

# Environmental Assessment for the Proposed HIO 13R-31L RSA Improvements



## Draft EA

Hillsboro Airport (HIO), Hillsboro, Oregon | April 2021

### Appendix C: Final Alternatives Analysis Memorandum

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## Final Alternatives Analysis Memorandum – Revised

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## ACRONYMS AND ABBREVIATIONS

ACRONYM/ABBREVIATION	DEFINITION
AOA	Air Operations Area
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWS	Clean Water Services
DSL	Oregon Department of State Lands
EA	Environmental Assessment
EMAS	Engineered Material Arresting System
FAA	Federal Aviation Administration
HIO	Hillsboro Airport
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
NAVAIDS	Navigational Aid System
NEPA	National Environmental Policy Act
Port	Port of Portland
RPZ	Runway Protection Zone
RSA	Runway Safety Area
USACE	U.S. Army Corps of Engineers



## 1. INTRODUCTION

The Port of Portland (Port) and Federal Aviation Administration (FAA) are preparing an Environmental Assessment (EA) for proposed improvements to the northern end of Runway 13R-31L and the associated runway safety area (RSA) at Hillsboro Airport (HIO) in Hillsboro, Oregon, pursuant to the National Environmental Policy Act (NEPA).<sup>1</sup> This portion of the runway and its RSA are hereafter referred to as Runway 13R and Runway 13R RSA, respectively. The purpose of the proposed improvements is to meet current FAA airfield design standards for Runway 13R and its RSA.<sup>2</sup> The northern portion of Runway 13R- and the portion of the RSA northwest of the end of Runway 13R do not fully comply with FAA design standards for longitudinal gradients and for drainage of stormwater.<sup>3, 4</sup> In some areas, the grades exceed those permitted by the FAA standards or there are slope changes in surface grade that are greater than permitted by the FAA standards. In the Runway 13R RSA, which is not paved, the RSA is bisected by a tributary, Glencoe Swale, and wetlands that impound water most of the year. These areas include depressions that deviate from the gradient and drainage standards.

The purpose of this memorandum is to identify options (hereafter referred to as alternatives) for achieving the purpose of the proposed project and evaluating them to decide which ones to carry forward for detailed study in the EA. Section 2 identifies a range of alternatives that achieve the project purpose and describes them in detail. Section 3 presents a process and criteria for evaluating the alternatives. Section 4 presents the results of applying the evaluation criteria and identifies the alternatives that will be retained for further analysis in the EA, along with the No Action Alternative, as required by NEPA.<sup>5</sup>

## 2. ALTERNATIVES

This section identifies alternatives that achieve the project purpose and that are feasible. Alternatives that do not achieve the purpose and need and/or are not feasible are not considered or discussed in this analysis. Alternatives that achieve the project purpose and need are alternatives that resolve the deviations from the FAA design standards for gradients and drainage of stormwater that are described in Section 1. For purposes of this memorandum, the term “feasible” is used to mean “possible” and refers to sound engineering principles; an alternative is feasible if, as a matter of sound engineering principles and existing technology, it can be built.<sup>6</sup> The alternatives discussed in this section are both feasible and would resolve the deviations from the FAA design standards. Whether alternatives identified in this section are practical is addressed in Section 4 by applying the alternatives evaluation criteria that are presented in Section 3.

Additional factors taken into consideration in identifying alternatives are the requirements of Section 404 of the federal Clean Water Act (CWA) and federal executive orders protecting wetlands and floodplains, as well as the vegetated corridor requirements of the regional water resources management agency,

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<sup>1</sup> 42 U.S.C. 4371 et. seq.

<sup>2</sup> FAA Advisory Circular 150/5300-13A, Change 1, Airport Design (dated September 28, 2012), Runway: Paragraph 313.b (1) and (2); RSA: Paragraph 307 b and 313 d (1) and Figure 3-22.

<sup>3</sup> The longitudinal gradient is the grade or slope along the length of the runway and the part of the RSA that extends beyond the end of the runway.

<sup>4</sup> AC 150/5300-13A, change 1, Airport Design, Paragraph 307 b.

<sup>5</sup> A no action alternative means no improvements to the RSA and runway would occur (Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, Council on Environmental Quality, 40 CFR 1502.4(d)).

<sup>6</sup> FAA Order 5050.4B, Paragraph 1007e(4)(a).

Clean Water Services (CWS).<sup>7</sup> Wetlands, floodplains, and vegetated corridors are collectively referred to herein as “water resources.” These factors are considered because the Section 404 requirements and the executive orders require FAA to determine that no practicable alternatives exist before FAA can approve an action encroaching on a floodplain or affecting wetlands.<sup>8</sup> The U.S. Army Corps of Engineers (USACE) requires a similar determination before issuing a Section 404 Permit, as does CWS regarding vegetative corridors before issuing a Service Provider Letter (similar to a permit).<sup>9, 10</sup>

Glencoe Swale and other related water resources that bisect the Runway 13R RSA are among the features in the RSA that are not in compliance with the FAA design standards and could be affected by proposals to achieve the project purpose. Therefore, this analysis addresses the requirements to determine whether practicable alternatives to affecting these resources exist by identifying alternatives in this section that are likely to avoid or minimize impacts to the resources and, in Section 4, determining if they are practicable. While the executive orders and CWS do not define practicable, the CWA guidelines define the term practicable as “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.”<sup>11</sup> This section addresses whether the alternatives are available and capable of being implemented after taking into consideration existing technology, which is similar to the NEPA definition of feasible. The other factors are addressed by the screening criteria and process described in Section 3 and applied in Section 4.

Six alternatives have been identified that would achieve the project purpose and are feasible. Alternatives 1 through 4 would avoid impacts to the water resources. Alternatives 5 and 6 appear, from a screening level of evaluation, to have unavoidable impacts to water resources; these alternatives are included in case the avoidance alternatives are deemed not practicable after applying the evaluation criteria described in Section 3. The alternatives are described in detail in Sections 2.1 through 2.7 and are illustrated in Figure 1 through Figure 6 at the end of this document.

## 2.1. No Action Alternative

Under the No Action Alternative, no improvements to the RSA and runway would be constructed and the RSA and runway would continue not to meet FAA design standards.

## 2.2. Alternative 1: Reduce Runway 13R-31L Length

Alternative 1 would accommodate a standard 1,000-foot RSA south of Glencoe Swale and its associated wetlands and vegetated corridor by relocating the Runway 13R threshold approximately 740 feet south of its existing location, reducing the length of Runway 13R-31L by approximately 740 feet. This would result in a 5,860-foot Runway 13R-31L.

As shown in Figure 1, approximately 740 feet of pavement would be removed from the north end of Runway 13R-31L and Taxiway A. Connector Taxiway A1 and Taxiway A2 would be relocated to the new Runway 13R threshold location. The newly defined Runway 13R RSA (south of the wetlands, vegetated corridor, and Glencoe Swale) and Runway 13R would be regraded to comply with FAA design standards.

