TRANSPORTATION AND ENVIRONMENTAL ANALYSIS

OF THE

ATLANTIC STEEL DEVELOPMENT PROPOSAL

DRAFT

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Prepared for the United States Environmental Protection Agency by Hagler Bailly, Inc.

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I. SUMMARY

To evaluate the expected air emissions impacts of the Atlantic Steel eXcellence and Leadership Project EPA, in consultation with stakeholders, undertook three main analyses: 1) regional transportation and air emissions impacts; 2) local carbon monoxide (CO) impacts; and 3) site level travel and multi-media impacts. Five site/design combinations were analyzed for these impacts. This memorandum reports the draft results of these analyses.

To analyze the transportation and air emissions impacts of *locating* new development at the Atlantic Steel site, EPA used the Atlanta regional transportation and MOBILE 5 emissions models to compare the Atlantic Steel site to three other possible development locations for similar-scale development in the Atlanta region. EPA's evaluation of the Atlantic Steel site's impacts is driven by two facts. First, Atlanta will grow over the next 20 years. Second, without redeveloping the Atlantic Steel site (138 acres), more of this growth will locate in outlying areas.

Analysis of regional transportation and air emissions impacts of the proposed Atlantic Steel development shows that absorbing a portion of Atlanta's future growth at the Atlantic Steel site would create less travel and fewer emissions than developing likely alternative sites.

Figure 1: Travel and emissions impacts of development alternatives

Vehicle Miles Traveled (per day in yr 2015)

Site	Regional total	Associated with site	Difference from Atlantic Steel
Atlantic Steel	139,180,585	348,685	
Sandy Springs	139,221,572	389,672	11.8%
Cobb/Fulton	139,339,398	507,498	45.5%
Henry County	139,350,097	518,197	48.6%

Vehicle miles traveled produce:

Emissions

	NOx			**VOC**		
Site	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel
Atlantic Steel	192.04	0.49		154.30	0.68	
Sandy Springs	192.10	0.55	12.3%	154.37	0.75	11.2%
Cobb/Fulton	192.24	0.69	41.4%	154.31	0.69	2.1%
Henry County	192.27	0.72	48.4%	154.46	0.84	24.5%

EPA also analyzed whether additional traffic resulting from the redevelopment of Atlantic Steel would cause CO hotspots—levels of CO exceeding national environmental and safety standards. Preliminary analysis indicates that CO hot spots would not occur. Areas where CO would increase tend to be those that currently enjoy a low CO concentration. Final CO analysis is underway.

EPA also analyzed the transportation and air emissions impacts of the new development's site design. EPA compared the proposed Atlantic Steel site plan to likely site plans for the three greenfield sites (holding jobs and residents constant), and to a site plan for the Atlantic Steel site developed by Duany Plater-Zyberk & Co. (DPZ), a leading town planning firm.

The site designs differ substantially in ways that affect travel behavior and thus emissions. On important measures such as density, mix of use and transit access, the Atlantic Steel site design as proposed by Jacoby is superior to that which would likely occupy two of the three greenfield sites. Jacoby's design also offers superior transit access compared to the third greenfield site. The DPZ alternative design for the Atlantic Steel site performs the best of any design analyzed. Compared to Jacoby's design, it excels in three areas in particular. First, it greatly improves the mix of uses on-site by integrating them at a finer scale. Second, the DPZ alternative design provides better connectivity on- and off-site. Finally, the pedestrian environment is improved through street design, more direct routing and slower traffic speeds. However, the analysis will not be complete until EPA translates on-site design differences into an adjusted projection of vehicle miles of travel (VMT). That analysis is underway and will be available in late February.

This report describes the analysis methodology, presents draft results, and discusses the results. Please note that these results are *draft*.

II. INTRODUCTION

Jacoby Development Corp., a developer in Atlanta, GA has proposed redeveloping a 138 acre site near Atlanta's central business district currently owned by Atlantic Steel. The proposed development is a mix of residential and business uses, and includes an auto and transit bridge that would cross the interstate to connect to the neighborhood east of the interstate. In addition, Jacoby Development Corp. has proposed 3 ramps to provide improved interstate access for the neighborhood and proposed development.

Atlanta is currently out of compliance with federal transportation conformity requirements, meaning that it has failed to demonstrate that its transportation activities will not exacerbate existing air quality problems or create new air quality problems in the region. As a result, Atlanta (with limited exception) is not allowed to use federal funds to add to its highway system nor may it construct certain types of transportation projects that require federal approval even if not federally funded. Construction of the proposed bridge/ramps is covered by this prohibition.

Jacoby Development Corp. believes that developing the Atlantic Steel site, including the access bridge/ramps, would result in the production of fewer transportation air pollution emissions than not developing the site. Underpinning this assessment is the belief that if development does not occur in this location it will locate instead at sites in the region that produce more VMT and more transportation emissions.

Transportation literature suggests travel emissions resulting from a developed Atlantic Steel site might be lower than emissions resulting from another site because:

1. the proposed development would include high densities, a mix of uses, and would be located near transit, and would therefore generate fewer total auto trips than comparable amounts of development placed in locations without these features; and

2. the proposed development would be regionally central to more activities, so auto trips to and from the site would on average be shorter.

Previous EPA work has quantified the magnitude of potential improvement in the transportation and environmental performance of developments located to produce regional and transit accessibility. The EPA Office of Policy study "Transportation and Environmental Impacts of Infill and Greenfield Development" found that locating development on regionally central infill sites can produce emissions benefits when compared to locating that same development on greenfield sites on the fringe of the currently developed area. In three EPA case studies, per-capita VMT associated with a development site was reduced by as much as 61% at infill sites compared to the greenfield sites, and NO_x emissions were reduced by 27% to 42%. This and related literature suggest that allowing the Atlantic Steel project to be built may reduce future emissions growth in the region.

Any future emissions reductions from the Atlantic Steel redevelopment are likely to be the result of the site's regionally central location and site design — versus the location and design of growth that would have taken place absent the development of the Atlantic Steel site. Therefore, EPA analyzed the likely environmental performance of the Atlantic Steel site at two levels. First, EPA evaluated the performance of the Atlantic Steel site relative to three other likely regional growth locations. As part of this evaluation, CO emissions associated with the Atlantic Steel site were evaluated for potential "hot spots." Second, EPA is investigating the performance of the site design originally proposed by Jacoby Development Corp. relative to three greenfield site designs and one new design prepared for the Atlantic Steel site.

III. REGIONAL PERFORMANCE

This section describes EPA's investigation of the performance of the Atlantic Steel site relative to other potential regional growth locations.

A. WHAT ALTERNATIVES TO COMPARE?

In order to answer the question "will the proposed development reduce future air emissions by virtue of its location?", EPA first needed to decide, "compared to what?"

1. Alternative selection assumes growth in the greater Atlanta region

The Atlanta region is one of the fastest growing metropolitan areas in the United States. EPA believes that the Atlanta region will continue to grow whether or not the proposed development is built, and that the total amount of growth coming to the Atlanta region will not be significantly affected by the proposed development — only its location in the region. In other words, if the proposed development is built, it will absorb a portion of the Atlanta region's projected growth. If the proposed development is not built, the growth will go elsewhere within the region.

Where is growth projected to go, and how does the proposed Atlantic Steel development represent a change from this scenario? Current projections used by the Atlanta Regional Commission (ARC) in regulatory submissions of future transportation plans anticipate that between 2000 and 2010 (Atlantic Steel's projected build out period) the City of Atlanta will add 18,199 residents and 33,646 jobs. During that same period, Midtown, the subarea where Atlantic Steel is located, is projected to add 4,528 jobs and 193 residents. By comparison, the proposed Atlantic Steel development is projected to add 11,000 jobs and 5,000 residents to the Midtown subarea.

The development proposed for the Atlantic Steel site is large enough to significantly effect regional development patterns. At build-out it would increase City of Atlanta employment growth by 33%, and population growth by 27%. For the Midtown subarea the effect is even more significant: a roughly 240% employment growth increase and 2500% population growth increase. Clearly development at Atlantic Steel would shift growth to Midtown, but from where? Some Project XL stakeholders were concerned that the development might absorb growth that would otherwise have gone elsewhere in the regional center, rather than elsewhere outside the regional center. As shown in Figure 2, the proposed development is so large that if it absorbed growth only from other regionally central major activity centers (the CBD, Midtown, etc.), the Atlantic Steel site would constitute over half this growth and would actually add population to the regional center. In addition, the average projected distribution of new regional growth between 2000 and 2010 is 18% in Atlanta and 82% in the surrounding jurisdictions. If the Atlantic Steel development draws growth from these surrounding jurisdictions in rough proportion to where it is currently projected to go, it appears it would draw the majority of its growth from outer areas of Metro Atlanta, rather than from other parts of the City of Atlanta.

	Employment growth	% of total	Population growth	% of total
Atlanta	33,646		18,199	
Subareas				
CBD	4,224	12.6%	2,474	13.6%
Midtown	4,528	13.5%	193	1.1%
Buckhead	6,179	18.4%	1,405	7.7%
Perimeter Center	4,166	12.4%	-50	-0.3%
Sub-Areas total	19,097	56.8%	4,022	22.1%
Proposed Atlantic Steel	11,000	32.7%	5,000	27.5%

Figure 2: City of Atlanta Projected Population and Employment Growth (2000-2010)

Atlantic Steel's high growth figures suggested that the alternatives analysis would have to compare the Atlantic Steel development to scenarios in which growth went to the locations predicted in the absence of Atlantic Steel-- elsewhere in the region, and specifically to areas outside the city of Atlanta.

EPA considered two approaches to developing alternative scenarios for analysis.

1. Drawing growth from a number of places throughout the region—as though Atlantic Steel displaced a little growth from each of many locations. Thus, the paired comparison would be

   a) the region with Atlantic Steel and a little less development in a number of locations, versus
   b) the region with a little more development in a number of locations.

   This approach would require running ARC's regional land use model in order to identify the appropriate parcels from which to shift growth.

2. Comparing Atlantic Steel to one or more equivalent developments located further from the regional center (to reflect future growth location projections).

The latter approach was chosen for reasons discussed below (number 4 this section). For this analysis, EPA developed three scenarios of where growth might go if not to the Atlantic Steel site.

In addition, and importantly, it was recognized that this approach would provide only a relative measure of the Atlantic Steel site's performance. That is, Atlantic Steel may perform better than other sites but nonetheless fail to improve the region. Thus, the Atlantic Steel site's performance was also compared to average regional performance measures where appropriate.

2. Selection criteria

For the alternative scenarios, EPA identified greenfield land parcels that could support development of the scope proposed for the Atlantic Steel site. The greenfield land area required is based on the amount of development proposed for the Atlantic Steel property, but developed at suburban densities typical for the Atlanta region, as shown in Figure 3.

