

6.E.2 WETLANDS

6.E.2.1 Wetland Impacts Methodology and Analysis

This section provides detailed descriptions of wetlands potentially impacted by the runway development alternatives within the Detailed Study Area. An ArcView Geographic Information systems (GIS) program was used to calculate wetland impacts associated, based on the limits of disturbance, for each alternative. The limits of disturbance identify the footprint of the areas that would be disturbed during construction activities (see Chapter Four, *Alternatives*). All wetlands were assigned scores using the Uniform Mitigation Assessment Method (UMAM).³⁴ In addition, Florida Land Use, Cover and Form Classification System (FLUCCS)³⁵ codes were assigned to each wetland.

The FAA has shown to the extent practicable that a sequencing process was followed to avoid impacts, followed by minimizing impacts and, finally, by requiring mitigation for unavoidable impacts to the aquatic environment. This sequence is described in the Clean Water Act Section 404 (b)(1) Guidelines (40 CFR, Part 230, Subparts B-F). Subpart B requires the analysis of alternatives that avoid wetland encroachments. This analysis must demonstrate that there are no practicable alternatives to the proposed discharge which would have fewer adverse impacts on the aquatic ecosystem. In addition, Subpart B states that no discharge shall be permitted unless measures have been taken to minimize potential adverse impacts. Total avoidance of wetlands in the project area is not practicable because it would not meet the purpose and need.

The avoidance and minimization of wetlands and conceptual mitigation proposed to offset unavoidable wetland impacts for all of the runway development alternatives is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*. Because wetlands are located off the ends of the runways and within existing runway safety areas, impacts to wetlands cannot be avoided. Potential further avoidance and minimization opportunities related to wetland impacts would be identified during permitting. A conceptual mitigation plan is discussed in Chapter Eight, *FAA's Preferred Alternative*.

³⁴ The Uniform Mitigation Assessment Method (UMAM) is used to determine the amount of mitigation needed to offset adverse impacts to wetlands and other surface waters and to award and deduct mitigation bank credits. The methodology provides a standardized procedure for assessing the functions provided by wetlands and other surface waters, the amount that those functions are reduced by a proposed impact, and the amount of mitigation necessary to offset that loss. It does not assess whether the adverse impact meets other criteria for issuance of a permit, nor the extent that such impacts may be approved. Upon making a determination that mitigation is required to offset a proposed impact, the methodology shall be used to quantify the acreage of mitigation, or the number of credits from a mitigation bank or regional offsite mitigation area, required to offset the impact. This method is also used to determine the degree of improvement in ecological value of proposed mitigation bank activities. Source: <http://www.dep.state.fl.us/legal/Rules/surfacewater/62-345.pdf#search=%22%22Uniform20Mitigation%20Assessment%20Method%22%22> A UMAM Level II Analysis was conducted for the EIS. See Appendix M, *Biological Resources*, for more information.

³⁵ Florida Land Use, Cover and Form Classification System (FLUCCS) Handbook, developed by the Florida Department of Transportation, January 1999. This handbook is considered as the state standard for land use and land cover mapping classifications. See Appendix M, *Biological Resources*, for more information.

When the Airport Sponsor modified the Airport Sponsor's Proposed Project to limit expansion east of NE 7th Avenue, potential impacts wetlands, in particular to Wetland 25, were significantly minimized. Further minimization of potential impacts to Wetland N4 (West Lake Park) was achieved by modifying the proposed runway approach light system. The Medium Intensity Approach Light System proposed for the Airport Sponsor's Proposed Project (Alternative B1c) does not include a Runway Alignment Indicator Light system, and therefore, only extends 1,400 feet prior to the landing threshold. This shortened approach light system avoids encroachment into West Lake Park.³⁶

Further minimization of wetland impacts was achieved by limiting the encroachment into the Dania Cut-Off Canal and the adjacent triangular waterbody by proposing a non-standard spacing of 225 feet between the seventh and eighth light stations to serve Runway 9R arrivals. This will require a minor modification to FAA design standards.