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<sup>7</sup> A vegetated corridor is a corridor adjacent to a Sensitive Area (including wetlands) that is preserved and maintained to protect the water quality functions of the Sensitive Area (Design and Construction Standards for Sanitary Sewer and Surface Water Management, Clean Water Services, Sections 1.03.56 and 1.03.66, April 2017).

<sup>8</sup> FAA Order 5050.4B, paragraph 1007e(6), Clean Water Act Guidelines 40 CFR 230, Executive Order 11990: Protection of Wetlands (May 24, 1977, as amended), and Executive Order 11988: Floodplain Management (May 24, 1977, as amended).

<sup>9</sup> Clean Water Act Guidelines 40 CFR 230.10(a).

<sup>10</sup> Design and Construction Standards for Sanitary Sewer and Surface Water Management, Clean Water Services, Section 3.07.3b, April 2017.

<sup>11</sup> 40 CFR 230.3(q).

The Runway Protection Zone (RPZ) for Runway 13R, the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), and other elements of the Navigational Aid System (NAVAIDS) associated with the Runway 13R end would be relocated based on the new Runway 13R threshold. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards. Relocating the RPZ would require that it meet current FAA standards; therefore, one-half mile of NE Evergreen Road and one-quarter mile of NE 25th Avenue would be relocated outside the RPZ or tunneled under it. If the roads are relocated, small portions of the roads would be located beyond the existing airport boundary; the remaining project elements would occur within the existing airport property boundary.

### 2.3. Alternative 2: Runway 13R Declared Distances

As shown in Figure 2, Alternative 2 would accommodate a standard 1,000-foot RSA south of Glencoe Swale and its associated wetlands and vegetated corridor by reducing the landing distance on the Runway 13R departure end by approximately 740 feet; this 740 feet of the runway would be counted as RSA for landings. This would result in a 5,860-foot runway for landings on Runway 13R and takeoffs on Runway 31L but would maintain 6,600 feet for takeoffs on Runway 13R and landings on Runway 31L.

No pavement would be removed or relocated for this alternative. Runway 13R and the portion of the existing Runway 13R RSA south of the wetlands and vegetated corridor and Glencoe Swale would be regraded to comply with FAA design standards. The RPZ for Runway 13R, the MALSR, and other elements of the NAVAIDS associated with Runway 13R end would be relocated as necessary based on the new Runway 13R threshold. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards. Relocating the RPZ would require that it meet current FAA standards; therefore, one-half mile of NE Evergreen Road and one-quarter mile of NE 25th Avenue would be relocated outside the RPZ or tunneled under it. If the roads are relocated, small portions of the roads would be located beyond the existing airport boundary, requiring property acquisitions, as shown in Figure 2; the remaining project elements would occur within the existing airport property boundary.

### 2.4. Alternative 3: Shift Runway 13R-31L South

As shown in Figure 3, Alternative 3 would accommodate a standard 1,000-foot RSA south of Glencoe Swale and its associated wetlands and vegetated corridor by shifting Runway 13R-31L approximately 740 feet south of its existing location. This would maintain the 6,600-foot length of Runway 13R-31L.

At the Runway 13R end, approximately 740 feet of pavement would be removed from the runway and from Taxiway A, as shown in Figure 3. Connector Taxiway A1 and Taxiway A2 would be relocated to the new Runway 13R threshold location. The newly defined Runway 13R RSA (south of the wetlands, vegetated corridor and Glencoe Swale) would be regraded to comply with FAA design standards. The RPZ for Runway 13R, the MALSR, and other elements of the NAVAIDS associated with the Runway 13R end would be relocated based on the new Runway 13R threshold. Relocating the RPZ would require that it meet current FAA standards; therefore, one-half mile of NE Evergreen Road and one-quarter mile of NE 25th Avenue would be relocated outside the RPZ or tunneled under it. If the roads are relocated, small portions of the roads would be located beyond the existing airport boundary; the remaining Runway 13R end project elements would occur within the existing airport property boundary.

At the Runway 31L end, approximately 740 feet of pavement would be added to Runway 13R-31L and Taxiway A. Connector Taxiway A8 and Taxiway A9 would be relocated to the new Runway 31L threshold location. The Runway 31L RSA and RPZ would shift to the south and the RSA may need to be regraded to comply with FAA design standards. The RPZ for Runway 31L and the NAVAIDS associated with the

Runway 31L end would be relocated based on the new Runway 31L threshold. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards.

Approximately 660 linear feet of NE Cornell Road would fall in the newly defined Runway 31L RSA and would have to be tunneled under the RSA or relocated outside the RPZ. Approximately 830 linear feet of NE Veterans Drive and 500 feet of NE Brookwood Parkway would fall in the newly defined Runway 31L RPZ and would have to be relocated outside the RPZ or tunneled under it. If these roads are relocated, substantial portions of some of them would have to be located beyond the airport boundary, requiring property acquisitions. The remaining Runway 31L end project elements would occur within the existing airport property boundary.

## 2.5. Alternative 4: Install Engineered Materials Arresting System (EMAS)

Alternative 4 would meet the safety requirements for Runway 13R RSA by installing an Engineered Materials Arresting System (EMAS) south of Glencoe Swale and its associated wetlands and vegetated corridor. An EMAS is an FAA-approved aircraft arresting system that uses porous cellular materials and is intended to stop aircraft that have overshot a runway. It is primarily feasible when there is insufficient distance for the standard 1,000-foot RSA dimension. An EMAS consists of an arrestor material bed, anchor beam, and grooved pavement lead-in ramp. The arrestor bed features 4-foot by 4-foot cellular cement blocks adjusted in thickness to crush from the weight of aircraft.

As shown in Figure 4, this alternative would relocate the Runway 13R threshold approximately 500 feet south of its existing location to accommodate the EMAS, reducing the length of Runway 13R-31L by approximately 500 feet. Runway 13R would be regraded to comply with FAA design standards. This would result in a 6,100-foot Runway 13R-31L.

Approximately 500 feet of pavement would be removed from the north end of Runway 13R-31L and Taxiway A. Connector Taxiway A1 and Taxiway A2 would be relocated to the new Runway 13R threshold location. The RPZ for Runway 13R, the MALSR, and other elements of the NAVAIDS associated with Runway 13R end would be relocated based on the new runway threshold. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards. Relocating the Runway 13R RPZ would require that it meet current FAA standards; therefore, slightly less than one-half mile of NE Evergreen Road and one-quarter mile of NE 25th Avenue would be relocated outside the RPZ. If the roads are relocated, small portions of the roads would be located beyond the existing airport boundary, requiring minor property acquisitions on a corner of two properties; the remaining project elements would occur within the existing airport property boundary.

