
Section 2.0 Alternatives Considered

2.1 Introduction

In accordance with the Council on Environmental Quality (CEQ) regulations found in 40 Code of Federal Regulations (CFR) § 1502.14(d), an environmental review process requires that all prudent and feasible alternatives be identified and evaluated that might accomplish the objectives of a proposed project.

As the lead federal agency, the Federal Aviation Administration (FAA) is responsible for complying with the policies and procedures of the National Environmental Policy Act (NEPA) of 1969 and other related environmental laws, regulations and orders applicable to FAA actions. This requires the FAA to identify the potential alternatives that are available to achieve the purpose and need for a proposed project and present the basis used to make an informed decision regarding the selection of a Preferred Alternative.

NEPA and FAA regulations do not require the inclusion of a specific number of alternatives or a specific range of alternatives in an Environmental Assessment (EA). However, an EA must consider the Proposed Action and the consequences of taking no action. For alternatives that were considered but eliminated from further study, the Airport Sponsor must briefly explain why such alternatives were eliminated from further discussion.

Pursuant to FAA regulations set forth in Order 1050.1E, *“Environmental Impacts: Policies and Procedures”*, an alternatives discussion must include:

- A list of alternatives considered, including the Proposed Action and the No Action alternatives
- Any connected or cumulative actions associated with each alternative
- A concise statement explaining why any initial alternative considered was eliminated from further study
- A statement identifying a Preferred Alternative, if one has been identified
- Any other applicable laws, regulations, executive orders and associated permits, licenses, approvals and reviews required to implement a project alternative

Alternatives discussed in this section were the result of the Cuyahoga County Airport Master Plan Update completed in February 2010. The Master Plan Update included forty (40) airfield development alternatives, eight of which were selected for further evaluation during this EA because they met the Cuyahoga County Airport’s (Airport or CGF) need of compliant Runway Safety Areas (RSAs) and 5,500 feet of usable runway length. For additional details of why the project is needed, see **Section 1.0 Purpose and Need**.

The following alternatives are presented and discussed in this section:

Administrative Options:

- No-Build Alternative
- Build a New Airport at a Different Location
- Use Another Airport in the Vicinity

Build Alternatives:

- Alternative 15 – Runway Reorientation (Relocate Bishop & Richmond Road)
- Alternative 16 – Runway 6 Extension to West (Relocate Richmond Road)
- Alternative 17 – Runway 24 Extension to East (Relocate Bishop Road)
- Alternative 18 – Runway 24 Extension to the East (Tunnel Bishop Road)
- Alternative 19 – Road Relocations at Both Runway Ends
- Alternative 23 – Engineered Materials Arresting Systems (EMAS) at Both Runway Ends (Master Plan Preferred Alternative)
- Alternative 24 – Combination of Runway 24 Shift to West and Runway 6 EMAS

An overview of potential impacts is provided in **Section 2.15 Overview of Impacts**. This section quantifies the expected impacts from each build alternative and provides a ranking system for comparison.

2.2 Safety Areas

Safety areas, as defined by the FAA in Advisory Circular (AC) 150/5300-13A Change 1, are of importance in evaluating any potential alternative because they are a controlling factor for each runway end and for determining potential impacts. This section includes a definition of the different safety areas that are required by FAA design standards.

Runway Safety Area (RSA): The RSA is a graded area surrounding the runway surface and is constructed to enhance the safety of airplanes in the event of an unintended excursion from the runway's paved surface. This area must be:

- Cleared and graded with no potentially hazardous humps, ruts, depressions or other surface variations
- Adequately drained to prevent water accumulation
- Capable of supporting snow removal equipment, rescue and firefighting equipment, and occasional aircraft passage without causing structural damage to the aircraft
- Free of objects, except for those that need to be located in the RSA because of their function, and then, to the extent practical, mounted on low impact (frangible) structures
- Capable, under normal (dry) conditions, of supporting airplanes without causing structural damage to the airplanes or injury to their occupants

Runway Object Free Area (ROFA): A ROFA is a two-dimensional ground surface surrounding a runway. The ROFA clearing standards preclude above ground objects protruding above the RSA edge elevation, except those required to be located within the ROFA for navigation, ground maneuvering, aircraft taxi and aircraft holding purposes. No other objects are permitted.

The size of an RSA and ROFA is predicated upon specific runway and visibility minimums. **Table 2.0 Runway Safety Area / Runway Object Free Area** illustrates the FAA design standard for CGF and the existing conditions at the Airport.

Table 2.0 Runway Safety Area / Runway Object Free Area		
Design Element	FAA Standard	Existing Condition
Runway Width	100 ft	100 ft
Runway Safety Area		
Width	500 ft	310 ft
Length Beyond Runway 6 End	1,000 ft	43 ft
Length Beyond Runway 24 End	1,000 ft	57 ft
Runway Object Free Area		
Width	800 ft	735 ft
Length Beyond Runway 6 End	1,000 ft	285 ft
Length Beyond Runway 24 End	1,000 ft	0 ft
Source: CHA Runway 6/24 Safety Area Improvements, Project Definition Report & 30% Design Report, 2013		

Runway Protection Zone (RPZ): The RPZ is a trapezoidal shape centered about the extended runway centerline. The function of a RPZ is to enhance the protection of people and property on the ground, protect airspace and prevent incompatible land uses. Airports are encouraged by the FAA to control the land within the RPZ to prevent the creation of hazards to landing and departing aircraft.

2.3 No-Build Alternative

The No-Build Alternative assumes that no action would be taken to reorient or extend Runway 6/24 or establish compliant RSAs. Under this alternative, the Airport would remain in its current state with no plans to provide additional runway length as requested by existing users or to improve safety areas as required by the FAA. As such, the No-Build Alternative does not meet the project's purpose and need of providing a compliant air transportation facility with enhanced takeoff lengths.

Although the No-Build Alternative does not meet the purpose and need of the proposed action, it does serve as a baseline of comparison for environmental impacts associated with other build alternatives and is, therefore, retained for analysis and carried forward for review.

2.4 Build a New Airport at a Different Location

Generally, the development and construction of a new airport is considered when an existing airport is approaching or has exceeded operational capacity and it is not feasible to expand at its current location. This is not the case at Cuyahoga County Airport which is projected to have adequate capacity for the 20-year planning horizon.

Substantial improvements and investments have been made at the current site with future improvement projects currently planned. Closing the existing Airport to relocate to a different location would create a significant loss of public and private investment and would be fiscally irresponsible in light of past federal, state and local investments.

The benefits of developing another airport facility are limited. Development of a new site to replace the functions of CGF would likely involve considerable land acquisitions, could have unacceptable environmental impacts, and could cause severe residential and commercial relocations. Site preparation and construction of new facilities to provide equivalent services as CGF would take years to accomplish and the cost of such actions would be substantial.

Although constructing a new airport would accomplish the project's purpose and need of FAA compliant safety areas, this can be met at the existing location more practicably and feasibly with minimal social, environmental or economic (SEE) impacts when compared to the construction of a new airport at a different location. Construction of a new airport is not a prudent use of public funds. As a result, this alternative has been removed from further consideration.

