procedures, monitor tests, interpret monitoring data, and design the restrictions.

- EVALUATION

Whether threshold noise levels are based on F.A.R. Part 36 or measured results, care must be taken to ensure that the restriction does not fall with undue harshness on any particular operator. The feasibility of complying with the restriction, given existing technologies and equipment, must also be considered. Such a restriction would be subject to legal challenges and rejection by FAA as unjust discrimination and potentially burdensome to interstate commerce.

- CONCLUSION

Restrictions based on noise levels could be viewed as discriminatory and, therefore, be subject to litigation and possible rejection by the FAA. In addition, the requirements of a costly F.A.R. Part 161 Study would have to be met before any restriction on Stage 2 business jets under 75,000 pounds or Stage 3 aircraft could be implemented. This activity will not merit further discussion.

Touch-and-Go Restrictions

Restrictions on touch-and-go or multiple approach operations can be effective in reducing noise when those operations are extremely noisy, unusually frequent, or occur at very noise-sensitive times of the day. At many airports, touch-and-go operations are associated with primary pilot training, although this type of operation is also done by licensed pilots practicing approaches.

- EVALUATION

Touch-and-go and multiple approaches are frequently performed at Georgetown Municipal Airport. In 2003, there were 59,300 local general aviation operations (generally involving multiple approaches or touch-and-go operations). The touch-and-go operations were done mainly by light, single-engine aircraft.

A prohibition on touch-and-go operations would seriously reduce the business and revenues generated at the airport. Such a prohibition might have legal ramifications as it could conflict with the terms of local fixed base operator leases.

- CONCLUSION

Multiple approaches and touch-and-go's are a necessary aspect of maintaining pilot proficiency. Several flight schools located at Georgetown need to perform such operations as part of pilot training programs. Restrictions on training operations would seriously impact the viability of these businesses. In addition, these operations are primarily performed during daytime hours when their activity is less likely to be an excessive burden to surrounding land uses. Therefore, restrictions on touch-and-go activity will not merit further discussion.

Engine Run-up Restrictions

Engine run-ups are a necessary and critical part of aircraft operation and maintenance. Run-ups are required for various aircraft maintenance operations. Engine run-ups are often more annoying than aircraft overflight noise because they are more unpredictable, have a more sudden onset rate, and usually last longer. In addition, because run-ups occur on the ground, they tend to be more sensitive than overflights to atmospheric effects. Temperature inversions, for example, can cause noise on the ground to travel further. For all these reasons, run-up noise can be more annoying than a cursory analysis of A-weighted noise levels might indicate.

Engine maintenance run-ups may be restricted by airport operators. These restrictions, when they apply to run-ups as a separate function from the takeoff and landing of the aircraft, do not appear to need special FAA review or approval under F.A.R. Part 161. (See *Airport Noise Report*, Vol. 6, No. 18, September 26, 1994, p. 142.) They are, nevertheless, subject to other legal and constitutional limitations on unjust discrimination, undue interference with interstate commerce, or conflict with FAA grant assurances. As previously discussed, noise due to aircraft maintenance run-up operations could be mitigated through the installation of a run-up enclosure. If constructed, it will be essential to establish policies for the use of that facility.

- EVALUATION

Georgetown Municipal Airport currently requests that aircraft maintenance run-ups be performed as near the center of the airfield as possible and kept to a limited duration. As previously mentioned, depending on wind direction, run-ups are performed at two locations on the airfield. The first, and most commonly used, location is on a connecting taxiway between Taxiway C and Runway 18-36, located on the southern portion of the airfield. The second location is on Taxiway B, adjacent to the airport's windsock. Run-up operations can last between 30 seconds and 30 minutes depending on the nature of the aircraft repair.

- CONCLUSION

Aircraft operational and maintenance run-ups are a necessary part of operations at Georgetown Municipal Airport. The airport may be able to establish policies encouraging run-up operations to be conducted at certain times of the day. The implementation of restrictions that would significantly curtail aircraft run-ups would hinder airport operators, safety, and would likely facilitate litigation. The additional mitigation of run-up noise would best be addressed through the utilization of a run-up enclosure such as a "hush-house" or run-up pen.

SELECTION OF MEASURES FOR DETAILED EVALUATION

Preliminary screening of the complete list of noise abatement techniques indicated that some measures may be potentially effective in the Georgetown area. These are evaluated in detail in this section.

EVALUATION CRITERION

Four operational alternatives have been selected for detailed analysis in addition to the possible effects of a run-up enclosure. The noise analysis for each alternative was based on the 2008 baseline analysis presented in Chapter Four, "Aviation Noise Impacts." The 2008 baseline was chosen to offer a common base of comparison for all alternatives. This time frame allows time for FAA review and approval of the final Noise Compatibility Program and any environmental assessments which may be required prior to implementation of the procedures. The alternatives are evaluated using the following criterion.

Noise Reduction Effects. The purpose of this evaluation is to reduce aircraft noise on people. A reduction in noise impacts, if any, over noise-sensitive areas are assessed.

Operational Issues. The effects of the alternative on the operation of aircraft, the airport, and local airspace are considered. Potential airspace conflicts and air traffic control (ATC) constraints are discussed, and the means by which they could be resolved are evaluated. Potential impacts on operating safety are also addressed. FAA regulations and procedures will not permit aircraft operation and pilot workload to be handled other than in a safe manner, but within this limitation, differences in safety margins occur. A significant reduction in safety margins will render an abatement procedure unacceptable.

Air Service Factors. These factors relate to a decline in the quality of air transportation service which would be expected from adoption of an abatement measure. Declines could possibly result from lowered capacity or operational requirements.

Costs. Both the cost of operating aircraft to comply with the noise abatement measure and the cost of construction or operation of noise abatement facilities are considered. Estimated capital costs of implementing the noise abatement alternative, where relevant, are also presented.

Environmental Issues. Environmental factors related to noise are of primary concern in an F.A.R. Part 150 Update analysis. Procedures that involve a change in air traffic control procedures or increased noise over residential areas may require a separate environmental assessment.

Implementation Factors. The agency responsible for implementing the noise abatement procedure is identified. Any difficulties in implementing the procedure are discussed. This is based on the extent to which it departs from accepted standard operating procedures; the need for changes in FAA procedures, regulations, or criteria; the need for changes in airport adminis-

trative procedures; and the likelihood of community acceptance.

Upon completion of a review of each measure based on the above criteria, an assessment of the feasibility of each measure and the strategies required for its implementation are presented. At the end of the section, a summary comparison of the noise impacts of each alternative is presented. Recommendations as to alternatives which deserve additional consideration are presented.

ALTERNATIVE 1 - EVALUATE RUNWAY 11 NIGHTTIME PREFERENTIAL RUNWAY USE FOR NOISE ABATEMENT

Goals

This alternative seeks to test the effectiveness of utilizing Runway 11 for propeller-powered aircraft under 12,500 pounds during nighttime hours (10:00 p.m. to 7:00 a.m.). The goal of this procedure would be to take advantage of the existing noise compatible corridor off the departure end of Runway 11. By removing some nighttime departures from Runways 18, 36, and 29, noise impacts and aircraft overflights could be reduced around the airport.

Procedure

Approximately 10 percent of the total annual operations at Georgetown Municipal Airport occur during the nighttime hours (10:00 p.m. to 7:00 a.m.). To test the nighttime preferential Runway 11 use program, a 50 percent compliance rate was assumed for nighttime operations by aircraft less than 12,500 pounds. For noise modeling purposes, the 2008 baseline input was modified to reflect the use of the flight procedure described above.

Noise Effects

The noise contours presented in **Exhibit 5E** illustrate the effects of this procedure. South and north of the airport, all noise exposure contour levels experience a slight reduction in size relative to the 2008 baseline contours.