## 2.6. Alternative 5: Underground Conveyance

As shown in Figure 5, Alternative 5 would accommodate a standard 1,000-foot RSA by conveying the portion of Glencoe Swale that traverses Runway 13R RSA under the RSA in a conduit at the same location. The RSA (including the existing swale, wetlands, vegetated corridor, and floodplain) and Runway 13R would be regraded to comply with FAA design standards. Mitigation for the swale, wetlands, and vegetated corridor impacts would occur off-site in accordance with the recommendation of FAA to site wetlands mitigation outside of the air operations area (AOA) and the policies of the HIO Wildlife Hazard Management Plan, which calls for off-site mitigation of wetlands, because surface water and wetlands are wildlife hazard attractants (Port 2015) (FAA 2020).<sup>12</sup> This alternative would maintain the 6,600-foot length of Runway 13R-31L in its current location. No changes would occur to either of the

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<sup>12</sup> Section 2.4.1 of HIO Wildlife Hazard Management Plan also states that CWS has allowed the Port to mitigate for impacts to vegetated corridors off-site.

RPZs, but the Runway 13R MALSR and other NAVAIDS would be removed during construction and replaced in the same locations after the regrading of the RSA. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards. All project elements would occur within the existing airport property boundary.

## 2.7. Alternative 6: Reroute Swale around Runway Safety Area (RSA)

Like Alternative 5, Alternative 6 would accommodate a standard 1,000-foot RSA by removing Glencoe Swale and the associated water resources from the Runway 13R RSA. However, unlike Alternative 5, this alternative would mitigate impacts to the water resources by relocating them on the airport (on-site mitigation). Alternative 6, as shown in Figure 6, would reroute Glencoe Swale and, as much as possible, its associated wetlands and vegetated corridor north around the outside of the RSA in a U-shape. This swale segment would be extended from approximately 900 feet to 2,200 feet. The RSA would be regraded, including the existing swale, wetlands, vegetated corridor, and floodplain, to comply with FAA design standards. The swale would be conveyed in a pipe or culvert for short distances under the service road just north of and parallel to the existing swale location on both sides of the RSA, but it would otherwise be open water at the surface. This alternative would maintain the 6,600-foot length of Runway 13R-31L in its current location. No changes would occur to either of the RPZs, but the Runway 13R MALSR and other NAVAIDS would be removed during construction and replaced in the same locations after the regrading of the RSA. Additionally, any equipment that is not fixed by function in the RSA would be relocated based on current RSA standards. All project elements would occur within the existing airport property boundary.

## 3. SCREENING CRITERIA AND PROCESS

NEPA requires evaluation of the environmental consequences of all reasonable alternatives, or a set of alternatives that represents all those that are reasonable.<sup>13, 14</sup> Reasonable alternatives include those that are: (1) feasible; and (2) practical from a technical and economic standpoint and using common sense.<sup>15</sup> Section 2 addressed feasibility of the six preliminary alternatives. This section presents a process and set of criteria for evaluating if alternatives are practical.

Technical criteria address aircraft safety and operations: a practical alternative does not cause safety or operations problems that cannot easily be resolved. Economic and common-sense criteria typically address the relative costs and anticipated impacts of alternatives: alternatives that are likely to be extraordinarily costly or that likely to cause extraordinary environmental or social impacts compared to other alternatives that achieve the project purpose are typically considered not practical. Common sense criteria also address problems that are unusual or unique and make an alternative not feasible or practical. Each of these types of criteria is discussed more below in Sections 3.1 and 3.2.

The term “screening” is commonly used to refer to this alternatives evaluation process. Screening usually consists of at least two levels of evaluation, each with more detailed quantitative and/or qualitative criteria. In this analysis, screening provides a means of separating the alternatives that are practical and must be carried forward for detailed study of their environmental consequences from those that are not practical. After each level, a decision is made as to whether to advance each of the alternatives to the

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<sup>13</sup> Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, Council on Environmental Quality, 40 CFR 1502.14(a).

<sup>14</sup> Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Council on Environmental Quality (Question 1b), 46 Fed. Reg. 18026, March 23, 1981.

<sup>15</sup> Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Council on Environmental Quality (Question 2a), 46 Fed. Reg. 18026, March 23, 1981.



subsequent level. The first level typically evaluates whether alternatives achieve the purpose and need, and subsequent levels determine if they are feasible (the first part of the definition of a reasonable alternative under NEPA) and practical.<sup>16</sup> Section 2 identified only alternatives that achieve the purpose and need and are feasible, thus accomplishing the first two levels of screening in a different way.

This section defines “practical” (the other part of the definition of a reasonable alternative under NEPA) and presents a two-level process and criteria for evaluating whether alternatives are practical. For each alternative, Screening Level 1 is applied; only those alternatives that meet the Screening Level 1 criterion are advanced to Screening Level 2. Alternatives that meet the Screening Level 2 criteria are retained for detailed analysis in the EA. Section 3.1 and Section 3.2 describe the methods and criteria for Screening Levels 1 and 2, respectively.

### 3.1. Screening Level 1: Compatibility with Critical Aircraft

Screening Level 1 addresses a major factor aspect of aircraft operations. The FAA design standards applicable to a runway, including length, are determined primarily by the characteristics of a “critical design aircraft” (or critical aircraft), which is the type of aircraft or group of aircraft with similar characteristics that are the most demanding aircraft (in terms of runway length, width, pavement strength, and similar characteristics) that make regular use of a runway. The HIO Master Plan Update concluded that the current and future critical aircraft for Runway 13R-31L is the Gulfstream 650.<sup>17</sup> Thus, Screening Level 1 determines if the alternatives are compatible with the dimensional requirements for this type of aircraft as the critical aircraft.

Although the HIO Master Plan Update concludes that an optimal runway length for the critical aircraft is 7,500 feet, which would fully accommodate the critical aircraft and numerous other business jets, increasing the existing 6,600-foot Runway 13R-31L by 900 feet would require resolving serious land use incompatibilities and making significant infrastructure investments. The Master Plan Update concluded that the existing 6,600-foot length of Runway 13R-31L is usable by the critical aircraft under most conditions and would suffice for the foreseeable future. Therefore, full use of a 6,600-foot runway is the Screening Level 1 criterion. This is a “fatal flaw” criterion and alternatives that cannot provide this length are not advanced to the second level of screening.

### 3.2. Screening Level 2: Practicality

Screening Level 2 uses two criteria, each with a series of sub-criteria, to screen alternatives to determine if they are practical. The first criterion further addresses aircraft safety and operations. The second criterion addresses the relative environmental and social impacts of the alternatives. Cost was not evaluated in this analysis because it is unlikely that any of the alternatives that progress to Screening Level 2 are extraordinarily more costly than other alternatives that progress to that level.