2.5 Use Another Airport in the Vicinity

Three airports in the vicinity of CGF were considered as replacement facilities for CGF (Lost Nation Municipal Airport, Burke Lakefront Airport and Cleveland-Hopkins International Airport). Although all three airports meet the project's purpose and need of providing compliant RSAs, as described below, each airport has extenuating circumstances that eliminate it from further consideration.

Lost Nation Municipal Airport is approximately 11 miles from CGF, but only provides a runway length of 5,028 feet. This fails to meet the project's purpose and need of providing 5,500 of useable runway length for takeoff in both directions.

Burke Lakefront Airport is approximately 13 miles from CGF and provides a runway length of 6,603 feet. This runway length would satisfy the need for 5,500 feet of useable runway length as described in project's purpose and need. However, given Burke Lakefront Airport's current infrastructure constraints and physical limitations to expand, it is unlikely that it would be able to absorb the tenants and aircraft operations from CGF.

Cleveland-Hopkins International Airport is approximately 30 miles from CGF and provides several runways that exceed the 5,500 foot runway length needed to satisfy the project's purpose and

need. Hopkins is primarily focused on serving commercial airlines and introducing a significant number of general aviation operations could impact its airfield capacity.

Additionally, CGF is part of the National Plan of Integrated Airport Systems (NPIAS) and is considered significant to the success of the national air transportation system and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). Requiring existing users of CGF to relocate 30 miles from a functioning facility as well as expecting the FAA to surrender an asset that is considered a national resource is unreasonable.

Relocating airport operations to another facility and abandoning the existing infrastructure is not a practicable or feasible alternative since there is a demonstrated need to provide an airport in the local community. These options would cause the FAA and the County to lose their public investment in the facility and would cause businesses to lose their private investment. These actions would be limited by the FAA's Grant Assurances and would have a negative impact on the regional economy. These alternatives do not represent prudent and feasible options and therefore were removed from further consideration.

2.6 Alternative 15 – Runway Reorientation (Relocate Bishop & Richmond Road)

With this alternative, Runway 6/24 would be reoriented and constructed to 5,500 feet in length with standard RSAs and ROFAs beyond the runway's thresholds as shown on **Figure 2.1 Alternative 15 – Runway Reorientation (Relocate Bishop and Richmond Road)**. This alternative requires rerouting Richmond and Bishop Roads and Curtiss Wright Parkway as well as the construction of a new runway, parallel taxiway, connecting taxiways and other infrastructure.

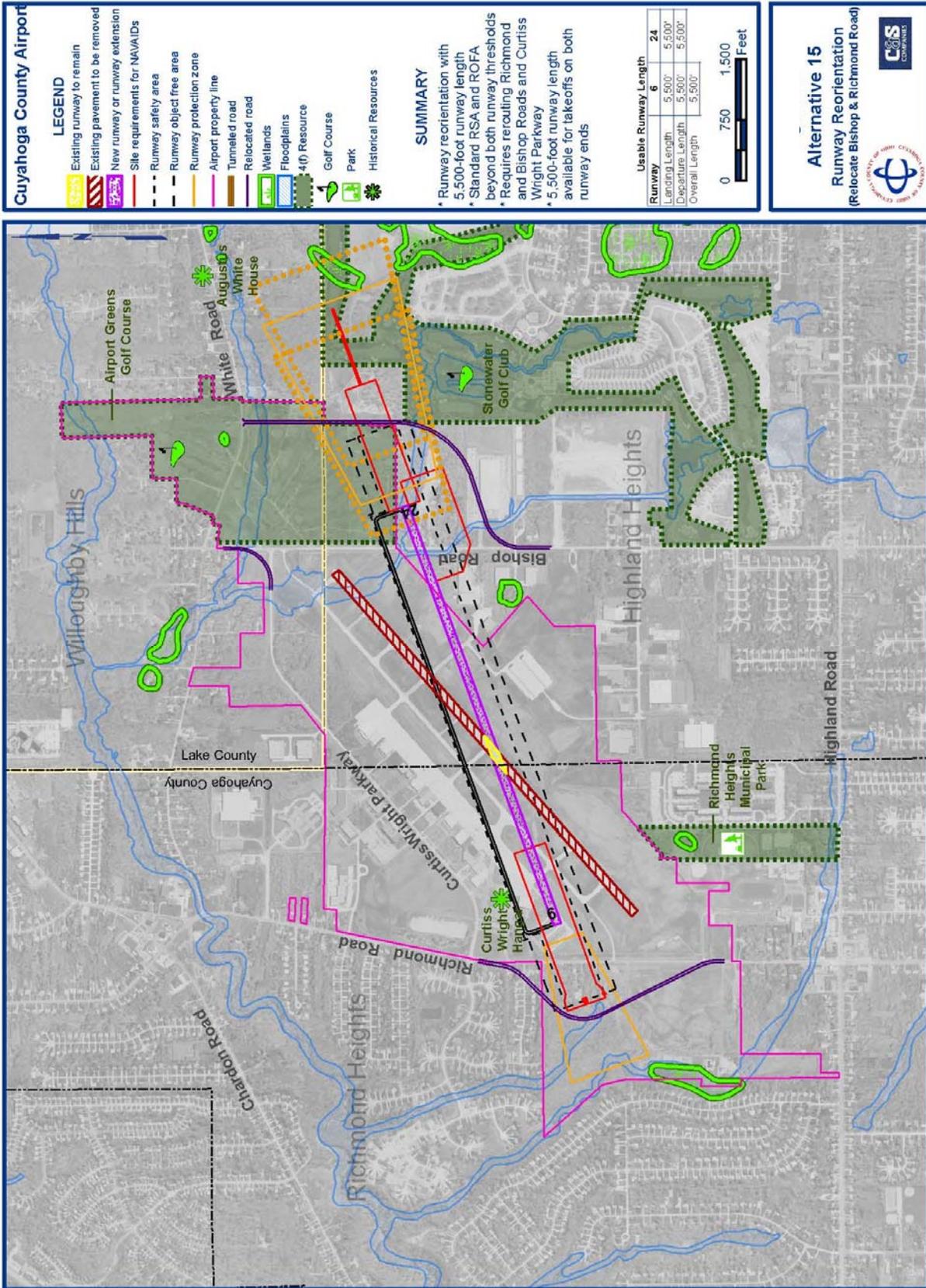
This alternative provides 5,500 feet of pavement for takeoff and landing operations with compliant safety areas. Although Alternative 15 is considered a sound alternative to meet the project's primary purpose and need, it requires significant road relocation and represents an expansion of the airport - both of which are opposed by the local communities. This alternative would require replacement or relocation of infrastructure the airport has already constructed and installed.

Compared to the other build alternatives, Alternative 15 requires the most road relocation and ground disturbance and generally has the most community impacts of all the alternatives being considered. This alternative has the most impact on streams and farmland, but is expected to have the least amount of impacts to wetlands. Alternative 15 also impacts parkland and recreational resources in the area.