Figure 3: Greenfield space requirements

Atlantic Steel Plan (9/10/98)	Assumed Suburban Density	Greenfield Acres Needed
2400 dwellings	4 dwelling units/acre	600
4.8 mm sq.ft. office	0.5 FAR*	220
1.4 mm sq.ft. retail	0.5 FAR	65
0.8 mm sq.ft. hotel	0.5 FAR	40
Subtotal		925
Rights-of-way and public spaces**		250
Total		1,175 acres

*Floor to area ratio

**space for roads, parks and other public uses

The geographic scope of the study area is defined as the 13-county region that is in Clean Air Act non-attainment, and which is covered by Atlanta Regional Commission's (ARC) transportation model. The primary data sources were ARC's "Economic Development Information System," its transportation model, and land-use and infrastructure plans for each county. Staff from ARC and county planning departments were consulted in the course of work, particularly about constraints recommended for use in screening out unsuitable lands.

Potential greenfields were selected by identifying the region's vacant land and applying a series of nine constraints in order to find locations that are both unconstrained and large enough to accommodate the proposed Atlantic Steel development. This series of successive screenings was performed with geographic information systems (GIS) software and included the following steps:

a. Gross Available Land

The only available electronic inventory of vacant undeveloped land in the region is ARC's "agriculture and forestry" land cover inventory (this is existing land status as opposed to future land-use designations). Consultation with ARC and county planning staff indicated that the agriculture and forestry land cover is considered the functional equivalent of a vacant lands inventory for parcels larger than 100 acres. Three of the 13 counties (Forsyth, Paulding, and Coweta) are not covered by ARC's land cover database, but in those counties subsequent steps compensated for this by eliminating all protected and developed lands, leaving essentially the equivalent of agriculture and forestry. The following lands were then eliminated.

b. Surface Water Exclusions

Using the ARC database, all surface water areas were eliminated, along with buffer lands immediately adjacent to them. For the Chattahoochee River, a 2,000-ft. buffer on either side of the river was used; for all other major water bodies 500 ft. was used.

c. Wetland Exclusions

All wetland areas in the ARC database were eliminated.

d. Protected Groundwater Exclusions

All groundwater recharge areas in ARC's database were excluded. Because this data was unavailable electronically, groundwater boundaries were manually transferred into this study's GIS coverages as accurately as possible.

e. Constrained Water Supply Exclusions

All Georgia Environmental Protection Division-designated "small water supply" watersheds were excluded. Again, because of a lack of electronic source information, these areas were manually delineated as accurately as possible in this study's GIS.

f. Constrained Highway Exclusions

Using the ARC transportation model's 2010 projections, lands were eliminated within traffic analysis zones having over 1,000 ft. of capacity-constrained highway segments.

g. Municipal Boundaries

All lands inside the region's municipalities were eliminated based on ARC and county planning staff conclusions that the amount of greenfield acreage required could not be found inside any city (excluding the New Manchester site in Douglasville, which nonetheless has been committed to that project).

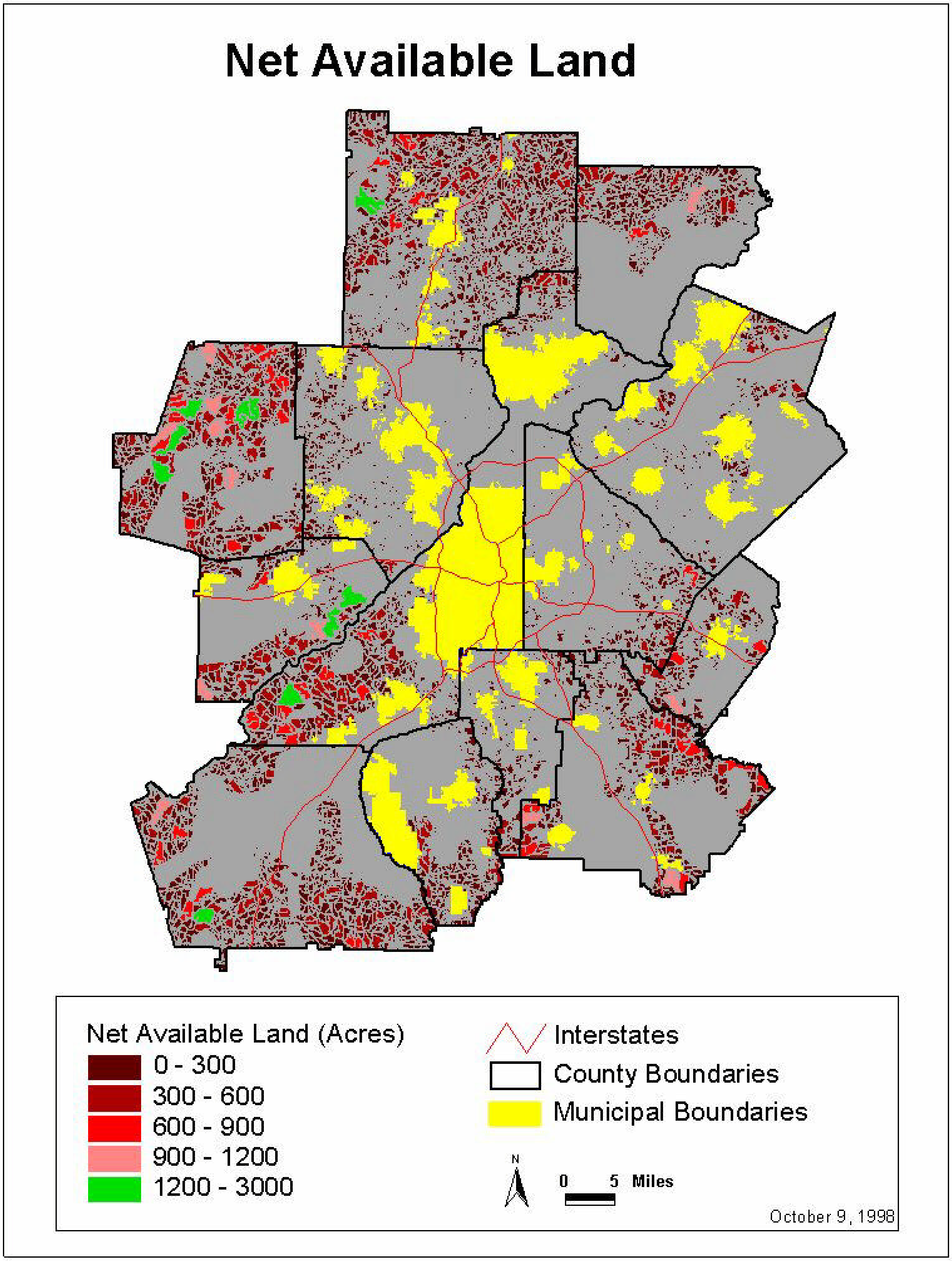
h. County Land-Use Plan Exclusion Areas

Those areas designated for non-development purposes in county land-use plans were eliminated, including such designations as parks, civic facilities, and institutional uses. Because plans were unavailable electronically, these boundaries were transferred manually into this study's GIS as accurately as possible for the largest sites (e.g., over 100 acres) in each county.

i. Committed Lands

A final screening was made for those lands already committed to some level of development as reflected by local street construction. Using the ARC electronic database, lands within 500 ft. of all streets were eliminated. This had the effect of removing existing built-out and partially built-out residential subdivisions and commercial strips fronting thoroughfares.

The resulting net available land and candidate sites are shown in Map 1 by range of size in acres. Note that this definition of "net available land" in the Atlanta region is useful in this case, but is not a description of all land available for development.

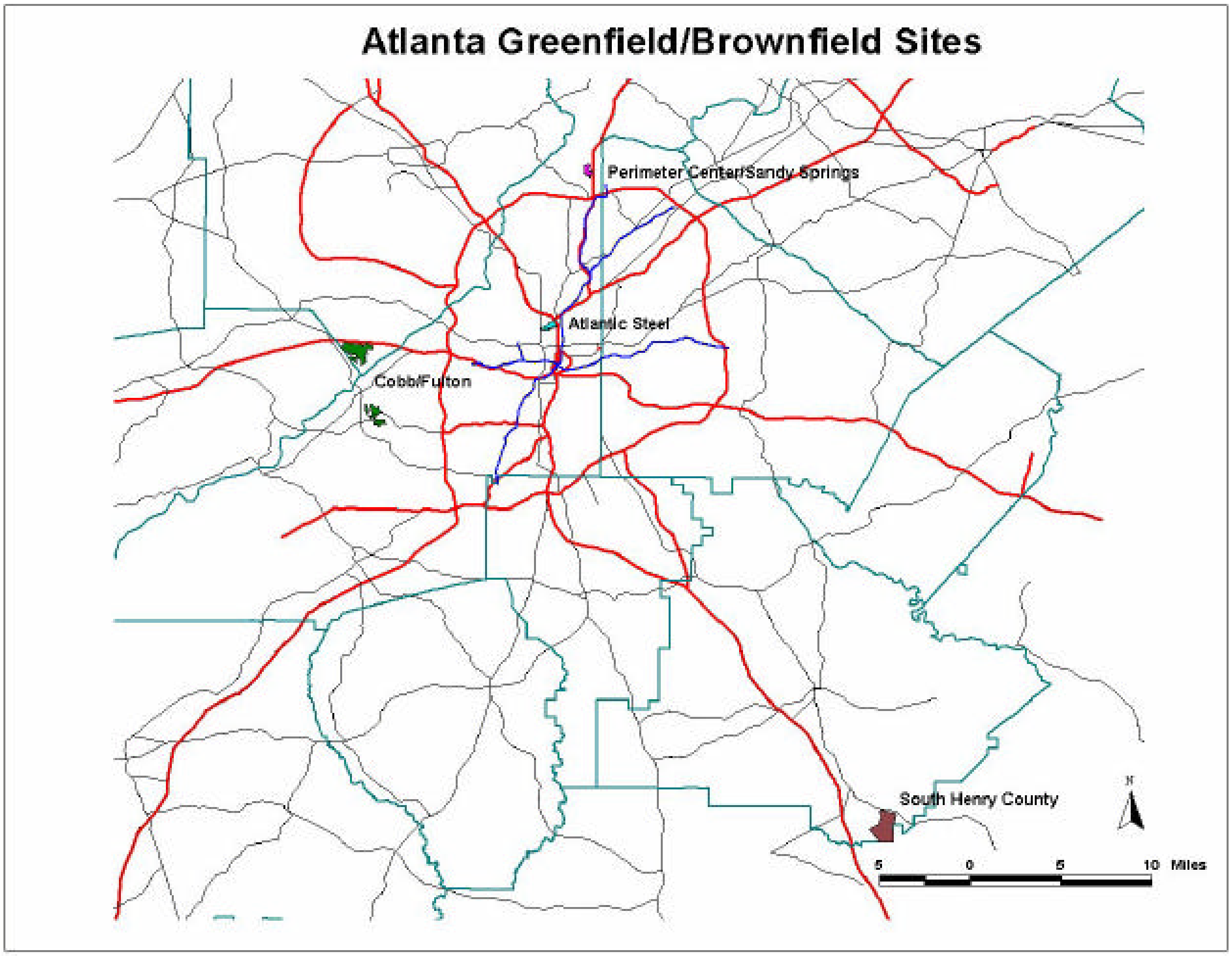


Map 1: Land available for significant development in the Atlanta region

3. Stakeholder panel

The land use screens produced eight contiguous parcels large enough to absorb the proposed development at suburban densities. The screens also produced numerous parcels that, combined with others nearby, could absorb the development.