Airport projects present special challenges in minimizing wetland impacts, because FAA safety, operational, and airport design standards must be strictly followed. Impacts to wetlands would include filling, erosion, sedimentation, and the clearing of vegetation. In addition to direct impacts, the FAA recognizes the potential for secondary impacts to wetlands. Secondary impacts to wetlands could include a change in hydrology, introduction of invasive species, changes in the vegetative community, etc. A discussion of potential secondary impacts to wetlands is provided for the FAA's Preferred Alternative in Chapter Eight, *FAA's Preferred Alternative*, in this EIS.

To remain consistent with the approach used to identify wetlands in previous documents prepared for the FLL, and at the request of regulatory agencies, nomenclature for previously-identified wetlands that may be affected by the runway development alternatives has remained the same.

As discussed below, wetlands identified with the prefix "N" were not described in previous documents prepared for FLL. Some wetlands (i.e., W-17 and W-25) have been divided into sub-areas designated by the letters 'a', 'b', and so forth, to distinguish the morphological, hydrological, and biological differences observed within the sub-areas, and subsequently scored individually under the UMAM. The UMAM scores assigned to wetlands identified in the previous documents were provided to the regulating agencies prior to a field visit to each of the wetlands on August 10, 2006. Materials from that meeting are provided in Appendix M, *Biological Resources*. The previous UMAM scores were modified after a joint teleconference held with representatives of the Broward County Environmental Protection Department (BCEPD), the South Florida Water Management District

³⁶ See Appendix E, *Airfield Planning, Design, & Constructability Review*, Section E.1.5, *NAVAID Facilities*.

(SFWMD), the U.S. Environmental Protection Agency (USEPA), and the U.S. Army Corps of Engineers (USACE) on September 13, 2006 (see meeting notes presented in Appendix M, *Biological Resources*).

Section 5.E.2, *Wetlands*, describes in general the existing wetlands identified within the Detailed Study Area. Wetland impacts associated with the limits of disturbance for each runway development alternative are described in the following sections and summarized for comparison purposes in, **Table 6.E.2.1, *Wetland Impact Matrix*** (located on page 6.E-26). The limits of disturbance for each runway development alternative are graphically depicted in **Exhibit 6.E.2-1 through Exhibit 6.E.2-7**.

6.E.2.2 Wetlands Located Within the Limits of Disturbance for the Runway Development Alternatives

Jurisdictional determinations were assigned for wetlands within the Detailed Study Area in accordance with definitions described under Title 33 CFR, Chapters 373 and 403 of Florida Administrative Code (FAC), and Chapter 27 of the Broward County Code pertaining to the definition of wetlands. Federal, State, and local regulatory agencies generally agreed with these jurisdictional determinations during an interagency meeting and site visit. A summary of this meeting is included in Appendix M, *Biological Resources*. Jurisdictional wetlands within the Detailed Study Area that may be affected by the runway development alternatives are described below.

6.E.2.2.1 Previously Described Wetlands

A Jurisdictional Wetland/Surface Water Map was prepared for FLL in 1998.³⁷ The 1998 map depicted a total of 34 wetlands, within the area defined for the proposed project at that time. Some of these wetlands have been filled and are accounted for under permits previously obtained from resource agencies. Some have been combined with surface waters or existing stormwater treatment systems. Others now are located beyond the proposed limits of disturbance identified for the runway development alternatives described in this EIS. Of these previously described wetlands, Wetlands 8, 17, 25, and 33 may be affected by the runway development alternatives and are described below.

Wetland 8: Wetland 8 (W-8) is located south of the Dania Cut-Off Canal. W-8 was identified in previous documents as 0.24 acres. W-8 is now identified as being 2.67 acres, based on analysis and field investigations conducted for this EIS. W-8 is a mangrove wetland (FLUCCS Code #612) dominated by white mangrove (*Laguncularia racemosa*) with some black mangroves (*Avicennia germinans*) present. The area immediately fringing the Dania Cut-Off Canal contains red mangroves (*Rhizophora mangle*). Because of shading from the overstory canopy,³⁸ there is little or no understory growth typical of mangrove forests.

³⁷ Prepared in 1998 by Keith and Schnars, P.A. (Engineers, Planners, Surveyors), Fort Lauderdale, FL 33309-2132.

³⁸ The field investigations conducted for this EIS took place in November 2004, January 2005, May 2006, and August 2006.