Alternative 15 would require property acquisition to extend the airport property boundary and to clear obstructions on the northeast end of the airfield. This alternative cannot be implemented on existing airport property.

Due to the availability of other more fiscally responsible alternatives which are supported locally, Alternative 15 has been eliminated from further consideration.

Figure 2.1 Alternative 15 – Runway Reorientation (Relocate Bishop and Richmond Road)



2.7 Alternative 16 – Runway 6 Extension to West (Relocate Richmond Road)

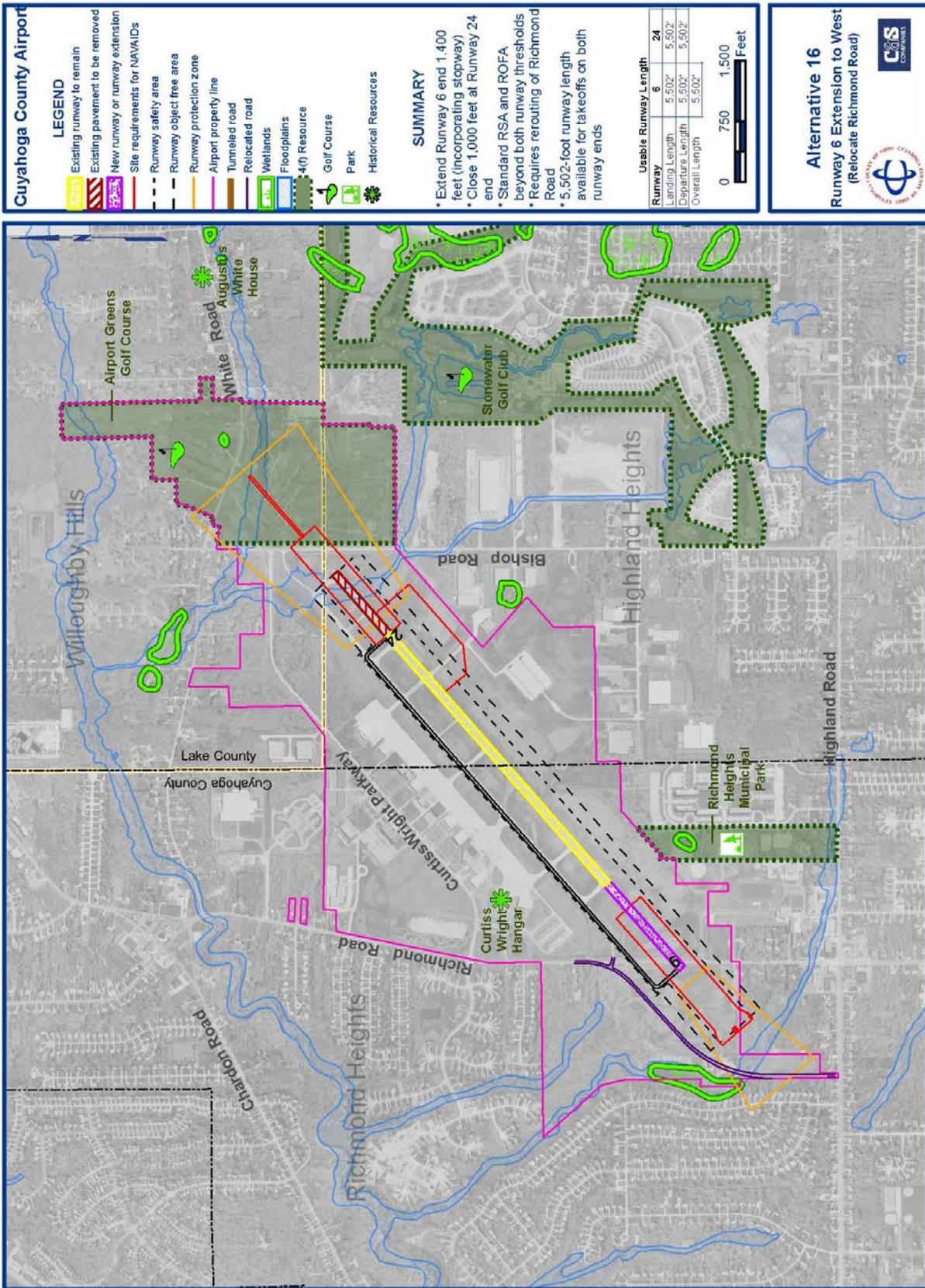
Under this alternative, the Runway 6 end would be extended 1,400 feet and 1,000 feet of Runway 24 would be closed by removing existing pavement (**Figure 2.2 Alternative 16 – Runway 6 Extension to West (Relocate Richmond Road)**). Standard RSAs and ROFAs would be constructed beyond the runway's thresholds. This alternative requires relocating Richmond Road.

This alternative provides 5,502 feet of pavement for takeoff and landing operations with compliant safety areas.

When compared to the other build alternatives, Alternative 16 has the most impacts on wetlands, floodplains and ditches. It also requires a road relocation of Richmond Road. Property acquisition is required to clear runway surfaces and approaches which represents an expansion of the airport off existing airport owned property. Both road relocation and airport expansion are opposed by the local communities.

Although Alternative 16 is considered a viable alternative to meet the project's primary purpose and need, it is removed from further consideration due to the availability of other more feasible and less environmentally damaging alternatives that are supported by the local community.

Figure 2.2 Alternative 16 – Runway 6 Extension to West (Relocate Richmond Road)