EPA asked a panel of regional stakeholders for their individual input on what sites or combination of sites would be useful to analyze. EPA then chose two sets of parcels from Map 1. The first set of parcels is in south Henry County adjacent to a highway, far from the regional center and with no transit access. The other set of parcels is on the border between Fulton and Cobb Counties, again along a highway, just beyond the perimeter, and with bus transit. In addition, EPA selected an “edge city” site in north Fulton County, adjacent to the planned Sandy Springs MARTA station just north of the Perimeter Highway. As shown previously, Perimeter Center is part of Atlanta and is projected to receive less than 100 people and roughly 1,700 jobs. This site is not representative of where future growth is projected to locate. Instead it was chosen as an alternate site representing one end of a spectrum of locations that could possibly absorb future growth. This site was not large enough to accommodate the planned development at suburban densities, but could absorb the development at the same densities planned for the Atlantic Steel site. This site could be considered infill in a suburban activity center. It has rail transit access, is located adjacent to higher density development, and is near a mixture of activities.



Map 2: Regional location of sites evaluated

Together, these three sites represent the breadth of possible locations and associated site designs likely to occur in the Atlanta region. Therefore these sites capture several important variables that help determine travel behavior:

Location	Development density	Regional location	MARTA rail served?
Atlantic Steel	Urban	Regionally central	Yes
Cobb/Fulton	Suburban	Suburban	No (shuttle link to MARTA rail: yes)
South Henry County	Suburban	Exurban	No
Perimeter Center/ Sandy Springs	Urban	Just past the perimeter	Yes

Although these four sites do not cover all possible locational variations, they represent the locational options most available. It is worth noting again that only two (South Henry and Cobb/Fulton) of the three selected sites are consistent with the region's projected pattern of exurban growth. Regionally, little of the growth projected in the future is predicted to locate in the suburban infill scenario represented by Perimeter Center/Sandy Springs. Modeling the regional travel expected as a result of development on each of these sites helps EPA and stakeholders understand the role of location and other site-specific characteristics in determining environmental impact.

4. Alternatives selection methodology not chosen: running the regional land use model

Selecting discrete alternative locations for growth makes the subsequent analysis of environmental performance particularly useful for policy analysis, because it helps stakeholders shed light on "what if" questions: *what if* future regional growth tends to concentrate in places *like* Perimeter Center/Sandy Springs? Or *what if* future regional growth tends to concentrate in places *like* Cobb/Fulton on I-20? In allowing stakeholders to ask more questions, the analysis is more flexible, and depends less on any one particular future being especially likely. This discrete approach was also essential to allow accurate "apples to apples" site design comparisons.

However, this is not the only possible approach. As suggested earlier in this memo, another approach would be to model future regional development patterns using Atlanta's regional land use model, DRAM/EMPAL. In this approach, EPA would have developed two regional land use forecasts: one without the Atlantic Steel development, and one with the development. In the latter case, the Atlantic Steel development would not absorb growth from a single set of parcels, as it does in the approach EPA did take. Rather, the Atlantic Steel development would absorb growth from many, widely dispersed parcels.

EPA did not use the DRAM/EMPAL approach for two reasons. First, EPA did not believe that this approach would yield more useful, nor necessarily more accurate results. Current land use forecasts project that growth would have been drawn dominantly from sites which are similar to the Cobb/Fulton or South Henry site with much smaller amounts coming from sites like Perimeter Center/Sandy Springs. In other words, growth would have been distributed to a variety of sites whose regional characteristics (from a transportation perspective) would be similar to the greenfields chosen for this study—albeit in smaller parcels. To some degree the result of such a growth scenario can be inferred from the individual site model runs. Jobs and households taken from a site with characteristics matching the Cobb/Fulton site would likely create differences similar to those created by Cobb/Fulton. Similar parallels can be drawn with the other sites.

One difference that may have resulted from a DRAM/EMPAL approach and its consequent small parcel distribution is the impact such a distribution would have on intrazonal trip-making (trips within a sub-area/traffic analysis zone). For the greenfield sites in this study, residential and non-residential uses may be more clustered than would have occurred in a DRAM/EMPAL distribution with a resulting increase in intra-zonal travel and possibly an associated reduction in some trip lengths. However, it is impossible to assess the magnitude or frequency of any such changes.

Understanding the transportation impacts of locating development on the Atlantic Steel site versus other possible locations was one of the goals of this study. Selecting distinct types for analysis—infill in a suburban activity center, suburban greenfield with bus transit, and a relatively isolated exurban greenfield site in a community with a rural character—would produce information about a variety of development locations. These different scenarios serve to illustrate the effects of displacing growth from a variety of locations and provide EPA with a better understanding of the sensitivity of any emissions reductions to these different locations. A highly dispersed scenario would not produce this type of information.

The results, as summarized on page one, suggest that the decision to analyze discrete alternative sites was in fact useful. Not only is there a clear difference between the Atlantic Steel site and the other three locations, but there are also clear differences between the three alternative locations. This serves to highlight site location characteristics such as access to transit, regional accessibility, etc., that produce different levels of performance. Had EPA simply compared regional development with and without the Atlantic Steel development, EPA would have learned very little about which site location elements are important.

The second factor dictating use of the current approach was that ARC, which operates DRAM/EMPAL, would have found it difficult to make the model and/or the modeling staff available to EPA for this purpose, given other demands on its time. Even with staff available, running DRAM/EMPAL requires significant time and resources. It was EPA's judgement that investing those resources would not add fundamentally to the insight gained from the chosen analysis method.

5. Alternatives chosen for analysis

Using the results of the land use screens and the advice of the individuals on the stakeholder panel, EPA chose three alternative sites to compare to Atlantic Steel. EPA believes that these sites represent the likely *range* of development alternatives to the Atlantic Steel site and sheds light on other variants.[1]

a. Growth absorbed in Cobb/Fulton

The site is located in South Fulton County, near the convergence of Interstate 20 and Interstate 285. The existing land-use is primarily light industrial and warehouse facilities. The area is served by bus service connecting to downtown's Five Points MARTA rail station. The area is economically

[1] EPA does not expect that development would *necessarily* go to these sites in lieu of Atlantic Steel; EPA believes only that the sites represent the plausible range of likely growth locations in lieu of Atlantic Steel.

depressed and has been targeted by the 'Empowerment Zone' program as an area in need of economic development assistance as well as increased mobility options for low-income residents.

The western portion of the I-285 perimeter highway has experienced small increases in congestion relative to the more rapidly expanding areas. The site has easy access to downtown and the airport.

b. Growth absorbed in Henry County

Located in the southern portion of Henry County, the site is not served by MARTA bus service. Henry County has been experiencing significant growth in the northern portion of the county, and subdivisions have gradually emerged in the southern portion of the county.

Of the alternatives, the site is the most removed from regional activity centers and transit service. The county maintains a rural character despite significant development pressures. Henry County's growth has lagged behind that of the booming northern counties but has gradually gained attention given the Northside's higher land values and congestion levels. Henry County's proximity to Atlanta Hartsfield Airport has also raised the county's attractiveness as a site for freight and warehousing companies.

c. Growth absorbed in Perimeter Center/Sandy Springs site

The Sandy Springs site is located in the Perimeter Center area, one of the region's largest employment concentrations. The proposed site is scattered on parcels north and south of the I-285 freeway. All parcels are within two miles of existing or proposed MARTA heavy rail stations. Of all sites modeled, this location is the most congested, with many facilities experiencing low levels of service in the peak periods. Local surface vehicle traffic is accommodated through a handful of arterials, with few alternate routes available.

The North Fulton area has been experiencing rapid growth rates, with most new growth occurring in the far northern fringes of the county (Alpharetta). Perimeter Center/Sandy Springs is the only suburban 'edge-city' in the region with heavy rail service.

Although nearby housing is largely comprised of single-family detached dwellings, relatively high concentrations of multi-family housing are found nearby (Roswell Road in the north, Peachtree Road in the south/east).

d. Growth absorbed at the Atlantic Steel site

The Atlantic Steel site is situated at the convergence of I-75 and I-85. Located in Midtown Atlanta, the site is located within one mile of the Arts Center MARTA station, and several bus lines serve the site. The Georgia Institute of Technology is within two miles of the site, and the site is abutted to the south and north by established neighborhoods of single-family dwellings. Access to the site is somewhat restricted by the downtown connector (I-75/I-85) that inhibits direct access to the midtown business district. The closest access is the $10^{th}/14^{th}$ street bridge, nearly a mile to the south.

The Midtown business district has attracted large amounts of office employment and housing in the last decade. Plans are underway to fill in vacant parcels and redevelop deteriorated buildings.

B. METHODOLOGIES FOR COMPARING THE ALTERNATIVES

EPA analyzed the regional transportation and air emissions performance of each site using the following methodologies.

1. Travel and emissions analysis

EPA used the ARC regional transportation model to model the transportation behavior associated with developing each of the four geographic sites. This is the same model that ARC (Atlanta's MPO) uses for regulatory submittals to EPA. ARC's model is a version of Tranplan adapted by ARC and applied to the Atlanta metropolitan area.

The ARC version of Tranplan is a relatively sophisticated application of traditional four-step travel modeling.

a. Applying the ARC travel model

For all alternatives, EPA modeled the performance of Atlanta's transportation system in the year 2015 using the "existing and committed" network of transportation facilities, both road and transit networks. The model runs incorporate the following assumptions:

Existing + Committed transit and highway networks

Both transit and highway networks include all projects that have either been completed and those included in the ARC Interim Transportation Improvement Program that will be completed by year 2000. These are currently the only approved additions to the transportation network and represent the same scenario used by ARC when they make future projections. The one exception to this statement is the proposed 17th street bridge. In the two Atlantic Steel scenarios, the highway network includes the proposed 17th street bridge. In addition, the Atlantic Steel site will be modeled with the addition of a shuttle service linking the site to mass transit as well as with the addition of the 3 ramps connecting to the adjacent interstate. These results will be included in the final modeling results. Because of the scale of the changes relative to the size of the 13 county region, it is not expected that these changes will significantly affect the regional modeling outcomes. Effects of these changes are expected to be more significant for the site design analysis and in determining site level travel behavior.

Land use and socioeconomic data

Tranplan models behavior given the population and employment projected and distributed for year 2015. Population and households were distributed across income classes and household sizes based on the regional average distribution, due to lack of information about future households.

Congested travel

EPA assumed that 60% of daily VMT occurred under congested (peak period) conditions, and 40% in uncongested (off-peak) conditions. This split is supported by ARC model documentation.

b. Outputs

Tranplan provides the following performance indicators relevant to the EPA analysis, and to stakeholder interest in how each alternative will perform in the community.