Since the November 2004 field investigation and calculation of the UMAM score, the mangroves have been trimmed down to reduce the canopy height within the existing approach to Runway 9R/27L. A large stormwater outfall, presumably from the Hilton (formerly the Wyndham) Ft. Lauderdale Airport Hotel and parking garage, discharges into the southeast corner of W-8. Tidal inundation of W-8 appears to be neither regular nor complete due to the presence of a partial berm between the wetland and the open waters of the Dania Cut-Off Canal. *A UMAM functional assessment score of 0.567 was calculated for W-8.*

Wetland 17: Wetland 17 (W-17) is located to the east of U.S. Highway 1 on-airport and is bounded by Taylor Road to the south and the airport entrance roadway ramp to the north. W-17 was identified in previous documents as 22.17 acres, but is identified in this EIS as 6.09 acres. This reduction in size is assumed to be the result of impacts from previously permitted projects, such as roadway improvements associated with the airport entrance ramps. W-17 still contains some mangroves within its eastern areas, but is primarily dominated by Brazilian pepper. W-17 has been divided into sub-areas W-17a, W-17b, and W-17c to account for differences in wetland quality. The sizes of these three sub-areas were estimated to be: W-17a = 0.61 acres, W-17b = 2.81 acres, and W-17c = 2.67 acres.

Current conditions within the sub-areas reflect a mix of vegetation indicative of a disturbed and hydrologically-poor wetland system. *UMAM functional assessment scores of 0.267, 0.367, and 0.467 were calculated for W-17a, W-17b, and W-17c, respectively.*

Wetland 25: Wetland 25 (W-25), the largest contiguous wetland within the Detailed Study Area, is a mangrove wetland (FLUCCS Code #612) located immediately east of NW 7th Avenue. W-25 is composed mainly of red mangrove, black mangrove, white mangrove, and to a lesser degree, buttonwood (*Conocarpus erectus*).

This wetland is interspersed with areas of Brazilian pepper, Australian pine (*Casuarina equisetifolia*), and other non-native invasive plant species, particularly within its northwestern reaches and along its periphery. The presence of invasive species is the result of the construction of drainage ditches, soil disruption due to farming, and the diminished reach of tidal flushing toward the northwest corner of W-25. W-25 has been divided into two sub-areas, W-25a and W-25b, to account for the differences in wetland quality that were observed. The acreages for each sub-area were calculated as follows: W-25a = 8.92 acres, W-25b = 22.80 acres. *UMAM functional assessment scores of 0.600 and 0.733 were calculated for W-25a and W-25b, respectively.*

Wetland 33: Wetland 33 (W-33) is located to the east of FLL and south of Taylor Road. W-33 was identified in previous documents as 0.82 acres. Based on field investigations conducted for this EIS, W-33 was expanded to 8.59 acres. W-33 is a freshwater wetland, dominated by Brazilian pepper. Due to its low elevation, it receives and retains stormwater runoff from the surrounding areas and now maintains the requisite wetland characteristics of hydrology, soils, and plants. *A UMAM functional assessment score of 0.333 was calculated for W-33.*

6.E.2.2.2 NEWLY DESCRIBED WETLANDS

The following four jurisdictional wetlands are located within the proposed limits of disturbance for one or more of the runway development alternatives, and were not previously delineated on the 1998 Jurisdictional Wetland/Surface Water Map.³⁹ To distinguish these wetlands from those previously numbered the prefix "N" has been added to each wetland designation.

Wetland N2: Wetland N2 (W-N2) is situated at the northeast intersection of U.S. Highway 1 and NE 10th Street. U.S. Highway 1 serves as the west boundary of the wetland, with NE 10th Street bounding it on the south and Taylor Road bounding it on the east. W-N2 is approximately 1.86 acres in size (FLUCCS Code #619 and #640), and is contiguous with a stormwater conveyance swale that is located along the eastern right-of-way of U.S. Highway 1. Because of the differences in habitat types observed within W-N2, it has been divided into two sub-areas: W-N2a (1.04 acres) and W-N2b (0.82 acres). W-N2a is a low grassy area that is located contiguous with a portion of the stormwater system for U.S. Highway 1 to the west; this sub-area is dominated by Para grass, an exotic pest plant species. W-N2b is a small tree island dominated by Sea hibiscus, Brazilian pepper, and Seaside mahoe. *A UMAM functional assessment score of 0.367 was calculated for W-N2a, and a score of 0.300 was calculated for W-N2b.*