2.8 Alternative 17 – Runway 24 Extension to East (Relocate Bishop Road)

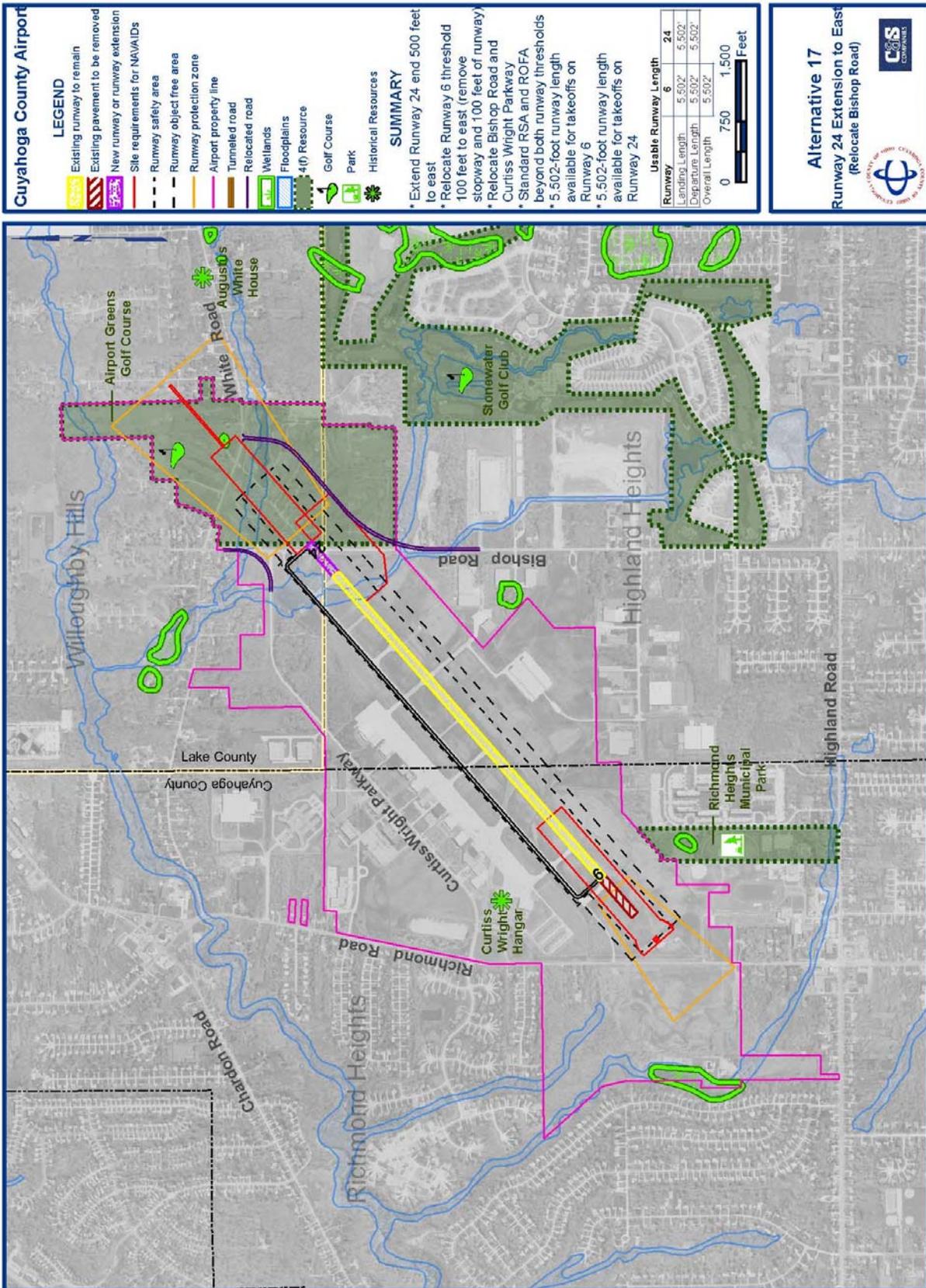
With this alternative, Runway 24 would be extended 500 feet to the east while 100 feet of Runway 6 and the associated stopway would be closed by removing existing pavement (**Figure 2.3 Alternative 17 – Runway 24 Extension to East (Relocate Bishop Road)**). Standard RSAs and ROFAs would be constructed beyond the runway's thresholds. This alternative requires rerouting Bishop Road and Curtiss Wright Parkway.

Alternative 17 provides 5,502 feet of pavement for takeoff and landing operations with compliant safety areas.

Compared to the other build alternatives, Alternative 17 has substantial community impacts in the categories of road relocation and parkland and recreational resources. Although wetlands, floodplains, streams and farmland impacts are not the largest with this alternative, there are other alternatives that have even less environmental impacts. This alternative could be implemented within existing airport property, except for potential obstruction and RPZ clearing at the Runway 24 end of the airfield, by extending across Bishop Road onto the golf course.

Alternative 17 is considered a sound alternative to meet the project's primary purpose and need. However, due to the road relocation (which is opposed by the local community) and the availability of more prudent and feasible alternatives with fewer environmental impacts, Alternative 17 has been removed from further consideration.

Figure 2.3 Alternative 17 – Runway 24 Extension to East (Relocate Bishop Road)



2.9 Alternative 18 – Runway 24 Extension to the East (Tunnel Bishop Road)

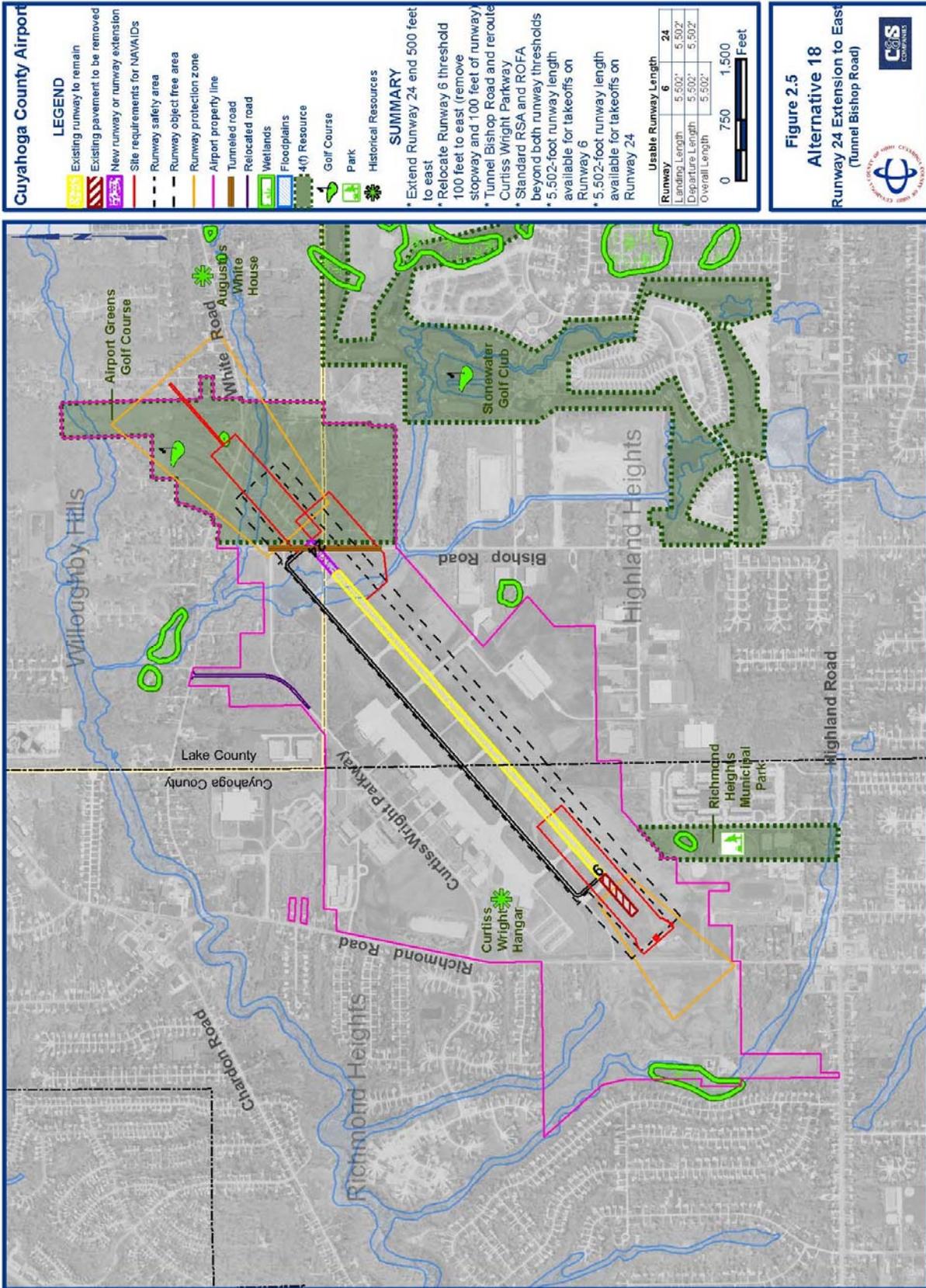
In this alternative, Runway 24 would be extended 500 feet to the east additionally 100 feet of Runway 6 and the associated stopway would be closed by removing existing pavement (**Figure 2.4 Alternative 18 – Runway 24 Extension to East (Tunnel Bishop Road)**). Standard RSAs and ROFAs would be constructed beyond the runway's thresholds. This alternative requires constructing a tunnel under the extended runway for Bishop Road and rerouting Curtiss Wright Parkway.

