EXPANSION OF HKIA INTO A THREE-RUNWAY SYSTEM - Determination of Assessment Area Boundary (Night Time Period (2300 to 0700 hours))

Worst Assumptions:
1). All Aircraft Type to be Boeing 747-400 (Max. Taxi NPD)
2). Based on the TAAM results provided by NATS, the total no. of aircraft taxiing events in 30 mins. is found to be 51 (at max.) at Year 2032.

Table A1: Extremely Worst Overall SPL due to Aircraft Taxiing + APUs (07C-25C (Central) OR 07L-25R (North)) at Various Distances between the Aircraft and the NSR

		Aircraft Taxiing - Taxi NPD (Source: ACRP Web-Only Doc. 9 - Enhanced Modelling of Aircraft Taxiway Noise, Vol. 2 - Aircraft Taxi Noise Database and Development Process by TRB)			Operation of APU - SWL of 116.6 dB(A) (Source: www.m-a-g.fsnet.co.uk)		
Ft	meter	7% Thrust SEL(dBA)	*Correction for Total No. of Aircraft Taxiing Events over 30 Mins. Period (N)	7% Thrust SPL(dBA)=SEL+10log(N)-32.6+Cfacade	ISO 9613 **, *** and ****SPL(dBA)	Extremely Worst Overall SPL(dBA)	Note:
200	61	95.6	14.1	80.2	79.9	83.0	
400	122	92.3	14.1	76.9	73.7	78.6	
630	192	90.0	14.1	74.5	69.5	75.7	
1000	305	87.2	14.1	71.8	65.2	72.6	
2000	610	82.3	14.1	66.9	58.2	67.4	
By Log Interpolation	862.3	79.3	14.1	63.9	54.4	64.4	
4000	1219	76.3	14.1	60.9	50.4	61.3	
By Log Interpolation	1529.9	73.9	14.1	58.5	47.4	58.8	
6300	1920	71.6	14.1	56.1	44.3	56.4	
By Log Interpolation	2155.2	70.1	14.1	54.6	42.6	54.9	
By Log Interpolation	2419.1	68.6	14.1	53.2	40.8	53.4	
By Log Interpolation	**2715.4**	**67.1**	**14.1**	**51.7**	**38.9**	**51.9**	**07C-25C (Central) (for Pt. A)** **<= Assessment Area Boundary (Night Time Period) (See Drawing No. MCL/P132/EIA/7-4-006a)**
10000	3048	65.7	14.1	50.2	36.9	50.4	
By Log Interpolation	3428.1	63.9	14.1	48.5	34.7	48.6	**07L-25R (North) (for Pt. A)**
By Log Interpolation	3855.5	62.1	14.1	46.7	32.4	46.8	
By Log Interpolation	4336.3	60.4	14.1	44.9	29.9	45.1	
16000	4877	58.6	14.1	43.1	27.2	43.3	
25000	7620	51.0	14.1	35.6	15.1	35.6	

Remarks:
(*): The total no. of aircraft taxiing events in 30 mins. for 07C-25C (Central) and 07L-25R (North) at Year 2032 are assumed to be equal (i.e. 26 (at max.) for 07C-25C (Central) / 07L-25R (North)).
(**): The no. of aircraft taxiing events for arrival and departure in 30 mins. of 07C-25C (Central) / 07L-25R (North) at Year 2032 are assumed to be equal (i.e. 13 (at max.) for arrival / departure).
(***): Operation time of 1 min. (before the aircraft reaching the gate) / 5 mins. (after the aircraft leaving the gate) throughout the 30 mins. period under the runway utilization mode of arrival / departure, respectively, is adopted.

(****): A sound absorption by the atmosphere (assumed at 500 Hz as well as 23.6°C, RH 68.3% and 101.3kPa as per the monthly meteorological data sets for Year 2011 of the HKO's monitoring station located at HKIA) has been accounted for in accordance with ISO 9613-1 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere.

