APPENDIX-4.3.3 ANNUAL INTERNATIONAL PASSENGER DEMAND BY ORIGIN/DESTINATION COUNTRY (HIGH PROJECTION)

Annual International Passenger Demand by Origin / Destination Country (High Projection)

From/to Solomon Is.	1989	1995	2000	2005	2010
Australia	12,500	25,200	43,200	71,300	115,200
New Zealand	3,800	7,600	13,000	21,500	34,800
Papua New Guinea	3,800	9,100	17,700	32,800	59,100
Fiji	1,000	2,500	4,900	9,000	16,200
Japan	1,900	4,100	7,500	13,300	23,200
United Kingdom	1,500	3,100	5,200	8,700	14,000
U.S.A.	3,400	6,900	11,800	19,400	31,400
Other Pacific	2,200	5,400	10,400	19,200	34,700
Other Europe	700	1,300	2,300	3,800	6,100
Others	2,900	6,100	10,700	18,300	30,500
Total Countries	33,600	71,300	126,700	217,400	365,000

APPENDIX-4.3.4 ANNUAL INTERNATIONAL PASSENGER DEMAND BY ORIGIN/DESTINATION COUNTRY (LOW PROJECTION)

Annual International Passenger Demand by Origin / Destination Country (Low Projection)

From/to Solomon Is.	1989	1995	2000	2005	2010
Australia	12,500	18,200	24,200	31,600	40,800
New Zealand	3,800	5,500	7,300	9,500	12,300
Papua New Guinea	3,800	6,100	8,600	12,000	16,400
Fiji	1,000	1,700	2,400	3,300	4,500
Japan	1,900	2,800	3,900	5,300	7,100
United Kingdom	1,500	2,200	2,900	3,800	5,000
U.S.A.	3,400	4,900	6,600	8,600	11,100
Other Pacific	2,200	3,600	5,100	7,000	9,600
Other Europe	700	1,000	1,300	1,700	2,200
Others	2,900	4,300	5,800	7,700	10,100
Total Countries	33,600	50,200	68,100	90,600	119,100

APPENDIX-4.4.1 TRIP TIME AND COST OF DOMESTIC TRAVEL

From/to Honiara	Distance (Km)	Air Transportation		Sea Transportation	
		Trip Time (Hours)	Trip Cost (SI$)	Trip Time (Hours)	Trip Cost (SI$)
Western	337	2.75	183	23.60	48
Isabel	156	1.42	83	10.35	29
N. Central	95	1.09	61	6.70	22
S. Central	240	1.92	119	15.40	37
Guadalcanal	103	1.09	61	7.20	23
Malaita	111	1.25	63	7.65	35
Makira/Ulawa	237	1.59	119	15.20	36
Temotu	665	3.84	302	40.90	67

APPENDIX-4.4.2 CONCEPT OF MD MODEL

This model explains the model shares using two different distributions concerning time value and total cost (time cost and fare) of passengers. They are expressed as follows:

g (x) : Distribution function of time value of passengers
(x = 1/v, v: time value, SI$/hour)

f (u) : Distribution function of total cost of passengers
(u: total cost, SI$)

It is generally assumed that these distribution functions follow normal logarithmic type of distribution.

In this model, a passenger chooses a mode of which victim value is smaller than that of other mode of transportation. The victim value is expressed in terms of time in logarithm as follows:

$$S = ln\ (t + c/v)$$

where,
S : Victim value
t : Trip time (hour)
v : Time value (SI$/hour)
c : Fare of a transportation mode

Considering two modes of transportation, air and sea, a passenger choose air transportation if S_1 is smaller than S_2. Here, "1" denotes air and "2" denotes sea.

Substitutional time value which gives Sa equals to Ss is calculated as follows:

$$v' = \frac{C_1 - C_2}{t_2 - t_1} \quad \text{or} \quad x' = \frac{t_2 - t_1}{C_1 - C_2}$$

Illustrating the two distribution functions in a figure, air passengers account for D1 of the all potential passengers and sea passenger account for D2 of the all potential passengers. D_1 and D_2 are expressed as follows :

$$D1 = \int_{-\infty}^{x'} g(x) \int_{S1}^{\infty} f(u)\ dx$$

$$D2 = \int_{x'}^{\infty} g(x) \int_{S2}^{\infty} f(u)\ dx$$

The shares of air transportation (H1) and sea transportation (H2) are according obtained as follows:

$$H1 = D1/(D1 + D2)$$

$$H2 = D2/(D1 + D2)$$

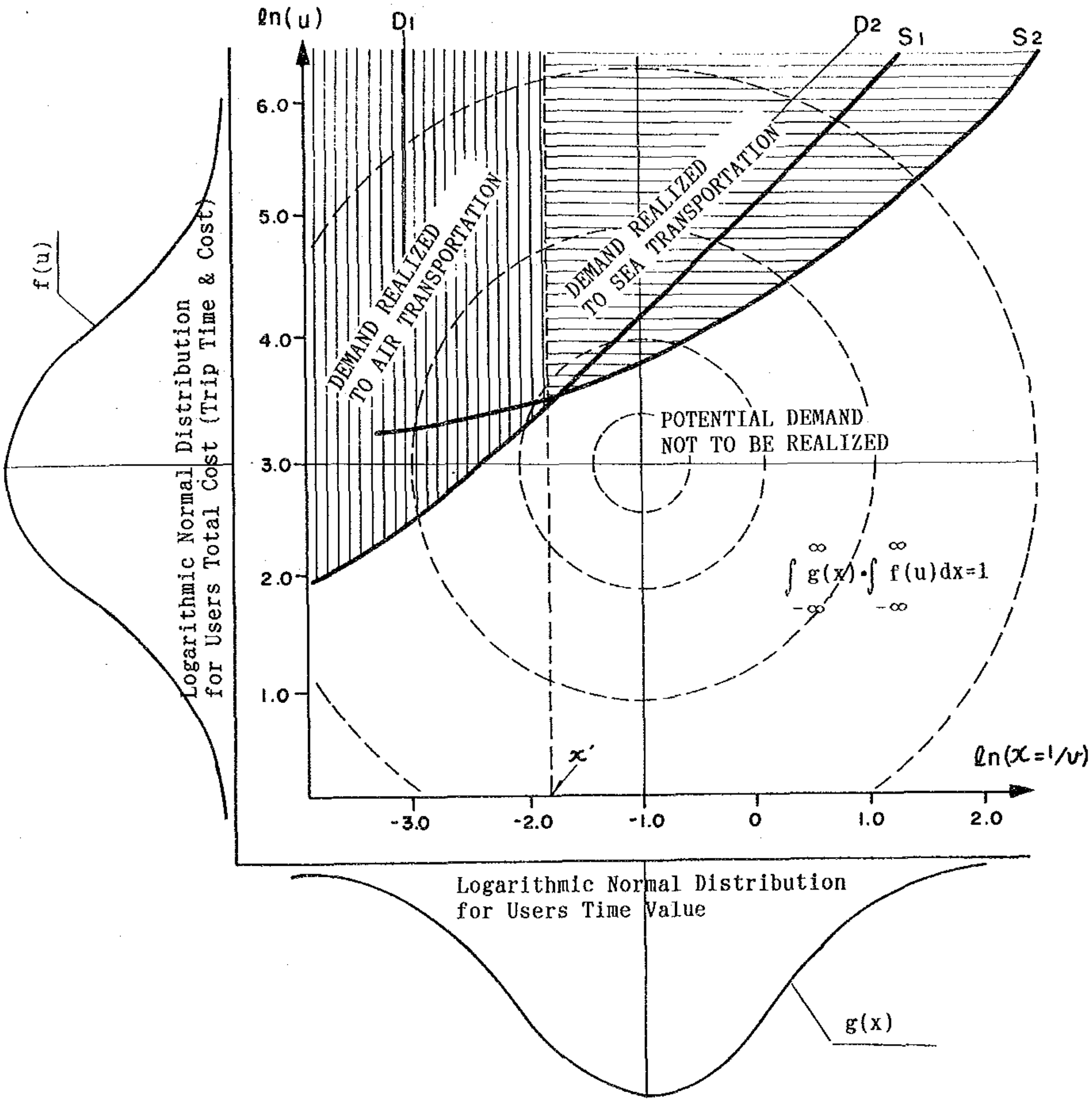


Figure A.4.4.2 Concept of MD Model

APPENDIX-4.4.3 PARAMETERS OF MD MODEL

	1989	1995	2000	2005	2010
mean value of ln (1/v)	-0.738	-0.957	-1.123	-1.276	-1.424
deviation of ln (1/v)	1.021	1.021	1.021	1.021	1.021
mean value of ln (U)	3.75	3.75	3.75	3.75	3.75
deviation of ln (U)	2.09	2.09	2.09	2.09	2.09

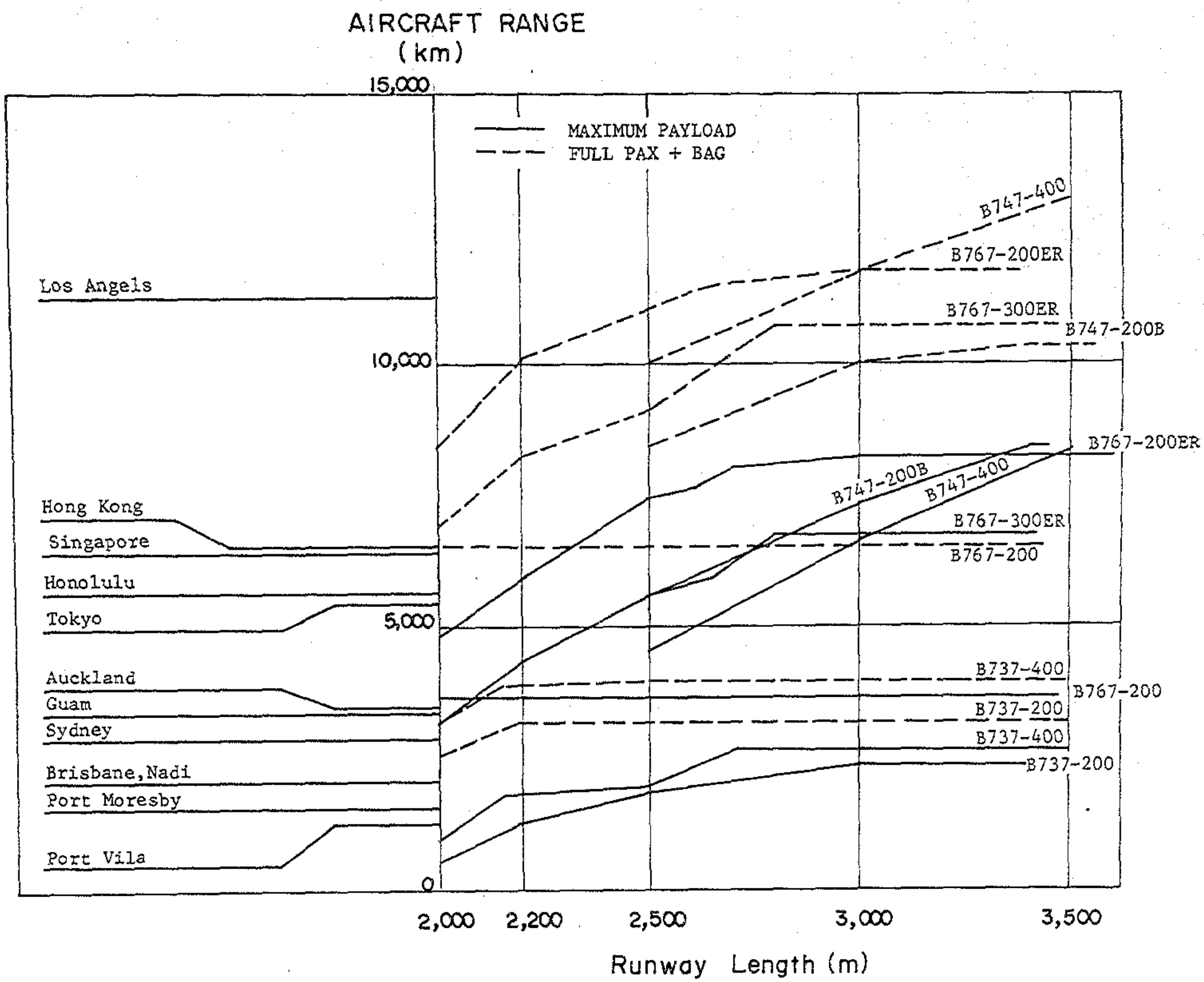
In the above mentioned parameters, v means average time value (SI$ per hour) which is assumed to increase according to the growth of GDP in this Study. The value of v is obtained by the following formula.

$$v = \overline{GS}^{k} \times v89$$

where,
- v : Average time value in the future (SI$/hour)
- v89 : Average time value in 1989 (2.09 SI$/hour).
- $\overline{GS}$: The growth factor of GDP of Solomon Islands (1989 = 1.0)
- k : Parameter, k = 0.75

APPENDIX TO CHAPTER 5

APPENDIX-5.2.1 RUNWAY LENGTH VS AIRCRAFT RANGE



AIRCRAFT RANGE
(km)
15,000
10,000
5,000
0
MAXIMUM PAYLOAD
FULL PAX + BAG
Los Angels
Hong Kong
Singapore
Honolulu
Tokyo
Auckland
Guam
Sydney
Brisbane,Nadi
Port Moresby
Port Vila
B747-400
B767-200ER
B767-300ER
B747-200B
B767-200ER
B747-200B
B747-400
B767-300ER
B767-200
B737-400
B767-200
B737-200
B737-400
B737-200
2,000
2,200
2,500
3,000
3,500
Runway Length (m)

APPENDIX TO CHAPTER 6

APPENDIX-6.2.1 DIMENSION OF HONIARA FIR

FLIGHT INFORMATION REGIONS AND CONTROLLED AREAS

NAME AND LATERAL LIMITS	UPPER LIMIT / LOWER LIMIT	UNIT PROVIDING SERVICE	RADIO CALL-SIGN (Language)	REMARKS
1	2	3	4	5
HONIARA FLIGHT INFORMATION REGION 0450S 15900E - 0450S 16000E - 1030S 16645E - 1400S 15500S - 07195 15500E thence along the international boundary between Solomon Islands and Papua New Guinea to 0450S 15900E	UNL / GND	Honiara Flight Information Unit	RTF HONIARA (En)	Flight Information and Alerting Service only H.24
NAURU FLIGHT INFORMATION REGION 0330N 16000E - 0330N 17000E - 1000S 1700E - 1148S 16652.5E - 1030S 16645E - 0450S 16000E - 0330N 16600E	UNL / GND	Nauru Flight Service Unit	RTF: NAURU (En)	Flight Information and Alerting Service to aircraft bound to/from Nauru aerodrome only But FIR not yet implemented. Service will be provided by Honiara FIC when Nauru FSU not in operation
CONTROL AREAS NIL				

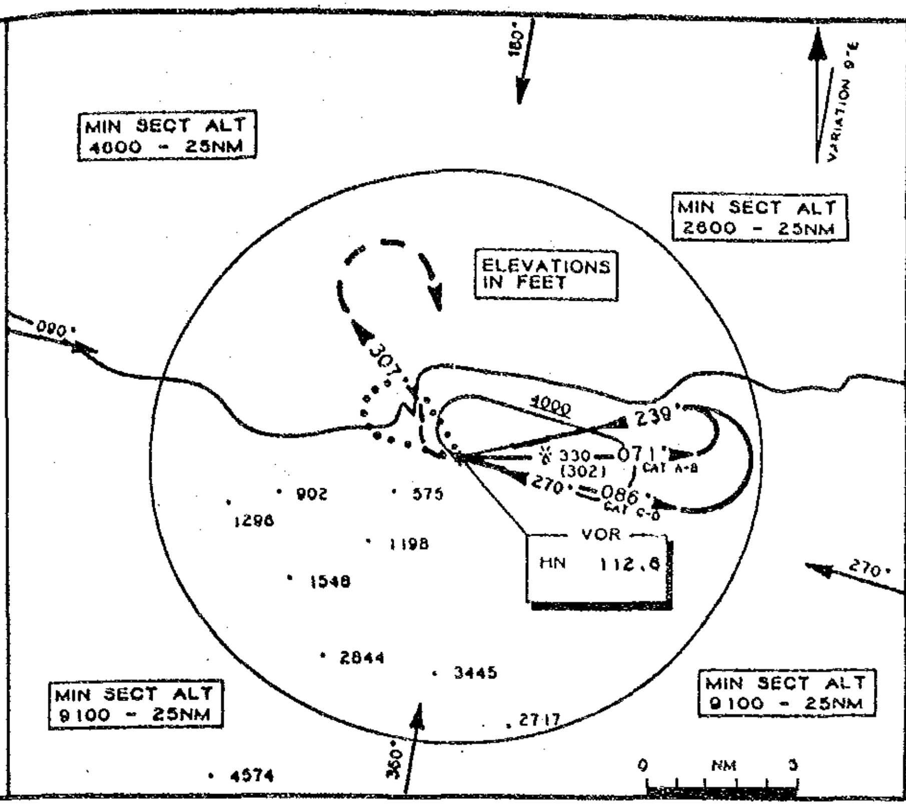
APPENDIX-6.2.2 DIMENSION OF RESTRICTED AREA

PROHIBITED,RESTRICTED AND DANGER AREA

AREA	POSITION	VERTICAL LIMITS	LATERAL LIMITS	HOURS OF OPERATION	CONTROLLING AUTHORITY	REMARKS
PROHIBITED AREAS —	NIL					
DANGER AREAS —	NIL					
RESTRICTED AREAS						
AGR 1 HELL'S POINT	0926S 1600415E (333m South East Rwy 24)	1100 ALT Surface	266m (1200ft) Radius	HJ (as notified by ATS)	Royal Solomon Islands Police	Explosive Demolition Note:Liaison exist with Honiara FIC to avoid any explosions when aircraft are in vicinity
AGR 2 LUNGA BEACH	0924036S 1600209E	10000ft ALT Surface	1000m Radius	2200 to 0400 UTC Mon,Tue & Wed	Royal Solomon Islands Police	Explosive Demolition Note:Liaison exist with Honiara FIC to avoid any explosions when aircraft are in vicinity

APPENDIX-6.2.3 INSTRUMENT APPROACH PROCEDURE RWY 24 VOR

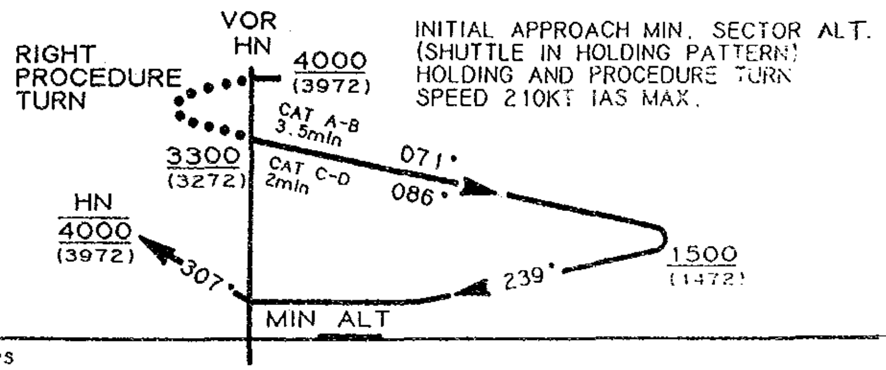
RWY 24 VOR



TWR	119.1 mHz
SMC	123.4 mHz
FIS	118.1 mHz

TR IN	TURN	TIME	MIN ALT	DME LIMIT
270	RIGHT	1	4000	---

Bearings are Magnetic
Elevations in Feet AMSL



INITIAL APPROACH MIN. SECTOR ALT. (SHUTTLE IN HOLDING PATTERN) HOLDING AND PROCEDURE TURN SPEED 210KT IAS MAX.

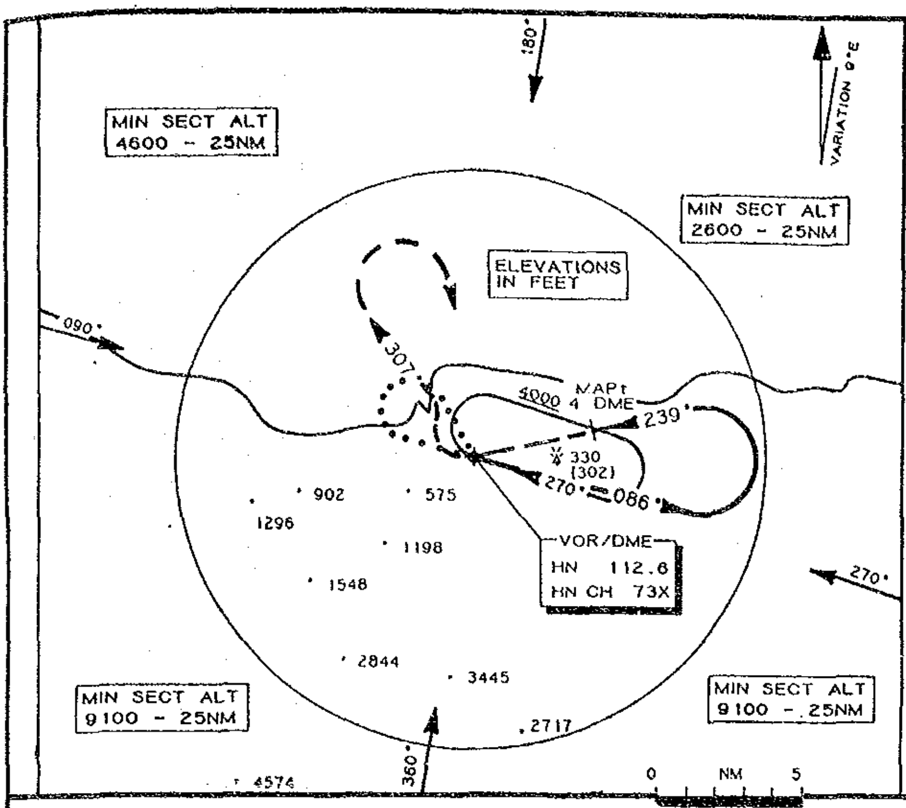
MISSED APPROACH:
At HON VOR climbing right turn on to 307°. Climb to 4000 and return to HN VOR.
Climb to 1300 prior to level acceleration.

OCA'S

CATEGORY	A	B	C	D
S-VOR	630 (616)		1000 (986)	
CIRCLING				
SECTOR 239° to 059°	630 (602)		1320 (1292)	
SECTOR 059° to 239°	630 (602)		1600 (1572)	

TRANSITION ALTITUDE: 11000 FT
TRANSITION LEVEL: FL 120 (MIN)

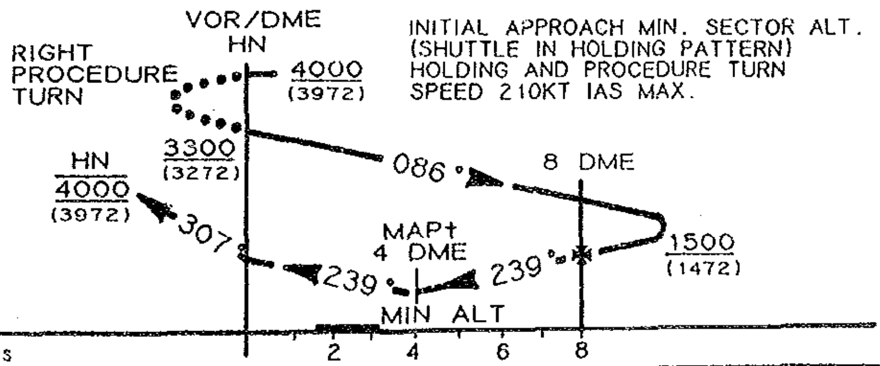
APPENDIX-6.2.4 INSTRUMENT APPROACH PROCEDURE RWY 24 VOR/DME



TWR	119.1 mHz
SMC	123.4 mHz
FIS	118.1 mHz

TR IN	TURN	TIME	MIN ALT	DME LIMIT
270	RIGHT	1	4000	---

Bearings are Magnetic
Elevations in Feet AMSL



MISSED APPROACH:
Climb straight ahead to HN VOR. Turn right on to 307°. Climb to 4000 and return to HN VOR. Climb to 1100 prior to level acceleration.

