

**Lee County MPO Rail Feasibility Study
Contract 2012-001**



Technical Report

**Compatibility of Public Transit
and Freight Rail Expansion**

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1. Compatibility of Major Public Transit Systems

A public transit system by definition serves centers of population. Because transit systems have the potential to create noise and vibration at nearby residences and other sensitive land uses, noise and vibration assessments are key parts of the environmental studies for proposed transit projects.

1.1 Noise

Noise from public transit comes from several sources:

- The type of propulsion determines one source: a whine from the electric motors that power light-rail vehicles, or the diesel-engine exhaust noise from bus rapid transit and commuter rail vehicles.
- Another source is the interaction of wheels/tires with their running surfaces. Tire noise from rubber-tired vehicles is significant at normal operating speeds. Steel wheels on rails generate three types of noise: normal rolling noise, impact noise when a wheel meets a discontinuity in the rail, and squeal generated by friction on tight curves.
- Transit vehicles are equipped with horns and bells for use in emergencies and as a warning to track workers, pedestrians, and motorists at street crossings.
- Diesel engines are often left idling in stations or storage yards.

Figure 1 shows the interaction of these sources for diesel-powered trains and electric-powered trains. At slow speeds, the exhaust noise from the diesel engine is much louder than the electric motor. At higher speeds, the diesel engines are not as noisy because they have stopped accelerating; the amount of wheel/rail noise from each type of train becomes the dominant noise impact and is about equal.

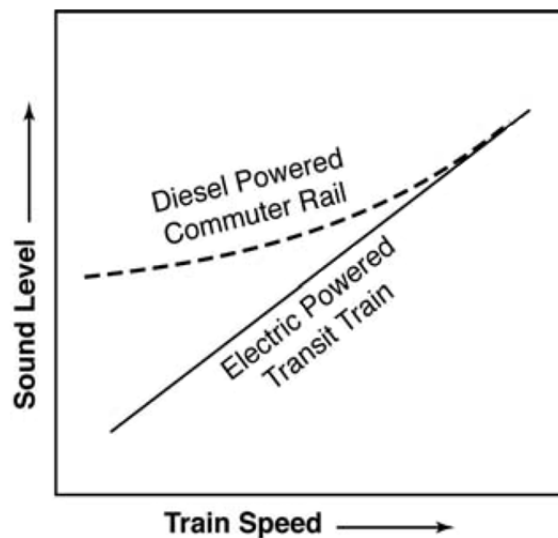


Figure 1. Example Sound Level Dependence on Speed

(Source: FTA's *Transit Noise and Vibration Impact Assessment*, May 2006)

1.2 Noise-Sensitive Land Uses

Land uses are broken into three categories, depending on their expected sensitivity to noise:

- Noise category 1 includes uses where quiet is an essential element in their intended purpose, such as indoor concert halls or historic landmarks where outdoor interpretation routinely takes place.
- Noise category 2 includes residences and buildings where people sleep (including motels and hospitals).
- Noise category 3 includes institutional land uses with primarily daytime and evening use, such as schools, places of worship, and libraries.

Noise impact criteria are not applied to most commercial or industrial uses because, in general, the activities within these buildings are compatible with higher noise levels. An exception is made for businesses that depend on quiet as an important part of operations, such as recording studios.

Parks used primarily for active recreation would not be considered noise-sensitive. However, some parks are valued as havens from noise and may be treated as noise-sensitive.

1.3 Vibration

Ground-borne vibration can occasionally be a concern for nearby neighbors of a transit route if buildings shake or rattle or if rumbling sounds can be heard. Vibration can be caused by trains or by buses on rough roads.

Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

Ground-borne vibration is almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of a building, the motion does not provoke the same adverse human reaction. In addition, the rumble noise that usually accompanies the building vibration is perceptible only inside buildings.

Freight trains can be the source of intrusive ground-borne vibration. Locomotives and rail cars with flat spots on their wheels are the sources of the highest vibration levels. Vibration from freight trains is occasionally a consideration for transit projects funded by the Federal Transit Administration (FTA) when a new transit line will share an existing freight train right-of-way, even though most freight railroad tracks were in existence for many years before the affected residential areas were developed. For instance, relocating the freight tracks within the right-of-way to make room for transit tracks is deemed by the FTA to be a direct impact of the transit system which must be evaluated as part of the proposed transit project.

1.4 Vibration-Sensitive Land Uses

The three categories of land uses that are sensitive to vibration are similar to the categories for noise-sensitive land uses:

- Vibration category 1 includes uses where vibration would interfere with operations within the building, including vibration levels that may be below those associated with human annoyance. Examples include vibration-sensitive research and manufacturing and hospitals or universities with vibration-sensitive equipment.
- Vibration category 2 includes all residences and any other buildings where people sleep (including motels and hospitals). There is no distinction between types of residences, because ground-borne vibration is experienced indoors and occupants have no means of reducing their exposure.
- Vibration category 3 includes institutional land uses with primarily daytime use, including schools, places of worship, and office buildings.