Worst Assumption: All Aircraft Type to be Boeing 747-400 (Max. Original NPD)

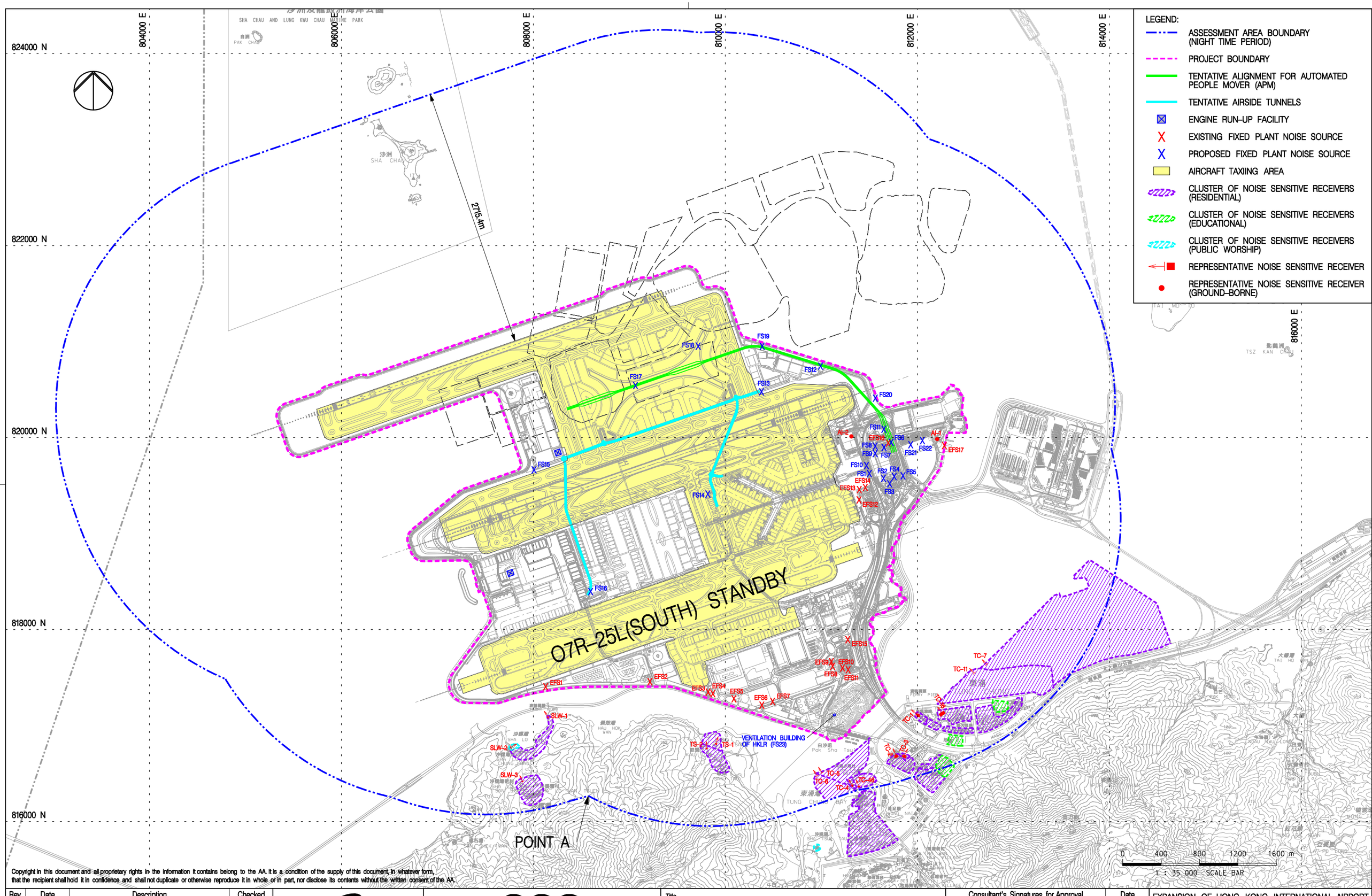
Table B1: Extremely Worst Overall SPL due to Existing OR New ERUF at Various Distances between the Aircraft and the NSR