No substantial change is seen in the noise exposure contours above 65 DNL. **Table 5C** presents the population impacts for this alternative. This alternative impacts a total of six fewer people than the baseline condition. This reduction is primarily attributed to a shifting of the 65 DNL noise contour over a noise compatible corridor southeast of the airport.

TABLE 5C
Population Impacted by Noise
ALTERNATIVE 1 - EVALUATE RUNWAY 11 NIGHTTIME PREFERENTIAL RUNWAY USE FOR NOISE ABATEMENT

DNL Range	2008 Baseline	Alternative 1	Net Change
Existing Population			
65-70	73	70	-3
70-75	6	3	-3
75+	0	0	0
Subtotal	79	73	-6
Potential Population[1]			
65-70	14	26	+12
70-75	0	0	0
75+	0	0	0
Subtotal	14	26	+12
Total	93	99	+6
LWP	37	38	+1

Notes:

1. Based on additional potential new dwelling units in 2008 reflecting current land use plans and zoning.

* LWP – level-weighted population – is an estimate of the number of people actually annoyed by aircraft noise. It is computed by multiplying the population in each DNL range by the appropriate LWP response factor: 65-70 DNL = 0.376; 70-75DNL = 0.644; and 75+ DNL = 1.000. See the **Technical Information Paper,** ***Measuring the Impact of Noise on People,*** at the back of the *Noise Exposure Maps* document.

A breakdown of the increase or decrease in population from the 2008 baseline and Alternative 1 noise contours is presented in **Table 5D**. Alternative 1 reduces noise to six existing individuals above the 65 DNL contour range.

Given the potential for future development, the implementation of Alternative 1 would impact a total of 12 additional individuals than the 2008 baseline operations. This increase is only relevant if noise-sensitive development is allowed to be constructed southeast of the extended centerline of Runway 11.

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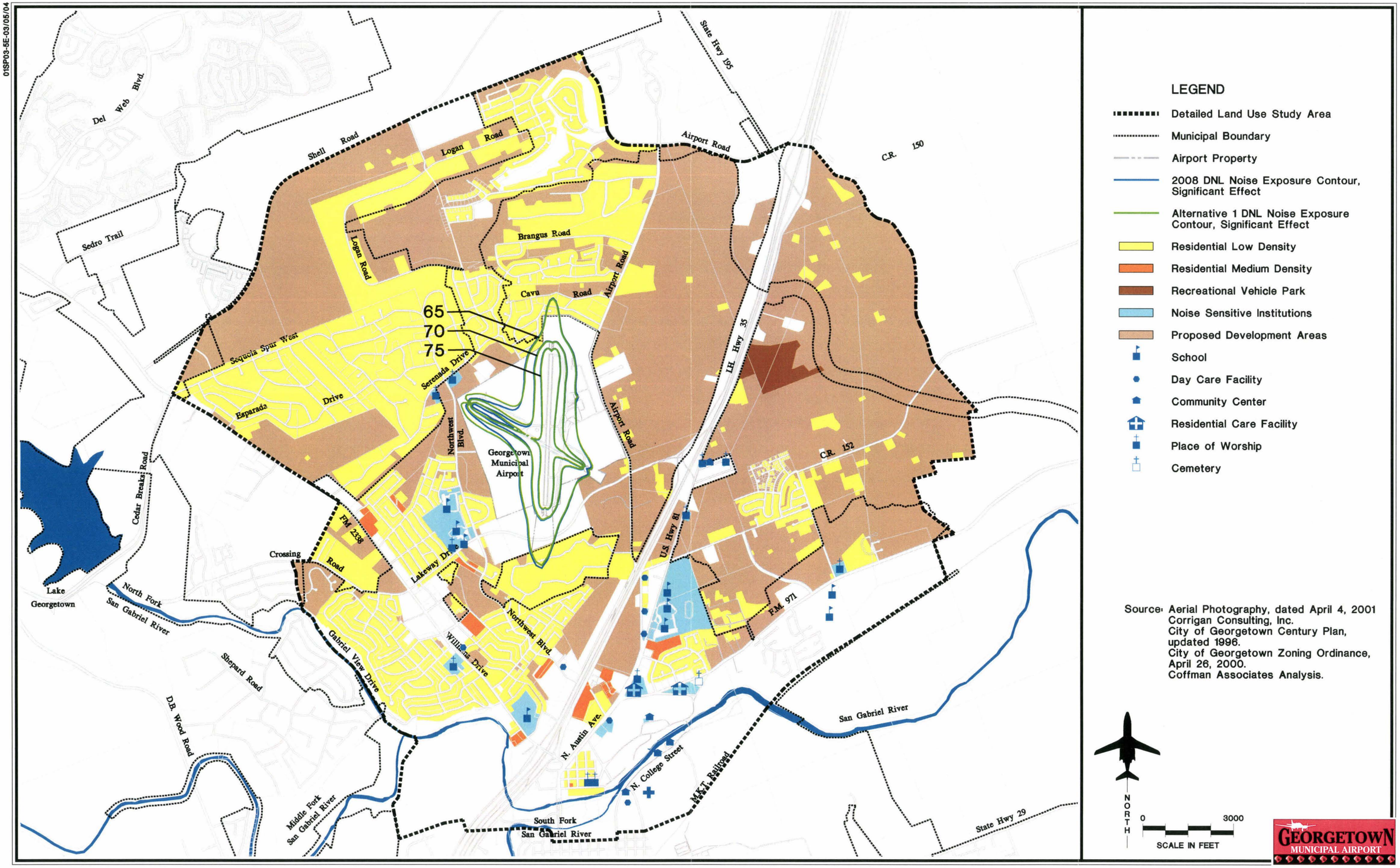

Exhibit 5E
NIGHTTIME PREFERENTIAL RUNWAY USE

TABLE 5D Population Increase or Decrease with Alternative 1				
2008 vs. Alt. 1	**65-70**	**70-75**	**75+**	**Net Impact**
Existing Land Use	-3	-3	0	-6
Future Potential Land Use	+12	0	0	+12
Totals	+9	-3	0	+6

Operational Issues

Pilots have the ultimate decision of which runway to use when departing an airport. At times, pilots may choose Runway 18 due to its greater length and close proximity to aircraft parking areas. The decision to use Runway 11 for nighttime departures may cause additional taxi times. Pilots may also incur some delays while awaiting aircraft landing or departing on Runway 18. No other operational issues are associated with this alternative.

Air Service Factors

Some delays are anticipated due to increased taxi distances and the use of a crossing runway configuration.

Costs

Aircraft operators would likely experience an increase in taxi time. In addition, this procedure would expose future potential population to increased noise above the 65 DNL range southeast of the airport. Therefore, an environmental review may have to be prepared.

Environmental Issues

Since this alternative exposes future potential residential areas to new and/or increased levels of aircraft noise above 65 DNL, a preliminary environmental review may be required prior to implementation. Based on the results of the preliminary environmental review, the FAA will determine the level of environmental analysis needed pursuant to the *National Environmental Policy Act of 1969* and its implementing regulations.

Implementation

This procedure would primarily be implemented by the airport proprietor. This could be accomplished through informational brochures, use of the Airport Facility Directory, and/or a Notice to Airmen (NOTAM).

Implementation of noise abatement measures are subject to additional operational, feasibility, and environmental review by the FAA.

Conclusion

While this alternative places a number of potential future residents above the 65 DNL noise exposure contour, the number of existing individuals is reduced. Since the location of the potential future population is based on where future noise-sensitive development is constructed, land use planning initiatives will ultimately decide the number of individuals impacted by aircraft noise. Due to the reduction in the number of existing individuals exposed to aircraft noise above 65 DNL, the use of this procedure for noise abatement deserves further consideration.

