that will be topped with native vegetative screening to provide a noise and visual buffer between the new development and the single-family development to the east (**Figure 14**). This buffer may be improved on behalf of the city to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. The addition of the open space and vegetative buffers will aid in noise cancellation and provide a level of sound screening to the adjacent properties. Additionally, SHM will follow ordinance noise requirements and limit all erection, excavation, demolition, alteration, or repair work to any buildings or structures to the hours of 6:00 a.m. and 8:30 p.m. Monday through Friday from June 1 to September 30; between 7:00 a.m. and 8:30 p.m. Monday through Friday from October 1 to May 31; between 8:00 a.m. and 8:30 p.m. on Saturday; and between 10:00 a.m. and 8:30 p.m. on Sunday. SHM will comply with the aforementioned construction windows. However, in case of urgent necessity and in the interest of public safety and convenience, the city building official may issue special permits for such construction work to occur at other hours with which SHM will comply. Additionally, facility-installed radios and noise emanating from maintenance sheds will comply with the City of Lewisville noise ordinance requirements.

- Mitigation of water quality impacts include creation and implementation of Soil Erosion and Sedimentation plans and Stormwater Management Plans (consistent with Section 402 of the CWA) and will be prepared for the development to ensure proper mitigation and BMPs are put in place to minimize sediment loads into nearby water bodies and properties. Typical BMPs used to reduce outfall velocities and prevent erosion include rock riprap, rock check dams, slope stabilization using both seeding and Curlex as needed, and silt-fence around all disturbed boundaries. Temporary sedimentation basins may be utilized where drainage areas greater than 10 acres are disturbed. Long-term detention will not be required for this site. SHM will minimize the total area of bare soil at any one time as much as possible by constructing the project in phases and restabilizing areas with vegetation as progressively and quickly as practicable. Additionally, SHM will comply with all applicable NWP's and their associated mitigation recommendations.
- Mitigation of floodplains includes a commitment by SHM to restrict fill below 522 amsl and to avoid fill between the 522 feet and 537 feet amsl wherever possible. In the event that fill between 537 feet amsl and 522 feet amsl occurs, it will be balanced with cut and fill activities to maintain preconstruction flood storage levels.
- Mitigation of traffic impacts include a commitment by SHM to design and construct a right-hand turn lane on Lake Ridge Road turning into the marina property prior to the end of the proposed development construction. The addition of this right-hand turn lane will prevent large back-ups down Lake Ridge Road due to buildup of guests waiting in a queue to turn right

into the marina property. The addition of a right-hand turn lane will allow for a steady and safe flow of traffic northbound on Lake Ridge Road.

- Mitigation of terrestrial vegetation will consist of SHM following all applicable federal, state, and local requirements for vegetation removal, disturbance, and restoration. SHM will restore disturbed areas with site appropriate vegetative cover (including native plants and invasive free materials (seed mixes, rock, mulch, soil) as progressively and quickly as possible using appropriate and certified seed mixes, and seed dispersal, management, and maintenance processes, as applicable (Figure 14). Specifically, SHM has proposed to add 16.20 acres of native prairie grasses, 16.61 acres of vegetated berms, 7.09 acres of trees, and preserve and supplement over 33.24 acres of existing areas of vegetation on site.
 - More specifically, Blackland Prairie vegetation will consist of either a larger native grassland and/or pocket prairies within the lease area (Figure 14). These areas will be seeded during dormant periods occurring in either the late winter or early spring. Vegetation will be watered weekly until it is established, and from that point will then be watered bi-weekly through the first summer season. During the second year, SHM will manage for invasive vegetation species like Johnsongrass and King Ranch bluestem, the herbicide Plateau will target Johnsongrass. In the third year SHM will continue management of the grassland vegetation and maintain a vegetation ratio of at least 65 percent native species within three years. In areas planted with turfgrass, SHM will seed with buffalograss or bring in buffalograss sod to ensure the vegetation establishes readily with success. As with the native prairie grass, approximately 65 percent of the turf grass should be established buffalograss within three years. Along with these overall efforts, SHM will also look to incorporate the planting and seeding of native milkweed and other nectar plants during these revegetation efforts.
 - Regarding woody vegetation mitigation, SHM will plant a native tree at each of the proposed RV and campsites, this not only is beneficial to natural resources, but is also great for USACE's recreation mission to provide shade, and aesthetics to the area (Figure 14). Planted trees will be native to North Central Texas and sourced from local nurseries. SHM will utilize USACE recommended native tree species including: bur oak, Shumard oak, pecan, Mexican plum, common persimmon, and redbud. In addition to be native species, these species establish very well and provide additional wildlife habitat. All planted trees will be mulched, staked, and watered regularly for one year to ensure at least 80 percent tree survivability at the end of the three-year period.
- Mitigation of Wildlife and Threatened and Endangered Species impacts includes a commitment by SHM to avoid construction in areas with sensitive vegetation, unique habitat, designated natural resources, or in areas with known locations or habitats for threatened or endangered species, if practical. SHM will develop and maintain "good

housekeeping” procedures to ensure that sites would be kept clean of debris, garbage, and fugitive trash or waste during operation, including microtrash. SHM would also instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive seasons. SHM will minimize herbicide and pesticide use during maintenance activities to the extent possible and utilize site-appropriate native plants and invasive free materials (seed mixes, rock, mulch, soil) for revegetation and restoration efforts. As a BMP to protect wildlife and migratory birds, pursuant to TPWD recommendations, SHM will utilize the minimum amount of night-time lighting needed for safety and security for lighted structures. SHM will minimize the Project’s contribution to skyglow by focusing light downward, with cutoff luminaries to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, fully shielded, as bright as needed, and minimizes blue light emissions.

- More specifically, to assure that alligator snapping turtle nests are not impacted during construction, a preconstruction nest survey will be conducted, if ground disturbance occurs during nesting season (February to June). Along with this survey, an identification survey for the eastern and western box turtles will be conducted. To assure that bald eagles or nests are not impacted during construction, a preconstruction nest survey will be conducted. Tree removal will only occur when trees have been identified as not containing nests. Trees with nests will be left in place and/or consultation with USFWS will be necessary.
- Mitigation of light pollution impacts include a commitment by SHM to utilize the minimum amount of night-time lighting needed for safety and security for lighted structures. SHM will minimize the Project’s contribution to skyglow by focusing light downward, with cutoff luminaries to avoid light emitting above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, fully shielded, as bright as needed, and minimizes blue light emissions. Lastly the proposed development is designed to be consistent with the Dark Sky International initiative goals and guidelines.
- Mitigation of Aquatic Habitat impacts will be achieved by following all applicable federal and state requirements for construction activities near/in fish habitat. SHM will establish a 15-foot buffer around wetlands to prevent potential impacts to sensitive habitat. Additionally, SHM will implement an emergency response plan for fuel spills and environmental emergencies. SHM will minimize sedimentation and turbidity in aquatic habitats by implementing sediment and erosion control measures, as practicable by the use of silt fences, silt curtains, etc. SHM will also use site-appropriate native plants and invasive free materials (seed mixes, rock, mulch, soil) for revegetation and restoration efforts. Additionally, SHM will comply with all applicable NWP’s and their associated mitigation recommendations.

- Mitigation of Land Use impacts involves a commitment by SHM to follow applicable federal, state, and local land use plans and policies to ensure compatibility with existing and surrounding land uses, and to follow and comply with applicable development requirements to ensure compatibility with existing and surrounding land uses. SHM will also contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and land use issues and concerns specific to the region. SHM will schedule construction activities according to local ordinance requirements and schedule construction activities where feasible, to minimize existing and surrounding land uses.
- Mitigation of odor impacts involves the deployment of industry-standard odor control device(s), which will be installed in tandem with the sanitary sewer lift station. Installation of these devices is standard practice when lift stations are located near pedestrian or residential uses and is very effective mitigation for unwanted odors. Additionally, all trash receptacles will be located and managed to reduce potential odors both for adjacent residents and patrons of the development. Typical commercial dumpsters and/or compactors will be provided and emptied on a schedule determined by the City of Lewisville and their solid waste provider. The residential buffer provided adjacent to the single-family development is also anticipated to mitigate against potential unwanted odors impacting existing residents. It is anticipated that odors from typical recreational activities will occur, including wood fires and outdoor cooking. These activities, and their subsequent odors, are concurrent with the intended use of public recreational lands as well as existing adjacent residential developments; therefore, no additional impact minimization measures for such odors are planned beyond the proposed buffer. While locations of onsite trash bins have not been determined at this time, comments submitted concerning proximity of refuse to the adjacent neighborhoods will be considered in the final design of the proposed development.

8. AGENCY CONSULTATION AND COORDINATION

The following agencies and organizations summarized in **Table 8-1** were involved in the development of the Pier 121 Final EA.

Table 8-1. Agency Consultation and Coordination Summary

Agency/ Tribe	Date	Coordination Type	Summary
USFWS	7/27/2022	Letter	Letter was sent soliciting comments on the Proposed Action
EPA Region 6	7/27/2022	Letter	Letter was sent soliciting comments on the Proposed Action
Texas Historical Commission	11/16/2022	Review of Cultural Report	Cultural Report was sent to the Texas Historical Commission as part of compliance with the Section 106 process
Texas Parks and Wildlife Department	7/27/2022	Letter	Letter was sent soliciting comments on the Proposed Action
City of Lewisville	10/04/2022	Meeting	Meetings to discuss water, sewer, and utility upgrades, and trail placement
Local Tribes	9/6/2022	Letter	Letter was sent soliciting comments on the Proposed Action

The archeological survey and background study recommended that no cultural resources would be adversely impacted by the project. USACE determined that no cultural resources would be adversely impacted by the project. USACE submitted a request for concurrence with this determination to the Texas Historical Commission on December 20, 2022. Concurrence was received from the Texas Historical Commission on January 11, 2023. No comments, concerns, or issues were raised by any of the local tribes as part of the tribal consultation process.

8.1. PUBLIC INVOLVEMENT SUMMARY

8.1.1. Public Scoping Comment Period

USACE conducted a public scoping comment period for the Pier 121 Marina Proposed Action at Lewisville Lake, Texas. A legal notice announcing the proposed development and a public comment period for the Pier 121 Marina Project was made in two local Lewisville area papers, *The Lakeside Journal* and *The Leader*, on August 7, 2022, and were made available in both hard copy and electronic form. USACE sent emails to the potentially affected communities around the Pier 121 Marina property and introduced a link to the Pier 121 project background page on the USACE Fort Worth District's website. Along with the public notice of development letter and a public comment form with instructions, the USACE Lewisville Lake 2020 Master Plan, a

presentation of the conceptual site plans for the park and marina, and a description of the EA process were included to educate the public and facilitate feedback. The public was invited to review information about the Proposed Action and provide comments for consideration in the NEPA Draft EA. The 30-day public scoping comment period extended from August 4, 2022, to September 6, 2022. In total, USACE received 68 submissions during the public scoping comment period. Senders included state and local government agencies, non-governmental organizations, members of the general public, and local homeowners.

All public feedback received during the public scoping comment period was considered and used to inform the analyses conducted and the resources evaluated in the Draft EA. Once the Draft EA was prepared, USACE issued a Draft EA Public Notification and invited the public to comment on the Draft EA during a 30-day Draft EA public comment period. A notice of Draft EA availability was published in accordance with 40 CFR §1506.6 and USACE requirements.

8.1.2. Draft EA Public Comment Period

USACE conducted a second public comment period after publication of the Draft EA. In accordance with 40 CFR §1506.6 and USACE requirements, a legal notice announcing the availability of the Draft EA and a public comment period for the Pier 121 Marina Project was made in two local Lewisville area papers, *The Lakeside Journal* and *The Lewisville Leader*, on May 24, 2024, and were made available in both hard copy and electronic form. USACE sent the public notice of Draft EA availability letter out to all consulting parties and made the public Draft EA public comment form with instructions, the USACE Lewisville Lake 2020 Master Plan, a slide deck presentation, and posters describing the Draft EA review process available on the USACE Fort Worth District's website to educate the public and facilitate feedback.

The public was invited to review information about the Proposed Action and provide comments on the Draft EA for consideration in the Final EA. The Pier 121 Draft EA public open house was held on June 5, 2024, at the Hedrick House in Lewisville Texas, and displayed a series of posters and a rolling slide deck presentation describing the proposed development and the resources evaluated in the Pier 121 Draft EA. Several hard copies of the Pier 121 Draft EA were available for review, and project staff attended the event to receive and answer questions concerning the proposed development. The 30-day Draft EA public comment period extended from May 31, 2024, to June 30, 2024.

In total, USACE received 9 submissions (totaling 72 substantive comments) during the Draft EA public comment period. Senders included members of the public and were largely submissions from nearby homeowners.

8.1.3. Public Comments

As required under NEPA (40 CFR 1503.4), USACE considers and responds to all substantive comments received during public scoping and Draft EA public comment periods. To aid in the response to submissions, similar comments were grouped into themes, and these themes were responded to within the Draft EA and Final EA instead of responding to each comment individually. Each submission was reviewed by subject matter experts during the drafting of the Draft and Final EA to make sure that each comment was appropriately addressed, as necessary, in the Final EA. See **Appendix E** of the Final EA for a record of all substantive comments received during the Draft EA public comment period. All substantive comments received during the public scoping period are included in the published version of *the Draft Pier 121 Project Denton County, Texas — Appendix E*, which can be found on the USACE Fort Worth District website.

8.1.4. Comment Themes Identified During Public Scoping

In total, 15 themes were identified following the public scoping comment period, and they addressed various environmental, socioeconomic, and administrative issues. Although some issues seemed to be peripheral to those typically covered by a NEPA review, it was important to consider these issues or effects in some manner as they could be an impact or potential outcome of the Proposed Action.

Of the 68 submissions, 60 were in opposition, 5 were neutral, and 3 were in support of the Proposed Action. The overarching theme from the submissions in opposition was that the Proposed Action should not be constructed in close proximity to existing homes or displace any existing natural areas or greenspace. The most numerous, common, and specific themes identified are listed in **Table 8-2** along with general responses and locations where these comment themes are addressed in the EA.

Table 8-2. Comment Themes Identified During Scoping

Comment Theme (CT)	Response	EA Section Where Addressed
CT 1: USACE should hold a public hearing for citizens to voice their opinions.	USACE will be holding a public open house as part of the Draft EA public comment period.	NA

Comment Theme (CT)	Response	EA Section Where Addressed
CT2: The natural area/greenspace on which much of the Proposed Action is planned should be protected and not developed.	The USACE Program Mission is to integrate the management of diverse natural resource components with the provision of public recreation opportunities. The Project Area has been classified as a high-density recreation area and planned for development for quite some time. Although there will be impacts to natural resources, they are not considered to be significant. The Preferred Action will thus provide public recreation opportunities and be in compliance with the USACE Program Mission Statement.	3.1; 3.2; 5.1.1; 5.1.2; 5.2.2; 5.2.5; 5.2.6; 5.3.6; 6.3.1; 6.3.9; 6.3.10; 6.3.14; 7.1
CT 3: The Proposed Action would negatively impact property values.	It would be difficult to evaluate the impacts of the Preferred Action on housing in the context of natural resources versus recreation. Property values would be expected to mirror those of the broader area, and no long-term significant impacts would be expected as there would ultimately be a balance between perceived negative and positive impacts, which can be largely subjective.	5.3.4
CT 4: The Proposed Action would create noise pollution.	Construction of the Proposed Action is scheduled to occur in varying phases within different regions of the Project Area from 2024 to 2029. Noise derived from the proposed construction activities will be present for the entire three-year development duration, although it will have differing impacts on the surrounding areas due to differing levels of noise. The noise associated with the operation of machinery on construction sites is typically short-term, intermittent, and highly localized. Long-term noise impacts from the increase of auto traffic, Marina operations, and recreational camping, surfing, and boating activities are anticipated due to the increased capacity of the marina but would be negligible as the surrounding areas contains dock charters, outfitters, golf courses, campgrounds, and parks where similar activities occur. SHM has committed to establishing quiet hours in the RV park and campground between 10:00 pm and 6:00 am CST. Activity and noise regulations enforced at the lodge and surf area would be consistent with local ordinance requirements. SHM has also committed to maintaining a 100-foot vegetative buffer between the new development and the single-family development to the east. This buffer may be improved on behalf of the city to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. The addition of the open space and vegetative buffers will aid in noise cancellation and provide a level of sound screening to the adjacent properties.	2.2; 5.1.5; 5.2.5; 6.3.4; 7.1

Comment Theme (CT)	Response	EA Section Where Addressed
CT 5: The Proposed Action would create light pollution and/or change the visual aesthetics of the area.	The Proposed Action would occur in a partially developed park with existing structures and disturbed areas. The Proposed Action involves new facilities that would be viewable from parts of the lake and shoreline that are consistent with other uses and structures in the area. To mitigate impacts to viewsheds from the park and the single-family residential neighborhood, SHM has committed to maintaining a 100-foot vegetative buffer between the new developments and the single-family development to the east. Likewise, this buffer may be improved on behalf of the City of Lewisville to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. With the implementation of the vegetative buffers, and the nature of the uses in the surrounding area, the Proposed Action is not anticipated to cause significant adverse aesthetic impacts. Since all lighting on-site will be down shielded, the impacts of lighting on the adjacent properties are not expected to be significant.	2.2; 5.2.5; 5.3.1; 6.3.11; 7.1
CT 6: The Proposed Action would increase traffic, both terrestrial and aquatic.	The number of boat slips for marinas was determined in the 1999 PEA, in accordance with the findings of the Water-Related Recreation Use Study. Therefore, the overall number of boats in a given zone of the lake is not expected to increase above levels prescribed and discussed in either the 1999 PEA or the 1998 Water-Related Recreation Use Study. Additionally, boat traffic would be expected to be spread out along the lake and not concentrated in any one spot. Results from a Traffic Impact Analysis (2022) done for the project concluded that the Pier 121 Marina Proposed Development is expected to have an overall minimal impact to the intersection of Lake Ridge Road & Leora Lane. An additional Traffic Impact Analysis (2023) highlighted that the Turn Lane/Access Management Analysis was based on old traffic volumes and concluded that there was in fact a need for a right-hand turn lane on Lake Ridge Road turning into the Pier 121 Marina Property. As a result of the report findings, SHM will design and construct the right-hand turn lane, thus reducing any traffic potentially resulting from Pier 121 Marina guests waiting to turn into the Marina property.	2.2; 5.1.5; 5.3.4; 6.3.6; 6.3.16; 7.1
CT 7: The Proposed Action would create crime and impact the safety of residents.	The proposed facilities will be staffed for the safety and security of both site users and off-site residents. Quiet hours shall be maintained in all public use areas between the hours of 10 p.m. and 6 a.m., or those hours designated by USACE in conjunction with the City of Lewisville. Excessive noise occurring during these quiet hours which unreasonably disturbs persons is prohibited and will be enforced. The Proposed Action would require on-site lighting to ensure the safety of guests on-site and within the surrounding areas.	2.2; 5.1.5; 5.3.1; 5.3.4; 6.3.4

Comment Theme (CT)	Response	EA Section Where Addressed
CT 8: The Proposed Action would pollute the environment and increase litter in the area.	Mitigation of water quality impacts include creation and implementation of a SWPPP and ensure proper mitigation and BMPs are put in place to minimize sediment loads into nearby water bodies and properties. Typical BMPs used to reduce outfall velocities and prevent erosion include rock riprap, rock check dams, slope stabilization using both seeding and Curlex as needed, and silt-fence around all disturbed boundaries. Increased boating and vehicular traffic may temporarily generate small releases of pollutants. Long-term operation of the marina and associated recreation areas are expected to continue to generate low level amounts of criteria pollutants related to boating and recreation vehicle activities in the area because boating activities would be distributed throughout the lake area and recreational vehicles would be primarily parked in place without continuous running of engines. Users of the existing facility and boaters in the area will have fuels and other petroleum, oils, and lubricants in their personal vehicles and boats. However, the marina will have a spill prevention, control, and countermeasures plan to reduce the potential impacts from these chemicals.	2.2; 5.1.3; 5.1.6; 5.1.7; 5.6; 6.3.2; 6.3.5; 6.3.17; 7.1
CT 9: The Proposed Action would negatively impact local species (plants and animals, threatened and common).	For the majority of common species present within the Project Area, there is ample habitat to relocate in neighboring areas to the northeast or southwest. SHM has committed to revegetate and replant prairie and woody vegetation to account for vegetative impacts. The Project Area is not ideal habitat for most of the identified species of concern. Most of those that have the potential to be present would vacate the area once disturbed. SHM has committed to perform pre-construction surveys for others that may nest within the Project Area to avoid impacts.	5.2; 6.3.9; 6.3.10; 7.1
CT 10: The Proposed Action would impact recreational access to this area / the area would be better served through additional recreational access.	There is currently no formal recreational access to the area proposed for the Project Area. Although the Preferred Action will impact some natural resources, the Project Area has been classified as a high-density recreation. The Preferred Action will thus provide increased and varied public recreation opportunities and be in compliance with the USACE Program Mission Statement.	3.1; 3.2; 5.3.6; 6.3.14
CT 11: If developed, the Proposed Action should include a noise/visual buffer between the residential housing and the Project Area.	SHM has committed to maintaining a 100-foot vegetative buffer between the new developments and the single-family development to the east. Likewise, this buffer may be improved on behalf of the City of Lewisville to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. With the implementation of the vegetative buffers, and the nature of the uses in the surrounding area, the Proposed Action is not anticipated to cause significant adverse aesthetic impacts.	5.1.5; 5.2.5; 5.3.1; 6.3.4; 6.3.11; 7.1

Comment Theme (CT)	Response	EA Section Where Addressed
CT 12: The Proposed Action plans conflict with the City of Lewisville's plan/zoning/building codes.	The USACE land use category for USACE-managed land around Lewisville Lake allows uses such as recreation, wildlife management, and project operations. The USACE Master Plan allows recreational uses on the entire Pier 121 property, as the land is designated "high-density recreation area." Development associated with the Proposed Action would fall entirely under the category of recreation. Land use would be consistent with USACE's land use classification and would remain consistent with the general character of the surrounding area, which currently has multiple businesses such as marinas, restaurants, boat rental/storage, and retail storefronts.	5.3.2; 6.3.12; 7.1
CT 13: Based on past experiences, SHM should not be allowed to manage the new facilities.	The USACE manages federal lands consistent with USACE regulations and its specific Master Plan for Lewisville Lake. Therefore, SHM would be a lessee to USACE. The City of Lewisville issues building permits and performs building inspections on USACE property. Between these various levels of oversight throughout all stages of project planning, construction, and operations, USACE believes that SHM will be held responsible to develop and manage the new facilities consistent with appropriate and applicable federal, state, and local laws, regulations, and policies.	NA
CT 14: There are issues with the materials that were provided that need to be corrected/more information is needed regarding the proposed plans.	USACE has reviewed the comments received during scoping that noted errors or inconsistencies in presentation materials. As aspects of the project may have changed since that time, USACE has made any necessary changes to address those issues and/or update information with the most accurate data available.	2.0
CT 15: General support or opposition, no specific theme mentioned.	Comments are noted; thank you for your participation.	2.0; 3.1; 3.2

8.1.5. Comment Themes Identified during the Draft EA Public Comment Period

In total, 14 themes were identified following the Draft EA public comment period, and they addressed various environmental, socioeconomic, and administrative issues. All nine submissions were opposed to the Proposed Action. Additionally, several singular comments were submitted that did not fall under the 14 commonly mentioned theme categories. As observed during the public scoping comment period, some issues raised seemed to be peripheral to those typically covered by a NEPA review; however, it was still deemed important

to consider these issues or effects in some manner as they could be an impact or potential outcome of the Proposed Action.

The overarching theme from the submissions was that the proposed development would create significant noise, odor, and crime and safety issues specifically from the RV and glamping sites included in the proposed development design. Additionally, it was communicated that increased buffering and screening should be incorporated into the project design to benefit neighboring communities. The most numerous, common, and specific themes and less common singular comments identified are listed in **Table 8-3** along with general responses and locations where these comment themes and individual comments are addressed in the Final EA.

Table 8-3. Comment Themes Identified During Draft EA Public Comment Period

Comment Theme (CT)	Response	EA Section Where Addressed
CT 1: USACE should hold a public hearing for citizens to voice their opinions.	<p>The U.S. Army Corps of Engineers has provided several opportunities for the public to comment on this proposed Project.</p> <p>The Final EA details public involvement in Section 8.1 which summarizes the 30-day public scoping comment period that took place August 4, 2022, through September 6, 2022, in which citizens were able to voice their opinions on the Project.</p> <p>Details regarding the recent public open house that occurred on June 05, 2024, and the 30-day Draft EA public comment period opportunity that occurred from May 31, 2024, to June 30, 2024, have been added within Section 8.1.2 of the Final EA.</p>	8.1.2
CT2: The proposed development would negatively impact property values.	<p>Section 5.3.4 of the Final EA explains that it is inconclusive as to whether property values would be impacted negatively or positively by the proposed development as there are varying tradeoffs between natural resource benefits and recreational opportunities and an individual's personal preferences and perceptions.</p> <p>Some homeowners may prefer the natural setting of the current Project Area, and others may be interested in the recreational opportunities from the proposed development. Studies have shown that many factors affect residential property values in very specific contexts from general to local housing availability, urban form, transport systems, setting and feeling, and consumer preferences.</p>	5.3.4

Comment Theme (CT)	Response	EA Section Where Addressed
CT 3: The proposed development would create noise pollution.	<p>Section 7.1 of the Final EA discusses various sound minimization techniques as they relate to the establishment of quiet hours and active construction hours in accordance with local ordinances and the use of berms and vegetative screening to intercept sound produced within the Project Area.</p> <p>Additional detail, specifically regarding air conditioning units, facility-installed radios, and typical sound levels produced from maintenance sheds, is discussed in Section 5.1.5 of the Final EA.</p>	5.1.5
CT 4: The proposed development would create light pollution and/or change the visual aesthetics of the area.	<p>Section 7.1 of the Final EA discusses minimization techniques for light pollution impacts, which include a commitment by SHM to use the minimum amount of nighttime lighting needed for safety and security for lighted structures, by focusing light downward, with cutoff luminaries to avoid light emitting above the horizon. Dark-sky friendly lighting will also be used that is illuminated only when needed, fully shielded, as bright as needed, and minimizes blue light emissions.</p> <p>Additionally, Table 8-2 of the Final EA explains that the Proposed Action involves new facilities that would be viewable from parts of the lake and shoreline that are consistent with other uses and structures in the area. To mitigate impacts to viewsheds from the park and the single-family residential neighborhood, SHM has committed to maintaining a 100-foot vegetative buffer between the new developments and the single-family development to the east. Likewise, this buffer may be improved on behalf of the City of Lewisville to include a 10-foot trail. SHM will also maintain and improve a 50-foot minimum buffer between the development and the parkland to the south. With the implementation of the vegetative buffers, and the nature of the uses in the surrounding area, the Proposed Action is not anticipated to cause significant adverse aesthetic impacts.</p>	7.1; 5.3.1
CT 5: The proposed development would increase terrestrial traffic.	<p>Section 5.3.5 Infrastructure and Section 7.1 Best Management Practices and Mitigation Measures for All Resource Types within the Final EA discuss the commitment by SHM to design and construct a right-hand turn lane on Lake Ridge Road turning into the marina property prior to the end of the proposed development construction, which will prevent traffic back-ups down Lake Ridge Road and allow for a steady and safe flow of traffic northbound on Lake Ridge Road.</p>	5.3.5; 7.1

Comment Theme (CT)	Response	EA Section Where Addressed
CT 6: The proposed development would create crime and impact the safety of residents.	<p>These following sections of the Final EA address crime and safety of residents stating that the proposed facilities will be staffed for the safety and security of both site users and off-site residents.</p> <p>Quiet hours shall be maintained in all public use areas between the hours of 10 p.m. and 6 a.m., or those hours designated by USACE in conjunction with the City of Lewisville. Excessive noise occurring during these quiet hours, which unreasonably disturbs persons, is prohibited and will be enforced. SHM will follow all state and federal laws regarding the carrying of firearms by patrons and staff. The Proposed Action will include on-site lighting to ensure the safety of guests on-site and within the surrounding areas. Lastly, the Proposed Development will include the installation of safety signage consistent with all applicable state and local ordinances and laws.</p>	2.2; 5.1.5; 5.3.1; 5.3.4; 6.3.4.
CT 7: The proposed development would pollute the environment and introduce litter to the area.	<p>Water quality is discussed throughout the Final EA. Specifically, SHM makes a commitment to create and implement a stormwater pollution prevention plan (SWPPP) and ensure proper mitigation and best management practices (BMPs) are put in place to minimize sediment loads into nearby water bodies and properties.</p> <p>The Final EA also discusses the potential impact of low-level amounts of criteria pollutants related to boating and recreational vehicle activities in the area; however, the estimated amount of criteria pollutants generated by these activities are below the legal allowable thresholds, and thus consistent with state and federal water and air quality regulations. Additionally, no hazardous waste will be generated as a result of the proposed development.</p> <p>Furthermore, Section 2.2, Operations, discusses that sufficient trash containers will be located throughout the resort and that the property will be sufficiently staffed to ensure that waste does not accumulate in trash containers or on the Pier 121 Marina grounds to prevent litter from being introduced to the Marina property and surrounding areas.</p>	2.2; 5.1.3; 5.1.6; 5.1.7; 5.6; 6.3.2; 6.3.5; 6.3.17; 7.1.