		Operation of ERUF - Original NPD (Source: INM Model)					
Ft	meter	80% Thrust LAMAX(dBA)	90% Thrust LAMAX(dBA)	80% for 13 Mins. and 90% for 3 Mins. over 30 Mins. Period #Combined SPL(dBA)	##Screening Effect	Extremely Worst Overall SPL(dBA)	Note:
200	61	110.4	114.0	108.6	-15.0	93.6	
400	122	103.6	107.2	101.8	-15.0	86.8	
630	192	98.9	102.4	97.1	-15.0	82.1	
1000	305	94.0	97.6	92.2	-15.0	77.2	
2000	610	86.2	89.8	84.4	-15.0	69.4	
By Log Interpolation	862.3	82.0	85.8	80.3	-15.0	65.3	
4000	1219	77.9	81.8	76.2	-15.0	61.2	
By Log Interpolation	1529.9	75.0	78.9	73.3	-15.0	58.3	
6300	1920	72.2	76.1	70.5	-15.0	55.5	
By Log Interpolation	2155.2	70.6	74.5	68.9	-15.0	53.9	
By Log Interpolation	2419.1	69.0	72.9	67.3	-15.0	52.3	**Existing ERUF (for Pt. A)**
By Log Interpolation	2715.4	67.4	71.3	65.7	-15.0	50.7	
10000	3048	65.8	69.7	64.1	-15.0	49.1	
By Log Interpolation	3428.1	64.2	68.1	62.5	-15.0	47.5	**New ERUF (for Pt. A)**
By Log Interpolation	3855.5	62.5	66.5	60.9	-15.0	45.9	
By Log Interpolation	4336.3	60.9	64.9	59.3	-15.0	44.3	
16000	4877	59.3	63.3	57.7	-15.0	42.7	
25000	7620	53.2	57.2	51.6	-15.0	36.6	

Remarks:
(#): By assuming the Combined SPL to be equal to the Combined LAMAX for conservative approach.
(##): Noise enclosure with noise reduction of at least 15 dBA at the ERUFs is assumed to be incorporated.

Extremely Worst Overall SPL(dBA) due to Aircraft Taxiing + APUs (07C-25C (Central)) and Existing ERUF at Pt. A	=10log(10^(51.9/10)+10^(52.3/10))	= 55.1 dBA
Extremely Worst Overall SPL(dBA) due to Aircraft Taxiing + APUs (07L-25R (North)) and New ERUF at Pt. A	=10log(10^(48.6/10)+10^(47.5/10))	= 51.1 dBA
Extremely Worst Overall SPL(dBA) at Pt. A	=10log(10^(55.1/10)+10^(51.1/10))	= 56.6 dBA (or 57 dBA)

Note: All proposed and existing fixed plant noise sources are assumed to be insignificant as comparing with the ground noise sources (operation of aircraft taxiing / ERUFs / APUs).



LEGEND:

- ASSESSMENT AREA BOUNDARY (NIGHT TIME PERIOD)
- PROJECT BOUNDARY
- TENTATIVE ALIGNMENT FOR AUTOMATED PEOPLE MOVER (APM)
- TENTATIVE AIRSIDE TUNNELS
- ENGINE RUN-UP FACILITY
- EXISTING FIXED PLANT NOISE SOURCE
- PROPOSED FIXED PLANT NOISE SOURCE
- AIRCRAFT TAXIING AREA
- CLUSTER OF NOISE SENSITIVE RECEIVERS (RESIDENTIAL)
- CLUSTER OF NOISE SENSITIVE RECEIVERS (EDUCATIONAL)
- CLUSTER OF NOISE SENSITIVE RECEIVERS (PUBLIC WORSHIP)
- REPRESENTATIVE NOISE SENSITIVE RECEIVER
- REPRESENTATIVE NOISE SENSITIVE RECEIVER (GROUND–BORNE)

Rev.	Date	Description	Checked
A	27FEB14	FIRST ISSUE	HL
B	21MAR14	GENERAL REVISION	HL

香港國際機場 HONG KONG INTERNATIONAL AIRPORT
Airport Authority Hong Kong, 1 Sky Plaza Road, Hong Kong International Airport, Lantau, Hong Kong
Tel : (852) 2188 7111 Fax : (852) 2824 0717

Mott MacDonald
in association with
ARUP
Atkins China Limited
Clymene Enterprises
Deltares
Ecosystems Limited
SDA Marine Limited
Urbis Limited
URS Limited

Title

LOCATIONS OF NOISE SENSITIVE RECEIVERS (NSRs) FOR FIXED NOISE SOURCE IMPACT ASSESSMENT

Consultant's Signatures for Approval		Date
Design	HL	27FEB14
Checkers	HL	27FEB14
Design Supervisor	EC	21MAR14
Authorised Representative	AFK	21MAR14

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE–RUNWAY SYSTEM

Drawing No. MCL / P132 / EIA / 7–4–006a

Scale at A3 1 : 35000

Rev. B

Filename: J:\308875\REPORT\ENV\EIA\140303\MCL-P132-EIA-7-4-006a.dgn

EXPANSION OF HKIA INTO A THREE-RUNWAY SYSTEM - Determination of Assessment Area Boundary (Day & Evening Time Period (0700 to 2300 hours))

Worst Assumptions:
1). All Aircraft Type to be Boeing 747-400 (Max. Taxi NPD)
2). Based on the TAAM results provided by NATS, the total no. of aircraft taxiing events in 30 mins. is found to be 84 (at max.) at Year 2032.