Like the previous three alternatives, this alternative provides 5,502 feet of pavement for takeoff and landing operations with compliant safety areas.

Compared to the other build alternatives, Alternative 18 has more impacts to parkland and recreational resources, wetlands, floodplains, streams and farmland and requires more road relocation and ground disturbance than most of the other alternatives. This alternative could be implemented within existing airport property, except for obstruction and RPZ clearing at the Runway 24 end of the airfield, by extending over Bishop Road onto the golf course.

Although Alternative 18 is considered a sound alternative and meets the project's primary purpose and need, it is opposed by the local communities due to the road impacts. In addition, the construction of a tunnel would be cost prohibitive. Due to the availability of other alternatives with lower cost, fewer environmental impacts and greater community support, Alternative 18 has been removed from further consideration.

Figure 2.4 Alternative 18 – Runway 24 Extension to the East (Tunnel Bishop Road)



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2.10 Alternative 19 – Road Relocations at Both Runway Ends

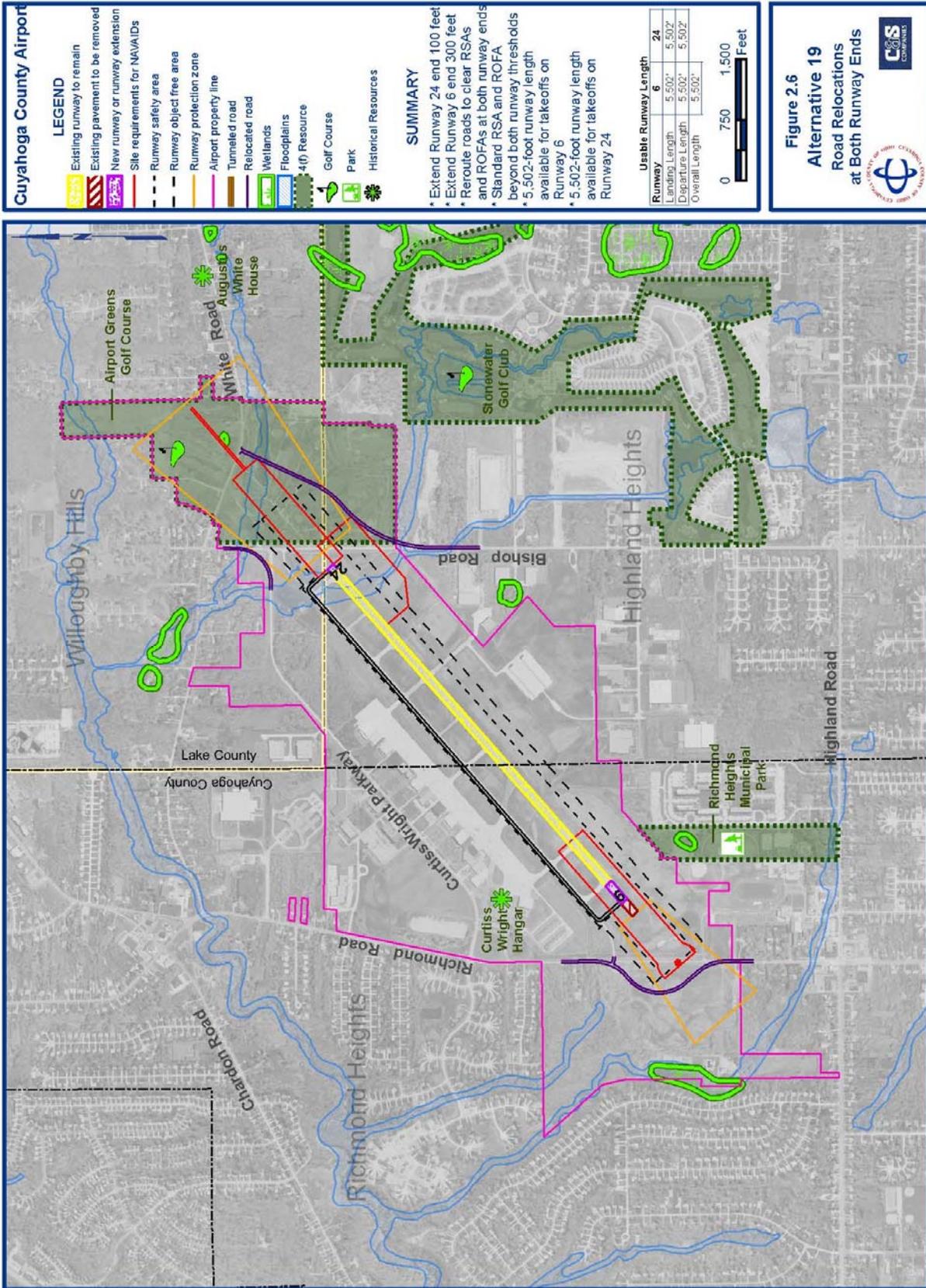
With this alternative, Runway 24 would be extended 100 feet to the east and Runway 6 would be extended 300 feet to the west (**Figure 2.5 Alternative 19 – Road Relocations at Both Runway Ends**). In order to provide standard RSAs and ROFAs, this alternative requires the relocation of Richmond Road, Bishop Road and Curtiss Wright Parkway.

This alternative provides 5,502 feet of pavement for takeoff and landing operations with compliant safety areas.

Compared to the other build alternatives, Alternative 19 has the second highest amount of community impacts (after Alternative 15) with three road relocations and parkland impacts. In terms of other environmental impacts such as wetlands, floodplain and streams, it has neither the most nor least amount of disturbance when compared to the other alternatives. This alternative could be implemented within existing airport property, except potential obstruction and RPZ clearing at both ends of the airfield, by extending over Richmond Road into open space owned by the Airport and over Bishop Road to the golf course.