ALTERNATIVE 2 - ANALYZE RUNWAY 11 NOISE ABATEMENT DEPARTURE TURNS FOR EFFECTIVENESS

Goals

This alternative analyzes the potential noise abatement benefits of utilizing Interstate Highway 35 as a viable noise compatible corridor for VFR aircraft departing on Runway 11. By keeping aircraft along this corridor, the number of aircraft overflights of noise-sensitive areas can be reduced. As a means to keep aircraft away from noise-sensitive land uses, aircraft should continue over Interstate Highway 35 until reaching a position beyond concentrated noise-sensitive development. Once aircraft are clear of this development, they would be free to fly on-course.

Procedure

Aircraft departing Runway 11 under VFR would fly the runway heading until reaching Interstate Highway 35. Aircraft with southern or western destinations would turn south, to follow the highway until reaching a position beyond concentrations of noise-sensitive development, before turning on-course. Aircraft with northern or eastern destinations would turn to follow the Interstate to the north. Once reaching a position over the intersection of Interstate 35 and State Highway 195, aircraft could proceed north or turn east on-course. The use of this procedure would be reserved to propeller-driven aircraft under 12,500 pounds due to the strength and weight limitations of Runway 11.

For noise modeling purposes, the 2008 baseline input was modified to reflect use of the flight procedure described above.

Noise Effects

The noise contours presented in **Exhibit 5F** illustrate the effects of this procedure. The shape of the alternative noise contours is nearly identical to those of the 2008 baseline contours. The primary benefit of the use of this procedure is a reduction in the number of direct overflights of noise-sensitive areas east of the airport. In addition, use of this procedure reduces the number of aircraft overflights of noise-sensitive areas both north and south of the airport as aircraft routinely turn on-course immediately after departure.

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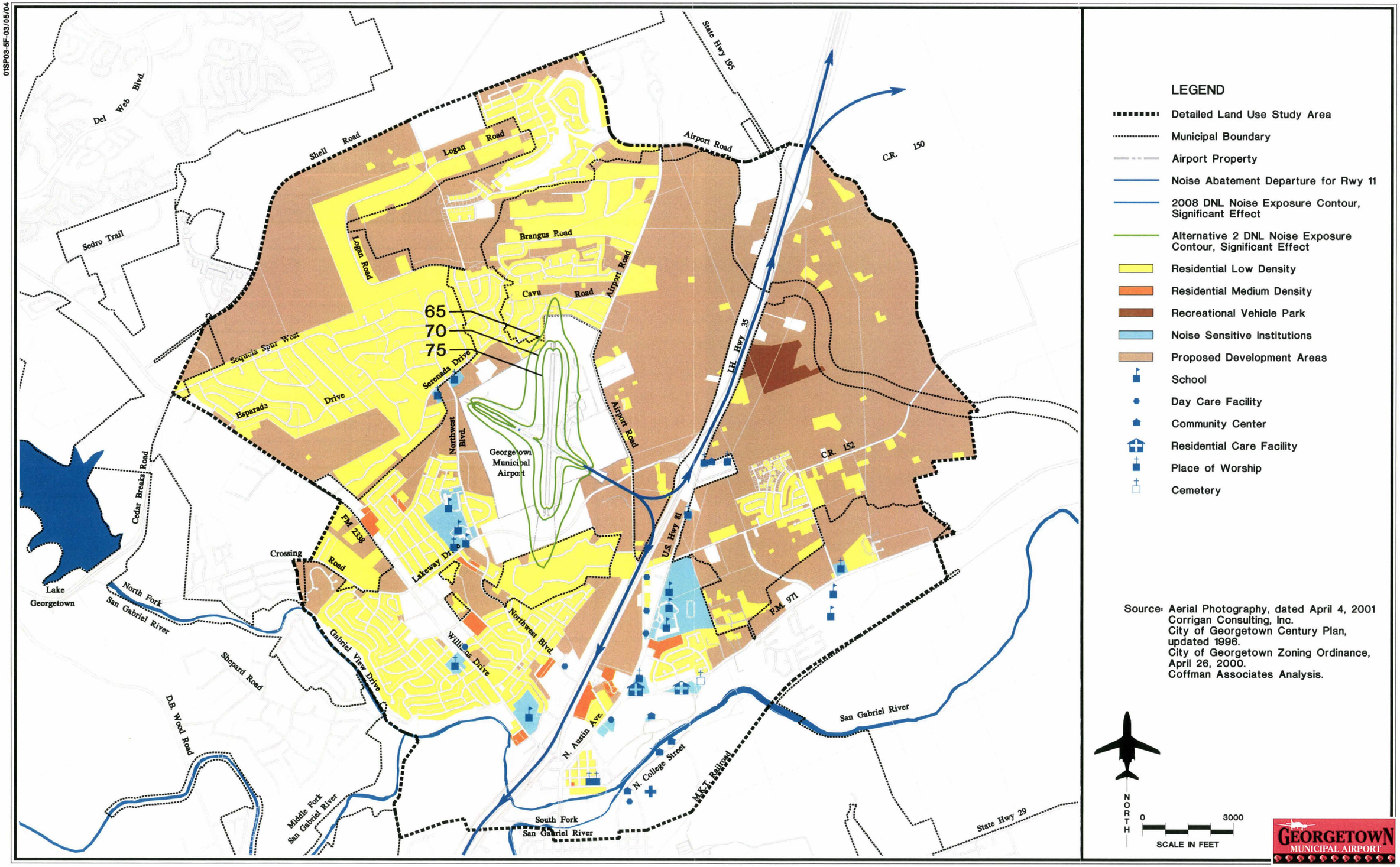

Exhibit 5F
NOISE ABATEMENT DEPARTURE TURN

Table 5E presents the population impacts for this alternative. There are no changes to the existing or future potential population impacts above 65 DNL.

TABLE 5E
Population Impacted by Noise
ALTERNATIVE 2 - ANALYZE RUNWAY 11 NOISE ABATEMENT DEPARTURE TURNS FOR EFFECTIVENESS

DNL Range	2008 Baseline	Alternative 2	Net Change
Existing Population			
65-70	73	73	0
70-75	6	6	0
75+	0	0	0
Subtotal	79	79	0
Potential Population[1]			
65-70	14	14	0
70-75	0	0	0
75+	0	0	0
Subtotal	14	14	0
Total	93	93	0
LWP	37	37	0

Notes:

1. Based on additional potential new dwelling units in 2008 reflecting current land use plans and zoning.

* LWP – level-weighted population – is an estimate of the number of people actually annoyed by aircraft noise. It is computed by multiplying the population in each DNL range by the appropriate LWP response factor: 65-70 DNL = 0.376; 70-75DNL = 0.644; and 75+ DNL = 1.000. See the **Technical Information Paper,** ***Measuring the Impact of Noise on People***, at the back of the *Noise Exposure Maps* document.

The LWP also remains unchanged with the implementation of this alternative.

A breakdown of the increase or decrease in population from the 2008 baseline and Alternative 2 noise contours is presented in **Table 5F**. There are no changes to the existing and future potential population impacts above 65 DNL with the use of this alternative.

TABLE 5F Population Increase or Decrease with Alternative 2				
2008 vs. Alt. 2	**65-70**	**70-75**	**75+**	**Net Impact**
Existing Land Use	0	0	0	0
Future Potential Land Use	0	0	0	0
Totals	0	0	0	0

Operational Issues

For aircraft departing Runway 11 with destinations to the east or west, this procedure would cause some increase in flight times due to the delay in immediate on-course flight. No other operational issues are anticipated with the use of this alternative.

Air Service Factors

Since this procedure is reserved for aircraft flying under VFR, no significant delays are anticipated.

Costs

The primary cost impact of this procedure would be a potential increase in aircraft flight times and operational costs.