Certain other land uses are also sensitive to vibration, such as concert halls, TV and recording studios, and theaters.

1.5 Physical and Aesthetic Effects

Public transit systems can cause significant physical effects under certain circumstances:

- A new transit corridor can divide neighborhoods.
- Transit corridors can introduce conflicts between transit vehicles and traffic at cross-streets, for instance when traffic signals or crossing gates are actuated by transit vehicles.
- The maintenance of freight rail corridors can be upgraded when frequent transit vehicles are introduced.
- Bridges, elevated segments of guideway, and maintenance yards can be unsightly.

1.6 Air Pollution

Public transit systems generally have a net positive impact on air pollution compared to travel by private vehicles. However, the impacts vary by type of propulsion, regime of travel, vehicle occupancy, and location of the corridor.

Electric-powered vehicles, whether using rubber tires or steel wheels, avoid the direct emissions that are created by gasoline or diesel-powered vehicles. Emissions are still produced, but they occur at the power-generating location instead of along the transit corridor. Diesel-powered vehicles produce emissions along the entire transit corridor.

The regime of travel has a strong effect on the amount and composition of emitted pollutants. Diesel emissions are increased by frequent stops, where pedestrians are heavily exposed, especially as vehicles accelerate. Congested streets have the highest degree and most harmful types of air pollution from diesel-powered vehicles.

High vehicle occupancy is a major factor that makes public transit superior to auto travel with respect to air pollution, even when transit vehicles are powered with diesel.

The impact of air pollution produced along transit corridors is also dependent on land uses along the route of the corridor, similar to noise and vibration impacts. Parks, playgrounds, and outdoor activities will be more affected by air pollution, as will uses in non-air-conditioned buildings.

2. Noise and Vibration Review Processes

There are many analytical and review processes before major public transit investments are made. These processes generally begin when an MPO identifies a need and potential solution. The MPO process considers social, economic, and environmental effects of proposed major infrastructure improvements at a very broad scale, for example the overall development and travel patterns. Detailed assessments of noise and environmental impacts are not performed at this stage because the specific infrastructure improvements have not been selected.

2.1 Alternatives Analysis and Formal Environmental Review

Once the need for the investment has been established, the next task is identifying the transit mode best suited for the corridor. The Federal Transit Administration (FTA) provides funding for many public transit projects, including bus rapid transit, light rail, and commuter rail. The FTA process includes three stages: project development, engineering, and construction. To enter the first stage, the MPO would provide information required by FTA and initiate a formal review process under the National Environmental Policy Act (NEPA), which includes a more thorough analysis on benefits, costs, and impacts of alternative strategies for meeting the identified need. Usually, several alternatives ranging in cost will be evaluated.

FTA provides several procedures for comparing noise/vibration effects among different transit modes during the NEPA analysis. Proposed projects can be classified by the level of analysis required:

Environmental Impact Statement (EIS). Large projects such as commuter rail and light rail normally require full "environmental impact statements," which include in-depth noise and vibration assessments. These projects often pass through dense urban areas where noise and vibration impacts are a frequent concern.

Categorical Exclusion. At the other extreme are smaller transit projects which normally do not cause significant environmental impacts and do not require a noise and vibration assessment.

Environmental Assessment (EA). If FTA is uncertain whether the project requires an EIS or qualifies as a categorical exclusion, an "environmental assessment" will be required. An EA is a relatively brief study which helps determine the magnitude of the impacts that might occur.

There are three levels of noise and vibration analysis which may be employed, depending on the type and scale of the project, the stage of project development, and the environmental setting.

The first level is a **screening procedure** that identifies noise- and vibration-sensitive land uses in the vicinity. When the screening procedure establishes the possibility of noise/vibration impacts, two levels of analyses can be used to quantify potential impacts and assess the need for mitigation.

A **general assessment** is used when comparing alternative modes and alignments and when comparing transit noise impacts with highway expansions. A **detailed analysis** quantifies impacts through an in-depth analysis of a single preferred alternative and then delineates site-specific impacts and mitigation measures.

2.2 Areas of Potential Sensitivity in Lee County

A preliminary scan of land uses along the Seminole Gulf rail corridor has been conducted to identify areas of potential sensitivity to noise and vibration.

2.2.1 Noise

There are no known land uses along the Seminole Gulf rail corridor that fall into category 1 for noise sensitivity (e.g. concert halls).