OCA'S

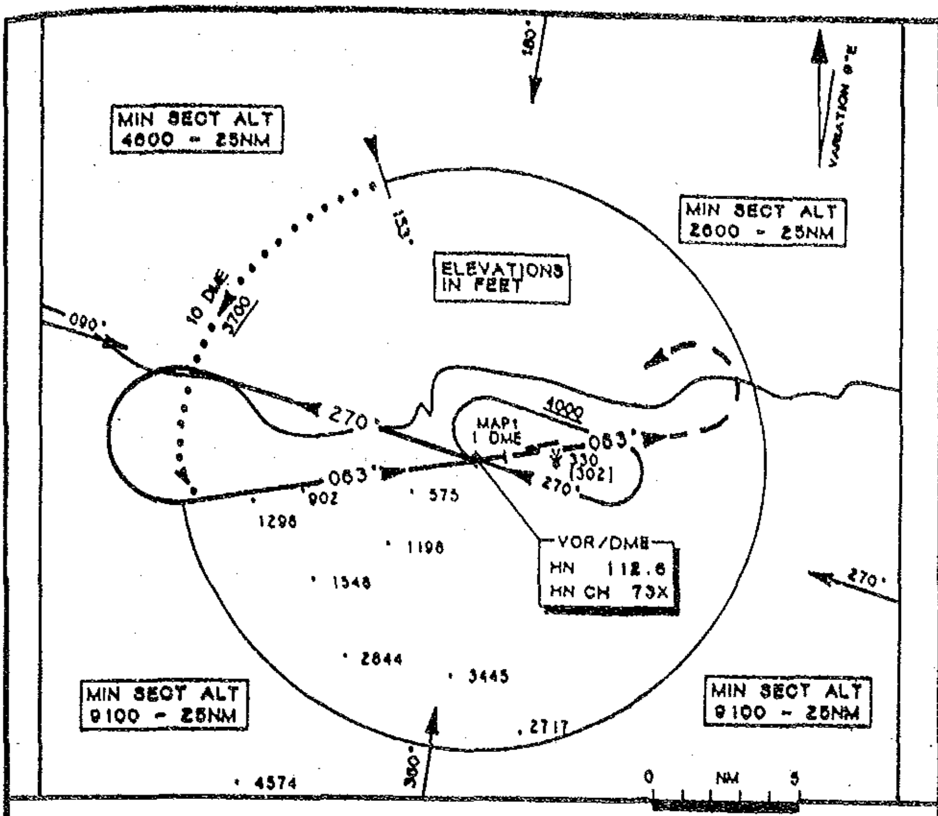
CATEGORY	A	B	C	D
S-VOR/DME	400 (388)			
CIRCLING				
SECTOR 239° to 059°	430 (402)	530 (502)	1320 (1292)	
SECTOR 059° to 239°	630 (602)		1600 (1572)	

DME DISTANCES AND ALTITUDES

DME DIST.	MAPt 4	6	8	10
ALTITUDE	MDA	990	1600	2210

TRANSITION ALTITUDE: 11000 FT
TRANSITION LEVEL: FL 120 (MIN)

APPENDIX-6.2.5 INSTRUMENT APPROACH PROCEDURE RWY 06 VOR/DME



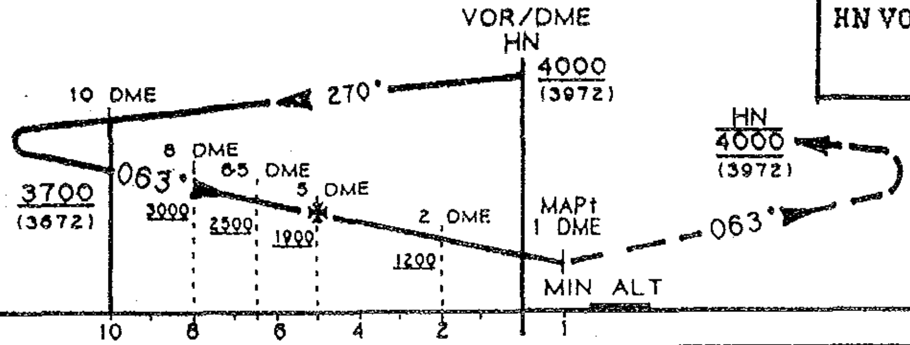
TWR	
SMC	
FIS	118.1 mHz

TR IN	TURN	TIME	MIN ALT	DME LIMIT
270	RIGHT	1	4000	---

Bearings are Magnetic
Elevations in Feet AMSL

MISSED APPROACH:
Climb straight ahead to MNM 2000. Turn left to return to HN VOR MNM 4000.

INITIAL APPROACH MIN. SECTOR ALT.
(SHUTTLE IN HOLDING PATTERN)
HOLDING SPEED 210KTS IAS MAX.



CATEGORY	A	B	C	D
S-VOR/DME	430 (402)			580 (552)
CIRCLING				
SECTOR 239°to059°	430 (402)	530 (502)	1320 (1292)	
SECTOR 059°to239°	630 (602)		1600 (1572)	

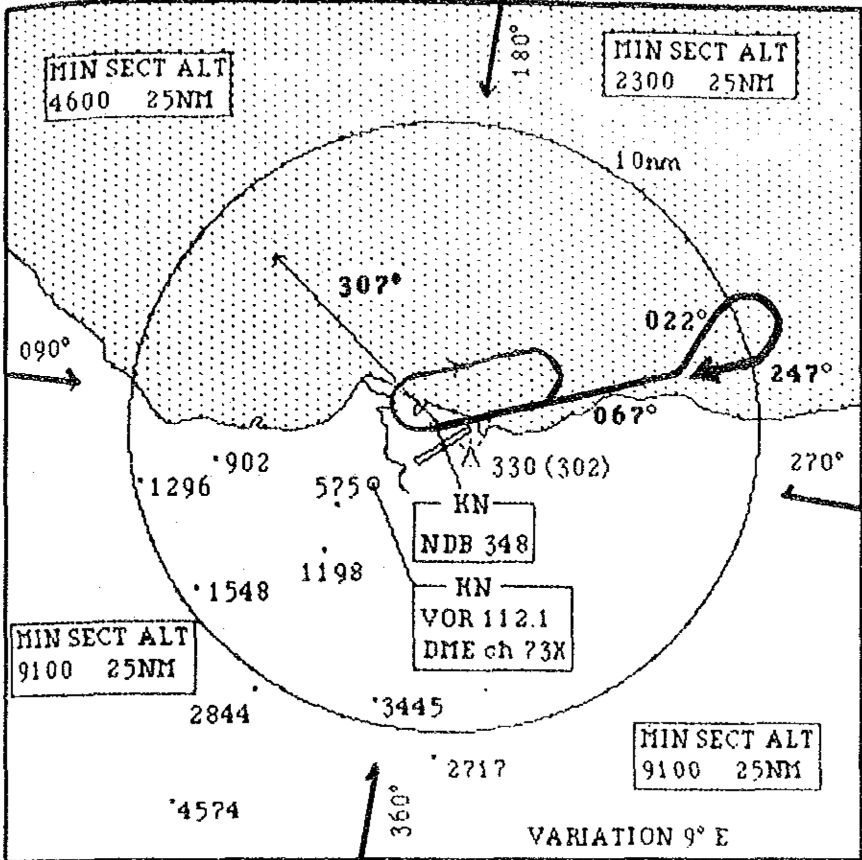
DME DISTANCES AND ALTITUDES						
DME DIST	8	6	4	2	VOR	MAPt 1
ALTITUDE	3080	2460	1840	1220	640	MDA

TRANSITION ALTITUDE: 11000 FT
TRANSITION LEVEL: FL 120 (MIN)

APPENDIX-6.2.6 INSTRUMENT APPROACH PROCEDURE RWY 24 NDB OR NDB/DME

Changes: DME repositioned, VOR, AD Elevation

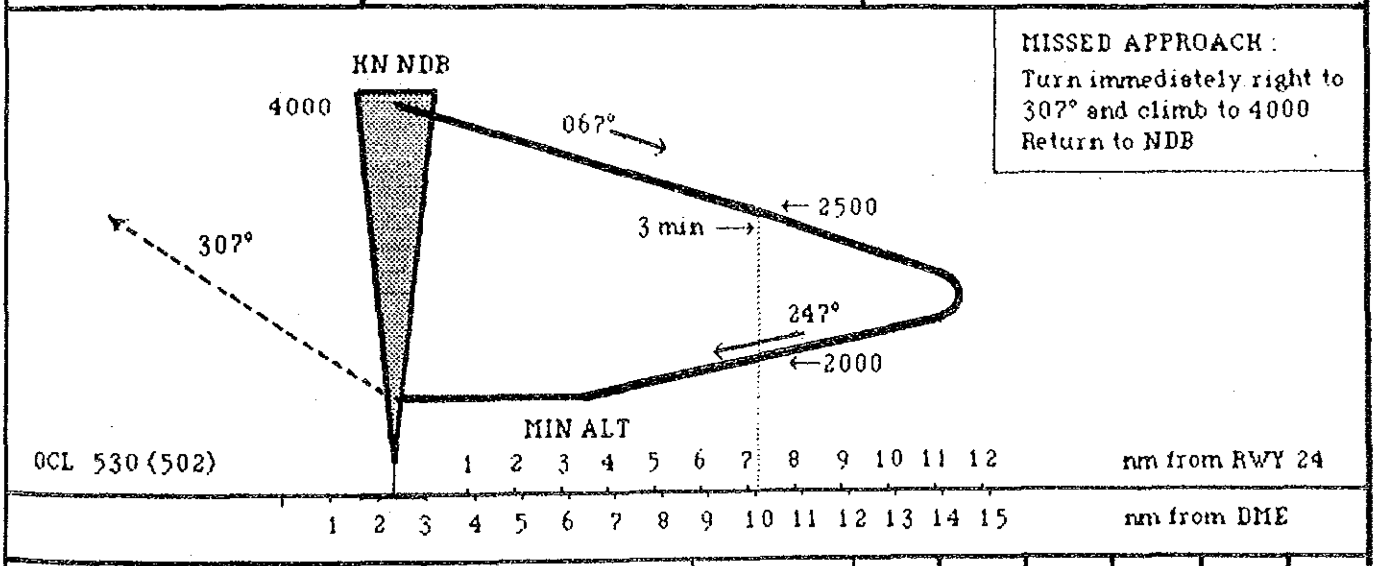
RWY 24 NDB or NDB/DME



TWR	
SMC	
FIC	118.1 mHz

TR IN	TURN	TIME	MIN ALT	DME LIMIT
247°	RIGHT	1	4000	-----

Bearings are Magnetic
Elevations in Feet AMSL



MISSED APPROACH:
Turn immediately right to 307° and climb to 4000
Return to NDB

DME DIST	5.7	6.5	7.5	8.5	9.5	10.5
ALTITUDE	500	710	965	1215	1465	1760

CIRCLING MINIMA

SECTOR	OCL
239° - 059° THROUGH N	900 (872)
059° - 239° THROUGH S	1500 (1472)

NOTE: DME equipped aircraft commence procedure turn at 10 DME
Transition Altitude: 11 000 FT
Transition Level: FL 120 (MIN)

APPENDIX-6.3.1 RUNWAY USABILITY ANALYSIS

The runway usability factors are examined by analyzing wind data at the airport for the cases as follows:

(a) All conditions of visibility - head wind.

(b) All conditions of visibility - tail wind.

(c) Restricted visibility condition - low ceiling/poor visibility

The result analysis are presented hereinafter.

(1) <u>All Conditions of Visibility - Head Wind</u>

A wind rose is produced based on the wind data during 12 years from 1975 to 1986, and shown in Figure A.11.1. The calculated wind coverage for three different speeds of cross-wind components are shown in Table A.6.3.1.

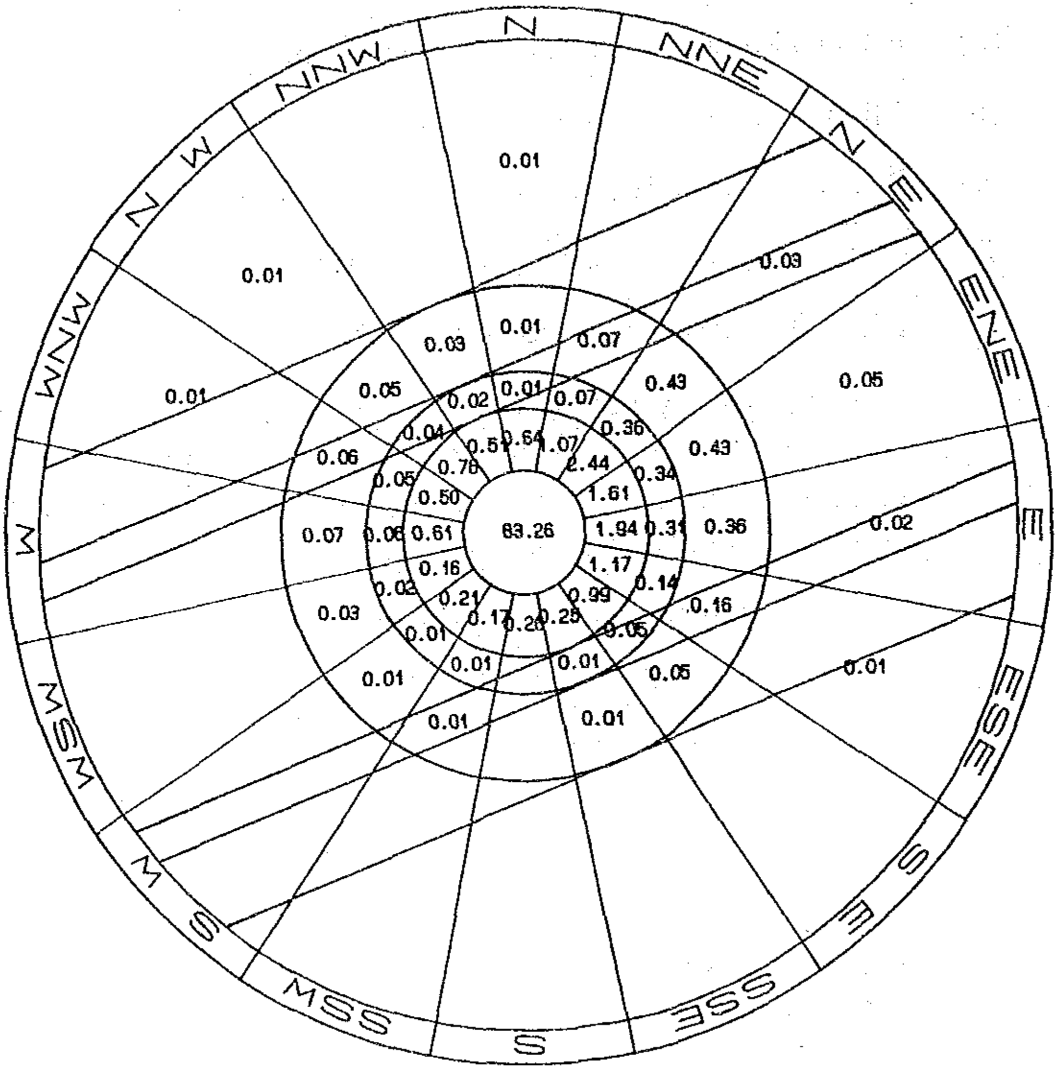
Table A.6.3.1 Wind Coverage

Cross-Wind Component	Wind Coverage
Less than 10kt	99.40
Less than 13kt	99.73
Less than 20kt	99.97

Light aircraft (reference field length less than 1200m) require cross-wind component not to exceed 10 kt for their safe operation.

Since majority of aircraft movements at Henderson International Airport consist of these small light aircraft, the runway must have more than 95% wind coverage for cross-wind component not exceeding 10kt. As seen in the table above, the runway more than satisfies the requirements with its excellent 99.4% wind coverage. Further examination of the wind rose reveals that any runway orientation at the airport site would satisfy 95% minimum aerodrome usability factor for the cross-wind component not exceeding 10kt specified in ICAO Annex 14.

Nevertheless, the present runway orientation is the optimum with regards to the wind coverage because of its



SOURCE : SOLOMON ISLANDS METEOROLOGICAL SERVICE OFFICE
LOCATION : HENDERSON AIRPORT
PERIOD : 1975～1986
RUNWAY ORIENTATION : N68° E
WIND COVERAGE : 99.40% (CROSS WIND 10kt)
99.73% (CROSS WIND 13kt)
99.97% (CROSS WIND 20kt)

Figure A.6.3.1 Wind Coverage

almost highest usability factor under all conditions of visibility. (Refer to Figure A.11.2)

(2) <u>All Conditions of Visibility - Tail Wind</u>

The wind coverages of each runway heading were examined for the convined effects of cross-winds (13kt and 20kt) and tail winds (5kt and 10kt) by the use of a computer program and the wind data. The output of the computer is tabulated in Table A.6.3.2.

Table A.6.3.2 Wind Coverage with Tail Wind

Cross Wind Component	Runway 06 Landing with less than 5kt Tail Wind	Runway 06 Landing with less than 10kt Tail Wind
Less than 13kt	98.01%	99.50%
Less than 20kt	98.20%	99.72%

Cross Wind Component	Runway 24 Landing with less than 5kt Tail Wind	Runway 24 Landing with less than 10kt Tail Wind
Less than 13kt	89.86%	97.48%
Less than 20kt	89.98%	97.64%

As seen in the table above, there is not much difference for wind coverage between landings on the runway 06 and runway 24 in case of tail wind less than 10kt. However, in case of tail wind less than 5kt, the runway 06 has much higher coverage than the runway 24.

Thus, it can be said that the main approach runway is the runway 06 (landing from the southwest) from the prevailing wind conditions especially for small aircraft.

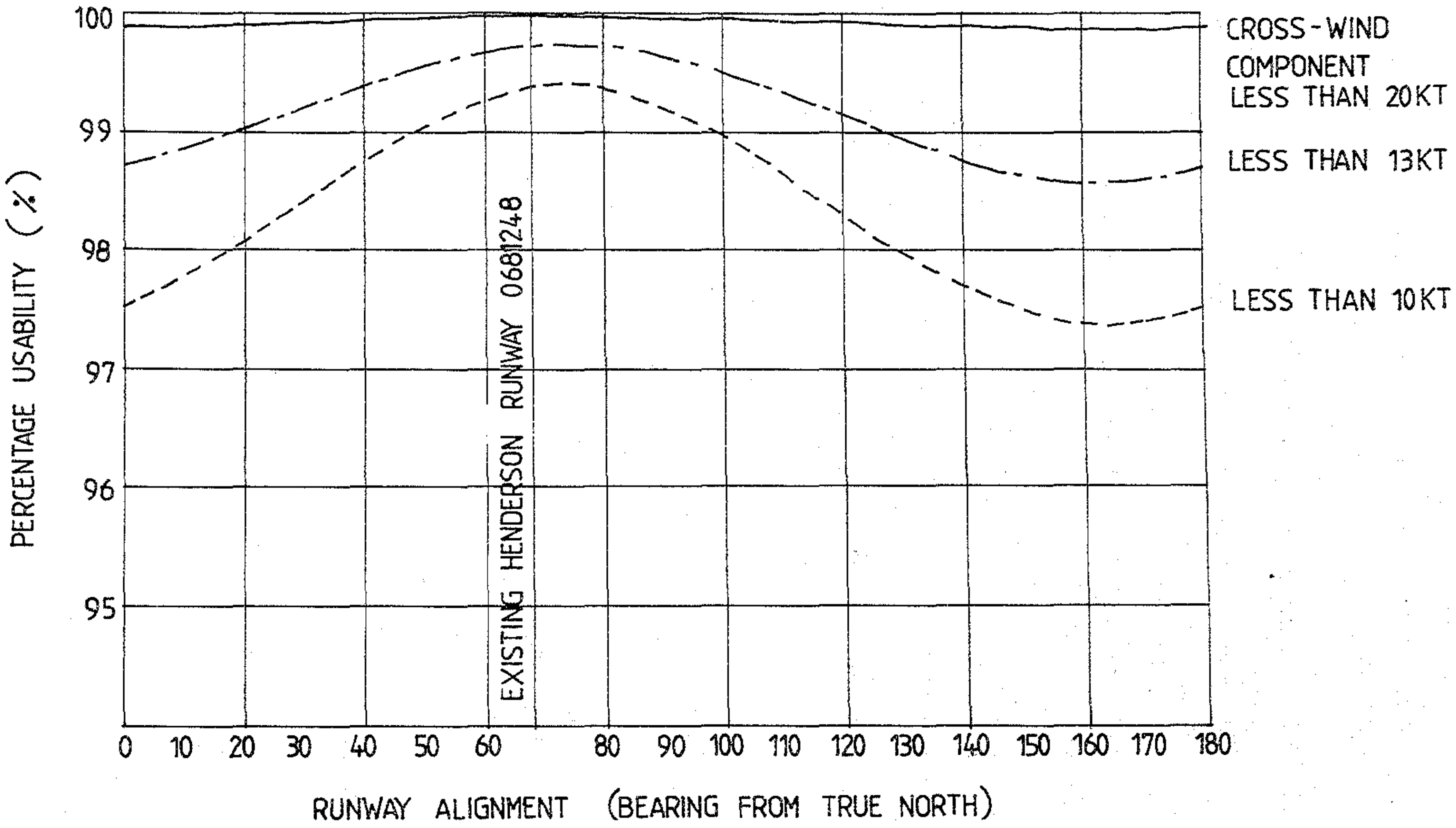


Figure A.6.3.2 Wind Coverage vs. Runway Alignment

(3) **Restricted Visibility Condition - Low Ceiling/Poor Visibility**

The wind coverage of the runway under restricted visibility condition, i.e, low ceiling and poor visibility conditions was analysed based on the data of a 12 year period from 1975 to 1986. A correlation table between ceiling and visibility is shown in Table A.11.3. The coverages by VOR weather minima and ILS minima are compared in Table A.6.3.3.

Table A.6.3.3 Collelation of Ceiling and Visibility

Ceiling (m)	Visibility (m)					
	0 - 399	400 - 799	800 - 1499	1500 - 4999	5000 -	Total
0 - 29	0	0	0	0	0	0
30 - 59	0	0	0	0	0	0
60 - 89	0	0	1	1	1	3
90 - 149	1	0	0	0	1	2
150 - 299	13	1	1	4	15	34
300 -	16	14	14	23	36148	36215
Total	30	15	16	28	36165	36254

Table A.6.3.4 Comparison of Ceiling and Visibility Coverage for VOR Minima and ILS Minima

Weather Condition	Ceiling and Visibility Coverage
Better than Minima for VOR *1	99.78%
Better than Minima for ILS CAT-1 *2	99.88%

*Note *1: Ceiling height more than 600 ft and visibility more than 3,200m*
**2: Ceiling height more than 200 ft and visibility more than 800m*

Table A.6.3.4 indicates that low ceiling and reduced visibility are very rare at Henderson International Airport. The occurrence of weather condition less than VOR minima is only 0.22% of the total observations, which is 19 hours per year. Therefore, the upgrading of the existing VOR, approach procedure to precision approach category-I procedure would have very limited improvement in the runway usability from the viewpoint of meteorological conditions.