Table A2: Extremely Worst Overall SPL due to Aircraft Taxiing + APUs (07R-25L (South), 07C-25C (Central) OR 07L-25R (North)) at Various Distances between the Aircraft and the NSR

		Aircraft Taxiing - Taxi NPD (Source: ACRP Web-Only Doc. 9 - Enhanced Modelling of Aircraft Taxiway Noise, Vol. 2 - Aircraft Taxi Noise Database and Development Process by TRB)			Operation of APU - SWL of 116.6 dB(A) (Source: www.m-a-g.fsnet.co.uk)			
Ft	meter	7% Thrust SEL(dBA)	*Correction for Total No. of Aircraft Taxiing Events over 30 Mins. Period (N)	7% Thrust SPL(dBA)=SEL+10log(N)-32.6+C_{facade}	ISO 9613 **, *** and **** SPL(dBA)	Extremely Worst Overall SPL(dBA)	Note:	
200	61	95.6	14.5	80.5	80.2	83.4		
400	122	92.3	14.5	77.2	74.0	78.9		
630	192	90.0	14.5	74.9	69.8	76.1		
1000	305	87.2	14.5	72.1	65.5	72.9		
2000	610	82.3	14.5	67.2	58.5	67.8		
By Log Interpolation	725.3	80.8	14.5	65.7	56.7	66.2		
By Log Interpolation	862.3	79.3	14.5	64.2	54.8	64.7		
By Log Interpolation	1025.3	77.8	14.5	62.7	52.8	63.1		
4000	**1219**	**76.3**	**14.5**	**61.2**	**50.7**	**61.6**	**07R-25L (South) (for Pt. B)**	**<= Assessment Area Boundary (Day & Evening Time Period) (See Drawing No. MCL/P132/EIA/7-4-006b)**
By Log Interpolation	1365.6	75.1	14.5	60.0	49.2	60.4		
By Log Interpolation	1529.9	73.9	14.5	58.8	47.8	59.1		
By Log Interpolation	1763.4	72.8	14.5	57.6	45.8	57.9		
6300	1920	71.6	14.5	56.4	44.6	56.7		
By Log Interpolation	2419.1	68.6	14.5	53.5	41.1	53.7	**07C-25C (Central) (for Pt. B)**	
10000	3048	65.7	14.5	50.5	37.2	50.7	**07L-25R (North) (for Pt. B)**	
By Log Interpolation	3855.5	62.1	14.5	47.0	32.7	47.2		
16000	4877	58.6	14.5	43.5	27.6	43.6		
25000	7620	51.0	14.5	35.9	15.4	35.9		

Remark:
(*): The total no. of aircraft taxiing events in 30 mins. for 07R-25L (South), 07C-25C (Central) and 07L-25R (North) at Year 2032 are assumed to be equal (i.e. 28 (at max.) for 07R-25L (South) / 07C-25C (Central) / 07L-25R (North)).

(**): The no. of aircraft taxiing events for arrival and departure in 30 mins. of 07R-25L (South) / 07C-25C (Central) / 07L-25R (North) at Year 2032 are assumed to be equal (i.e. 14 (at max.) for arrival / departure).
(***): Operation time of 1 min. (before the aircraft reaching the gate) / 5 mins. (after the aircraft leaving the gate) throughout the 30 mins. period under the runway utilization mode of arrival / departure, respectively, is adopted.

(****): A sound absorption by the atmosphere (assumed at 500 Hz as well as 23.6°C, RH 68.3% and 101.3kPa as per the monthly meteorological data sets for Year 2011 of the HKO's monitoring station located at HKIA) has been accounted for in accordance with ISO 9613-1 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere.