- A practical alternative does not cause safety or operational problems that are not easily resolvable. More specifically, a practical alternative:
  - Does not cause increases in RPZ non-compliance
  - Does not create a high-energy runway intersection<sup>18</sup> with Runway 2-20 in the middle third of Runway 13R-31L

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<sup>16</sup> NEPA defines reasonable as feasible and practical from a technical and economic standpoint and using common sense. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, Council on Environmental Quality (Question 2a), 46 Fed. Reg. 18026, March 23, 1981.

<sup>17</sup> HIO Draft Master Plan Update. Section 3.9.1 Critical Aircraft Determination. Draft March 13, 2018.

<sup>18</sup> A high-energy runway intersection is created where one intersection crosses another within the middle one-third of the other runway.

- Eliminates the wildlife hazard in the RSA
- Does not create new or increase existing obstructions to Part 77 surfaces<sup>19</sup>
- Does not adversely affect NAVAIDs
- Does not present unique problems or appear to result in an accumulation of factors that collectively present safety or operational problems
- A practical alternative does not cause environmental or social impacts that are not easily resolvable. More specifically, a practical alternative:
  - Does not appear to result in greater environmental or social impacts than another alternative(s) that solves the problem the purpose is designed to achieve. Relative environmental and social impacts are qualitatively assessed for each alternative using aerial photographs and readily available data. Water resource impacts are quantified due to the regulatory requirements described in Section 2 to determine there are no practicable alternatives to affecting the resources.
  - Does not present unique problems or appear to result in an accumulation of impacts that collectively reach extraordinary magnitudes. This criterion addresses unique regulatory or logistical problems that could make an alternative not feasible to implement, as well as the collective effect of multiple environmental and/or social impacts that might make an alternative not practical to implement.

These criteria can also be framed as questions, as listed in Table 2 at the end of this document. It is not likely that all alternatives can completely meet all the requirements of the Screening Level 2 criteria, so this level of screening identifies alternatives that meet most of the requirements and that do not have any fatal flaws in terms of unique problems or an accumulation of impacts.

Alternatives that pass Screening Level 2 are retained for detailed analysis in the EA; alternatives that do not are eliminated from further analysis and the reasons for their elimination are clearly explained in Section 4. The environmental consequences of the retained alternatives will be evaluated in the EA, where the consequences of the alternatives will be compared to each other and to the environmental consequences of the No Action Alternative.

## 4. SCREENING RESULTS

This section presents the results of applying the screening process and criteria described in Section 3 to the alternatives described in Section 2 to establish whether the alternatives are reasonable; that is, are they both feasible and practical. Sections 4.1 through 4.7 below present the screening results. Figure 1 through Figure 6 at the end of the document present an illustration of each alternative with a bulleted list of the key elements and screening results for the alternative.

### 4.1. No Action Alternative

Under the No Action Alternative, no improvements to the RSA and runway would be constructed and the RSA and runway would continue not to meet FAA design standards. NEPA requires the evaluation of the environmental consequences of a no action alternative (CEQ 2005); as such, the No Action Alternative was retained for detailed analysis in the EA.

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<sup>19</sup> Part 77 surfaces (defined in 14 CFR Part 77) are imaginary surfaces in the air around an airfield, below which obstructions to air navigation are not permitted or should be avoided to prevent or minimize the adverse impacts to the safe and efficient use of navigable airspace. The surfaces are sometimes depicted or described as resembling the tiered seats in a football stadium.

#### 4.2. Alternative 1: Reduce Runway 13R-31L Length

Alternative 1, which is shown in Figure 1 at the end of the document, would reduce the length of the runway by 740 feet to a length of 5,860 feet to accommodate a standard 1,000-foot Runway 13R RSA south of Glencoe Swale and the associated wetlands and vegetated corridor. Under this alternative, the runway length would be less than the required runway length (6,600 feet) for the critical aircraft identified in the Master Plan Update and therefore this alternative was not advanced to Screening Level 2.

**Alternative 1 was not retained for detailed analysis because it would not accommodate the critical aircraft.**

#### 4.3. Alternative 2: Runway 13R Declared Distances

Alternative 2, which is shown in Figure 2 at the end of the document, would use declared distances on Runway 13R to accommodate a standard 1,000-foot Runway 13R RSA south of Glencoe Swale and the associated wetlands and vegetated corridor. This would reduce the landing distance on Runway 13R and takeoff distance on Runway 31L by 740 feet to 5,860 feet, while maintaining 6,600 feet for takeoffs on Runway 13R and landings on Runway 31L. Under this alternative, the runway length would be less than the required runway length (6,600 feet) for the critical aircraft identified in the Master Plan Update and therefore this alternative was not advanced to Screening Level 2.

**Alternative 2 was not retained for detailed analysis because it would not accommodate the critical aircraft.**

#### 4.4. Alternative 3: Shift Runway 13R-31L South

Alternative 3, which is shown in Figure 3 at the end of the document, would maintain the 6,600-foot runway length by shifting the entire runway 740 feet to the south to accommodate a standard 1,000-foot Runway 13R RSA south of Glencoe Swale and the associated wetlands and vegetated corridor. Alternative 3 was retained for additional analysis in Screening Level 2 because it would accommodate the critical aircraft (Screening Level 1).

Alternative 3 would cause several safety and operational problems that are not easily resolvable: it would increase RPZ non-compliance in the Runway 31L RPZ and create new obstructions at the southern end of the runway. NE Veterans Drive and NE Brookwood Parkway would fall in the relocated Runway 31L RPZ and NE Cornell Road would fall in the Runway 31L RSA. These roads would be difficult to relocate or tunnel without substantial impacts. This alternative would create a high-energy runway intersection with Runway 2-20, a safety problem that is not resolvable. It would require relocation of the Runway 13R MALSR and NAVAIDS at both ends of the runway and may increase existing obstructions to Part 77 surfaces due to the shift in the runway thresholds towards developed areas. Shifting the runway south would not eliminate the wildlife hazard at the north end of the runway but would move it from the RSA to the RPZ.

Alternative 3 would not be practical because resolving some of the safety and operational problems would likely have greater environmental and/or social impacts without any additional benefit or advantage over other alternatives that progressed to Screening Level 2 (Alternatives 5 and 6). Alternative 3 would likely result in substantial impacts at the southern end of the runway by relocating (or tunneling) three roadways from the RSA and RPZ, including impacts to Dawson Creek. Although NE Brookwood Parkway could be relocated to east, it would require two new crossings of Dawson Creek and traversing associated wetlands and vegetated corridors (e.g., filling of wetlands) to avoid business and residential relocations. Up to seven acres of wetlands and six acres of vegetated corridors would be

impacted.<sup>20</sup> These impacts to wetlands and vegetated corridors would have to be mitigated. Road relocations would likely require extensive residential property acquisitions and community disruption in this area. This alternative would also relocate or tunnel a half-mile of NE Evergreen Road and a quarter-mile of NE 25th Avenue from the Runway 13R RPZ.