- i. Congestion
- ii. Regional accessibility
- iii. Trip length
- iv. Travel time
- v. Vehicle delay rate
- vi. Mode split
- vii. Personal vehicle use
- viii. Vicinity congestion
- ix. Regional congestion

2. Regional VOC and NO_x emissions

The Project XL application requests flexibility from the Clean Air Act regulations which are triggered by Atlanta's violation of the ground level ozone standard. The project sponsor believed that the Atlantic Steel development would reduce, relative to the baseline, emissions of the ozone precursors volatile organic compounds (VOCs) and nitrogen oxides (NO_x). NO_x and VOCs combine to form ozone, a human health hazard. Thus, EPA evaluated emissions of VOCs and NO_x under each alternative. NO_x and VOCs are regional pollutants: they do not decompose rapidly, so NO_x emitted in one part of the region can travel and combine with VOCs emitted in another part of the region, forming ozone that in turn can travel throughout the region. Thus it was appropriate to analyze *regional* production of these emissions under each scenario. EPA investigated the production of these pollutants in the following ways.

VMT-based approach: To calculate emissions from the modeled travel, EPA used MOBILE 5a emissions factors, which are currently required by the EPA for use in regulatory submittals. The MOBILE model is a VMT- and speed-based emissions model. Calculating emissions with MOBILE involves distributing the VMT projected by a travel model into speed categories, and multiplying the mileage in each speed category by the emissions factor appropriate for that speed. This is done for each vehicle class, for the region's vehicle fleet. Emissions factors vary with vehicle type, season, emissions inspection and maintenance programs in place, regional clean fuels programs, etc. For this analysis EPA used the regional fleet mix and emissions factors used by Atlanta for its regulatory submissions.

Trip-based approach: In starting from VMT, the MOBILE approach does not explicitly take into account trip ends. Rather, trip-end emissions (cold start, hot soak, etc.) are incorporated into the per-mile emissions rates used to convert VMT to emissions. While this works well for many purposes, it has limitations in a comparison between alternatives where vehicle trip generation varies substantially. To shed light on the change in emissions produced by the different number of trips produced by each site, EPA conducted a trip-based analysis of VOC and NO_x emissions. This analysis involved two steps:

1. Use of ARC Tranplan analysis to predict number of vehicle trips for each site,

2. Multipliplication of those trip numbers by an accepted per-mile emissions factor for miles driven in cold-start mode. The average vehicle operates in cold-start mode for the first 3.2 miles of a trip, so each trip was multiplied by "cold start emissions per mile" of 3.2. (note: this analysis will be re-run using the correct cold start trip distance of 3.6 miles)

Thus,

$$\text{Cold start emissions per site} = \text{Vehicle trips}_{\text{site}} * \text{Cold start emissions/mile} * 3.2 \text{ miles}$$

3. Local CO emissions

Although Atlanta, and the Project XL application, focus on NO_x and VOC as pollutants of regional concern, EPA must ensure that any approved project does not produce local pollution problems while reducing regional emissions. CO is the pollutant of concern at the local level.

To analyze the proposed project's impacts on CO emissions, EPA analyzed changes in traffic and resulting changes in CO emission rates on roads in the immediate area of the Atlantic Steel site. Like the *regional* emissions analysis, the *local* area analysis examined conditions under "build" and "no-build" scenarios. However, for the local analysis, the no-build scenario was simply the "expected and committed" road network with the proposed project's growth located elsewhere in the region. No additional traffic from any source on that road network was assumed for the no build. The build scenario assumed the new roads, ramps and transit proposed by Jacoby Development, including the site's internal roads and transit, the proposed 17th Street bridge, and the three ramps from I-75/I-85 to the 17th St. bridge.

Traffic was modeled using a road network simulation constructed for the Atlantic Steel site area.[2] Predicted traffic volumes on individual links of that network were then examined for speed changes from the baseline. CO emissions change with speed, so speed changes were then translated to changes in emissions rates. Traffic was modeled for the peak period.

This preliminary analysis examined only increases in emissions rates, not net increases in aggregate CO emissions, or CO concentrations. Those analyses are underway. (See below.)

C. RESULTS

Performing the regional analysis described above for each of the four sites, and the CO analysis for the Atlantic Steel site, produced the following results.

1. Basic travel results, and the emissions that travel would produce

Figure 4 shows first basic travel results. Vehicle miles traveled are per day. The regional total is the total number of miles traveled per day in the region. The increment of travel attributable to each site is then broken out. Emissions are then calculated from this travel.

[2] The network was developed by the applicant's consultants. EPA is currently analyzing the traffic and CO impacts using an independent consultant.

Vehicle Miles Traveled (per day in yr 2015)

Site	Regional total	Associated with site	Difference from Atlantic Steel
Atlantic Steel	139,180,585	348,685	
Sandy Springs	139,221,572	389,672	11.8%
Cobb/Fulton	139,339,398	507,498	45.5%
Henry County	139,350,097	518,197	48.6%

Using Mobile 5, vehicle miles traveled produce…

Emissions

	NOx			VOC		
Site	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel
Atlantic Steel	192.04	0.49		154.30	0.68	
Sandy Springs	192.10	0.55	12.3%	154.37	0.75	11.2%
Cobb/Fulton	192.24	0.69	41.4%	154.31	0.69	2.1%
Henry County	192.27	0.72	48.4%	154.46	0.84	24.5%

Figure 4: Basic travel and emissions results

2. Trips-based emissions

Figure 5 shows the total trips associated with each site, and the emissions difference attributable to differences in starts. The total emissions calculation used in MOBILE 5 does include an element to account for cold starts, so it would be improper to add the emissions calculated below to the emissions calculated above. However, because MOBILE 5 uses the same cold start emission adjustment for each scenario, it underestimates the difference in air emissions attributable to differences in total number of trips. Number of vehicle starts and associated emissions are presented here to bound the magnitude of any under- or over-estimation of emissions.

Vehicle Starts (per day in yr 2015)

Site	Regional total	Associated with site	Difference from Atlantic Steel
Atlantic Steel	11,244,191	18,004	
Sandy Springs	11,251,226	25,039	39.1%
Cobb/Fulton	11,258,480	32,293	79.4%
Henry County	11,259,067	32,880	82.6%

Vehicle starts times cold-start emissions factor produces…

Cold Start Emissions

	NOx			VOC		
Site	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel	Regional total (tons/day)	Associated with site (tons/day)	Difference from Atlantic Steel
Atlantic Steel	28.51	0.06		29.19	0.06	
Sandy Springs	28.53	0.08	37.2%	29.21	0.08	37.2%
Cobb/Fulton	28.78	0.33	469.2%	29.47	0.34	469.2%
Henry County	28.92	0.48	721.6%	29.62	0.49	721.6%

Figure 5: Trips-based emissions analysis

3. Travel behavior, and land use/transportation system performance

a. Performance

The ARC transportation model forecasts travel behavior by forecasting the number of trips people will take, and the path those trips will take. In the model, the region is divided into "traffic analysis zones (TAZs)," small areas that people travel to, from, and within. The forecast gives the number of trips originating in a zone and ending in a zone. These trips can be described by their purpose: work, non-work, other, or non-home based (NHB). For each forecast, statistics about the speed, length, and mode of different kinds of trips describe the performance of the regional transportation system.

The table below measures and describes the forecast performance of the transportation system under four scenarios: with the Atlantic Steel site developed, and with each of three alternative sites developed. A regional average for each descriptive or performance measure is also given where appropriate.

Measure	Regional Average	Atlantic Steel	Perimeter/ Sandy Springs	Fulton/Cobb	Henry County
Daily VMT					
per capita	34.05/capita	23.54/capita	31.19/capita	31.98/capita	15.58/capita
per household	85.26/hh	58.85/hh	77.97/hh	79.94/hh	38.96/hh
Daily VMT per employee	14.54	10.70	13.15	14.35	26.68
Transit share of trip starts[3]	7.7%/Work 1.9%/Non-work	14.9%/Wk 7.3%/NW	12.5%/Wk 6.0%/NW	1.8%/Wk 0.8%/NWk	0%/Wk 0%/NWk
Transit share of trip ends	7.7%/Work 1.9%/Non-work	14.49% 6.25%	12.3% 2.2%	1.73% 0.61%	0% 0%
Average length (miles), trips originating in TAZ	14.35/Work 8.18/Other 8.61/NHB*	4.24/Wk 3.76/Other 5.98/NHB*	6.50/Wk 5.43/Other 7.62/NHB*	11.01/Wk 6.34/Other 8.85/NHB*	6.29/Wk 6.17/Other 5.01/NHB*
Average length (miles), trips ending in TAZ	14.35/Work 8.18/Other 8.61/ NHB*	10.70/Wk 7.41/Other 6.62/ NHB*	14.35/Wk 9.39/Other 7.72/ NHB*	13.15/Wk 6.35/Other 8.34/ NHB*	26.68/Wk 11.65/Other 1.68/ NHB*
Average congested trip time (minutes)	36.99/Work 21.14/Other 22.88/ NHB*	34.57/Wk 22.73/Other 20.49/ NHB*	44.97/Wk 30.29/Other 25.29/ NHB*	33.93/Wk 17.82/Other 22.87/ NHB*	86.15/Wk 39.98/Other 5.42/ NHB*
Average trip time (minutes)	36.99/Work 21.141/Other 22.88/ NHB*	18.23/Wk 12.507/Other 18.44/ NHB*	23.24/Wk 17.60/Other 23.95/ NHB*	28.52/Wk 15.47/Other 21.93/ NHB*	14.29/Wk 14.23/Other 13.24/ NHB*

[3] Unless otherwise noted, all trip statistics are for trips beginning or ending in the Transportation Analysis Zone (TAZ).

Regional accessibility: % of jobs within 30/45 minutes congested travel time	n.a.	27.03%/30 min 52.09%/45 min	18.6%/30 47.6%/45	10.7%/30 32.5%/45	1.09%/30 1.63%/45
Regional accessibility: % of population within 30/45 minutes congested travel time	n.a.	15.96%/30 min 34.96%/45 min	8.04%/30 27.35%/45	9.9%/30 27.3%/45	1.03%/30 2.31%/45
***NHB= trips not originating from the home (non-home based)**					

b. Discussion of performance measures

The regional analysis results paint a picture of three site types. The first can be described as regionally accessible and transit oriented on a macro level. Atlantic Steel and Perimeter Center/ Sandy Springs fit this profile. Both have good regional accessibility as demonstrated by the measures of accessibility and trip length. In addition, at 14% and 12% transit share for work, they each have good transit access relative to the other sites. In combination, the regional and transit accessibility lead to significantly lower VMT associated with these sites, from 120,000 to 160,000 fewer miles of travel per day. Such accessibility also means these sites fare well compared to typical regional travel behavior. They have lower, and in Atlantic Steel's case significantly lower, per capita, per household and per employee VMT. In addition, both sites significantly exceed the regional average transit mode share.

However, Atlantic Steel and Perimeter/Sandy Springs each have significant congestion on local road networks. Therefore, speeds in their vicinity are slower than for the other sites. Importantly, speeds are slower not only for the traffic associated with the site but also for traffic passing the site. Small speed changes can have large effects if they affect a large volume of travel. NO_x is relatively insensitive to speed changes in the speed ranges relevant to this discussion. However, VOCs can be significantly affected by speed changes. Over the relevant range of speeds, VOC emissions per mile generally rise with decreasing speeds. Speed-based differences show up strongly in the VOC comparison between Cobb/Fulton, Perimeter/Sandy Springs and Atlantic Steel. However, in the case of Atlantic Steel, the reductions in VMT are sufficient to overcome the higher VOC emissions per mile, producing the least net emissions. Finally, it is important to recall that MOBILE 5 uses a standard emission adjustment for cold starts. The adjustment in this case undercounts emissions reductions from the fewer vehicle starts associated with Atlantic Steel and Perimeter/Sandy Springs.