Wetland N3: Wetland N3 (W-N3) is located immediately east of W-N2, and is bordered by NE 10th Street on the south, Taylor Road on the northwest, and the taxi parking area on the east. W-N3 is approximately 8.60 acres in size (FLUCCS Code #241 and #422). The majority of W-N3 is used as a tree nursery, but continues to exhibit wetland characteristics and harbor native wetland groundcover. Because of the differences in habitat types present within W-N3, it has been divided into two sub-areas - W-N3a (2.95 acres) and W-N3b (5.65 acres). *UMAM functional assessment scores of 0.300 and 0.400 were calculated for W-N3a and W-N3b, respectively.*

Wetland N4: Wetland N4 (W-N4) is located immediately east of W-25, separated from W-25 by the Florida Power & Light (FPL) transmission corridor and access road. This mangrove wetland (FLUCCS Code #612) is part of West Lake Park. The portion of W-N4 located within the Detailed Study Area is approximately 13.45 acres. None of the runway development alternatives would have a direct impact to this wetland. Initially no UMAM score was calculated and no impact analysis was conducted. *However, due to the potential for secondary impacts, as agreed to during the joint agency teleconference of September 13, 2006, the UMAM score for W-N4 is assumed to be equivalent to W-25b, or 0.733.*

Wetland N5: Wetland N5 (W-N5) is located within the west airfield, immediately south of W-4 (see Exhibit 5.E.2-1). W-N5 is contiguous to Surface Water 10 (SW-10) (see Appendix L, *Water Resources*). W-N5 is approximately 0.14 acres

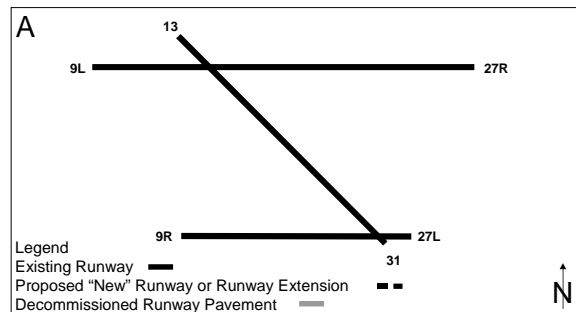
³⁹ Prepared in 1998 by Keith and Schnars, P.A. (Engineers, Planners, Surveyors), Fort Lauderdale, FL 33309-2132.

in size (FLUCCS Code #643), and is an area that is inundated only following severe storm events when SW-10 overtops. A UMAM functional assessment score of 0.400 was calculated for W-N5.

6.E.2.3 Analyses of Direct Wetland Impacts

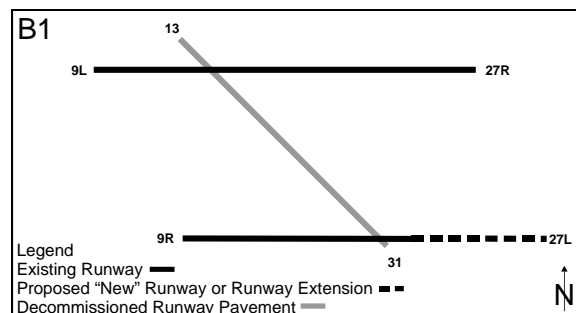
Direct impacts to wetlands are summarized in Table 6.E.2.1, *Wetland Impact Matrix*, and graphically depicted in **Exhibits 6.E.2-1 through 6.E.2-7**. UMAM functional gain (FG) credits needed are equivalent to the UMAM functional loss scores assigned for impacts resulting from the runway development alternatives.

6.E.2.3.1 ALTERNATIVE A: NO ACTION



There would be no changes to the existing airfield and airport facilities with implementation of Alternative A. *No direct impacts to wetlands would occur with implementation of Alternative A.*

6.E.2.3.2 ALTERNATIVE B1: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO AN 8,600-FOOT BY 150-FOOT ELEVATED RUNWAY