Environmental Issues

The current policy of the FAA is to require an environmental review on most noise abatement procedures. Consequently, an environmental assessment would be required.

Implementation

As with Alternative 1, this procedure would primarily be implemented by the airport proprietor. This could be accomplished through informational brochures, use of the Airport/Facility Directory, and/or a Notice to Airmen (NOTAM).

Implementation of noise abatement measures are subject to additional operational feasibility, and environmental review by the FAA.

Conclusion

This alternative results in no change to the number of residents above the 65 DNL noise exposure contour. In addition, overflights over concentrated residential areas would be reduced by keeping aircraft over the Interstate 35 corridor. Therefore, this alternative deserves further consideration.

ALTERNATIVE 3 - ANALYZE USE OF VISUAL ARRIVAL ROUTE FOR RUNWAY 18-36 FOR EFFECTIVENESS

Goals

This alternative seeks to confine aircraft operating under VFR, over noise compatible corridors. This should reduce the number of aircraft overflights over noise-sensitive areas.

Procedure

Aircraft arriving from the north for landing on Runway 36 would follow Interstate 35 until reaching the intersection of State Highway 195. Aircraft would turn right and enter a left base leg for landing on Runway 36. Southbound aircraft approaching the airport for landing on Runway 36 would follow Interstate 35 and enter a standard right downwind leg for landing.

Aircraft approaching from the south for landing on Runway 36 would follow Interstate 35 inbound and turn right to enter a left crosswind for landing. Aircraft approaching for landing on Runway 11 would fly a straight-in final approach upon passing Williams Drive.

Aircraft arriving from either the east or west should approach the airport via one of the routes described above. Aircraft should make every attempt to avoid overflights of noise-sensitive areas by staying over the Interstate 35 corridor. This approach would be reserved for aircraft operating under VFR only.

For noise modeling purposes, the 2008 baseline input was modified to reflect the use of VFR arrival flight procedures described above.

Noise Effects

The noise contours presented in **Exhibit 5G** illustrate the effects of this procedure. South, east, and west of the airport, all noise exposure contour levels remain nearly identical in both size and shape as the 2008 baseline contours. Northeast of the airport, the 65 DNL noise exposure contour bows out slightly over a small portion of existing noise-sensitive development due to aircraft entering the base leg for Runway 36. All aircraft noise exposure contours above 70 DNL remain identical to those in the 2008 baseline.

Table 5G presents the population impacts for this alternative. This alternative impacts no additional individuals above the 65 DNL contour.

Even with the potential for additional noise-sensitive development around the airport, there are no changes in impacts above 65 DNL. This results in no change in the LWP.

A breakdown of the increase or decrease in population from the 2008 baseline and Alternative 3 noise contours is presented in **Table 5H**.

TABLE 5G Population Impacted by Noise ALTERNATIVE 3 - ANALYZE USE OF VISUAL ARRIVAL ROUTE FOR RUNWAY 18-36 FOR EFFECTIVENESS			
DNL Range	**2008 Baseline**	**Alternative 3**	**Net Change**
Existing Population			
65-70	73	73	0
70-75	6	6	0
75+	0	0	0
Subtotal	79	79	0
Potential Population[1]			
65-70	14	14	0
70-75	0	0	0
75+	0	0	0
Subtotal	14	14	0
Total	93	93	0
LWP	37	37	0

Notes:

1. Based on additional potential new dwelling units in 2008 reflecting current land use plans and zoning.

* LWP – level-weighted population – is an estimate of the number of people actually annoyed by aircraft noise. It is computed by multiplying the population in each DNL range by the appropriate LWP response factor: 65-70 DNL = 0.376; 70-75DNL = 0.644; and 75+ DNL = 1.000. See the **Technical Information Paper, *Measuring the Impact of Noise on People***, at the back of the *Noise Exposure Maps* document.

TABLE 5H Population Increase or Decrease with Alternative 3				
2008 vs. Alt. 3	**65-70**	**70-75**	**75+**	**Net Impact**
Existing Land Use	0	0	0	0
Future Potential Land Use	0	0	0	0
Totals	0	0	0	0

Operational Issues

Standard traffic patterns are designed to avoid conflicts, facilitate the safe and efficient movement of traffic, and are well established in the aviation industry. Creating nonstandard entry points and angles will create a potentially unsafe aircraft traffic pattern. In addition, Interstate 35 is a major visual flight route in the area and attempting to concentrate Georgetown

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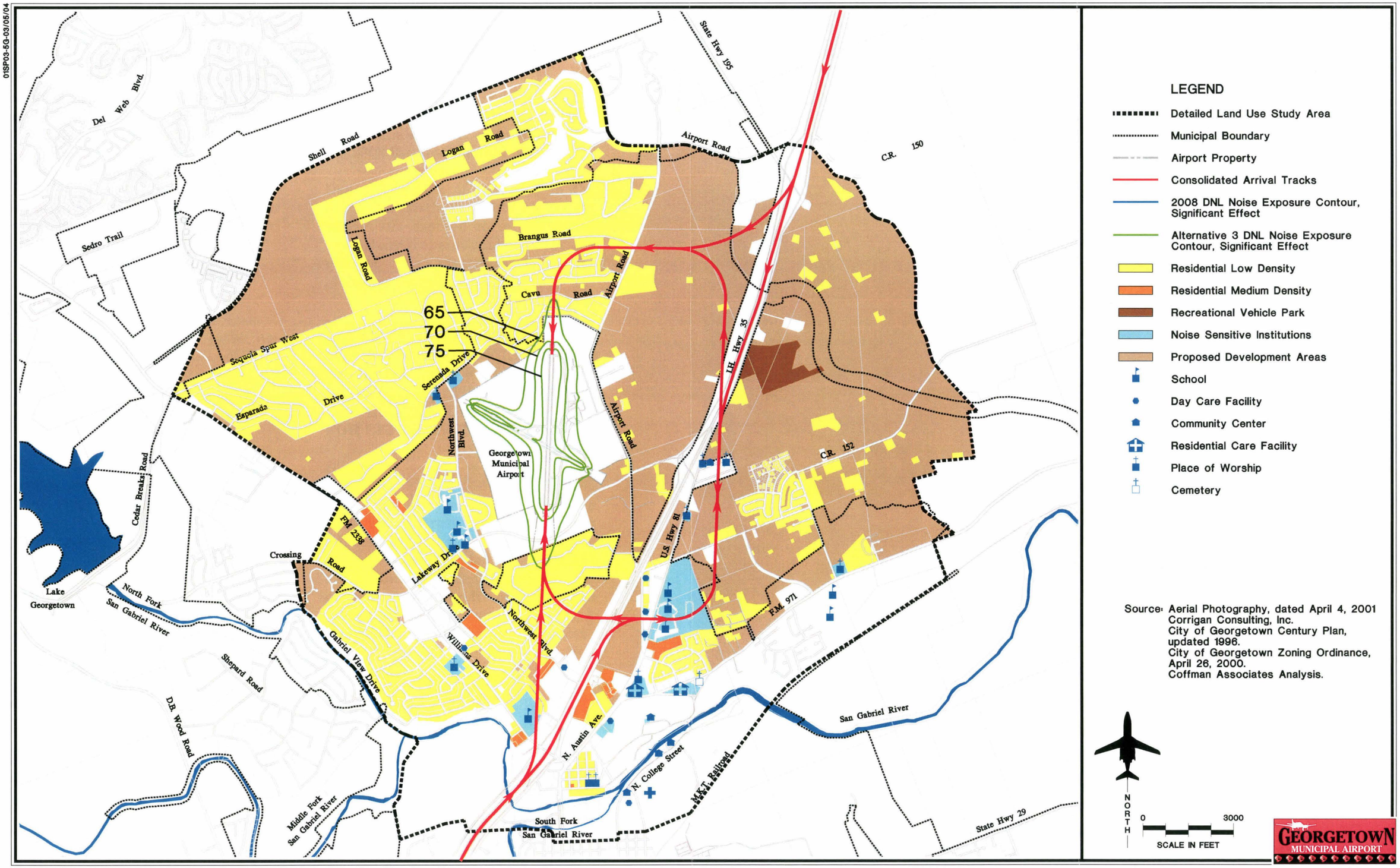

Exhibit 5G
NOISE ABATEMENT
VISUAL ARRIVAL ROUTES

Municipal Airport's arrivals and departures could also create potential conflict with aircraft transiting the area.