Alternative 19 is considered a sound alternative to meet the project's primary purpose and need but it requires road relocations, which are strongly opposed by the local communities. Due to the availability of other alternatives with fewer environmental impacts and greater community support, Alternative 19 has been removed from further consideration.

Figure 2.5 Alternative 19 – Road Relocations at Both Runway Ends



2.11 Preferred Alternative 23 – EMAS at Both Runway Ends (Master Plan Preferred Alternative)

Under this alternative, construction at the southwest end of the runway, relocation of the northeast end of the runway, removal of the stopway and installation of Engineered Material Arresting System (EMAS) at both runway ends is proposed. EMAS uses crushable concrete placed at the end of a runway to stop an aircraft that overruns the runway. The tires of the aircraft sink into the lightweight concrete and the aircraft is decelerated as it rolls through the material.

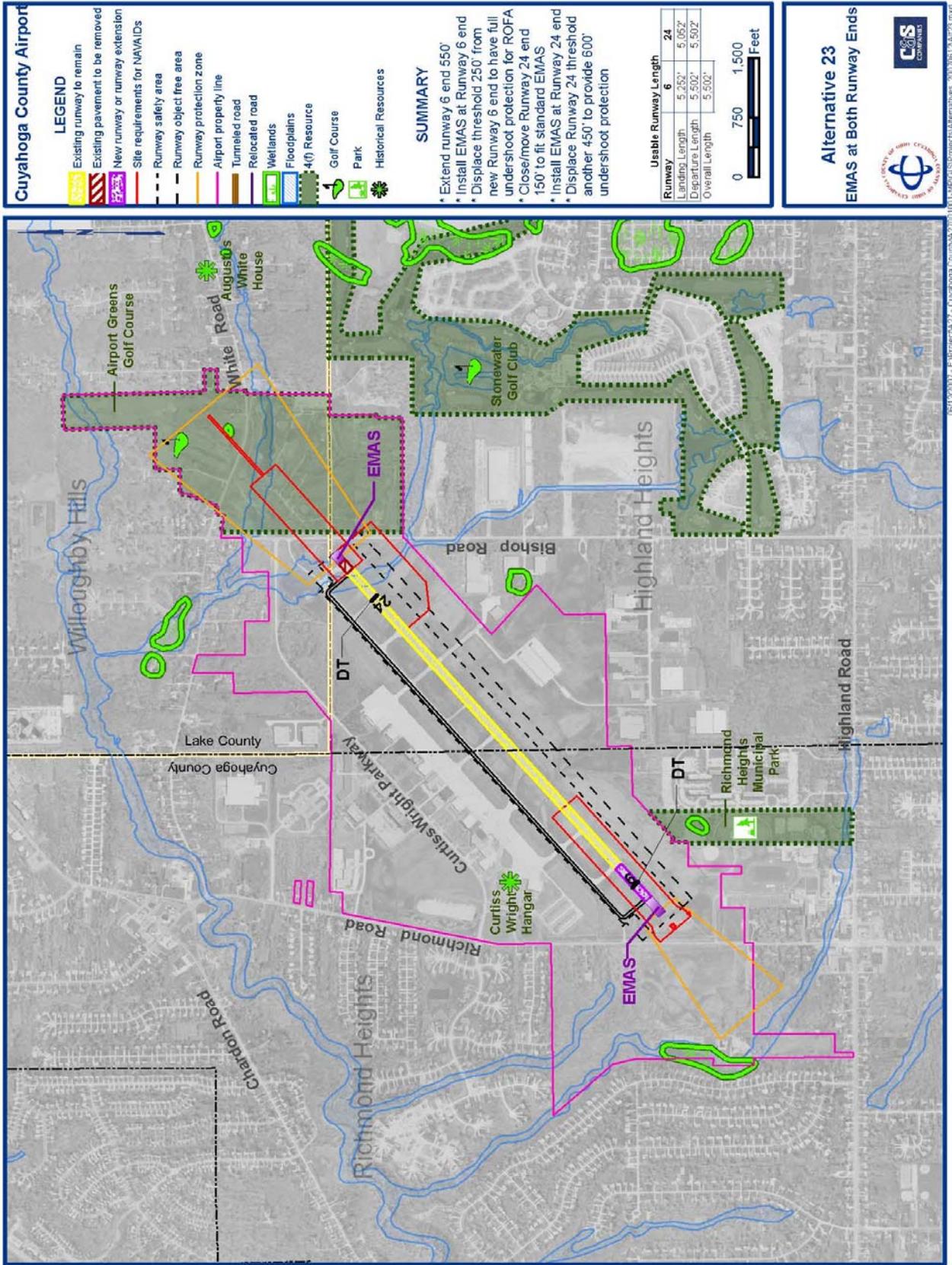
Runway 6 would be extended 550 feet to the west and EMAS would be installed. The threshold for Runway 6 would be displaced 250 feet to provide full undershoot protection for the ROFA. Runway 24 would be shortened by 150 feet to allow EMAS to be installed and the threshold for Runway 24 would also be displaced 450 feet to provide 600-foot undershoot protection (**Figure 2.6 Preferred Alternative 23 – EMAS at Both Runway Ends**).

This alternative provides 5,502 feet of pavement for takeoff operations in both directions with compliant safety areas. Alternative 23 provides less landing distance due to the use of displaced thresholds. The landing distance available is 5,252 feet for Runway 6 and 5,052 feet for Runway 24.

When compared to all of the other build alternatives, Alternative 23 has the least anticipated impacts to floodplains, streams and farmland. It does not impact parkland or recreational resources, has no road relocations and has the least amount of proposed ground disturbance for construction. The construction elements of this alternative can be accomplished entirely on airport property. Off-airport work includes potential obstruction / tree clearing off both runway approaches and proposed property acquisition within each proposed RPZ. This alternative has the least amount of community impacts and is supported by both the general public and elected officials in all three local communities.

Alternative 23 is considered a prudent and feasible alternative and meets the project's primary purpose and need of providing safety areas that meet FAA requirements and 5,500 feet of runway as required for continued viability of the airport. Alternative 23 was the locally preferred alternative in the 2010 Airport Master Plan Update.