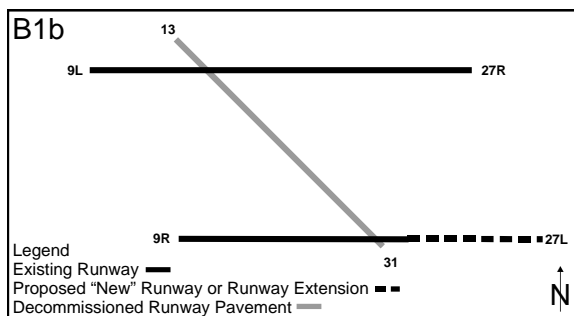
Expansion of Runway 9R/27L to the east would directly impact 6.09 acres of W-17, 5.37 acres of W-33, 2.83 acres of W-N3a, and 0.74 acres of W-N3b. These impacts would result in the following UMAM FG credits needed for mitigation: 2.44 credits for W-17, 1.79 credits for W-33, 0.85 credits for W-N3a, and 0.30 credits for W-N3b. Also in the east, the installation of the runway approach lights and associated access roads would impact 0.14 acres of W-25a, resulting in 0.08 UMAM FG credits needed for mitigation. Alternative B1 would have no impact on the Dania Cut-Off Canal. No direct impacts would occur to W-N4 or W-N5 due to their location outside of proposed limits of construction. **Exhibit 6.E.2-1** graphically depicts the limits of disturbance and impacts to wetlands resulting from

implementation of Alternative B1. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

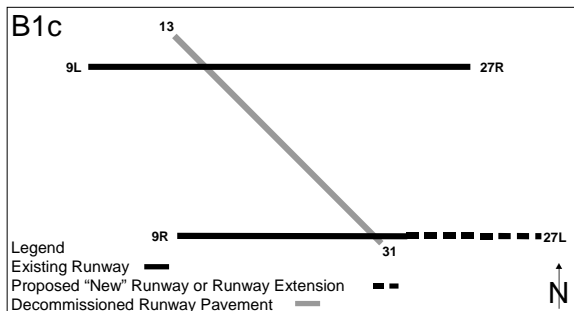
Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 15.17 acres of direct impact to wetlands would occur with implementation of Alternative B1, resulting in a total of 5.46 UMAM FG credits needed for mitigation.

6.E.2.3.3 ALTERNATIVE B1b: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO AN 8,000-FOOT BY 150-FOOT ELEVATED RUNWAY WITH EMAS



ALTERNATIVE B1c (AIRPORT SPONSOR'S PROPOSED PROJECT): REDEVELOP EXISTING RUNWAY 9R/27L TO AN 8,000-FOOT BY 150-FOOT ELEVATED RUNWAY WITH EMAS; RUNWAY USE DETERMINED BY BROWARD COUNTY'S INTERLOCAL AGREEMENTS



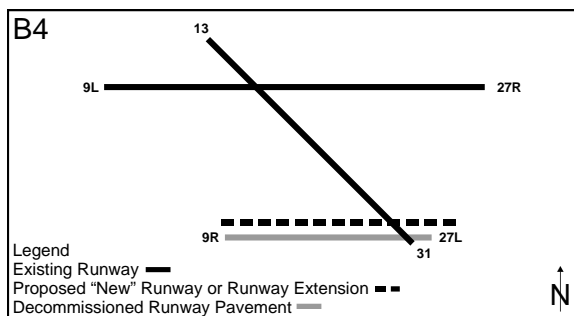
Redevelopment of Runway 9R/27L to the east would impact 6.09 acres of W-17, 5.37 acres of W-33, 2.83 acres of W-N3a, and 0.74 acres of W-N3b. These impacts would result in the following UMAM FG credits needed for mitigation: 2.44 credits for W-17, 1.79 credits for W-33, 0.85 credits for W-N3a, and 0.30 credits for W-N3b. Further east, the installation of the runway approach lights and associated access roads would impact 0.20 acres of W-25a and 0.18 acres to W-25b, resulting in 0.12 and 0.13 UMAM FG credits needed for mitigation, respectively. Alternatives B1b and B1c would have no impact on the Dania Cut-Off Canal. No impacts would occur to W-N4 or W-N5 due their location outside of the proposed limits of construction. **Exhibit 6.E.2-2** graphically depicts the limits of disturbance and

impacts to wetlands resulting from implementation of Alternatives B1b and B1c. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 15.41 acres of direct wetland impacts would occur with implementation of Alternatives B1b or B1c, resulting in a total of 5.63 UMAM FG credits needed for mitigation.