(4) Runway Usability Factor

The runway usability factors which incorporate the wind coverage and the ceiling and visibility coverage are calculated. The usability factors with the existing VOR approach procedure are shown in Table A.6.3.5

Table A.6.3.5 Runway Usability Factor

Cross-wind Component	Usability Factor
Less than 10kt	99.2%
Less than 13kt	99.5%
Less than 20kt	99.8%

Note: An introduction of ILS CAT-I would improve the usability factors by 0.1 point respectively.

It is concluded from the table that the runway usability factor of Henderson International Airport is almost 100% owing to the favorable meteorological conditions and adequate orientation of the runway to the prevailing winds.

APPENDIX-6.6.1 EVALUATION OF EXISTING AIRFIELD PAVEMENT

(1) Evaluation of Existing Pavement for B737 Operations

The existing runway pavement is evaluated based on JCAB Airfield Asphalt Design Manual. This manual basically refers to CBR method developed by the US Army Corps of Engineers. A relationship between design coverage, reference pavement thickness and subgrade CBR for B737-200 are shown in figure A.6.6.1. Applying 5% CBR value obtained by the soil investigation at the airport, a relationships between design coverage and reference pavement thickness is illustrated in Figures A.6.6.2 for B737.

In the above figures, the reference pavement thickness is a total pavement thickness obtained by evaluating each layer of the existing pavement. The various equivalency factors are provided by JCAB, and are used for this evaluation. The existing 56cm thick pavement is evaluated to be equivalent to 62 cm thick pavement for B737 operations as follows:

Table A.6.6.1 Evaluation of Existing Pavement for B737 Operations

Existing Pavement	Evaluated Thickness for B737 Operations
1. 4cm surface course	1. 4cm surface course
2. 6cm binder course	2. 6cm binder course
3. 6cm binder course	3. 12cm base course (Equivalency factor = 2.0)
4. 20cm base course	4a. 18cm base course 4b. 2cm subbase course (Equivalency factor = 1.0)
5. 20cm subbase course	5. 20cm subbase course
Total thickness 56cm	Reference thickness 62cm

Note 1: The required thickness of the asphalt surface for B737 is 10cm.
Note 2: The required thickness of the base course for B737 is 30cm for subgrade CBR of 5.0%.

From this reference pavement thickness, possible number of operations can be read in Figure A.6.6.3. In this figure, design coverage of 1,000 approximately equals to 2 movements per day. Then the maximum allowable number

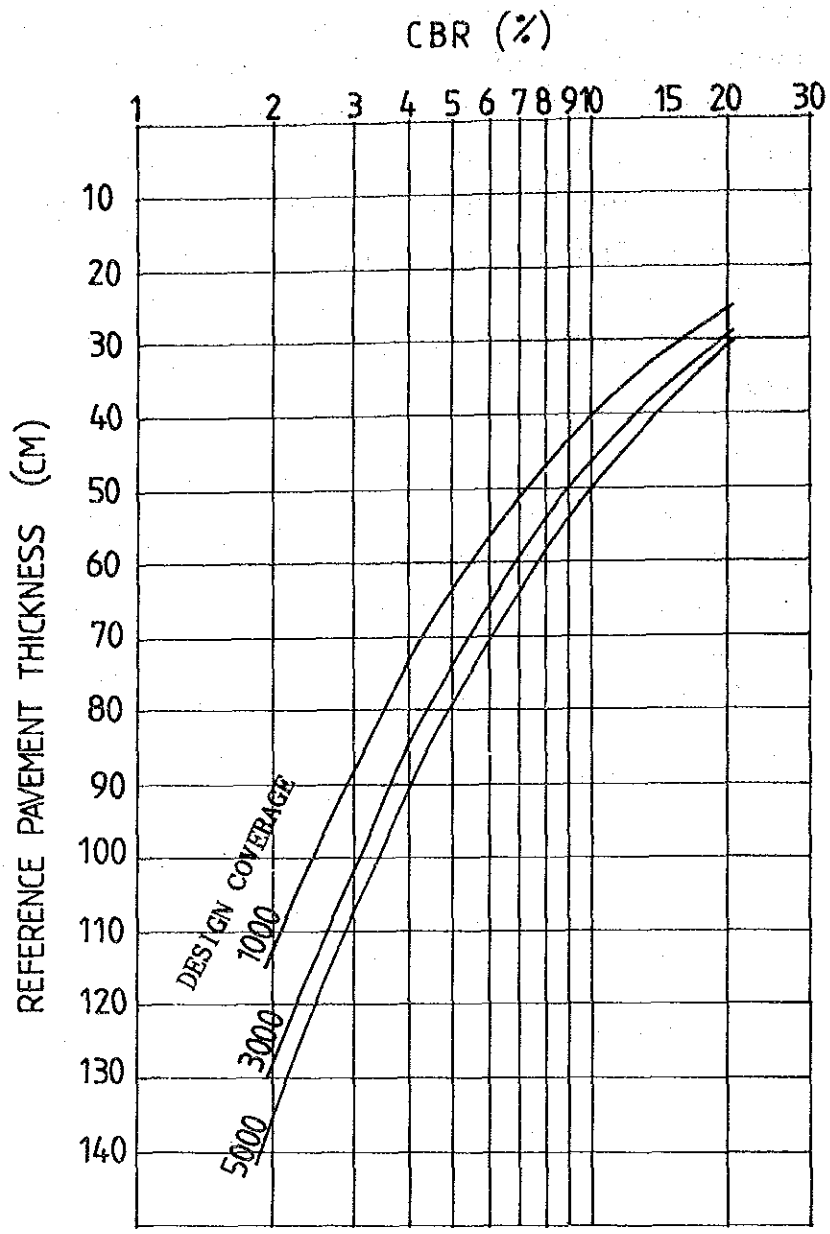


Figure A.6.6.1 Pavement Design Curve for B737-200

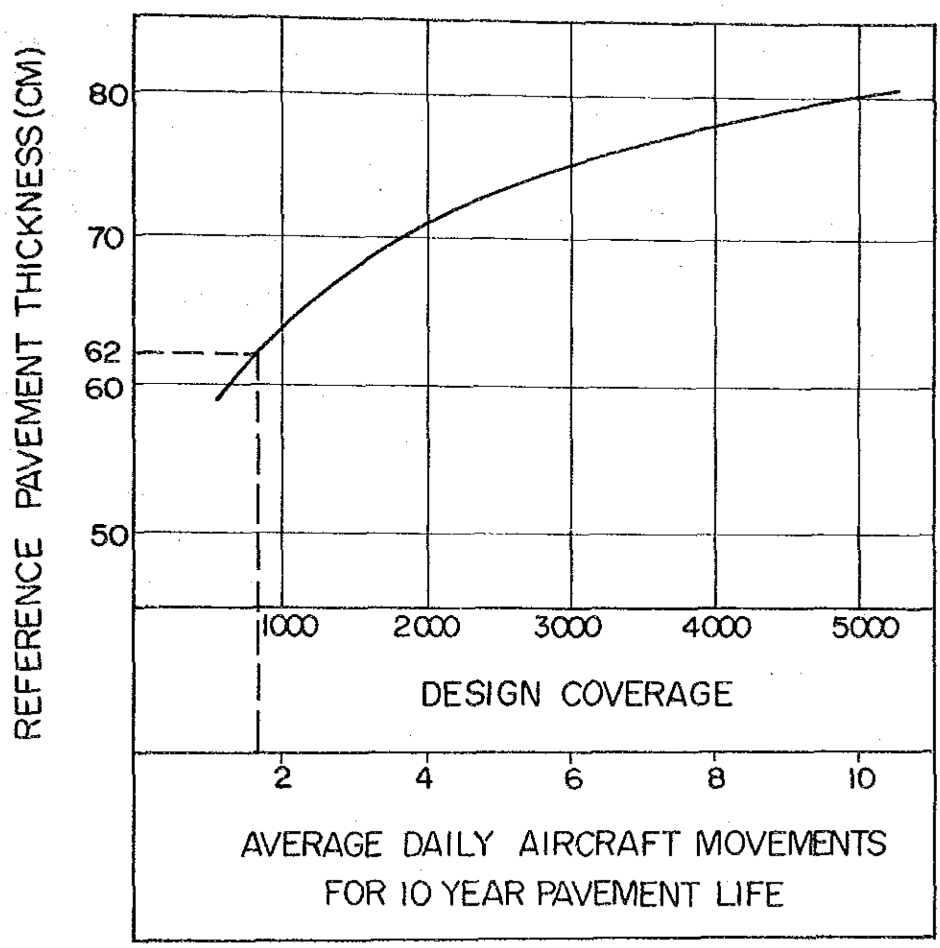


Figure A.6.6.2 Pavement Thickness and Coverage (B737-200, CBR = 5.0%)

of B737 operations on the existing pavement is 2 movements per day.

The present daily movements of B737 are three movements per day on an average, but they are operating at a weight less than all-up mass. Thus, the strength of the existing pavement is barely sufficient for the present loading condition.

(2) **Evaluation of Existing Pavement for B767 Operations**

Taking into account the design aircraft, i.e. B737, on the flexible pavement on subgrade CBR of 5%, declared PCN (pavement classification number of 29) in the AIP Solomon Islands is evaluated to be appropriate. Since the ACN (aircraft classification number) of B767-200 with all-up mass is 55, the overload ratio (ACN/PCN = 55/29) is approximately 1.9. The overload operations on such a high overload ratio (more than 1.5) is allowed only in emergency cases in accordance with the United Kingdom Practice. Therefore, operations of B767 on the existing pavement should be avoided except on emergency occasions.

(3) **Required Thickness for Short-term Development**

a) Calculation of design coverage

Design coverage is calculated as shown in Table A.6.6.2 based on annual aircraft movements for a 10 year period from 1995 to 2004.

Table A.6.6.2 Calculation of Design Coverage

Aircraft	Phase	ni	Pi	Po	$\sqrt{Pi/Po}$	ni'	Wi	Wi x ni'
B767	T/O	1,150	37.5	37.5	1.000	1,150	4	4,600
	L/D	1,150	33.5	37.5	0.945	1,087	4	4,348
B737	T/O	5,700	19.0	37.5	0.712	4,058	4	16,232
	L/D	5,700	16.9	37.5	0.671	3,825	4	15,300
Total							N=	40,480
					Coverage = N x 0.04 =			1,600

b) Required Thickness

The required total thickness of the new pavement is estimated to be 97cm using the pavement design curve for B767-200 shown in Figure A.6.6.3.

The required thickness of asphalt concrete overlay on the existing runway is estimated as follows:

Table A.6.6.3 Thickness of Pavement Overlay

Required Thickness for B767 Operations	Pavement Overlay Design
1. 49cm subbase course	1a. 20cm subbase course 1b. 20cm base course (Equivalency factor = 1.0) 1c. 4.5cm binder course (Equivalency factor = 2.0)
2. 35cm base course	2a. 7.5cm binder course (Equivalency factor = 2.0) 2b. 4cm surface course (Equivalency factor = 2.0) 2c. 6cm overlay (Equivalency factor = 2.0)
3. 13cm bituminous surface	3. 13cm overlay

The minimum thickness of the pavement overlay is 19cm as a total of 6cm for base course thickning and 13cm bituminous surface.

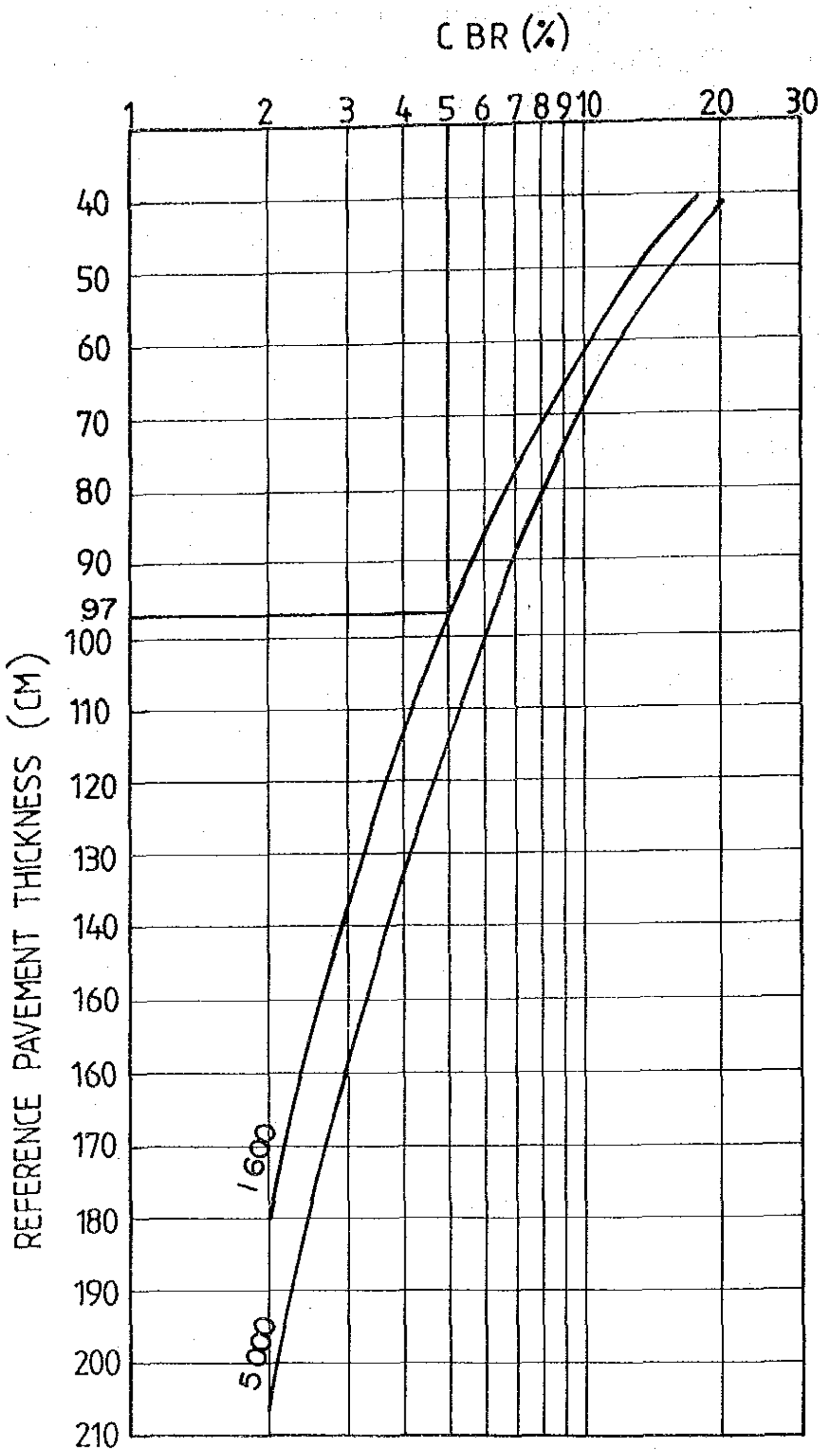


Figure A.6.6.3 Pavement Design Curve for B767-200

APPENDIX-6.7.1 CAPACITY ANALYSIS OF EXISTING PASSENGER TERMINAL BUILDING

The capacities of the major components of the existing passenger terminal building are evaluated by using the criteria of International Air transport Association (IATA) as well as the data obtained from the survey. The capacities are calculated for the following two cases:

B-737 Case : One arrival or departure of B737 (100 seats) 70 originating or terminating passengers.

B-767 Case : One arrival or departure of B767 (220 seats) 155 departing or arriving passengers.

(1) Departure Concourse (176 sq.m)

$A = s \times y/60 \times a\ (1 + W)$

Where, A : Area required (sq.m)
s : Space required per person (1.5 sq.m)
y : Average occupancy time per passenger (20 min.)
a : Peak hour number of departing passengers
W : Number of greeters per passenger (1.1)

Result, B-737 Case : 110 sq.m
B-767 Case : 244 sq.m
Existing Capacity : 110 passengers

Assumption : 50% of peak hour number of passengers arrive within the first 20 minutes.

(2) Check-in Counters (3 counters)

$N = t1/60 \times a + (10\%)$

Where, N : Number of counters required
t1 : Average processing time per passenger (1.8 minutes)
a : Peak hour number of departing passengers

Result, B-737 Case : 3
B-767 Case : 5
Existing Capacity : 90 passengers

(3) Queing Area for Check-in (30 sq.m)

A = L x D + (20%)

Where, A : Area required (sq.m)
L : Counter length (1.75m each)
D : Queuing length (10m)

Result, B-737 Case : 63 sq.m
B-767 Case : 105 sq.m
Existing Capacity : 60 passengers

(4) Departure Immigration (1 position)

N = t2/60 x a + (+10%)

Where, N : Number of counters required
t2 : Average processing time per passenger (0.5 min.)
a : Peak hour number of departing passengers

Result, B-737 Case : 1
B-767 Case : 2
Existing Capacity : 110 passengers

(5) Security Check of Hand Baggage (2 positions)

N = t3/60 x a + (+10%)

Where, N : Number of counters required
t3 : Average processing time per passenger (0.9 min.)
a : Peak hour number of departing passengers

Result, B-737 Case : 2
B-767 Case : 3
Existing Capacity : 120 passengers

(6) <u>Departure Lounge (85 sq.m)</u>

A = (bd + ce) x a' + (10%)

Where, A : Area required (sq.m)
b : Ratio of standing passengers (25%)
c : Ratio of seating passengers (75%)
d : Unit space for standing passengers (1.0 sq.m)
e : Unit space for seating passengers (1.5 sq.m)
a' : Peak hour number of aircraft seats

Result, B-737 Case : 151 sq.m
B-767 Case : 333 sq.m
Existing Capacity : 60 passengers

(7) <u>Arrival Immigration (4 positions)</u>

N = t4/60 x b + (10%)

Where, N : Number of counters required
t4 : Average processing time per passenger (1.8 min.)
b : Peak hour number of arriving passengers

Result, B-737 Case : 3
B-767 Case : 5
Existing Capacity : 90 passengers

(8) <u>Queing Area for Arrival Immigration (36 sq.m)</u>

$$A = s \times \frac{5}{60}\left(\frac{12 \cdot b}{2} - b\right)$$

Where, A : Area required (sq.m)
s : Space required per person (1.5 sq.m)

Result, B-737 Case : 44 sq.m
B-767 Case : 97 sq.m
Existing Capacity : 60 passengers

Assumption : 50% of peak hour passengers arrive within the first 5 minutes.

(9) Baggage Claim Area (45 sq.m)

A = s x y/60 x b + (10%)

Where, A : Area required (sq.m)
s : Space required per person (1.8 sq.m)
y : Average occupying time (30 min.)

Result, B-737 Case : 69 sq.m
B-767 Case : 153 sq.m
Existing Capacity : 50 passengers

(10) Number of Baggage Claim Devices (1 unit)

N = b/q

Where, N : Number of devices requiral
q : Capacity per device (300 passengers)
b : Number of departing passengers

Result, B-737 Case : 1
B-767 Case : 1
Existing Capacity : 300 passengers

(11) Customs (2 positions)

N = t5/60 x b + (20%)

Where, N : Number of counters required
t5 : Average processing time per passenger (0.4 min.)
b : Number of departing passengers

Result, B-737 Case : 1
B-767 Case : 2
Existing Capacity : 270 passengers

(12) Queing Area for Customs (23 sq.m)

$$A = s \times \frac{20}{60}\left(\frac{3 \cdot b}{2} - b\right) + (10\%)$$

Where, A : Area required

s : Space required per person (1.5 sq.m)

Result, B-737 Case : 19 sq.m

B-767 Case : 43 sq.m

Existing Capacity : 80 passengers

Assumption : 50% of peak hour passengers arrive within the first 20 minutes.

APPENDIX-6.9.1 CARGO HANDLING

The procedure of cargo handling was investigated based on hearing from the cargo agents, i.e. Solomon Airlines and TNT.

(1) **Outgoing Cargo Handling**

(a) Collection of goods in town and stored at the cargo terminal in Ranadi.
(b) Weighing of goods and preparation of shipping bill, cargo manifest and airway bill.
(c) Transportation of goods to airport by a truck.
(d) Transhipment of goods to a trolly at the edge of the apron.
(e) Loading of goods to aircraft.

(2) **Incoming Cargo Handling**

(a) Unloading of goods from aircraft to a trolly.
(b) Checking airway bill and preparation of cargo manifest.
(c) Transhipment of goods to a truck at the edge of the apron
(d) Transportation of goods to the cargo terminal at Ranadi
(e) Preparation of import entry document.
(f) Clearance by the customs officer.
(g) Transportation of goods by consignees.