The second site type is represented by Cobb/Fulton. This site has the least congested road network and bus transit access; it is on the edge of the region's center and brings a large number of jobs to a job-poor area. This last factor allows the site to capture more local travel as some current residents shift their destinations to closer opportunities. Despite this shift, it lacks the high accessibility to multiple services and destinations that characterize Atlantic Steel and Perimeter/Sandy Springs. It also lacks direct rail transit, so auto travel at this site is much higher than at Atlantic Steel or Perimeter/Sandy Springs. In fact, travel here is very similar to South Henry. Somewhat higher speeds at this site drive VOC emissions down, but do not reduce NO_x, which tracks VMT closely.

South Henry County is the final site type- regionally isolated site. The results here may appear somewhat counter-intuitive. Per capita and per household VMT are much lower than any of the other sites or the regional average. On the other hand, daily VMT per employee is much higher than at other sites, or the regional average. These characteristics are explained by the site's isolation. It is far from regional activity centers, urban or suburban. It has no transit. South Henry's road networks are relatively uncongested but being somewhat rural in character are also low in their total capacity. Less than 3% of the region's population, and 2% of the region's jobs are within a 45-minute drive during peak traffic hours.

Trips from this site are either very short or very long. As a result, the model designates roughly 90% of the site's trips as local. Hence per capita VMT, driving by people who live there, is very low. And, per-employee-VMT, driving by people who have to travel to get there, is very high. The net result is that the long trips still push the VMT up — over 50% higher than at Atlantic Steel. Speeds do not keep VOCs down as much as Cobb/Fulton because the more rural road network (design and capacity) can't accommodate the high speeds that Cobb/Fulton can. It is worth noting that at roughly 90%, South Henry's capture rate is striking when compared to the other sites: Cobb/Fulton under 15%, and Atlantic Steel and Perimeter/Sandy Springs under 10%.

4. CO emissions

Atlantic Steel achieves lower emissions through shorter trips and higher transit share. Traffic volumes and congestion remain at significant levels, raising the possibility of CO "hot spots." Unlike VOCs and NO_x, CO is pollutant of local, rather than regional, concern. As the name suggests, CO can concentrate in small areas.

The results of the CO analysis, summarized below by corridor, are based on increases in emissions *rates*, not on changes in aggregate emissions. However, the results suggest that project construction, and resulting traffic, will not produce any new local area exceedances of the CO standard.

10th and 14th Street corridors

The highest emissions rate of CO in the baseline ("no-build") scenario are found along 10th and 14th streets (approaching 20 grams/mile). As the dominant East-West corridors for the Midtown area, providing direct access to the downtown connector (Interstates 75 and 85) and the Midtown business district, these arterials are typically the most congested in the site area. The "build" results indicate that CO emissions rates would actually marginally improve in these corridors. Certain links would worsen in the peak period (AM), but this growth would generally occur on links without a high concentration of CO in the no-build alternative. For example, the greatest overall increase in rates of CO on 10th street was from 0.87 to 11.82 (1000% growth rate – build vs. no build). Despite the exceptionally high growth rate, the final rate of 11.82 g/m is low in comparison to emissions rates approaching 25 grams/mile elsewhere along 10th street in the no-build scenario.

Northside Drive

Northside Drive is North of the confluence of I75 and I85. It is a major north/south arterial about 0.5 miles west of the Atlantic Steel site, and provides direct access to Interstate 75/85. Northside Drive currently is typified by *moderate CO levels*. Results indicate a 30-60% growth in CO rates in the build case; however, the resulting overall CO emission rates are 10-14 grams/mile, still only a moderate CO emissions rate.

State Street, 16th Street

These corridors are lightly traveled in the baseline with low CO emissions rates in the baseline (less than 6 grams/mile). The CO emission rate increases moderately in the build scenario along the peak direction of State St. (31%), with a top emissions rate of 6.74 grams/mile in the peak in the build scenario. Along 16th street, however, growth rates approaching a thousand percent in the build scenario are found, with one link adjacent to the site increasing to 15 grams/mile. This is still a moderate CO emissions rate.

CO summary

Generally speaking, CO emissions rates along links in the most congested corridors—i.e.,10th and 14th Street—would moderately decrease in the build scenario, with the exception of certain links on 16th Street. Lightly traveled links in the baseline—i.e., State Street, Northside Drive—without a current CO problem would see CO emissions rates increase to moderate levels. It is unlikely that these increases would create a hot-spot problem. In sum, additional access provided by proposed construction appears to mitigate CO emissions rates on the existing worst links, while increasing CO emissions rates on underutilized links to moderate levels.

D. ADDITIONAL CO ANALYSES

While these preliminary results suggest that the proposed Atlantic Steel project will not produce new CO hotspots, they do not complete the necessary CO analysis. After predicting emissions, further CO hotspot analysis is needed to analyze local concentration levels, taking into account wind-driven dispersion and concentration.

1. The CALINE model

EPA is currently completing a full local-area CO analysis using a version of the CALINE model adapted by Dr. Randall Guensler and Dr. Michael Rodgers at the Georgia Institute of Technology. CALINE is a standard CO emissions analysis model. The Guensler/Rodgers version provides several features useful to rigorous examination of local CO impacts, including predicting the wind angle for worst-case wind concentration, and several graphical presentation features useful for helping audiences understand the likely impacts of the build scenario.

2. Expected direction of results

EPA does not expect that this more comprehensive analysis will predict any new CO hotspots. None of the emissions changes found in the preliminary analysis suggest the amount of emissions that would likely be necessary to produce new hotspots.

In addition to the more comprehensive analysis of the Jacoby's proposal, EPA is also using the Guensler/Rodgers CALINE model to evaluate whether the number and type of ramps connecting the 17th Street bridge and I-75/I-85 significantly affect local CO impacts. Again, although the ramp number and design will affect local traffic patterns, EPA does not expect the model to find that the changes produce changes in CO concentration significant enough to produce new CO hotspots under any scenario.

IV. SITE DESIGN PERFORMANCE

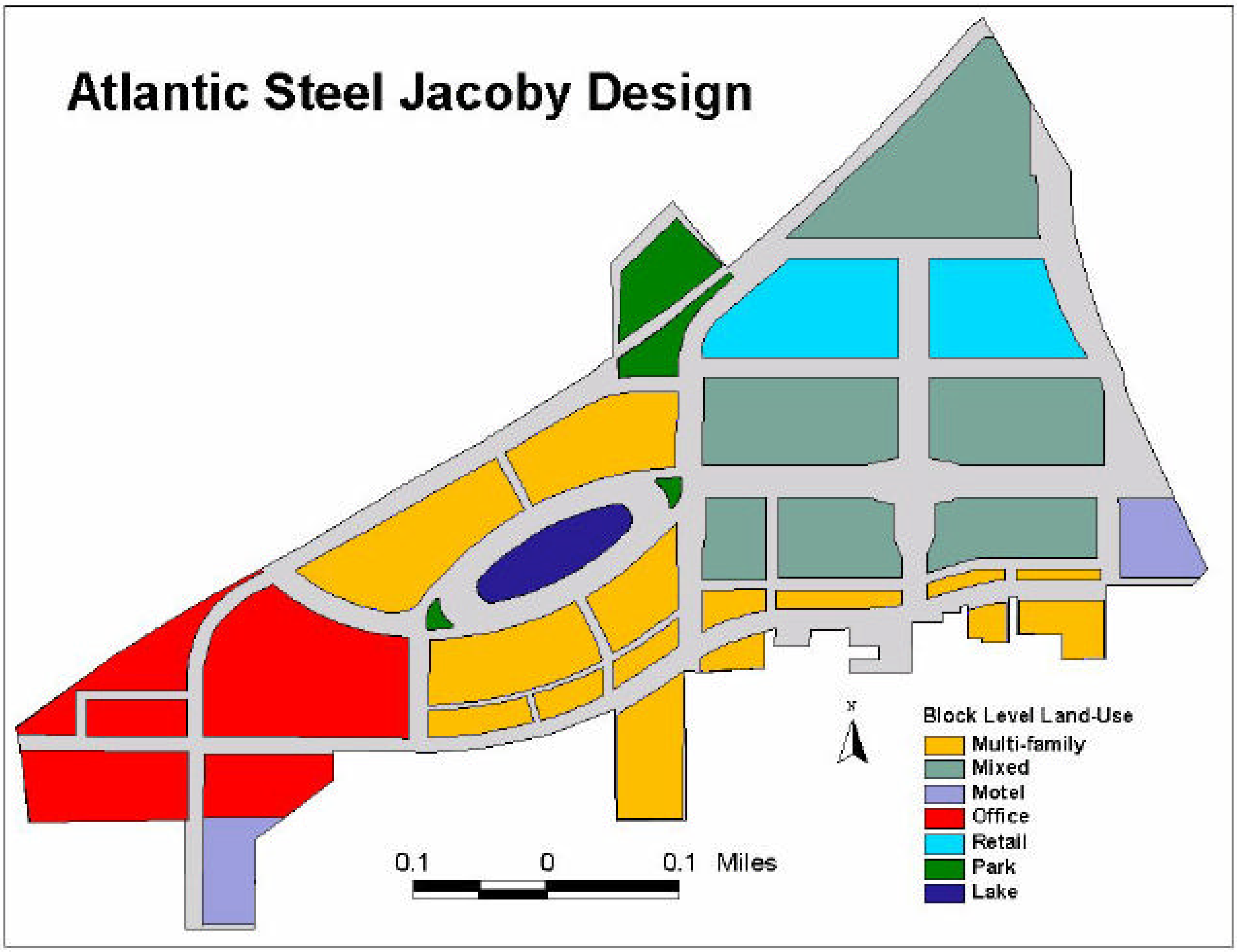
In addition to the site's *location* in the Atlanta region, site *design* is also an important factor in travel behavior. Thus, in addition to analyzing the performance of the site from a regional location perspective, EPA also analyzed the performance of the site design using INDEX®, a GIS-based model that measures land use and site design characteristics. Where the regional analysis examined whether the site's *location* produced performance improvements relative to alternatives, the site design analysis examines whether the *design* of the site produces improvements relative to alternatives.

A. WHAT ALTERNATIVES TO COMPARE?

Several comparisons were made. Jacoby Development Corp.'s proposed design was compared to each of the three greenfield alternatives. In addition, the site was compared to an alternate plan for the Atlantic Steel site. The alternate plan was commissioned by EPA explicitly to seek potential environmental improvements. In this way EPA is better able to answer two questions: 1) How does Jacoby's site design compare with the likely greenfield alternative? And, 2) how can the proposed plan's transportation and air quality performance be improved?

1. The developer's site plan

Jacoby submitted the following site design.