Air Service Factors

Since this procedure is reserved for aircraft flying under VFR, no significant delays are anticipated.

Costs

No additional operating costs are anticipated with the use of this procedure.

Environmental Issues

The current policy of the FAA is to require an environmental review on most noise abatement procedures. Consequently, an environmental assessment would be required.

Implementation

This procedure would primarily be implemented by the airport proprietor. This could be accomplished through informational brochures, use of the Airport/Facility Directory, and/or a Notice to Airmen (NOTAM).

Implementation of noise abatement measures are subject to additional operational, feasibility, and environmental review by the FAA.

Conclusion

This alternative does not change the number of existing and future individuals impacted when compared to the 2008 baseline conditions.

Due to the lack of reduction in the number of existing and future potential individuals exposed to aircraft noise and potential operational concerns, the use of this procedure for noise abatement is questionable.

ALTERNATIVE 4 - ANALYZE CONSOLIDATION OF RUNWAY 11 NIGHTTIME PREFERENTIAL RUNWAY USE AND RUNWAY 11 DEPARTURE TURNS FOR EFFECTIVENESS

Goals

This alternative seeks to reduce the noise impacts resulting from benefits inherent to both Alternatives 1 and 2. This alternative implements the use of a nighttime preferential runway use program for aircraft under 12,500 pounds using Runway 11, and a departure turn to follow the Interstate 35 corridor for aircraft departing Runway 11.

Procedure

Approximately 10 percent of the total annual operations at Georgetown Municipal Airport occur during the nighttime hours (10:00 p.m. to 7:00

a.m.) To test the nighttime preferential Runway 11 use program, a 50 percent compliance rate was assumed for the nighttime operations by aircraft less than 12,500 pounds. In addition, aircraft operating from Runway 11 would execute a turn to follow the Interstate 35 corridor until reaching a position relatively free from noise-sensitive land uses. For noise modeling purposes, the 2008 baseline input was modified to reflect the use of the flight procedure described above.

Noise Effects

The noise contours presented in **Exhibit 5H** illustrate the effects of this procedure. South and north of the airport, the 65 DNL noise exposure contour is reduced in size relative to the 2008 baseline contours. A small decrease in size of the 65 DNL noise exposure contour is seen south of the airport over a residential area. Otherwise, no substantial changes are seen in the noise exposure contours above 65 DNL.

Table 5J presents the population impacts for this alternative. This alternative impacts six fewer people than the baseline condition. Three of these people are removed from the 65-70 DNL contour and three from the 70-75 DNL contour.

Given the potential for additional noise-sensitive development around the airport, an additional 12 persons could be impacted by aircraft noise above 65 DNL. The majority of these additional impacts would be due to potential development southeast of the airport.

The LWP increases from 37 to 38. As previously mentioned, this increase is primarily the result of potential future development located within the 65 DNL contour. This increase is only relevant if noise-sensitive development is allowed to be constructed southeast of the airport.

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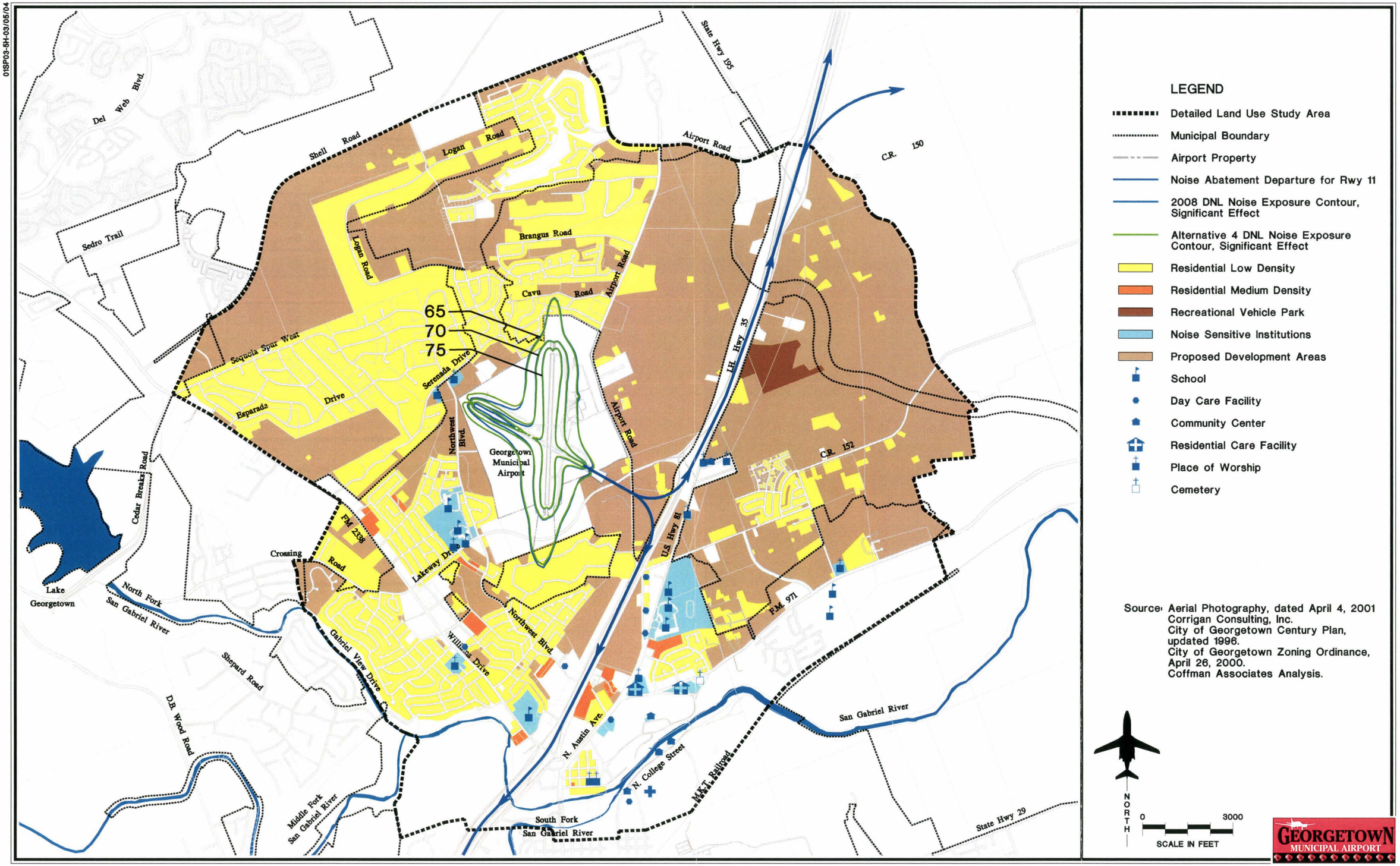

Exhibit 5H
CONSOLIDATION OF PREFERENTIAL RUNWAY USE AND NOISE ABATEMENT DEPARTURE TURN

TABLE 5J
Population Impacted by Noise
ALTERNATIVE 4 - ANALYZE CONSOLIDATION OF RUNWAY 11 NIGHTTIME PREFERENTIAL RUNWAY USE AND RUNWAY 11 DEPARTURE TURNS FOR EFFECTIVENESS

DNL Range	2008 Baseline	Alternative 4	Net Change
Existing Population			
65-70	73	70	-3
70-75	6	3	-3
75+	0	0	0
Subtotal	79	73	-6
Potential Population[1]			
65-70	14	26	+12
70-75	0	0	0
75+	0	0	0
Subtotal	14	26	+12
Total	93	99	+6
LWP	37	38	+1

Notes:

1. Based on additional potential new dwelling units in 2008 reflecting current land use plans and zoning.

* LWP – level-weighted population – is an estimate of the number of people actually annoyed by aircraft noise. It is computed by multiplying the population in each DNL range by the appropriate LWP response factor: 65-70 DNL = 0.376; 70-75DNL = 0.644; and 75+ DNL = 1.000. See the **Technical Information Paper,** ***Measuring the Impact of Noise on People***, at the back of the *Noise Exposure Maps* document.