Comment Theme (CT)	Response	EA Section Where Addressed
<p>CT 8: The proposed development would negatively impact local species (plants and animals; threatened and common and their habitats).</p>	<p>Based on the results of the Threatened and Endangered Species (TES) Assessment conducted as a part of the Final EA, it is unlikely that any federally listed TES would be affected during construction or operation. As a precaution, preconstruction nest surveys for the bald eagle and alligator snapping turtle, and identification surveys for the eastern and western box turtles will be conducted prior to construction. Additionally, construction will occur outside of the active bat season.</p> <p>In the unlikely event that any TES species were to be found within the Project Area, SHM would avoid, as practicable and feasible, any areas during construction, operation, and maintenance activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented.</p> <p>Furthermore, SHM will develop and maintain “good housekeeping” procedures to ensure that sites would be kept clean of debris, garbage, and fugitive trash or waste during operation, including microtrash. SHM would also instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive seasons. SHM will minimize herbicide and pesticide use during maintenance activities to the extent possible and use site-appropriate native plants and invasive-free materials (seed mixes, rock, mulch, soil) for revegetation and restoration efforts.</p> <p>SHM has committed to mitigation of the terrestrial vegetation within the Project Area. Section 7.1 of the Draft EA details these vegetation commitments.</p>	<p>5.2; 6.3.9; 6.3.10; 7.1.</p>
<p>CT 9: The proposed development would impact recreational trail access to this area/the area would be better served through additional recreational access.</p>	<p>Section 2 of the Final EA currently discusses that SHM has committed to constructing a trail network of sidewalks, nature trails, and numerous pocket parks. Additionally, the existing East Hill Park entrance road (which intersects City of Lewisville Park land) will be widened to a maximum width of 60 feet and is expected to include an associated trail/sidewalk.</p> <p>Section 2 of the Final EA has been updated to explain that the public trail along East Hill Park Road will continue to the public beach area and the sidewalks will provide accessible paths to many of the planned amenities. As no existing public sidewalks or trails exist on the property currently, this will increase recreational access significantly.</p> <p>SHM is also working with the City of Lewisville’s local Parks and Recreation officials and the City Manager’s office to assess additional options for future trail access through the proposed development.</p>	<p>2.0</p>

Comment Theme (CT)	Response	EA Section Where Addressed
CT 10: If developed, the proposed plans should increase the size of the proposed noise/visual buffer between the residential housing development and proposed development.	<p>Increasing the overall buffer width between the proposed development and the adjacent housing development is not feasible given the current project design.</p> <p>Section 5.1.1 of the Final EA was updated to confirm the use of a 10-foot earthen berm (previously 8–10 foot) and modified to clarify that the earthen berm will be topped with a combination of native coniferous and deciduous trees and native grasses to provide year-round vegetative screening for sound and visual impacts (year-round screening was not initially clearly included).</p>	5.1.1; 7.1
CT 11: The proposed development plans conflict with the City of Lewisville’s City Plan/zoning/building codes and the Green Centerpiece Master Strategy Update.	<p>SHM and their engineering team have worked with the City of Lewisville planning and development officials to ensure the proposed development is consistent with all applicable city codes and standards.</p> <p>Additionally, as identified by one of the comment submissions, the Green Centerpiece Master Strategy Update does include the Pier 121 Project Area within its proposed strategy footprint. Section 5.3.2 of the Final EA has been updated to explain that the proposed development is consistent with the goals of the Green Centerpiece Master Strategy.</p> <p>Specifically, Section 14 of the Green Centerpiece Master Strategy identifies Recreation and Education as a key component of the strategy. The plan lists a number of intended recreational uses of the Green Centerpiece area including camping, dining, lodging, boating, and “other meaningful and engaging outdoor recreation experiences for visitors.” The proposed development meets the strategy goals of this plan by adding trails, a surf skills training facility, and opportunities for camping, dining, lodging, and boating. Furthermore, the proposed development is designed to be consistent with the Dark Sky International initiative goals and guidelines.</p>	5.3.2; 5.3.3; 6.3.12; 7.1.

Comment Theme (CT)	Response	EA Section Where Addressed
<p>CT 12: The proposed development would create odor pollution.</p>	<p>The Final EA does not specifically address potential odor impacts as a result of the proposed development; however, odor-causing airborne particulate matter is more generally assessed under the Air Quality resource section.</p> <p>Additionally, Section 7.1 of the Final EA was modified to explain that industry standard odor control device(s) will be installed in tandem with the sanitary sewer lift station. Installation of these devices is standard practice when lift stations are located near pedestrian or residential uses and is very effective mitigation for unwanted odors. Furthermore, in response to public concerns regarding potential failure of the manhole at Lake Ridge Road, the potential for surcharging within the sewer system, and the potential for unwanted odor, it is important to note that sanitary sewer capacity modeling conducted by the City of Lewisville has indicated that failure is not anticipated and has also demonstrated the potential for surcharging to occur within the receiving sewer system under existing conditions (not including the potential effects of the Proposed Development). Due to challenges with existing capacity, the City has determined that improvements are required regardless of the Proposed Development. These long-term improvements to the sanitary sewer capacity are being analyzed by the City of Lewisville staff and their third-party engineering consultants, but the timing of sewer system improvements is not available at this time. Moreover, the manhole at Lake Ridge Road is not one of the manholes that the City has identified as having limited capacity or one that is subject to surcharge. Additionally, no odor is anticipated to be generated as a result of the Lake Ridge Road tie-in. Citizens should contact the City of Lewisville for a map of City-owned and -maintained manholes currently subject to surcharge to discuss the potential risks of failure and for a schedule of future improvements.</p> <p>Additionally, the Final EA was updated to explain that all trash receptacles will be located and managed to reduce potential odors both for adjacent residents and patrons of the development. Typical commercial dumpsters and/or compactors will be provided and emptied on a schedule determined by the City of Lewisville and their franchised solid waste provider. The residential buffer provided adjacent to the single-family development is also anticipated to mitigate against potential unwanted odors impacting existing residents.</p> <p>It is anticipated that odors from typical recreational activities will occur including wood fires and outdoor cooking. These activities, and their subsequent odors, are concurrent with the intended use of public recreational lands as well as existing adjacent residential developments; therefore, no additional impact minimization measures for such odors are planned beyond the proposed buffer.</p>	<p>7.1</p>

Comment Theme (CT)	Response	EA Section Where Addressed
CT 13: If developed, the proposed plans should be modified to relocate various assets including the RV/glamping lots, trash bins, and the orientation of accessory solar panels. Additionally, the hotel and parking structures should be limited to 75 feet and 20 feet in height, respectively.	<p>The locations of onsite trash bins have not been determined at this time. But comments submitted concerning proximity of refuse to the adjacent neighborhoods will be considered in the final design of the proposed development.</p> <p>Additionally, while relocation of the RV and glamping lots cannot be achieved at this time, a buffer has been added between the proposed development and the existing adjacent residential neighborhood with a 10-foot minimum earthen berm and native vegetative screening.</p> <p>As stated in the Final EA, the hotel will not exceed six stories or 75 feet in height, and the parking structure will be a maximum of four stories tall.</p> <p>Lastly, all solar panels will be designed in compliance with the Federal Aviation Administration requirements to not direct glare toward nearby aircraft.</p>	7.0, 5.3.1
CT 14: If developed, the proposed plans should prioritize the western fill of the RV spaces in order to provide a larger buffer of noise, odor, or visual impacts.	<p>A final RV park operator has not been confirmed at this time; therefore, it is not possible for the developer to guarantee they will have the capability to rent the RV spaces in any particular order. This request will be relayed to the operator but cannot be guaranteed at this time.</p>	NA
Singular comment themes (specific but only appear once)		
The proposed development would increase opportunity for temporary housing in the designated RV lots.	<p>The Final EA addresses concerns regarding temporary housing in Section 2.2 Operations.</p> <p>Currently, the section notes that, “Consistent with 36 CFR Part 327, public sites [on USACE land] can be rented for no more than 14 consecutive days during any 30-day period.”</p> <p>Therefore, the proposed RV lots would not serve as temporary housing units in any capacity.</p>	NA
Electric, water, and gas demands of the Project will affect nearby residents.	<p>SHM is currently working in coordination with the City of Lewisville and CoServ Electric on all utility upgrades to ensure the Project is adequately served by local utilities and will not cause adverse effects to neighboring communities due to an increased demand on City utilities.</p>	NA

Comment Theme (CT)	Response	EA Section Where Addressed
Will the developer pay for City improvements?	<p>SHM is working with the City of Lewisville to add a right-hand turn lane along Lake Ridge Road at the intersection of Lake Ridge Road and Leora Lane.</p> <p>SHM is also adding a development entrance through the City parkland that is accompanied by associated sidewalks/ trails.</p> <p>All onsite and offsite upgrades associated with the Proposed Development are being developed at the expense of SHM.</p>	NA
All modeling for the EA report should use maximum values for the designated venues.	SHM utilized a conservative approach when modeling utility loads for electric, water, and sanitary sewer demands.	NA

9. COMPLIANCE WITH ENVIRONMENTAL RESOURCE LAW

This Final EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared in accordance with the CEQ's implementing regulations for NEPA, 40 CFR Parts 1500 – 1508, and the USACE ER 200-2-2, *Environmental Quality: Procedures for Implementing NEPA*. Below is a list of applicable environmental laws and regulations that were considered in the planning of this project and the status of the project's compliance with each law or regulation.

Fish and Wildlife Coordination Act of 1958, as amended — USACE initiated public involvement and agency scoping activities to solicit input on the Proposed Action and identify significant issues related to the Proposed Action. Information provided by USFWS and the Texas Parks and Wildlife Department on fish and wildlife resources has been utilized in the development of the Final EA.

ESA of 1973, as amended — Current lists of TES were compiled for the Proposed Action. No adverse impacts on TES would result from the Proposed Action.

Bald and Golden Eagle Protection Act of 1940, 16 U.S.C. §668 et seq. — The BGEPA prohibits the take of bald eagles and golden eagles, except as otherwise permitted in the BGEPA. The U.S. Fish and Wildlife Service, National Bald Eagle Management Guidelines (USFWS 2007) and IPaC project planning tool were used to evaluate project impacts to bald and golden eagles and known nest locations. Although bald eagles may be present in the area, the proposed action would have no impact to preferred nesting, rearing, or foraging habitat, and no 'take' of bald eagles because no known nesting sites are near the construction area, which is also currently a heavily trafficked area by people.

EO 13186 (Migratory Bird Habitat Protection) — Sections 3a and 3e of EO 13186 direct federal agencies to evaluate the impacts of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative impacts on migratory birds. The Proposed Action would not result in adverse impacts on migratory birds or their habitat.

Migratory Bird Treaty Act — The Migratory Bird Treaty Act of 1918 extends federal protection to migratory bird species. The non-regulated "take" of migratory birds is prohibited under this act in a manner similar to the prohibition of "take" of TES under the ESA. The Proposed Action would not result in adverse impacts to migratory birds or their habitat.

CWA of 1977 — SMH will avoid impacts to wetlands and other aquatic resources to the maximum extent practicable. All construction will implement BMPs and erosion control measures and avoid fill in wetlands. SHM will be responsible for obtaining a CWA National Pollutant Discharge Elimination System Section 402 Construction General Permit. The Proposed

Action will be in compliance with all state and federal CWA regulations and requirements, and facilities will be regularly monitored by USACE and TCEQ for water quality. There would be no change in the existing management of the Marina and associated property that would impact water quality.

NHPA of 1966, as amended — Compliance with the NHPA of 1966, as amended, requires identification of all properties in the Project Area listed in, or eligible for listing in, the NRHP. All surveys were coordinated with the Texas Historical Commission. No known sites will be impacted as a result of construction, operation, or maintenance activities from the Proposed Action.

Clean Air Act of 1977 — The USEPA established nationwide air quality standards to protect public health and welfare. Construction, operation, and maintenance of the Proposed Action will be compliant with the Clean Air Act.

Farmland Protection Policy Act of 1980 and 1995 — The purpose of this act is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. Some portions of the Proposed Action area are classified as prime farmland and would be modified for recreational use. However, since the Proposed Action area is not farmland, nor is it used as farmland, no loss or conversion of prime agricultural land used for farming practices would occur.

EO 11990, as amended, Protection of Wetlands — EO 11990 requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when executing federal projects. The Proposed Action will comply with EO 11990.

EO 11988, as amended, Floodplain Management — This EO directs federal agencies to evaluate the potential impacts of proposed actions in floodplains. The operation and management of the Proposed Action will comply with EO 11988.

EO 13751, Invasive Species — This EO directs executive departments and agencies to take steps to prevent the introduction and spread of invasive species and to support efforts to eradicate and control invasive species that are established. The operation and management of the Proposed Action will comply with EO 13751.

CEQ Memorandum dated August 11, 1980, Prime or Unique Farmlands — Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. Some portions of the Proposed Action area are classified as prime farmland and would be modified for recreational

use. However, since the Proposed Action area is not farmland, nor is it used as farmland, no loss or conversion of prime agricultural land used for farming practices would occur.

EO 12898, Environmental Justice — This EO directs federal agencies to achieve environmental justice to the greatest extent practicable and permitted by law and consistent with the principles set forth in the report on the National Performance Review. Agencies are required to identify and address, as appropriate, disproportionately high, and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The Proposed Action would not result in a disproportionate adverse impact on minority or low-income population groups.

10. LIST OF PREPARERS

Table 10-1. List of Preparers

Preparer	Final EA Contribution	Qualifications
Andrew DeWitt	Project Director	M.S., Geo-Spatial Sciences in Geography and Geology Missouri State University, 2012 B.S., Geology, Grand Valley State University, 2010
Katy Reminga	Environmental Project Manager; Report Author	M.S., Geo-Spatial Sciences in Geography and Geology Missouri State University, 2019 B.S., Geology, Grand Valley State University, 2017
Andrew Bielakowski	Environmental Consultant; Report Author	M.S., Environmental Science and Ecology Montana State University, 2024 M.A., Archaeology, University of Toronto, 2000 B.A./B.S., Anthropology, Classical Civilizations, Philosophy, Loyola University-Chicago, 1998
Mark Doperalski	Cultural Resources Subject Matter Expert	M.A., Archeology and Heritage Management, University of Minnesota-Twin Cities, 2013 B.S., Archeological Science, University of Wisconsin-La Crosse, 2000
Lee Radley	Associate Director	B.S., Civil Engineering, University of Texas at Tyler, 2013
Michelle Bivins	Environmental Consultant	M.S, Coastal and Ocean Policy, University of North Carolina Wilmington B.S, Cell and Molecular Biology, University of North Carolina Asheville

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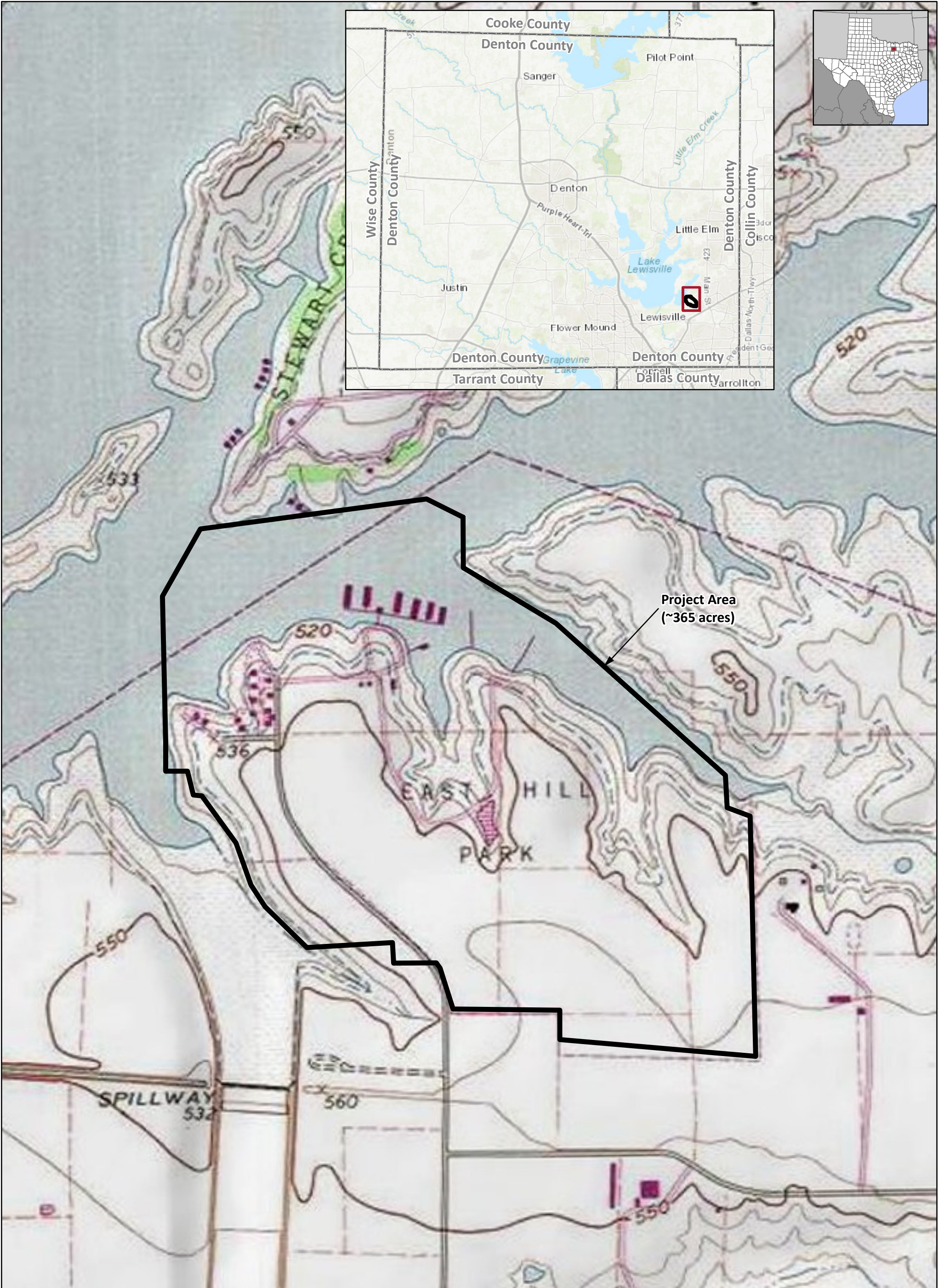
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FIGURES



 Project Area (~365 acres)

Source: USGS Topographic Quadrangle
LEWISVILLE EAST (1981)



Environmental Assessment
Pier 121 Marina
21001622
December 20, 2022
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Figure 1
Site Location Map
Denton County, Texas



Potential Covered Parking Areas With Solar

- Zone 01
-1D Surf Club Parking
-1E Members Parking
- Zone 02
- Hotel Parking
- Zone 03
- 3B Beach Parking
- Zone 05
- 5A Existing Covered Boat Storage
- 5B Proposed Covered Boat Storage
- 5F Existing Boat Maintenance Buildings

ZONING SUMMARY

ZONE 01 - KATY BEACH SURF PARK

- 1A Surf Club Building
1B Members Building
1C Surf Lagoon
1D Surf Club Parking
1E Members Parking
1F Additional + Employee Parking
1G Future Food and Beverage
1H Remote Lodge Rooms - 10
1I Pump Track Training Facility

OFFSITES

- O1 Offsite Lake Ridge Rd. Right Turn Lane
O2 Offsite Leora Ln. Extension
O3 Offsite East Hill Park Rd. Improvement

ZONE 02 - KATY BEACH HOTEL/ Lodge

- 2A Hotel/ Lodge
(Max 150 Rooms,Max 6 Stories with Restaurant)

ZONE 03 - KATY BEACH MARINA PARK & BEACH

- 3A Public Beach
3B Beach Parking - 20 spaces
3C Marina Park
3D Marina Member Parking Lot - 60 spaces
3E Existing Boat Launch To Remain
3F Existing Boat Ramp To Be Removed

ZONE 04 - KATY BEACH MARINA CLUB

- 4A Existing Member's Parking To Remain
4B Future Structured Parking +/- 1500 spaces
4C Existing Building Refurbish to Marina Maintenance
4D Guest Boat Launch
4E Trailer Surface Parking

ZONE 05 - KATY BEACH MARINA SERVICE

- 5A Existing Covered Boat Storage
5B Proposed Covered Boat Storage
5C Proposed Boat Sales Building
5D Existing Boat Service Building
5E Existing Boat Maintenance Yard
5F Existing Boat Maintenance Buildings

ZONE 06 - KATY BEACH RV RESORT

- 6A Phase 1 Glamping - 30 Units
(18 Glamping Tents/ 12 Park Models)
6B Phase 6 Glamping - 30 Units
(10 Glamping Tents/ 20 Park Models)
6C Comfort Stations - 3
6D Amenity Center - 3 acre
6E Parks - 2.3 acre
6F Maintenance Area - 0.5 acre
6G Check-in / Welcome Center Parking
6H Transient RV Sites(Varying Mix of Back In & Pull Through)

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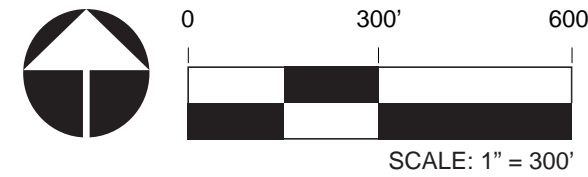


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Austin, Texas 78703
Tel: 512.480.0032
www.rviplanning.com

PIER 121 • Figure 2. SITE PLAN

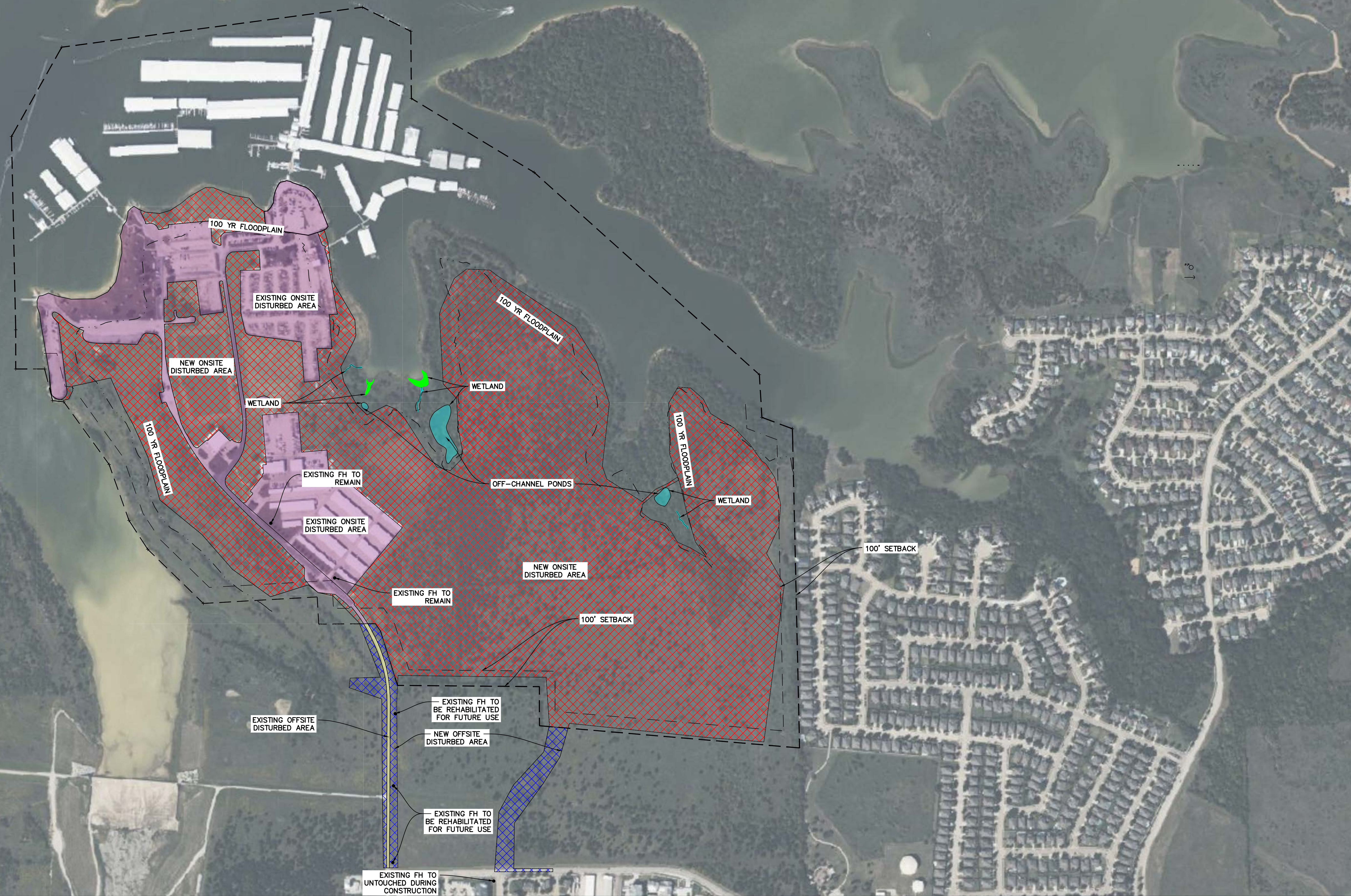
- 📍 Denton County, TX
📅 December 05, 2023
20004210
👤 Safe Harbor Marinas

Aerial photography circa MM-DD-YYYY



Information furnished regarding this property is from sources deemed reliable. RVI has not made an independent investigation of these sources and no warranty is made as to their accuracy or completeness. This plan is conceptual, subject to change, and does not represent any regulatory approval