Category 2 includes hospitals, motels, and residences. The nearest existing hospital is the Gulf Coast Hospital on Daniels Parkway, which is 1,050 feet east of the rail corridor. Lee Memorial Health System is planning a new 80-bed satellite hospital just south of Coconut Road near U.S. 41, which would be about 850 feet west of the rail corridor. There are two motels within 325 feet of the rail corridor: the Highlander Motel on Palm Beach Boulevard and Shangri La Springs (not currently in operation) on Old US 41 in Bonita Springs. A third motel, DoubleTree Suites, is located directly on US 41 in North Naples along a potential transit route that could connect the rail corridor to a North Naples terminus on Immokalee Road.

There are many residences near the rail corridor. The greatest concentrations are located in:

- Pioneer Village RV Resort in North Fort Myers just south of Bayshore Road
- East Fort Myers north of Palm Beach Boulevard
- Dunbar near Cranford Avenue
- Granada Lakes RV Resort north of San Carlos Park
- San Carlos Park (throughout this community)
- The Vines
- Estero Golf Resort, Cascades, and Cypress Bend RV Resort along Estero Parkway
- Shadow Wood at the Brooks
- Gulf Coast RV Resort, Spring Creek East, Pueblo Bonito, and Imperial Harbor in Bonita Springs
- Downtown Bonita Springs
- Spanish Wells south of Bonita Beach Road
- Landmark Naples near the county line

These residential neighborhoods are the primary noise-sensitive areas along the rail corridor.

Category 3 includes schools, places of worship, and libraries. The closest public school to the rail corridor is Edgewood Academy in Fort Myers (195 feet); the next closest is Spring Creek Elementary in Bonita Springs (775 feet). Two charter schools are close to the rail corridor: the Bonita Springs Charter School (50 feet) and City of Palms Charter High School (250 feet). The closest library is the South County Regional Library on Three Oaks Parkway in Estero, which is over a mile away. Churches have not been mapped at this time.

There are few if any noise- or vibration-sensitive uses between Edison Avenue and Alico Road.

2.2.2 Vibration

The impact of ground-borne vibration is most pronounced with rail rapid transit systems that provide frequent service, in the range of 3 to 10 minutes between arrivals. When fewer trains pass by, such as with commuter rail service, vibration levels would have to be considerably greater to evoke the same community response. Rubber-tired transit projects rarely cause vibration impacts.

There are no known activities along the Seminole Gulf rail corridor that would fall into vibration category 1. The closest hospital or university to the rail corridor is the Gulf Coast Hospital on Daniels Parkway east of Metro Parkway, which is over 1,000 feet away, well beyond the distance that would trigger a vibration analysis even if the hospital uses vibration-sensitive equipment. The proposed satellite hospital south of Coconut Road would be about 850 feet west of the rail corridor, also beyond the distance that would trigger a vibration analysis.

Residences fall into vibration category 2, as described earlier. Although many residential lots abut the Seminole Gulf rail corridor, the width of the corridor and the setbacks on residential lots are likely to be large enough to avoid any need for a vibration analysis. Motels and hospitals are also included in vibration category 2; none are located close enough that a vibration analysis is anticipated.

Schools, churches, and libraries fall into vibration category 3. The closest public schools and public library are far enough from the Seminole Gulf rail corridor that a site-specific vibration analysis would not be warranted. Only the Bonita Springs Charter School may be close enough to warrant a vibration analysis. Churches have not been mapped at this time.

3. Freight Rail Compatibility

In addition to creating noise during normal operations, freight trains cause ground-borne vibration, particularly when flat spots on wheels contact the rails. The noise and vibration impacts of a proposed new freight corridor would be analyzed in a manner similar to a proposed public transit system, as described in earlier sections of this report.

Because the Seminole Gulf (SGLR) rail corridor has been in existence since early last century, it pre-dated the development that grew up around it. Normal economic cycles cause the flow of freight trains to rise and fall over time; these cycles do not require that impacts be reexamined. One exception might be the potential relocation of freight tracks within the right-of-way to make room for public transit operations. Another might be overnight operation of freight trains if daytime and evening hours were reserved for public transit.

This section of the report evaluates the compatibility of other potential expansions of freight rail operations with adjacent land uses and neighborhoods.

3.1 Expanded Freight Rail Tracks

A companion technical report, *Assessment of Existing and Future Freight Issues*, identifies other rail corridors in Lee County that have been abandoned. Between the 1920s and the 1950s, the Seaboard Air Line (SAL) operated its own north-south railroad across Lee County, parts of which are now occupied by Ten Mile Canal. The SAL also had lines that extended west to Punta Rassa and east to LaBelle. A spur from the SAL was constructed during World War II to serve the Buckingham Army Airfield but was abandoned after the war. Because these corridors have been converted to other uses such as canals, roads, and power lines, their re-use for freight service is unlikely.

