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IMPLEMENTATION OF ENHANCED TERMINAL AIRSPACE ORGANISATION AT KUALA LUMPUR TMA

1. PURPOSE

1.1 The purpose of this Circular is to provide information concerning the planned implementation of enhanced terminal airspace organisation and procedures at KL International Airport.

2. NEW AIRSPACE ORGANISATION

The new airspace organisation at Kuala Lumpur TMA is based on:

a) an enlarged TMA;

b) implementation of RNAV 1 operations;

c) publication of selected RNAV-1 SIDs for departing aircraft;

d) publication of RNAV-1 STARS (Trombone) for arriving aircraft;

e) implementation of Point Merge System for arriving aircraft;

f) enhanced ATS sectorisation.

2.1 Enlarged TMA

2.1.1 The new KL TMA will entirely encompass the STAR and SID network allowing ATCOs to provide vectors within controlled airspace as shown in **Appendix A.**

2.2 RNAV 1 Operations

2.2.1 According to Malaysia PBN Implementation Plan and according to AIC Malaysia 01/2013 “Performance Based Navigation (PBN) Implementation in Malaysia”, RNAV 1 operations will be implemented in KL TMA for arrivals up to IFs (Intermediate Fixes), and for departures, in order to enhance the traffic flows within KL TMA.

2.2.2 In order to operate along RNAV 1 procedures, operators shall have an appropriate Operational Approval according to AIC Malaysia 02/2013 “Performance Based Navigation Operational Approval”.

2.2.3 Non-RNAV 1 approved aircraft shall advise the appropriate ATS unit before entering KL TMA or before departing from KL International Airport. A set of conventional procedures will be retained for non-RNAV 1 approved aircraft.

2.2.4 PBN navigation capability shall be inserted in the Item 10 of the flight plan, while the navigation specification approval shall be inserted in the Item 18 of the flight plan.

2.3 RNAV-1 SIDs

2.3.1 To complement the introduction of Point Merge arrival procedures, a number of RNAV 1 SIDs will be implemented for runway 15/33, in order to improve airspace utilization.

2.3.2 Conventional SIDs will be retained for non-RNAV 1 approved aircraft. Those aircraft shall advise ATS unit before obtaining departure clearance.

2.4 RNAV1 STARs

2.4.1 A number of RNAV-1 STARs will be implemented. “Trombone” arrival procedures will be implemented to ease the management of the inbound flights and as a back-up when PMS is not flyable (e.g. in case of adverse weather condition).

2.4.2 The STAR network and PMS permit a simple management of the arrival flights. The “high workload”, caused by the arrival flights during peak hours, is absorbed by PMS and “Trombone”. ATCOs will have a reduced workload, compared to the open loop vectors, because the flights are following established delay patterns and no vectoring instructions are issued for that purpose.

2.4.3 The designed patterns will provide the distance from touch down information easing the flight crew orientation and ATCO’s duty of providing such data, permitting to have an updated situation awareness about the arrival sequence.

2.4.4 A limited set of conventional STARs will be retained for non-RNAV 1 approved aircraft. Those aircraft shall advise ATS unit before entering KL TMA and can expect clearance along conventional STARs or vectoring to final approach. Non-RNAV 1 approved aircraft should expect delays and/or extended routings during peak hours.

2.5 POINT MERGE SYSTEM (PMS)

2.5.1 PMS is a technique of managing the flow of inbound traffic based on a structure of RNAV 1 arrival routes. This is an innovative technique that improves the efficiency of operational management in the arrival terminal areas with high traffic density by reducing the workload of controllers/flight crews

2.5.2 The objective of PMS is to have a smoother and a more harmonized management method for arriving traffic according to the following characteristics:

- to keep the current airport capacity but at the same time to make it possible to deal with any future capacity increase;

- to minimize environmental impact by the use of continuous descent ensuring that the longest track miles distance remains within a preset limit;

- to increase the predictability of the maximum possible trajectory;

2.5.3 It is a dedicated RNAV 1 route structure with a systemised operating method to integrate arrival flows into one sequence while keeping aircraft on FMS lateral navigation mode, thus allowing the efficient use of FMS advanced functions and consequent optimisation of vertical profiles.

2.5.4 By using linear holding, the arriving aircraft are always a fixed distance from the runway and this permits more efficient sequencing of the arriving aircraft because they are just one turn from a direct approach to the runway at all times.

2.5.5 Arriving traffic established on the STAR may at any time be cleared directly to the Merge Point and flight crews must be prepared for this. In many traffic situations, it is expected that aircraft will be routed direct to the Merge Point at or shortly after the entry onto the appropriate sequence leg.

2.5.6 PMS STARs will include a sequence leg and a Merge Point. The STAR will be described from the STAR initial fix via the last point on the sequence leg to the Merge Point, from where the instrument approach procedure starts. The sequence legs (1000FT vertically spaced) are used to absorb any delay required.

2.5.7 It is imperative that altitude and speed constraints described in the STAR or assigned by ATC are strictly adhered to.

2.5.8 Point Merge will almost eradicate the need to clear aircraft into the traditional circular holding patterns, providing environmental benefits by cutting fuel burn and carbon emissions, as well as reducing delays.