LAKE LEWISVILLE



LEGEND




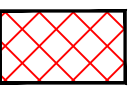
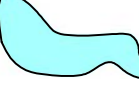
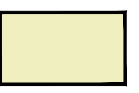
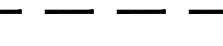
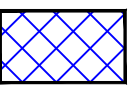
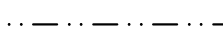
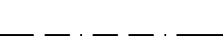
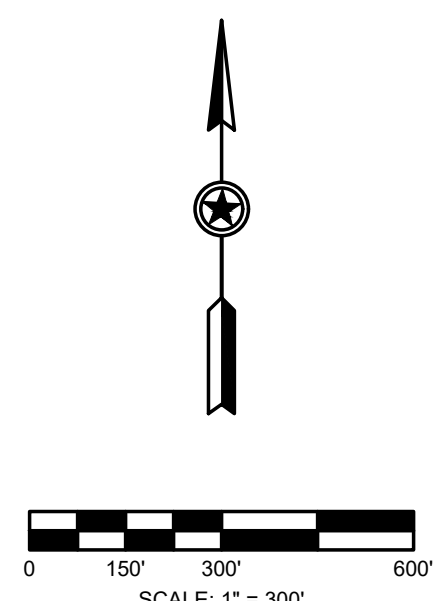
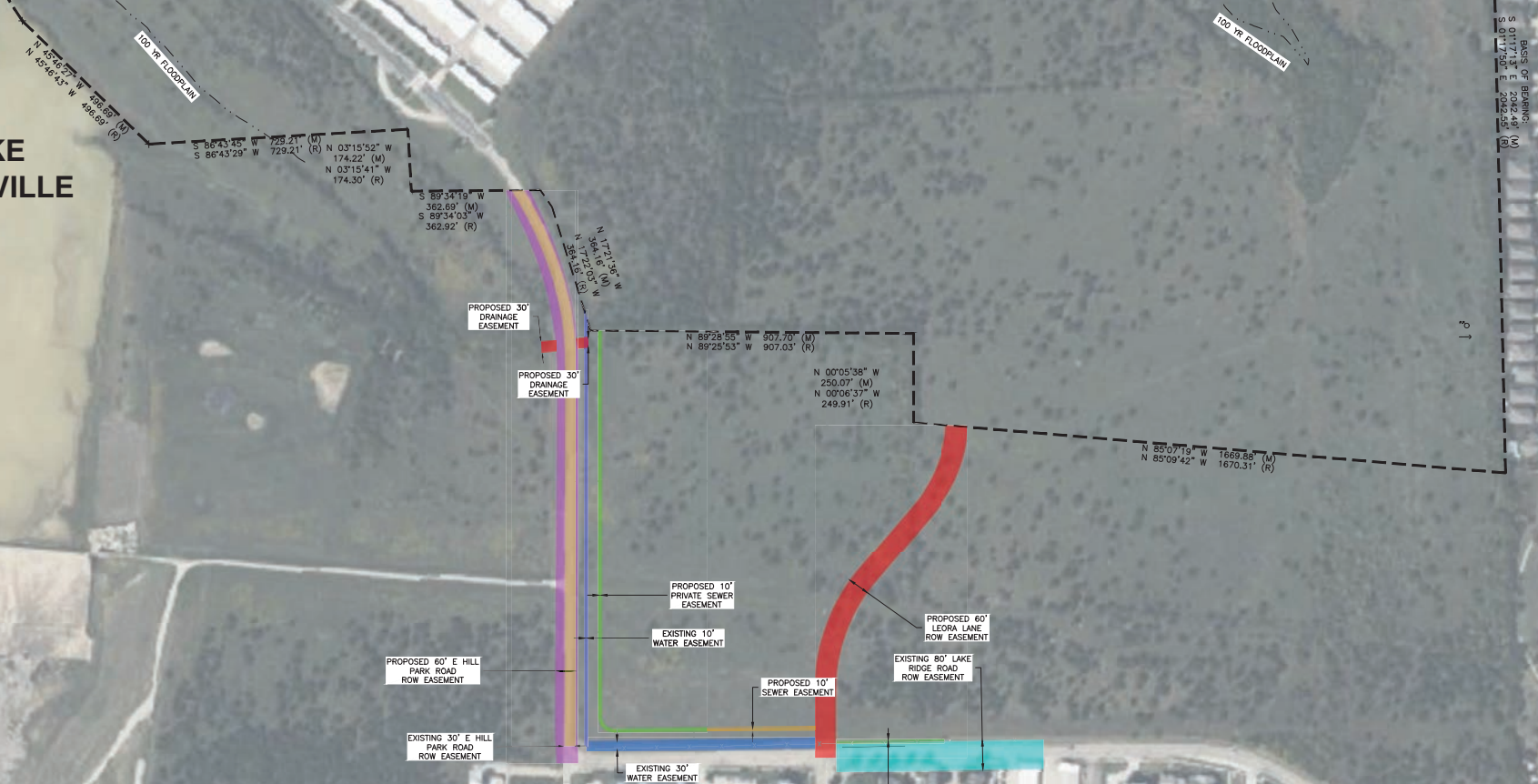
	EPHEMERAL DRAINAGES (EPH-1 & EPH-2)		EXISTING ONSITE DISTURBED AREA - 41.6 ACRES
	EMERGENT WETLANDS (EW-1 & EW-2)		NEW ONSITE DISTURBED AREA - 146.7 ACRES
	OFF-CHANNEL PONDS		EXISTING OFFSITE DISTURBED AREA - 0.8 ACRES
	PROPERTY BOUNDARY		NEW OFFSITE DISTURBED AREA - 6.2 ACRES
	100 YR FEMA FLOODPLAIN (ZONE AE)		
	BUILDING SETBACK		

FIGURE. 3
SITE DISTURBED AREA
EXHIBIT



LAKE
LEWISVILLE



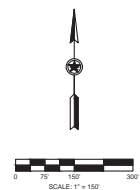
--- PROPERTY BOUNDARY
- - - - - 100 YR FEMA FLOODPLAIN (ZONE AE)

	PROPOSED 10' WATER LINE EASEMENT		EXISTING 30' E. HILL PARK RD. ROW
	EXISTING 30' WATER LINE EASEMENT		PROPOSED 60' E. HILL PARK RD. ROW
	PROPOSED 10' PRIVATE SEWER EASEMENT		PROPOSED 60' LEORA LN. ROW
	PROPOSED 10' SEWER EASEMENT		EXISTING 80' LAKE RIDGE ROW
	PROPOSED 30' DRAINAGE EASEMENT		PROPOSED 7' ADDITIONAL ROW FOR R-TURN LN. ALONG LAKE RIDGE RD.

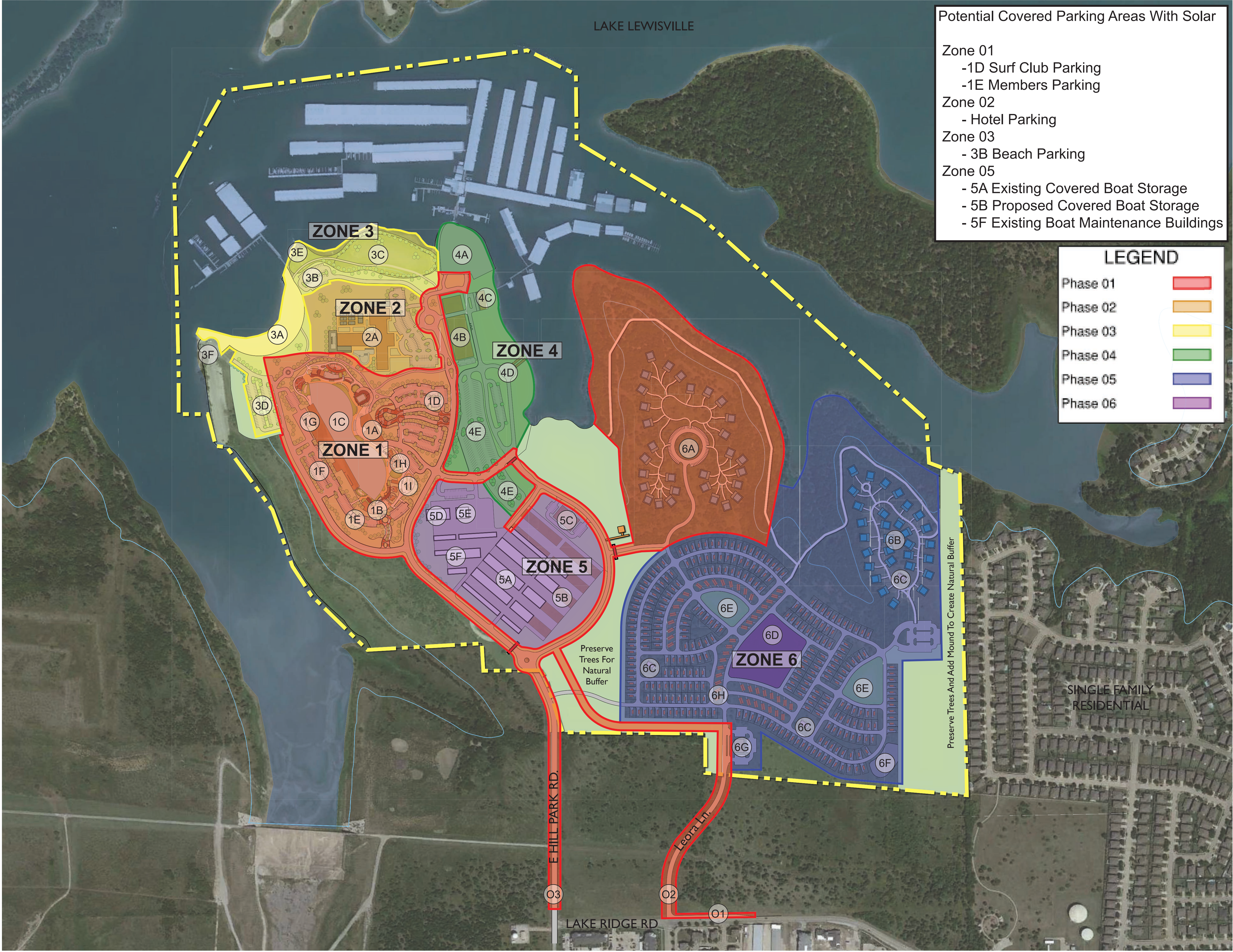
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FIGURE 3(a)
EASEMENTS AND ROW

ATWELL
800.850.4200 www.atwell-engineers.com
TBPE NO. 12242
9001 AIRPORT FREEWAY, SUITE 660
NORTH RICHLAND HILLS, TX 76180



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ZONING SUMMARY

ZONE 01 - KATY BEACH SURF PARK

- 1A Surf Club Building
- 1B Members Building
- 1C Surf Lagoon
- 1D Surf Club Parking
- 1E Members Parking
- 1F Additional + Employee Parking
- 1G Future Food and Beverage
- 1H Remote Lodge Rooms - 10
- 1I Pump Track Training Facility

OFFSITES

- O1 Offsite Lake Ridge Rd. Right Turn Lane
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- O3 Offsite East Hill Park Rd. Improvement

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- 2A Hotel/ Lodge
(Max 150 Rooms,Max 6 Stories with Restaurant)

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- 3A Public Beach
- 3B Beach Parking - 20 spaces
- 3C Marina Park
- 3D Marina Member Parking Lot - 60 spaces
- 3E Existing Boat Launch To Remain
- 3F Existing Boat Ramp To Be Removed

ZONE 04 - KATY BEACH MARINA CLUB

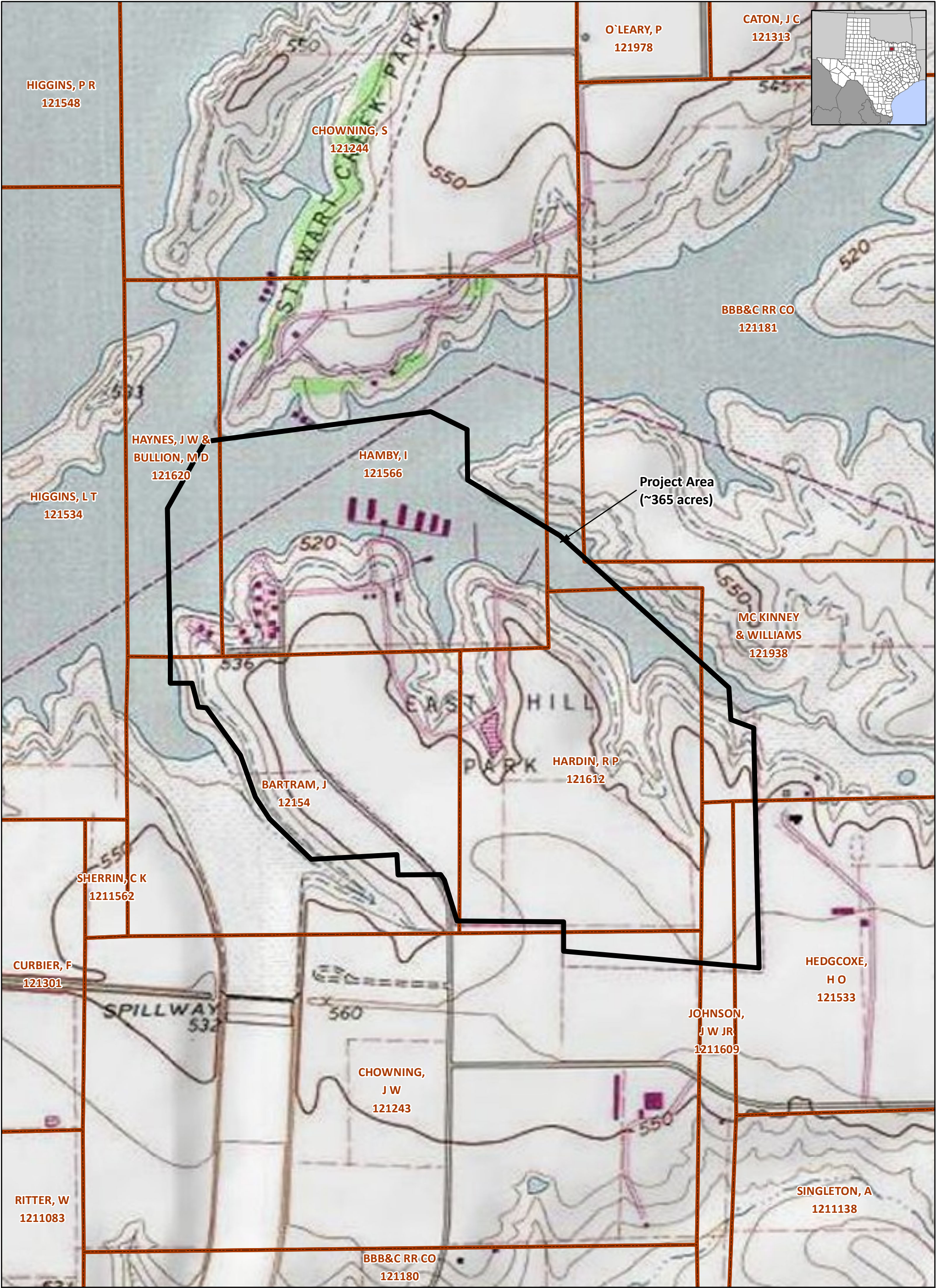
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- 4D Guest Boat Launch
- 4E Trailer Surface Parking

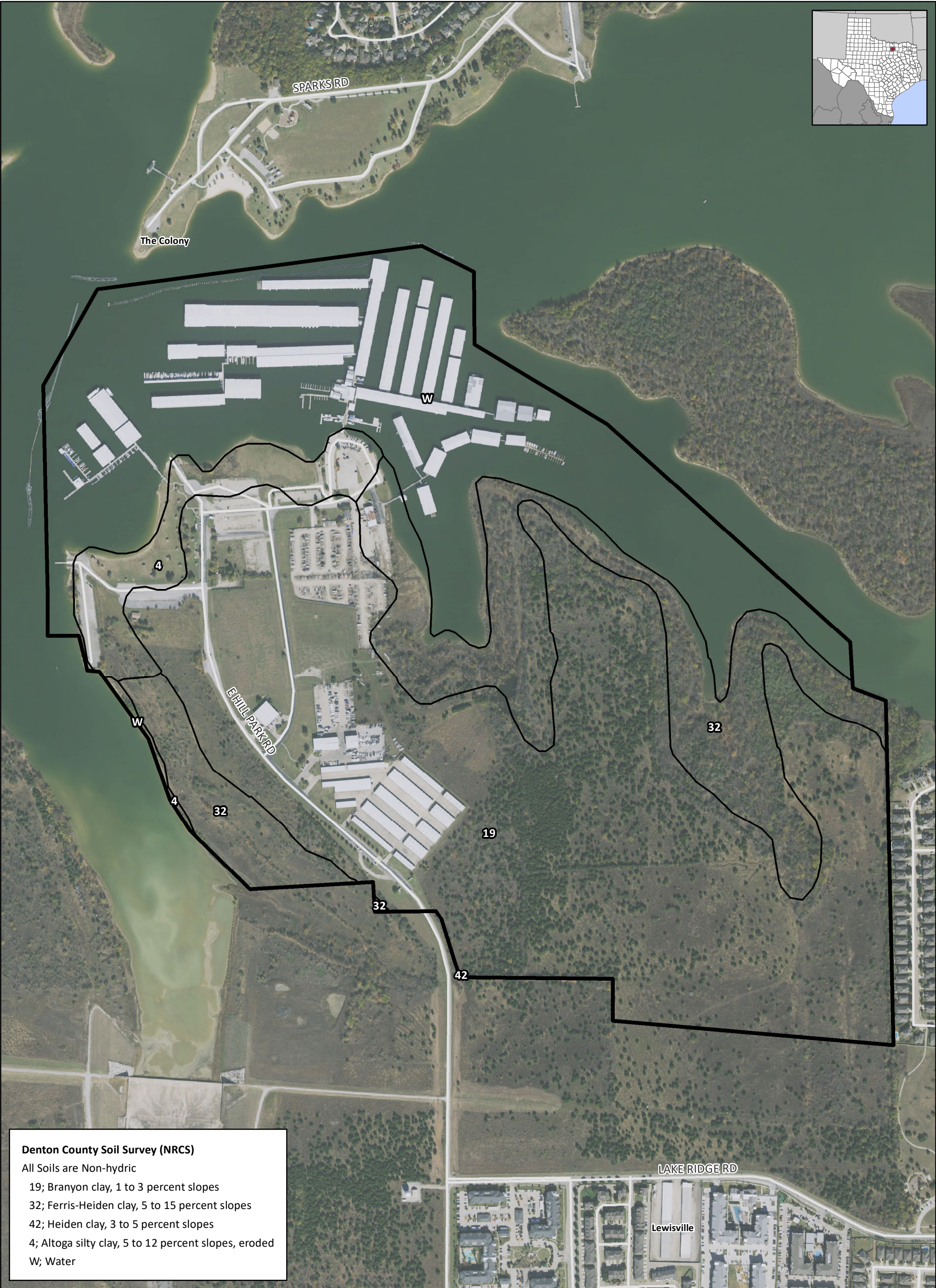
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- 6F Maintenance Area - 0.5 acre
- 6G Check-in / Welcome Center Parking
- 6H Transient RV Sites





Source: National Agriculture Imagery Program (2020)
FEMA FIRM 48121C0560G



Environmental Assessment
Pier 121 Marina
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December 20, 2022
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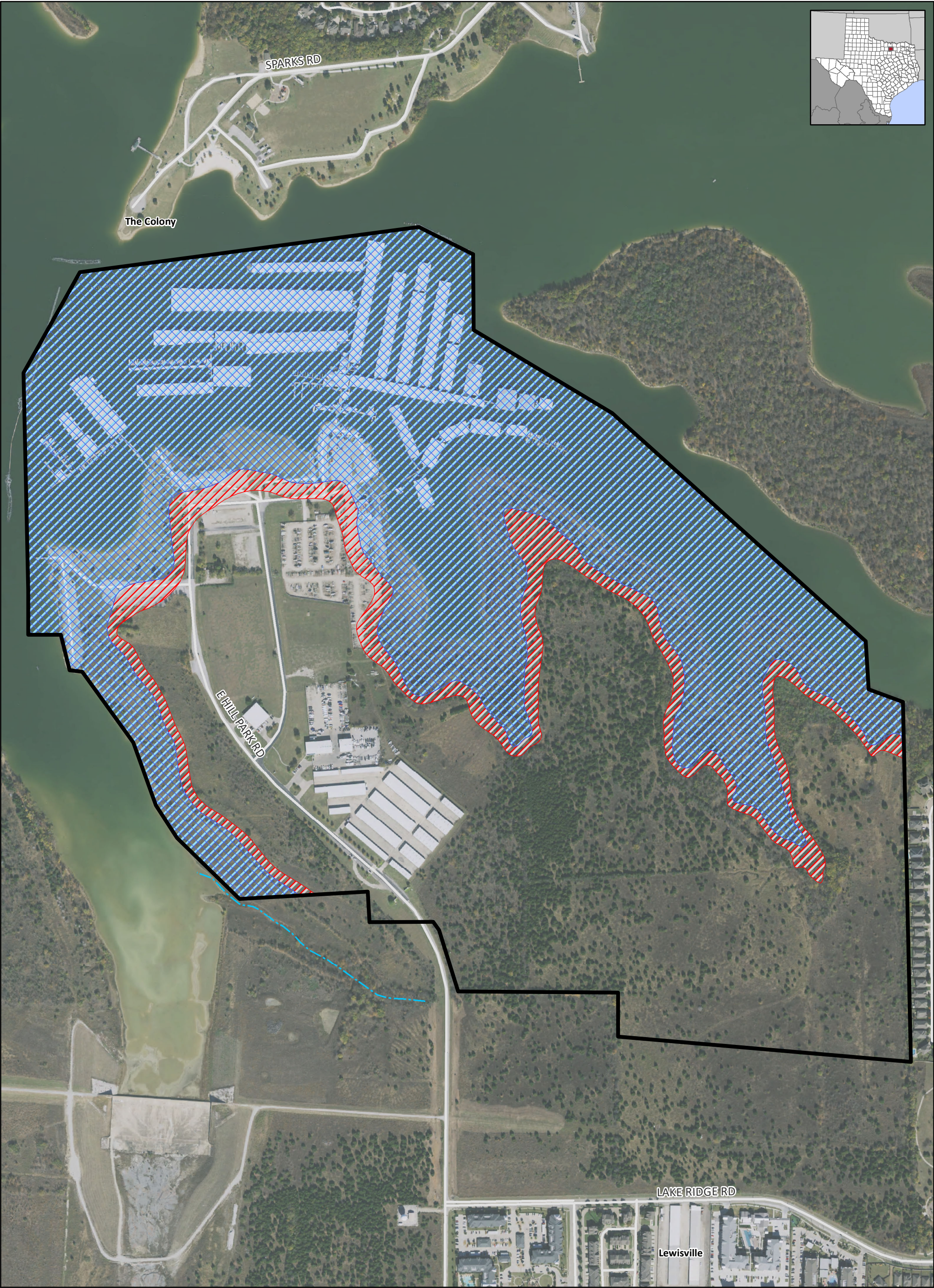






Figure 6
County Soil Survey Map
Denton County, Texas



 Project Area (~365 acres)  Zone AE: subject to inundation by the one-percent-annual chance flood event determined by detailed methods  Zone X: subject to inundation by the 0.2-percent-annual chance flood event

Source: National Agriculture Imagery Program (2020)
FEMA FIRM 48121C0560G



Environmental Assessment
Pier 121 Marina
21001622
December 20, 2022
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Figure 7
FEMA Floodplain Map
Denton County, Texas

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Potential Covered Parking Areas With Solar

- Zone 01
-1D Surf Club Parking
-1E Members Parking
- Zone 02
- Hotel Parking
- Zone 03
- 3B Beach Parking
- Zone 05
- 5A Existing Covered Boat Storage
- 5B Proposed Covered Boat Storage
- 5F Existing Boat Maintenance Buildings

ZONING SUMMARY

ZONE 01 - KATY BEACH SURF PARK

- 1A Surf Club Building
1B Members Building
1C Surf Lagoon
1D Surf Club Parking
1E Members Parking
1F Additional + Employee Parking
1G Future Food and Beverage
1H Remote Lodge Rooms - 10
1I Pump Track Training Facility

OFFSITES

- O1 Offsite Lake Ridge Rd. Right Turn Lane
O2 Offsite Leora Ln. Extension
O3 Offsite East Hill Park Rd. Improvement

ZONE 02 - KATY BEACH HOTEL/ Lodge

- 2A Hotel/ Lodge
(Max 150 Rooms,Max 6 Stories with Restaurant)

ZONE 03 - KATY BEACH MARINA PARK & BEACH

- 3A Public Beach
3B Beach Parking - 20 spaces
3C Marina Park
3D Marina Member Parking Lot - 60 spaces
3E Existing Boat Launch To Remain
3F Existing Boat Ramp To Be Removed

ZONE 04 - KATY BEACH MARINA CLUB

- 4A Existing Member's Parking To Remain
4B Future Structured Parking +/- 1500 spaces
4C Existing Building Refurbish to Marina Maintenance
4D Guest Boat Launch
4E Trailer Surface Parking

ZONE 05 - KATY BEACH MARINA SERVICE

- 5A Existing Covered Boat Storage
5B Proposed Covered Boat Storage
5C Proposed Boat Sales Building
5D Existing Boat Service Building
5E Existing Boat Maintenance Yard
5F Existing Boat Maintenance Buildings

ZONE 06 - KATY BEACH RV RESORT

- 6A Phase 1 Glamping - 30 Units
(18 Glamping Tents/ 12 Park Models)
6B Phase 6 Glamping - 30 Units
(10 Glamping Tents/ 20 Park Models)
6C Comfort Stations - 3
6D Amenity Center - 3 acre
6E Parks - 2.3 acre
6F Maintenance Area - 0.5 acre
6G Check-in / Welcome Center Parking
6H Transient RV Sites (Varying Mix of Back In & Pull Through)

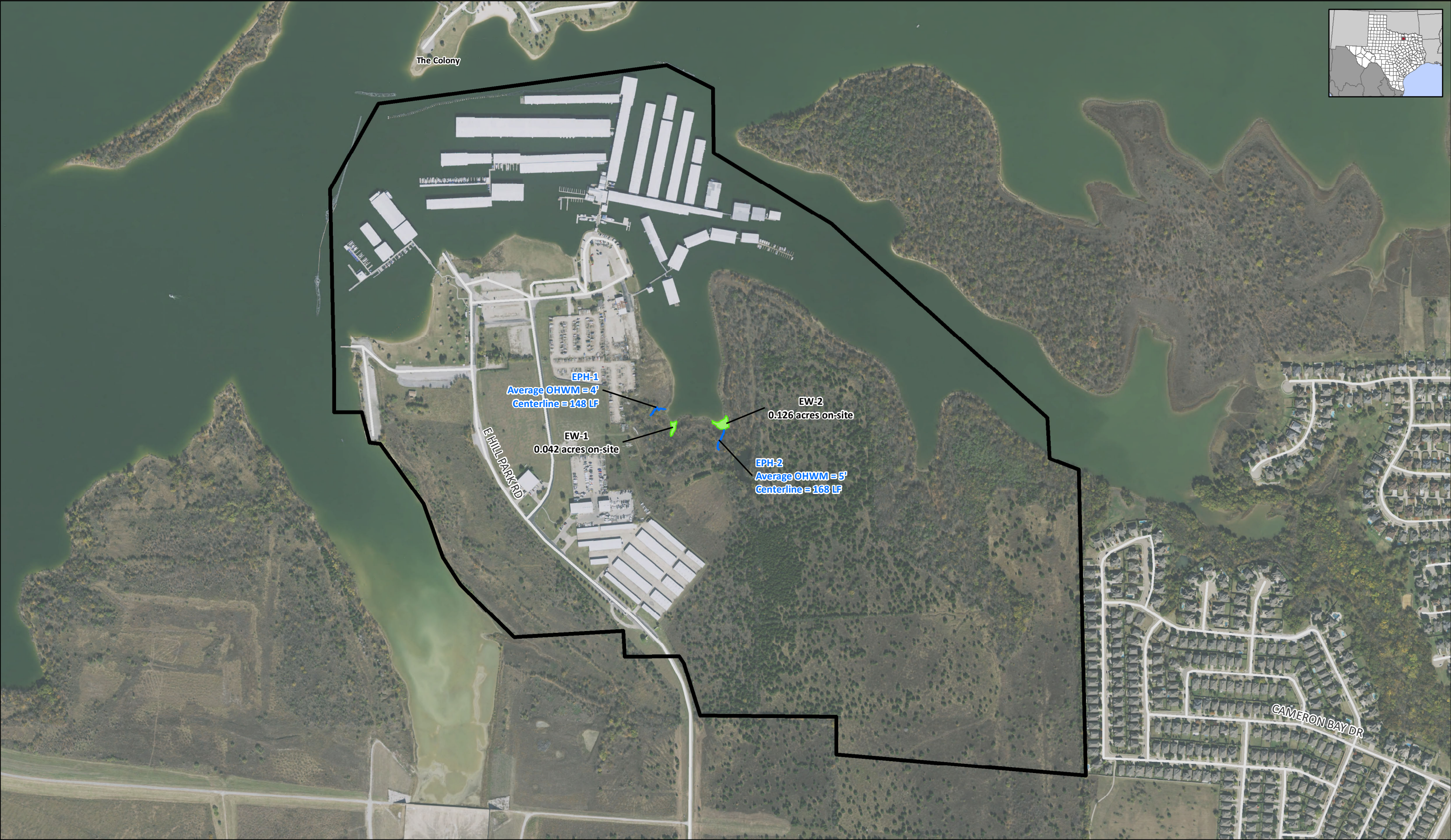
LEGEND

- POTENTIAL AREA'S WHERE BETWEEN ELEV. 522'-537' WHERE FILL COULD BE NEEDED
- POTENTIAL AREA BETWEEN ELEV. 522'-537' WHERE CUT-FILL BALANCING CAN BE DONE
- 100YR FLOODPLAIN ELEVATION 537' CONTOUR

--- PROPERTY BOUNDARY

NOTE:
NO FILL PERMITTED BELOW ELEVATION 522' AND FILL FROM ELEVATION 522' - 537' MUST BE BALANCED WITH CUT ELSEWHERE BETWEEN THESE CONTOURS