Lee County and its municipalities identify lands in their comprehensive plans for industrial development; a composite map is included in *Assessment of Existing and Future Freight Issues*. There are numerous vacant sites along the current SGLR corridor that have been identified for industrial uses. If additional industrial land is needed for rail-served uses, there is some potential for extensions of SGLR freight rail trackage eastward along the north side of Alico Road and northeastward through industrial districts in Fort Myers. Such extensions would not require changes to future land use patterns identified in local comprehensive plans or create new compatibility issues with adjoining land uses. There are insufficient lands designed for industrial uses in Lehigh Acres or Cape Coral to justify consideration of new freight rail extensions to those communities.

At present, freight that arrives in or departs from Lee County by rail is handled at specific end-user industrial sites. For instance, lumber is delivered to lumber yards; refrigerated foods are delivered to a warehouse in North Fort Myers; and scrap metal is picked up from wholesale recycling yards. There are no facilities at present for the bulk transfer of goods from rail to truck for local delivery, or from rail to pipeline for underground delivery of bulk fuels. The following sections identify potential terminal facilities that would expand the use of the railroad for movement of goods into Lee County.

3.2 Train/Truck Intermodal Facility

Movement of freight by railroad is energy-efficient and reduces the number of heavy trucks on the road system. Movement of freight by truck is more flexible because destinations need not be located on railroad tracks, but it is less fuel-efficient and more labor-intensive. When these two modes can be combined, shippers can take advantage of the strengths of both modes.

There are three methods of intermodal freight transport that combine railroads and trucking. One transfers fully loaded semi-trailers to and from rail flatcars, which transport the semi-trailers for long distances where they are picked up by another truck. This method is known as piggy-backing or "trailer on flat car" (TOFC). Another method uses intermodal freight containers instead of semi-trailers; cranes transfer the modular containers between the bed of trucks and rail cars. The technical term for this method is "container on flat car" (COFC). A third method, known as "team track," allows smaller manufacturers and shippers to transfer goods between trucks and rail without requiring full trailers or shipping containers. Each method requires an intermodal yard to accomplish the transfers.

A potential intermodal yard is listed in the Investment Element of the 2010 Florida Rail System Plan (project 288, "Lee County Intermodal Transfer Terminal"). The preferred site, now owned by Seminole Gulf, is just south of Hanson Street and west of Veronica S. Shoemaker Boulevard near the end of an existing rail spur, as shown on Figures 2 and 3. This intermodal yard is also included in the MPO's 2035 Long Range Transportation Plan.

Figure 2 also identifies the designations of all surrounding land on the Fort Myers Comprehensive Plan's "future land use map." These are long-range designations; in some cases, uses are restricted further by zoning districts, which are discussed further below. The future land use map designations on Figure 2 have these meanings:

- **IND (Industrial):** This district provides areas for expanded job opportunities, investments, and production opportunities. These areas have special locational requirements, including transportation needs (e.g., air, rail, interstate access, and immediate access to arterial roadways), industrial levels of water, sewer, and fire protection, and central locations to reduce employee commuting distances.
- **C/C (Corridor Commercial):** This district accommodates intensive commercial and mixed-use development along existing commercial corridors. The maximum standard residential density is 25 dwelling units per acre.
- **T/C (Traditional Community):** These areas accommodate employment centers and commercial services near existing residential and commercial areas or corridors. The maximum standard residential density is 25 dwelling units per acre.
- **RMD (Residential Medium Density):** These areas are characterized by medium- and high-density multifamily developments with neighborhood scaled commercial uses. The maximum standard density is 16 dwelling units per acre.
- **RLD (Residential Low Density):** These areas are characterized by low-density residential and limited neighborhood commercial uses. The maximum standard density is 8 dwelling units per acre.