Figure 2.6 Alternative 23 – EMAS at Both Runway Ends (Master Plan Preferred Alternative)



2.12 Alternative 24 – Combination of Runway 24 Shift to West and Runway 6 EMAS

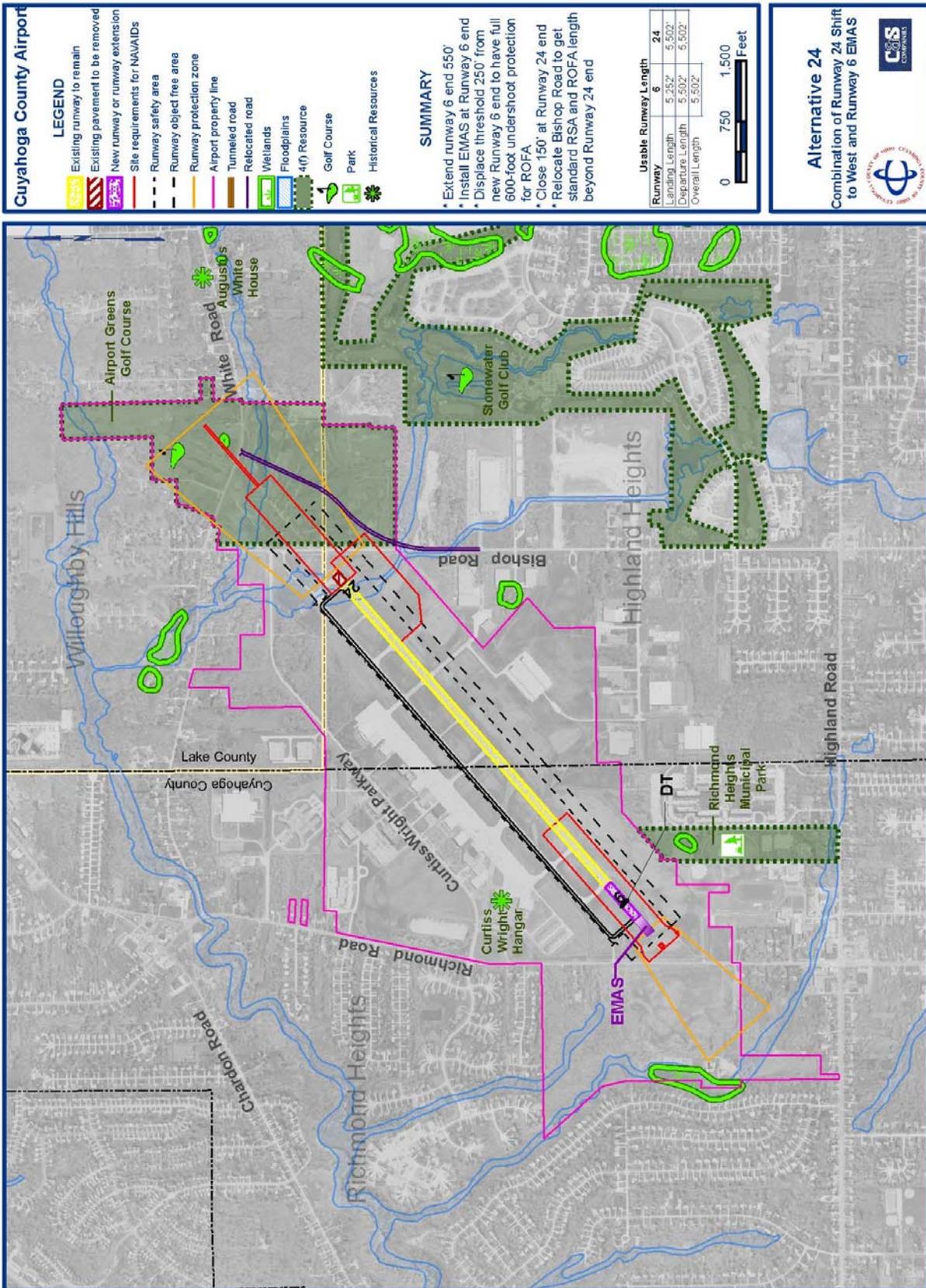
With this alternative, Runway 6 would be extended 550 feet, the stopway would be removed and EMAS would be installed at its end. The threshold for Runway 6 would be displaced by 250 feet and 600 feet of undershoot protection would be provided for the ROFA. Runway 24 would be shortened by 150 feet by removing existing pavement and standard RSA and ROFA would be constructed at this end of the runway (**Figure 2.7 Alternative 24 – Combination of Runway 24 Shift to West and Runway 6 EMAS**). This alternative requires relocation of Bishop Road.

This alternative provides 5,502 feet of pavement for takeoff operations in both directions and 5,502 feet of landing pavement on Runway 24. This alternative would have compliant safety areas and similar to Alternative 23, it provides a more limited landing distance of 5,252 feet for Runway 6 due to the use of a displaced threshold.

Compared to the other build alternatives – except for Alternative 23 – Alternative 24 would be considered the alternative with the least amount of community and environmental impacts. This alternative has impacts to parkland and recreational resources and requires the relocation of Bishop Road to provide compliant safety areas, but has minimum impacts to floodplains, streams and farmland. Alternative 24 has the least amount of ditch impacts of any of the alternatives being considered. This alternative could be implemented within existing airport property, except potential obstruction and RPZ clearing at both ends of the airfield.

Although Alternative 24 is considered a sound alternative and meets the project's primary purpose and need, it requires a road relocation which is strongly opposed by the local communities. Due to the availability of an alternative with generally fewer expected impacts (Alternative 23) and no road relocations, Alternative 24 is removed from further consideration.

Figure 2.7 Alternative 24 – Combination of Runway 24 Shift to West and Runway 6 EMAS



2.13 Selection of Preferred Alternative

After analysis of the advantages and disadvantage of each alternative, the alternative that best meets the project's purpose and need, while minimizing impacts to the built and natural environment, is Alternative 23 – EMAS at Both Runway Ends (**Figure 2.6 Alternative 23 – EMAS at Both Runway Ends – (Master Plan Preferred Alternative)**). Alternative 23 best meets the project's purpose and need of providing 5,500 feet of runway for takeoff in both directions as well as providing compliant safety areas and is selected as the Preferred Alternative for the EA.

Preferred Alternative 23 has the least amount of overall community and environmental impacts and does not require any road relocations which have been highly unpopular with both elected officials and citizens from all three local communities. In addition, throughout the public involvement process, this alternative has been repeatedly identified as the alternative most preferred by the public. See

B Public Involvement Prior to the Draft EA for details on the public involvement process.

Alternative 23 is considered the most prudent and feasible alternative when compared to the other alternatives. The recommendation that Alternative 23 be selected as the Preferred Alternative for the EA was accepted by Cuyahoga County in early 2014. As a result, Alternative 23 is carried forward in the EA for additional analysis, public comment and agency review.

2.14 Summary of Costs of Preferred Alternative 23

During preliminary design of Preferred Alternative 23, detailed cost estimates were developed by the Airport's engineer (CHA Companies) and are shown in **Table 2.1 Estimated Construction Costs of the Preferred Alternative 23**. The cost of Alternative 23 depends on construction phasing and availability of federal and local funding and is subject to change. Final construction costs of the Preferred Alternative will be developed during the final design phase, if the project is ultimately approved following the environmental review process.

Table 2.1 Estimated Construction Costs of the Preferred Alternative 23	
Number of Construction Seasons	Cost Estimate
One Year	\$43,668,181*
Two Year	\$40,677,013
Three Year (multi-year plan)	\$42,058,925

*One year costs reflect a cost premium to accelerate work activities through one construction season.