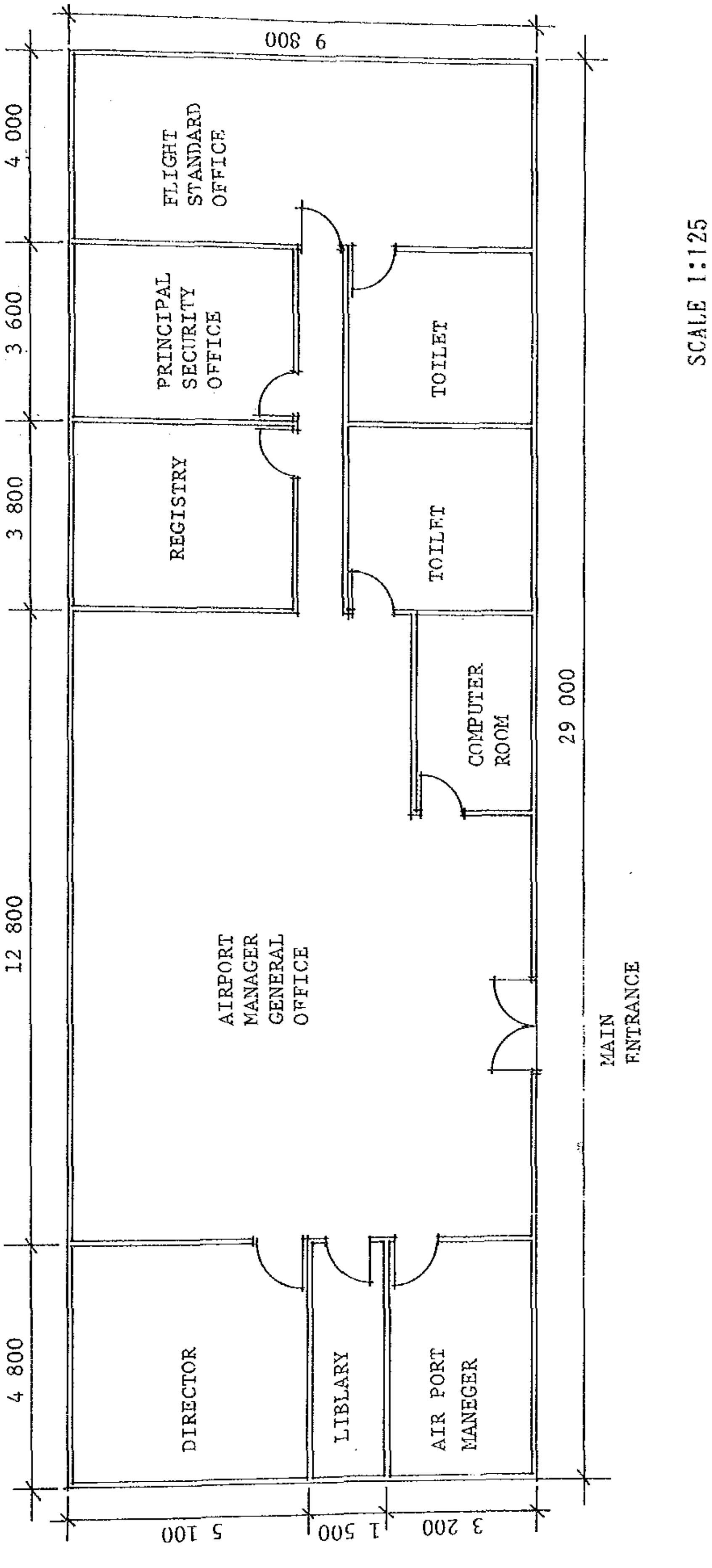
(3) **General Items of Cargo**

General items of the outgoing and incoming cargo are as follows:

(a) Outgoing:
- Agricultural Products
- Marine Products
- Mechanical Parts for Repair

(b) Incoming:
- Car Parts
- Aircraft Parts
- Personal Effects
- Vegetables

APPENDIX-6.10.1 FLOOR PLAN OF EXISTING ADMINISTRATION BUILDING


9 800
4 000
3 600
3 800
12 800
4 800
FLIGHT STANDARD OFFICE
PRINCIPAL SECURITY OFFICE
REGISTRY
TOILET
TOILET
COMPUTER ROOM
29 000
AIRPORT MANAGER GENERAL OFFICE
MAIN ENTRANCE
DIRECTOR
LIBLARY
AIR PORT MANEGER
5 100
1 500
3 200
SCALE 1:125

APPENDIX-6.13.1 DETAILS OF EXISTING AIR NAVIGATION SYSTEM

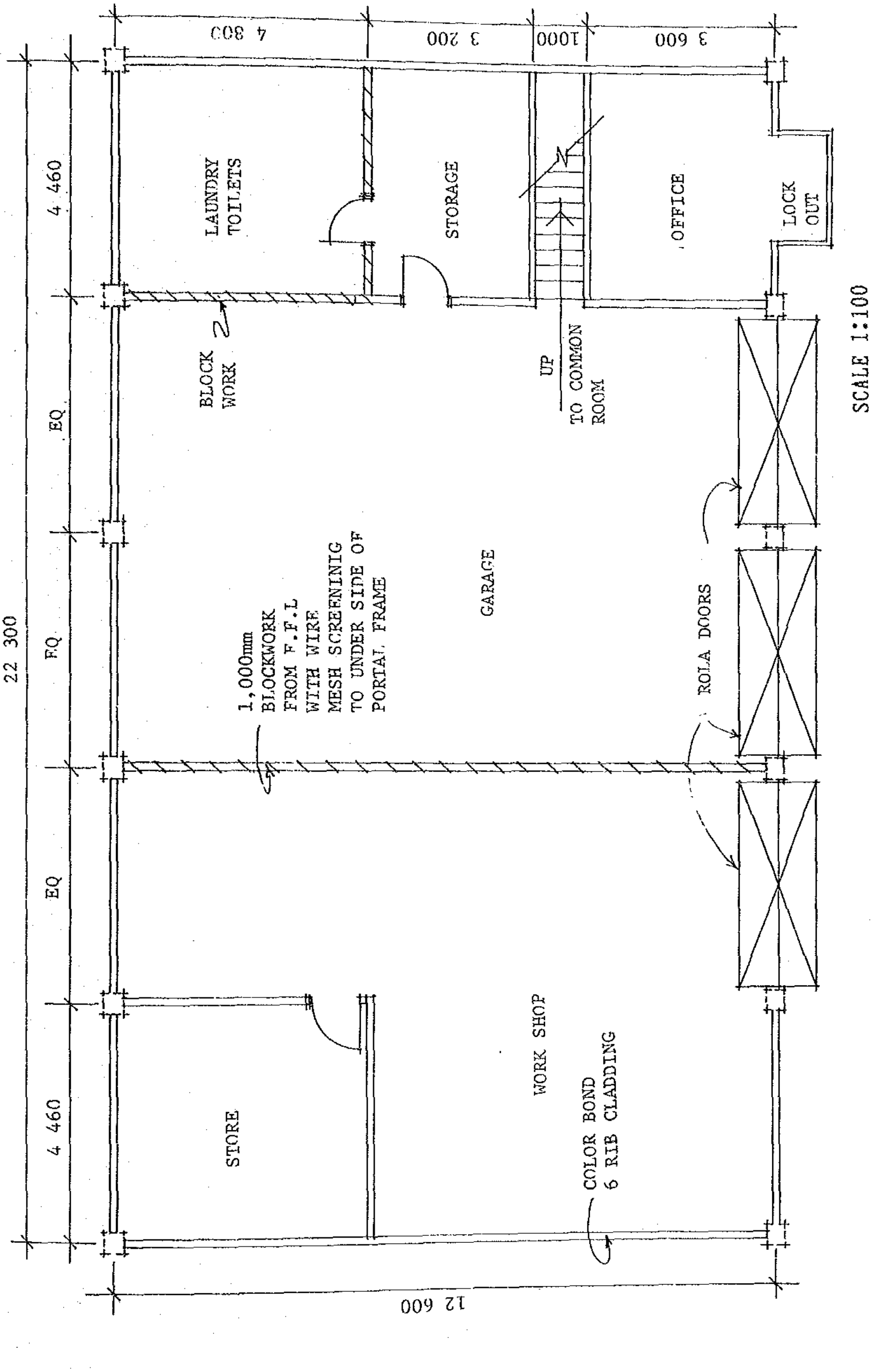
DETAILS OF EXISTING AIR NAVIGATION SYSTEM

ITEM	DESCRIPTION		YEAR OF COMMISSIONING
1. Radio Navaids			
NDB (Non Directional Beacon)	Coordinates	: 09503 S 1600314 E	1981
	Location	: 259mag/0.49NM from RWY 24 THR	
	Coverage	: 150NM	
	Identification	: HN	
	Frequency	: 348 KHZ	
	Output	: 1KW	
	Hours of operation	: H24	
DVOR (Doppler type Very high frequency Omni-directional Radio Range)	Coordinates	: 092554 S 1600100 E	1986
	Location	: 239mag/1.7mm from RWY 06 THR	
	Coverage	:	
	Identification	: HN	
	Frequency	: 112.6 MHZ	
	Output	: 50W	
	Hours of operation	: H24	
DME (Distance Measuring Equipment)	Coordinates	: 092554 S 1600100 E	1986
	Location	: 239mag/1.7mm from RWY 06 THR	
	Coverage	:	
	Identification	: HN	
	Channel	: 73X	
	Output	: 1KW	
	Hours of operation	: H24	
ILS	Nil		
2. Aeronautical Telecommunications			
- Air to Ground VHF Communications	FIS	118.1 MHZ 121.9 MHZ	1986
Automated Terminal Information Service		NIL	-
- HF/SSB Air to Ground Communications	3425, 5362, 6553, 8846, 11339 KHZ		1986
- AFTN Message Teletypewriter	Sydney		1986
- Magnetic Tape Recorder	Provided		1986
- Time Distribution System	NIL		
- Control Console	FIS. FIC		1986
- ATC Intercommunication			1986

DETAILS OF EXISTING AIR NAVIGATION SYSTEM

ITEM	DESCRIPTION	YEAR OF COMMISSIONING
3. Aeronautical Ground Lights		
- Aerodrome Beacon	2.1 KW	1986
- Approach lighting System	RWY 24 (310m length) RWY 06 (420m length)	1986
- Precision Approach Path Indicator	RWY 06 and 24 3 degrees	1986
- Runway Threshold and End light	RWY 06 and 24	1986
- Runway edge lights	Provided	1986
- Taxiway edge lights	Provided	1986
- Emergency Generator	85KVA x 2	1974
- Apron flood lighting	Provided	1986
4. Meteorological Observation System		
- Runway Surface Observation Sensors	• Animometer • Thermometer • Precipitation gauge Barometer	1986
- Runway Visual Range Equipment	NIL	-
- Ceilometer	Ceilograph	1986
- WX Teletypewriter	Provided	1986
- WX Facsimile	Provided	1986
- WX data processing Equipment	Provided	1986
- HF Voice Communications	Provided	1986
- Automatic Picture Receiving Equipment	Provided	1990

APPENDIX-6.14.1 FLOOR PLAN OF EXISTING FIRE STATION



4 300
3 200
1000
3 600
4 460
EQ
EQ
EQ
4 460
22 300
12 600
LAUNDRY
TOILETS
STORAGE
OFFICE
LOCK
OUT
BLOCK
WORK
UP
TO COMMON
ROOM
SCALE 1:100
GARAGE
1,000mm
BLOCKWORK
FROM F.F.L
WITH WIRE
MESH SCREENINIG
TO UNDER SIDE OF
PORTAL FRAME
ROLA DOORS
STORE
WORK SHOP
COLOR BOND
6 RIB CLADDING

APPENDIX TO CHAPTER 7

APPENDIX-7.2.1 AIRSPACE USE STUDY

(1) General

This appendix sets out the feasibility of precisian approach category-I operations at the airport. Existence of obstacles are evaluated using obstacle limitation surfaces in accordance with ICAO Annex-14, and obstacle assessment and identification surfaces in ICAO PANS/OPS. The evaluation covered in this appendix is as follows:

a) Obstacle Limitation Surface (OLS, ICAO Annex-14)

- Runway 06 Approach Surface (Present condition)
- Runway 06 Approach Surface (After 300m long extension of the runway)
- Runway 24 Approach Surface

b) Obstacle Assessment Surface (OAS, ICAO PANS/OPS)

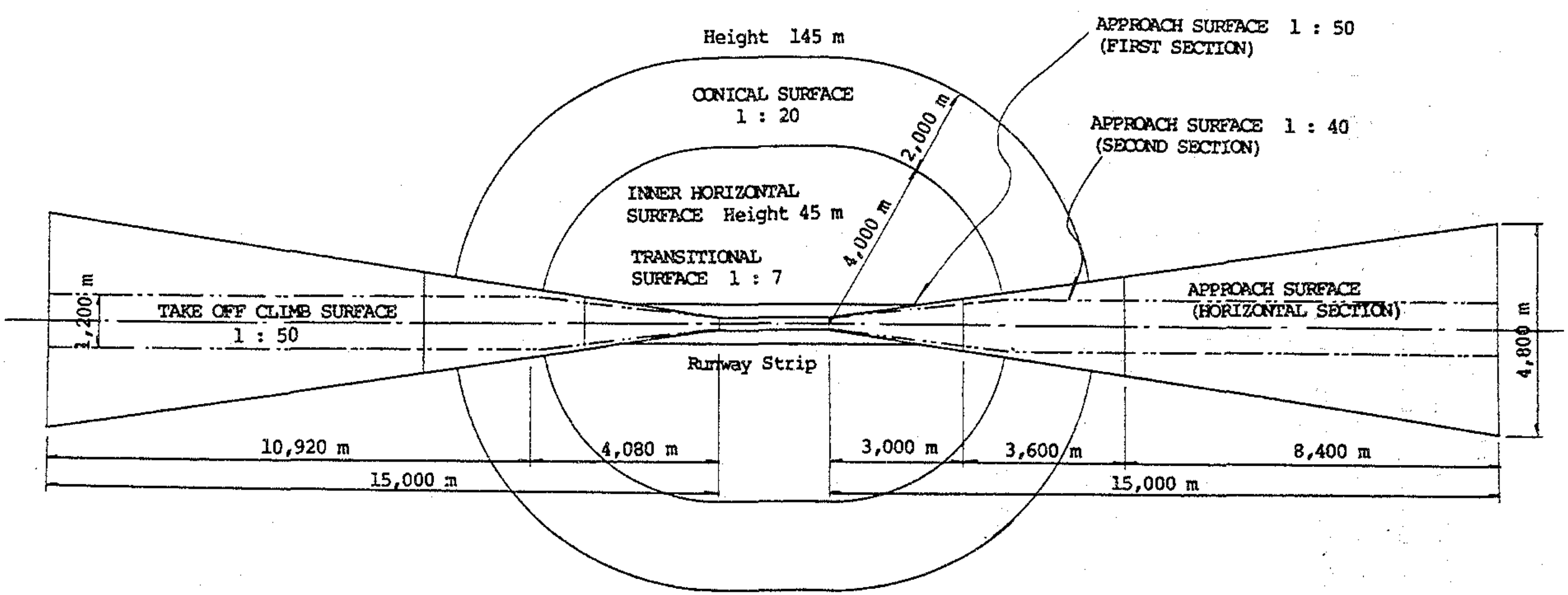
- Runway 06 Approach (Present condition)
- Runway 06 Approach (After 300m long extension of the runway)
- Runway 24 Approach

c) Obstacle Identification Surface (OIS, ICAO PANS/OPS)

- Runway 24 Departure (Present condition)
- Runway 24 Departure (After 300m long extension of the runway)
- Runway 06 Departure

(2) Obstacle Limitation Surfaces (ICAO Annex-14)

The requirements of the obstacle limitation surfaces in accordance with ICAO Annex-14 are summarized in Figures A.7.2.1 and A.7.2.2, and Tables A.7.2.1 and A.7.2.2 for the aerodrome reference code number of 4.



Note : Height above aerodrome elevation

Figure A.7.2.1 Obstacle Limitation Surfaces (1)

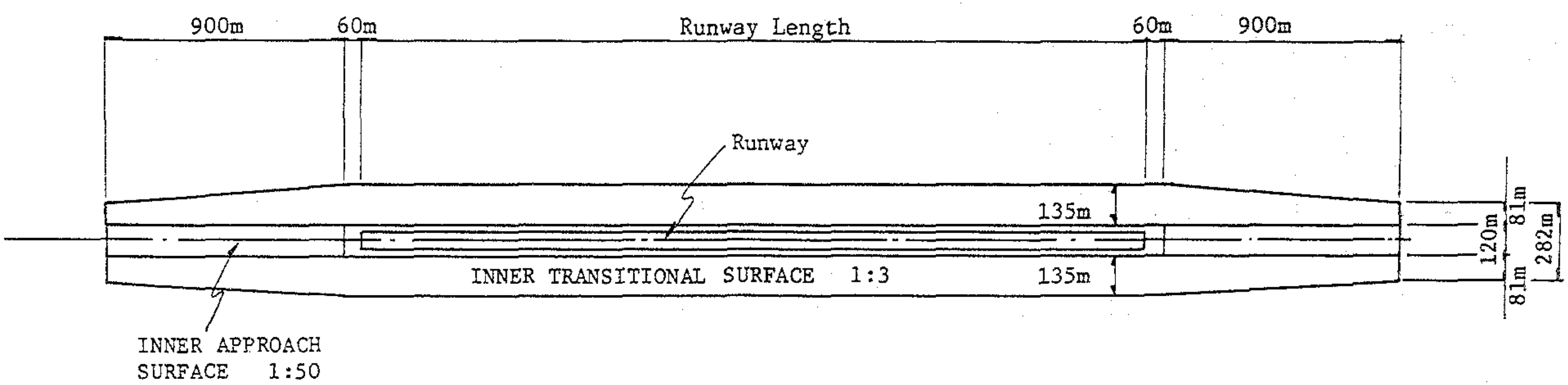


Figure A.7.2.2 Obstacle Limitation Surfaces (2)

Table A.7.2.1 Obstacle Limitation Surfaces (1)

APPROACH RUNWAYS

	RUNWAY CLASSIFICATION									
	Non-instrument				Non-precision approach			Precision approach category I		Precision approach category II or III
	Code number				Code number			Code number		Code number
Surface and dimensions[a]	1	2	3	4	1,2	3	4	1,2	3,4	3,4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	–	–	–	–	–	–	–	90 m	120 m	120 m
Distance from threshold	–	–	–	–	–	–	–	60 m	60 m	60 m
Length	–	–	–	–	–	–	–	900 m	900 m	900 m
Slope								2.5%	2%	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	150 m	300 m	300 m	150 m	300 m	300 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	–	–	–	–	–	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	–	–	–	–	–	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	–	–	–	–	–	8 400 m[b]	8 400 m[b]	–	8 400 m[b]	8 400 m[b]
Total length	–	–	–	–	–	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope	–	–	–	–	–	–	–	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	–	–	–	–	–	–	–	90 m	120 m	120 m
Distance from threshold	–	–	–	–	–	–	–	c	1 800 m[d]	1 800 m[d]
Divergence (each side)	–	–	–	–	–	–	–	10%	10%	10%
Slope	–	–	–	–	–	–	–	4%	3.33%	3.33%

a. All dimensions are measured horizontally unless specified otherwise.
b. Variable length (see 4.2.9 or 4.2.17).
c. Distance to the end of strip.
d. Or end of runway whichever is less.

Source: ICAO ANNEX-14

Table A.7.2.2 Obstacle Limitation Surfaces (2)

TAKE-OFF RUNWAYS

	Code number		
Surface and dimensions[a]	1	2	3 or 4
(1)	(2)	(3)	(4)
TAKE-OFF CLIMB			
Length of inner edge	60 m	80 m	180 m
Distance from runway end[b]	30 m	60 m	60 m
Divergence (each side)	10%	10%	12.5%
Final width	380 m	580 m	1 200 m 1 800 m[c]
Length	1 600 m	2 500 m	15 000 m
Slope	5%	4%	2%[d]

a. All dimensions are measured horizontally unless specified otherwise.
b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.
d. See 4.2.24 and 4.2.26.

Source: ICAO ANNEX-14

a) Approach to Runway 06

i) Present condition

Figure A.7.2.3 shows the obstacle limitation surfaces with extended approach surface to the runway 06. The profile of the approach surface is shown in Figure A.7.2.4. As seem in these figures, the horizontal section of the extended approach surface will be infringed by hills and mountains in the southwest of the airport. Figure A.7.2.5 shows the first section of the approach surface to the runway 06. Trees numbered 30 and 32 infringing the approach surface should be felled in order to secure safe aircraft operations.

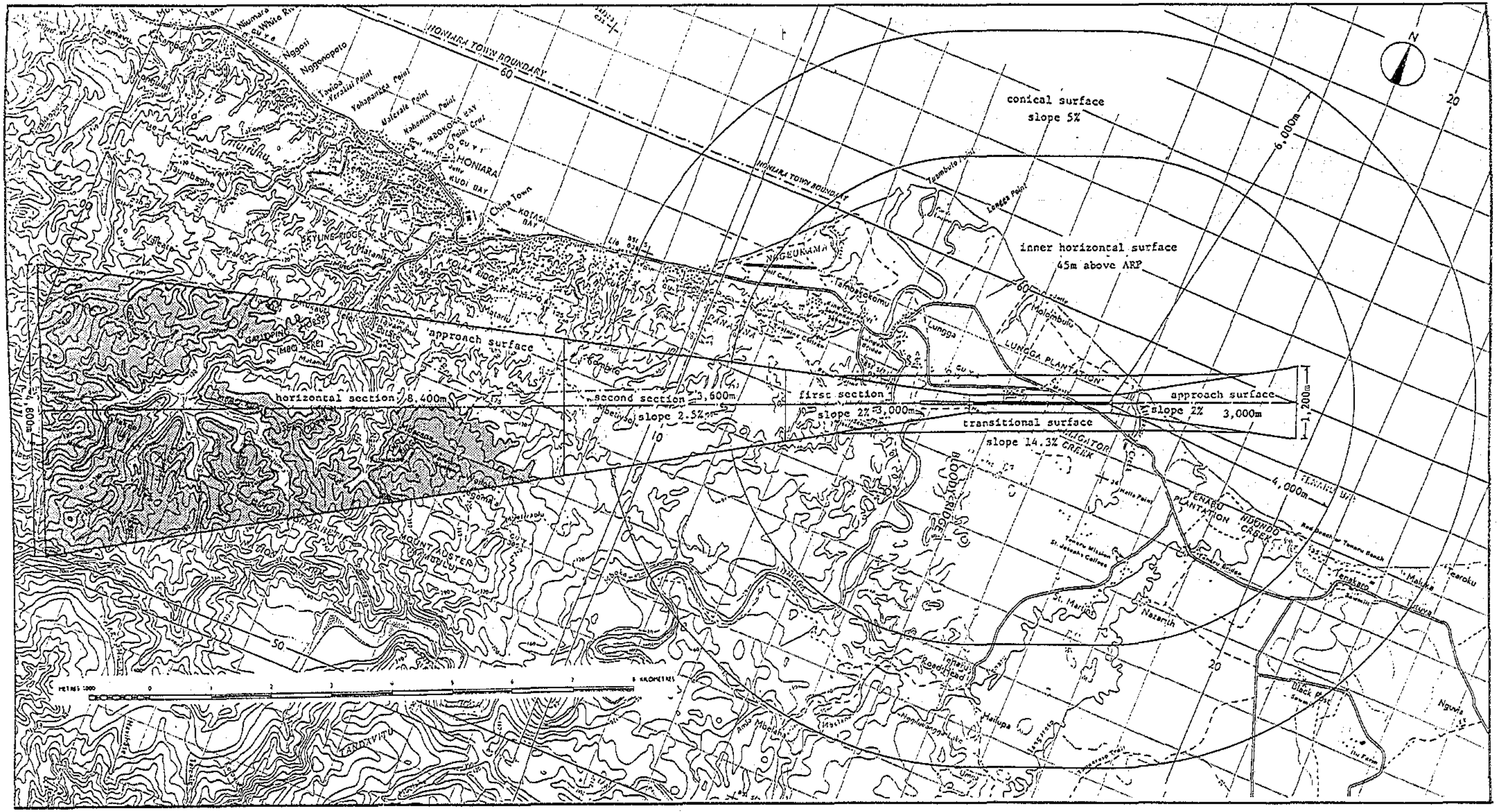
ii) After 300m long extension of the Runway

Figure A.7.2.6 shows the obstacle limitation surfaces with extended approach surface to the runway 06 when the runway is extended by 300m toward the southwest. The profile of the approach surface is shown in Figure A.7.2.7. Hills and mountains infringe the horizontal section of the extended approach surface the same as the existing condition. Figure A.7.2.8 shows the first section of the approach surface to the runway 06. A tree numbered 33 infringes the approach surface in addition to the trees numbered 30 and 32.

b) Approach to Runway 24

Figure A.7.2.9 shows the obstacle limitation surface with extended approach surface to the runway 24, and Figure A.7.2.10 shows the first section of the approach surface to the runway 24 threshold. The clusters of trees numbered 15 and 17 infringing the approach surface should be felled.

As seen in the above studies, the first section of the approach surface can be cleared when the trees in the vicinity of the both thresholds of the runway are felled even if the runway is extended.