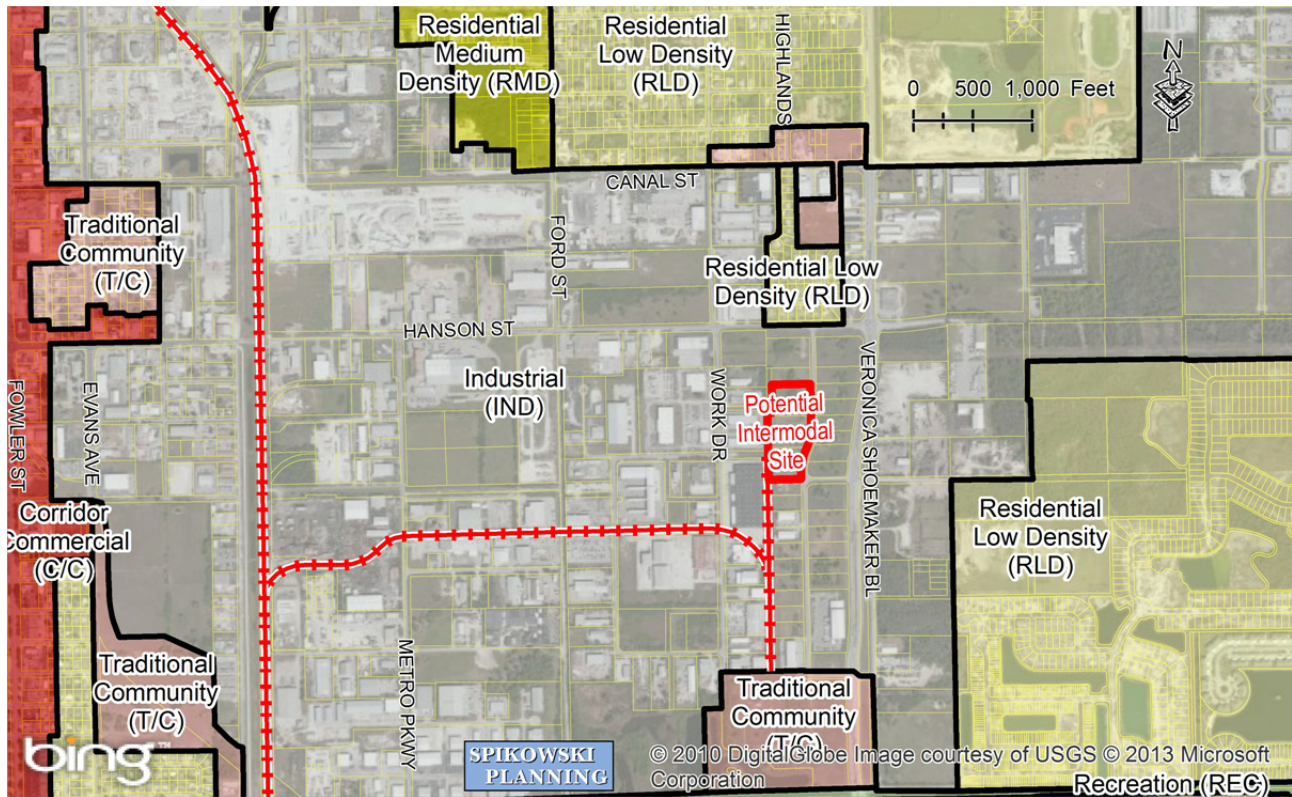


Figure 2, Location of Proposed Intermodal Transfer Terminal, With Fort Myers Future Land Use Designations

Figure 3 shows the intermodal site and current zoning districts. Zoning districts provide a finer-grained delineation about what land uses can be added in each district at the present time. Zoning districts can be more easily changed than future land use map designations. The zoning districts shown on Figure 3 have these meanings:

- **IH (Industrial Heavy):** The IH district allows general manufacturing, processing, construction, and utility uses, as well as all light industrial uses.
- **IL (Industrial Light):** The IL district has access to industrial infrastructure, but due to existing and proposed development nearby, it is limited to light industrial uses.
- **CG (Commercial General):** The CG district allows a wide range of indoor commercial uses.
- **CI (Commercial Intensive):** The CI district allows CG commercial uses in addition to warehouses and outdoor commercial uses such as flea markets and vehicle sales.
- **PUD (Planned Unit Development):** The PUD district promotes flexibility of design and integration of uses and structures within a single parcel or development tract.

- **MU (Mixed Use):** Newly developing areas zoned as MU must follow PUD requirements.
- **PO (Professional Office):** The PO district allows professional offices in otherwise residential neighborhoods; the maximum density is 16 dwelling units per acre.
- **RM-12 (Residential Multifamily):** The RM-12 district accommodates low-density single-family and multifamily neighborhoods; the maximum density is 12 dwelling units per acre.
- **RS-7 and RS-6 (Residential Single-Family):** These districts accommodate single-family neighborhoods with detached and zero-lot-line homes; maximum densities are 7 dwelling units per acre in RS-7 and 6 units in RS-6.