FIGURE. 8
FLOODPLAIN FILL MAP



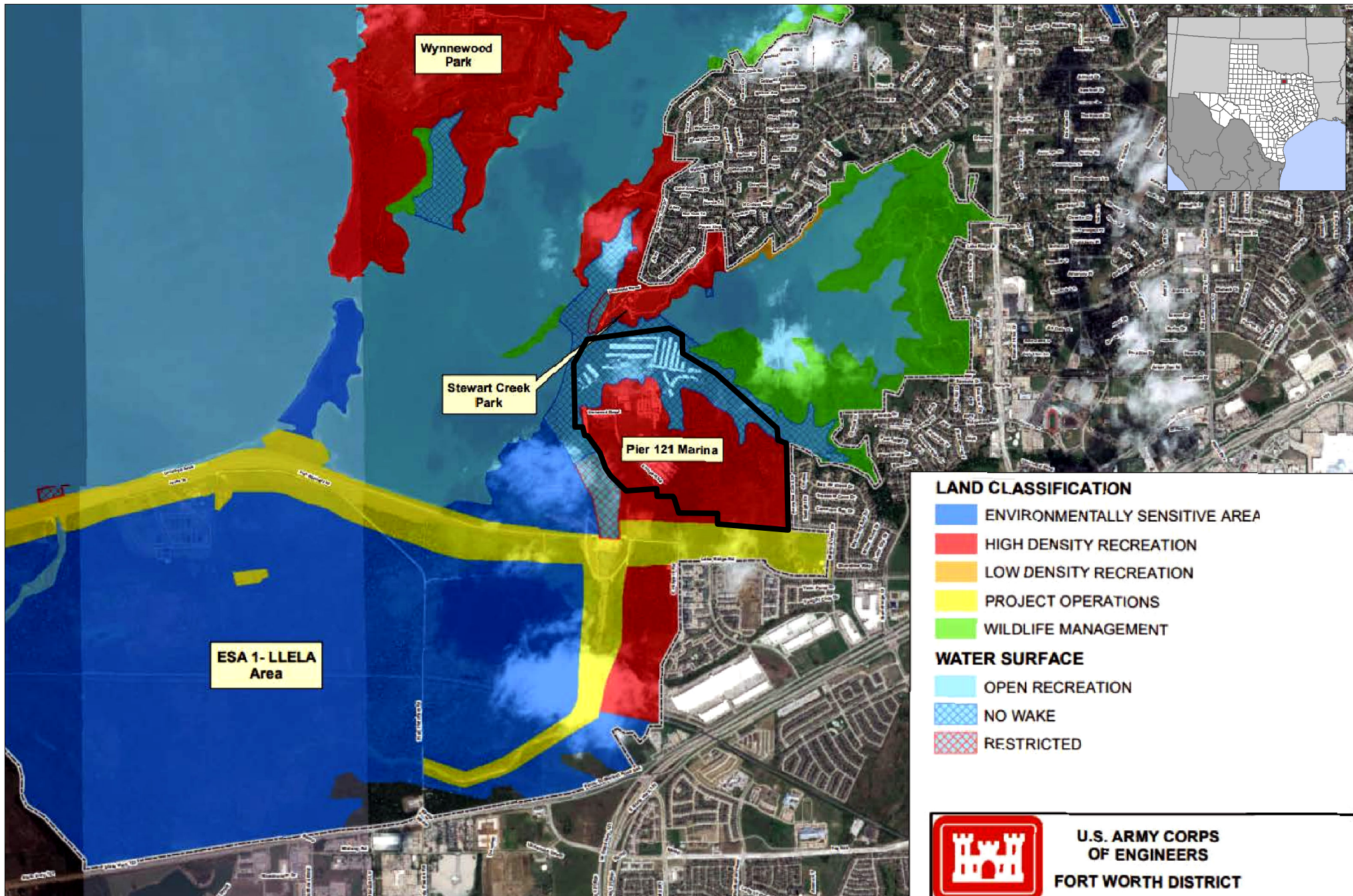
Environmental Assessment
Pier 121 Marina
21001622
December 20, 2022
DRAFT



- Project Area (~365 acres)
- Ephemeral Drainage
- Emergent Wetland

Source: Jones and Ridenour

Figure 9
Wetland Delineation Map
Denton County, Texas



Environmental Assessment
Pier 121 Marina
21001622
December 20, 2022
DRAFT

Source: Lewisville Lake Master Plan (USACE)

Figure 10
Land Classification Map
Denton County, Texas

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Potential Covered Parking Areas With Solar

- Zone 01
-1D Surf Club Parking
-1E Members Parking
- Zone 02
- Hotel Parking
- Zone 03
- 3B Beach Parking
- Zone 05
- 5A Existing Covered Boat Storage
- 5B Proposed Covered Boat Storage
- 5F Existing Boat Maintenance Buildings

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6G Check-in / Welcome Center Parking
6H Transient RV Sites (Varying Mix of Back In & Pull Through)

LEGEND

	CONSERVATION POOL ELEVATION OF LAKE LEWISVILLE (522.0')		PROPOSED PUBLIC ACCESS RD (16,402 LF)
	EPHEMERAL DRAINAGES (EPH-1 & EPH-2)		PROPOSED CONTROLLED PUBLIC ACCESS RD (7,050 LF)
	EMERGENT WETLANDS (EW-1 & EW-2)		PROPOSED PRIVATE ACCESS RD (22,370 LF)
	OFF-CHANNEL PONDS		PROPOSED RIGHT TURN LANE (300 LF)
	PROPERTY BOUNDARY		
	100 YR FEMA FLOODPLAIN (ZONE AE)		

Figure 11.
PAVEMENT ACCESS EXHIBIT



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Potential Covered Parking Areas With Solar

- Zone 01
- 1D Surf Club Parking
 - 1E Members Parking
- Zone 02
- Hotel Parking
- Zone 03
- 3B Beach Parking
- Zone 05
- 5A Existing Covered Boat Storage
 - 5B Proposed Covered Boat Storage
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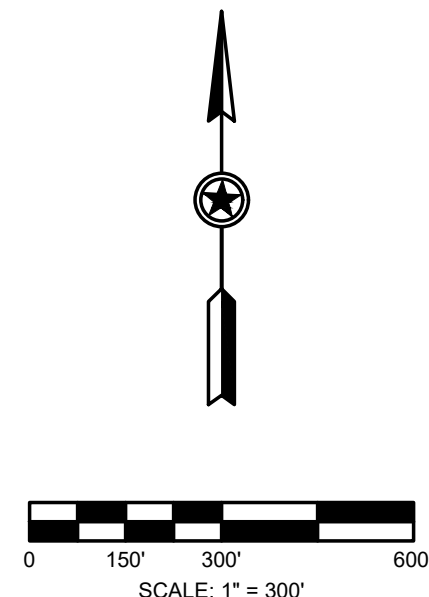
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ZONE 05 - KATY BEACH MARINA SERVICE

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- 5C Proposed Boat Sales Building
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- 6B Phase 6 Glamping - 30 Units
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- 6D Amenity Center - 3 acre
- 6E Parks - 2.3 acre
- 6F Maintenance Area - 0.5 acre
- 6G Check-in / Welcome Center Parking
- 6H Transient RV Sites (Varying Mix of Back In & Pull Through)



LEGEND			
	EXISTING 12" WATER MAIN TO REMAIN (3,733 LF)		PROPERTY BOUNDARY
	EXISTING 12" WATER MAIN TO BE REMOVED (1,297 LF)		100 YR FEMA FLOODPLAIN (ZONE AE)
	PROPOSED 6" WATER MAIN (10,410 LF)		
	PROPOSED 8" WATER MAIN (10,915 LF)		
	PROPOSED 12" WATER MAIN (5,933 LF)		

NOTE:
ALL UTILITIES REPRESENTED ARE BEING SHOWN IN THEIR PRELIMINARY DESIGN STAGE AND ARE SUBJECT TO CHANGE.

UNLESS OTHERWISE NOTED, ALL WATERLINES SHOWN ARE PUBLIC

FIGURE. 12
WATER
SITE UTILITY PLAN EXHIBIT



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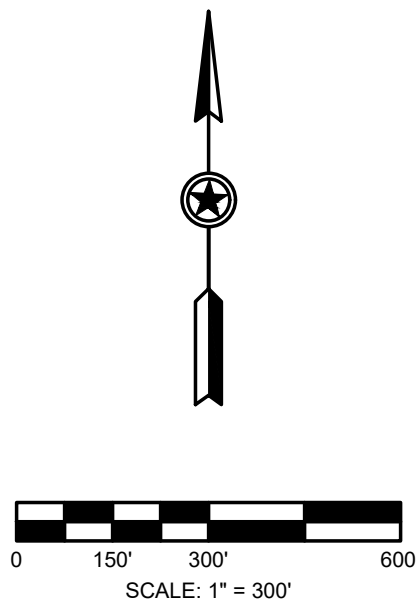
LEGEND

- | | | | |
|--------|---|-----|----------------------------------|
| ○ | 4' DIA. PRECAST SANITARY SEWER MANHOLES (109) | --- | PROPERTY BOUNDARY |
| — | PROPOSED 6" SANITARY SEWER MAIN (12,860 LF) | --- | 100 YR FEMA FLOODPLAIN (ZONE AE) |
| — WW — | PROPOSED 8" SANITARY SEWER MAIN (5,695 LF) | | |
| — WW — | PROPOSED 12" SANITARY SEWER (1,001 LF) | | |
| --- | PROPOSED FORCE MAIN (4,355 LF) | | |

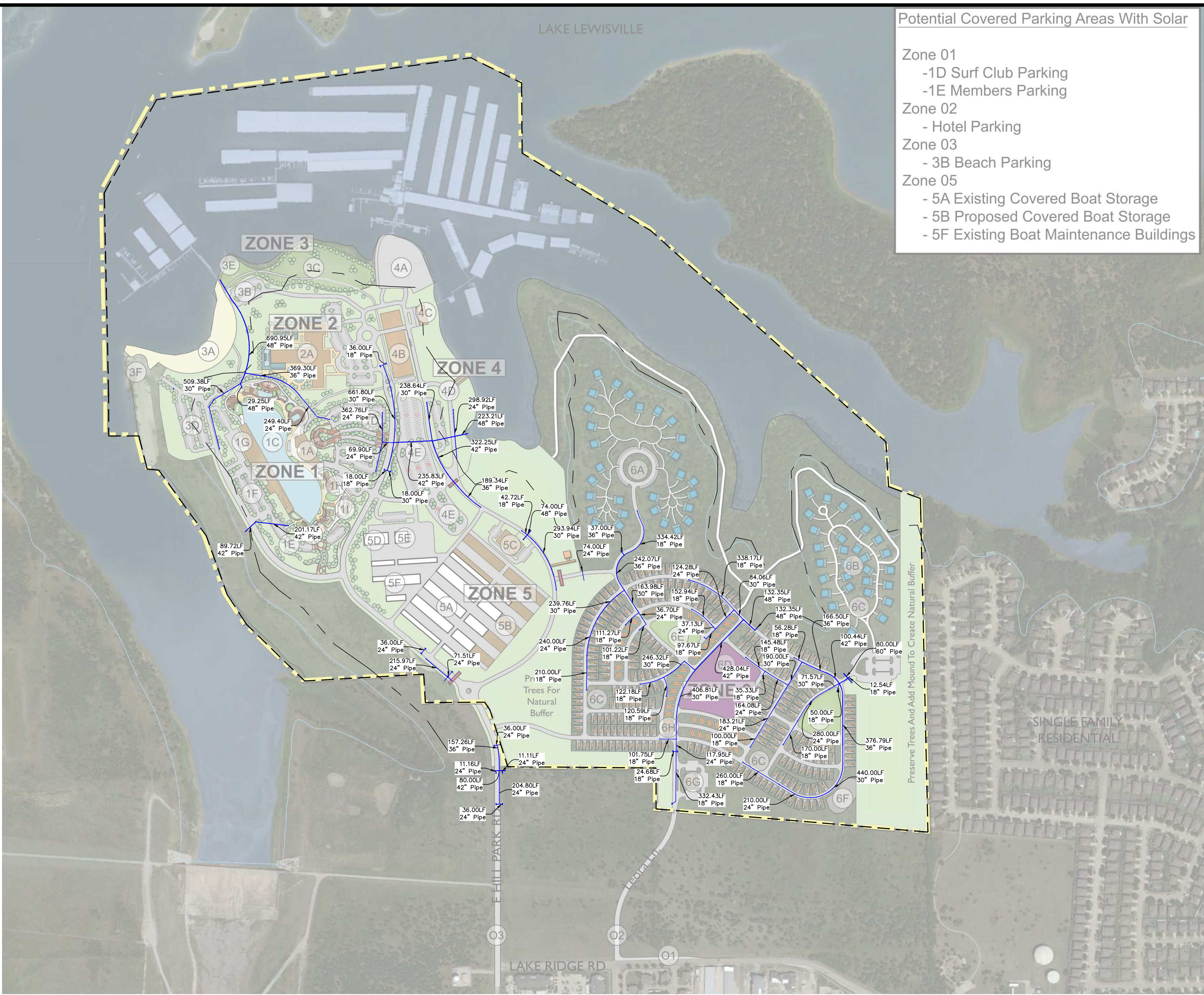
NOTE:
ALL UTILITIES REPRESENTED ARE BEING SHOWN IN THEIR PRELIMINARY DESIGN STAGE AND ARE SUBJECT TO CHANGE.

UNLESS OTHERWISE NOTED, ALL SANITARY SEWER SHOWN IS PRIVATE

FIGURE. 12
SANITARY SEWER
SITE UTILITY PLAN EXHIBIT



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ZONING SUMMARY

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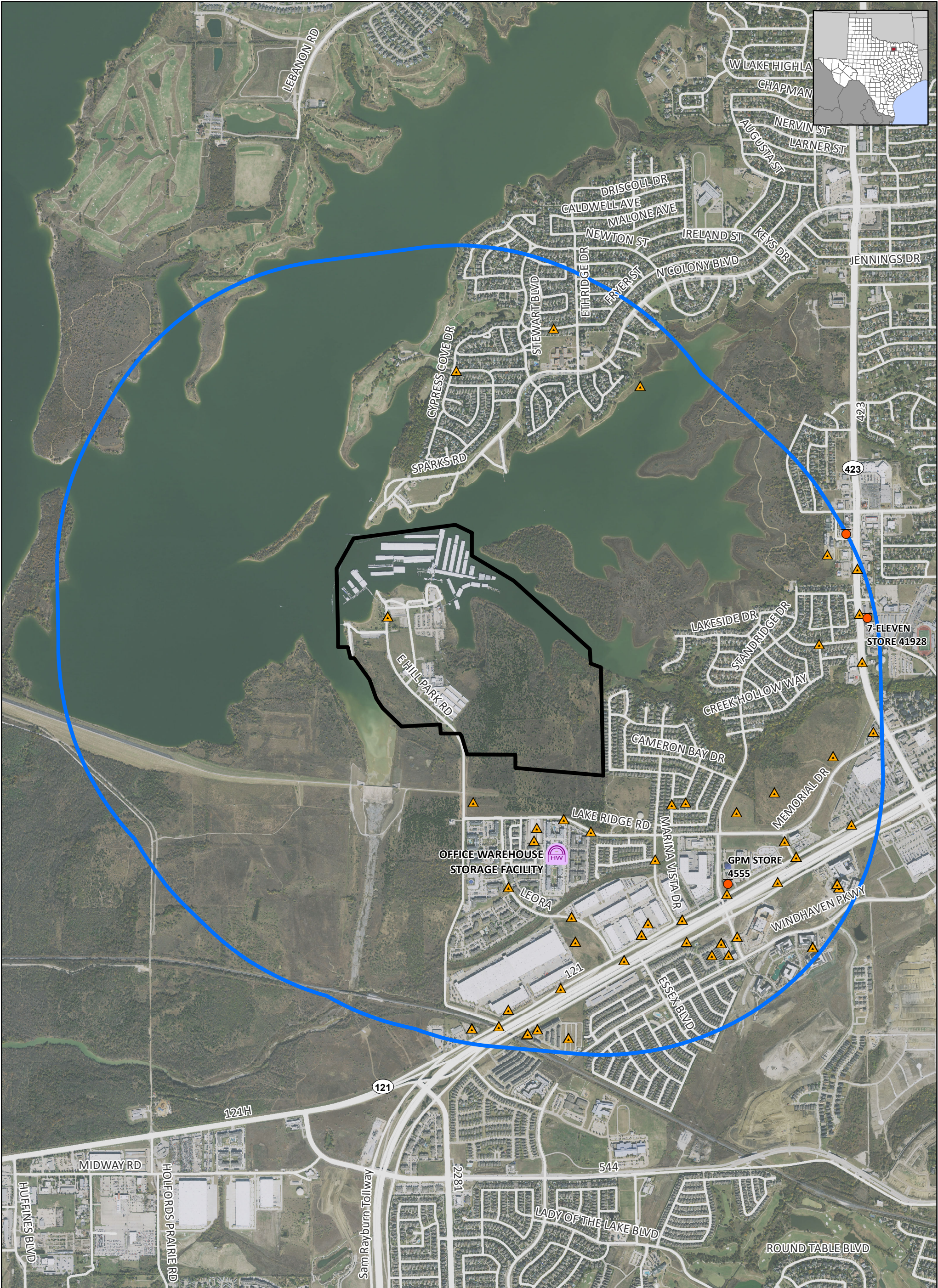
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FIGURE. 12
STORM SEWER
SITE UTILITY PLAN EXHIBIT





- Project Area (~365 acres)

1-mile Buffer
- Hazardous Waste Storage Facility (TCEQ)

Petroleum Storage Tank (TCEQ)
- Facility (EPA)

Source: National Agriculture Imagery Program (2020)
FEMA FIRM 48121C0560G

ATWELL

Environmental Assessment

Pier 121 Marina

21001622

December 20, 2022

DRAFT

0

1,500

Feet

N

Figure 13
Hazardous Waste Site Map
Denton County, Texas

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ZONING SUMMARY

ZONE 01 - KATY BEACH SURF PARK

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FIGURE. 14
PROJECT MITIGATION
TECHNIQUES MAP

APPENDICES

APPENDIX A

CULTURAL RESOURCE SURVEY REPORT

[CONFIDENTIAL INFORMATION: REDACTED]

CONFIDENTIAL: DO NOT DISTRIBUTE

APPENDIX B

**PRELIMINARY WETLANDS DETERMINATION AND WETLANDS
DELINEATION**

[CONFIDENTIAL INFORMATION: REDACTED]

CONFIDENTIAL: DO NOT DISTRIBUTE

APPENDIX C

IPAC AND RTEST RESOURCE LISTS



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Arlington Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
Phone: (817) 277-1100 Fax: (817) 277-1129
Email Address: arles@fws.gov

In Reply Refer To:

09/04/2024 20:42:12 UTC

Project Code: 2024-0139510

Project Name: Pier 121 Marina Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)).

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: <https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see [Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service \(fws.gov\)](#).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office

17629 El Camino Real, Suite 211

Houston, TX 77058-3051

(817) 277-1100

PROJECT SUMMARY

Project Code: 2024-0139510

Project Name: Pier 121 Marina Project

Project Type: Commercial Development

Project Description: Expansion of existing marina to include lodge, surf lagoon, camping, RV park, and public boat ramp relocation.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@33.0735455,-96.9167315844438,14z>



Counties: Denton County, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is final critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: <ul style="list-style-type: none">▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: <ul style="list-style-type: none">▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane <i>Grus americana</i> Population: Wherever found, except where listed as an experimental population There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

REPTILES

NAME	STATUS
Alligator Snapping Turtle <i>Macrochelys temminckii</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4658	Proposed Threatened

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Katy Reminga
Address: Two Towne Square Suite #700
City: Southfield
State: MI
Zip: 48076
Email: kreminga@atwell-group.com
Phone: 6163079193

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers

APPENDIX D

**JANUARY 2022 AND JANUARY 2023 TRAFFIC IMPACT
ANALYSES**



Traffic Impact Analysis - REVISED

Pier 121 Improvements

Lewisville, Texas

27 February 2023

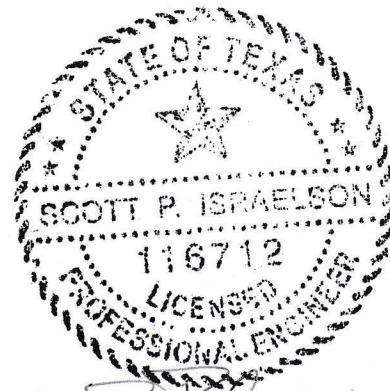
TRAFFIC IMPACT
GROUP, LLC

1431 Greenway Drive, Suite 800
Irving, TX 75038
972.358.6383



Pier 121 Improvements - Lewisville

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Texas.



 1/21/2023

Scott P. Israelson, P.E., PTOE
License No. 116712

Executive Summary

Project Description

Pier 121 Improvements is a proposed commercial development in Lewisville, Texas. The site is located on the south side of Lewisville Lake at the north terminus of Hill Park Road.

The development is proposed to consist of new internal access roadways, a public beach, multiple parking lot expansions/reconfigurations, a surf beach recreation area and pool, a 150-room resort hotel with a pool, “glamping” cabins, and an RV resort totaling 500 campsites, with an extension of Leora Lane from Lake Ridge Road north as access, jogging trail, public parks, and other amenities.

The City of Lewisville required a TIA for this development. This REVISED document incorporates comments received from the City during review.

Trip Generation

The proposed development is expected to generate 96 entering and 89 exiting trips in the AM peak hour, and 133 entering and 105 exiting trips in the PM peak hour.

Turn Lanes/Access Management

The development proposes to add a fourth southbound leg to the existing intersection of Lake Ridge Road & Leora Lane for a new project access to the proposed camping area. It is **recommended** to construct a westbound right-turn lane at the project access.

Traffic Impacts

At Standridge Drive & Lake Ridge Road/Memorial Drive, analysis shows that the northbound right-turn movement currently sees LOS F in the PM peak hour. A full signal warrant analysis would reveal that the intersection meets warrants for signalization under existing conditions. This would be needed for current conditions and should not be tied to development.

All other intersections are projected to function acceptably under Full Build conditions.

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I. Introduction

Pier 121 Improvements is a proposed commercial development in Lewisville, Texas. The site is located on the south side of Lewisville Lake at the north terminus of Hill Park Road.

The development is proposed to consist of new internal access roadways, a public beach, multiple parking lot expansions/reconfigurations, a surf beach recreation area and pool, a 150-room resort hotel with a pool, “glamping” cabins, and an RV resort totaling 500 campsites, with an extension of Leora Lane from Lake Ridge Road north as access, jogging trail, public parks, and other amenities.

The City of Lewisville required a TIA for this development. This REVISED document incorporates comments received from the City during review.

The study area included the following intersections:

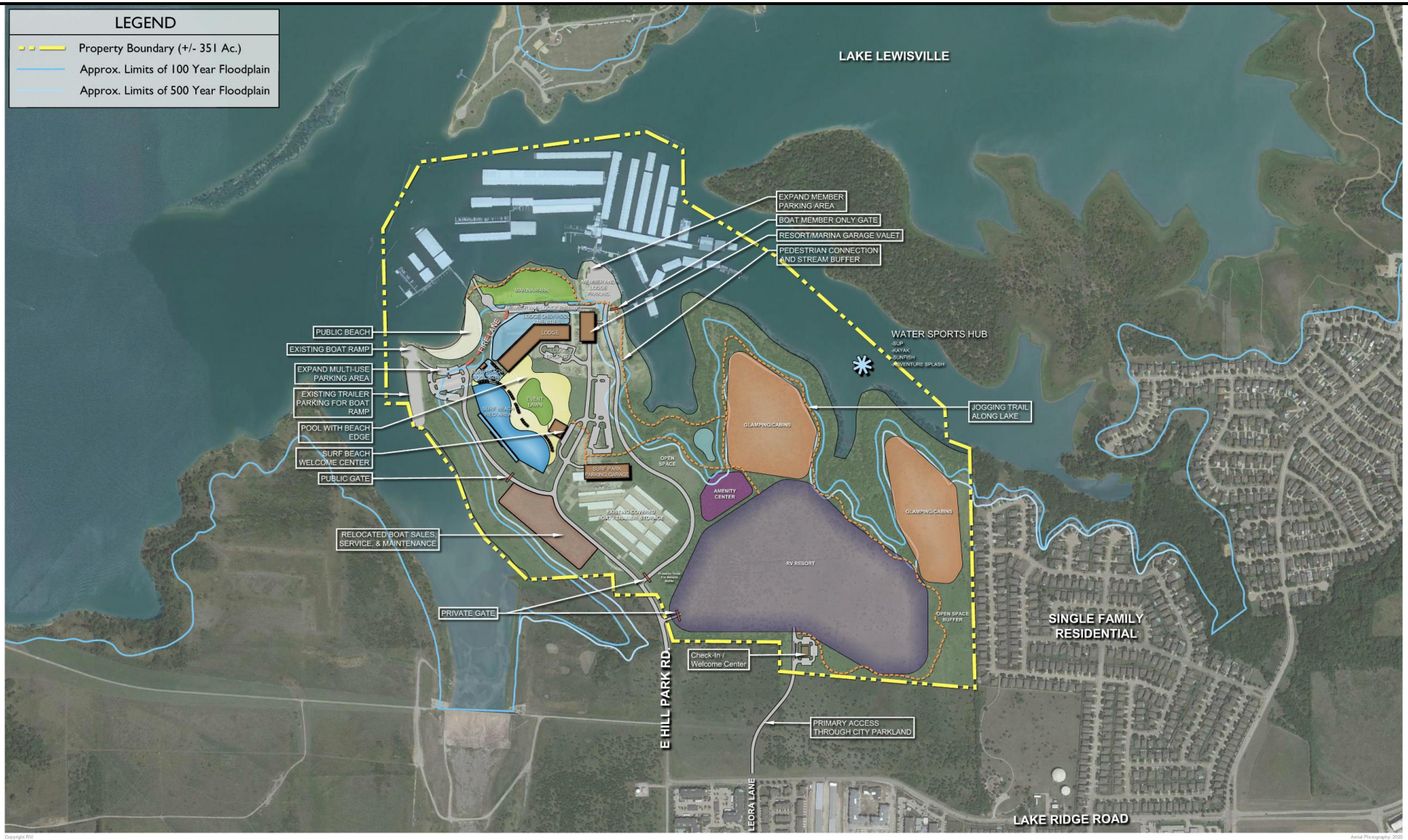
- Lake Ridge Road & Hill Park Road
- Lake Ridge Road & Leora Lane/Project Access
- Lake Ridge Road & Marina Vista Drive
- Standridge Drive & Lake Ridge Road/Memorial Drive

The study analyzed the following scenarios:

- 2022 Existing Conditions
- Full Build 2023 Conditions

The AM peak hour and PM peak hour were analyzed.

Figure 1 shows the most recent site plan. **Figure 2** shows the project vicinity map.