□ : Area infringed by Hills and Mountains

Figure A.7.2.3 Obstacle Limitation Surfaces
(2,200m Long Runway, Approach to RWY06)

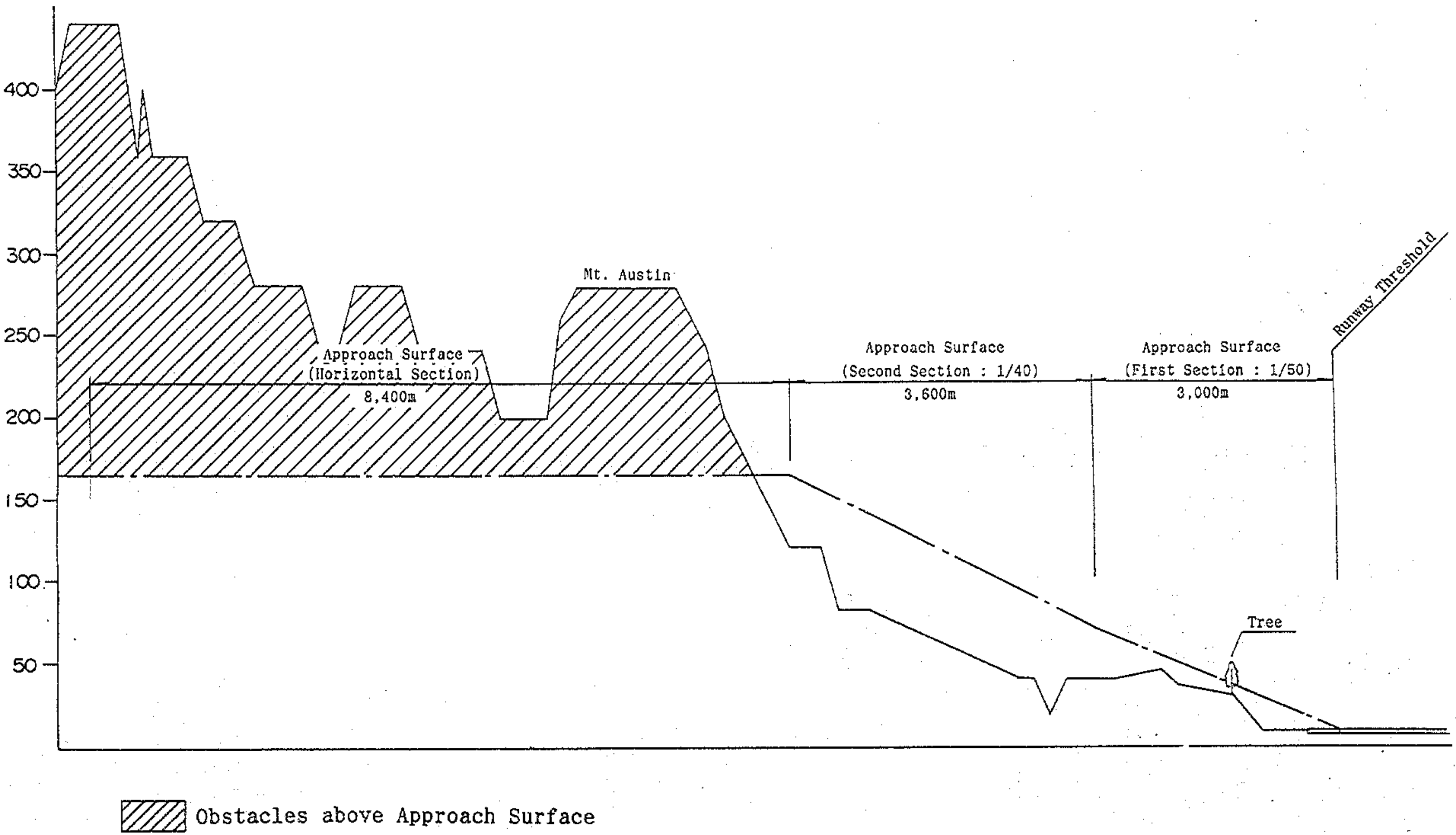


Figure A.7.2.4 Runway06 Approach Surface (2,200m Long Runway)

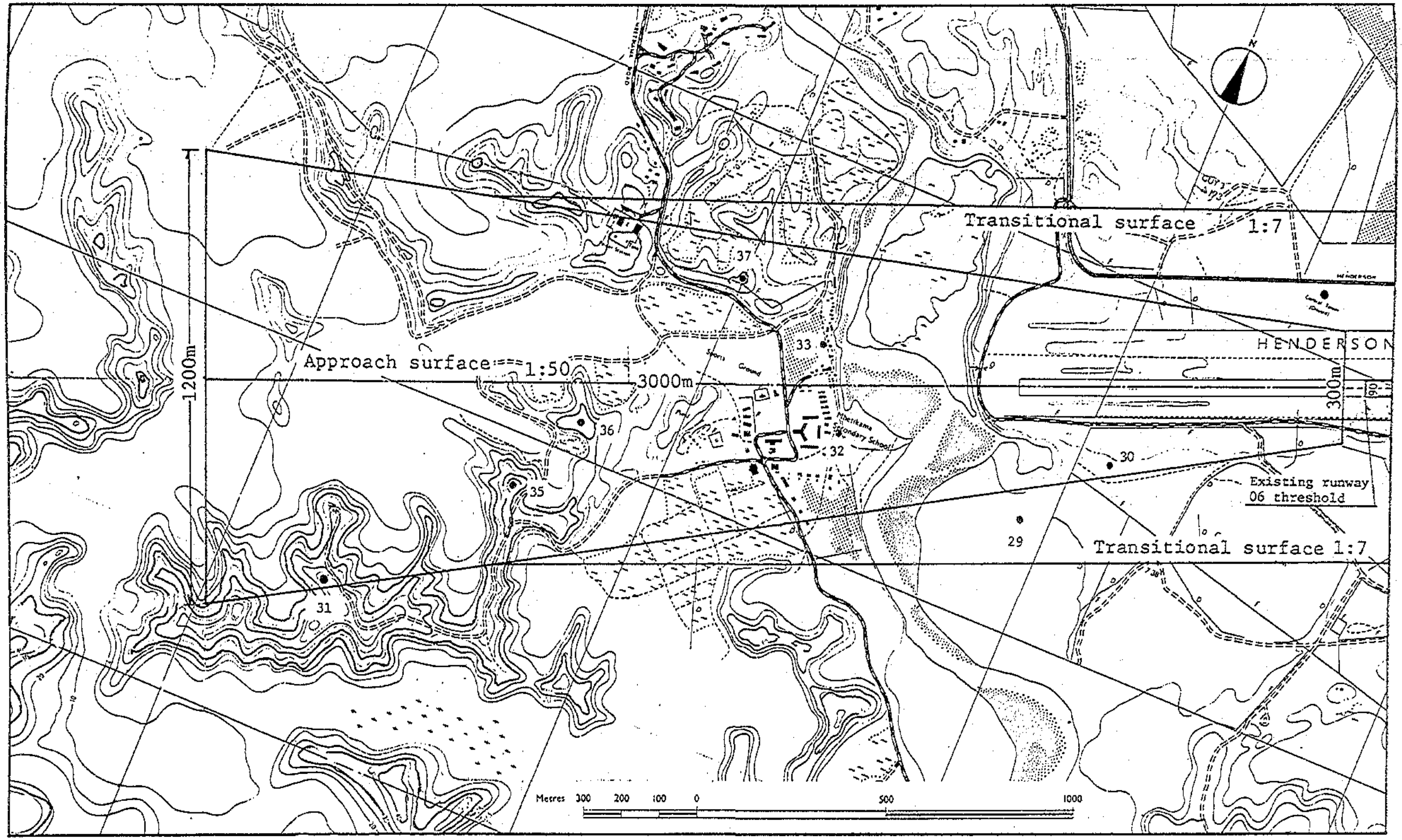
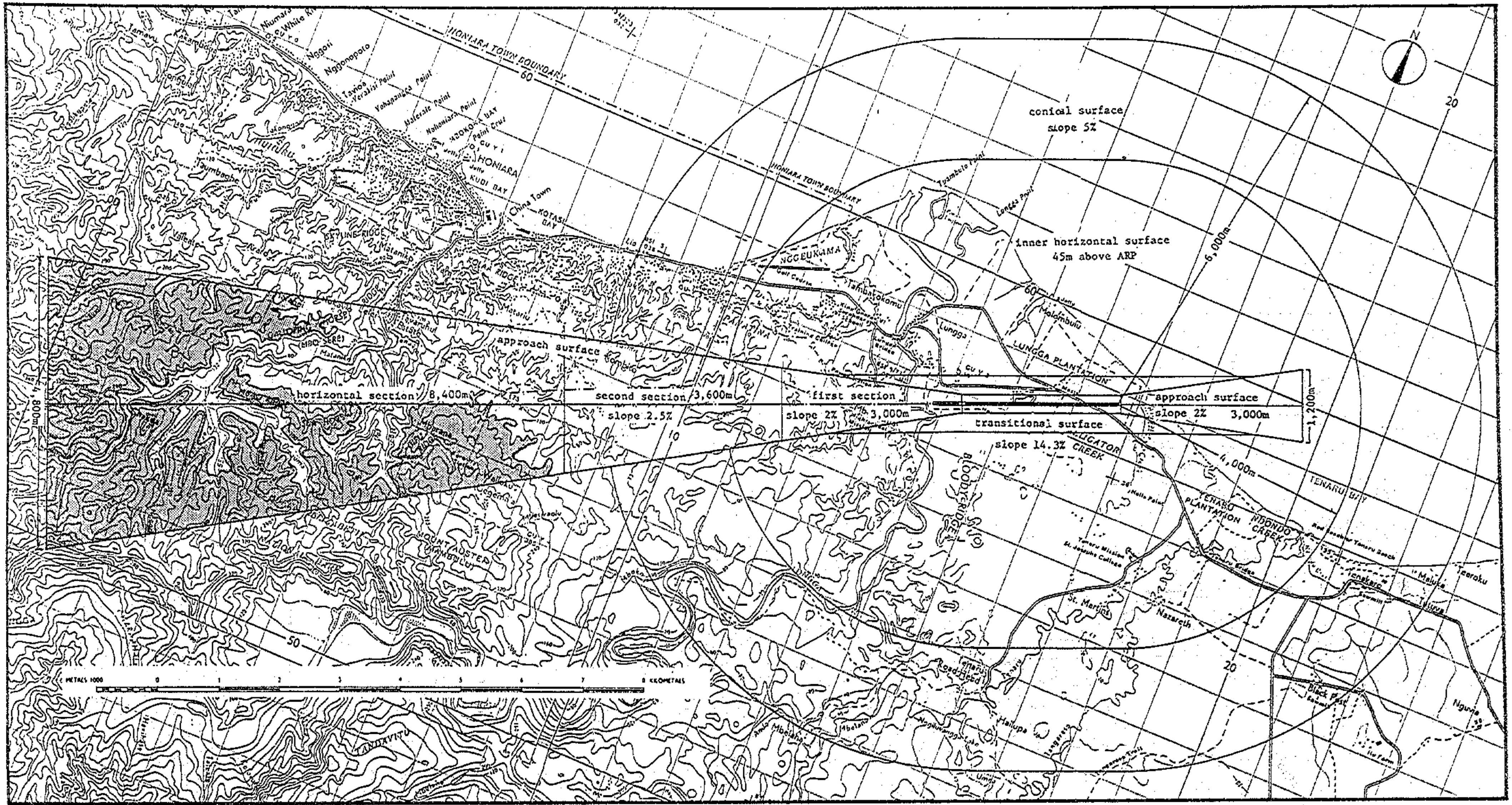


Figure A.7.2.5 Dimensions of Obstacles in and around Runway06 Threshold (2,200m Long Runway)



: Area infringed by Hills and Mountains

Figure A.7.2.6 Obstacle Limitation Surfaces
(2,500m Long Runway, Approach to RWY06)

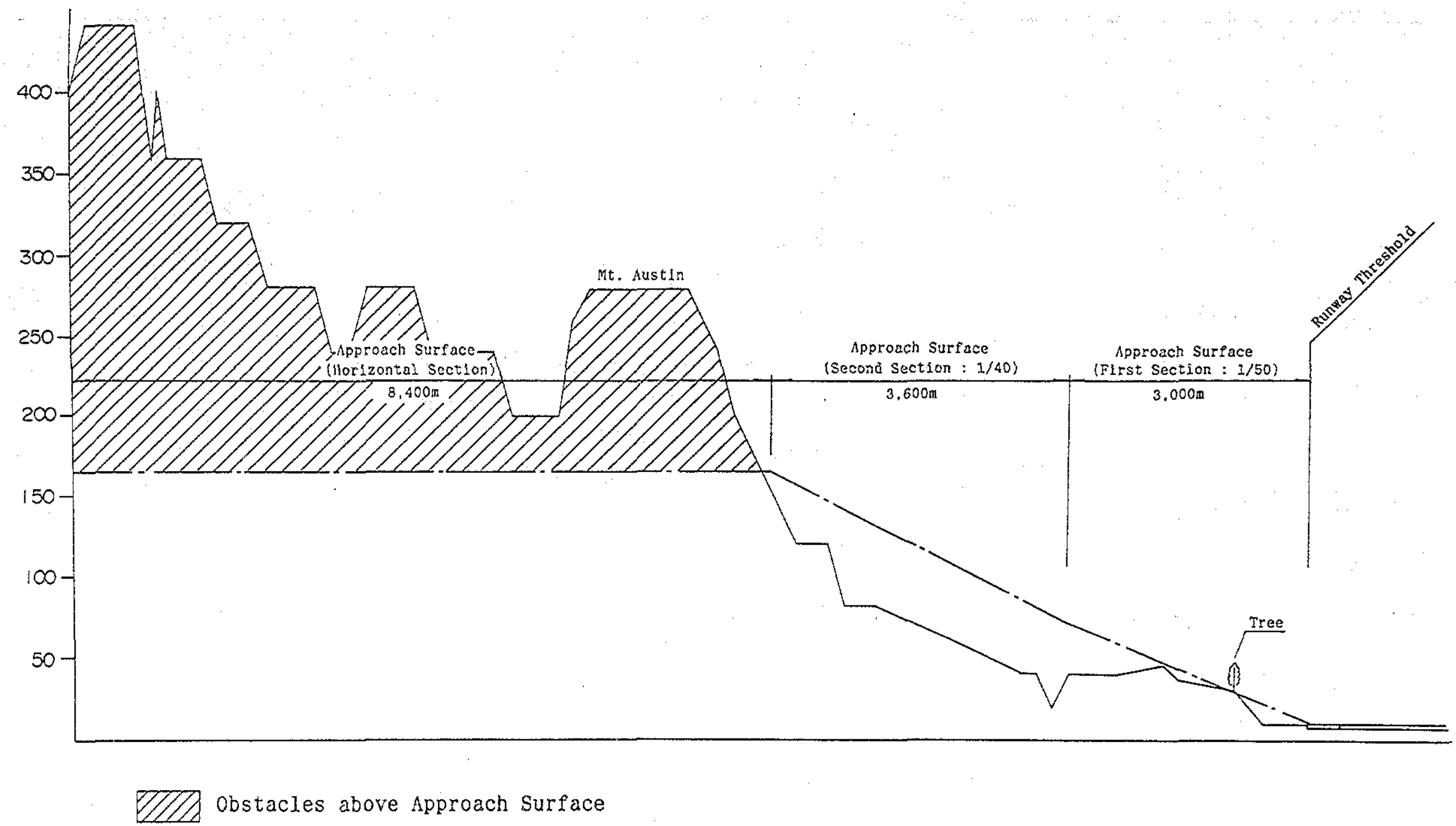


Figure A.7.2.7 Runway Approach Surface (2,500m Long Runway)

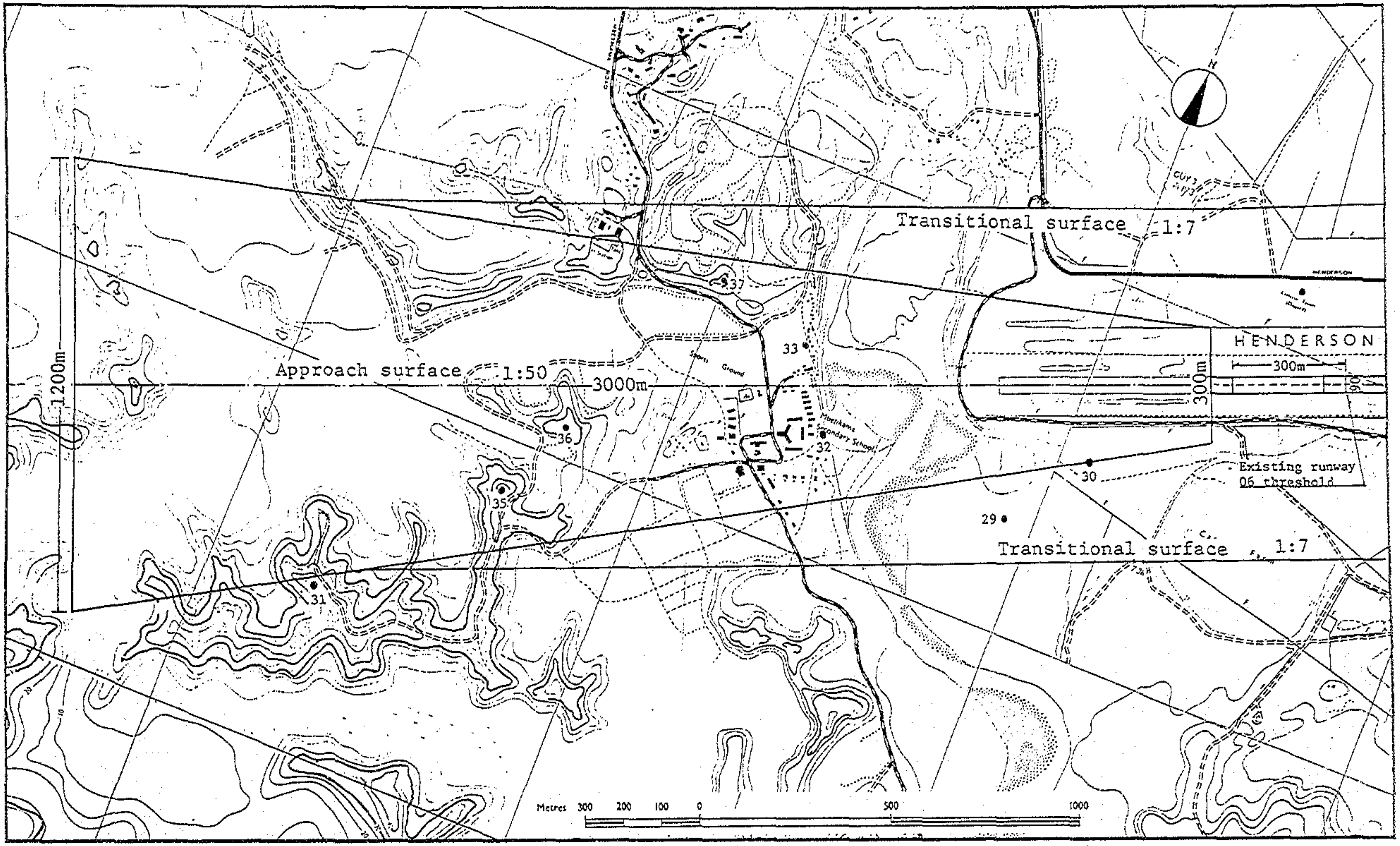


Figure A.7.2.8 Dimensions of Obstacles in and around Runway06 Threshold (2,500m Long Runway)

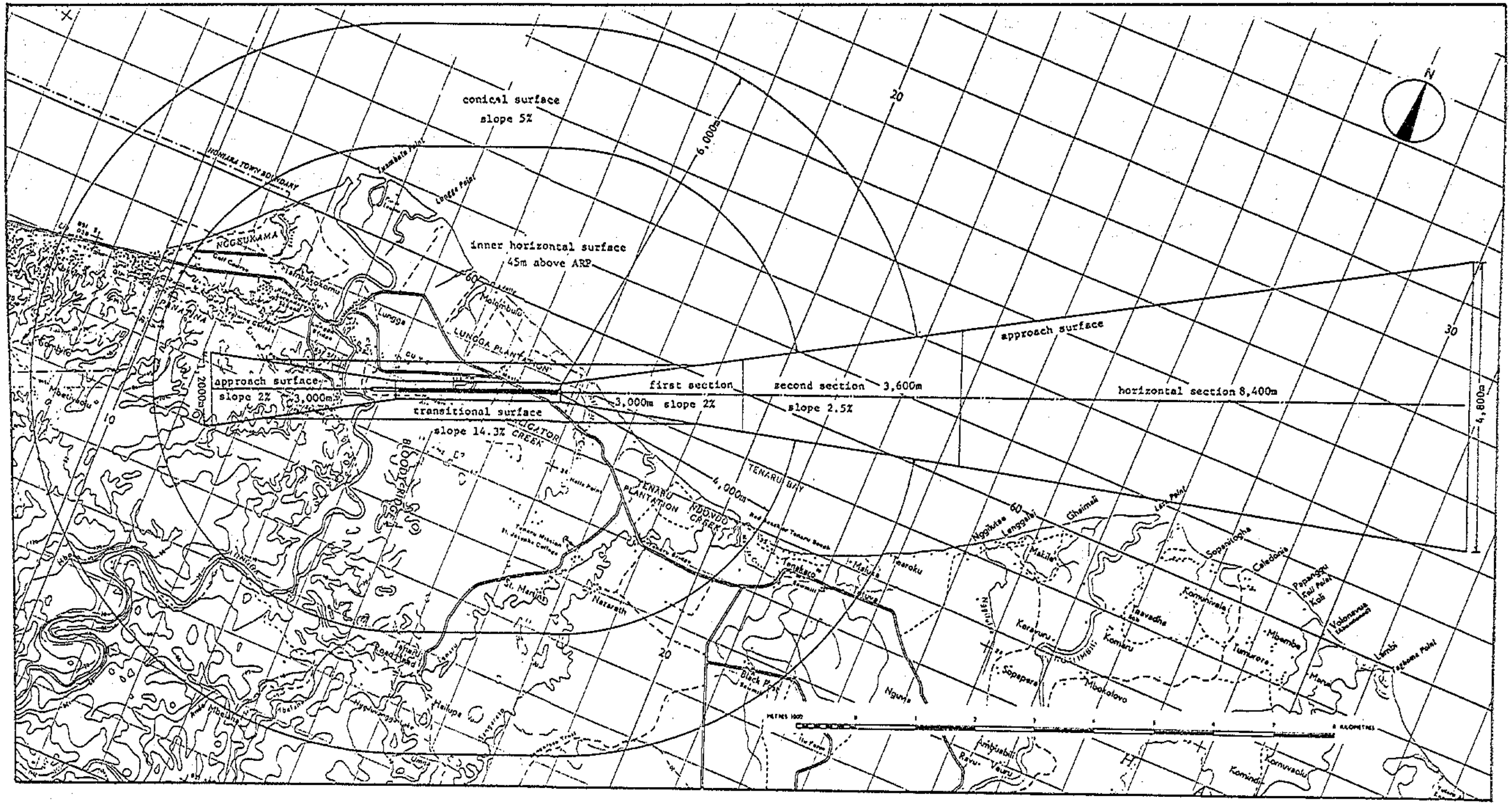


Figure A.7.2.9 Obstacle Limitation Surfaces (Approach to RWY24)

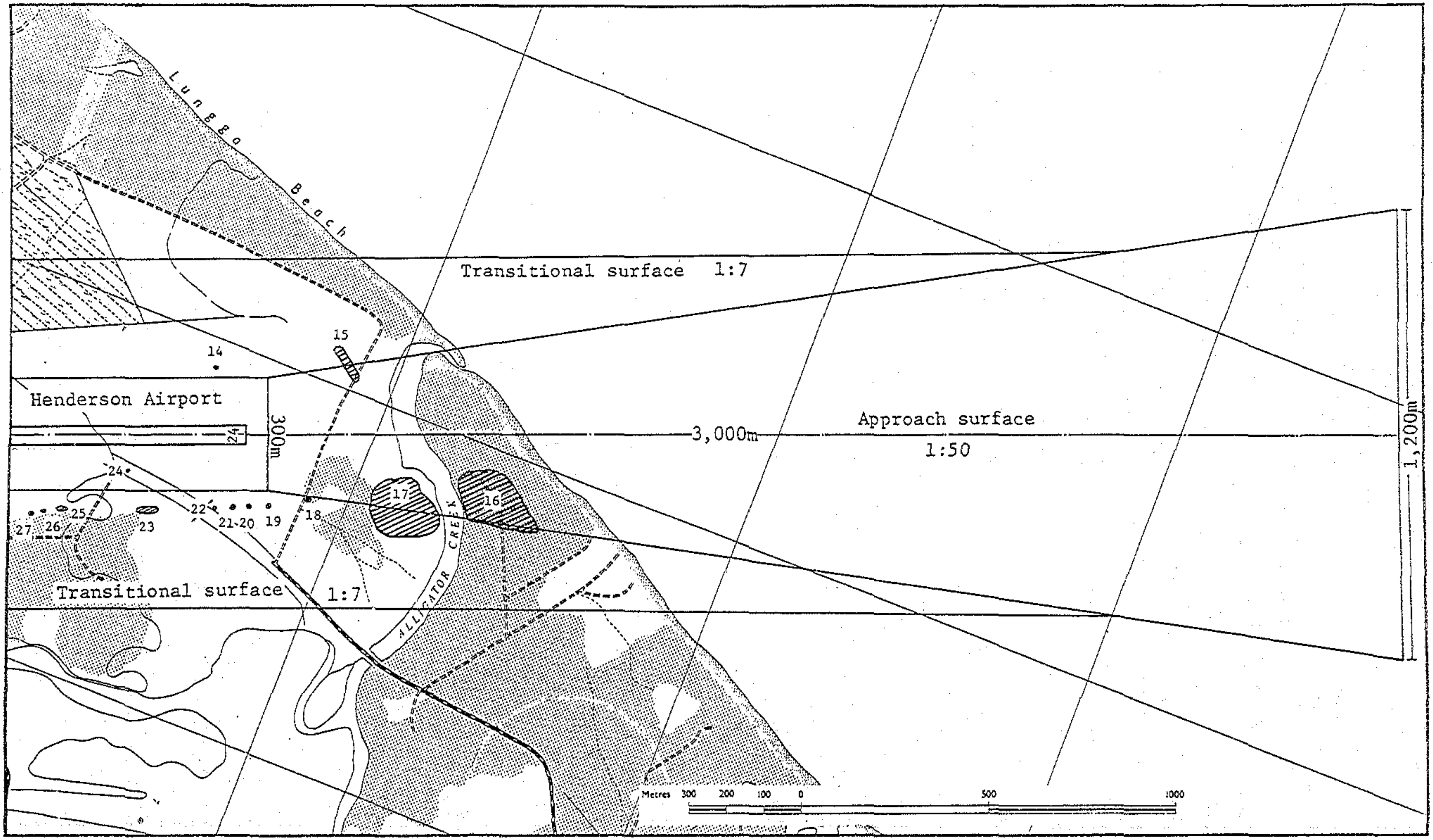


Figure A.7.2.10 Dimensions of Obstacles in and around Runway24 Threshold

Although hills and mountains infringe horizontal section of the approach surface to the runway 06, the removal of such fixed obstacles is impractical. However, there will be no practical problem in conducting precisian approach operations to the runway 06 if obstacle assessment surface mentioned in the next section is secured.