**Alternative 3 was not retained for detailed analysis because it would cause several safety and operational problems, some of which are not solvable; solving others would result in an accumulation of impacts of extraordinary magnitude, without any additional benefit or advantage over Alternative 5 or Alternative 6.**

#### 4.5. Alternative 4: Install Engineered Material Arresting System (EMAS)

Alternative 4, which is shown in Figure 4 at the end of the document, would reduce the length of the runway by 500 feet to a length of 6,100 feet to accommodate an EMAS south of Glencoe Swale and the associated wetlands and vegetated corridor. Under this alternative, the runway length would be less than the required runway length (6,600 feet) required for the critical aircraft identified in the Master Plan Update and, therefore, this alternative was not advanced to Screening Level 2.

**Alternative 4 was not retained for detailed analysis because it would not accommodate the critical aircraft.**

#### 4.6. Alternative 5: Underground Conveyance

Alternative 5, which is shown in Figure 5 at the end of the document, maintains the 6,600-foot runway length by conveying Glencoe Swale under the Runway 13R RSA in a conduit and regrading the Runway 13R RSA, including Glencoe Swale and the associated wetlands and vegetated corridor. Mitigation for impacts to the water resources would occur off-site. Alternative 5 was retained for additional analysis in Screening Level 2 because it would accommodate the critical aircraft (Screening Level 1).

Alternative 5 would not cause safety or operational problems because aside from correcting deviations of Runway 13R and the Runway 13R RSA from the FAA design standards, it would not permanently change the location or geometry of any airfield facilities. This alternative would not cause increases in RPZ non-compliance because there are no changes to the RPZs. It would not create a high-energy runway intersection with Runway 2-20 or increase existing obstructions to Part 77 surfaces because there are no changes in runway thresholds or location. By regrading the entire Runway 13R RSA, this alternative would eliminate standing water and thus, the wildlife hazard in the RSA. While the MALSR and other NAVAIDS would be removed from the Runway 13R RSA during construction, they would be replaced in the same locations following construction. There would be no unique safety or operational problems associated with Alternative 5.

It was estimated that Alternative 5 could impact up to eight acres of wetlands and seven acres of vegetated corridors, including Glencoe Swale and its associated wetlands, floodplain, and vegetated corridors. Compared to other alternatives that progressed to Screening Level 2, impacts to these resources under Alternative 5 would potentially be greater than impacts under Alternative 3, but that alternative has other unresolvable, and no more impact to those resources or other similar resources than in Alternative 6). Mitigation required for the swale, wetlands, and vegetated corridor impacts would occur off-site under this alternative.

The totality of the impacts of Alternative 5 would be substantially less than the totality of the impacts of Alternative 3, which could result in similar or greater water resource impacts to Dawson Creek and

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<sup>20</sup> Estimated wetland impacts in this memo were based on a preliminary high-level assessment of GIS data. Actual wetlands present in the vicinity of HIO and resulting impacts will be refined in the EA.

associated resources, as well as property acquisitions, relocations and community disruption, and/or tunneling of up to five different road segments, as described in Section 4.4. The impacts of Alternative 5 to water resources would be similar to the impacts of Alternative 6 to these resources.

**Alternative 5 was retained for detailed analysis in the EA because it would not cause safety or operational problems, is one of two alternatives that would cause the least social and environmental impacts and would not present any unique problems.**

#### **4.7. Alternative 6: Reroute Swale Around Runway Safety Area (RSA)**

Alternative 6, which is shown in Figure 6 at the end of the document, would maintain the 6,600-foot runway length by rerouting Glencoe Swale around the north end of Runway 13R RSA, thus mitigating on-site for the impacts to the water resources. It would include regrading the Runway 13R RSA, including the existing Glencoe Swale and its associated wetlands, floodplain, and vegetated corridors. Alternative 6 was retained for additional analysis in Screening Level 2 because it would accommodate the critical aircraft.

Alternative 6 would not cause safety or operational problems because aside from correcting deviations of Runway 13R and the Runway 13R RSA from the FAA design standards, it would not change the location or geometry of any airfield facilities. It would not cause increases in RPZ non-compliance because there are no changes to the RPZs. It would not create a high-energy runway intersection with Runway 2-20 or increase existing obstructions to Part 77 surfaces because there are no changes in runway thresholds or location. By rerouting water resources from the RSA to the RPZ, this alternative would not eliminate the wildlife hazard, but would move it from the RSA to the RPZ. While the MALSR and other NAVAIDS would be removed from the Runway 13R RSA during construction, they would be replaced in the same locations following construction. There would be no unique safety or operational problems associated with Alternative 6.

Alternative 6 is not reasonable because on-site mitigation for the impacts to the water resources in the Runway 13R RSA would cause unique problems. Rerouting Glencoe Swale and associated wetlands north around the Runway 13R RSA would increase the length and area of the swale and wetlands in the AOA just outside of the RSA from an approximate 900-foot corridor to a 2,200-foot corridor of surface water and associated wetlands and vegetated corridors. This on-site mitigation would conflict with FAA guidance to site wetlands mitigation outside of the AOA and the policies of the HIO Wildlife Hazard Management Plan, which calls for off-site mitigation of wetlands, because surface water and wetlands are wildlife hazard attractants.<sup>21, 22</sup> Further, the regulatory agencies that have jurisdiction over wetlands and waters in the project area, the Oregon Department of State Lands (DSL) and the USACE, are unlikely to permit on-site mitigation. These agencies generally prefer purchase of wetland mitigation bank credits over on-site mitigation for the following reasons:

- Mitigation banks are already established, so purchasing mitigation bank credits avoids a temporal loss in wetland functions, as would occur from construction of an on-site mitigation site.
- Wetland mitigation banks tend to be large habitats that provide greater functions and values as compared to smaller, potentially more isolated permittee-constructed mitigation sites.

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<sup>21</sup> Port of Portland, Hillsboro Airport Wildlife Hazard Management Plan (Updated January 2015), Section 2.2.2 Clean Water Act Section 404 and Section 2.3.1 Oregon Removal Fill Law. Section 2.4.1 also states that CWS has allowed the Port to mitigate for impacts to vegetated corridors off-site.

<sup>22</sup> FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports (dated August 28, 2007): Paragraph, 2-4.c Mitigation for wetland impacts from airport projects.



- Smaller permittee-constructed mitigation sites have greater potential to fail compared to existing, successfully established mitigation banks.