PIER 121 • CONCEPT PLAN H

Denton County, TX
 September 21, 2021
 # 20004210
 Safe Harbor Marinas



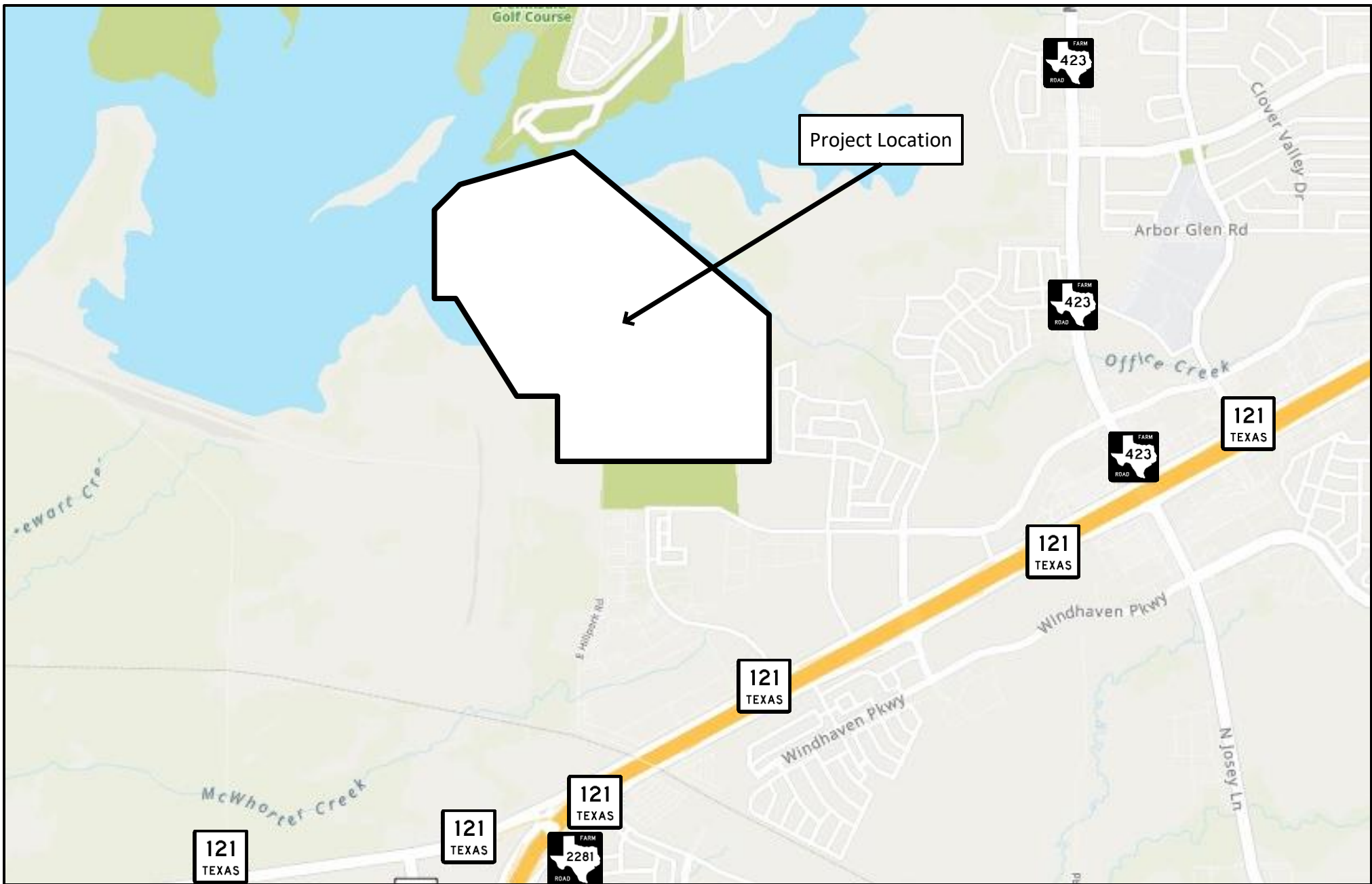
Site Plan

Figure 1

Pier 121 - Lewisville

Date: 26 January 2022

TRAFFIC IMPACT
GROUP, LLC



Vicinity Map

Figure 2

Pier 121 - Lewisville

Date: 26 January 2022

TRAFFIC IMPACT
GROUP, LLC

II. Existing Conditions

A. Existing Roadway Conditions

Table 2.1 presents a summary of the existing roadway conditions in the study area.

Table 2.1 - Existing Roadways				
Street Name	Functional Class	Typical Section	Posted Speed	AADT
Lake Ridge Road	Major Collector	Two-lane undivided	35 mph	4,721
Hill Park Road	Local street	Two-lane undivided	35 mph	933
Leora Lane	Local street	Two-lane undivided	35 mph	NA

B. Existing Intersection Geometry

Lake Ridge Road & Hill Park Road is unsignalized with stop sign control on Lake Ridge Road. All approaches are single lane.

Lake Ridge Road & Leora Lane is unsignalized with stop sign control on Leora Lane. The eastbound approach has a through lane and a right-turn lane. The westbound and northbound approaches are single lane.

C. Traffic Volumes

Traffic data collection for study area intersections was performed on January 12, 2022. Traffic data for additional intersections was performed on January 11, 2023. **Figure 3** displays existing traffic volumes. These volumes can be found in the Appendix.

The most recent Average Annual Daily Traffic (AADT) volumes were retrieved from the TxDOT Planning Office website.



Existing Traffic Volumes

Figure 3

Pier 121 - Lewisville

Date: 21 January 2023

TRAFFIC IMPACT
GROUP, LLC

III. Methodology

A. Base Assumptions

Intersection capacity analysis was conducted using Synchro v11.0. Trip generation was calculated using the 10th edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. Right-turn and left-turn lanes were examined using the National Cooperative Highway Research Program (NCHRP) Report No. 279 *Intersection Channelization Design Guide*.

B. Background Growth

The average annual background growth rate is calculated using historical AADT volumes. Calculations show that the background growth on Main Street, north of SH 121 is 0.94% per year. These calculations can be found in the Appendix.

Existing volumes were increased by 1.0% to estimate background growth for Full Build 2023 conditions.

C. Trip Generation

The development is proposed to consist of a 150-room resort hotel with a pool, approximately 100 “glamping” cabins, and an RV resort totaling 500 campsites, and a surf beach of 4.9 acres.

The *ITE Trip Generation Manual, 10th Edition* was used to estimate the projected trips by this development.

Table 3.1 contains the summary of the land uses and sizes used for trip generation estimates.

Table 3.1 - ITE Trip Generation							
Average Weekday Driveway Volumes				AM Peak Hour		PM Peak Hour	
Land Use	ITE Code	Size		Enter	Exit	Enter	Exit
Resort Hotel/Cabins	330	250	Rooms/Cabins	58	22	44	58
Water Slide Park (Surf beach)	482	4.9	Acres	0	0	1	0
Campground/Recreational Vehicle Park	416	500	Occupied Campsite	38	67	88	47
Total New Peak Hour Trips to Adjacent Network				96	89	133	105

D. Trip Distribution

Trips for this proposed development were assigned to the surrounding roadway network based on existing traffic patterns and comments from the City. The proposed trip distribution for this project can be found in **Figure 4**, and the projected site trips are shown in **Figure 5**.

Full Build 2023 volumes are shown in **Figure 6**.



Full Build 2023 Volumes

Figure 6

Pier 121 - Lewisville

Date: 21 January 2023

TRAFFIC IMPACT
GROUP, LLC

IV. Turn Lane/Access Management

A. Right-Turn Lanes

The National Cooperative Highway Research Program (NCHRP) Report 279 *Intersection Channelization Design Guide* was used to determine right-turn lane and left-turn lane thresholds for this study.

For public officials that do not have formal thresholds for determining when new access requires turn lane treatments, the NCHRP Report 279 is a tool in assessing the impacts from development. Specifically, this report allows the traffic engineering professional to input roadway type, posted speed, advancing volume (and opposing volume for left turns), and number of turning vehicles. The result is a plot on a graph defined by the above inputs recommending turn lanes or not.

Table 4.1 shows the volumes used for analysis.

Table 4.2 - Right-Turn Lane Analysis						
Driveway	AM/ PM	Approach	Posted Speed	Advancing Vol	RT Vol	Turn Lane needed?
Lake Ridge Road & Leora Lane /Project Access	AM	WB	35	171	38	Yes
	PM			267	53	Yes
Lake Ridge Road & Hill Park Road	AM	WB	35	74	74	No
	PM			93	93	No

It is **recommended** to construct a westbound right-turn lane at Lake Ridge Road & Leora Lane/Project Access.

B. Left-Turn Lanes

Table 4.2 shows the volumes used in the analysis.

Table 4.2 - Left-Turn Lane Analysis							
Driveway	AM/ PM	Approach	Posted Speed	Advancing Vol	Opposing Vol	LT Vol	Turn Lane needed?
Lake Ridge Road & Leora Lane /Project Access	AM	EB	35	77	111	0	No
	PM			85	180	0	No
Lake Ridge Road & Hill Park Road	AM	SB	35	48	0	48	No
	PM			69	0	69	No

Based on no left-turns entering at the proposed Access, and no opposing volumes for the southbound left-turn, no left-turn lanes from Lake Ridge Road or Hill Park Road are required.

C. Intersection Sight Distance

The table below shows required ISD for posted speeds based on AASHTO Greenbook standards.

Speed (mph)	Stopping Sight Distance (ft.)	Design Intersection Sight Distance (ft.)
25	155	280
30	200	335
35	250	390
40	305	445
45	360	500
50	425	555
55	495	610
60	570	665
65	645	720

Source: A Policy on Geometric Design of Highway and Streets, 5th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2004.

An ISD analysis shows that the intersection of Lake Ridge Road & Leora Lane/Project Access does not have sight distance concerns as proposed. Lake Ridge Road has a posted speed limit of 35 mph, which requires an ISD of 390 feet. There are no sight distance obstructions that obscure the view of vehicles.



Lake Ridge Road - looking east

V. Capacity Analysis

The Transportation Research Board's Highway Capacity Manual (HCM) utilizes a term "level of service" (LOS) to measure how traffic operates in intersections. There are currently six levels of service ranging from A to F. Level of Service "A" represents the best conditions and Level of Service "F" represents the worst. Synchro software was used to determine the level of service for intersections in the study area. All worksheet reports from the analyses can be found in the Appendix.

Table 5.1 shows the control delay per vehicle associated with LOS A through F for signalized and unsignalized intersections.

Table 5.1 - Highway Capacity Manual Levels of Service and Control Delay			
Signalized Intersection		Unsignalized Intersection	
Level of Service	Control Delay per Vehicle (sec)	Level of Service	Control Delay per Vehicle (sec)
A	≤ 10	A	≤ 10
B	> 10 and ≤ 20	B	> 10 and ≤ 15
C	> 20 and ≤ 35	C	> 15 and ≤ 25
D	> 35 and ≤ 55	D	> 25 and ≤ 35
E	> 55 and ≤ 80	E	> 35 and ≤ 50
F	> 80	F	> 50

A. Lake Ridge Road & Leora Lane/Project Access

Lake Ridge Road & Leora Lane is unsignalized with stop sign control on Leora Lane. The eastbound approach has a through lane and a right-turn lane. The westbound and northbound approaches are single lane. The project access will add a fourth southbound leg to this intersection, which is proposed to be a single lane.

Table 5.2 shows the current LOS, control delay, and 95th percentile queue length for existing conditions.

Table 5.2 - Intersection LOS, Delay, and Queue by Movement - 2022 Existing								
Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Lake Ridge Road & Leora Lane	EB	TH	FREE					
		RT						
	WB	LT	A	7.4	3'	A	7.5	8'
		TH	FREE					
	NB	LT	A	9.7	0'	B	11.2	3'
		RT	A	9.2	18'	A	9.3	18'

Table 5.3 shows the expected LOS, control delay, and 95th percentile queue length for Full Build 2023 conditions.

Table 5.3 - Intersection LOS, Delay, and Queue by Movement - 2023 Full Build								
Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Lake Ridge Road & Leora Lane/Project Access	EB	LT	Free					
		TH						
		RT						
	WB	LT	Free					
		TH						
		RT						
	NB	LT	B	10.6	-	B	13.7	-
		TH						
		RT	A	9.2	18'	A	9.7	18'
	SB	LT	B	14.2	10'	C	22.1	28'
		TH						
		RT						

It is recommended to construct a westbound right-turn lane at the project access.

B. Lake Ridge Road & Marina Vista Drive

Lake Ridge Road & Marina Vista Drive is all-way stop controlled. The eastbound, northbound, and southbound approaches consist of a single lane. The westbound approach has a shared left-through lane and a right-turn lane.

Table 5.4 shows the current LOS, control delay, and 95th percentile queue length for existing conditions.

Table 5.4 - Intersection LOS, Delay, and Queue by Movement - 2022 Existing								
Intersection			AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Lake Ridge Road & Marina Vista Dr	EB	LT	B	13.4	85'	B	13.1	63'
		TH						
		RT						
	WB	LT	B	10.4	25'	B	13.3	58'
		TH						
		RT	A	7.7	-	A	8.2	5'
	NB	LT	A	9.1	10'	B	12.0	45'
		TH						
		RT						
	SB	LT	A	10.0	18'	A	9.9	10'
		TH						
		RT						

Table 5.5 shows the expected LOS, control delay, and 95th percentile queue length for Full Build 2023 conditions.

Table 5.5 - Intersection LOS, Delay, and Queue by Movement - 2023 Full Build								
Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Lake Ridge Road & Marina Vista Dr	EB	LT	C	20.8	163'	C	22.1	143'
		TH						
		RT						
	WB	LT	B	12.4	43'	C	20.7	118'
		TH						
		RT						
	NB	LT	A	8.1	-	A	9.0	8'
		TH	B	10.7	18'	C	16.8	80'
		RT						
	SB	LT	B	11.1	23'	B	11.4	10'
		TH						
		RT						
Overall			C (17.3)			C (19.2)		

C. Standridge Drive & Lake Ridge Road/Memorial Drive

Table 5.6 shows the current LOS, control delay, and 95th percentile queue length for existing conditions.

Table 5.6 - Intersection LOS, Delay, and Queue by Movement - 2022 Existing								
Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Standridge Dr & Lake Vista Rd/Memorial Dr	EB	LT	B	11.7	-	B	13.7	-
		TH	C	16.3	45'	C	23.4	75'
		RT	C	19.3	80'	C	19.0	53'
	WB	LT	E	42.7	200'	D	32.6	120'
		TH	B	12.3	13'	C	15.8	25'
		RT						
	NB	LT	B	13.8	18'	C	16.4	40'
		TH	B	13.1	18'	D	34.8	168'
		RT	C	18.7	73'	F	237.2	800'
	SB	LT	B	12.6	5'	C	15.6	10'
		TH	C	16.7	43'	C	15.9	18'
		RT						

Table 5.7 shows the expected LOS, control delay, and 95th percentile queue length for Full Build 2023 conditions.

Table 5.7 - Intersection LOS, Delay, and Queue by Movement - 2023 Full Build								
Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
Standridge Dr & Lake Vista Rd/Memorial Dr	EB	LT	B	12.1	-	B	14.4	5'
		TH	C	17.4	48'	D	26.3	83'
		RT	D	27.8	135'	D	28.5	105'
	WB	LT	F	53.4	190'	E	40.0	140'
		TH	B	13.1	15'	C	17.3	28'
		RT						
	NB	LT	C	17.2	40'	C	24.7	88'
		TH	B	13.7	18'	E	42.3	193'
		RT	C	20.4	80'	F	284.1	800'
	SB	LT	B	13.3	5'	C	16.8	13'
		TH	C	18.8	48'	C	17.2	18'
		RT						
Overall			D (26.8)			F (105.4)		

Analysis shows that the northbound right-turn movement currently sees LOS F in the PM peak hour. A full signal warrant analysis would reveal that the intersection meets warrants for signalization under existing conditions. This would be needed for current conditions and should not be tied to development.

D. Lake Ridge Road & Hill Park Road

Lake Ridge Road & Hill Park Road is unsignalized with stop sign control on Lake Ridge Road. All approaches are single lane. The northbound approach on Hill Park Road is closed. There are no conflicting movements at this intersection. All levels of service will be LOS A. No improvements are required.



Lake Ridge Road & Hill Park Road - looking north

VI. Summary and Conclusion

This study serves as an analysis of the traffic impacts from the Pier 121 development in Lewisville, Texas.

Turn Lanes/Access Management

It is recommended to construct a westbound right-turn lane at the project access.

Traffic Impacts

At Standridge Drive & Lake Ridge Road/Memorial Drive, analysis shows that the northbound right-turn movement currently sees LOS F in the PM peak hour. A full signal warrant analysis would reveal that the intersection meets warrants for signalization under existing conditions. This would be needed for current conditions and should not be tied to development.

All other intersections are projected to function acceptably under Full Build conditions.

Appendix

Background Information

Traffic Volumes

Trip Generation

Capacity Analysis

BACKGROUND INFORMATION

TO: Sagar Medisetty, City of Lewisville

FROM: Scott Israelson

DATE: 3 December 2021

RE: Traffic Impact Study - Proposed Methodology
Pier 121
Lewisville

Project Description

The existing Pier 121 is proposed to undergo redevelopment. It is located on Lake Lewisville and has access on Hill Park Road.

The existing marina has a restaurant, dining and music entertainment venue, wet and dry storage spaces, and a public boat ramp and park.

The redevelopment will add a 150-room lodge, an RV resort with 500 RV and “glamping”/cabin sites, and a 4.9-acre surf beach. The site will maintain its existing access on Hill Park Road for boating activities, and the RV resort/glamping portion will have a new full-access connection to Lake Ridge Road. Full build out is assumed to occur in 2023.

Figure 1 shows the most recent site plan.

Trip Generation

Trip generation estimates will be based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual 10th Edition*. Table 1 shows trip generation estimates.

Table 1 - ITE Trip Generation							
Average Weekday Driveway Volumes				AM Peak Hour		PM Peak Hour	
Land Use	ITE Code	Size		Enter	Exit	Enter	Exit
Resort Hotel	330	150	Rooms	53	51	26	35
Public Park	411	4.9	Acres	0	0	1	0
Campground/Recreational Vehicle Park	416	500	Occupied Campsite	38	67	88	47
Total New Peak Hour Trips to Adjacent Network				91	118	115	82

Study Area

For this analysis, the study area will include:

- Intersections
 - Lake Ridge Road & Hill Park Road
 - Lake Ridge Road & Access

Trip Distribution and Assignments

The trip distribution for the project is based on engineering judgment:

- 65% to/from the east on Lake Ridge Road
- 35% to/from the south on Hill Park Road

Background Traffic

The background traffic growth rate will be determined using historical AADT in the area.

Analysis

Intersection capacity analysis will be performed using Synchro v10.0.

Analysis will be performed for (1) existing conditions, and (2) Full Build conditions. The AM and PM peak hours will be examined.

The study will examine:

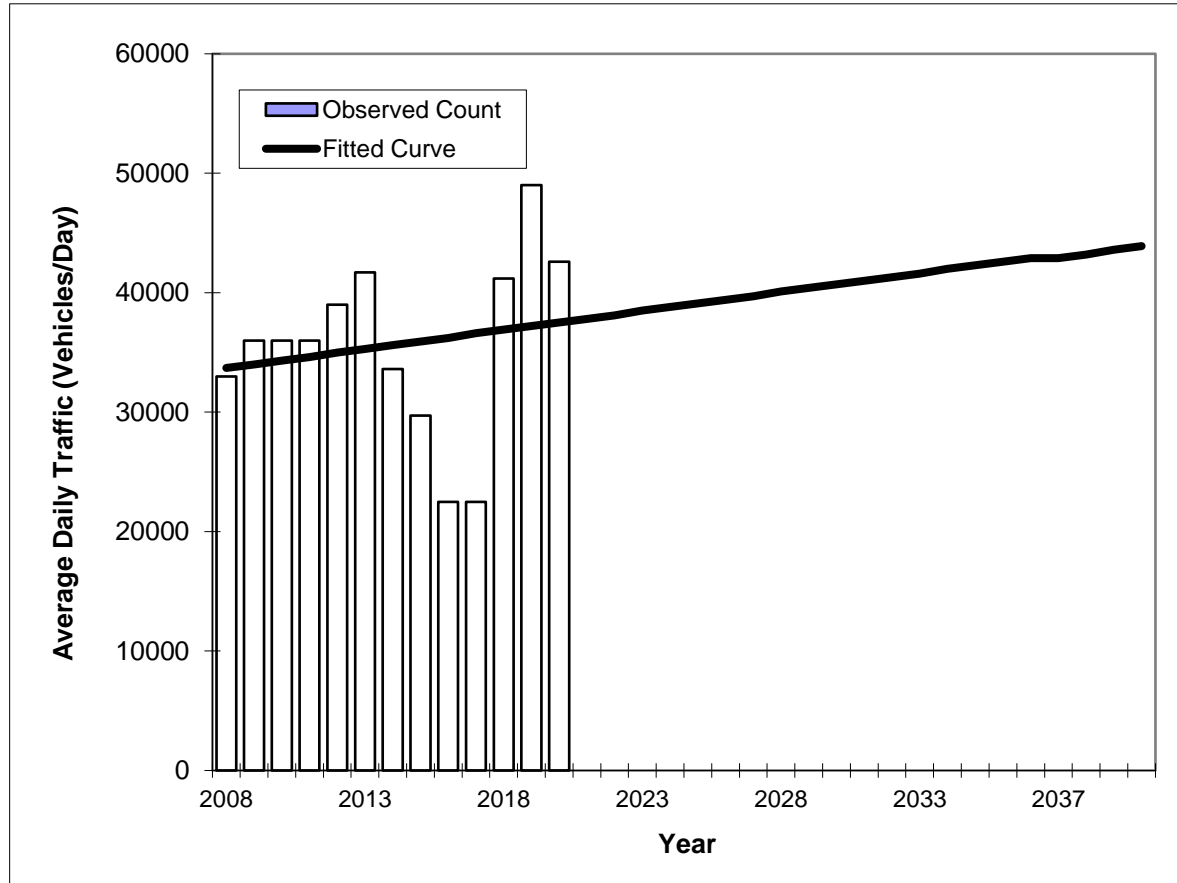
- Existing 2021 Conditions
- Full Build 2023 Conditions

Traffic Trends - V2.0

Main Street -- north of Hwy 121

Location	Lewisville
----------	------------

County:	Denton
Station #:	61H53
Highway:	Main Street



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2008	33000	33700
2009	36000	34000
2010	36000	34300
2011	36000	34600
2012	39000	35000
2013	41700	35300
2014	33600	35600
2015	29700	35900
2016	22500	36200
2017	22500	36600
2018	41200	36900
2019	49000	37200
2020	42600	37500
2007 Opening Year Trend		
2007	N/A	#N/A
2020 Mid-Year Trend		
2020	N/A	37500
2022 Design Year Trend		
2022	N/A	38100
TRANPLAN Forecasts/Trends		

** Annual Trend Increase:	318
Trend R-squared:	2.64%
Trend Annual Historic Growth Rate:	0.94%
Trend Growth Rate (2019 to Design Year):	0.81%
Printed:	21-Jan-22
Straight Line Growth Option	

*Axle-Adjusted

TRAFFIC VOLUMES

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ LEORA LN
Site Code:
Start Date: 01/12/2022
Page No: 1

Turning Movement Data

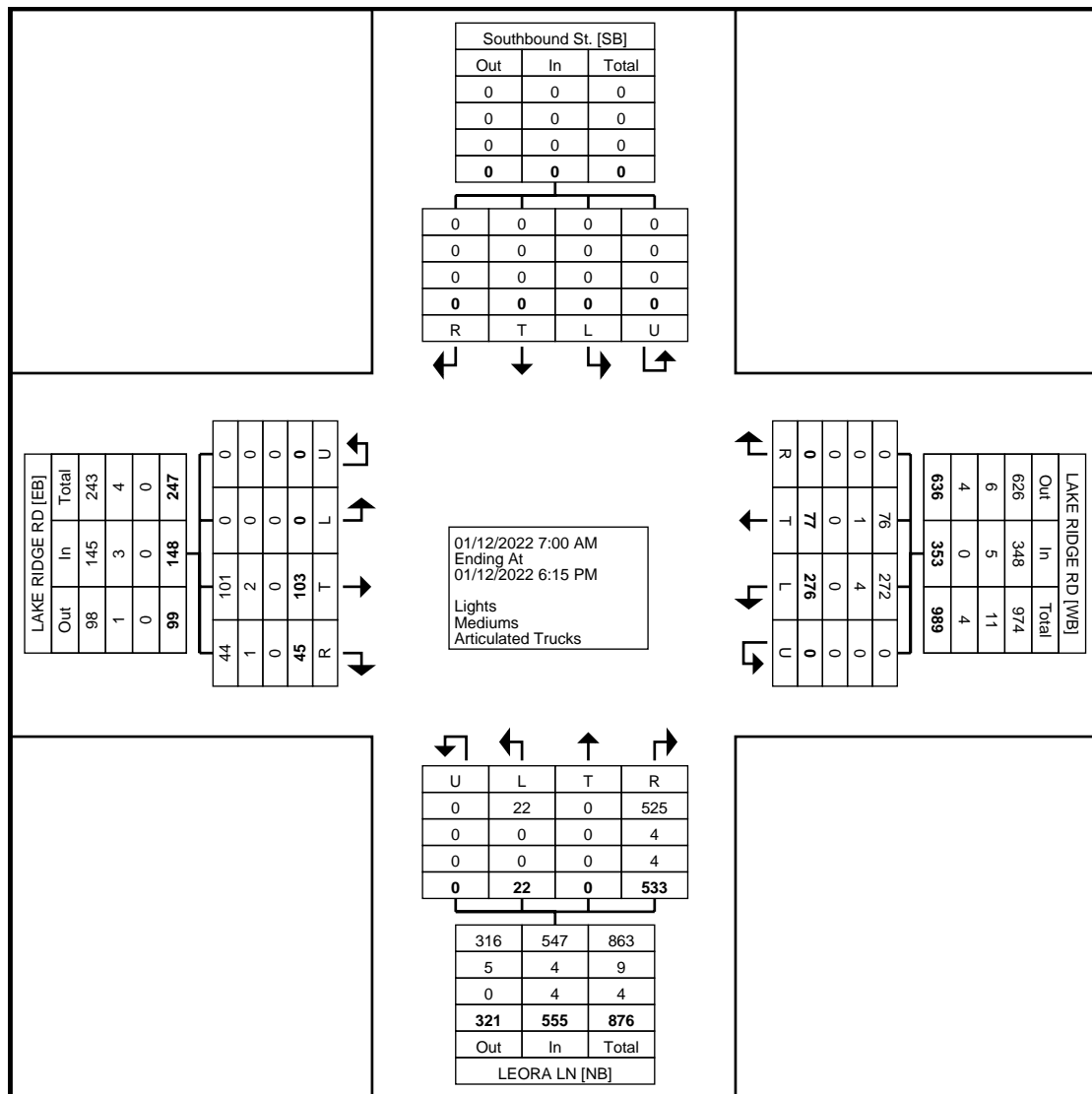
Start Time	Southbound St. Southbound					LAKE RIDGE RD Westbound					LEORA LN Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:00 AM	0	0	0	0	0	13	3	0	0	16	0	0	23	0	23	0	0	3	0	3	42
7:15 AM	0	0	0	0	0	15	2	0	0	17	1	0	54	0	55	0	5	7	0	12	84
7:30 AM	0	0	0	0	0	12	4	0	0	16	1	0	40	0	41	0	11	1	0	12	69
7:45 AM	0	0	0	0	0	18	8	0	0	26	2	0	30	0	32	0	1	2	0	3	61
Hourly Total	0	0	0	0	0	58	17	0	0	75	4	0	147	0	151	0	17	13	0	30	256
8:00 AM	0	0	0	0	0	10	5	0	0	15	3	0	34	0	37	0	2	1	0	3	55
8:15 AM	0	0	0	0	0	16	3	0	0	19	1	0	26	0	27	0	8	0	0	8	54
8:30 AM	0	0	0	0	0	10	6	0	0	16	1	0	26	0	27	0	5	2	0	7	50
8:45 AM	0	0	0	0	0	6	1	0	0	7	1	0	28	0	29	0	2	5	0	7	43
Hourly Total	0	0	0	0	0	42	15	0	0	57	6	0	114	0	120	0	17	8	0	25	202
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	12	4	0	0	16	2	0	28	0	30	0	7	2	0	9	55
4:15 PM	0	0	0	0	0	16	1	0	0	17	2	0	33	0	35	0	10	2	0	12	64
4:30 PM	0	0	0	0	0	20	6	0	0	26	0	0	34	0	34	0	7	1	0	8	68
4:45 PM	0	0	0	0	0	22	7	0	0	29	0	0	31	0	31	0	8	4	0	12	72
Hourly Total	0	0	0	0	0	70	18	0	0	88	4	0	126	0	130	0	32	9	0	41	259
5:00 PM	0	0	0	0	0	20	7	0	0	27	1	0	36	0	37	0	7	2	0	9	73
5:15 PM	0	0	0	0	0	24	4	0	0	28	1	0	25	0	26	0	9	2	0	11	65
5:30 PM	0	0	0	0	0	27	9	0	0	36	2	0	48	0	50	0	13	9	0	22	108
5:45 PM	0	0	0	0	0	35	7	0	0	42	4	0	37	0	41	0	8	2	0	10	93
Hourly Total	0	0	0	0	0	106	27	0	0	133	8	0	146	0	154	0	37	15	0	52	339
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	276	77	0	0	353	22	0	533	0	555	0	103	45	0	148	1056
Approach %	0.0	0.0	0.0	0.0	-	78.2	21.8	0.0	0.0	-	4.0	0.0	96.0	0.0	-	0.0	69.6	30.4	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	26.1	7.3	0.0	0.0	33.4	2.1	0.0	50.5	0.0	52.6	0.0	9.8	4.3	0.0	14.0	-
Lights	0	0	0	0	0	272	76	0	0	348	22	0	525	0	547	0	101	44	0	145	1040
% Lights	-	-	-	-	-	98.6	98.7	-	-	98.6	100.0	-	98.5	-	98.6	-	98.1	97.8	-	98.0	98.5
Mediums	0	0	0	0	0	4	1	0	0	5	0	0	4	0	4	0	2	1	0	3	12
% Mediums	-	-	-	-	-	1.4	1.3	-	-	1.4	0.0	-	0.8	-	0.7	-	1.9	2.2	-	2.0	1.1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	4
% Articulated Trucks	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.8	-	0.7	-	0.0	0.0	-	0.0	0.4