(3) Obstacle Assessment Surface (ICAO PANS/OPS)

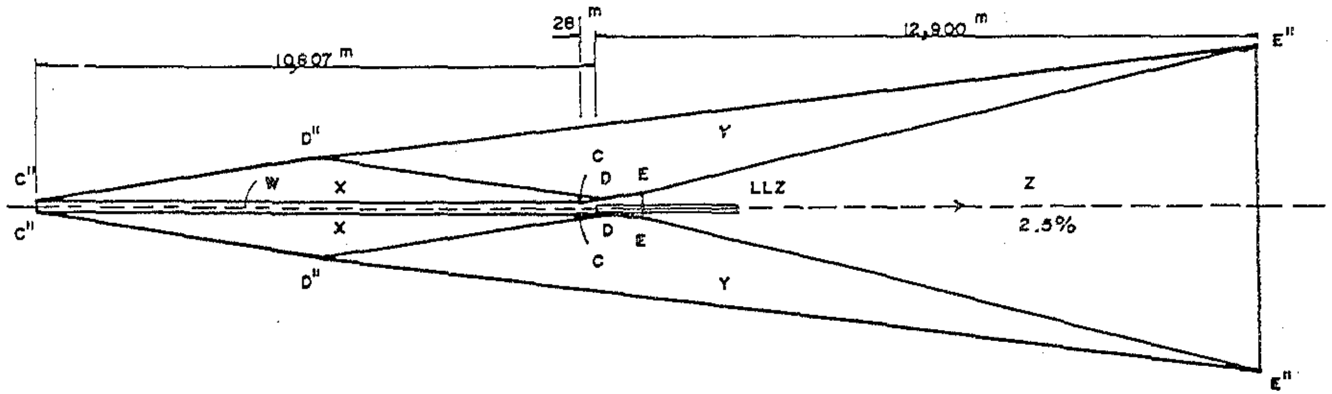
The dimensions of obstacle assessment surfaces (OAS) for category-I ILS in accordance with ICAO PANS/OPS are shown in Figure A.7.2.11. The OAS should be secured in order to conduct precision approach operations. The shape of the OAS changes depending on the angle of glide path (GP). This section sets out the OAS for glide path angle of 3.0 degrees and 3.1 degree.

a) Approach to Runway 06

i) Present condition

Figure A.7.2.12 shows the OAS for approach to the runway 06 for the glide path angle of 3.0 degrees. A relationship between the obstacles which are numbered in Figure A.7.2.12 and the OAS are summarized in Table A.7.2.3. As seen in Table A.7.2.3, the elevations of the all obstacles are below that of the OAS. However, since the clearances between the elevation of the OAS and mountains numbered 6, 16 and 17 are less than 30m, there is a possibility that trees infringe the OAS.

A relationship between the obstacles and the OAS for the glide path angle of 3.1 degree is summarized in Table A.7.2.4. Mountains numbered 6, 16 and 17 may infringe the OAS if tall trees exist. However, hight limitation will be less strict than the case of 3.0 degree glide path angle.



Caluculation of obstacle assessment surfaces height equations

W surface z= 0.0285x - 8.01
X surface z= 0.027335x + 0.180222y - 16.51
Y surface z= 0.023604x + 0.207042y -21.2
Z surface z= 0.025x - 22.50

Condition: Category I/GP 3.0°/LLZ-THR 2800m/ missed approach gradient 2.5 %

Coordinates of point C, D, E, C", D", E" (m)

	C	D	E	C"	D"	E"
X	281	-286	-900	10807	5438	-12900
Y	49	135	205	117	931	3022
Z	0	0	0	300	300	300

Figure.A.7.2.11 Obstacle Assessment Surfaces (OAS) for ILS Approach Category-I

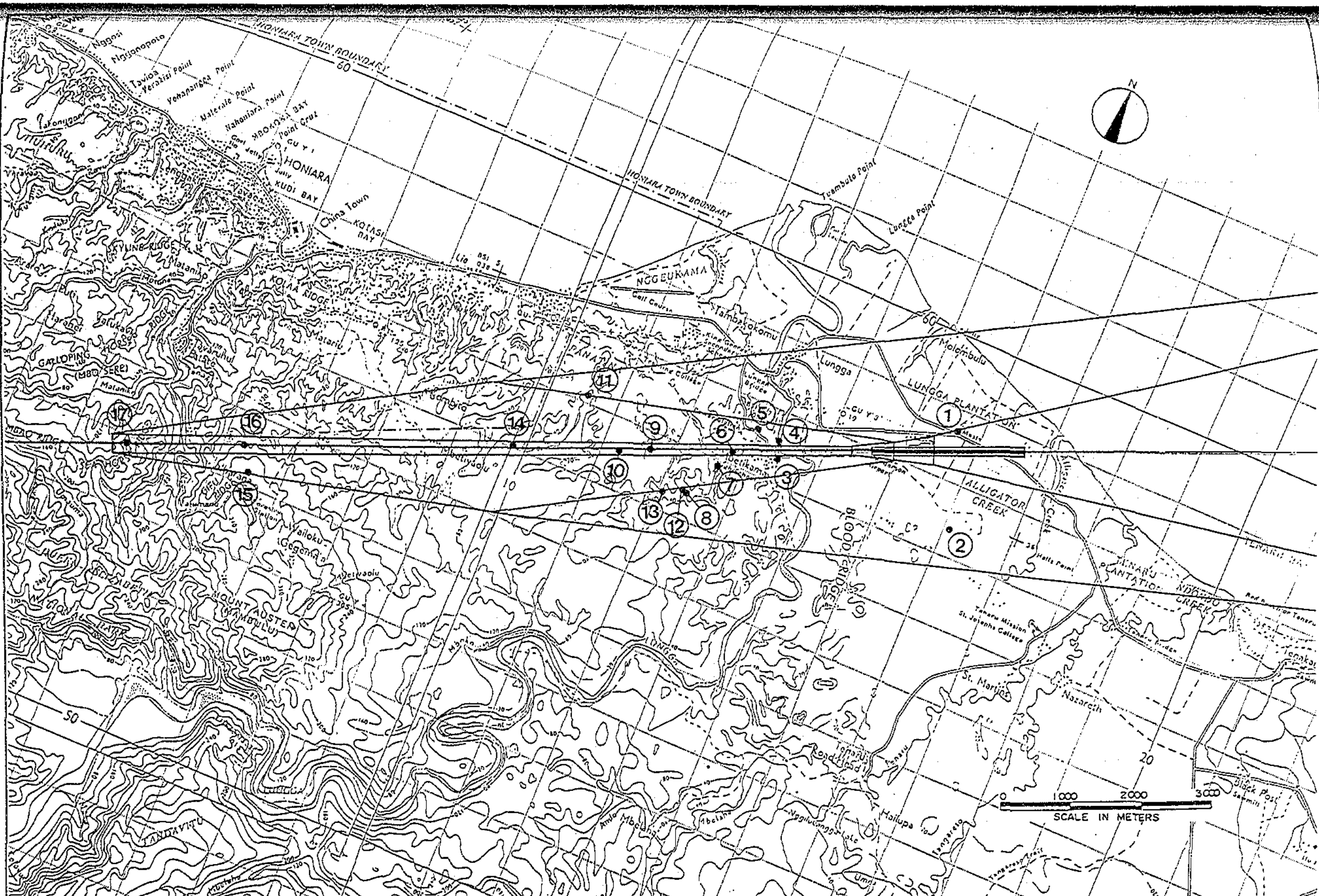


Figure A.7.2.12 Obstacle Assessment surface (OAS)
(2,200m Long Runway, Approach to RWY06)

Table A.7.2.3 Check Sheet for Obstacles in the OAS (1)

Category- I

Airport Name: Henderson International Airport — Approach: RWY06 — Elev. of RWY TH.: 9.13m — Distance THR-LLZ: 2,400m

Runway Length: 2,200m — Angle of GP: 3.0 deg.

Runway Strip: 2,320m×150m

No.	Type of Obstacle	Co-ordinates X-axis (m)	Co-ordinates Y-axis (m)	Height of Obstacle * (m)	CAT I W Surface (m)	CAT I X Surface (m)	CAT I Y Surface (m)	CAT I Z Surface (m)	Clearance (m)	Remarks
①	NDB Antenna	1,250	360	21.9				64.5	42.6	○
②	BS Antenna	1,250	1,050	91.4			224.4		133.0	○
③	Tree	1,347	124	33.9		41.4			7.5	○
④	Tree	1,352	115	22.2		40.0			17.8	○
⑤	Hill	1,600	302	21.9		79.3			57.4	○
⑥	Hill	2,020	57	26.0	49.6				23.6	△
⑦	Hill	2,201	245	35.3		85.2			49.9	○
⑧	Hill	2,637	663	49.3			173.2		123.9	○
⑨	Mountain	3,250	0	25.8	84.6				58.8	○
⑩	Mountain	3,690	50	30.8	97.2				66.4	○
⑪	Mountain	4,120	660	43.4		208.8			165.4	○
⑫	Mountain	2,710	600	50.8			161.6		110.8	○
⑬	Mountain	2,990	610	50.8			169.7		118.9	○
⑭	Mountain	5,160	30	60.8	139.1				78.3	○
⑮	Mountain	9,000	450	270.8		301.5			30.7	○
⑯	Mountain	9,000	0	230.8	248.5				17.7	△
⑰	Mountain	10,700	0	270.8	296.9				26.1	△
⑱									0.0	
⑲									0.0	
⑳									0.0	

Note, *: above Threshold

○: No Problem

△: Trees may infringe the surface

Table A.7.2.4 Check Sheet for Obstacles in the OAS (2)

Category- I

Airport Name: Henderson International Airport | Approach: RWY06 | Elev. of RWY TH.: 9.13 | Distance THR-LLZ: 2,400m

Runway Length: 2,200m | Angle of GP: 3.1 deg.

Runway Strip: 2,320m×300m

No.	Type of Obstacle	Co-ordinates X-axis (m)	Co-ordinates Y-axis (m)	Height of Obstacle * (m)	CAT I W Surface (m)	CAT I X Surface (m)	CAT I Y Surface (m)	CAT I Z Surface (m)	Clearance (m)	Remarks
①	NDB Antenna	1,250	360	21.9			82.7		60.8	○
②	BS Antenna	1,250	1,050	91.4			224.5		133.1	○
③	Tree	1,347	124	33.9		42.8			8.9	○
④	Tree	1,352	115	22.2		41.3			19.1	○
⑤	Hill	1,600	302	21.9		81.9			60.0	○
⑥	Hill	2,020	57	26.0	51.7				25.7	△
⑦	Hill	2,201	245	35.3		88.2			52.9	○
⑧	Hill	2,637	663	49.3			178.0		128.7	○
⑨	Mountain	3,250	0	25.8	87.9				62.1	○
⑩	Mountain	3,690	50	30.8	100.9				70.1	○
⑪	Mountain	4,120	660	43.4			212.8		169.4	○
⑫	Mountain	2,710	600	50.8			166.8		116.0	○
⑬	Mountain	2,990	610	50.8			175.5		124.7	○
⑭	Mountain	5,160	30	60.8	144.1				83.3	○
⑮	Mountain	9,000	450	270.8		312.7			41.9	○
⑯	Mountain	9,000	0	230.8	257.1				26.3	△
⑰	Mountain	10,700	0	270.8	307.1				36.3	△
⑱									0.0	
⑲									0.0	
⑳									0.0	

Note, *: above Threshold

○: No Problem

△: Trees may infringe the surface

ii) After 300m long extension of the Runway

Figure A.7.2.13 shows the OAS for the glide path angle of 3.0 degrees when the runway is extended by 300m towards the southwest. A clearance between the OAS and the obstacles are calculated as shown in Table A.7.2.5. Since mountains numbered 6, 16 and 17 are about 15m below the OAS, trees on the mountains may infringe the OAS.

Table A.7.2.6 shows the result of calculation for the clearance between the obstacles and the OAS for the glide path angle of 3.1 degree. Trees on the mountain numbered 6, 16 and 17 may infringe the OAS though degree of infringement will be less than the case of 3.0 degree glide path angle.

b) Approach to Runway 24

Figure A.7.2.14 shows the OAS for approach to the runway 24 for glide path angle of 3.0 degrees. The precision approach to runway 24 is possible since there is no obstacle in the final approach area except trees in the vicinity of runway 24 threshold. However, a right turning missed approach area will be secured to avoid hills and mountains located in the southwest side of the airport.

(4) Obstacle Identification Surface (ICAO PANS/OPS)

Obstacle identification surface (OIS) is the obstacle clearance surface for departure in accordance with ICAO PANS/OPS. The OIS is established with a gradient of 2.5% from the runway threshold which departing aircraft use. The dimensions of the OIS are shown in Figure A.7.2.15.

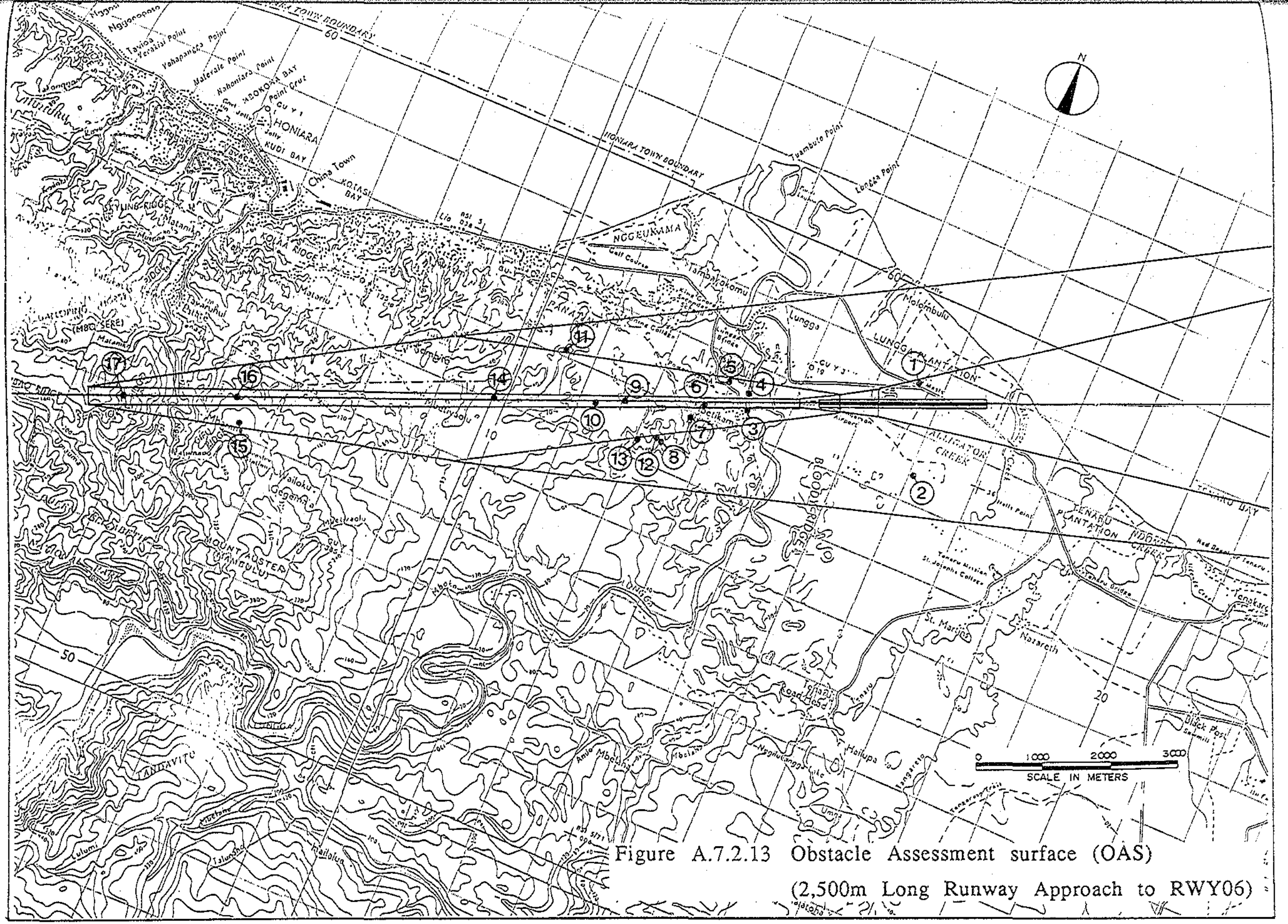


Figure A.7.2.13 Obstacle Assessment surface (OAS)
(2,500m Long Runway Approach to RWY06)

Table A.7.2.5 Check Sheet for Obstacles in the OAS (3)

Category-I

Airport Name: Henderson International Airport

Approach: RWY06

Elev. of RWY TH.: 9.391m

Distance THR-LLZ: 2,800m

Runway Length: 2,500m

Angle of GP: 3.0 deg.

Runway Strip: 2,620m×300m

No.	Type of Obstacle	Co-ordinates X-axis (m)	Co-ordinates Y-axis (m)	Height of Obstacle * (m)	CAT I W Surface (m)	CAT I X Surface (m)	CAT I Y Surface (m)	CAT I Z Surface (m)	Clearance (m)	Remarks
①	NDB Antenna	1,550	360	21.7				61.3	39.6	○
②	BS Antenna	1,550	1,050	91.2			232.8		141.6	○
③	Tree	1,047	124	33.7		34.5			0.8	○
④	Tree	1,052	115	22.0		33.0			11.0	○
⑤	Hill	1,300	302	21.7		73.5			51.8	○
⑥	Hill	1,720	57	25.8	41.0				15.2	△
⑦	Hill	1,901	245	35.1		79.6			44.5	○
⑧	Hill	2,337	663	49.1			171.2		122.1	○
⑨	Mountain	2,950	0	25.6	76.1				50.5	○
⑩	Mountain	3,390	50	30.6	88.6				58.0	○
⑪	Mountain	3,820	660	43.2		206.9			163.7	○
⑫	Mountain	2,410	600	50.6			159.9		109.3	○
⑬	Mountain	2,690	610	50.6			168.6		118.0	○
⑭	Mountain	4,860	30	60.6	130.5				69.9	○
⑮	Mountain	8,700	450	270.6		302.4			31.8	○
⑯	Mountain	8,700	0	230.6	239.9				9.3	△
⑰	Mountain	10,400	0	270.6	288.4				17.8	△
⑱									0.0	
⑲									0.0	
⑳									0.0	

Note, *: above Threshold

○: No Problem

△: Trees may infringe the surface

Table A.7.2.6 Check Sheet for Obstacles in the OAS (4)

Category- I

Airport Name: Henderson International Airport
Approach: RWY06
Runway Length: 2,500m
Elev. of RWY TH.: 9.391
Angle of GP: 3.1 deg.
Distance THR-LLZ: 2,800m
Runway Strip: 2,620m×300m

No.	Type of Obstacle	Co-ordinates X-axis (m)	Co-ordinates Y-axis (m)	Height of Obstacle * (m)	CAT I W Surface (m)	CAT I X Surface (m)	CAT I Y Surface (m)	CAT I Z Surface (m)	Clearance (m)	Remarks
①	NDB Antenna	1,550	360	21.7			92.9		71.2	○
②	BS Antenna	1,550	1,050	91.2			239.7		148.5	○
③	Tree	1,047	124	33.7		35.6			1.9	○
④	Tree	1,052	115	22.0		34.1			12.1	○
⑤	Hill	1,300	302	21.7		75.8			54.1	○
⑥	Hill	1,720	57	25.8	42.9				17.1	△
⑦	Hill	1,901	245	35.1		82.3			47.2	○
⑧	Hill	2,337	663	49.1			176.8		127.7	○
⑨	Mountain	2,950	0	25.6	79.1				53.5	○
⑩	Mountain	3,390	50	30.6	92.0				61.4	○
⑪	Mountain	3,820	660	43.2			212.7		169.5	○
⑫	Mountain	2,410	600	50.6			165.2		114.6	○
⑬	Mountain	2,690	610	50.6			174.2		123.6	○
⑭	Mountain	4,860	30	60.6	135.3				74.7	○
⑮	Mountain	8,700	450	270.6		313.6			43.0	○
⑯	Mountain	8,700	0	230.6	248.3				17.7	△
⑰	Mountain	10,400	0	270.6	298.3				27.7	△
⑱									0.0	
⑲									0.0	
⑳									0.0	