On the HIO property, there are additional reasons Oregon DSL and the USACE are unlikely to approve on-site mitigation:

- Oregon DSL and the USACE prefer on-site wetland mitigation when the impact site provides locally important functions and values and it would be more beneficial to replace those functions. However, the portion of Glencoe Swale and associated wetlands located on HIO provide moderate hydrologic and water quality functions and limited habitat functions that were not determined to be locally significant in the City's local wetland inventory, so it is unlikely Oregon DSL and the USACE would consider them locally important.
- Due to space limitations, particularly between the RSA and NE Evergreen Road, the mitigation area would be unlikely to replace the functions and values currently provided by Glencoe Swale and the adjacent wetlands.
- There are mitigation banks that serve the project area and offer mitigation credits for both wetlands and waters (stream) impacts.<sup>23</sup>

**Alternative 6 was not retained for detailed analysis because on-site wetland mitigation would present several unique problems: 1) it would conflict with FAA guidance and the policies of the HIO Wildlife Hazard Management Plan for on-site wetlands mitigation; 2) Oregon DSL and USACE would be unlikely to issue the required permits because these agencies typically prefer purchase of wetland mitigation bank credits over on-site mitigation, and; 3) specific conditions on this site would make on-site mitigation very unlikely to be successful, making it even less likely Oregon DSL and USACE would approve it.**

## 5. SUMMARY OF SCREENING RESULTS

Two alternatives are retained for detailed analysis in the EA, the No Action Alternative and Alternative 5, and five alternatives have been eliminated from further analysis, as summarized in Table 1. Additional detail on the screening process and the results of the screening for all the alternatives is presented in Table 2 at the end of this document.

Three alternatives were eliminated at Screening Level 1 (Alternatives 1, 2 and 4) because they would not maintain the current runway length and thus would not accommodate the critical aircraft. Two others were eliminated at Screening Level 2. Alternative 3 was eliminated because it would cause several safety and operational problems and because it would result in an accumulation of impacts of extraordinary magnitude, without any additional benefit or advantage, over Alternative 5 or Alternative 6. Alternative 6 presents unique problems because it would increase wildlife hazard attractants in conflict with FAA guidance and Port policy and it is unlikely that required water resources permits would be issued for it.

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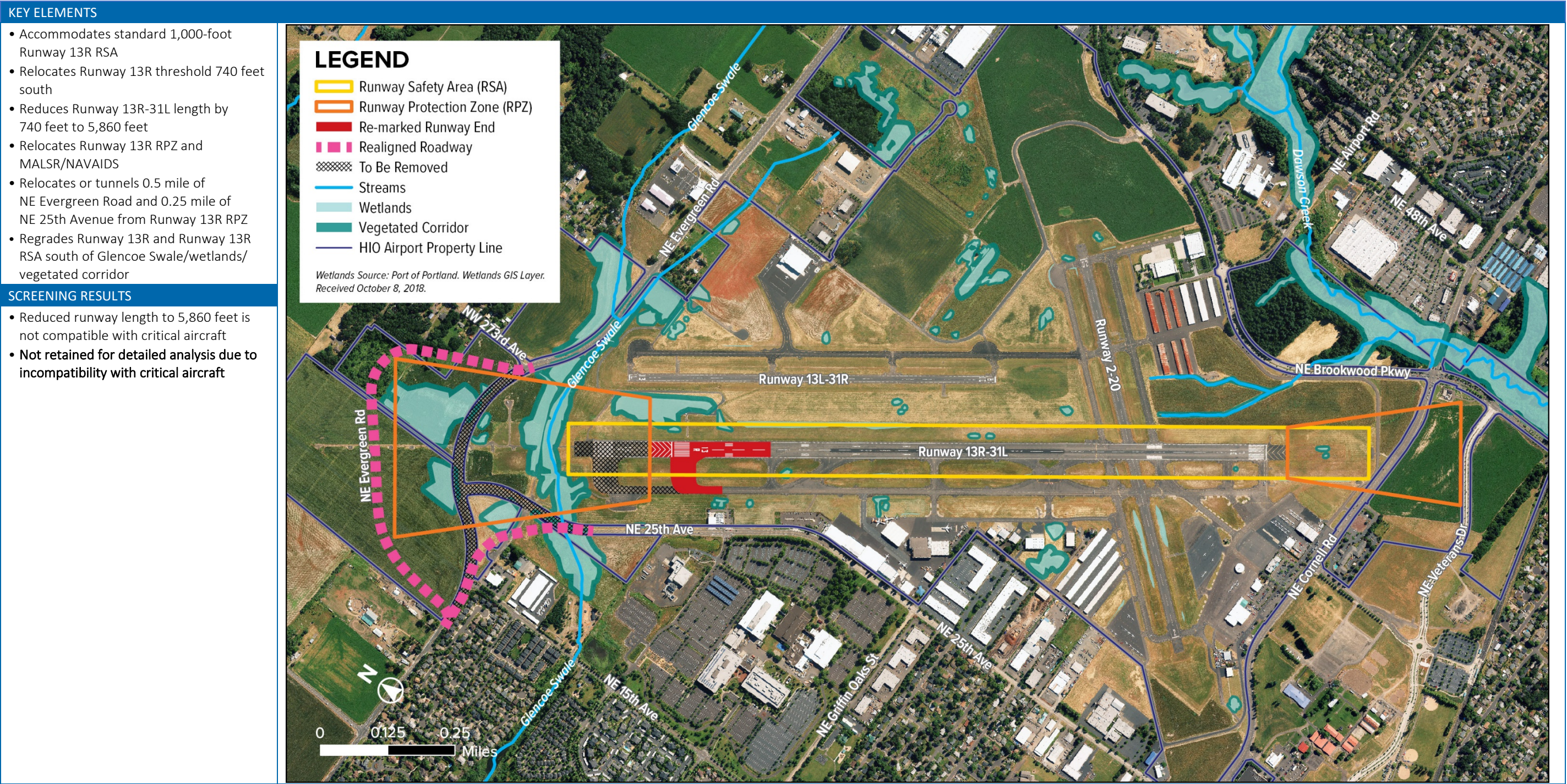
<sup>23</sup> The Half Mile Lane In-Lieu Fee Project/Site in the Tualatin River Watershed was established by DSL and offers both wetland and stream mitigation credits. The USACE approved the Half Mile Lane site and treats it similarly to a mitigation bank.

**Table 1. Summary Results of Alternatives Screening**

ALTERNATIVE		SCREENING RESULT	REASON FOR RESULT
No Action Alternative		Retain for detailed analysis	Requires evaluation of environmental consequences under NEPA
1	Reduce Runway 13R-31L Length	Do not retain for detailed analysis	Incompatible with critical aircraft
2	Runway 13R Declared Distances	Do not retain for detailed analysis	Incompatible with critical aircraft
3	Shift Runway 13R-31L South	Do not retain for detailed analysis	Likely accumulation of impacts that collectively reaches extraordinary magnitudes
4	Install Engineered Materials Arresting System (EMAS)	Do not retain for detailed analysis	Incompatible with critical aircraft
5	<b>Underground Conveyance</b>	<b>Retain for detailed analysis</b>	<b>Passes all criteria</b>
6	Reroute Swale around RSA	Do not retain for detailed analysis	Conflicts with FAA guidance and Port policy regarding wildlife hazard attractants and not likely to be approved for required permits due to on-site mitigation.