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ LEORA LN
Site Code:
Start Date: 01/12/2022
Page No: 2



Turning Movement Data Plot

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ LEORA LN
Site Code:
Start Date: 01/12/2022
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Southbound St. Southbound					LAKE RIDGE RD Westbound					LEORA LN Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:15 AM	0	0	0	0	0	15	2	0	0	17	1	0	54	0	55	0	5	7	0	12	84
7:30 AM	0	0	0	0	0	12	4	0	0	16	1	0	40	0	41	0	11	1	0	12	69
7:45 AM	0	0	0	0	0	18	8	0	0	26	2	0	30	0	32	0	1	2	0	3	61
8:00 AM	0	0	0	0	0	10	5	0	0	15	3	0	34	0	37	0	2	1	0	3	55
Total	0	0	0	0	0	55	19	0	0	74	7	0	158	0	165	0	19	11	0	30	269
Approach %	0.0	0.0	0.0	0.0	-	74.3	25.7	0.0	0.0	-	4.2	0.0	95.8	0.0	-	0.0	63.3	36.7	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	20.4	7.1	0.0	0.0	27.5	2.6	0.0	58.7	0.0	61.3	0.0	7.1	4.1	0.0	11.2	-
PHF	0.000	0.000	0.000	0.000	0.000	0.764	0.594	0.000	0.000	0.712	0.583	0.000	0.731	0.000	0.750	0.000	0.432	0.393	0.000	0.625	0.801
Lights	0	0	0	0	0	53	19	0	0	72	7	0	157	0	164	0	19	11	0	30	266
% Lights	-	-	-	-	-	96.4	100.0	-	-	97.3	100.0	-	99.4	-	99.4	-	100.0	100.0	-	100.0	98.9
Mediums	0	0	0	0	0	2	0	0	0	2	0	0	1	0	1	0	0	0	0	0	3
% Mediums	-	-	-	-	-	3.6	0.0	-	-	2.7	0.0	-	0.6	-	0.6	-	0.0	0.0	-	0.0	1.1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	-	0.0	0.0	-	0.0	0.0

Turning Movement Peak Hour Data Plot (7:15 AM)

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ LEORA LN
Site Code:
Start Date: 01/12/2022
Page No: 5

Turning Movement Peak Hour Data (5:00 PM)

Start Time	Southbound St. Southbound					LAKE RIDGE RD Westbound					LEORA LN Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
5:00 PM	0	0	0	0	0	20	7	0	0	27	1	0	36	0	37	0	7	2	0	9	73
5:15 PM	0	0	0	0	0	24	4	0	0	28	1	0	25	0	26	0	9	2	0	11	65
5:30 PM	0	0	0	0	0	27	9	0	0	36	2	0	48	0	50	0	13	9	0	22	108
5:45 PM	0	0	0	0	0	35	7	0	0	42	4	0	37	0	41	0	8	2	0	10	93
Total	0	0	0	0	0	106	27	0	0	133	8	0	146	0	154	0	37	15	0	52	339
Approach %	0.0	0.0	0.0	0.0	-	79.7	20.3	0.0	0.0	-	5.2	0.0	94.8	0.0	-	0.0	71.2	28.8	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	31.3	8.0	0.0	0.0	39.2	2.4	0.0	43.1	0.0	45.4	0.0	10.9	4.4	0.0	15.3	-
PHF	0.000	0.000	0.000	0.000	0.000	0.757	0.750	0.000	0.000	0.792	0.500	0.000	0.760	0.000	0.770	0.000	0.712	0.417	0.000	0.591	0.785
Lights	0	0	0	0	0	106	27	0	0	133	8	0	143	0	151	0	36	15	0	51	335
% Lights	-	-	-	-	-	100.0	100.0	-	-	100.0	100.0	-	97.9	-	98.1	-	97.3	100.0	-	98.1	98.8
Mediums	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	2
% Mediums	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.7	-	0.6	-	2.7	0.0	-	1.9	0.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
% Articulated Trucks	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	1.4	-	1.3	-	0.0	0.0	-	0.0	0.6

1120 W. Lovers Lane

Count Name: LAKE RIDGE RD
@ LEORA LN
Site Code:
Start Date: 01/12/2022
Page No: 6



GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ HILL PARK RD
Site Code:
Start Date: 01/12/2022
Page No: 1

Turning Movement Data

Start Time	HILL PARK RD Southbound					LAKE RIDGE RD Westbound					HILL PARK RD Northbound					Eastbound St. Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:00 AM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	3
7:30 AM	1	0	0	0	1	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	3
7:45 AM	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	7
Hourly Total	1	0	0	0	1	0	0	14	0	14	0	0	0	0	0	0	0	0	0	0	15
8:00 AM	1	0	0	0	1	0	1	4	0	5	0	0	0	0	0	0	0	0	0	0	6
8:15 AM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	0	1	4
8:30 AM	0	0	0	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0	0	0	6
8:45 AM	2	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3
Hourly Total	3	0	0	0	3	0	2	13	0	15	0	0	0	0	0	0	1	0	0	1	19
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	5	0	0	0	5	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	8
4:15 PM	5	0	0	0	5	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	7
4:30 PM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
4:45 PM	6	0	0	0	6	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	9
Hourly Total	19	0	0	0	19	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	27
5:00 PM	6	0	0	0	6	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	10
5:15 PM	7	0	0	0	7	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	9
5:30 PM	17	0	0	0	17	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	22
5:45 PM	6	0	0	0	6	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	8
Hourly Total	36	0	0	0	36	0	0	13	0	13	0	0	0	0	0	0	0	0	0	0	49
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	59	0	0	0	59	0	2	47	1	50	0	0	0	0	0	0	1	0	0	1	110
Approach %	100.0	0.0	0.0	0.0	-	0.0	4.0	94.0	2.0	-	0.0	0.0	0.0	0.0	-	0.0	100.0	0.0	0.0	-	-
Total %	53.6	0.0	0.0	0.0	53.6	0.0	1.8	42.7	0.9	45.5	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.9	-
Lights	57	0	0	0	57	0	2	46	1	49	0	0	0	0	0	0	1	0	0	1	107
% Lights	96.6	-	-	-	96.6	-	100.0	97.9	100.0	98.0	-	-	-	-	-	-	100.0	-	-	100.0	97.3
Mediums	2	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3
% Mediums	3.4	-	-	-	3.4	-	0.0	2.1	0.0	2.0	-	-	-	-	-	-	0.0	-	-	0.0	2.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	-	-	-	0.0	-	0.0	0.0	0.0	0.0	-	-	-	-	-	-	0.0	-	-	0.0	0.0

Turning Movement Data Plot

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ HILL PARK RD
Site Code:
Start Date: 01/12/2022
Page No: 3

Turning Movement Peak Hour Data (7:45 AM)

Start Time	HILL PARK RD Southbound					LAKE RIDGE RD Westbound					HILL PARK RD Northbound					Eastbound St. Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:45 AM	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	7
8:00 AM	1	0	0	0	1	0	1	4	0	5	0	0	0	0	0	0	0	0	0	0	6
8:15 AM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	0	1	4
8:30 AM	0	0	0	0	0	0	1	5	0	6	0	0	0	0	0	0	0	0	0	0	6
Total	1	0	0	0	1	0	2	19	0	21	0	0	0	0	0	0	1	0	0	1	23
Approach %	100.0	0.0	0.0	0.0	-	0.0	9.5	90.5	0.0	-	0.0	0.0	0.0	0.0	-	0.0	100.0	0.0	0.0	-	-
Total %	4.3	0.0	0.0	0.0	4.3	0.0	8.7	82.6	0.0	91.3	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	4.3	-
PHF	0.250	0.000	0.000	0.000	0.250	0.000	0.500	0.679	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.821
Lights	1	0	0	0	1	0	2	19	0	21	0	0	0	0	0	0	1	0	0	1	23
% Lights	100.0	-	-	-	100.0	-	100.0	100.0	-	100.0	-	-	-	-	-	-	100.0	-	-	100.0	100.0
Mediums	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Mediums	0.0	-	-	-	0.0	-	0.0	0.0	-	0.0	-	-	-	-	-	-	0.0	-	-	0.0	0.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	-	-	-	0.0	-	0.0	0.0	-	0.0	-	-	-	-	-	-	0.0	-	-	0.0	0.0

1120 W. Lovers Lane

Count Name: LAKE RIDGE RD
@ HILL PARK RD
Site Code:
Start Date: 01/12/2022
Page No: 4



1120 W. Lovers Lane

Count Name: LAKE RIDGE RD
@ HILL PARK RD
Site Code:
Start Date: 01/12/2022
Page No: 5

1120 W. Lovers Lane

Count Name: LAKE RIDGE RD
@ HILL PARK RD
Site Code:
Start Date: 01/12/2022
Page No: 6



GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
Page No: 1

Turning Movement Data

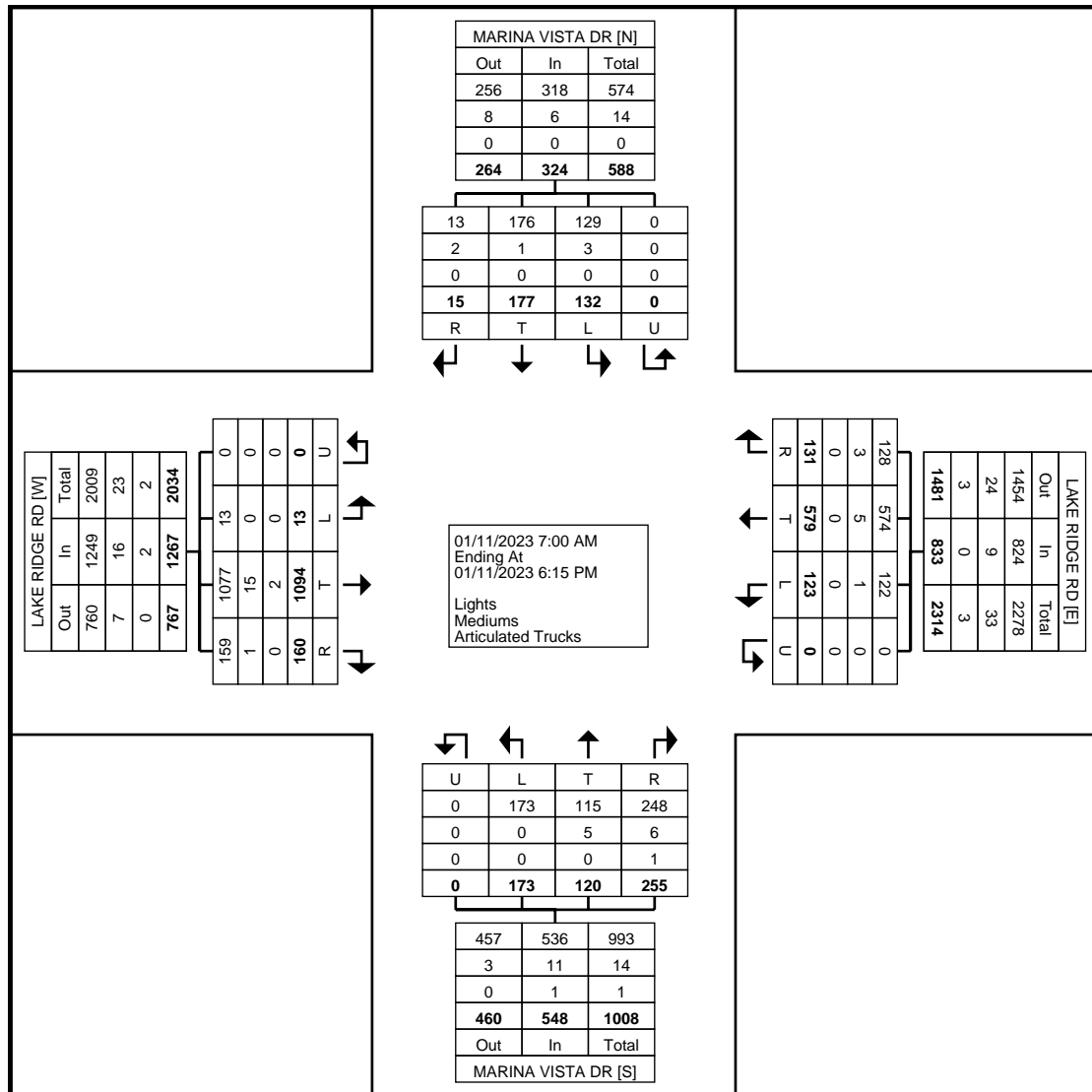
Start Time	MARINA VISTA DR Southbound					LAKE RIDGE RD Westbound					MARINA VISTA DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:00 AM	10	12	0	0	22	6	10	1	0	17	1	2	4	0	7	0	67	13	0	80	126
7:15 AM	19	18	1	0	38	14	11	6	0	31	5	4	7	0	16	4	99	13	0	116	201
7:30 AM	11	19	1	0	31	17	19	6	0	42	2	3	7	0	12	1	87	10	0	98	183
7:45 AM	7	18	2	0	27	17	24	5	0	46	4	10	10	0	24	0	73	18	0	91	188
Hourly Total	47	67	4	0	118	54	64	18	0	136	12	19	28	0	59	5	326	54	0	385	698
8:00 AM	12	10	1	0	23	18	25	2	0	45	5	6	8	0	19	0	64	17	0	81	168
8:15 AM	7	16	0	0	23	7	27	8	0	42	8	2	7	0	17	0	80	16	0	96	178
8:30 AM	9	12	0	0	21	17	20	3	0	40	4	5	9	0	18	2	58	16	0	76	155
8:45 AM	4	10	1	0	15	5	18	6	0	29	3	5	1	0	9	0	56	6	0	62	115
Hourly Total	32	48	2	0	82	47	90	19	0	156	20	18	25	0	63	2	258	55	0	315	616
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	9	8	0	0	17	0	32	13	0	45	16	9	31	0	56	0	50	5	0	55	173
4:15 PM	7	6	1	0	14	2	59	9	0	70	9	6	28	0	43	0	61	6	0	67	194
4:30 PM	7	9	0	0	16	4	39	15	0	58	11	12	22	0	45	0	76	13	0	89	208
4:45 PM	7	7	3	0	17	2	50	11	0	63	14	7	29	0	50	1	58	3	0	62	192
Hourly Total	30	30	4	0	64	8	180	48	0	236	50	34	110	0	194	1	245	27	0	273	767
5:00 PM	7	9	0	0	16	1	55	11	0	67	23	15	48	0	86	1	61	6	0	68	237
5:15 PM	5	11	3	0	19	4	52	12	0	68	22	14	20	0	56	2	65	4	0	71	214
5:30 PM	6	7	1	0	14	7	66	12	0	85	29	11	13	0	53	0	77	8	0	85	237
5:45 PM	5	5	1	0	11	2	72	11	0	85	17	9	11	0	37	2	62	6	0	70	203
Hourly Total	23	32	5	0	60	14	245	46	0	305	91	49	92	0	232	5	265	24	0	294	891
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	132	177	15	0	324	123	579	131	0	833	173	120	255	0	548	13	1094	160	0	1267	2972
Approach %	40.7	54.6	4.6	0.0	-	14.8	69.5	15.7	0.0	-	31.6	21.9	46.5	0.0	-	1.0	86.3	12.6	0.0	-	-
Total %	4.4	6.0	0.5	0.0	10.9	4.1	19.5	4.4	0.0	28.0	5.8	4.0	8.6	0.0	18.4	0.4	36.8	5.4	0.0	42.6	-
Lights	129	176	13	0	318	122	574	128	0	824	173	115	248	0	536	13	1077	159	0	1249	2927
% Lights	97.7	99.4	86.7	-	98.1	99.2	99.1	97.7	-	98.9	100.0	95.8	97.3	-	97.8	100.0	98.4	99.4	-	98.6	98.5
Mediums	3	1	2	0	6	1	5	3	0	9	0	5	6	0	11	0	15	1	0	16	42
% Mediums	2.3	0.6	13.3	-	1.9	0.8	0.9	2.3	-	1.1	0.0	4.2	2.4	-	2.0	0.0	1.4	0.6	-	1.3	1.4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	3
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.4	-	0.2	0.0	0.2	0.0	-	0.2	0.1

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
Page No: 2



Turning Movement Data Plot

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

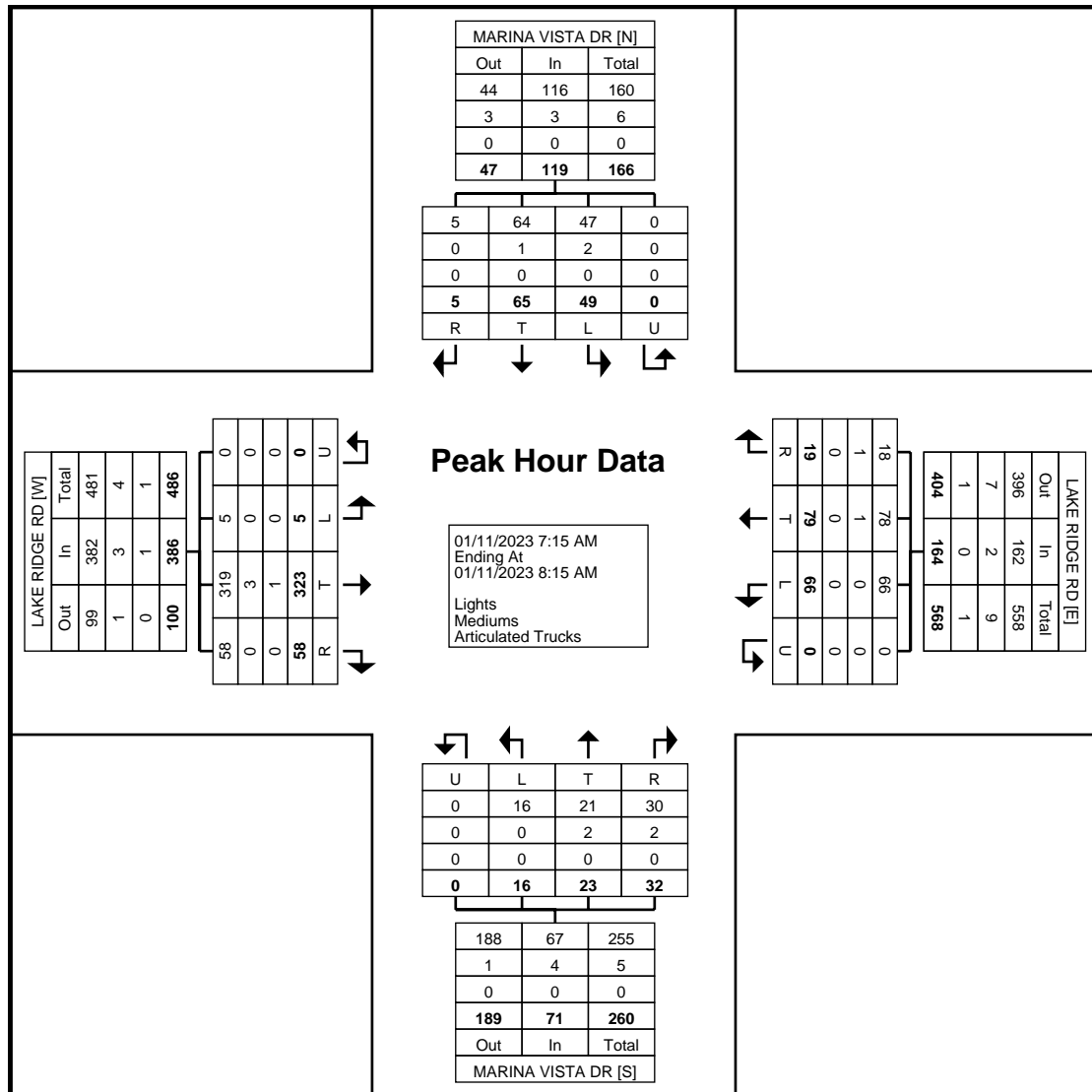
Start Time	MARINA VISTA DR Southbound					LAKE RIDGE RD Westbound					MARINA VISTA DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:15 AM	19	18	1	0	38	14	11	6	0	31	5	4	7	0	16	4	99	13	0	116	201
7:30 AM	11	19	1	0	31	17	19	6	0	42	2	3	7	0	12	1	87	10	0	98	183
7:45 AM	7	18	2	0	27	17	24	5	0	46	4	10	10	0	24	0	73	18	0	91	188
8:00 AM	12	10	1	0	23	18	25	2	0	45	5	6	8	0	19	0	64	17	0	81	168
Total	49	65	5	0	119	66	79	19	0	164	16	23	32	0	71	5	323	58	0	386	740
Approach %	41.2	54.6	4.2	0.0	-	40.2	48.2	11.6	0.0	-	22.5	32.4	45.1	0.0	-	1.3	83.7	15.0	0.0	-	-
Total %	6.6	8.8	0.7	0.0	16.1	8.9	10.7	2.6	0.0	22.2	2.2	3.1	4.3	0.0	9.6	0.7	43.6	7.8	0.0	52.2	-
PHF	0.645	0.855	0.625	0.000	0.783	0.917	0.790	0.792	0.000	0.891	0.800	0.575	0.800	0.000	0.740	0.313	0.816	0.806	0.000	0.832	0.920
Lights	47	64	5	0	116	66	78	18	0	162	16	21	30	0	67	5	319	58	0	382	727
% Lights	95.9	98.5	100.0	-	97.5	100.0	98.7	94.7	-	98.8	100.0	91.3	93.8	-	94.4	100.0	98.8	100.0	-	99.0	98.2
Mediums	2	1	0	0	3	0	1	1	0	2	0	2	2	0	4	0	3	0	0	3	12
% Mediums	4.1	1.5	0.0	-	2.5	0.0	1.3	5.3	-	1.2	0.0	8.7	6.3	-	5.6	0.0	0.9	0.0	-	0.8	1.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.3	0.0	-	0.3	0.1

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
Page No: 4



GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Peak Hour Data (5:00 PM)

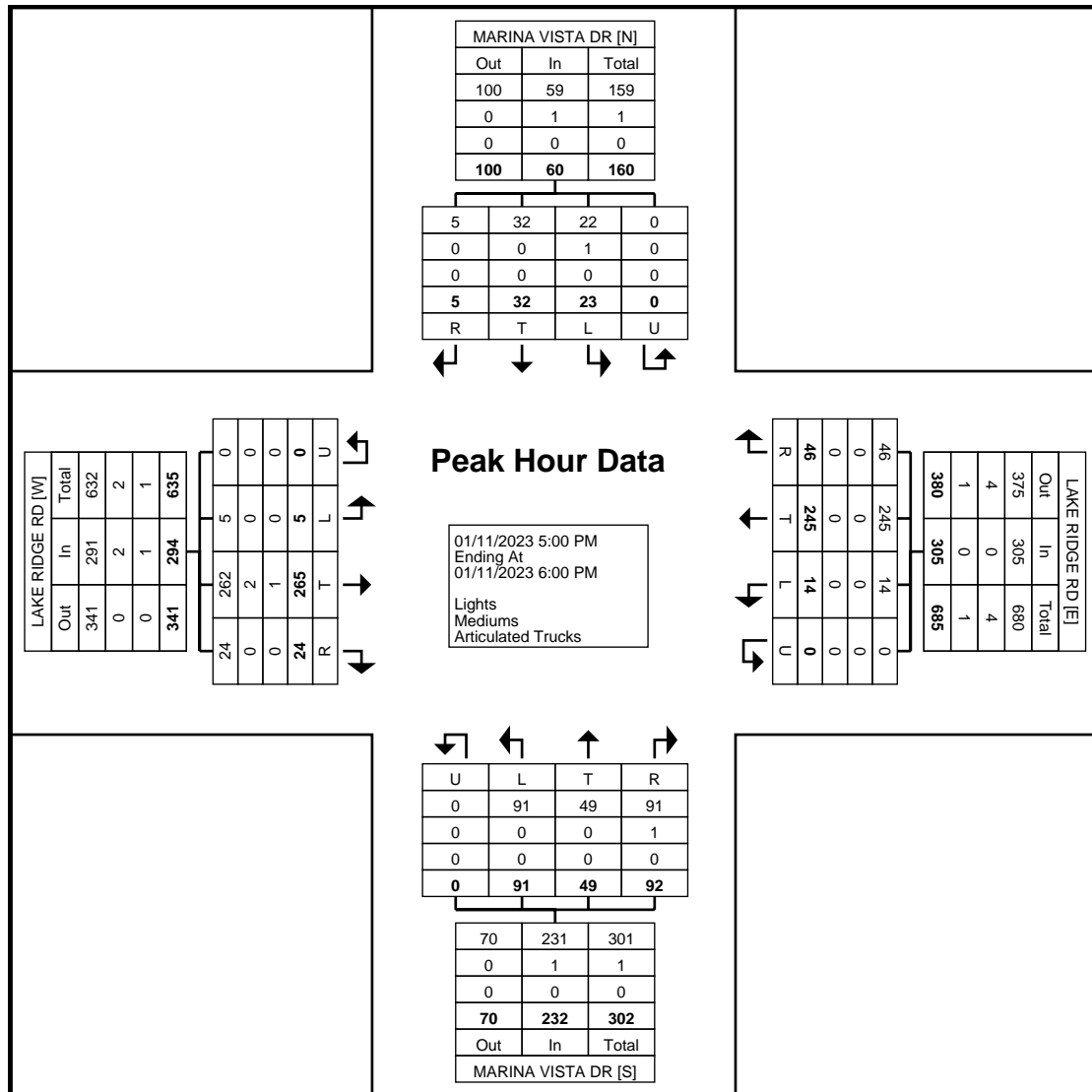
Start Time	MARINA VISTA DR Southbound					LAKE RIDGE RD Westbound					MARINA VISTA DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
5:00 PM	7	9	0	0	16	1	55	11	0	67	23	15	48	0	86	1	61	6	0	68	237
5:15 PM	5	11	3	0	19	4	52	12	0	68	22	14	20	0	56	2	65	4	0	71	214
5:30 PM	6	7	1	0	14	7	66	12	0	85	29	11	13	0	53	0	77	8	0	85	237
5:45 PM	5	5	1	0	11	2	72	11	0	85	17	9	11	0	37	2	62	6	0	70	203
Total	23	32	5	0	60	14	245	46	0	305	91	49	92	0	232	5	265	24	0	294	891
Approach %	38.3	53.3	8.3	0.0	-	4.6	80.3	15.1	0.0	-	39.2	21.1	39.7	0.0	-	1.7	90.1	8.2	0.0	-	-
Total %	2.6	3.6	0.6	0.0	6.7	1.6	27.5	5.2	0.0	34.2	10.2	5.5	10.3	0.0	26.0	0.6	29.7	2.7	0.0	33.0	-
PHF	0.821	0.727	0.417	0.000	0.789	0.500	0.851	0.958	0.000	0.897	0.784	0.817	0.479	0.000	0.674	0.625	0.860	0.750	0.000	0.865	0.940
Lights	22	32	5	0	59	14	245	46	0	305	91	49	91	0	231	5	262	24	0	291	886
% Lights	95.7	100.0	100.0	-	98.3	100.0	100.0	100.0	-	100.0	100.0	100.0	98.9	-	99.6	100.0	98.9	100.0	-	99.0	99.4
Mediums	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	4
% Mediums	4.3	0.0	0.0	-	1.7	0.0	0.0	0.0	-	0.0	0.0	0.0	1.1	-	0.4	0.0	0.8	0.0	-	0.7	0.4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	0.3	0.1

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ MARINA VISTA DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Peak Hour Data Plot (5:00 PM)