6.E.2.3.4 ALTERNATIVE B4: BUILD A NEW 6,001-FOOT AT GRADE RUNWAY WITH EMAS LOCATED 340 FEET NORTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)

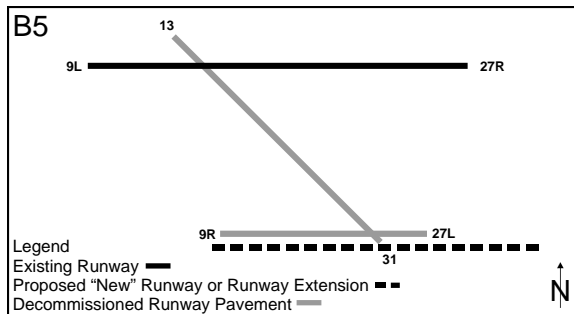


For Alternative B4, installation of the approach light system and construction of the associated access roads would permanently impact 0.13 acres of W-8. This impact would result in 0.07 UMAM FG credits needed for mitigation. No impacts would occur to W-N4 or W-N5 due to their location outside of the proposed limits of disturbance. Alternative B4 would have no impact on the Dania Cut-Off Canal. No impact to W-17 would occur because the installation of the runway approach lights would be along Taylor Road, an existing paved roadway that flanks W-17 to the south. In addition, because of the location of the runway approach lights along Taylor Road, no impacts to W-25, W-33, or W-N3 would occur. **Exhibit 6.E.2-3** graphically depicts the limits of disturbance and impacts to wetlands resulting from implementation of Alternative B4. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 0.13 acres of direct impacts to wetlands would occur with implementation of Alternative B4, resulting in a total of 0.07 UMAM FG credits needed for mitigation.

6.E.2.3.5 ALTERNATIVE B5: BUILD A 7,800-FOOT ELEVATED RUNWAY WITH EMAS LOCATED 320 FEET SOUTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)

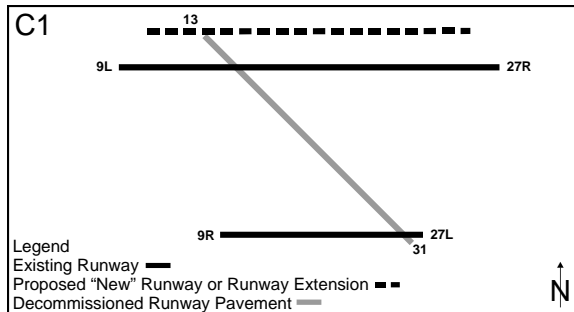


Redevelopment of Runway 9R/27L would impact 6.09 acres of W-17, 8.59 acres of W-33, 0.32 acres of W-N2a, 2.95 acres of W-N3a, and 3.54 acres of W-N3b. These impacts would result in the following UMAM FG credits needed for mitigation: 2.44 credits for W-17, 2.86 credits for W-33, 0.12 credits for W-N2a, 0.88 credits for W-N3a, and 1.42 credits for W-N3b. Further east, the installation of the runway approach lights and access roads would impact 0.18 acres to W-25b, resulting in 0.13 UMAM FG credits needed. W-25a would not be impacted by this alternative. No impacts would occur to W-N4 or W-N5 due their location outside of the proposed limits of disturbance. Alternative B5 would impact the bottom of the triangular waterbody that borders the Dania Cut-Off Canal to the west of the runway, due to the installation of one approach light tower and an elevated walkway to service it. **Exhibit 6.E.2-4** graphically depicts the limits of disturbance and impacts to wetlands resulting from implementation of Alternative B5. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 21.67 acres of direct wetland impacts would occur with implementation of Alternative B5, *resulting in a total of 7.85 UMAM FG credits needed for mitigation.*

6.E.2.3.6 ALTERNATIVE C1: BUILD A 7,721-FOOT AT GRADE RUNWAY LOCATED 850 FEET NORTH OF EXISTING RUNWAY 9L/27R (A DEPENDENT PARALLEL RUNWAY TO EXISTING RUNWAY 9L/27R)