Note, *: above Threshold
○: No Problem
△: Trees may infringe the surface

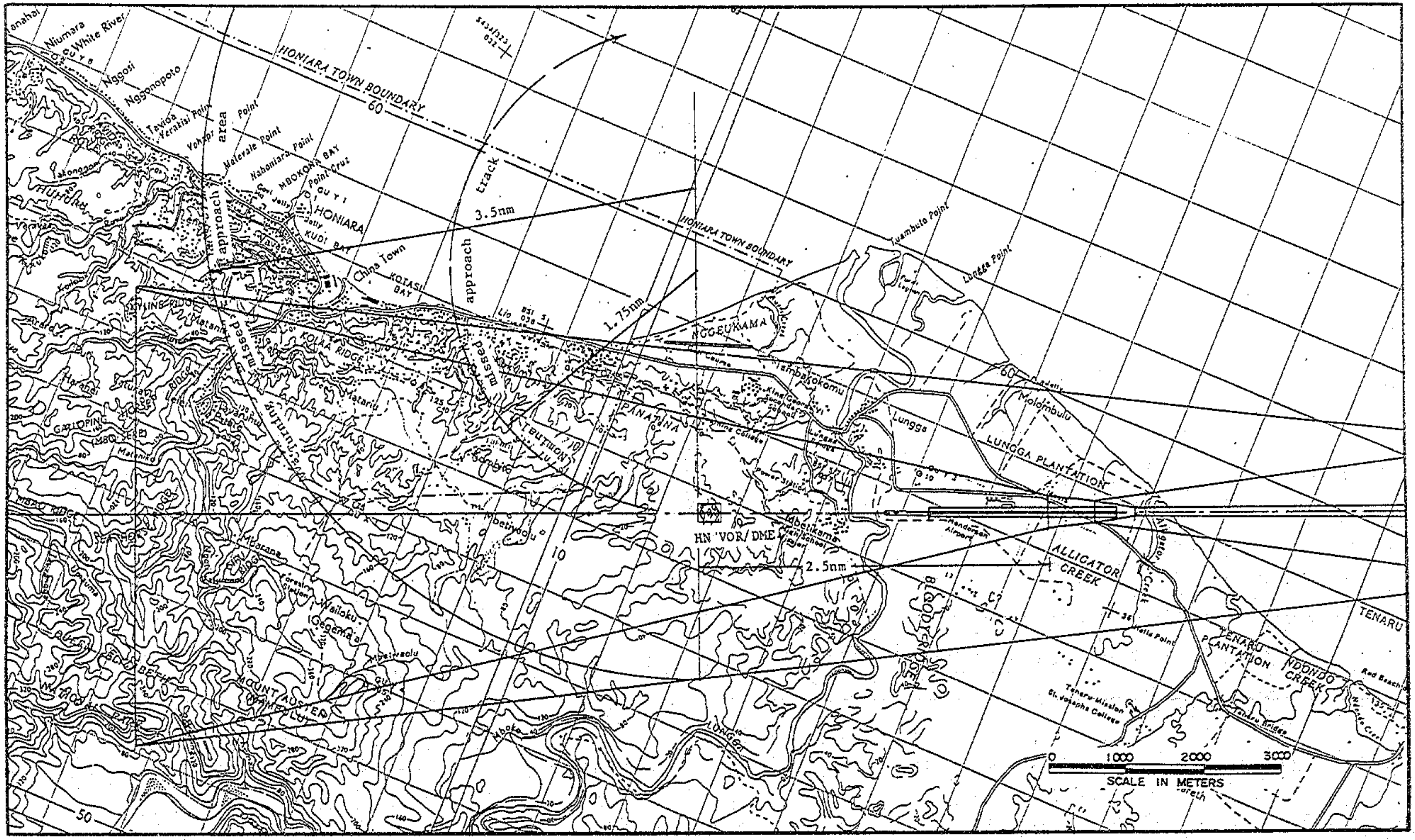


Figure A.7.2.14 Obstacle Assessment Surface (OAS)
(Approach to RWY24)

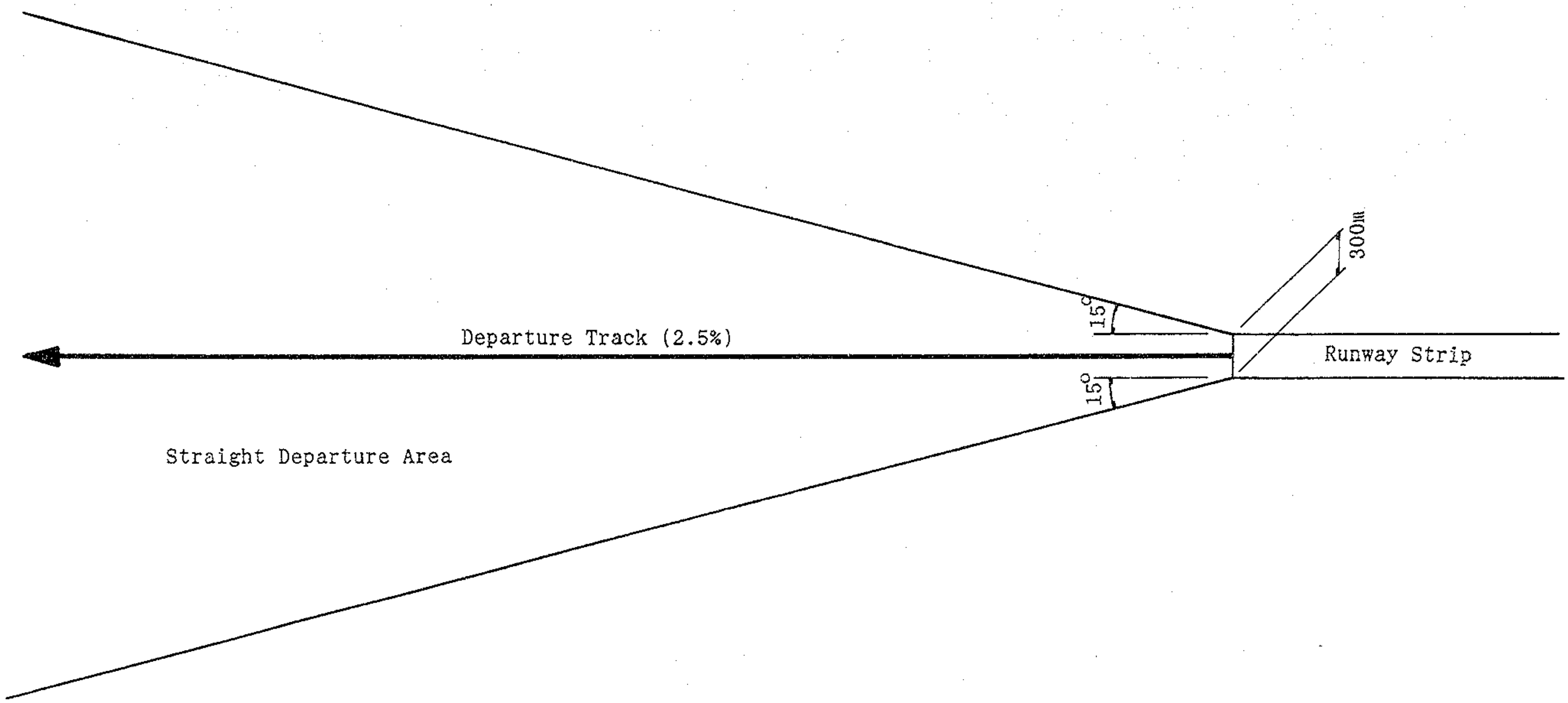


Figure A.7.2.15 Obstacle Identification Surface (015) for Straight Departure

a) Departure from Runway 24

i) Present condition

Figures A.7.2.16 and A.7.2.17 show the OIS for straight departure from the runway 24 for the existing 2,200m long runway. Clearances between the elevation of the OIS and the obstacles shown in Figure A.7.2.16 are shown in Table A.7.2.7. Obstacles numbered from 3 to 30 protrude upon the OIS. There are too many obstacles to conduct the straight departure from the runway 24. Therefore, the turning departure with a right turn or a left turn will be necessary to avoid such obstacles. Figures A.7.2.18 and A.7.2.19 show the right turning departure area and the left turning departure area respectively. The right turning departure is selected for the following reasons;

- Although no obstacles protrude upon OIS in both cases, take-off over the sea is more preferable than that over the hills taking into account emergency cases.

- Since the radius of the right turning departure track is larger than that of the left turning, control of aircraft is easier.

- Aircraft noise influence over Honiara town is minimum since the occasions of take-offs from the runway 24 are very limitated due to prevailing wind condition.

ii) After 300m long extension of the Runway

Figure A.7.2.20 and A.7.2.21 show the OIS when the runway is extended 300m towards the southwest. Table A.7.2.8 shows the result of the calculation of the clearance between the elevation of the OIS for the straight departure and the obstacles. Obstacles numbered 3 to 28 and 30 infringe the OIS. Figure A.7.2.22 and A.7.2.23 show the right turning departure area and the left turning departure area

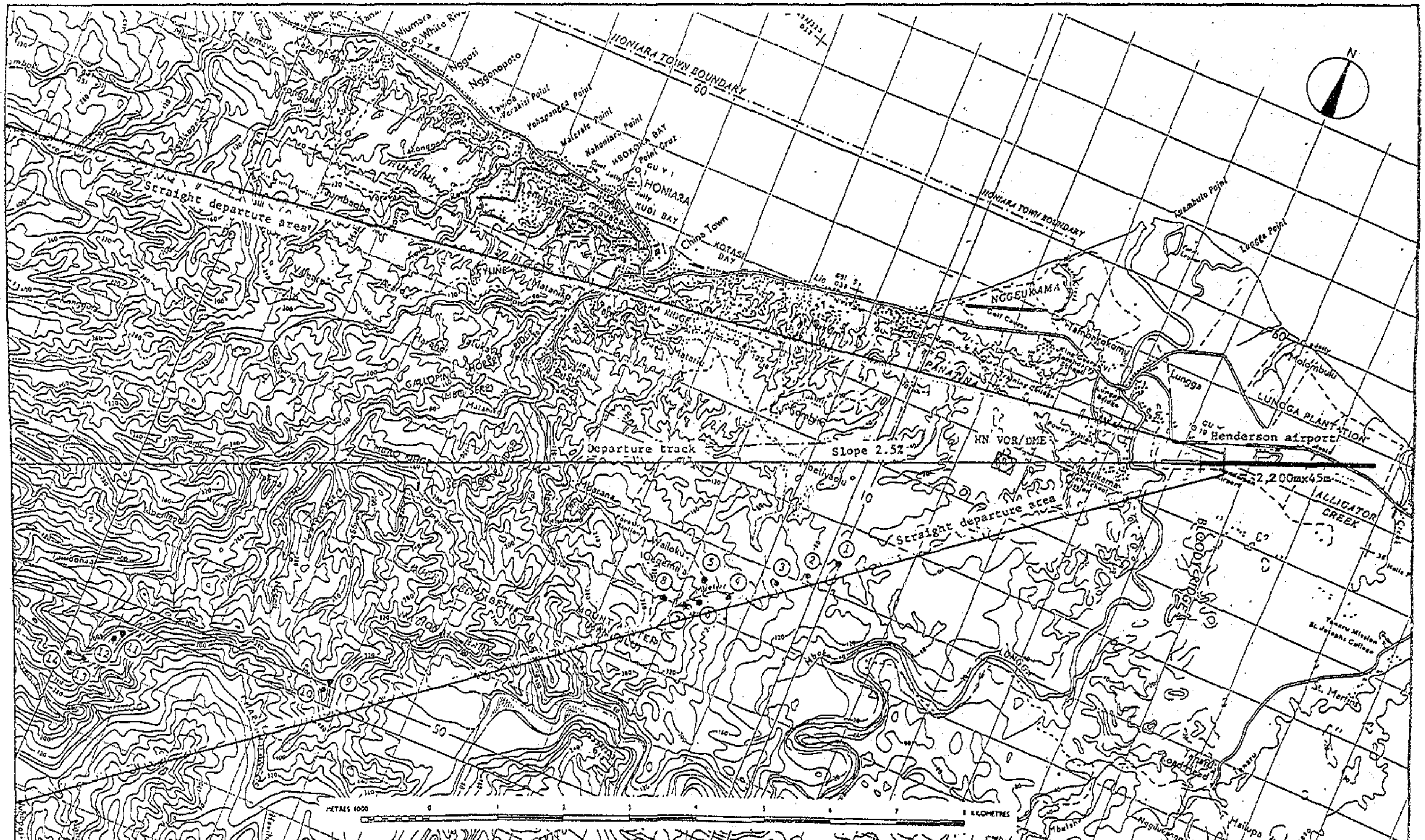


Figure A.7.2.16 Obstacle Identification Surface (OIS)
(2,200m Long Runway, Departure from RWY24)

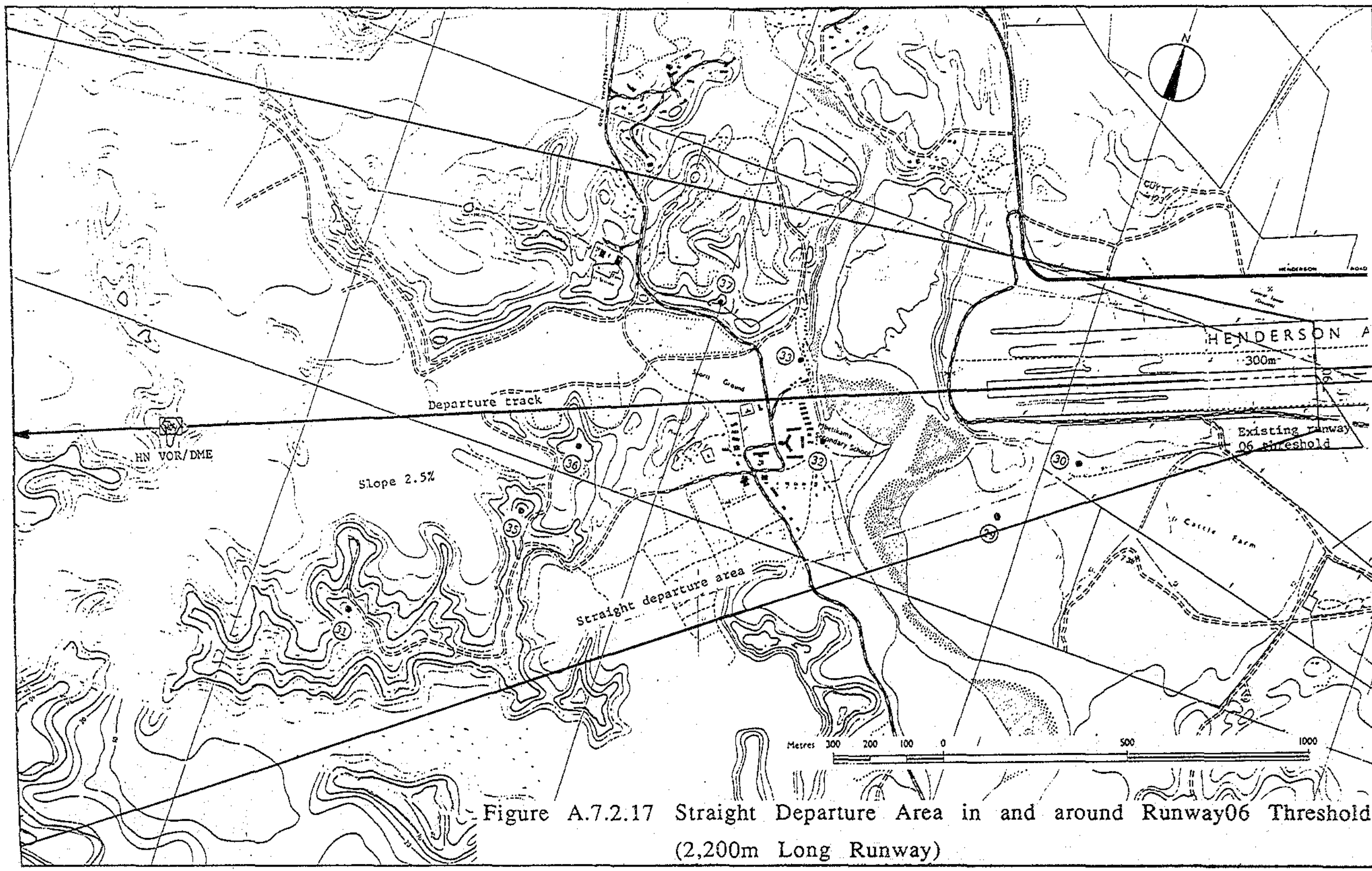
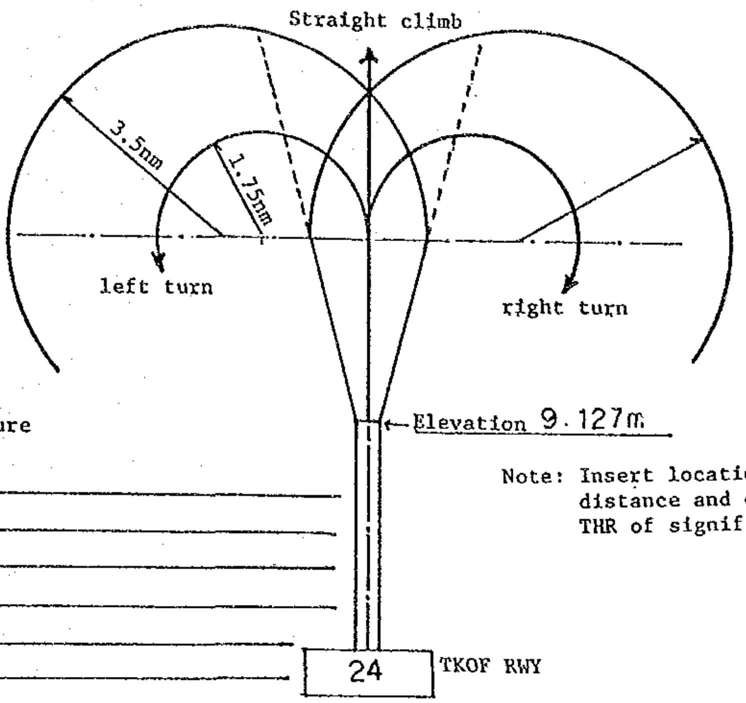


Figure A.7.2.17 Straight Departure Area in and around Runway06 Threshold (2,200m Long Runway)

Table A.7.2.7 Check Sheet for Obstacles in the TKOF Climb Area (1)

Name of Airport: Henderson TKOF RWY: 24 Elevation: 9.127

Runway: 2200mx45m Runway St. 2320mx300m TKOF Direction: Straight climb



Draft of SID Procedure

Note: Insert location, height(amsl), distance and direction from THR of significant obstacles.

	Height of Obstacle *	Dist. btwn THR & Obst.	Height of 1/40 at Obst. Point	Elev.+4	Compare with 2 & 5	Height of 1/30 at Obst. Point plus Elev.	Compare with 2 & 7	Height of 1/20 at Obst. Point plus Elev.	Compare with 2 & 9
1	2	3	4	5	6	7	8	9	10
1	110.000	5,800	145.00	154.13	OK	202.46	OK	299.13	OK
2	150.000	6,300	157.50	166.63	OK	219.13	OK	324.13	OK
3	190.000	6,800	170.00	179.13	NO	235.79	OK	349.13	OK
4	230.000	7,500	187.50	196.63	NO	259.13	OK	384.13	OK
5	270.000	7,800	195.00	204.13	NO	269.13	NO	399.13	OK
6	310.000	7,900	197.50	206.63	NO	272.46	NO	404.13	OK
7	350.000	8,100	202.50	211.63	NO	279.13	NO	414.13	OK
8	390.000	8,400	210.00	219.13	NO	289.13	NO	429.13	OK
9	430.000	13,400	335.00	344.13	NO	455.79	OK	679.13	OK
10	470.000	13,500	337.50	346.63	NO	459.13	NO	684.13	OK
11	510.000	16,300	407.50	416.63	NO	552.46	OK	824.13	OK
12	550.000	16,400	410.00	419.13	NO	555.79	OK	829.13	OK
13	590.000	16,800	420.00	429.13	NO	569.13	NO	849.13	OK
14	630.000	17,100	427.50	436.63	NO	579.13	NO	864.13	OK
15									
29	38.015	920	23.00	32.13	NO				
30	27.330	690	17.25	26.38	NO				
31	58.506	2,800	70.00	79.13	OK				
32	43.029	1,390	34.75	43.88	OK				
33	31.413	1,440	36.00	45.13	OK				
34			0.00	9.13	OK				
35	44.460	2,240	56.00	65.13	OK				
36	35.211	2,060	51.50	60.63	OK				
37	31.107	1,650	41.25	50.38	OK				

Note, *: plus 30m

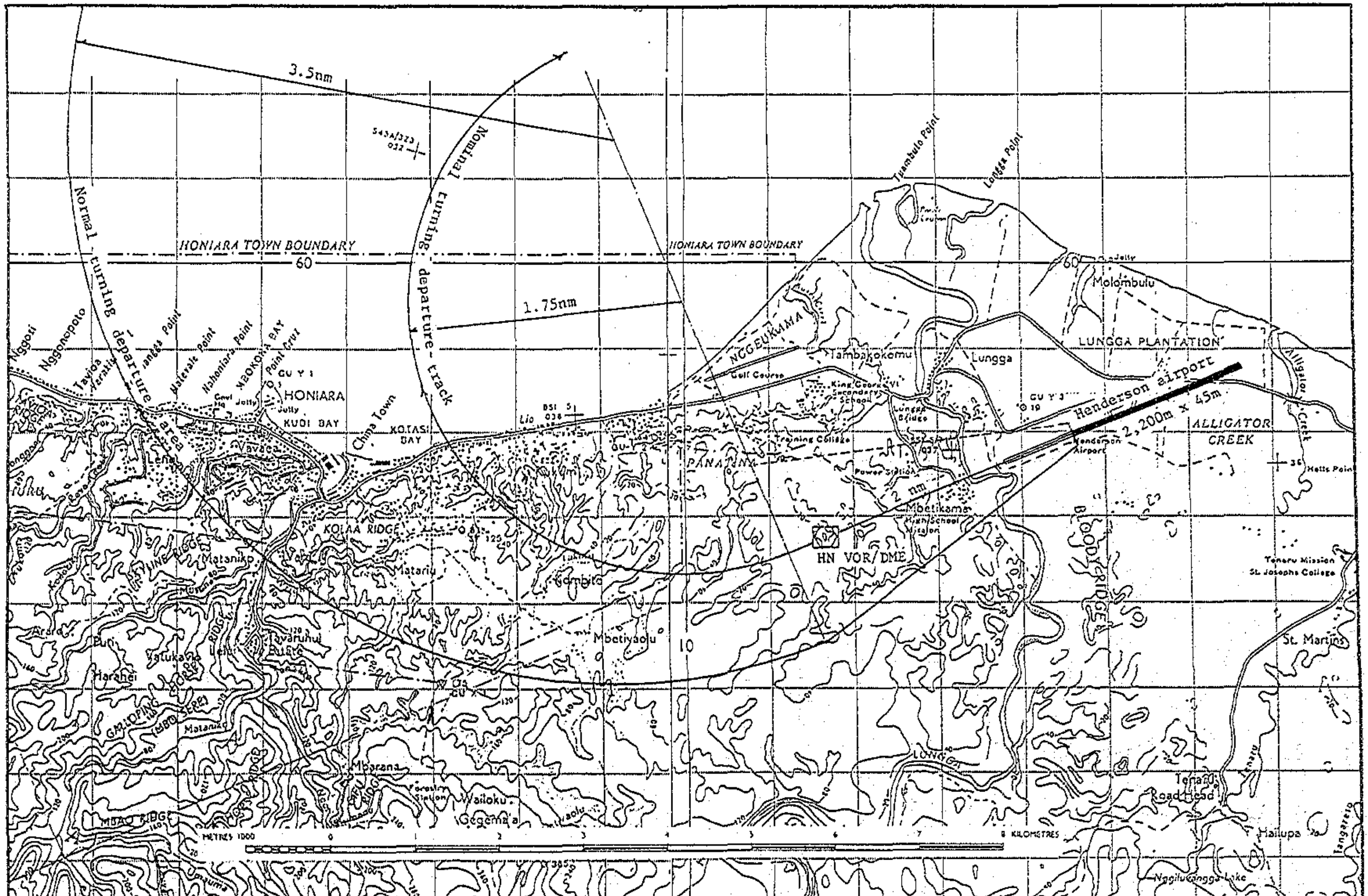


Figure A.7.2.18 Right Turning Departure Area (2,200m Long Runway)