A breakdown of the increase or decrease in population from the 2008 baseline and Alternative 4 noise contours is presented in **Table 5K**. This reveals that six people experience less noise during the existing land use conditions with the use of this alternative.

Accounting for the potential future development, Alternative 4 would impact 12 additional persons than the baseline condition. The potential future land use conditions reveal an increase in the number of people impacted by aircraft noise between the 65 and 70 DNL noise exposure contours.

TABLE 5K Population Increase or Decrease with Alternative 4				
2008 vs. Alt. 4	**65-70**	**70-75**	**75+**	**Net Impact**
Existing Land Use	-3	-3	0	-6
Potential Future Land Use	+12	0	0	+12
Totals	+9	-3	0	+6

Operational Issues

Pilots have the ultimate decision of which runway to use when departing an airport. At times, pilots may choose Runway 18 due to its greater length and close proximity to aircraft parking areas. The decision to use Runway 11 for nighttime departures may cause additional taxi times. Pilots may also incur some delays while awaiting aircraft landing or departing on Runway 18. Aircraft departing Runway 11 with destinations to the east or west could also cause some increase in flight times due to the delay in immediate on-course flight. In addition, there is also a potential for runway incursions as aircraft would have to taxi across Runway 18-36 to gain access to the end of Runway 11.

Air Service Factors

Some delays are anticipated due to increased taxi distances and the use of an intersecting runway configuration. Some additional flight time would be encountered for pilots with destinations to the east or west due to the north/ south departure turn.

Costs

Other than a slight increase in taxi time, there would be no other costs to the airport, FAA, or other airport users. Potential increases in aircraft flight times and operational costs may result for aircraft with east or west destinations. This procedure would also expose future potential population to increased noise above the 65 DNL range southeast of the airport. Therefore, an environmental review may need to be undertaken.

Environmental Issues

Since this alternative exposes future potential residential areas to new and/or increased levels of aircraft noise above 65 DNL, a preliminary environmental review may be required prior to implementation. Based on the results of the preliminary environmental review, the FAA will determine the level of environmental analysis needed pursuant to the *National Environmental Policy Act of 1969* and its implementing regulations.

Implementation

This procedure would primarily be implemented by the airport proprietor. This could be accomplished through informational brochures, use of the Airport/Facility Directory, and/or a Notice to Airmen (NOTAM).

Implementation of noise abatement measures are subject to additional operational, feasibility, and environmental review by the FAA.

Conclusion

While this alternative increases the number of potential future residents within the 65 DNL noise exposure contour, the overall number of existing individuals is reduced. Since the location of the potential future population is based on where future noise-sensitive development is constructed, land use planning initiatives will ultimately decide the number of individuals impacted by aircraft noise. Due to the reduction in the number of existing individuals exposed to aircraft noise, the use of this procedure for noise abatement should receive additional consideration.

ADDITIONAL NOISE ABATEMENT CONSIDERATIONS

ENGINE RUN-UP NOISE

Several operators located on the airfield perform reciprocating and turbine aircraft maintenance. Following maintenance, engine run-ups are done as a safety precaution to test the aircraft. Georgetown Municipal Airport currently requests that aircraft maintenance run-ups be performed as close to the center of the airfield as possible, and kept to a limited duration. As previously mentioned, depending on wind direction, run-ups are performed at two locations on the airfield. The first, and most commonly used location, is on a connecting taxiway between Taxiway C and Runway 18-36, located on the southern portion of the airfield. The second location is on Taxiway B adjacent to the airport's windsock. Run-up operations can last between 30 seconds and 30 minutes, depending on the nature of the aircraft repair.

The run-up analysis was prepared per guidance from FAA Order 5100.38B, *Airport Improvement Program Handbook*, Section 814 which states "Noise barriers may be effective in certain locations to reduce adverse noise impacts from aircraft on the ground, particularly from maintenance areas and loading gates. Generally, such activities do not make a substantial contribution to total noise exposure, but single event occurrences may disrupt nearby classrooms or residences. Noise barriers, earth berms, wall structures, "hush houses" and other devices designed to shield areas from noise generated on the airport are eligible with provisions: a. Noise barriers must be located and constructed in areas that benefit noncompatible uses affected by a single event ground operation noise that interferes with sleep and conversation. Single event reduction of at least 5 decibels should be realized at the nearest noncompatible land uses."

Engine run-up activity is not consistent enough at Georgetown Municipal Airport to be quantifiable in noise exposure contour analysis. Therefore, a single event analysis was performed.

The Integrated Noise Model (INM), Version 6.0c, was used for the analysis of engine maintenance run-ups. Single event noise patterns (L_{max} noise contours) were prepared for the loudest and most common aircraft used by these operators, the MU-2 turbo-prop business aircraft (INM designation DHC6). L_{max} represents the peak noise level of the event – the noise level that would actually be heard by the human ear. The noise contours were modeled with this aircraft located at the two locations. Aircraft located off Taxiway C were modeled facing south and the aircraft on Taxiway B were modeled facing north. This is the typical configuration of run-up operations on the airfield. The INM does not account for noise attenuation provided by structures when calculating noise exposure. Therefore, the noise exposure contours represent a worst-case scenario of the run-up noise.

Run-up noise is different from overflight noise in some important respects. Because the noise occurs on the ground, the effects of attenuation, reflection, and diffraction as the noise travels across the ground can vary greatly from place to place. In addition, atmospheric effects can cause significant variations in sound levels. Temperature inversions, for example, can cause noise on the ground to travel greater distances.

From the perspective of an airport area resident, run-up noise can be especially disturbing. It differs significantly from aircraft overflight noise. While overflight noise has a particular and predictable pattern and duration, run-up noise does not. The duration of run-ups can vary greatly, depending on the specific reason for the run-up and the difficulty in diagnosing a problem or completing required tests. This lack of a predictable pattern is perhaps the most important contributing factor to reports of annoyance regarding maintenance run-ups. Another problem that can occur with run-ups by propeller aircraft, like the MU-2, is the propagation of a penetrating tone, almost a pure tone, over long distances. Finally, the low frequency component of run-up noise can also travel great distances, create structural vibrations, and is not well attenuated by obstacles.

An analysis was conducted for each of the current run-up locations used on the airfield. The results of this analysis are depicted on **Exhibit 5J**. The contour represents the MU-20 aircraft L_{max} of 65 decibels (dBA) and 55 dBA. Given exterior-to-interior sound attenuation of 15 dBA for typical homes with windows open and 20 to 25 dBA for windows closed, 55 dBA and 65 dBA translate into interior levels of about 40 to 45 dBA. These levels generally represent the lower end of the sleep disturbance spectrum. (See the sleep disturbance section in the ***TIP, "Effects of Noise Exposure"***.)