2.15 Expected Navigational Aid Impacts of the Preferred Alternative

Certain navigational aids (NAVAIDS) will require relocation with the implementation of the Preferred Alternative 23. Final location of NAVAIDS will be determined during final design. Anticipated NAVAID relocations include:

Runway 6 Precision Approach Path Indicator (PAPI) and Runway End Identifier Lights (REILs): Runway 6 currently has a 4-box PAPI and REILs. The PAPI and REILs for Runway 6 will need to be relocated due to the proposed Runway 6 threshold shift to maintain the optimal threshold crossing height and identification of the new threshold. The existing PAPI and REILs for Runway 6 are owned and maintained by the FAA and therefore will be sited in accordance with FAA Order JO 6850.2B, *Visual Guidance Lighting System*. The Runway 6 PAPIs will be sited on the west side of the runway (left on approach) which is the preferred side. FAA Order JO 6850.2B, states that the inboard Lamp Housing Assembly (LHA #1) should not be closer than 50 feet from the edge of pavement and the separation between the lateral LHAs must be 30 feet (with a +/- 1' tolerance).

Runway 24 Glide Slope: Since the new Runway 24 threshold will be displaced 502 feet southwest of its current location, the glide slope will need to be relocated. In order to meet the requirements of FAA Order 6750.16D, *Siting Criteria for Instrument Landing Systems*, the new glide slope antenna will be located 912 feet southwest of the new Runway 24 displaced threshold and 410 feet southeast of runway centerline to keep it out of the Runway Object Free Area (ROFA). This location will also accommodate the null reference glide slope mast height and provide the required separation between the glide slope antenna and the runway centerline for the Obstacle Free Zone (OFZ) in accordance with FAA Advisory Circular 150/5300-13A.

Runway 24 Precision Approach Path Indicator: Runway 24 currently has a 4-box PAPI collocated with the existing glide slope. The PAPI will also need to be relocated due to the proposed threshold displacement in order to provide a coincidental visual glide path with the electronic version. The existing PAPI for Runway 24 is owned and maintained by the county and will be sited in accordance with FAA Order JO 6850.2B, *Visual Guidance Lighting System*. In order to coincide with the Runway 24 glide slope angle of 3.00 degrees and a TCH of 45 feet, the proposed PAPIs will be located 912 feet southwest of the Runway 24 threshold. The PAPI Obstacle Clearance Surface (OCS) for this location will be verified during final design.

Runway 24 Medium Intensity Approach Lighting System (MALSR): Runway 24 is currently served by an existing FAA owned and maintained MALSR. The existing MALSR extends from the end of the runway northeast along the extended runway centerline and crosses both Bishop Road and White Road. The proposed 502 foot displacement of the Runway 24 threshold will require the threshold bar and the first two light bars to be semi-flush, in-pavement type fixtures since that portion of the system will be in the displaced pavement area and subject to aircraft movement. The third light bar will be in the EMAS bed with the remaining MALSR stations mounted on Low-Impact Resistant (LIR) masts. Adjustments to the heights of the remaining steady-burning light bars and flashers will be necessary to meet the new light plane elevations by the siting criteria. The existing MALSR electronic equipment will be relocated to a new 10 foot by 16 foot fiberglass equipment

shelter. FAA Order JO 6850.2B, states that the MALSR power and control station shall be located no closer than 400 feet to the extended runway centerline. In order to be as close as possible to the MALSR distribution panel, the new MALSR equipment shelter will be located inside the airport boundary fence along the access road near the gate to Bishop Road.

2.16 Overview of Impacts

Table 2.2 Environmental Impact Evaluation provides an overview of the estimated initial impacts of each build alternative. To quantify preliminary impacts, online database reviews, environmental constraints reviews, consultation with biologists, and agency coordination were conducted. These provided a basis to effectively determine potential impacts of the alternatives being initially considered. Following the selection of the Preferred Alternative, onsite field investigations were conducted to refine the alternative and minimize anticipated impacts. Refined impact estimates for the Preferred Alternative are described in **Section 4.0 Environmental Consequences**.

Preliminary calculations are color coded either in “red” or “green” to aid in a visual understanding of the potential impacts of each alternative. Red indicates the alternative with the highest impact in a specific category while green indicates the least impact in a particular category. Impacts were calculated based on the expected area of construction for each alternative – commonly referred to as “grading limits of construction”. The area of construction was developed by the Airport’s engineering consultant and represents their best judgment given the information that was available at the beginning of the analysis phase. The same criteria was used for each build alternative as to allow an “apples-to-apples” comparison to better evaluate the alternatives.

Once the initial impact analysis was completed and a Preferred Alternative was selected, a more refined evaluation was undertaken on the Preferred Alternative. This refined approach included developing preliminary engineering plans (**Appendix C Preliminary Engineering**) on Preferred Alternative 23 in order to identify and avoid impacts to a greater degree. The development process of the Preferred Alternative 23 started with an attempt to first avoid, then minimize and ultimately mitigate potential environmental impacts if avoidance was not possible. As a result of preliminary engineering, impacts initially associated with Preferred Alternative 23 have, in most cases, been avoided or greatly reduced. See **Section 4.0 Environmental Consequences** for refined impact calculations.

Table 2.2 Environmental Impact Evaluation

Category	Criterion	No Action Alternative	Alternative 15	Alternative 16	Alternative 17	Alternative 18	Alternative 19	Alternative 23 (Preferred)	Alternative 24	
Community Impacts	Road Relocation/Tunnel (#)	0	3	1	2	2	3	0	1	
	Relocate Richmond Road (yes / no)	No	Yes	Yes	No	No	Yes	No	No	
	Relocate Bishop Road (yes / no)	No	Yes	No	Yes	Yes	Yes	No	Yes	
	Relocate Curtiss Wright Parkway Road (yes / no)	No	Yes	No	Yes	Yes	Yes	No	No	
Total Road Relocation Length (linear feet)	0	9,050	3,750	4,400	3,000	6,850	0	3,300		
Parkland / Recreational Resources (yes / no)	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	
Environmental Impacts	Wetlands (acres)	0	1.62	12.37	3.92	3.92	2.72	3.91	2.61	
	100-year Floodplain (acres)	0	8.16	20.22	7.43	4.23	6.55	2.30	5.51	
	Streams (linear feet)	0	9,040.33	6,824.76	8,319.31	6,354.12	8,182.08	5,249.42	7,617.43	
	Ditches (linear feet)	0	1,398.86	2,818.31	1,618.48	2,068.65	2,303.99	2,068.65	1,373.60	
	Prime Farmland if Drained (acres)	0	304.74	280.55	252.09	251.67	267.33	209.28	220.53	
	Property Noise Impact with 65 DNL (yes / no)	No	No	No	No	No	No	No	No	No
	Total Ground Disturbance (acres)	0	344.00	318.77	298.71	293.49	312.28	239.86	260.68	

The colors "green" and "red" represent a specific environmental category considered to have the least (green) or the most (red) amount of expected impacts when compared to the other build alternatives. It should be noted that impacts with Alternative 23 have been refined and in most cases, greatly reduced, after selection of the preferred alternative. See Section 4.0 Environmental Consequences for revised impact calculations of Preferred Alternative 23.