Figure 1. Alternative 1: Reduce Runway 13R-31L Length





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Figure 2. Alternative 2: Runway 13R Declared Distances

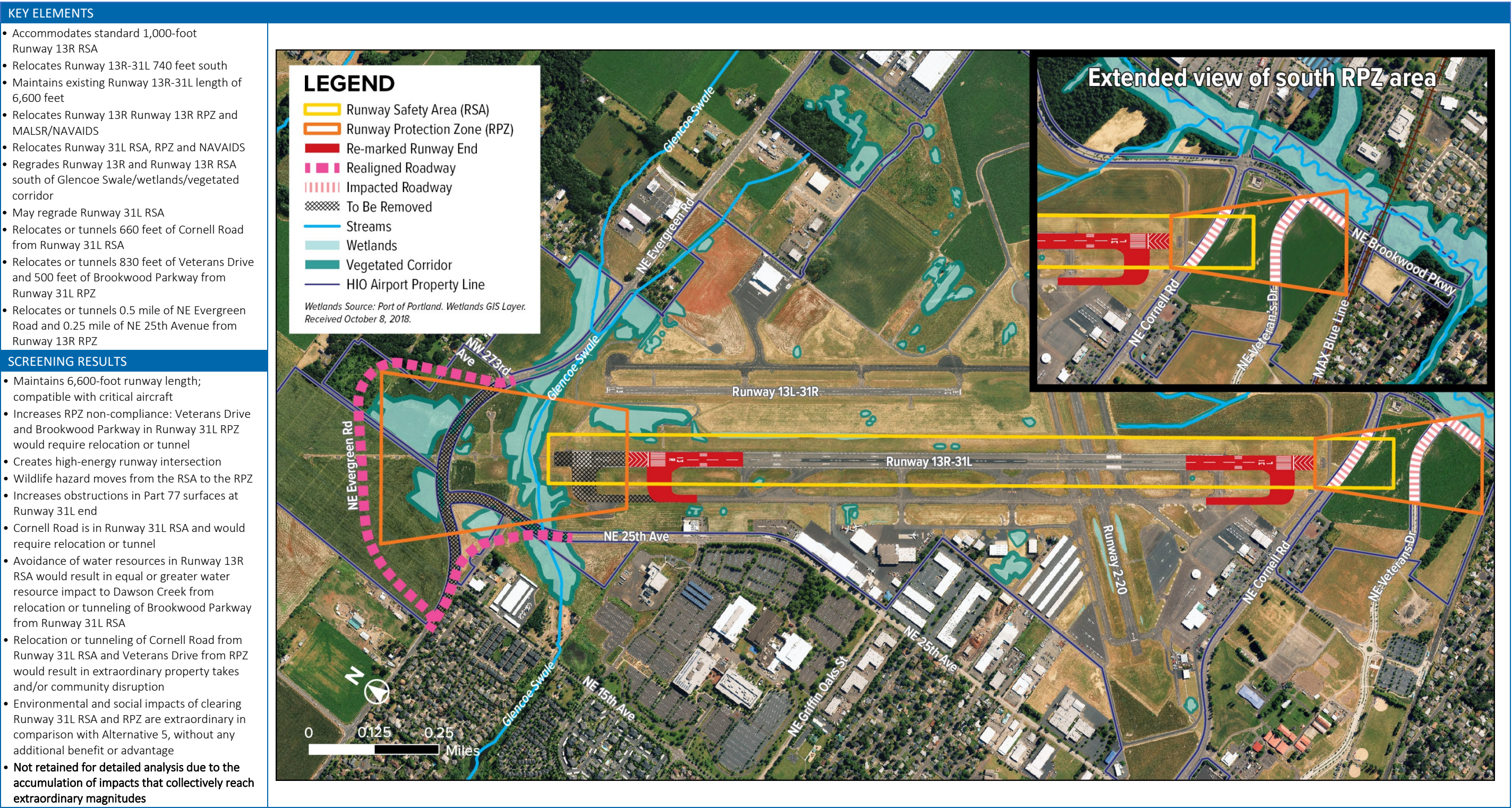




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Figure 3. Alternative 3: Shift Runway 13R-31L South