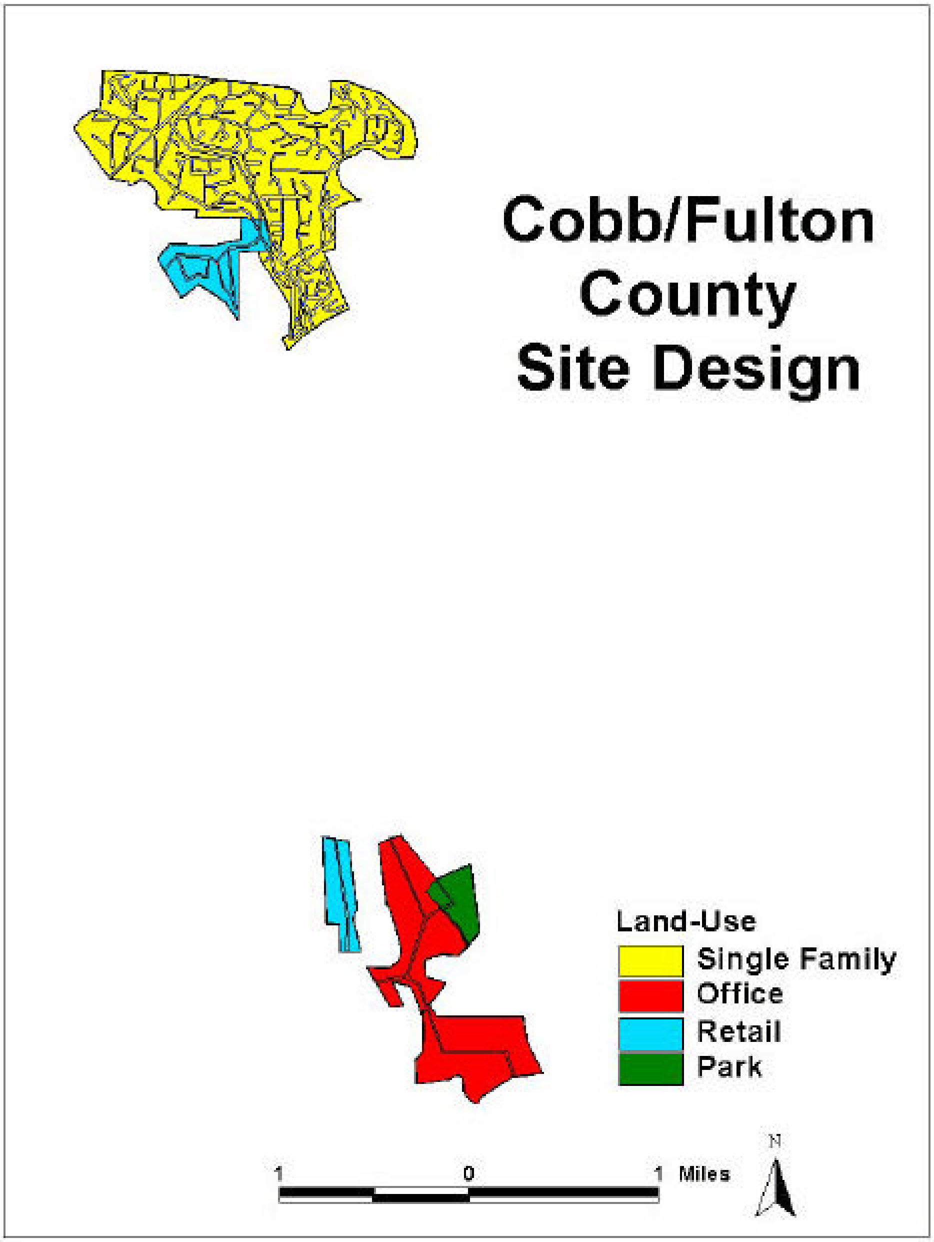


Map 3: Atlantic Steel site, Applicant's design

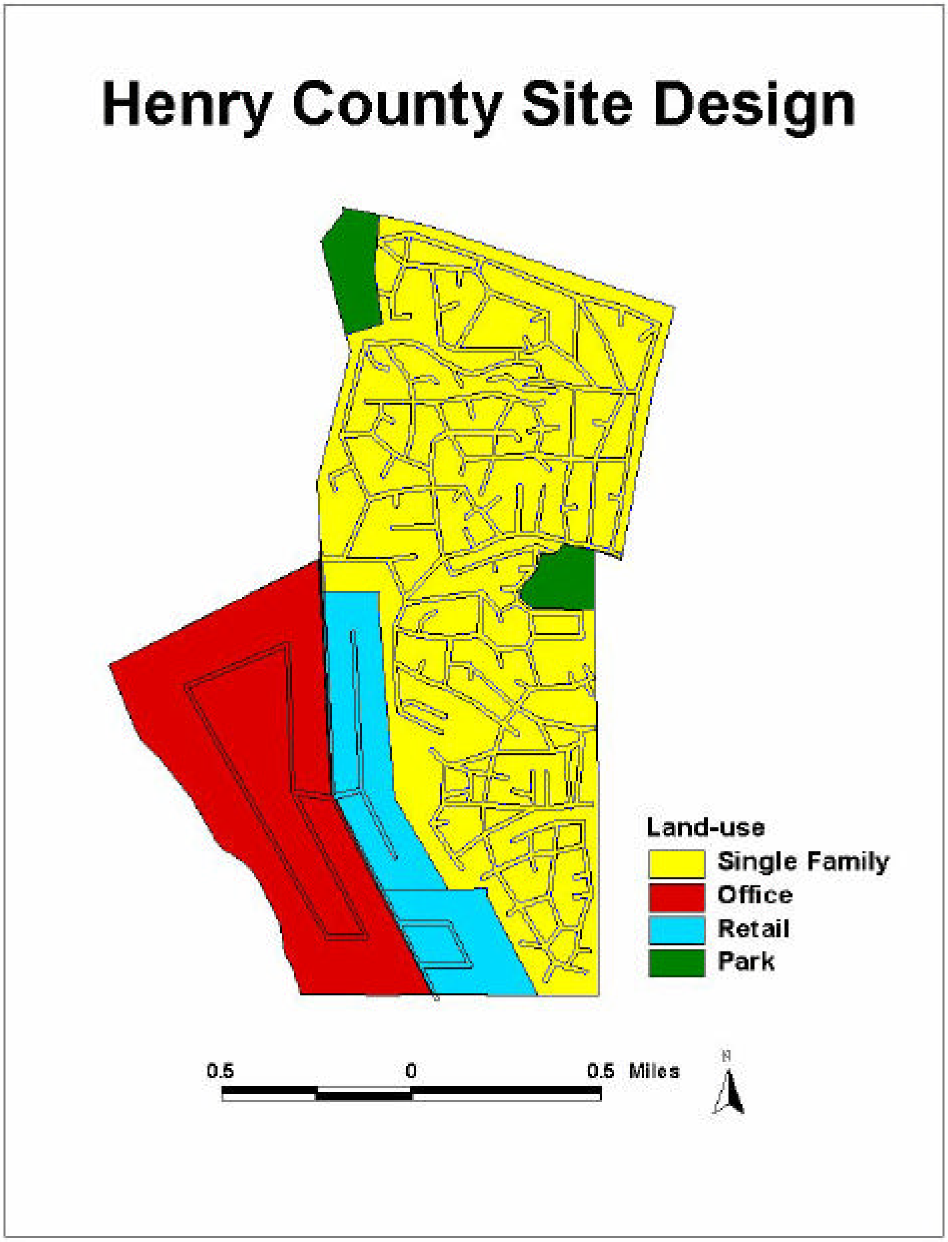
The design is for a moderate-density, mixed use development with hotel, retail, office, and residential uses. (See Figure 3, left-hand column.) Some areas of the site, and some buildings, have mixed uses. Uses are mixed primarily on the site's east side, near the 17th Street bridge, and nearest to the MARTA Arts Center station. On the west side, the applicant proposes a tech-focused office park and extended stay hotel with suburban style setbacks and greens. Residences, in some cases mixed with offices, are located in between the office park and the retail/hotel area. The street system is an adaptation of the site's existing grid system and includes some points of connection to neighborhood roads.

2. The greenfield site plans

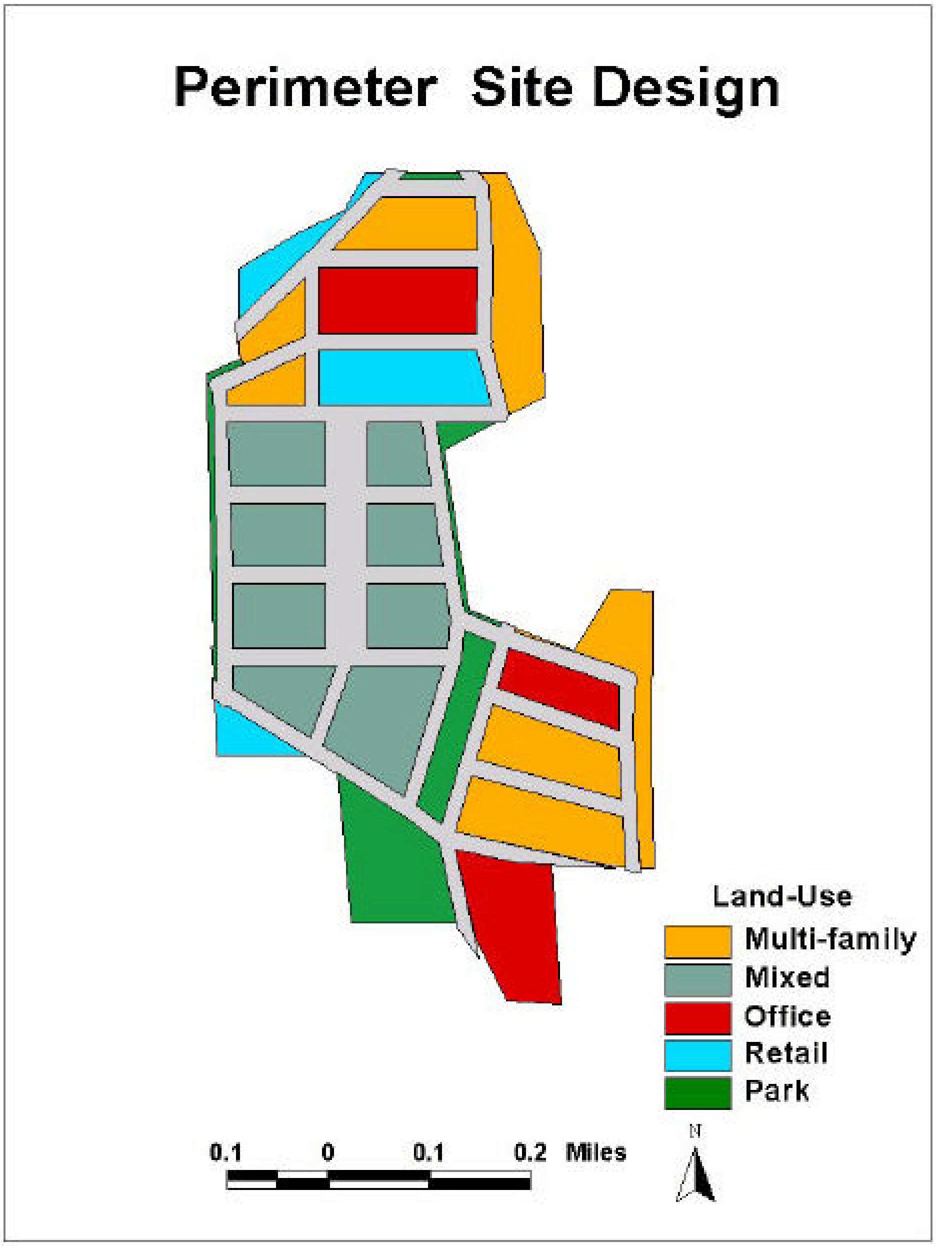
In order to allow analysis of the likely transportation and environmental performance of the greenfields, EPA (through its contractor Criterion Planners/Engineers, Inc.) prepared block-level site plans based on platting patterns established in the immediate vicinity of each greenfield site. The Cobb/Fulton and South Henry plans follow a low-density suburban design, locating as they do the applicant's proposed amount of development on sites almost ten times as large. The Perimeter/ Sandy Springs site has essentially the same density as the Atlantic Steel site. Its design also reflects that of its neighbors, which are characterized by large building setbacks and auto-orientation. The site plans are shown in Maps 4, 5, and 6.