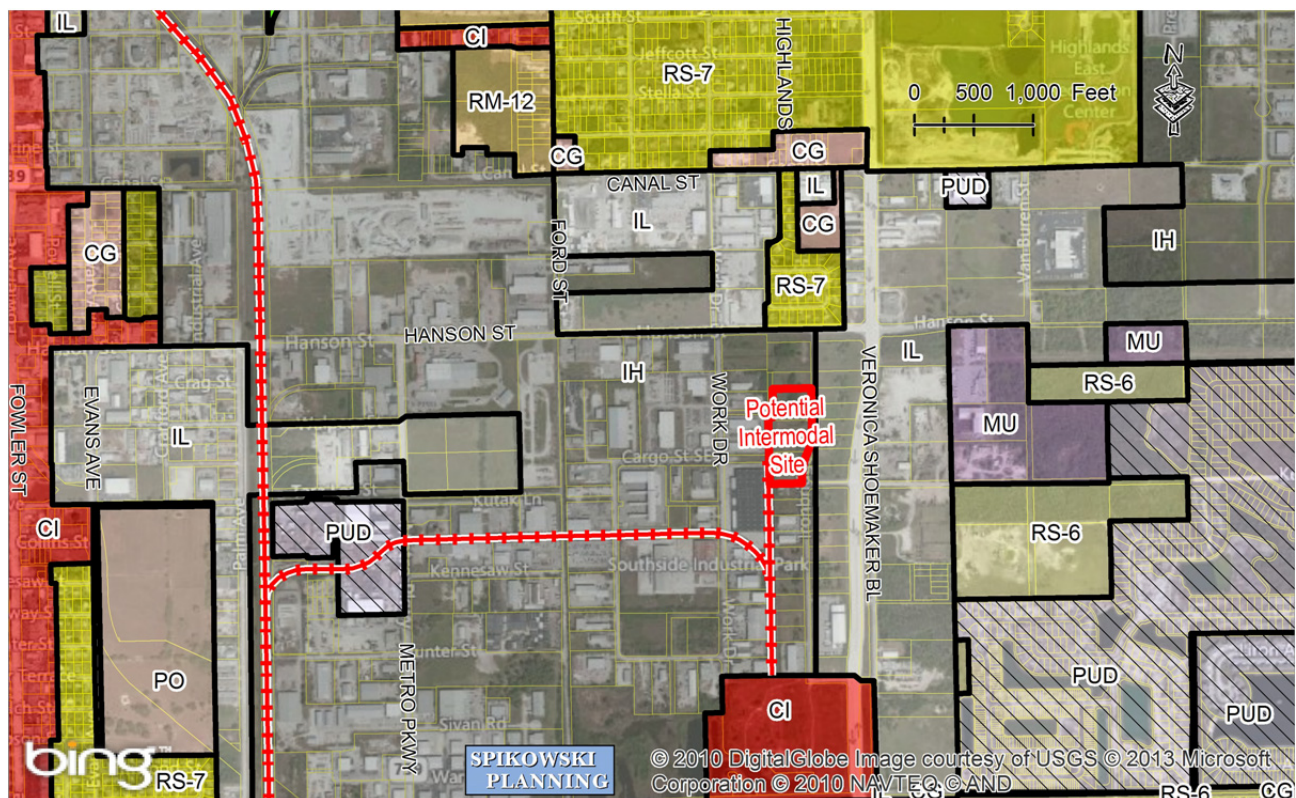


Figure 3, Location of Proposed Intermodal Transfer Terminal, With Fort Myers Zoning Designations

An intermodal facility at this location would be compatible with existing industrial site usage in the area. SGLR industrial trackage already comes close to the site and extending the trackage to serve such a new facility would be relatively simple.

An intermodal transfer terminal at this site would generate unspecified amounts of truck traffic. Until recent years, truck access to the Hanson Street industrial district was limited,

forcing trucks to use narrow city streets such as Ford Street and a few wider state roads such as Fowler Street and Dr. Martin Luther King Jr. Blvd. In 2006, the City of Fort Myers constructed Veronica S. Shoemaker Blvd. which allows traffic to bypass local streets and reach as far north as Palm Beach Boulevard and south to Daniels Parkway and beyond. The City intends to extend Hanson Street to the east at least to Ortiz Avenue and the state of Florida is currently connecting Metro Parkway to Evans Avenue. These projects will further improve the accessibility of the centrally located Hanson Street industrial district.

The nearest residential neighborhood to the terminal site contains about 40 homes on Highlands Circle just north of Hanson Street. This is the only residential neighborhood south of Canal Street; although zoned RS-7, it is almost entirely surrounded by industrial land. Immediately east and west is light industrial (IL) zoning; immediately to the south is heavy industrial zoning (IH). This neighborhood was annexed from unincorporated Lee County in 2003 at the same time as most of the Hanson Street industrial district was annexed.

Sites that could accommodate additional residential development begin about 700 feet east of Veronica S. Shoemaker Boulevard. Given the longtime existence of the Hanson Street industrial district, and its enshrinement in local land-use law, potential residents on these sites could not claim ignorance of the potential for noise, vibration, and odors from nearby industrial activities.

3.2 Fuel Terminal

Another project proposed in the Investment Element of the 2010 Florida Rail System Plan is a fuel terminal (project 289, "Rail Intermodal Yard"). This facility would be owned and operated by a private entity and located in the industrial district north of Alico Road. A specific site has not been acquired, but a fuel terminal in this vicinity was included in the MPO's 2035 Long Range Transportation Plan.

A promising site that had been considered for this terminal is located between Gator Road and Domestic Lane, a half mile north of Alico Road, as shown on Figure 4. Rail cars would arrive by a short northerly extension of the SGLR Baker Spur, which currently ends at Domestic Avenue. (An easterly extension of this spur that served a limerock mine east of I-75 was abandoned in the late 1980s.)