2.6 ENHANCED SECTORISATION

2.6.1 KL terminal airspace will be re-sectorised. The new sectorisation has been designed to support aircraft operational profiles and ATC procedures as well as to accommodate future traffic demand. More sectors will be designed and new frequencies implemented. The TMA sectorisation will follow the scheme as shown in **Appendix B** and **Appendix C**:

Scenario with arrivals on RWY32/RWY33	
NORTH	**SOUTH**
DEPARTURE NORTH Sector (DPN) Sector: lower limit - 8500FT	**FINAL MONITOR** (FM) Sector: lower limit - 4500FT
NORTH EAST HIGH (NEH) Sector: lower limit - FL245 (excluded DPN):	**SOUTH WEST APPROACH** (SWA) Sector: lower limit - 5500FT AMSL (excluded FM)
NORTH WEST HIGH (NWH) Sector: lower limit - FL245 (excluded DPN):	**SOUTH EAST APPROACH** (SEA) Sector: lower limit - 5500FT AMSL (excluded FM)
	SOUTH WEST HIGH (SWH) Sector: lower limit - FL245 (excluded SWA and FM)
	SOUTH EAST HIGH (SEH) Sector: lower limit - FL245 (excluded SEA and FM)

Scenario with arrivals on RWY14/RWY15	
NORTH	**SOUTH**
FINAL MONITOR (FM) Sector: lower limit - 4500FT	**DEPARTURE SOUTH Sector** (DPS) Sector: lower limit - 8500FT
NORTH WEST APPROACH (NWA) Sector: lower limit - 5500FT AMSL (excluded FM3)	**SOUTH EAST HIGH** (SEH) Sector: lower limit - FL245 (excluded DPS)
NORTH EAST APPROACH (NEA) Sector: lower limit - 5500FT AMSL (excluded FM)	**SOUTH WEST HIGH** (SWH) Sector: lower limit - FL245 (excluded DPS)
NORTH WEST HIGH (NWH) Sector: lower limit - FL245 (excluded NWA and FM)	
NORTH EAST HIGH (NEH) Sector: lower limit - FL185 (excluded NEA and FM1)	