Map 4: Cobb/Fulton site



Map 5: South Henry County site



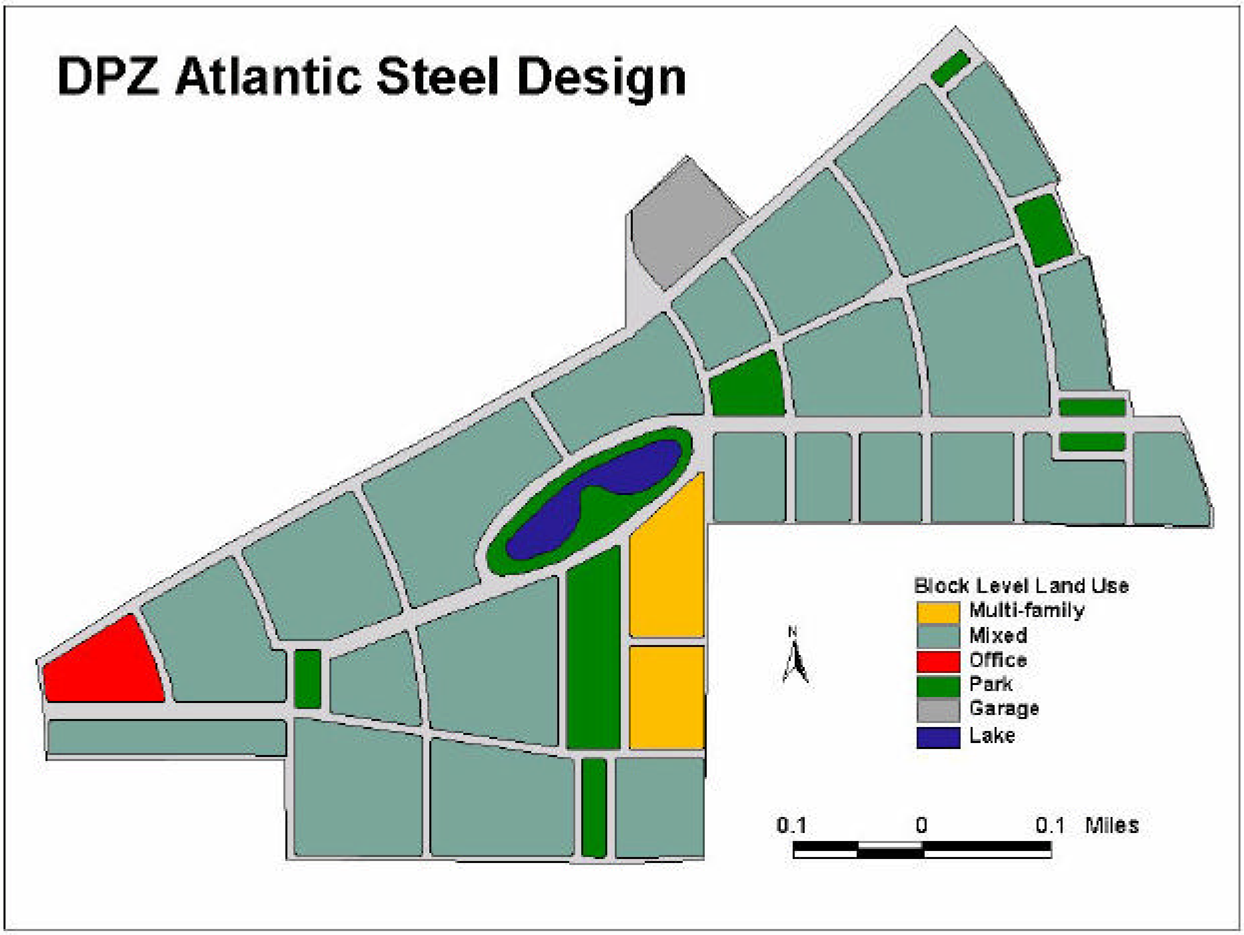
Map 6: Perimeter Center/Sandy Springs site

3. The DPZ alternative site plan

EPA hired one of the nation's leading town planning firms, Duany Plater-Zyberk and Company (DPZ), to identify, based on their expertise, areas where the Atlantic Steel site design could be made more conducive to pedestrian, bicycle and other non-motorized modes of transportation.

To accomplish this task DPZ, led by principal Andres Duany, held a three-day design charrette, in Atlanta, December 7-9, 1998.

Through the charrette DPZ received input from community residents, Jacoby Development and its consultants, local and state government, and others. Environmental, community, marketability and other factors were emphasized by different stakeholders. DPZ presented its recommendations and final design on the third day.



Map 7: Atlantic Steel site, DPZ alternative design

The DPZ design mixes uses at a fine level throughout the site. The neighborhood street grid is continued as much as possible through the site. The DPZ alternative plan also included a slightly larger land area than the original plan because there is reason to believe that the additional land will be co-developed.

4. Principal differences between site plans

The site design differences of greatest interest to EPA were those affecting travel behavior and subsequent emissions. Many urban land use and transportation planning issues that drive transportation behavior and thus affect environmental performance are captured by what have become known in the planning field as the three Ds: diversity, design, and density.[4] Improvements in each have been observed to produce reduced auto travel, an important contributor to reduced emissions.

“Diversity,” for example, means mixing land uses. Mixing uses has been observed to reduce auto trips by allowing trips to be made, chained, or combined without the use of the auto. For diversity of uses to be effective, however, the different uses must be within easy walking distances from each other. “Design” includes a range of choices that affect the physical and aesthetic experience of being in an area. For example, physically, how far are most people from transit stops? How direct is the route? Aesthetically, do sidewalks pass by parking lots, or are store and office-fronts continuous along a sidewalk? “Density” is a fairly straightforward measure, although it is worth noting that the arrangement of the density on the site is important. For instance, concentrating density around transit stops can increase ridership.

From these perspectives, the Jacoby-proposed design had both design merits and shortcomings. Compared to the Perimeter Center/Sandy Springs site, the Jacoby-proposed design is very similar to the suburban infill site-- with similar densities, use mixes, etc. The Jacoby design compares favorably with the Cobb/Fulton and South Henry greenfield sites. Versus these true greenfields the Jacoby-proposed design offers the following advantages:

- mix of uses at a scale relevant to non-auto forms of travel,
- proximity to high quality transit,
- and much higher density.

Though the Jacoby design improved upon the greenfield alternatives, opportunities to improve are still available. Opportunities to improve the travel and environmental performance in the Jacoby design are described below.

a. Some streets have high-speed geometries, and are auto-oriented (center line radii, lane widths, and curb radii) reducing the pedestrian-friendliness of the environment. Strategic reductions in travel speeds, reductions in building setbacks, and impediments to

[4] The phrase is Robert Cervero’s.

alternative transportation are opportunities to reduce auto trips and improve the environmental performance of the site.

b. The best pedestrian environments consist of well-defined spaces, continuous uses and a variety of streetscaping amenities. From this perspective, the site plan, particularly the west side, can be improved by better framing pedestrian areas and creating clear progressions of pedestrian-oriented uses—such as a clear line of pedestrian oriented retail along key pedestrian routes. The current retail is discontinuous in places and, in these places, does not promote a defined pedestrian route or set of routes. Other pedestrian-friendly improvements can also be made such as avoiding uses incompatible with pedestrian activity, such as surface parking lots along pedestrian routes. Increased attention to these important details of the site plan will enhance the attractiveness of pedestrian travel as a viable mode of transportation.

c. The west side of the site—the tech-focused office park, and its associated hotel—can be better integrated with other uses. The proposed configuration leaves these offices removed from the majority of on-site retail, restaurants, and residences. Studies have shown that pedestrian mode share substantially increases when trip lengths are a quarter mile or less. Increasing the west side offices' proximity to on-site destinations can increase pedestrian mode share.

d. Parking has a major effect on travel behavior. Recent work cited by DPZ suggests that co-locating hotels and offices allows for shared parking and reductions in needed capacity as high as 25%. By locating the two hotels next to one and other this opportunity is precluded. Preserving these and other opportunities for innovative parking arrangements makes sense for future traffic management.

The DPZ alternative site plan attempted to capitalize upon as many of these opportunities as possible. The DPZ alternative plan retains the fundamental features of the applicant's plan, with the following changes. The DPZ alternative design:

- Increases the amount of mixed use on the west side of the property while still keeping significant amounts of office space there.
- Improves land use mix on the site in general.
- Improves street frontages and creates clear pedestrian trajectories.
- Controls auto speeds for better pedestrian environment.
- Increases densities near transit stops.
- Continues the street grid of the existing, surrounding neighborhood into the site.

- Moves land uses to enable shared parking.

DPZ's alternative site plan and recommendations were well received by most of the participants in the charrette. Jacoby has indicated its intent to incorporate many concepts from the Charette into its final site design. Once a Final Project Agreement between EPA and Jacoby has been signed, the final design will be analyzed to determine its environmental performance.

B. METHODOLOGIES FOR COMPARING THE ALTERNATIVES

As with the locational analysis, EPA needed to quantitatively analyze the performance differences between site plans. To judge the effect of site design, EPA used a two-step analysis. First, the GIS-based model INDEX® was used (by EPA contractor Criterion Engineers/Planners, Inc.) to quantify the differences among the designs.

INDEX® evaluates a detailed GIS map of each development project to produce information about the spatial characteristics of a site. In doing so, it allows a quantitative comparison of design differences. Measures of site design include, for example, the number of residential dwellings within ¼ mile of a transit route.

Many of these measures suggest the extent to which non-auto transportation choices are available. They also provide information on a few of the parameters that are often included in the elusive concept of a "livable" community, such as how easy it is to walk around that community, and whether there are destinations to which to walk. The quality of life in each hypothetical community is not a central issue examined by this study. But where the model makes that information available, EPA makes that information available to the stakeholders.