Table 5L presents the population impacted by the 55 and 65 dBA L_{max} contours at Sites 1 (south) and 2 (north) during the baseline and ultimate land use development periods. At Site 1, run-up operations impact 141 dwellings within the 55 dBA L_{max} contour while no

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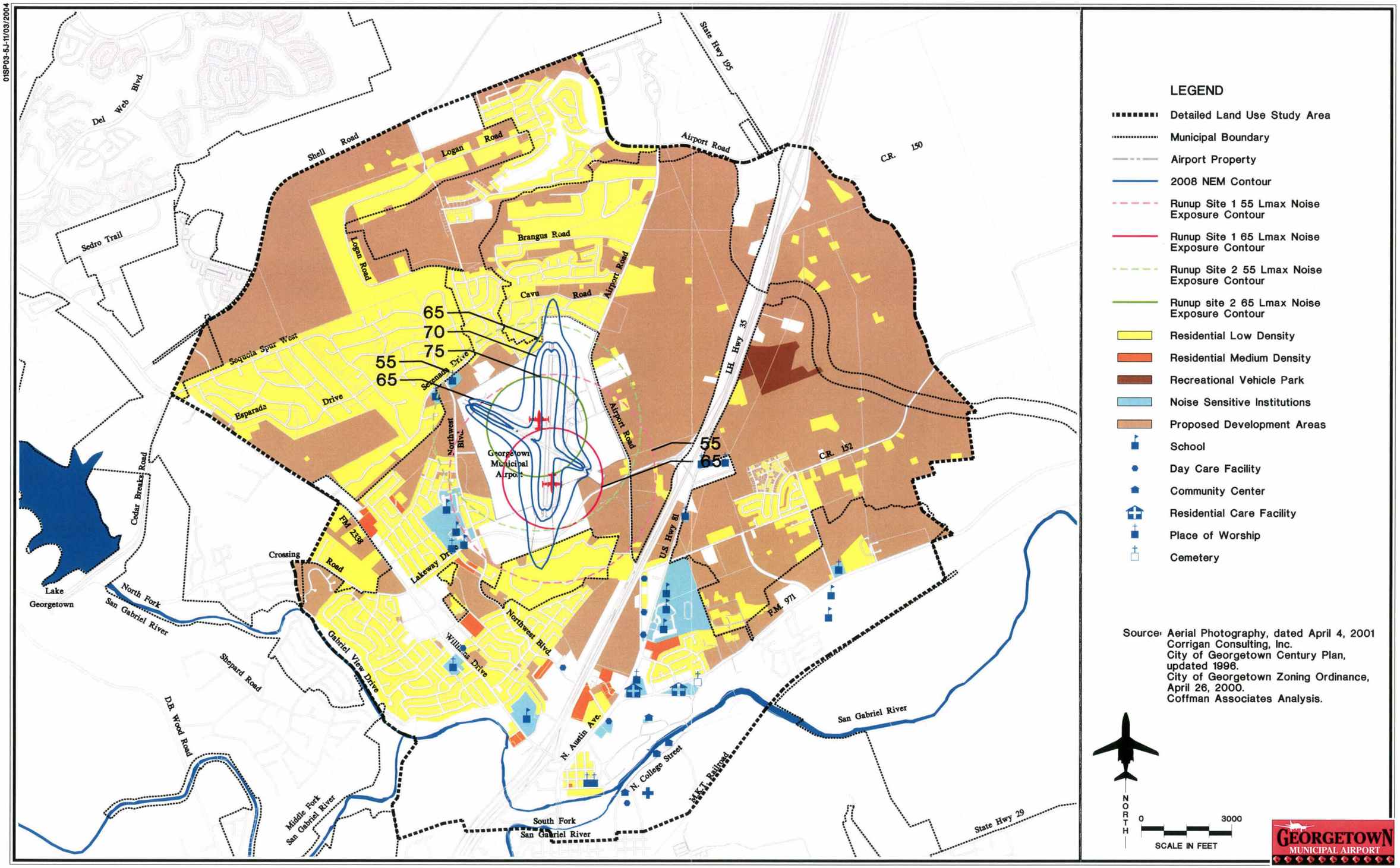

Exhibit 5J
AIRCRAFT RUN-UP NOISE ENCLOSURE

dwellings are impacted above 65 L_{max} during the baseline land use conditions. Given the potential for future development, a total of 2,230 dwellings could be affected within the 55 dBA L_{max} contour and 176 above 65 dBA L_{max}.

Run-up operations at Site 2 impact fewer dwellings in both the baseline and ultimate conditions than at Site 1. During the baseline conditions, 187 dwellings are impacted within the 55 dBA L_{max} contour while no dwellings are impacted by run-up noise exceeding 65 dBA L_{max}. The impacts associated with the 55 dBA L_{max} contour increase to 1,945 dwellings during the ultimate conditions. There are no impacts from run-up noise in excess of 65 dBA L_{max} during the ultimate land use scenario.

TABLE 5L
Land Use and Population Impacts Summary - Aircraft Run-up Operations
Georgetown Municipal Airport

	Site 1		Site 2		Total
	55-60 L_{max}	60-65 L_{max}	55-60 L_{max}	60-65 L_{max}	
Land Use					
Existing Dwelling Units	141	0	187	0	328

Source: Coffman Associates analysis.

Run-Up Enclosures

There are various designs for run-up enclosures. Fully enclosed buildings are known as hush-houses. They are most commonly found on airbases and are typically designed for use by fighter aircraft. Run-up enclosures without roofs are often referred to as "run-up pens."

Exhibit 5K shows an example of a run-up enclosure. This enclosure consists of a three-sided enclosure which can reduce noise by up to 15 decibels. The enclosure would be designed to handle the various types of aircraft operating at Georgetown Municipal Airport, with special design considerations given to the special aerodynamic issues related to propeller-driven aircraft. The estimated cost of such a structure is approximately $250,000. This cost estimate is based upon an estimate provided by Quilite International and can be found in **Appendix G**. This includes construction of additional ramp space needed for the structure.

Cost-Effectiveness Of A Run-up Enclosure

The run-up enclosure discussed above would reduce noise by approximately 15 decibels. One way to determine the cost-effectiveness of a run-up enclosure is to estimate the cost of alternative methods of noise attenuation. There

are at least three conceivable alternatives:

1. Complete prohibition of maintenance run-ups;

2. Removal of the homes that are subject to run-up noise; and/or

3. Sound insulation of the homes or noise-sensitive institutions to provide an equal amount of sound attenuation as a run-up enclosure.

Total prohibition of maintenance run-ups is not considered acceptable because of the needs of based operators at the airport. It is not the desire of the airport to cause the closure of these operators or to take other actions which would interfere with safe use of the airport.

Since there are 20 existing homes impacted within the 55 dBA L_{max} noise contour that are also within the 65 DNL noise exposure contour, there would be substantial cost involved in providing sound attenuation to these dwellings. Based on an estimated $20,000 per dwelling for acoustical treatment, it would cost approximately $400,000 to mitigate the impacts associated with the 55 dBA L_{max} contour.

Conclusion

Based on this discussion, construction of a run-up enclosure may potentially be a cost-effective alternative to acoustically treating the various noise-sensitive land uses impacted by run-up noise. With maintenance operations at the airport, construction of a run-up pen (a three-sided design capable of reducing noise by 15 decibels) should be considered.

It would also be helpful if the maintenance operators would keep detailed logs recording important facts about their run-up procedures. This would enable DNL noise contour analyses to be done in the future. It would also help in investigating complaints about engine maintenance run-ups. The following data should be recorded: type of aircraft, time of run-up, duration of run-up, location, aircraft orientation, number of engines used, and percentage of power used. A standardized form could be developed and supplied to the maintenance operators.

SUMMARY

This chapter has analyzed the range of potential noise abatement techniques for use at Georgetown Municipal Airport.