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Data

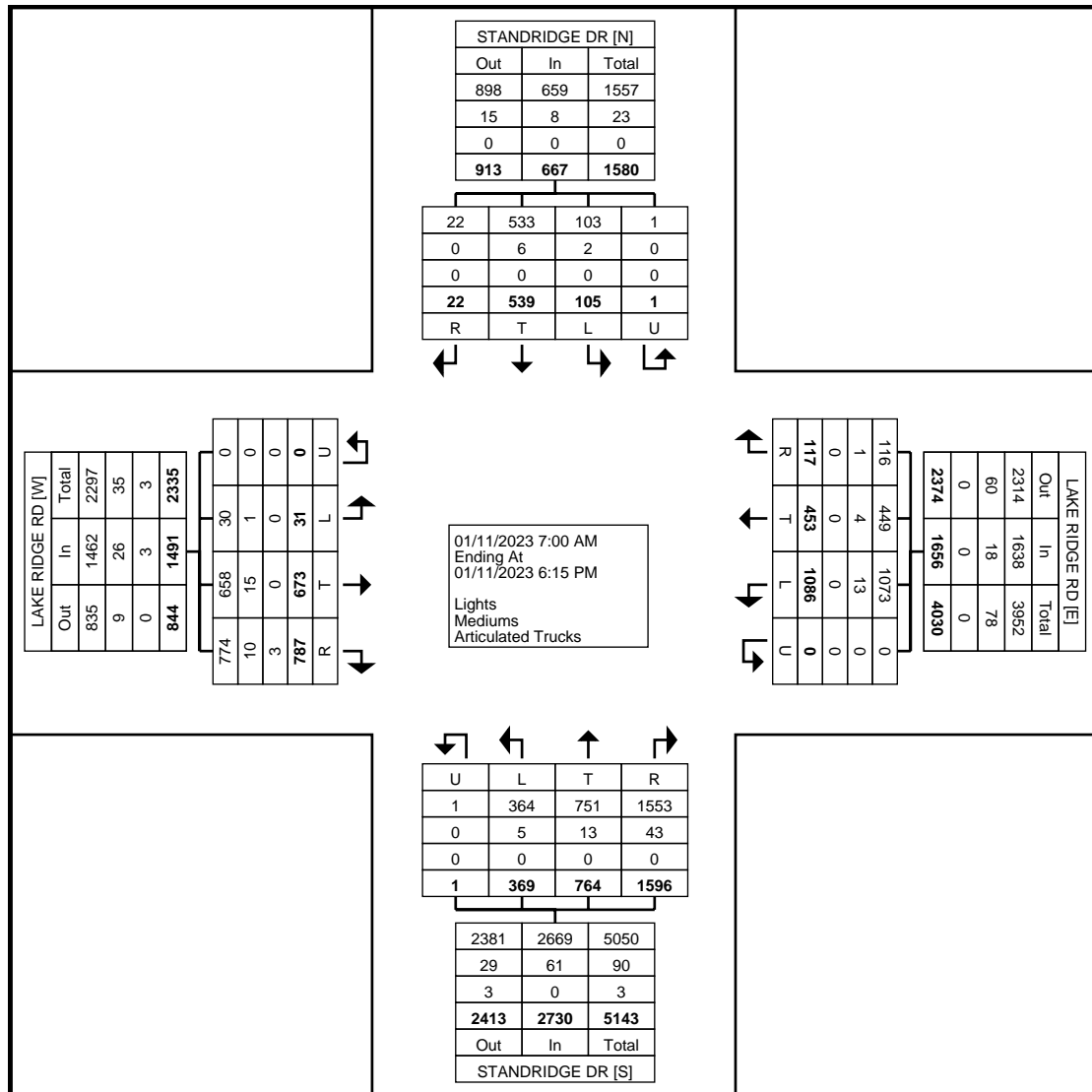
Start Time	STANDRIDGE DR Southbound					LAKE RIDGE RD Westbound					STANDRIDGE DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:00 AM	2	45	1	0	48	94	13	1	0	108	9	5	38	0	52	0	26	59	0	85	293
7:15 AM	6	52	2	0	60	85	18	1	0	104	15	18	58	0	91	2	45	82	0	129	384
7:30 AM	4	68	2	0	74	80	19	2	0	101	22	9	44	0	75	1	41	67	0	109	359
7:45 AM	9	54	0	0	63	81	31	4	0	116	23	28	70	0	121	1	35	49	0	85	385
Hourly Total	21	219	5	0	245	340	81	8	0	429	69	60	210	0	339	4	147	257	0	408	1421
8:00 AM	3	46	2	0	51	89	29	6	0	124	12	19	58	0	89	0	38	49	0	87	351
8:15 AM	6	50	0	0	56	103	25	1	0	129	19	17	49	0	85	0	41	54	0	95	365
8:30 AM	7	30	0	0	37	77	25	3	0	105	11	10	30	0	51	1	28	53	0	82	275
8:45 AM	2	22	1	0	25	48	20	5	0	73	8	19	46	0	73	0	22	39	0	61	232
Hourly Total	18	148	3	0	169	317	99	15	0	431	50	65	183	0	298	1	129	195	0	325	1223
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	8	29	1	0	38	41	21	10	0	72	24	65	105	0	194	4	49	42	0	95	399
4:15 PM	7	16	2	0	25	50	39	10	0	99	28	73	137	1	239	1	48	41	0	90	453
4:30 PM	7	14	1	0	22	50	33	17	0	100	25	87	139	0	251	3	61	42	0	106	479
4:45 PM	3	20	0	0	23	44	37	8	0	89	32	89	159	0	280	2	46	40	0	88	480
Hourly Total	25	79	4	0	108	185	130	45	0	360	109	314	540	1	964	10	204	165	0	379	1811
5:00 PM	6	28	1	0	35	56	32	11	0	99	27	59	173	0	259	5	66	44	0	115	508
5:15 PM	9	23	3	1	36	63	33	16	0	112	32	103	170	0	305	5	47	38	0	90	543
5:30 PM	16	19	3	0	38	78	44	9	0	131	36	82	158	0	276	2	50	45	0	97	542
5:45 PM	10	23	3	0	36	47	34	13	0	94	46	81	162	0	289	4	30	43	0	77	496
Hourly Total	41	93	10	1	145	244	143	49	0	436	141	325	663	0	1129	16	193	170	0	379	2089
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	105	539	22	1	667	1086	453	117	0	1656	369	764	1596	1	2730	31	673	787	0	1491	6544
Approach %	15.7	80.8	3.3	0.1	-	65.6	27.4	7.1	0.0	-	13.5	28.0	58.5	0.0	-	2.1	45.1	52.8	0.0	-	-
Total %	1.6	8.2	0.3	0.0	10.2	16.6	6.9	1.8	0.0	25.3	5.6	11.7	24.4	0.0	41.7	0.5	10.3	12.0	0.0	22.8	-
Lights	103	533	22	1	659	1073	449	116	0	1638	364	751	1553	1	2669	30	658	774	0	1462	6428
% Lights	98.1	98.9	100.0	100.0	98.8	98.8	99.1	99.1	-	98.9	98.6	98.3	97.3	100.0	97.8	96.8	97.8	98.3	-	98.1	98.2
Mediums	2	6	0	0	8	13	4	1	0	18	5	13	43	0	61	1	15	10	0	26	113
% Mediums	1.9	1.1	0.0	0.0	1.2	1.2	0.9	0.9	-	1.1	1.4	1.7	2.7	0.0	2.2	3.2	2.2	1.3	-	1.7	1.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.2	0.0

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Data Plot

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
Page No: 3

Turning Movement Peak Hour Data (7:15 AM)

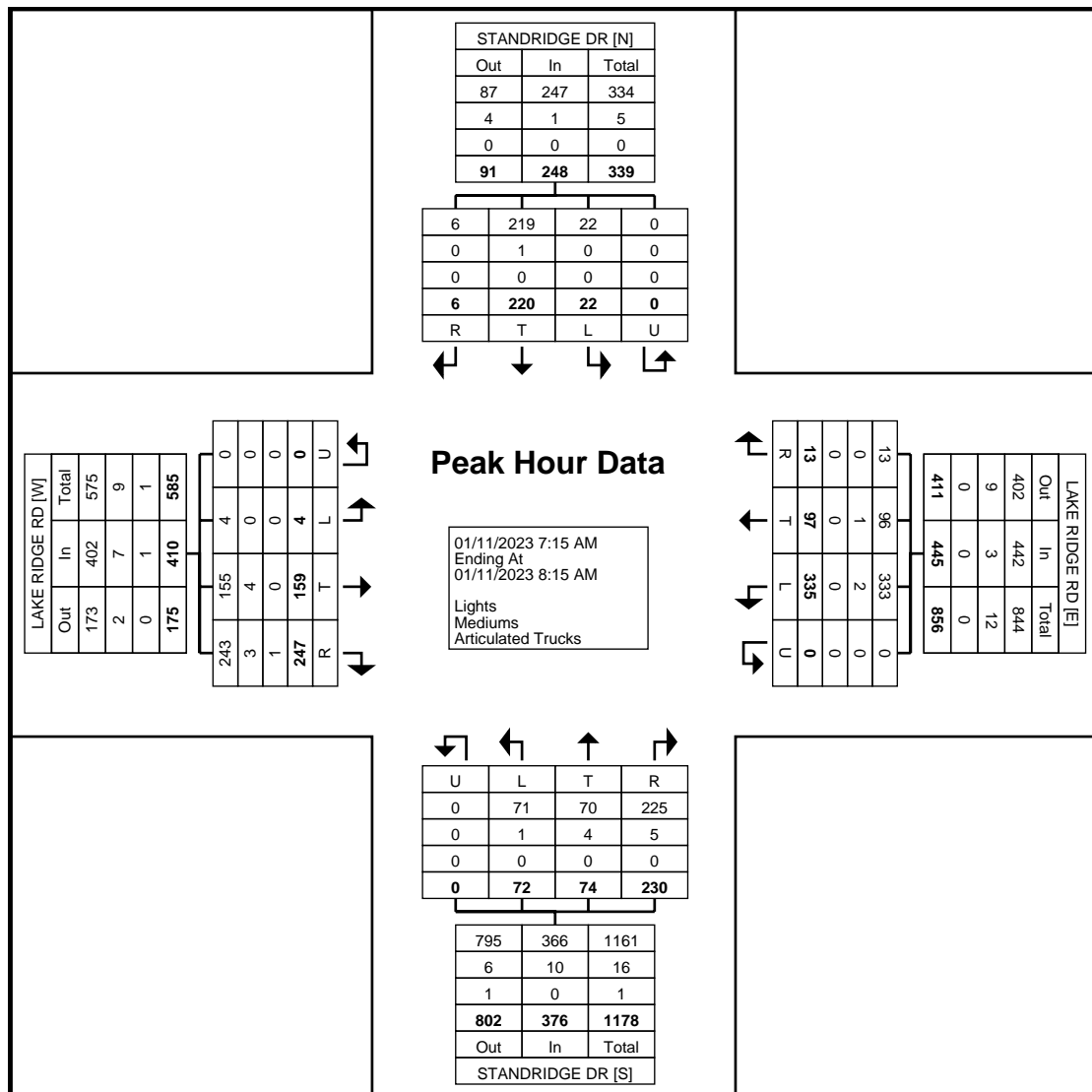
Start Time	STANDRIDGE DR Southbound					LAKE RIDGE RD Westbound					STANDRIDGE DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
7:15 AM	6	52	2	0	60	85	18	1	0	104	15	18	58	0	91	2	45	82	0	129	384
7:30 AM	4	68	2	0	74	80	19	2	0	101	22	9	44	0	75	1	41	67	0	109	359
7:45 AM	9	54	0	0	63	81	31	4	0	116	23	28	70	0	121	1	35	49	0	85	385
8:00 AM	3	46	2	0	51	89	29	6	0	124	12	19	58	0	89	0	38	49	0	87	351
Total	22	220	6	0	248	335	97	13	0	445	72	74	230	0	376	4	159	247	0	410	1479
Approach %	8.9	88.7	2.4	0.0	-	75.3	21.8	2.9	0.0	-	19.1	19.7	61.2	0.0	-	1.0	38.8	60.2	0.0	-	-
Total %	1.5	14.9	0.4	0.0	16.8	22.7	6.6	0.9	0.0	30.1	4.9	5.0	15.6	0.0	25.4	0.3	10.8	16.7	0.0	27.7	-
PHF	0.611	0.809	0.750	0.000	0.838	0.941	0.782	0.542	0.000	0.897	0.783	0.661	0.821	0.000	0.777	0.500	0.883	0.753	0.000	0.795	0.960
Lights	22	219	6	0	247	333	96	13	0	442	71	70	225	0	366	4	155	243	0	402	1457
% Lights	100.0	99.5	100.0	-	99.6	99.4	99.0	100.0	-	99.3	98.6	94.6	97.8	-	97.3	100.0	97.5	98.4	-	98.0	98.5
Mediums	0	1	0	0	1	2	1	0	0	3	1	4	5	0	10	0	4	3	0	7	21
% Mediums	0.0	0.5	0.0	-	0.4	0.6	1.0	0.0	-	0.7	1.4	5.4	2.2	-	2.7	0.0	2.5	1.2	-	1.7	1.4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.4	-	0.2	0.1

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Peak Hour Data Plot (7:15 AM)

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Peak Hour Data (5:00 PM)

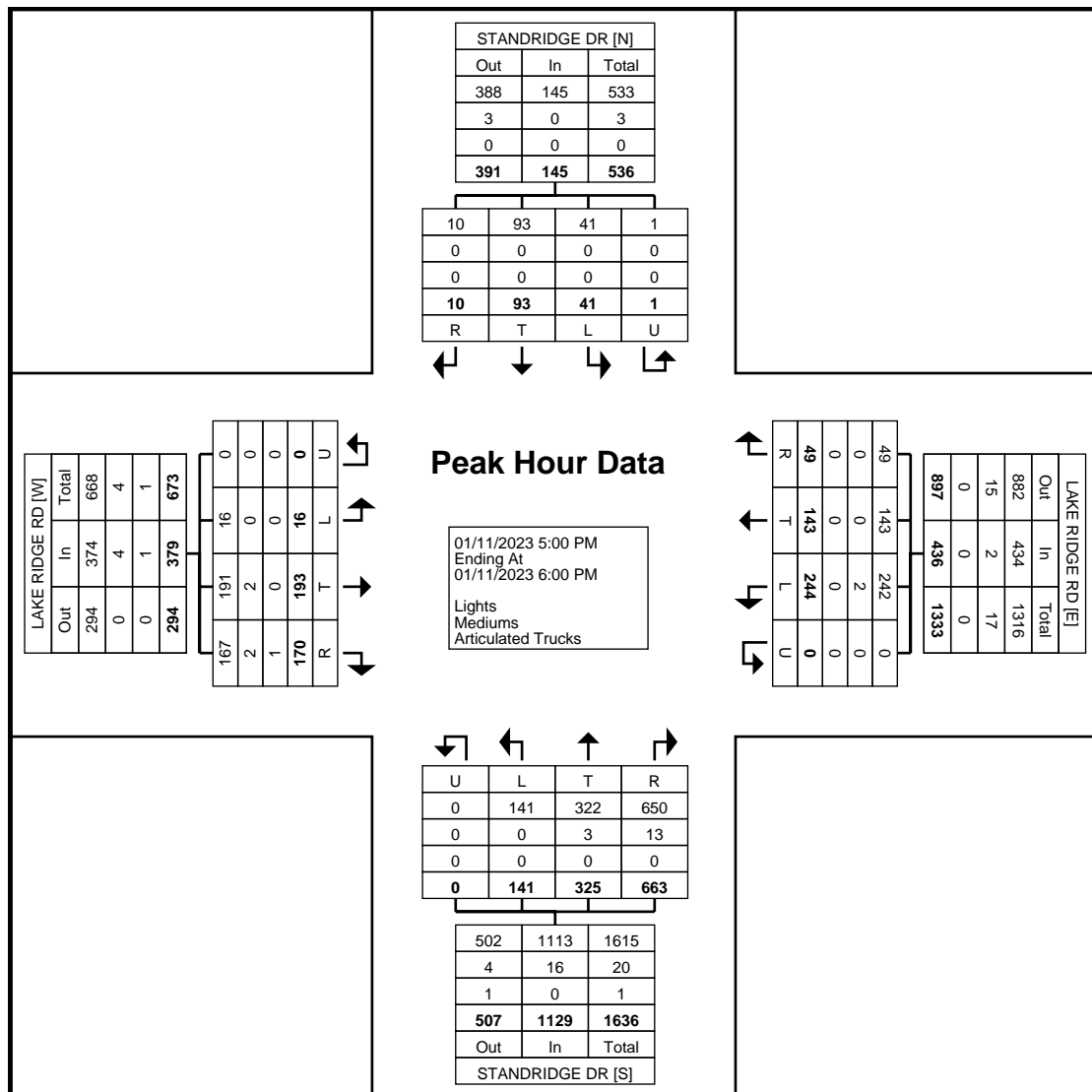
Start Time	STANDRIDGE DR Southbound					LAKE RIDGE RD Westbound					STANDRIDGE DR Northbound					LAKE RIDGE RD Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
5:00 PM	6	28	1	0	35	56	32	11	0	99	27	59	173	0	259	5	66	44	0	115	508
5:15 PM	9	23	3	1	36	63	33	16	0	112	32	103	170	0	305	5	47	38	0	90	543
5:30 PM	16	19	3	0	38	78	44	9	0	131	36	82	158	0	276	2	50	45	0	97	542
5:45 PM	10	23	3	0	36	47	34	13	0	94	46	81	162	0	289	4	30	43	0	77	496
Total	41	93	10	1	145	244	143	49	0	436	141	325	663	0	1129	16	193	170	0	379	2089
Approach %	28.3	64.1	6.9	0.7	-	56.0	32.8	11.2	0.0	-	12.5	28.8	58.7	0.0	-	4.2	50.9	44.9	0.0	-	-
Total %	2.0	4.5	0.5	0.0	6.9	11.7	6.8	2.3	0.0	20.9	6.7	15.6	31.7	0.0	54.0	0.8	9.2	8.1	0.0	18.1	-
PHF	0.641	0.830	0.833	0.250	0.954	0.782	0.813	0.766	0.000	0.832	0.766	0.789	0.958	0.000	0.925	0.800	0.731	0.944	0.000	0.824	0.962
Lights	41	93	10	1	145	242	143	49	0	434	141	322	650	0	1113	16	191	167	0	374	2066
% Lights	100.0	100.0	100.0	100.0	100.0	99.2	100.0	100.0	-	99.5	100.0	99.1	98.0	-	98.6	100.0	99.0	98.2	-	98.7	98.9
Mediums	0	0	0	0	0	2	0	0	0	2	0	3	13	0	16	0	2	2	0	4	22
% Mediums	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	-	0.5	0.0	0.9	2.0	-	1.4	0.0	1.0	1.2	-	1.1	1.1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.6	-	0.3	0.0

GRAM Traffic NTX Inc.

1120 W. Lovers Lane

Arlington, Texas, United States 76013
817.265.8968

Count Name: LAKE RIDGE RD
@ STANDRIDGE DR
Site Code:
Start Date: 01/11/2023
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Turning Movement Peak Hour Data Plot (5:00 PM)

Pier 121 - Lewisville

Vistro File:

Scenario 1 am

Report File: C:\...\vistro am.pdf

01/20/2023

Turning Movement Volume: Detail

ID	Intersection Name	Volume Type	Northbound		Southbound		Westbound		Total Volume
			Thru	Right	Left	Thru	Left	Right	
1	Lake Ridge Rd & Hillpark Rd	Final Base	0	0	1	0	0	19	20
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	36	0	0	58	94
		Other	0	0	0	0	0	0	0
		Future Total	0	0	37	0	0	77	114

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Lake Ridge Rd & Leora Ln/Access	Final Base	7	0	157	0	0	0	0	19	11	55	19	0	268
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	53	0	0	0	36	0	0	58	38	185
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	7	0	159	53	0	0	0	55	11	56	77	38	456

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Lake Ridge Rd & Marina Vista Dr	Final Base	16	23	32	49	65	5	5	323	58	66	79	19	740
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	38	0	0	0	0	0	0	53	36	0	58	0	185
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	54	23	32	49	66	5	5	379	95	67	138	19	932

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	Standridge Dr & Lake Ridge Rd	Final Base	72	74	230	22	220	6	4	159	247	335	97	13	1479
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	58	0	0	0	0	0	0	0	53	0	0	0	111
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	131	75	232	22	222	6	4	161	302	338	98	13	1604

Pier 121 - Lewisville

Vistro File:
Report File: C:\...vistro pm.pdf

Scenario 2 pm
01/20/2023

Turning Movement Volume: Detail

ID	Intersection Name	Volume Type	Northbound		Southbound		Westbound		Total Volume
			Thru	Right	Left	Thru	Left	Right	
1	Lake Ridge Rd & Hillpark Rd	Final Base	0	0	36	0	0	13	49
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	42	0	0	80	122
		Other	0	0	0	0	0	0	0
		Future Total	0	0	78	0	0	93	171

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Lake Ridge Rd & Leora Ln/Access	Final Base	8	0	148	0	0	0	0	37	15	106	27	0	341
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	63	0	0	0	42	0	0	80	53	238
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	8	0	149	63	0	0	0	79	15	107	107	53	581

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Lake Ridge Rd & Marina Vista Dr	Final Base	91	49	92	23	32	5	5	265	24	14	245	46	891
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	53	0	0	0	0	0	0	63	42	0	80	0	238
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	145	49	93	23	32	5	5	331	66	14	327	46	1136

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	Standridge Dr & Lake Ridge Rd	Final Base	141	325	663	42	93	10	16	193	170	244	143	49	2089
		Growth Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	80	0	0	0	0	0	0	0	63	0	0	0	143
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	222	328	670	42	94	10	16	195	235	246	144	49	2251




TRIP GENERATION




Project Information	
Project Name:	Lewisville Pier
No:	
Date:	12/3/2021
City:	Lewisville
State/Province:	
Zip/Postal Code:	
Country:	
Client Name:	Pier 121
Analyst's Name:	SPI
Edition:	Trip Generation Manual, 10th Ed

Land Use	Size	am		pm	
		Entry	Exit	Entry	Exit
330 - Resort Hotel (General Urban/Suburban)	150 Rooms	53	51	26	35
Reduction		0	0	0	0
Internal		0	0	0	0
Pass-by		0	0	0	0
Non-pass-by		53	51	26	35
416 - Campground/Recreational Vehicle Park (General Urban/Suburban)	500 Occupied Campsites	38	67	88	47
Reduction		0	0	0	0
Internal		0	0	0	0
Pass-by		0	0	0	0
Non-pass-by		38	67	88	47
411 - Public Park (General Urban/Suburban)	4.9 Acres	0	0	1	0
Reduction		0	0	0	0
Internal		0	0	0	0
Pass-by		0	0	0	0
Non-pass-by		0	0	1	0
Total		91	118	115	82
Total Reduction		0	0	0	0
Total Internal		0	0	0	0
Total Pass-by		0	0	0	0
Total Non-pass-by		91	118	115	82

CAPACITY ANALYSIS

Existing Conditions

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	19	0	0	1	0
Future Vol, veh/h	0	19	0	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	23	0	0	1	0
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	-	0	0	0	0	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s		0				
HCM LOS	-					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	13	0	0	36	0
Future Vol, veh/h	0	13	0	0	36	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	23	0	0	63	0
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	-	0	0	0	0	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s		0				
HCM LOS	-					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

Intersection						
Int Delay, s/veh	7.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖	↗	↖
Traffic Vol, veh/h	19	11	55	19	7	157
Future Vol, veh/h	19	11	55	19	7	157
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	120	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	24	14	69	24	9	196
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	38	0	186	24
Stage 1	-	-	-	-	24	-
Stage 2	-	-	-	-	162	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1585	-	808	1058
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	872	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1585	-	772	1058
Mov Cap-2 Maneuver	-	-	-	-	772	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	834	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		5.5		9.2	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	772	1058	-	-	1585	-
HCM Lane V/C Ratio	0.011	0.185	-	-	0.043	-
HCM Control Delay (s)	9.7	9.2	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	0.7	-	-	0.1	-






Intersection						
Int Delay, s/veh	6.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	↑
Traffic Vol, veh/h	37	15	106	27	8	146
Future Vol, veh/h	37	15	106	27	8	146
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	120	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	1
Mvmt Flow	47	19	134	34	10	185

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	66	0	349	47
Stage 1	-	-	-	-	47	-
Stage 2	-	-	-	-	302	-
Critical Hdwy	-	-	4.1	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.309
Pot Cap-1 Maneuver	-	-	1549	-	652	1025
Stage 1	-	-	-	-	981	-
Stage 2	-	-	-	-	755	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1549	-	595	1025
Mov Cap-2 Maneuver	-	-	-	-	595	-
Stage 1	-	-	-	-	981	-
Stage 2	-	-	-	-	689	-

Approach	EB	WB	NB
HCM Control Delay, s	0	6	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	595	1025	-	-	1549	-
HCM Lane V/C Ratio	0.017	0.18	-	-	0.087	-
HCM Control Delay (s)	11.2	9.3	-	-	7.5	0
HCM Lane LOS	B	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.7	-	-	0.3	-











Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	323	58	66	79	19	16	23	32	49	65	5
Future Vol, veh/h	5	323	58	66	79	19	16	23	32	49	65	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	351	63	72	86	21	17	25	35	53	71	5
Number of Lanes	0	1	0	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	13.4	10.1	9.1	10
HCM LOS	B	B	A	A

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	23%	1%	46%	0%	41%
Vol Thru, %	32%	84%	54%	0%	55%
Vol Right, %	45%	15%	0%	100%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	71	386	145	19	119
LT Vol	16	5	66	0	49
Through Vol	23	323	79	0	65
RT Vol	32	58	0	19	5
Lane Flow Rate	77	420	158	21	129
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.116	0.548	0.252	0.028	0.201
Departure Headway (Hd)	5.421	4.702	5.764	4.826	5.596
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	664	759	627	746	644
Service Time	3.435	2.791	3.464	2.526	3.607
HCM Lane V/C Ratio	0.116	0.553	0.252	0.028	0.2
HCM Control Delay	9.1	13.4	10.4	7.7	10
HCM Lane LOS	A	B	B	A	A
HCM 95th-tile Q	0.4	3.4	1	0.1	0.7






Intersection	
Intersection Delay, s/veh	22.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	159	247	335	97	13	72	74	230	22	220	6
Future Vol, veh/h	4	159	247	335	97	13	72	74	230	22	220	6
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	166	257	349	101	14	75	77	240	23	229	6
Number of Lanes	1	1	1	1	2	0	1	1	1	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	18.1	35.1	16.7	15.4
HCM LOS	C	E	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	71%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	29%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	72	74	230	4	159	247	335	65	45	22	147
LT Vol	72	0	0	4	0	0	335	0	0	22	0
Through Vol	0	74	0	0	159	0	0	65	32	0	147
RT Vol	0	0	230	0	0	247	0	0	13	0	0
Lane Flow Rate	75	77	240	4	166	257	349	67	47	23	153
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.187	0.182	0.519	0.01	0.385	0.548	0.838	0.152	0.104	0.059	0.374
Departure Headway (Hd)	8.998	8.498	7.798	8.866	8.366	7.666	8.64	8.14	7.94	9.307	8.807
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	423	462	405	431	471	419	442	452	385	409
Service Time	6.731	6.231	5.531	6.597	6.097	5.397	6.37	5.87	5.669	7.055	6.555
HCM Lane V/C Ratio	0.188	0.182	0.519	0.01	0.385	0.546	0.833	0.152	0.104	0.06	0.374
HCM Control Delay	13.8	13.1	18.7	11.7	16.3	19.3	42.7	12.3	11.6	12.6	16.7
HCM Lane LOS	B	B	C	B	C	C	E	B	B	B	C
HCM 95th-tile Q	0.7	0.7	2.9	0	1.8	3.2	8	0.5	0.3	0.2	1.7













Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	265	24	14	245	46	91	49	92	23	32	5
Future Vol, veh/h	5	265	24	14	245	46	91	49	92	23	32	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	282	26	15	261	49	97	52	98	24	34	5
Number of Lanes	0	1	0	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	13.1	12.5	12	9.9
HCM LOS	B	B	B	A

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	39%	2%	5%	0%	38%
Vol Thru, %	21%	90%	95%	0%	53%
Vol Right, %	40%	8%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	232	294	259	46	60
LT Vol	91	5	14	0	23
Through Vol	49	265	245	0	32
RT Vol	92	24	0	46	5
Lane Flow Rate	247	313	276	49	64
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.38	0.467	0.447	0.069	0.109
Departure Headway (Hd)	5.548	5.373	5.843	5.106	6.124
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	647	669	617	700	583
Service Time	3.596	3.415	3.585	2.848	4.186
HCM Lane V/C Ratio	0.382	0.468	0.447	0.07	0.11
HCM Control Delay	12	13.1	13.3	8.2	9.9
HCM Lane LOS	B	B	B	A	A
HCM 95th-tile Q	1.8	2.5	2.3	0.2	0.4