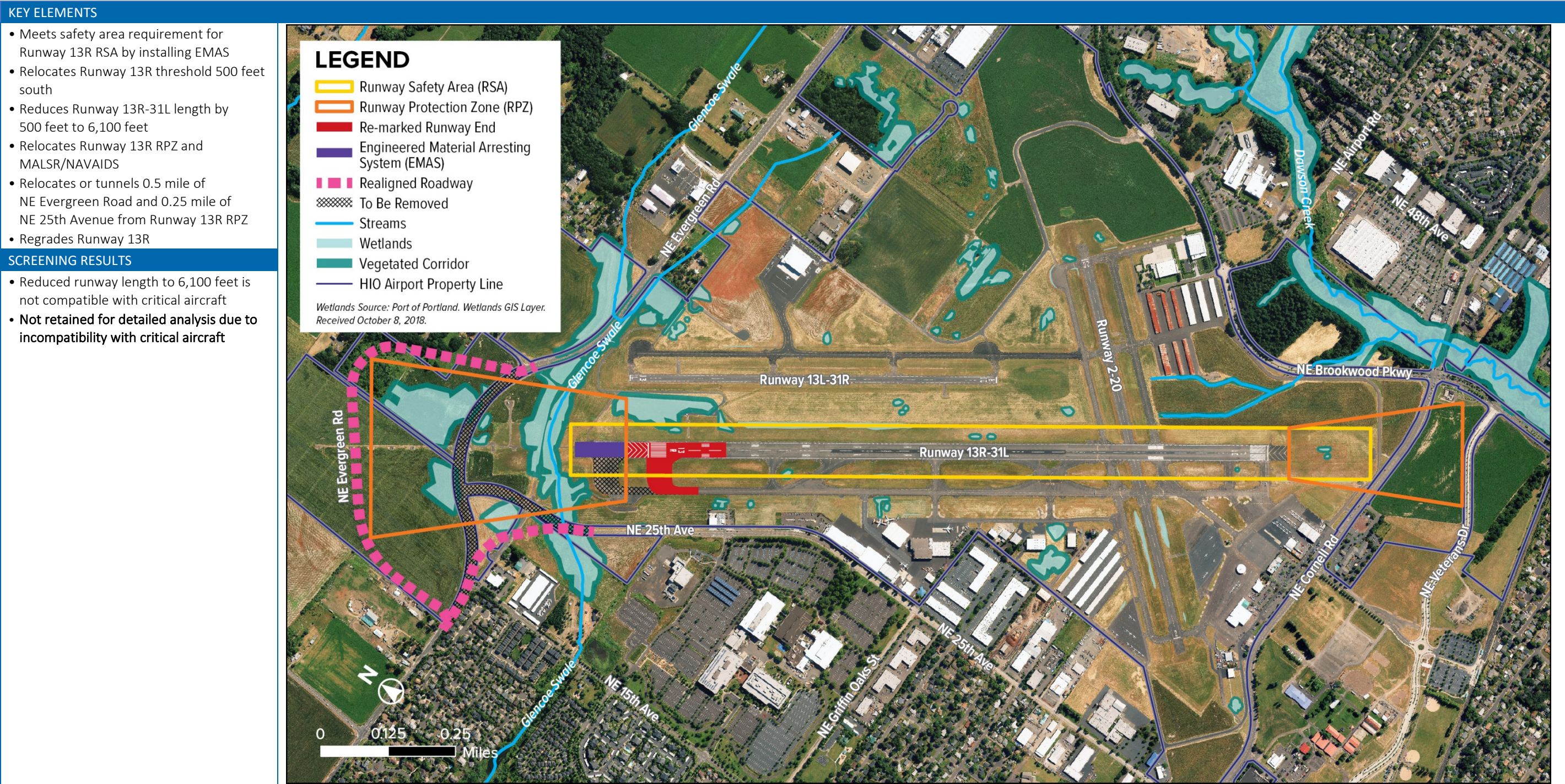




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Figure 4. Alternative 4: Install Engineered Material Arresting System (EMAS)





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Figure 5. Alternative 5: Underground Conveyance





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Figure 6. Alternative 6: Reroute Swale Around Runway Safety Area





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Table 2. Detailed Alternatives Analysis Screening Results

Screening Level	Alternatives Screening Criteria	Evaluation Ratings		Preliminary Alternatives					
		Positive	Negative	1 - Reduce Runway 13R-31L Length	2 - Runway 13R Declared Distances	3- Shift Runway 13R-31L South	4- Install EMAS	5- Underground Conveyance	6 - Reroute Swale Around RSA
1	Is the alternative compatible with critical aircraft? (Does the alternative maintain the existing useable Runway 13R-31L length of 6,600 feet?)	Yes	No	No - Reduces runway to 5,860 feet	No - Reduces available landing distance on Runway13R to 5,860 feet	Yes - Maintains 6,600-foot runway length with thresholds shifted to south	No - Reduces runway to 6,100 feet	Yes - Maintains 6,600-foot runway length and existing thresholds	Yes - Maintains 6,600-foot runway length and existing thresholds
SCREENING LEVEL 1 RESULT		Retain	Eliminate	Eliminate	Eliminate	Retain	Eliminate	Retain	Retain
2	Is the alternative practical?								
2A	Does the alternative cause safety or operational problems not easily resolvable?								
	Does the alternative cause increases in Runway Protection Zone (RPZ) non-compliance on either end of Runway 13R-31L?	No	Yes			Yes - Veterans Drive and Brookwood Parkway in Runway 31L RPZ would require relocation or tunnel		No	No
	Does the alternative create a high-energy runway intersection (Does Runway 2-20 cross the middle third of Runway 13R-31L)?	No	Yes			Yes – would cross center third of Runway 13R-31L		No	No
	Does the alternative eliminate the wildlife hazard in the Runway Safety Area (RSA)?	Yes	No			Yes – wildlife hazard moves from RSA to RPZ		Yes	Yes – wildlife hazard moves from RSA to RPZ
	Does the alternative create new or increase existing obstructions to Part 77 surfaces?	No	Yes			Yes, at Runway 31L end – existing obstructions would be greater penetrations of Part 77 surfaces and additional penetrations are likely as runway shifts to south.		No	No
	Does the alternative adversely affect MALSR or other NAVAIDS?					Yes: <ul style="list-style-type: none"><li>Relocates Runway 13R Runway 13R MALSR/NAVAIDS</li><li>Relocates Runway 31L NAVAIDS</li></ul>		No - MALSR and other NAVAIDS removed from Runway 13R RSA during construction and replaced in same locations	No - MALSR and other NAVAIDS removed from Runway 13R RSA during construction and replaced in same locations
	Does the alternative present unique problems or result in an accumulation of factors that collectively present safety or operational problems?	No	Yes			Yes – unique problems include: <ul style="list-style-type: none"><li>Cornell Road is in Runway 31L RSA and would require relocation or tunnel</li></ul>		No	No
2B	Does the alternative cause environmental or social impacts that are not easily resolvable?								
	Does the alternative cause greater environmental or social impacts than other alternative(s) that solve the problem?	No	Yes			Yes - the following impacts are greater than Alternatives 5 and 6: <ul style="list-style-type: none"><li>Avoidance of water resources in Runway 13R RSA would result in equal or greater water resource impacts to Dawson Creek from relocation of Brookwood Parkway out of RPZ</li><li>Up to 7 acres of wetlands and up to 6 acres of vegetated corridors</li><li>Relocation of Cornell Road from RSA and Veterans Drive from RPZ would result in extraordinary property takings and community disruption not associated with other alternatives</li><li>Relocation of Evergreen Road and NE 25th Avenue from RPZ would require minor property taking.</li></ul>		No – Up to 8 acres of wetlands and up to 7 acres of vegetated corridors	No – Up to 8 acres of wetlands and up to 7 acres of vegetated corridors
	Does the alternative present unique problems or result in an accumulation of impacts that collectively reach extraordinary magnitudes?	No	Yes			Environmental and social impacts of clearing Runway 31L RSA and RPZ and bringing Runway 13R RPZ into compliance are extraordinary in comparison with Alternative 5, with little or no reduction in impacts.		No	Yes – unique problems: <ul style="list-style-type: none"><li>Conflicts with FAA recommendations and Port policy by increasing wildlife hazard attractants in the air operations area</li><li>Unlikely to be approved for permits due to poor quality of and low likelihood of success of on-site water resources mitigation vs. off-site mitigation bank for Alternative 5</li></ul>
	SCREENING LEVEL 2 RESULT	Retain	Eliminate			Eliminate - Accumulation of impacts that collectively reaches extraordinary magnitudes		Retain	Eliminate - not permissible
Result of All Analyses		Retain	Eliminate	Eliminate	Eliminate	Eliminate	Eliminate	Retain	Eliminate

Environmental Assessment for the  
Proposed HIO 13R-31L RSA Improvements

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**Draft EA**

Hillsboro Airport (HIO), Hillsboro, Oregon  
April 2021