Two of the four alternatives presented reduce the total number of existing people impacted by aircraft noise above 65 DNL. The use of a nighttime preferential runway use program for Runway 11, presented in Alternative 1, would reduce the existing (2008) population by six. Alternatives 2 and 3 result in no change in the population impacts. The consolidation of Alternatives 1 and 2, incorporating the Runway 11 nighttime preferential runway use and Runway 11 departure turns (Alternative 4), would also reduce the existing population by six people. **Table 5M** provides a summation of the

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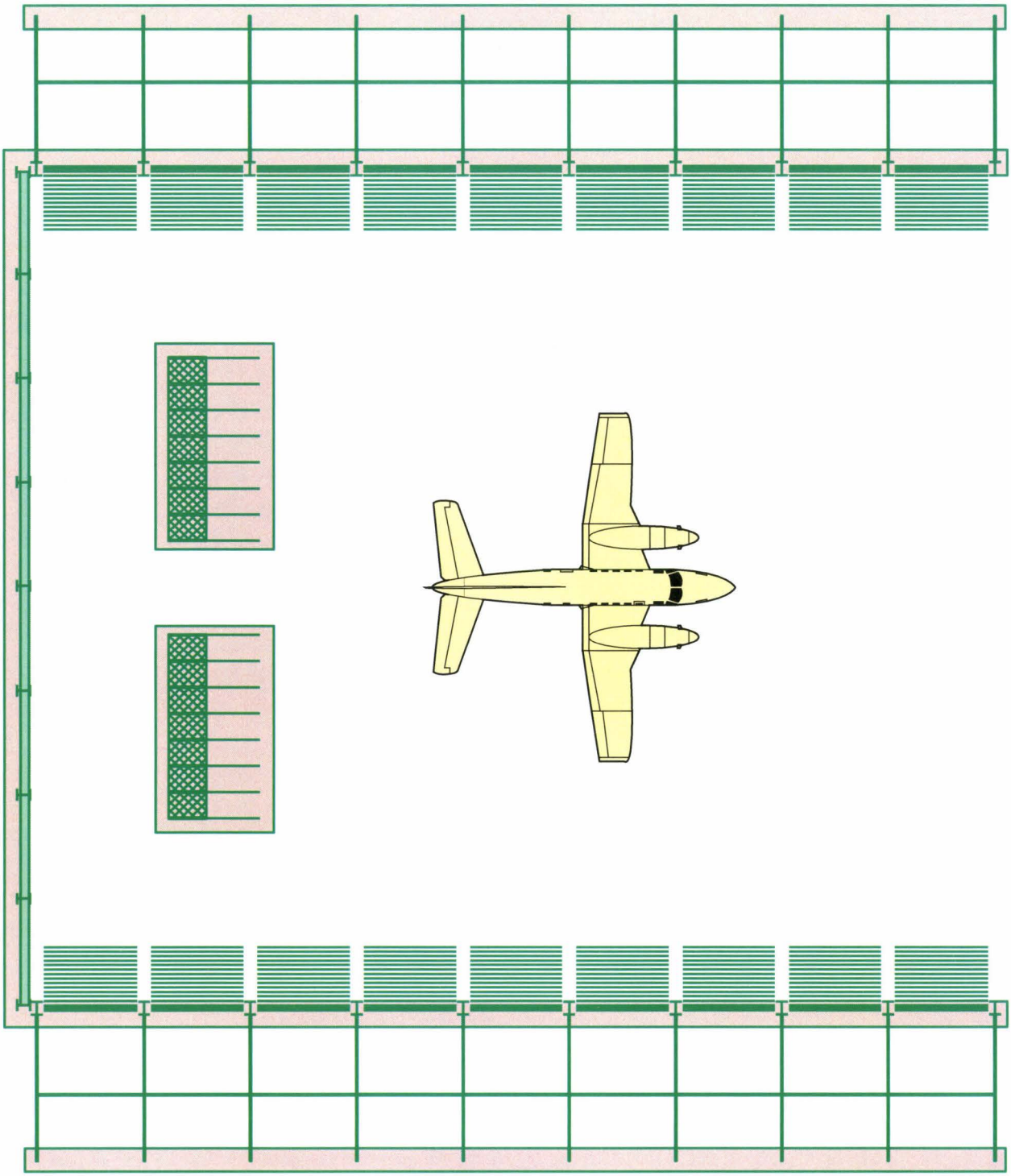

Source: Rheinhold & Mahla AG
Puchheim, Germany

GEORGETOWN
MUNICIPAL AIRPORT

Exhibit 5K
POTENTIAL RUN-UP
ENCLOSURE DESIGN

population impacts for each alternative and the 2008 baseline conditions.

In addition to these formal alternatives, one additional noise abatement consideration was evaluated: the implementation of a run-up enclosure on the airfield to reduce maintenance run-up noise. This alternative would cost significantly less than acoustically treating the dwellings currently impacted by the 55 dBA L_{max} contour and, therefore, a run-up enclosure can be justified. A summary of the noise abatement alternatives is listed in **Table 5N**.

The results of this analysis must be reviewed by the Planning Advisory Committee (PAC) and the general public before final recommendations can be made. Final recommendations will be presented in Chapter Seven, the Noise Compatibility Plan.

TABLE 5M
Alternative Population Impact Summary
Georgetown Municipal Airport

	2008 Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Existing Population					
65 DNL	73	70	73	73	70
70 DNL	6	3	6	6	3
75+ DNL	0	0	0	0	0
Subtotal	79	73	79	79	73
Future Potential Population					
65 DNL	14	26	14	14	26
70 DNL	0	0	0	0	0
75+ DNL	0	0	0	0	0
Subtotal	14	26	14	14	26
Total Net Population	93	99	93	93	99
LWP	37	38	37	37	38

Notes:

1. Based on additional potential new dwelling units in 2008 reflecting current land use plans and zoning.

* LWP – level-weighted population – is an estimate of the number of people actually annoyed by aircraft noise. It is computed by multiplying the population in each DNL range by the appropriate LWP response factor: 65-70 DNL = 0.376; 70-75DNL = 0.644; 75+ DNL = 1.000. See the **Technical Information Paper, *Measuring the Impact of Noise on People***, at the back of the *Noise Exposure Maps* document.

TABLE 5N
Summary Of Noise Abatement Alternatives

Alternative	Advantages	Disadvantages
1. Evaluate Runway 11 Nighttime Preferential Runway Use for Noise Abatement.	• Reduces existing population above 65 DNL (2008) by six.	• Increases net population above 65 DNL (2008) by six. • Could cause increased taxi distances for departing aircraft. • Environmental review may be required.
2. Analyze Runway 11 Noise Abatement Departure Turns for Noise Abatement.	• Reduced overflights over residential areas.	• Increased flight times and aircraft operational costs. • Environmental review may be required.
3. Analyze use of Visual Arrival Routes for Runway 18-36 for Effectiveness.	• May improve airport operating efficiency.	• No change in population impacts. • Environmental review may be required.
4. Analyze Consolidation of Runway 11 Nighttime Preferential Runway Use and Runway 11 Departure Turns for Effectiveness.	• Reduces existing population above 65 DNL (2008) by six.	• Increases net population above 65 DNL (2008) by six. • Could cause increased taxi distances for departing aircraft. • Increased flight times and aircraft operational costs. • Environmental review may be required.
5. Abatement of Run-Up Noise Through the Installation of a Run-Up Enclosure.	• Reduces existing dwellings above 55 dBA L_{max} by 20 inside the 65 DNL.	• Cost (Approximately $250,000)

REFERENCES

U.S. Department of Transportation, Federal Aviation Administration. "Criteria for Evaluation of Aviation Generated Noise," April 9, 2001. http://www.awp.faa.gov/ops/awp500/CRITERIA.htm.