Intersection	
Intersection Delay, s/veh	92
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	193	170	244	143	49	141	325	663	41	93	10
Future Vol, veh/h	16	193	170	244	143	49	141	325	663	41	93	10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	0	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	17	201	177	254	149	51	147	339	691	43	97	10
Number of Lanes	1	1	1	1	2	0	1	1	1	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	21	25.1	151.4	15.5
HCM LOS	C	D	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	49%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	51%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	141	325	663	16	193	170	244	95	97	41	62
LT Vol	141	0	0	16	0	0	244	0	0	41	0
Through Vol	0	325	0	0	193	0	0	95	48	0	62
RT Vol	0	0	663	0	0	170	0	0	49	0	0
Lane Flow Rate	147	339	691	17	201	177	254	99	101	43	65
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.358	0.779	1.455	0.046	0.529	0.434	0.686	0.255	0.249	0.128	0.184
Departure Headway (Hd)	8.786	8.286	7.586	10.522	10.022	9.339	10.256	9.756	9.401	11.265	10.765
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	408	437	483	342	362	388	356	370	385	320	335
Service Time	6.556	6.056	5.356	8.222	7.722	7.039	7.956	7.456	7.101	8.965	8.465
HCM Lane V/C Ratio	0.36	0.776	1.431	0.05	0.555	0.456	0.713	0.268	0.262	0.134	0.194
HCM Control Delay	16.4	34.8	237.2	13.7	23.4	19	32.6	15.8	15.2	15.6	15.9
HCM Lane LOS	C	D	F	B	C	C	D	C	C	C	C
HCM 95th-tile Q	1.6	6.7	34.2	0.1	3	2.1	4.8	1	1	0.4	0.7

Full Build 2023 Conditions

Pier 121 - Lewisville
4: Leora Lane/Project Access & Lake Ridge Rd

Full Build AM
01/20/2023

Intersection												
Int Delay, s/veh	6.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔			↔	↔		↔	
Traffic Vol, veh/h	0	19	11	56	77	38	7	0	159	53	0	0
Future Vol, veh/h	0	19	11	56	77	38	7	0	159	53	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	120	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	80	80	80	80	90	80	90	80	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	24	14	70	96	42	9	0	199	59	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	138	0	0	38	0	0	281	302	24	388	295	117
Stage 1	-	-	-	-	-	-	24	24	-	257	257	-
Stage 2	-	-	-	-	-	-	257	278	-	131	38	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1458	-	-	1585	-	-	675	614	1058	574	620	941
Stage 1	-	-	-	-	-	-	999	879	-	752	699	-
Stage 2	-	-	-	-	-	-	752	684	-	877	867	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1458	-	-	1585	-	-	650	585	1058	449	590	941
Mov Cap-2 Maneuver	-	-	-	-	-	-	650	585	-	449	590	-
Stage 1	-	-	-	-	-	-	999	879	-	752	665	-
Stage 2	-	-	-	-	-	-	716	651	-	712	867	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			2.5			9.3			14.2		
HCM LOS							A			B		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)	650	1058	1458	-	-	1585	-	-	-	449		
HCM Lane V/C Ratio	0.013	0.188	-	-	-	0.044	-	-	-	0.131		
HCM Control Delay (s)	10.6	9.2	0	-	-	7.4	0	-	-	14.2		
HCM Lane LOS	B	A	A	-	-	A	A	-	-	B		
HCM 95th %tile Q(veh)	0	0.7	0	-	-	0.1	-	-	-	0.4		

Pier 121 - Lewisville
4: Leora Lane/Project Access & Lake Ridge Rd

Full Build PM
01/20/2023

Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Traffic Vol, veh/h	0	79	15	107	107	53	8	0	149	63	0	0
Future Vol, veh/h	0	79	15	107	107	53	8	0	149	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	120	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	79	79	79	79	90	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	1	0	0	0
Mvmt Flow	0	100	19	135	135	59	10	0	189	80	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	194	0	0	119	0	0	535	564	100	639	554	165
Stage 1	-	-	-	-	-	-	100	100	-	435	435	-
Stage 2	-	-	-	-	-	-	435	464	-	204	119	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.21	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	1391	-	-	1482	-	-	459	438	958	392	443	885
Stage 1	-	-	-	-	-	-	911	816	-	604	584	-
Stage 2	-	-	-	-	-	-	604	567	-	803	801	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1391	-	-	1482	-	-	423	393	958	290	397	885
Mov Cap-2 Maneuver	-	-	-	-	-	-	423	393	-	290	397	-
Stage 1	-	-	-	-	-	-	911	816	-	604	524	-
Stage 2	-	-	-	-	-	-	542	509	-	645	801	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			3.2			9.9			22.1		
HCM LOS							A			C		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)	423	958	1391	-	-	1482	-	-	290			
HCM Lane V/C Ratio	0.024	0.197	-	-	-	0.091	-	-	0.275			
HCM Control Delay (s)	13.7	9.7	0	-	-	7.7	0	-	22.1			
HCM Lane LOS	B	A	A	-	-	A	A	-	C			
HCM 95th %tile Q(veh)	0.1	0.7	0	-	-	0.3	-	-	1.1			













Intersection	
Intersection Delay, s/veh	16.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↕			↕	
Traffic Vol, veh/h	5	379	95	67	138	19	54	23	32	49	66	5
Future Vol, veh/h	5	379	95	67	138	19	54	23	32	49	66	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	412	103	73	150	21	59	25	35	53	72	5
Number of Lanes	0	1	0	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	20.8	12	10.7	11.1
HCM LOS	C	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	50%	1%	33%	0%	41%
Vol Thru, %	21%	79%	67%	0%	55%
Vol Right, %	29%	20%	0%	100%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	109	479	205	19	120
LT Vol	54	5	67	0	49
Through Vol	23	379	138	0	66
RT Vol	32	95	0	19	5
Lane Flow Rate	118	521	223	21	130
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.201	0.733	0.375	0.03	0.225
Departure Headway (Hd)	6.116	5.067	6.055	5.178	6.214
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	584	713	593	689	575
Service Time	4.18	3.107	3.805	2.928	4.278
HCM Lane V/C Ratio	0.202	0.731	0.376	0.03	0.226
HCM Control Delay	10.7	20.8	12.4	8.1	11.1
HCM Lane LOS	B	C	B	A	B
HCM 95th-tile Q	0.7	6.5	1.7	0.1	0.9

Intersection												
Intersection Delay, s/veh	26.8											
Intersection LOS	D											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	161	302	338	98	13	131	75	232	22	222	6
Future Vol, veh/h	4	161	302	338	98	13	131	75	232	22	222	6
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	168	315	352	102	14	136	78	242	23	231	6
Number of Lanes	1	1	1	1	2	0	1	1	1	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	24.1	43.4	18.3	16.7
HCM LOS	C	E	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	72%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	28%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	131	75	232	4	161	302	338	65	46	22	148
LT Vol	131	0	0	4	0	0	338	0	0	22	0
Through Vol	0	75	0	0	161	0	0	65	33	0	148
RT Vol	0	0	232	0	0	302	0	0	13	0	0
Lane Flow Rate	136	78	242	4	168	315	352	68	48	23	154
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.355	0.192	0.548	0.011	0.408	0.703	0.894	0.163	0.112	0.063	0.401
Departure Headway (Hd)	9.356	8.856	8.156	9.248	8.748	8.048	9.142	8.642	8.442	9.861	9.361
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	385	405	442	387	411	450	398	415	424	363	384
Service Time	7.108	6.608	5.908	7.001	6.501	5.801	6.894	6.394	6.195	7.621	7.121
HCM Lane V/C Ratio	0.353	0.193	0.548	0.01	0.409	0.7	0.884	0.164	0.113	0.063	0.401
HCM Control Delay	17.2	13.7	20.4	12.1	17.4	27.8	53.4	13.1	12.3	13.3	18.3
HCM Lane LOS	C	B	C	B	C	D	F	B	B	B	C
HCM 95th-tile Q	1.6	0.7	3.2	0	1.9	5.4	9.2	0.6	0.4	0.2	1.9











Intersection	
Intersection Delay, s/veh	19.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↕			↕	
Traffic Vol, veh/h	5	331	66	14	327	46	145	49	93	23	32	5
Future Vol, veh/h	5	331	66	14	327	46	145	49	93	23	32	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	5	352	70	15	348	49	154	52	99	24	34	5
Number of Lanes	0	1	0	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	22.1	19.3	16.8	11.4
HCM LOS	C	C	C	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	51%	1%	4%	0%	38%
Vol Thru, %	17%	82%	96%	0%	53%
Vol Right, %	32%	16%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	287	402	341	46	60
LT Vol	145	5	14	0	23
Through Vol	49	331	327	0	32
RT Vol	93	66	0	46	5
Lane Flow Rate	305	428	363	49	64
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.542	0.707	0.654	0.078	0.129
Departure Headway (Hd)	6.387	5.949	6.491	5.756	7.278
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	565	607	555	621	491
Service Time	4.428	3.99	4.234	3.498	5.342
HCM Lane V/C Ratio	0.54	0.705	0.654	0.079	0.13
HCM Control Delay	16.8	22.1	20.7	9	11.4
HCM Lane LOS	C	C	C	A	B
HCM 95th-tile Q	3.2	5.7	4.7	0.3	0.4

Intersection												
Intersection Delay, s/veh	105.4											
Intersection LOS	F											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	195	235	246	144	49	222	328	670	42	94	10
Future Vol, veh/h	16	195	235	246	144	49	222	328	670	42	94	10
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	0	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	17	203	245	256	150	51	231	342	698	44	98	10
Number of Lanes	1	1	1	1	2	0	1	1	1	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	27	29.9	171.9	16.7
HCM LOS	D	D	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	49%	0%	100%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	51%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	222	328	670	16	195	235	246	96	97	42	63
LT Vol	222	0	0	16	0	0	246	0	0	42	0
Through Vol	0	328	0	0	195	0	0	96	48	0	63
RT Vol	0	0	670	0	0	235	0	0	49	0	0
Lane Flow Rate	231	342	698	17	203	245	256	100	101	44	65
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.594	0.831	1.561	0.049	0.565	0.635	0.743	0.277	0.27	0.14	0.2
Departure Headway (Hd)	9.254	8.754	8.054	11.151	10.651	9.968	11.121	10.621	10.268	12.103	11.603
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	391	413	454	323	341	365	328	340	352	298	311
Service Time	6.997	6.497	5.797	8.851	8.351	7.668	8.821	8.321	7.968	9.803	9.303
HCM Lane V/C Ratio	0.591	0.828	1.537	0.053	0.595	0.671	0.78	0.294	0.287	0.148	0.209
HCM Control Delay	24.7	42.3	284.1	14.4	26.3	28.5	40	17.3	16.7	16.8	17.2
HCM Lane LOS	C	E	F	B	D	D	E	C	C	C	C
HCM 95th-tile Q	3.7	7.8	38	0.2	3.3	4.2	5.6	1.1	1.1	0.5	0.7

APPENDIX E

DRAFT EA PUBLIC COMMENTS

Table E-1. Summary of Draft EA Public Comments

Date	Organization /Affiliation	Public Comment	Comment Theme 1	Comment Theme 2	Comment Theme 3	Comment Theme 4	Comment Theme 5	Comment Theme 6	Comment Theme 7	Comment Theme 8	Comment Theme 9	Comment Theme 10	Comment Theme 11	Comment Theme 12	Comment Theme 13	Comment Theme 14	Other
6/25/2024	General Citizen	A Public Hearing still needs to be held to allow residential neighbors to express their concerns. This needs to be held in front of the decision makers. Any comments / changes made to the project need to be discussed and documented.	X														
6/25/2024	General Citizen	All buffers, unplanned areas, open areas (especially between Annalea Cove residences and proposed berm (at 412 feet), be designated and held as a No Build Zone.										X					
6/25/2024	General Citizen	All city service personnel should be allowed on premise. Police, fire department, codes enforcement, health inspectors, all. All venues must comply with Lewisville codes and ordinances. If USACE has codes then they apply first. I believe they approve exterior finishes and land use items.											X				
6/25/2024	General Citizen	Implementation of rules signage at entries and throughout park. Include signage for No Fire Arms. No alcohol consumption except where designated. (bars, restaurants). No sex offenders. No open fires except where designated. Others, as needed, to provide for a safe environment.						X									
6/25/2024	General Citizen	Provide for on-site security 24/7/365. Off duty police officers preferred. Provide a small office for their use and detention.						X									
6/25/2024	General Citizen	Fire hydrants to be installed on east side of berm per Lewisville FD codes and operational plans. This could also include fire hydrants along Annalea Cove property line.						X									
6/25/2024	General Citizen	This proposed development will increase traffic, associated noise, and the strong potential for loss of quiet and odor free enjoyment.			X		X							X			
6/25/2024	General Citizen	Sound is directional. It can only be reduced with distance, or redirected by design of walls with hard and soft surfaced components. The berm can help in this matter. Trees do not reduce sound.			X									X			

Date	Organization /Affiliation	Public Comment	Comment Theme 1	Comment Theme 2	Comment Theme 3	Comment Theme 4	Comment Theme 5	Comment Theme 6	Comment Theme 7	Comment Theme 8	Comment Theme 9	Comment Theme 10	Comment Theme 11	Comment Theme 12	Comment Theme 13	Comment Theme 14	Other
6/25/2024	General Citizen	The documents show the clear area with a distance of approx. 412 ft. (scaled from plans) from south end of Annalea Cove property line to edge of RV parking. The berm should be placed at edge of RV parking area. The 412 foot distance parcel does not extend to far north end of project (to lake). This feature should be extended for all Annalea Cove residences. The glamping area marked 6B and 6C should be relocated to west side of Hill Park Rd.										X					
6/25/2024	General Citizen	The height of the berm should be set at 15 feet above grade at RV parking. This was based upon stopping sound transmissions from roof top RV air conditioning units. Also, any radios that may be playing in the area. Those speakers could be 8 feet above ground. The 15 foot berm will most likely block any observation of buildings. Evergreen trees similar to what’s existing, should be planted on east side of berm.			X												
6/25/2024	General Citizen	The berm should be installed as soon as construction starts. This will allow for the conservation components to be reestablished. It will also reduce noise during the construction period.			X												
6/25/2024	General Citizen	Other items to consider include placement of all speakers for public address or music systems, be directed to the west. Placement no higher than 12 feet above grade to work with 15 ft berm height.			X												
6/25/2024	General Citizen	Relocate maintenance facility just to the east of welcome / check in shed. Any odor or noise has a longer distance to Annalea Cove.			X									X			
6/25/2024	General Citizen	Relocate structure as drawn midway along east side of RV area. I am guessing this is a dump station. Move to the north side of activity center road, at the RV parking. Both of these moves are recommended for sound control. Also prevailing winds are from West to East. The added distance allows for odors to dissipate before reaching residences.			X									X			

Date	Organization /Affiliation	Public Comment	Comment Theme 1	Comment Theme 2	Comment Theme 3	Comment Theme 4	Comment Theme 5	Comment Theme 6	Comment Theme 7	Comment Theme 8	Comment Theme 9	Comment Theme 10	Comment Theme 11	Comment Theme 12	Comment Theme 13	Comment Theme 14	Other
6/25/2024	General Citizen	Activity center should be placed with back towards east and approx. 10 feet from road. Leave area on west side for any outside activities. Max height of building at 25 feet. Any air conditioning compressor units to be placed at grade, and shielded on the east side of unit. This requirement is applicable to all ac compressor units on property, including lodge / hotel.			X												
6/25/2024	General Citizen	Berm angle should be approx. 2:1 slope. (from articles found on the internet. This appears to be a compromise between vertical wall designs and associated sound reflection, and something that can be built with good success in sound absorption and reflection).										X					
6/25/2024	General Citizen	In the report, this issue seems to be dismissed as almost trivial. I respectfully disagree. There needs to be some consensus / conclusion on this issue. The concern is that no one on Annalea Cove loses money due to this development. I am not looking to make any additional money. Just looking to cover any loss. As noted earlier, I paid a premium for this lot because it backed up to Corp property.		X													
6/25/2024	General Citizen	The traffic study is confusing to me. I do not see where any information is used for the wave pool occupancy or the car traffic associated with public boat ramp, or marina user automobile traffic. Appears traffic associated with RV's, beach, and motel / hotel uses only. I do not believe traffic impact will be minimal.					X										
6/25/2024	General Citizen	Appears to be discrepancies between water supplied by city and wells vs. demand. My interest here is to make sure that residences are not affected by any loss of demand or loss of water pressure.															X

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6/25/2024	General Citizen	At lift station termination (manhole) on Lake Ridge Rd, any odors? What happens if fails? It was also noted that city had a condition where sewage thru this pipe was supercharged? This was noted as a reasonable temporary solution. How long is temporary? When will it be resolved? What happens if manhole at Lake Ridge Rd fails? Where does raw sewage go?												X			
6/25/2024	General Citizen	All modeling for this report should use maximum values for the designated venues.															X
6/25/2024	General Citizen	Is tenant paying for city improvements?															X
6/25/2024	General Citizen	Hotel lodge to be limited in height to 6 stories and 75 feet (at highest point of roof).													X		
6/25/2024	General Citizen	Parking structure no higher than 20 feet to top floor level.													X		
6/25/2024	General Citizen	Install fence on west side of berm when that phase of work is underway. 6 foot height.										X					
6/25/2024	General Citizen	Provide for dust control during all phases of construction.							X								
6/25/2024	General Citizen	CoServe on board with electrical upgrades? gas?															X
6/25/2024	General Citizen	Solar panels pointing south could interfere with airplane traffic.													X		
6/25/2024	General Citizen	Provide commitment to fill westernmost RV spaces first, before starting to park in easternmost RV area.														X	
6/25/2024	General Citizen	Provide a check in station on main entry. Locate to the south of RV secondary exit. All traffic into development should be greeted.													X		
6/13/2024	General Citizen	The berm which is now 10 ft. – we would truly appreciate consideration of making this berm larger. We all enjoy the wooded area behind our community and all the amazing wildlife it brings. We have deer grazing in our yards at times. Bunnies, foxes, and a neighborhood turkey which everyone knows by name and watches out for. A 10 ft. berm is not going to allow for much in the way of sight or sound protection from the proposed development.										X					

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6/13/2024	General Citizen	Another huge concern is the traffic on Lake Ridge Road. This appears to be the primary road into the Development and will be a big cause for congestion. At present there is a traffic light at Standridge and Lake Ridge Road. And then there is a 4-way Stop sign situation at Lake Ridge and Marina Vista. (This is one of the two Entrances to our Meridian Community. We already have problems with drivers who do not follow protocol for the 4-way Stop. Once we have those hauling boats and most especially large RVs coming down Lake Ridge, it is going to be a traffic nightmare. I do not know of a way to solve this problem. The light at Standridge and Lake Ridge pretty much guarantees there would never be a light at Lake Ridge and Marina Vista.					X										
6/13/2024	General Citizen	We very much enjoy our greenbelt and all the things it affords us in the Community. The idea of having constant traffic and the smells associated with a large RV Park is very concerning.					X							X			
6/15/2024	General Citizen	Appreciate the changes you have made to the initial plan. Having the size of the RV park go from 500 to 350 spaces is definitely a step in the right direction.													X		
6/15/2024	General Citizen	I also appreciate the plan for the mound being built with landscaping on it to help buffer the development from the neighborhood. One request I would like to make on this mound feature would be if the mound could be 20 ft instead of 10 ft. Even though 10 ft would buffer some, I believe 20 ft would be even better. I would prefer to have the view that I have right now which includes beautiful sunsets, but I would much rather look at a landscaped mound instead of an RV				X						X					
6/15/2024	General Citizen	If there is any way to push the RV park more west that would be of great interest.													X		

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6/15/2024	General Citizen	At the open house I heard that the standard buffer zone between a development and a neighborhood on Corps land is 50 ft. So your willingness to move this buffer to 100 ft on the northern part of the development along the neighborhood and 250 ft along the southern part against the neighborhood is very much appreciated. But I would like to say 100 ft and 250 ft is really not that much of a distance when you are talking about the possibility of 350 RVs at this distance from a neighborhood. So if there would be a way to redesign the plan to shift this RV park further away from the neighborhood I would appreciate it.										X			X		
6/15/2024	General Citizen	At the open house, I brought up the idea of filling the west side of the RV space first before filling the eastern side. This would help serve as a buffer, keeping the RVs further away from the neighborhood.															X
6/15/2024	General Citizen	Possibly, moving the RV part west some and building parks and walking trails between the RV park and the mound separating the neighborhood would help create a nicer buffer plus would also allow for more natural environment to help offset the pollution that 350 RVs would emit.							X			X			X		
6/5/2024	General Citizen	Noise and light pollution impacts to the Kings Grant and other surrounding neighborhoods, especially for the homes that back up to Lake Ridge Road and Marina Vista Drive.			X	X											
6/5/2024	General Citizen	Traffic impacts to Lake Ridge Road and Marina Vista Drive such as speeding and the movement of larger vehicles, such as RVs, along these neighborhood roads.					X										
6/5/2024	General Citizen	Many of us that live in the area walk and bike down towards Lewisville Lake. We are concerned about the lack of recreational access to the lake and green space around us. We would like to see complete streets being built and natural trails added to allow area residents to access the Lake.									X						

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6/5/2024	General Citizen	East Hill Park is located on Lake Ridge Road directly across from Kings Grant. We are concerned about the ability to safely cross Lake Ridge Road to access the neighborhood park and trails.						X			X						
6/5/2024	General Citizen	Impacts to wildlife and natural local ecosystems between East Hill Park and Pier 121. The development may displace wildlife and cause any influx of species to the nearby Kings Grant and surrounding area neighborhoods.								X							
6/5/2024	General Citizen	This development seems to conflict with the City of Lewisville’s 2025 plan - Big Move Green Centerpiece. Is the Corps working with the City of Lewisville on impacts to this city goal?											X				
6/5/2024	General Citizen	In addition, I would like to see the Corps hold public meetings with the Lewisville residents that will be impacted by this project.	X														
6/6/2024	General Citizen	Our neighborhoods and surrounding areas are well established as quiet, recessed neighborhoods with low crime rate, minimal traffic and with a reputation as a safe harbor for our families and children to play carefree in. As such, a development like the 121 Pier project brings a great deal of worry for family safety, crime, excessive noise, traffic, pollution/trash and the potential for the devaluation of our individual properties.		X	X		X	X	X								
6/6/2024	General Citizen	Members of our community were invited to learn more at a meeting on June 5th however, there was not much information given relevant to Those concerns noted above. Additionally, some of the questions/concerns voiced by community members were met with unprofessional rude remarks which only places further emphasis on our deepening concerns.	X														

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6/6/2024	General Citizen	A fun and vibrant establishment such as the one you are creating typically comes with a level of exuberance and drinking that makes for not only a loud environment but what I would call a certain level of “spill over” noise that would land squarely within our communities give the singular road access.			X												
6/6/2024	General Citizen	Concerns for drunk driving; discarded trash; speeding; loud cars and people during the hours families are winding down and children going to bed are major concerns.			X			X	X								
6/8/2024	General Citizen	I went to the June 5th meeting and learned that there is supposed to be a 10 ft berm topped with some type of vegetation stretching along the eastern edge running north and south near Meridian. However, this berm should be doubled to 20 ft - the topped vegetation should also included 3 rows of alternating evergreens to effectively.										X					
6/8/2024	General Citizen	Some type of small wrought iron fence running parallel to the berm on the west side should be added as a deterrent to help prevent criminal activity from the introduced transient community seeping into the existing communities while also allowing the save passage of animals into a protected area. Currently, this area is home to these documented species - deer, fox, turkey, bobcat, barred owl, eastern screech owl, possum, raccoon, armadillo, and barn owl.						X		X		X					
6/8/2024	General Citizen	The operator should be required to have the area patrolled 24/7 by at least 1 city of Lewisville Police Officer. This is similar to the concept of police patrolling malls, sporting events, festivals, etc.						X									
6/8/2024	General Citizen	Alcohol consumption should be prohibited except for the existing restaurant since that is an existing precedent.						X									

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6/8/2024	General Citizen	The eastern boundary at the northeast boundary should be pushed back - the boundary line should continue running parallel with the southeast boundary meaning moving the trailer turnaround further west and removing some campground sites at the northeast corner.													X		
6/8/2024	General Citizen	Lastly, some have theorized that this project is set up to fail in order to get where the real money is which is luxury high lakefront high rises. The thought is that it's a bridge too far to go to that end but would be MUCH MUCH more supportive of that idea if the land behind the lake front is saved. Can we open up discussions on this and move directly to that end? I think it's pretty silly to pretend that this project is anything but making money for the developer and the Army Corp of Engineers to raise funds for their pet projects. It would be nice to just move to the end goal - save the land and move to where the real money is.													X		
6/28/2024	General Citizen	I want to make you aware, that in 2022, I engaged a residential appraisal firm to appraise my property. In addition, I requested an appraisal based on the then concept of a finished project with Glamping behind my property. In short, the value of my home would fall approximately 8% or 50K. I am happy to provide copies of these documents upon request.		X													
6/28/2024	General Citizen	While that is obviously a concern, There are other concerns which I would consider environmental, safety, security and what can only be described as noise and disturbance violations.			X			X									
6/28/2024	General Citizen	All of us who are familiar with the vacant raw property that we currently adjoin, know of the deer, wild turkey, hawks, bald eagle's, coyotes and a host of other critters that are frequent visitors to our back fences. This development will impact the wildlife. There is no doubt that this impact will occur.								X							

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6/28/2024	General Citizen	It is the noise. Campers/RV/Glampers will on many occasions be respectable. Yet in more than I care to imagine, there will be the rowdy ones, those that have 4 wheelers, dirt bikes, fireworks, parties, camp fires to name just a few.			X												
6/28/2024	General Citizen	There is a safety consideration. Those of us that have pools. Those that have iron fences. Even wood fences will give way to blowing trash that will come with any type of camp ground.							X								
6/28/2024	General Citizen	It is conceivable that some RV or glamping sites while limited in time (28 day max?) will occasionally have transient workers as neighbors.															X
6/28/2024	General Citizen	The prevailing direction (thunderstorms) will bring all glamping trash and debris to us. Not to mention even a hardened cabin, Teepee, or tent like structures. Especially if the buffer is only 100 feet.							X			X					
6/28/2024	General Citizen	I want to focus on the buffer. It became clear that according to Atwell and the developer, the recommended minimum buffer suggested by the Corp of Engineers is only 50'. At a minimum, if Glamping sites are inevitable, I implore the design to include at least a 250 foot buffer from mine and my neighbors property.										X					
6/30/2024	General Citizen	My main concern is the proximity of the project to the residential area. During the presentation you had expressed the planned inclusion of a buffer zone - wooded hill with possible fencing. I like the idea but the width of the buffer zone is what concerns me. I feel that the width should be at least 500 feet or more.										X					
6/30/2024	General Citizen	The 100' buffer between the neighborhood and development is not enough. To reduce noise impact to our neighborhood as well as deter unwanted visitors from invading our privacy, the development's footprint should be shrunk.										X			X		

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6/30/2024	General Citizen	I think this can best be achieved by removing the eastern glamping area and the eastern half (approximately) of the RV park. This leaves plenty of other glamping and RV sites as well as the entire resort area. The hill/berm and additional trees between the neighborhood and development is certainly still needed.										X			X		
6/30/2024	General Citizen	The above smaller footprint also helps lessen wildlife destruction. Our family greatly enjoys the local wildlife, and a neighbor has a game cam that has captured some impressive footage. We have deer, coyotes, bobcats, armadillos, possums, a host of birds, and various other animals - all of which are already encroaching on the neighborhood due to habitat loss.								X							
6/30/2024	General Citizen	Using Memorial / Lake Ridge Dr as an access road is not a good plan for our neighborhood nor the other neighborhoods along the route. East Hill Park Rd should be the dedicated entrance to the development. I know this entails improvements to and reopening of the southern portion of East Hill Park Rd, but that is a far more acceptable solution than making the already dangerous intersection of Standridge Dr and Memorial / Lake Ridge even worse (this is a dangerous, accident-prone intersection that is often patrolled by Lewisville Police Dept) and inviting people to cut through our neighborhood with their trailers and boats to reach the new development. "Exit now" signage for the new development would be placed at the Standridge or even Josey/Main exit to prevent patrons from exiting 121 too late and trying to cross 3 lanes of traffic too quickly and dangerously.					X										

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6/30/2024	General Citizen	Along the above lines, speed humps should be added to East Hill Park Rd.					X										
6/30/2024	General Citizen	Hiking trails could be added to the east side of the development (in lieu of the eastern glamping and RV sites) and admission could be charged for folks who aren't staying at the RV park or glamping sites. Note that they shouldn't come too close to our neighborhood to maintain privacy, and additional trees and plants plus a wildlife-friendly fence could help with this.									X						
6/30/2024	General Citizen	To "make amends" with the residents of Meridian, some sort of perks could be offered to residents, such as 50% off admission to the beach area and/or glamping sites, etc. - some sort of discount. I imagine this would go a long way with residents - but only if some of the above concerns are addressed. If I were along the western edge and my property's current pristine backyard of nature was destroyed by the development, I can't imagine any olive branch would matter after that level of damage was done.									X						
Totals:			3	3	14	2	8	10	6	4	4	15	2	6	12	2	5