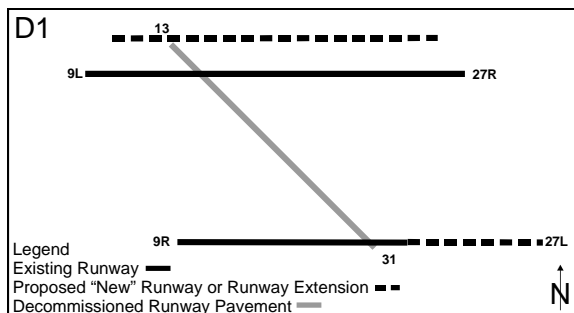


Development of Runway 8/26 with Alternative C1 requires relocation of facilities within the north airfield. These facility relocations have the potential to impact 0.14 acres of W-N5. This impact would result in 0.05 UMAM FG credits needed for mitigation. Additionally, impacts to W-33 and W-N3 could occur with relocation of facilities from the north airfield. The impact on 8.59 acres of W-33 and 6.67 acres of W-N3 would result in 2.86 and 2.37 UMAM FG credits needed, respectively. Alternative C1 would not impact W-8, W-17, W-25, W-N4, or the Dania Cut-Off Canal. **Exhibit 6.E.2-5** graphically depicts the limits of disturbance and impacts to wetlands resulting from implementation of Alternative C1.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 15.40 acres of direct wetland impacts could occur with implementation of Alternative C1, resulting in 5.28 UMAM FG credits needed for mitigation.

6.E.2.3.7 ALTERNATIVE D1: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO 8,000 FEET AND BUILD A NEW 7,721-FOOT RUNWAY NORTH OF EXISTING RUNWAY 9L/27R (COMBINATION OF ALTERNATIVES B1B AND C1)



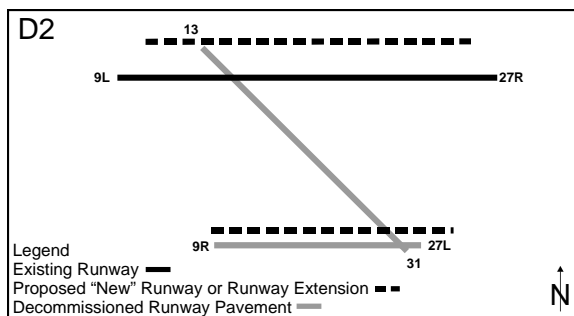
Impacts to wetlands caused by implementation of Alternative D1 are the same as those described under Alternatives B1b and C1, combined (See previous sub-sections). Alternative D1 would have no impact on the Dania Cut-Off Canal.

There would be no impact to W-N4 or W-8. **Exhibit 6.E.2-6** graphically depicts the limits of disturbance and impacts to wetlands resulting from implementation of Alternative D1. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 21.87 acres of direct wetland impacts would occur with implementation of Alternative D1, resulting in 7.97 UMAM FG credits needed for mitigation.

6.E.2.3.8 ALTERNATIVE D2: BUILD A NEW 6,001-FOOT AT GRADE RUNWAY WITH EMAS LOCATED 340 FEET NORTH OF EXISTING SOUTH RUNWAY AND BUILD A 7,721-FOOT AT GRADE RUNWAY LOCATED 850 FEET NORTH OF EXISTING RUNWAY 9L/27R (COMBINATION OF ALTERNATIVES B4 AND C1)



Impacts to wetlands caused by implementation of Alternative D2 are the same as those described under Alternatives B4 and C1, combined (See previous subsections). Alternative D2 would have no impact on the Dania Cut-Off Canal to the west. Alternative D2 would have no impact on W-17, W-25, or W-N4. **Exhibit 6.E.2-6** graphically depicts the limits of disturbance and impacts to wetlands resulting from implementation of Alternative D2. A detailed description of the installation of the approach light system to support Runway 9R/27L is provided in Appendix M, *Biological Resources*.

Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

A total of 15.54 acres of direct wetland impacts would occur with implementation of Alternative D2, resulting in 5.36 UMAM FG credits needed for mitigation.

6.E.2.4 Summary of Direct Wetland Impacts

Table 6.E.2.1 presents the acres of wetland directly impacted by each runway development alternative, including the total UMAM FG credits needed for mitigation. Alternative B4 has the lowest direct wetland impact with 0.13 acres, while Alternative D1 has the highest direct impact with 21.87 acres.