Worst Assumption: All Aircraft Type to be Boeing 747-400 (Max. Original NPD)

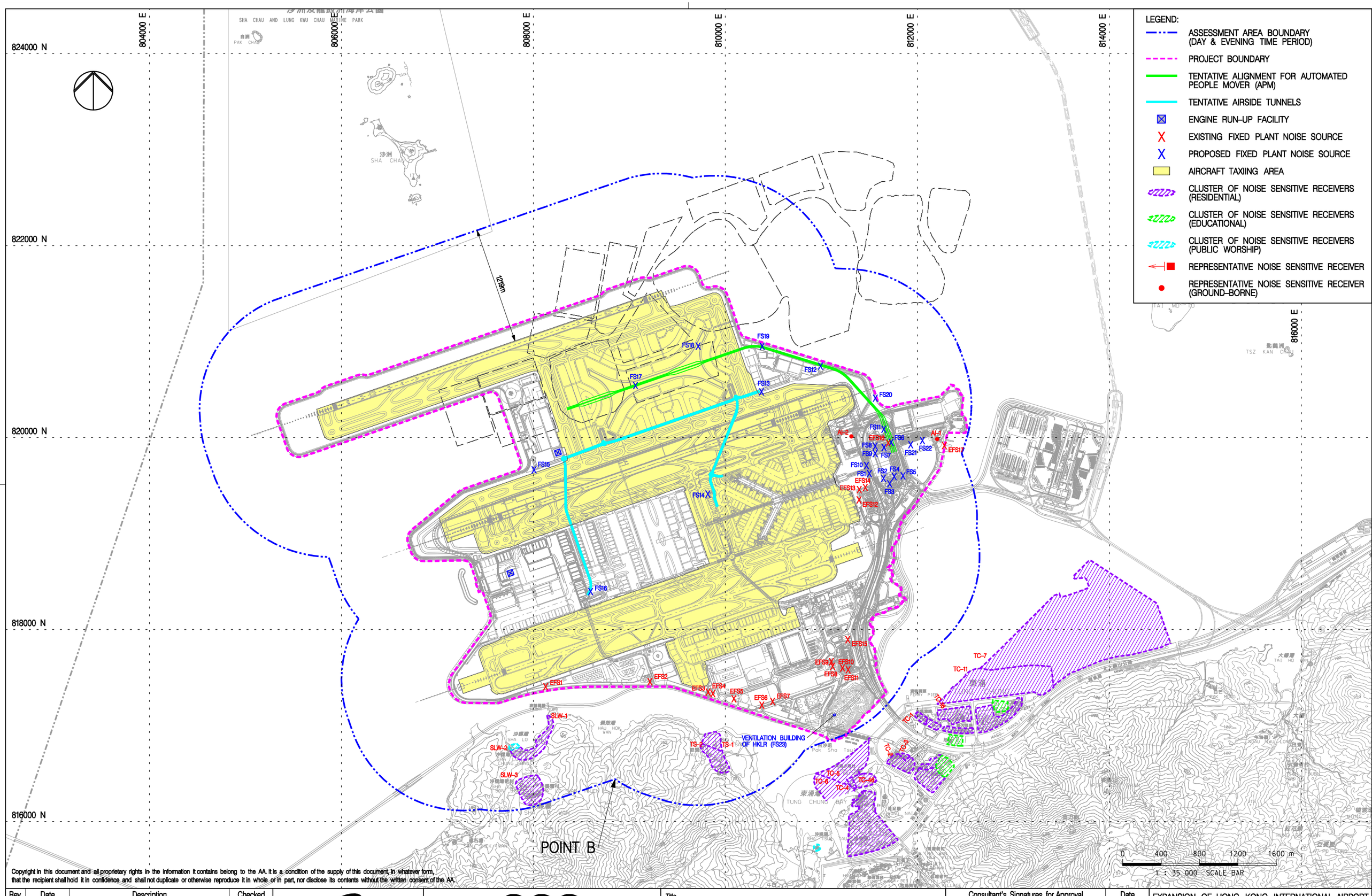
Table B2: Extremely Worst Overall SPL due to Existing OR New ERUF at Various Distances between the Aircraft and the NSR