C. RESULTS

Element	***Indicator***	***Definition***	***Sites***				
			Cobb/ Fulton	***South Henry***	***Sandy Springs***	***Applicant***	***DPZ***
Population	Resident population	Total number of residents	6,000	6,000	6,000	6,000	6,000
	Household population	Total number of dwelling units	2,400	2,400	2,400	2,400	2,400
	Employment population	Total number of jobs	17,483	17,483	17,483	17,483	17,483
Land use	Use mix	Dissimilarity between predominant uses in one-acre grid cells.	.01	.04	.29	0.29	0.39
	Activity diversity	Percent of blocks with mixed uses.	18%	64%	15%	18%	64%
	Block texture	Ratio of one acre per block versus actual acres per block.	.06	.05	.24	0.29	0.21
Housing	Average residential density	Dwelling units per net acre of land designated for residential uses.	4.1	4.2	72	81	83
	On-site transit proximity[5]	Average travel distance from all dwellings to closest on-site transit stop.	n/a (no on-site transit)	n/a	N/a	368 ft.	377 ft.
	MARTA rail transit proximity	Average travel distance from all dwellings to closest MARTA rail stop.	7.7 mi.	35 mi.	1.3 mi.	4,715 ft.	5,075 ft.

[5] On-site transit for Atlantic Steel assumes a mix of trolley and bus.

Employment	Nonresidential building size – total	Total nonresidential building area in million square feet.	7	7	7	7	7
	Nonresidential building size – average	Average size of nonresidential buildings in square feet.	259,000	93,000	n/a	n/a	n/a
	Jobs/housing balance	Ratio of jobs to dwelling units.	7.3	7.3	7.3	7.3	7.3
	Employment density	Employees per net acre of land designated for employment uses.	41	39	278	286	221
	Nonresidential building density	Average nonresidential building floor area ratio (per block).	0.4	0.4	2.5	2.6	2.0
	On-site transit proximity	Average travel distance from all businesses to closest on-site transit stop	n/a	n/a	n/a	588 ft.	778 ft.
	MARTA rail transit proximity	Average travel distance from all businesses to closest MARTA rail stop.	8.0 mi.	36 mi.	1.4 mi.	4,366 ft.	5,308
Parks & Recreation	Park space availability	On-site acres of park per 1,000 residents (includes lake and other open space).	n/a	n/a	n/a	3.6	2.2
	Recreation proximity	Average travel distance from all dwellings to closest park (includes lake and other open space).	3 mi.	4,193 ft.	1,501 ft.	830 ft.	284 ft.

Environment	Open space loss (assuming that the entirety of each site is currently open space—a good assumption for the greenfields, less useful for Atlantic Steel and Sandy Sprins)	Development site area	1,255 acres	1,218 acres	143 acres	138 acres	138 acres
	Imperviousness	Percent of total land area covered by impervious surfaces	53%	53%	71%	78%	55%
	Runoff-production capacity	Total land area covered by impervious surfaces.	665 acres	645 acres	101 acres	107 acres	76 acres
Transportation and Travel	Internal street connectivity	Ratio of street intersections versus intersections and cul-de-sacs.	.76	.6	1.0	0.93	1.0
	External street connectivity	Average distance between ingress/ egress streets on site boundary in ft.	6,404	8,221	1,701	1,181	725
	Pedestrian route directness	Average ratio of shortest walking distance from outlying nodes in 1/8, 1/4 and ½ mile increments to central nodes, to straight-line distance between the same points.	2.6	4.3	1.5	1.4	1.6
	Effective walking area	Ratio of land area reachable in 1/4 mile walk from designated nodes versus land area of 1/4 mile radius walking shed.	0.6	0.3	0.8	0.8	0.8
	On-site transit-oriented residential density	Average number of dwellings per net acre within 1/4 mile walk of on-site transit stops.	n/a	n/a	n/a	52	83

	On-site transit-oriented employment density	Average number of employees per net acre within 1/4 mile walk of on-site transit stops.	n/a	n/a	n/a	286	221
	Off-site transit-oriented residential density	Average number of dwellings per net acre within a 1/4 mile walk of an off-site MARTA bus stop.	n/a	n/a	n/a	8	63
	Off-site transit-oriented employment density	Average number of employees per net acre within a 1/4 mile walk of an off-site MARTA bus stop.	n/a	n/a	n/a	157	260

D. DISCUSSION OF RESULTS

1. Design goals

In general, the INDEX® evaluation demonstrates that the improvements sought by DPZ's recommendations—improved walkability and transit orientation—were achieved in the DPZ alternative plan. The land use mix improves, as measured by the indicators "Use mix" and "Activity diversity." This mix provides more walk-accessible destinations, through better mixing of office and retail (more lunchtime walking destinations) and of office and housing (more walk commute trips possible). The DPZ alternative plan improves the pedestrian environment for walk trips in ways both quantified (see "Internal street connectivity," and "External street connectivity" in table above) and unquantified (building frontage along sidewalks significantly increases; no surface parking along sidewalks). Pedestrian access to transit is also generally improved (see "On-site transit-oriented residential density," "Off-site transit-oriented residential density," "Off-site transit-oriented employment density" in table above). The DPZ alternative plan locates dense uses closer to transit stops not only in the site, but also takes into account the location of stops off-site. This is in keeping with DPZ's effort to improve upon the existing plan by providing better integration between the on- and off-site transportation networks. Extension of the existing street grid into and through the site is another example, which also helps improve connectivity numbers.

Some of the DPZ changes produce measures of site design which suggest decreased pedestrian and transit friendliness. For example, the average travel distance from all dwellings to both a MARTA rail stop and the on-site transit stop are slightly higher, as is the average distance of businesses. This is a result of two changes, the first of which is the improved land use mix. In particular, the western portion of the site, the furthest from the MARTA station, was redesigned from exclusively offices in the applicant's design, to mixed use. Second, DPZ changed the proposed transit route. This moves some residents further from the MARTA station. In exchange a diversity of uses is maintained across the entire site. On-site/site-adjacent transit still provides excellent transit access (see table above). Finally, some of the DPZ changes clearly suggest increased pedestrian and transit friendliness (for instance, on-site transit-oriented residential density).

Taken as a whole, DPZ produces a more walkable and more transit accessible plan. Literature on the impacts of site design indicates these factors are determinants of travel behavior. Based on these findings, DPZ's design would likely produce fewer auto trips. The plan suggests that it is possible to design the proposed Atlantic Steel development in such a way as to improve its environmental performance. Jacoby Development and EPA are exploring the feasibility of such improvements.

2. Multi-media impacts

In addition to air pollutant emissions, and the transportation behavior that produces them, EPA is concerned with performance across other environmental media. The result table (above) evaluates the alternatives on several environmental performance measures relevant to Atlanta.

a. Open space

The sites at Perimeter/Sandy Springs and Atlantic Steel have substantially smaller areas than the sites at Cobb/Fulton and South Henry. Especially compared to the latter two cases, development at Atlantic Steel would avoid consuming substantial amounts of regional open space.

b. Stormwater runoff

The sites at Perimeter/Sandy Springs and Atlantic Steel would have substantially smaller impervious surface areas than the sites at Cobb/Fulton and South Henry. Although both Atlantic Steel designs would outperform the others, the DPZ alternative design, with less impervious surface, would outperform the applicant's design. Assuming that all sites receive the same amount of rain, the DPZ alternative Atlantic Steel design would produce less stormwater runoff than the other site/design options.

c. Brownfield redevelopment

Not reflected in the table above, but an important consideration, is that both Atlantic Steel designs would result in the clean up of a brownfield. EPA has not analyzed the specific benefits of brownfield cleanup in this location. However, the federal government, and numerous states and cities have made brownfield cleanup a priority because such cleanups and redevelopments bring economic, health, and aesthetic benefits.

d. Noise/traffic

EPA is not performing a specific noise analysis for the Atlantic Steel site's neighborhood, Home Park. The neighborhood has endorsed redevelopment of the Atlantic Steel site, for a combination of reasons. Although some roads in the vicinity will see increased traffic, others will see decreases. The final traffic and emissions analysis that EPA is performing will also examine traffic counts.

E. ADDITIONAL SITE ANALYSIS

While the DPZ alternative site design produces a transportation/land use system that outperforms Jacoby's plan on the basis of the measures listed above, EPA still needs to quantify that performance with respect to its impact on VMT. Thus, the second step of the analysis will rely on the literature to estimate VMT changes associated with each site design. For instance, data from around the country shows that transit ridership varies with the proximity of residential development to the transit station.

Applying this empirical response to the site design, EPA will calculate adjustments to the development's VMT.[6] To EPA's knowledge, no such comprehensive application of empirical responses to site- and micro-scale design variables has yet been done in the United States. Travel and emissions adjustments will be applied to the two Atlantic Steel site plans and to one greenfield site.

F. EXPECTED RESULTS

With a few exceptions, the DPZ alternative site plan improves the design parameters that have been observed, in numerous empirical studies, to decrease auto trips and increase non-auto trips. There is reason to expect that the quantitative VMT comparison with Jacoby's plan will find the DPZ alternative plan provides some level of superior environmental performance. Studies of the effect of site design have observed meaningful decreases in auto trip shares.

Though the DPZ alternative provides the best performance in the parameters measured by INDEX®, compared with the greenfield, both the original design and the DPZ alternative plan greatly improve on design factors which reduce VMT. It is reasonable to expect that the difference resulting from these site designs will be significant.

V. CONCLUSION

Analyses of the proposed Atlantic Steel development and its alternative locations and designs tell a consistent story. At the regional level, the results demonstrate that absorbing a portion of Atlanta's growth through development at the Atlantic Steel site provides lower vehicle miles of travel and lower NO_x and VOC emissions in comparison to sites that represent other likely development locations. Emissions reductions result from Atlantic Steel's regionally central location and transit access. Combined, these factors reduce total VMT associated with the site, and reduce the number of auto trips associated with the site.

At the site level, preliminary analysis indicates that, despite increases in traffic, CO hot spots do not occur. Areas where CO increases tend to be those that currently enjoy a low CO concentration. Some areas that currently have higher concentrations of CO actually register slight declines in CO.

With respect to the site design, the analysis is clear. Atlantic Steel's design as proposed by Jacoby Development Corp. is better than that which would likely occupy the Cobb/Fulton site or the Henry site. It also offers better transit access than the Perimeter Center/Sandy Springs location. The DPZ

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[6] EPA will model the performance of the site using performance factors from an integrated transportation and land use model now under development for EPA. This model, a significantly enhanced version of INDEX® known as Smart Growth Index, will model travel behavior on the basis of empirically observed travel behavior responses to individual land use and design variables.

alternative design performs better than the one proposed by Jacoby Development Corp. in three respects. First, the DPZ alternative design provides increased connectivity on and off site. Second, it improves the mix of uses on site by integrating them at a finer scale, principally on the west side of the site. Finally, the pedestrian environment is improved through street design, more direct routing and slower traffic speeds. Each of these improvements contributes to create an atmosphere conducive to non-SOV travel, both for residents of the site and site visitors. This environment is crucial to achieving the environmental benefits made possible by the site's location and transit accessibility.