This terminal would receive, store, and transload petroleum products such as gasoline, diesel fuel, and aviation kerosene type jet fuel (Jet A Fuel) that would arrive in Lee County by rail. Jet fuel could be transported by pipeline to the Southwest Florida International Airport, whose closest point is less than three miles to the east. The white dashed line on Figure 4 indicates a drainage canal owned by the airport that would provide sufficient right-of-way for a pipeline from the fuel terminal to the airport. A pipeline to the airport has the potential to eliminate all the trucks that now haul jet fuel to the airport.

The fuel terminal could also handle rail cars of gasoline and diesel fuel that could be transloaded for local distribution by truck throughout the Fort Myers and Naples area. Local distribution of gasoline and diesel fuel would increase truck traffic along Alico Road. However, it would significantly reduce the number of trucks that now haul these fuels into southwest Florida every day.

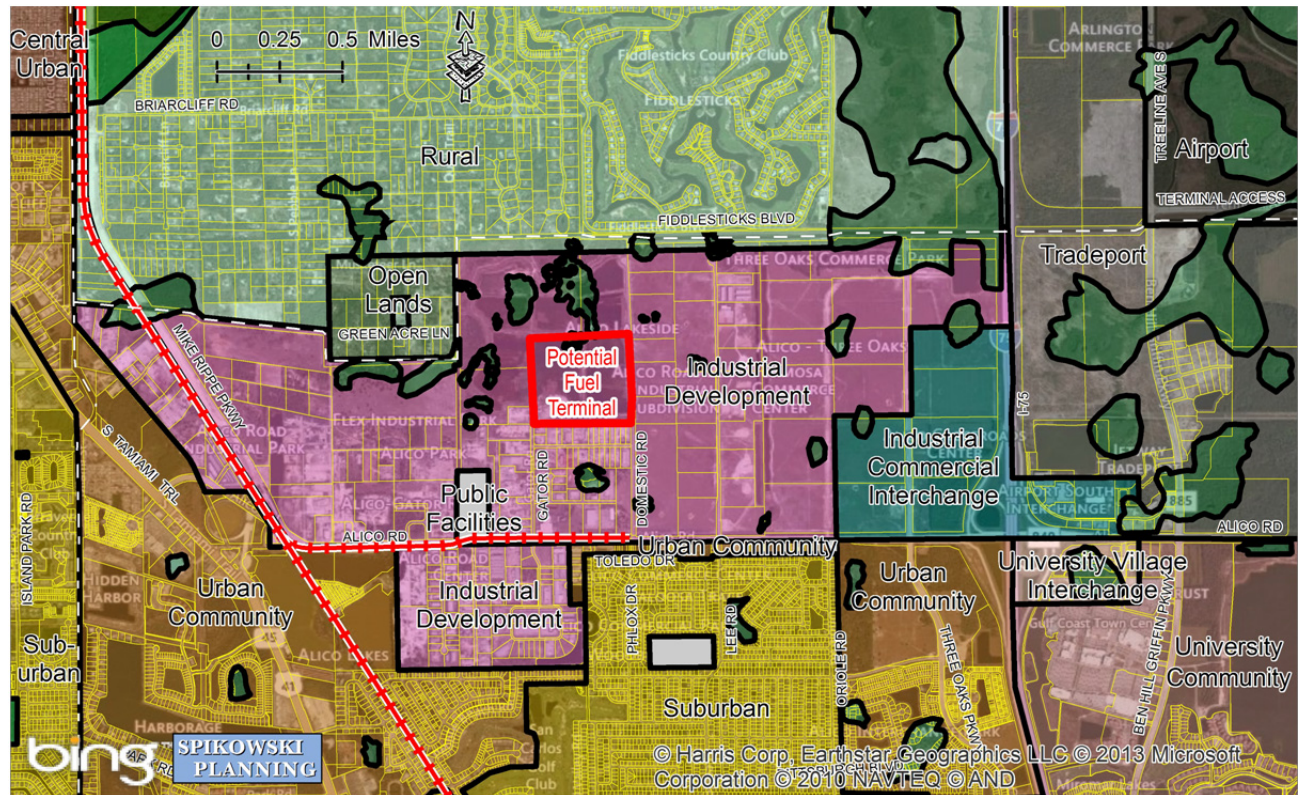


Figure 4, Potential Fuel Terminal Site North of Alico Road, With Lee County Future Land Use Designations

One potential compatibility issue might be the existing residential development north of the airport canal and south of Alico Road. To the north, the closest distance between residential lots and the perimeter of this site is about 2,200 feet; these lots face Fiddlesticks Boulevard. To the northwest, the closest distance is 1,600 feet to five-acre homesites along Green Acre Lane. To the south, the closest distance is 2,750 feet to lots along Toledo Drive in San Carlos Park, which is just south of businesses on the south side of Alico Road. All land between the site and these neighborhoods is currently designated by Lee County for industrial development.