		Operation of ERUF - Original NPD (Source: INM Model)					
Ft	meter	80% Thrust LAMAX(dBA)	90% Thrust LAMAX(dBA)	80% for 13 Mins. and 90% for 3 Mins. over 30 Mins. Period #Combined SPL(dBA)	##Screening Effect	Extremely Overall SPL(dBA)	Note:
200	61	110.4	114.0	108.6	-15.0	93.6	
400	122	103.6	107.2	101.8	-15.0	86.8	
630	192	98.9	102.4	97.1	-15.0	82.1	
1000	305	94.0	97.6	92.2	-15.0	77.2	
2000	610	86.2	89.8	84.4	-15.0	69.4	
By Log Interpolation	725.3	84.1	87.8	82.4	-15.0	67.4	
By Log Interpolation	862.3	82.0	85.8	80.3	-15.0	65.3	
By Log Interpolation	1025.3	80.0	83.8	78.3	-15.0	63.3	
4000	1219	77.9	81.8	76.2	-15.0	61.2	
By Log Interpolation	1365.6	76.5	80.3	74.8	-15.0	59.8	
By Log Interpolation	1529.9	75.0	78.9	73.3	-15.0	58.3	
By Log Interpolation	1763.4	73.6	77.5	71.9	-15.0	56.9	
6300	1920	72.2	76.1	70.5	-15.0	55.5	
By Log Interpolation	2419.1	69.0	72.9	67.3	-15.0	52.3	**Existing ERUF (for Pt. B)**
10000	3048	65.8	69.7	64.1	-15.0	49.1	**New ERUF (for Pt. B)**
By Log Interpolation	3855.5	62.5	66.5	60.9	-15.0	45.9	
16000	4877	59.3	63.3	57.7	-15.0	42.7	
25000	7620	53.2	57.2	51.6	-15.0	36.6	

Remarks:
(#): By assuming the Combined SPL to be equal to the Combined LAMAX for conservative approach.
(##): Noise enclosure with noise reduction of at least 15 dBA at the ERUFs is assumed to be incorporated.

Extremely Worst Overall SPL(dBA) due to Aircraft Taxiing + APUs (07R-25L (South) and 07C-25C (Central)) and Existing ERUF at Pt. B	=10log(10^(61.6/10)+10^(53.7/10)+10^(52.3/10))	= 62.7 dBA
Extremely Worst Overall SPL(dBA) due to Aircraft Taxiing + APUs (07L-25R (North)) and New ERUF at Pt. B	=10log(10^(50.7/10)+10^(49.1/10))	= 53.0 dBA
Extremely Worst Overall SPL(dBA) at Pt. B	=10log(10^(62.7/10)+10^(53.0/10))	= 63.1 dBA (or 63 dBA)

Note: All proposed and existing fixed plant noise sources are assumed to be insignificant as comparing with the ground noise sources (operation of aircraft taxiing / ERUFs / APUs).



LEGEND:

- ASSESSMENT AREA BOUNDARY (DAY & EVENING TIME PERIOD)
- PROJECT BOUNDARY
- TENTATIVE ALIGNMENT FOR AUTOMATED PEOPLE MOVER (APM)
- TENTATIVE AIRSIDE TUNNELS
- ENGINE RUN-UP FACILITY
- EXISTING FIXED PLANT NOISE SOURCE
- PROPOSED FIXED PLANT NOISE SOURCE
- AIRCRAFT TAXIING AREA
- CLUSTER OF NOISE SENSITIVE RECEIVERS (RESIDENTIAL)
- CLUSTER OF NOISE SENSITIVE RECEIVERS (EDUCATIONAL)
- CLUSTER OF NOISE SENSITIVE RECEIVERS (PUBLIC WORSHIP)
- REPRESENTATIVE NOISE SENSITIVE RECEIVER
- REPRESENTATIVE NOISE SENSITIVE RECEIVER (GROUND-BORNE)

Rev.	Date	Description	Checked
A	27FEB14	FIRST ISSUE	HL
B	21MAR14	GENERAL REVISION	HL

香港國際機場 HONG KONG INTERNATIONAL AIRPORT
Airport Authority Hong Kong, 1 Sky Plaza Road, Hong Kong International Airport, Lantau, Hong Kong
Tel : (852) 2188 7111 Fax : (852) 2824 0717

Mott MacDonald
in association with
ARUP
Atkins China Limited
Clymene Enterprises
Deltares
Ecosystems Limited
SDA Marine Limited
Urbis Limited
URS Limited

Title

LOCATIONS OF NOISE SENSITIVE RECEIVERS (NSRs) FOR FIXED NOISE SOURCE IMPACT ASSESSMENT

Consultant's Signatures for Approval		Date
Design	HL	27FEB14
Checkers	HL	27FEB14
Design Supervisor	EC	21MAR14
Authorised Representative	AFK	21MAR14

EXPANSION OF HONG KONG INTERNATIONAL AIRPORT INTO A THREE-RUNWAY SYSTEM

Drawing No. MCL / P132 / EIA / 7-4-006b

Scale at A3 1 : 35000

Rev. B

Filename: J:\308875\REPORT\ENV\EIA\140303\MCL-P132-EIA-7-4-006b.dgn