3. IMPLEMENTATION PLANNING FOR KUALA LUMPUR

3.1 Implementation is planned for 1 May 2014.

DATO' AZHARUDDIN ABDUL RAHMAN.
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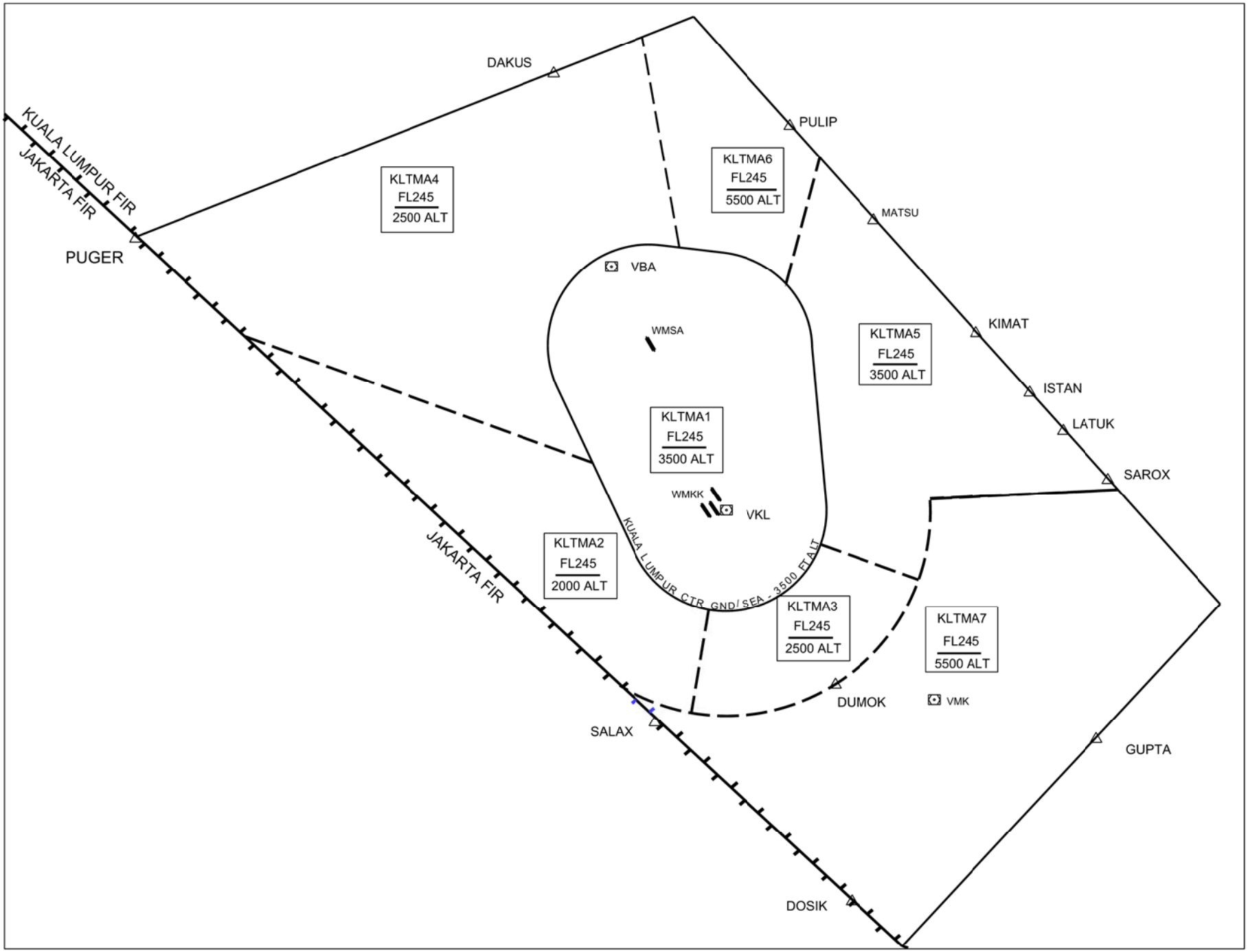
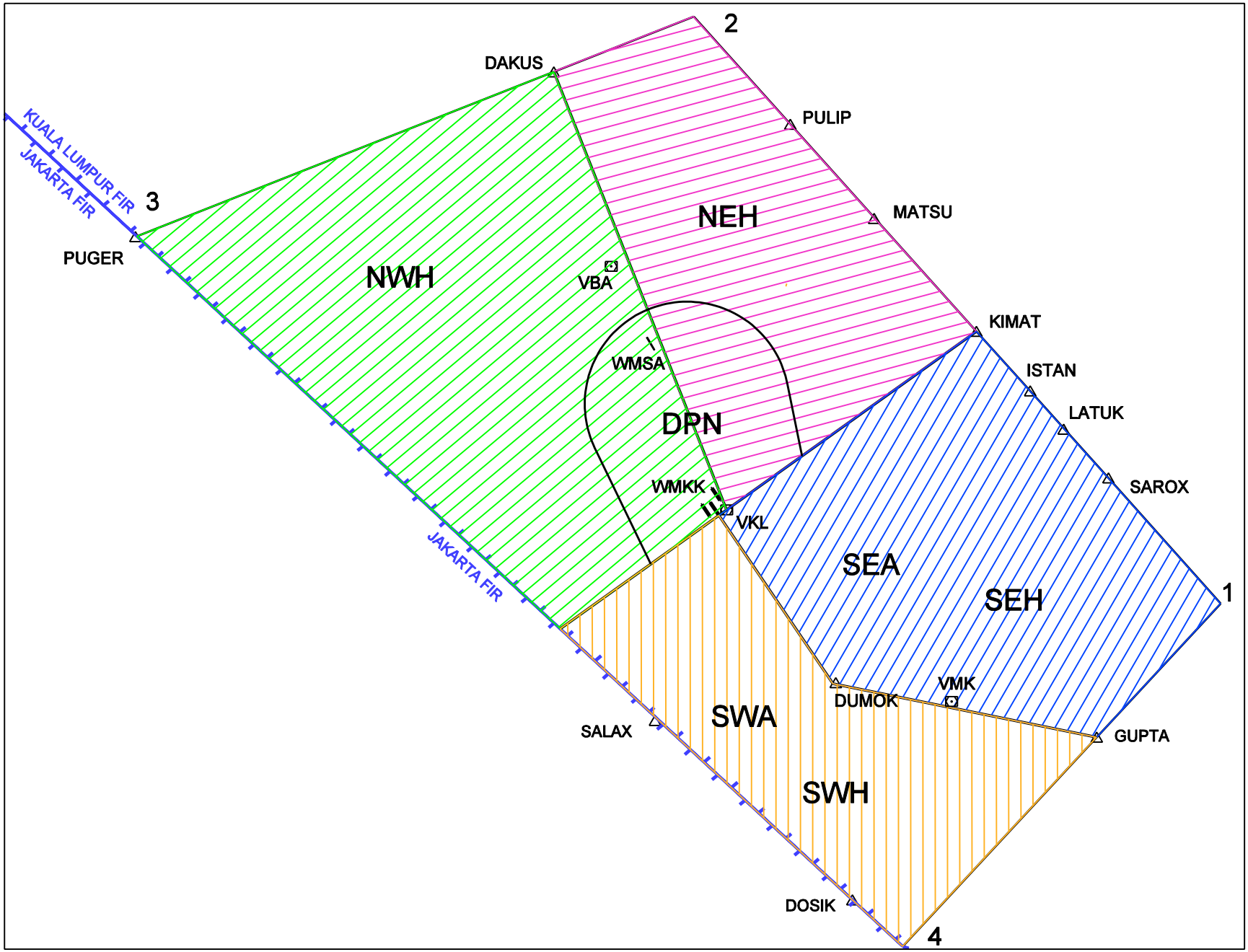
ENLARGED TMA



TMA SECTORISATION FOR RWY 32 / RWY 33



TMA SECTORISATION FOR RWY 14 / RWY15