**Table 6.E.2.1
COMPARATIVE SUMMARY OF IMPACTS TO WETLANDS CAUSED BY THE
PROJECT ALTERNATIVES**

Wetland ID	Total Acres	Wetland Type	Alternative Impact Acres For Each Wetland								
			A	B1	B1b	B1c	B4	B5	C1	D1	D2
W-8	2.67	Mangrove	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.14
W-17a	0.61	Exotic	0.00	0.61	0.61	0.61	0.00	0.61	0.00	0.61	0.00
W-17b	2.81	Exotic	0.00	2.81	2.81	2.81	0.00	2.81	0.00	2.81	0.00
W-17c	2.67	Mangrove/Exotic	0.00	2.67	2.67	2.67	0.00	2.67	0.00	2.67	0.00
W-25a	8.92	Mangrove	0.00	0.14	0.20	0.20	0.00	0.00	0.00	0.20	0.00
W-25b	22.80	Mangrove	0.00	0.00	0.18	0.18	0.00	0.18	0.00	0.18	0.00
W-33	8.59	Exotic	0.00	5.37	5.37	5.37	0.00	8.59	8.59	8.59	8.59
W-N2a	1.04	Prairie	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.31	0.00
W-N2b	0.82	Exotic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
W-N3a	2.95	Exotic	0.00	2.83	2.83	2.83	0.00	2.95	2.95	2.95	2.95
W-N3b	5.65	Tree Farm/Prairie	0.00	0.74	0.74	0.74	0.00	3.54	3.72	3.37	3.72
W-N5	0.14	Prairie	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.14	0.14
Total Acres of Impact			0.00	15.17	15.41	15.41	0.13	21.67	15.40	21.87	15.54
UMAM FG Credits Needed			0.00	5.46	5.63	5.63	0.07	7.85	5.28	7.97	5.36

The wetlands affected by the runway development alternatives are dominated by exotic vegetation, are hydrologically isolated, and are situated in areas that were previously disturbed by historic agriculture and silviculture. The greatest impact occurs to W-17 and W-33.

The runway development alternatives have been developed to avoid and minimize direct impacts to wetlands, to the extent practicable. Proposed conceptual mitigation to offset wetland losses is described in Section 6.J, *Conceptual Mitigation Measures Considered in the Draft EIS*.

6.E.2.5 Secondary Wetland Impacts

According to the *Summary of Amendments to Basis of Review for Environmental Resource Permit Application within the South Florida Water Management District*,⁴⁰ the permit application for a proposed action requires an assessment of secondary wetland impacts. Broward County will prepare a permit only for the wetland impacts resulting from the implementation of the proposed action. Therefore, secondary impacts were determined only for the FAA's Preferred Alternative.

⁴⁰ *Summary of Amendments to Basis of Review for Environmental Resource Permit Application within the South Florida Water Management District Originally adopted through Rule 16K-4.035 on May 12, 1977.* Internet web site: http://my.sfwmd.gov/portal/page?_pageid=2934,19738755&_dad=portal&_schema=PORTAL&cx=000069459018389069478%3Agyc1603q1bq&cof=FORID%3A11&q=secondary+impact#1101, p. 23.

As part of the South Florida Water Management District Environmental Resource Permit application, reasonable assurance will be made that the secondary impacts from construction, alteration, and intended or reasonably expected uses of a proposed system will not cause violations of water quality standards or adverse impacts to the functions of wetlands or other surface waters.⁴¹ The U.S. Army Corps of Engineers also considers secondary impacts to wetlands during the 404 permitting process.

A discussion of secondary impacts to wetlands is provided in Chapter Eight, *FAA's Preferred Alternative*.

6.E.2.6 Cumulative Wetland Impacts

A discussion of cumulative impacts to wetlands is provided in Chapter 7, *Cumulative Impacts*.

⁴¹ Secondary impacts to the habitat functions of wetlands associated with adjacent upland activities will not be considered adverse if buffers, with a minimum width of 15 feet and an average width of 25 feet, are provided abutting those wetlands that will remain under the permitted design, unless additional measures are needed for protection of wetlands used by listed species for nesting, denning, or critically important feeding habitat. Source: *Summary of Amendments to Basis of Review for Environmental Resource Permit Application within the South Florida Water Management District Originally adopted through Rule 16K-4.035 on May 12, 1977*, p. 23.

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