Another compatibility issue might be impacts of long trains hauling fuel to this terminal. If the trains operated during daytime hours, cross-traffic might be interrupted for longer periods than are experienced for other freight trains. If the trains operated at night to allow the tracks to be used for passenger service during daytime hours, traffic interruptions would be minimized, but noise impacts would be greater to residences near the tracks due to higher occupancy at night.

Overall, the north side of Alico Road is an ideal location for a fuel terminal. A regional perspective of this site can be seen on Figure 5. A rail spur already runs to this area, which is by far the largest area programmed for industrial uses in the region. The site is located between the end of the rail line and the airport, a major user of fuel. Alico Road provides direct access to US 41 and I-75, which would allow trucks to deliver fuel from the terminal in every direction, including south to Collier County.

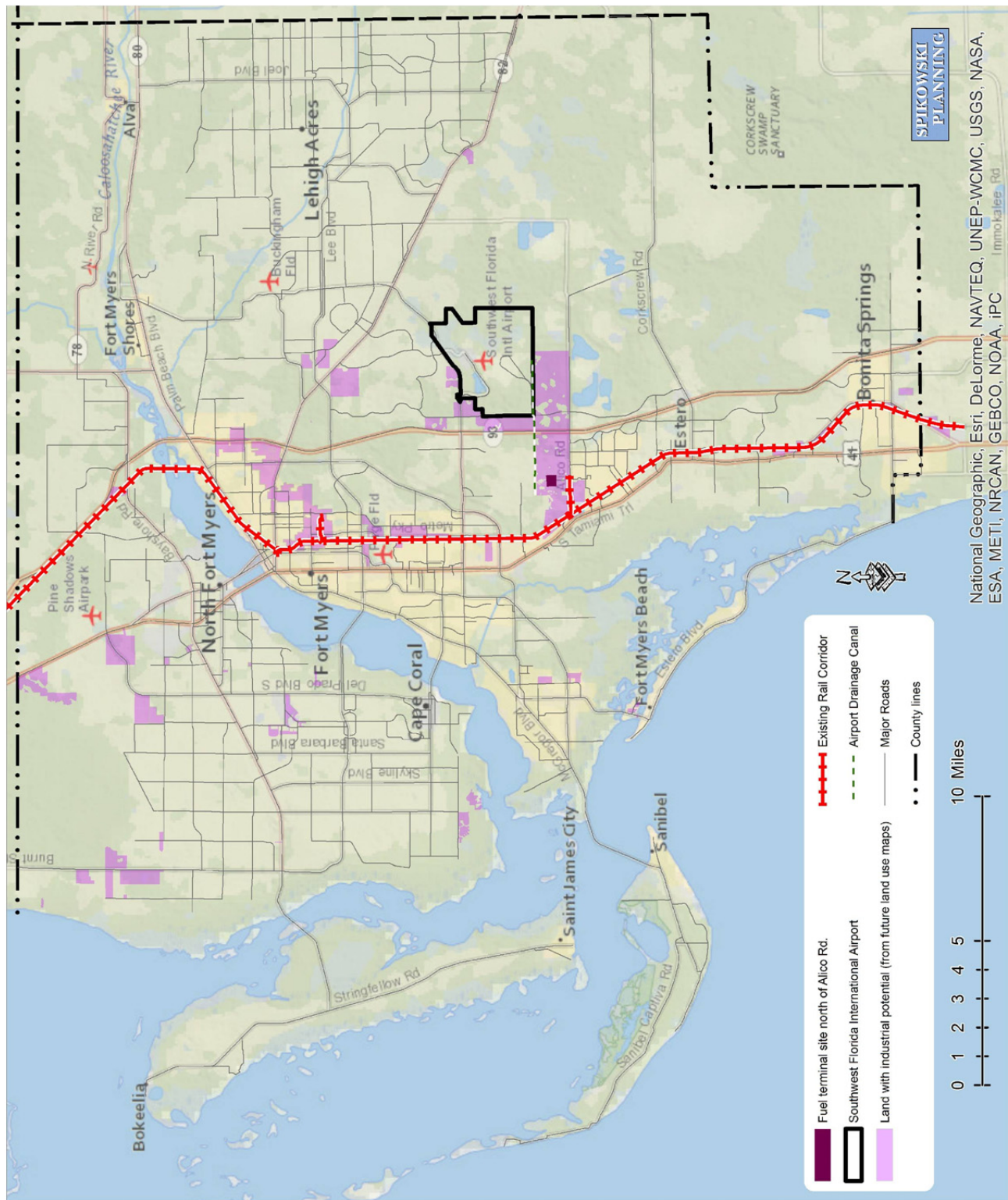


Figure 5, Potential Fuel Terminal Site, SW Florida International Airport & Drainage Canal