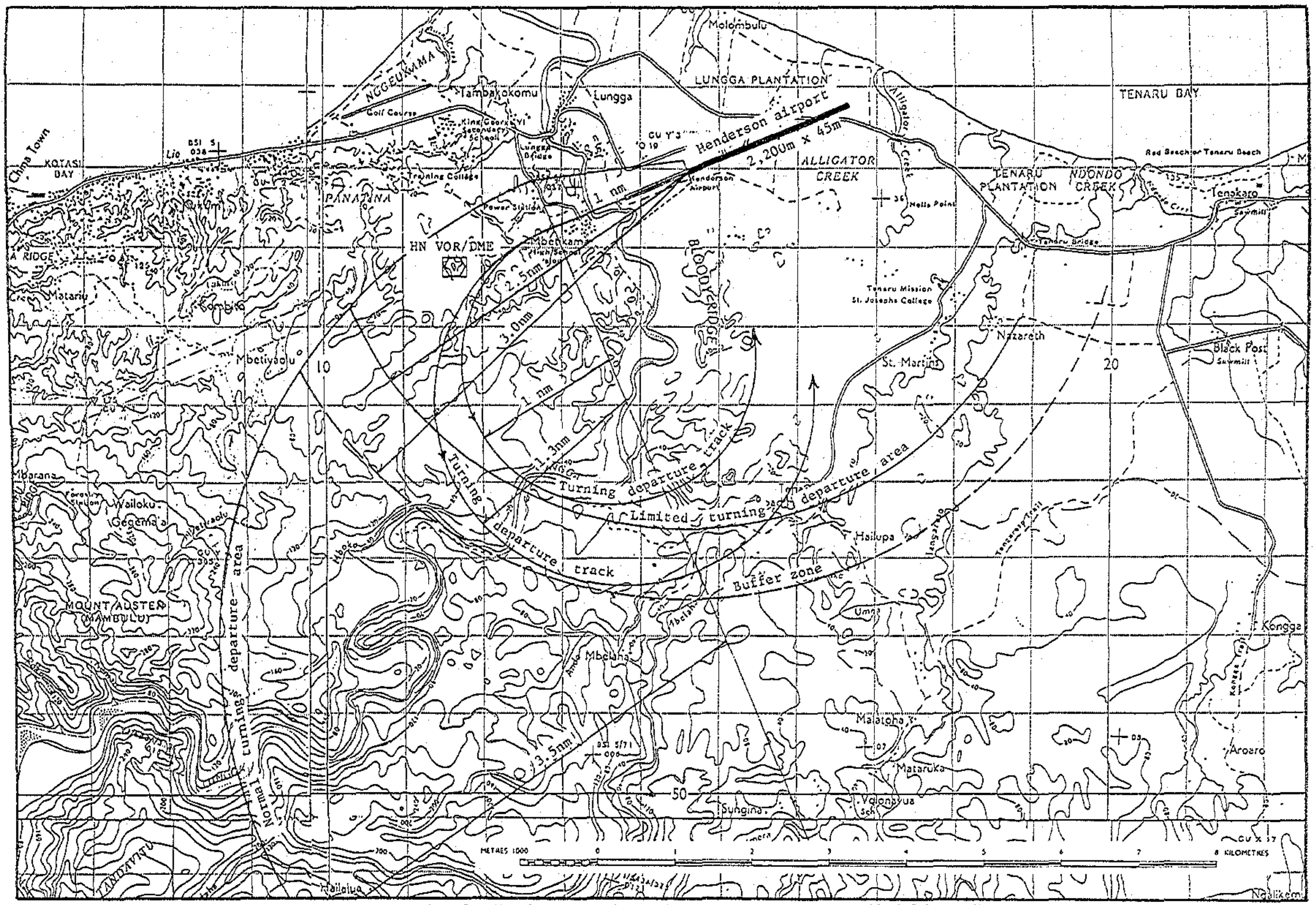


Figure A.7.2.19 Left Turning Departure Area (2,200m Long Runway)

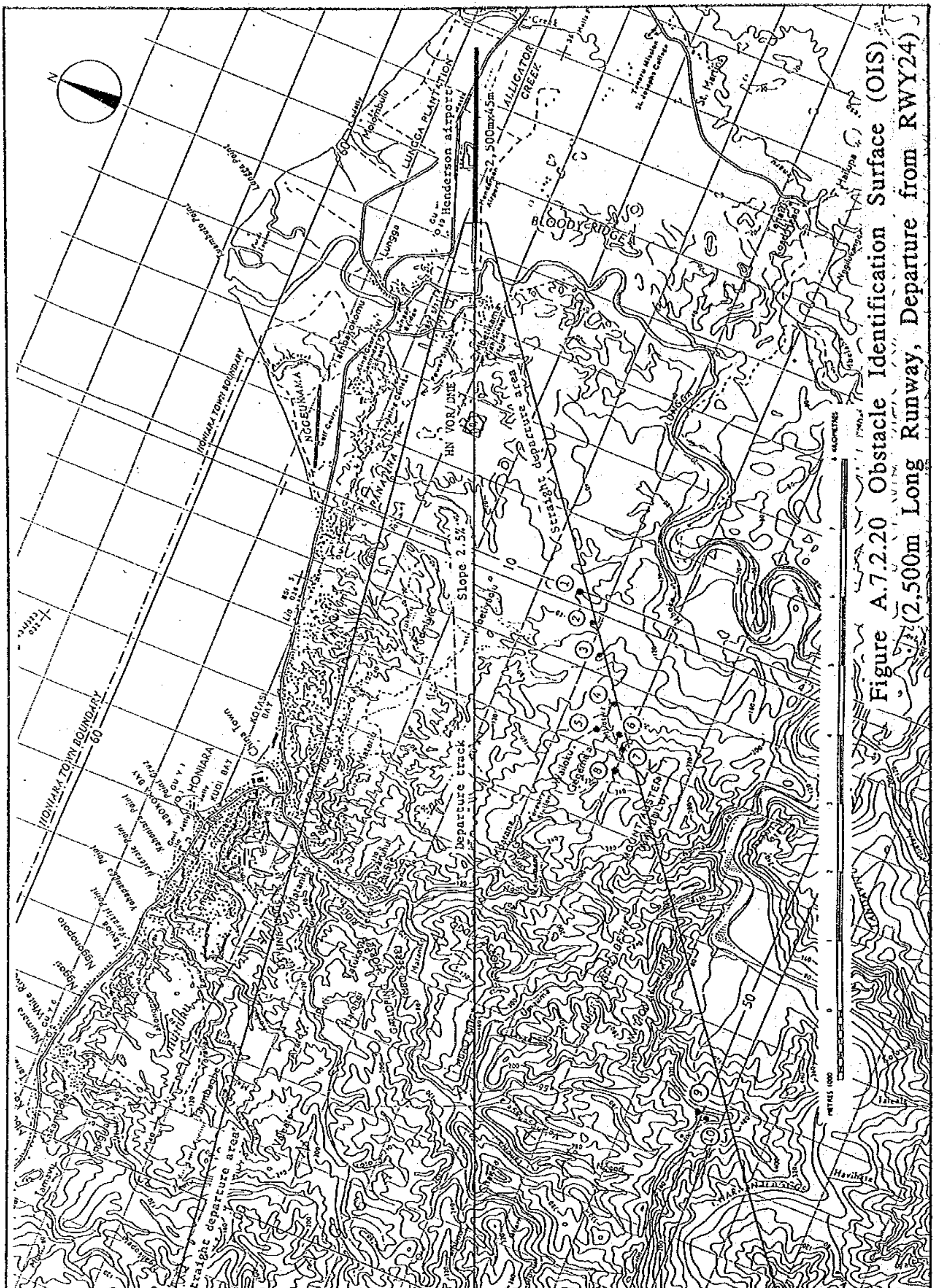


Figure A.7.2.20 Obstacle Identification Surface (OIS)
(2,500m Long Runway, Departure from RWY24)

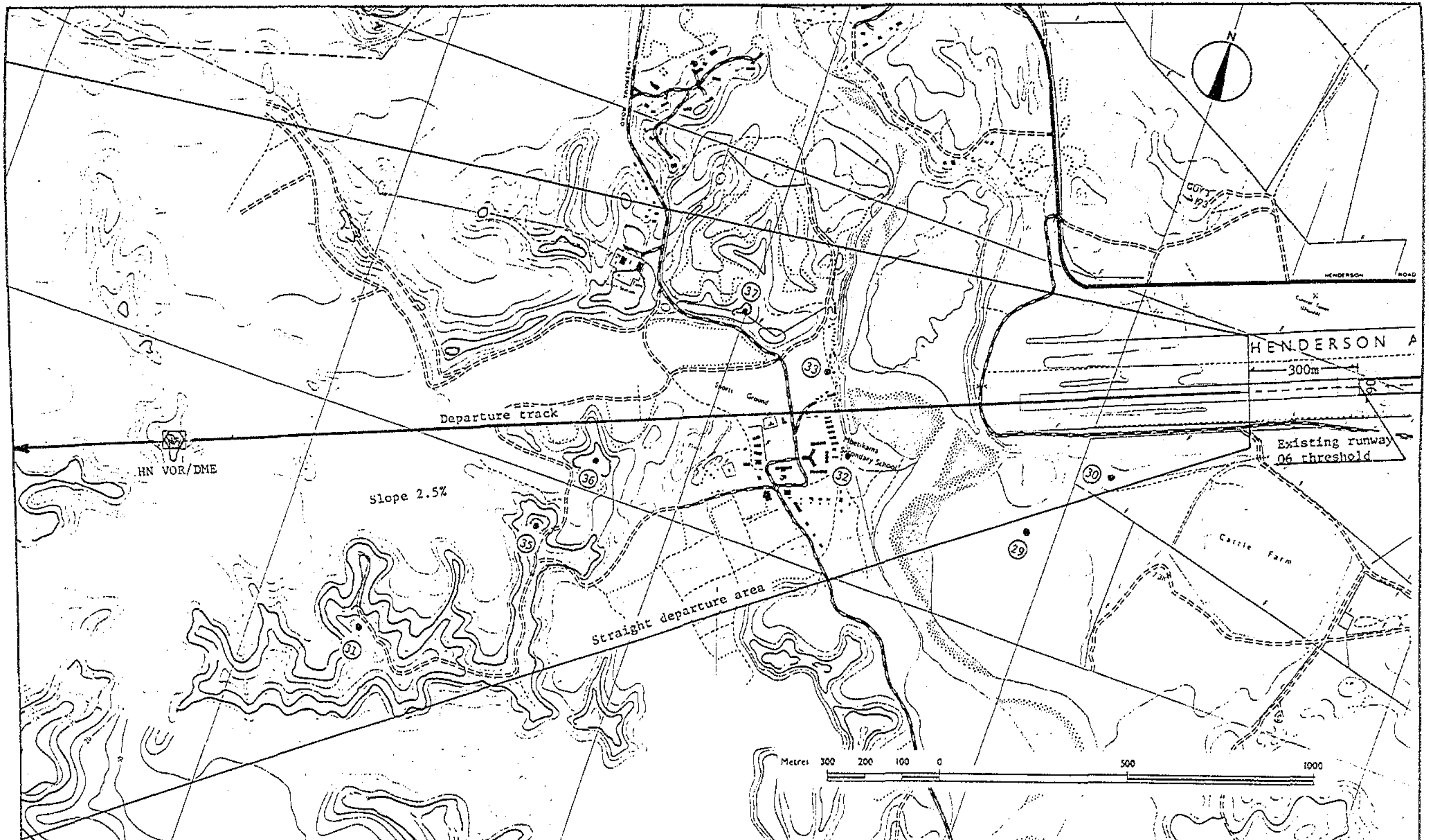
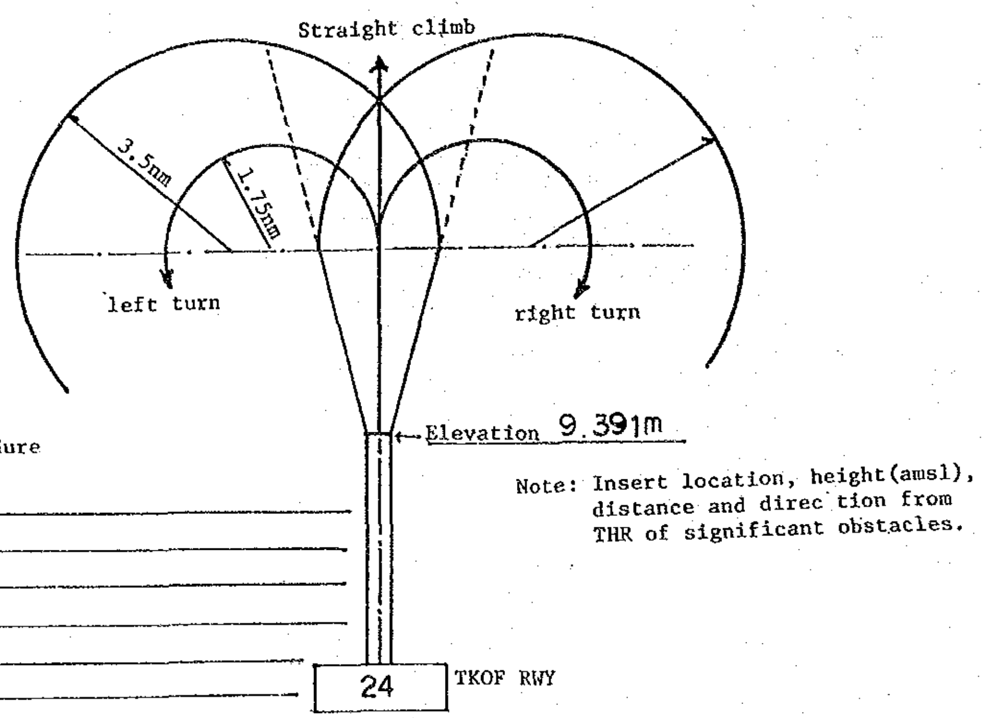


Figure A.7.2.21 Straight Departure Area in and around Runway06 Threshold

Table A.7.2.8 Check sheet for Obstacles in the TKOF Climb Area (2)

Name of Airport: Henderson | TKOF RWY: 24 | Elevation: 9.391

Runway: 2500mx45m | Runway St. 2620mx300m | TKOF Direction: Straight climb



Draft of SID Procedure

	Height of Obstacle *	Dist. btwn THR & Obst.	Height of 1/40 at Obst. Point	Elev.+4	Compare with 2 & 5	Height of 1/30 at Obst. Point plus Elev.	Compare with 2 & 7	Height of 1/20 at Obst. Point plus Elev.	Compare with 2 & 9
1	2	3	4	5	6	7	8	9	10
1	110.000	5,500	137.50	146.89	OK	192.72	OK	284.39	OK
2	150.000	6,000	150.00	159.39	OK	209.39	OK	309.39	OK
3	190.000	6,500	162.50	171.89	NO	226.06	OK	334.39	OK
4	230.000	7,200	180.00	189.39	NO	249.39	OK	369.39	OK
5	270.000	7,500	187.50	196.89	NO	259.39	NO	384.39	OK
6	310.000	7,600	190.00	199.39	NO	262.72	NO	389.39	OK
7	350.000	7,800	195.00	204.39	NO	269.39	NO	399.39	OK
8	390.000	8,100	202.50	211.89	NO	279.39	NO	414.39	OK
9	430.000	13,100	327.50	336.89	NO	446.06	OK	664.39	OK
10	470.000	13,200	330.00	339.39	NO	449.39	NO	669.39	OK
11	510.000	16,000	400.00	409.39	NO	542.72	OK	809.39	OK
12	550.000	16,100	402.50	411.89	NO	546.06	NO	814.39	OK
13	590.000	16,500	412.50	421.89	NO	559.39	NO	834.39	OK
14	630.000	16,800	420.00	429.39	NO	569.39	NO	849.39	OK
15									
/									
30	27.330	390	9.75	19.14	NO				
31	58.506	2,500	62.50	71.89	OK				
32	43.029	1,090	27.25	36.64	NO				
33	31.413	1,140	28.50	37.89	OK				
34			0.00	9.39	OK				
35	44.460	1,940	48.50	57.89	OK				
36	35.211	1,760	44.00	53.39	OK				
37	31.107	1,350	33.75	43.14	OK				

Note, *: plus 30m

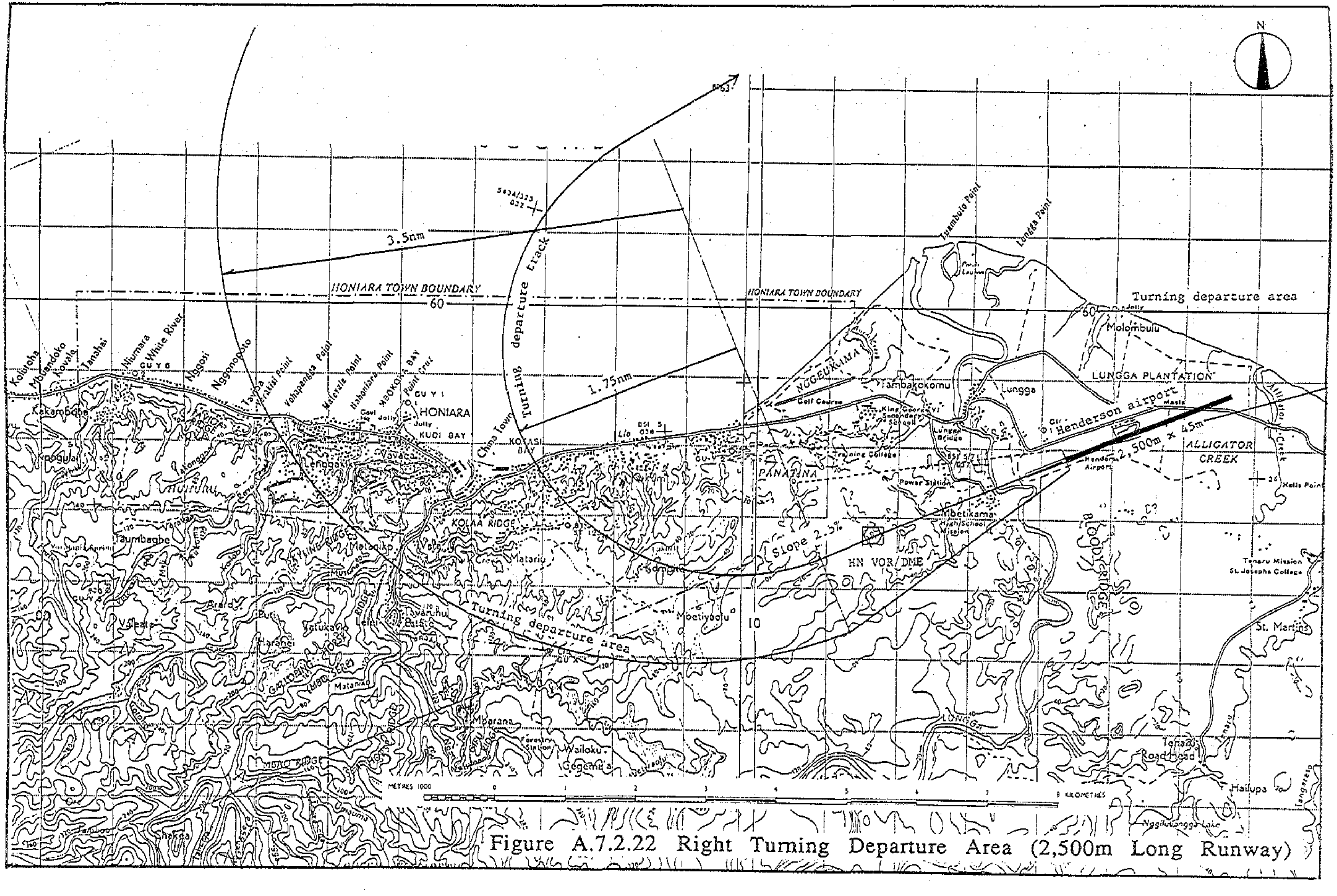


Figure A.7.2.22 Right Turning Departure Area (2,500m Long Runway)

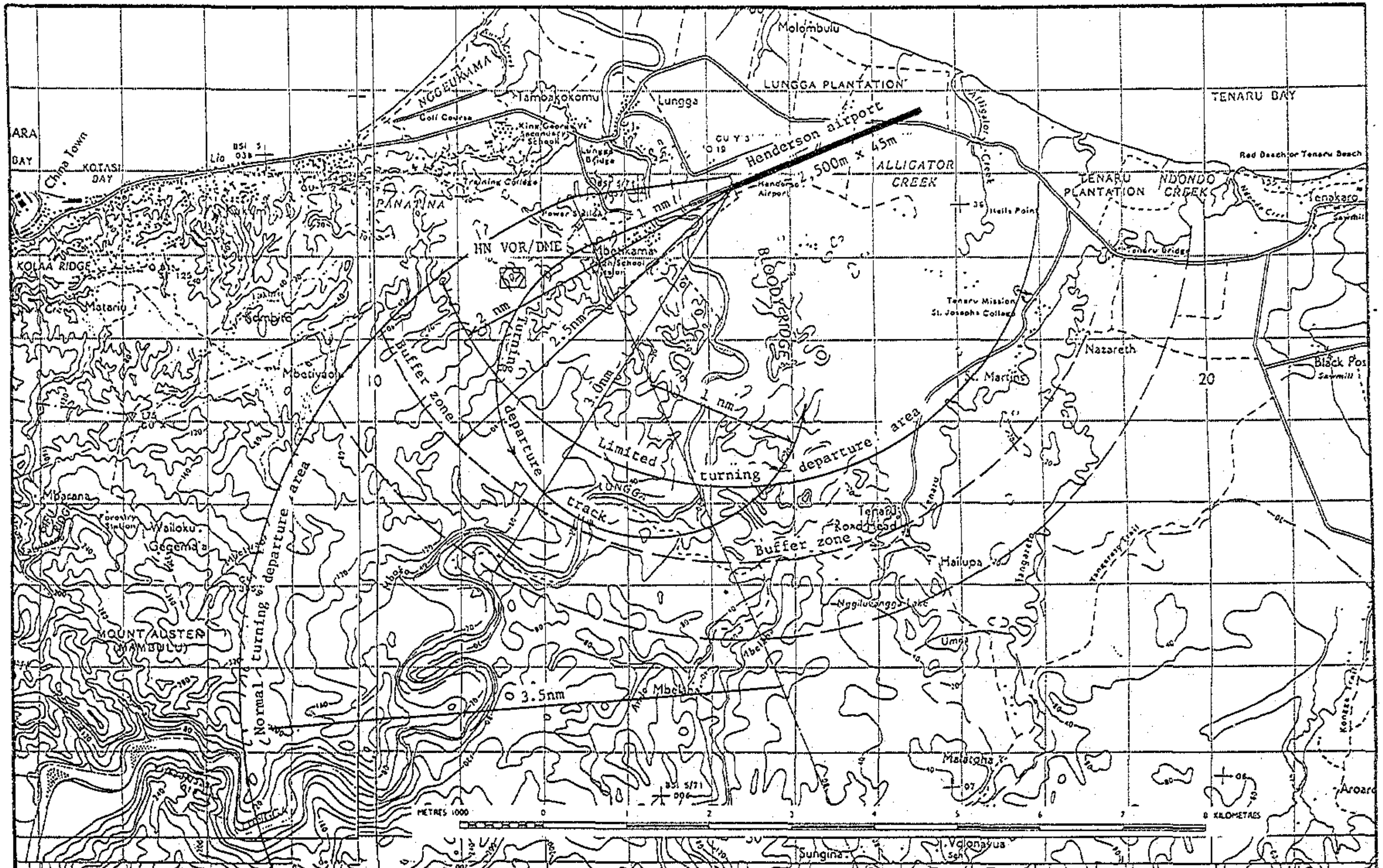


Figure A.7.2.23 Left Turning Departure Area (2,500m Long Runway) respectively. The right turning departure is selected for a same reason as the case of i).

b) Departure from Runway 06

The OIS for the straight departure from the runway 06 is shown in Figure A.7.2.24. A relationship between the OIS and the obstacles around the runway 24 threshold is summarized in Table A.7.2.9. As a result of the calculation in Table A.7.2.9, a cluster of trees (number 17 in Figure A.7.2.24) infringes the OIS. Since these trees can be felled easily, the straight departure will be possible.

(5) Conclusion

a) Summery of relationship between the surfaces and the obstacles

Based on the above studies, the relationship between the obstacles and the obstacle limitation surface or the obstacle clearance surfaces is summarized in Table A.7.2.10.

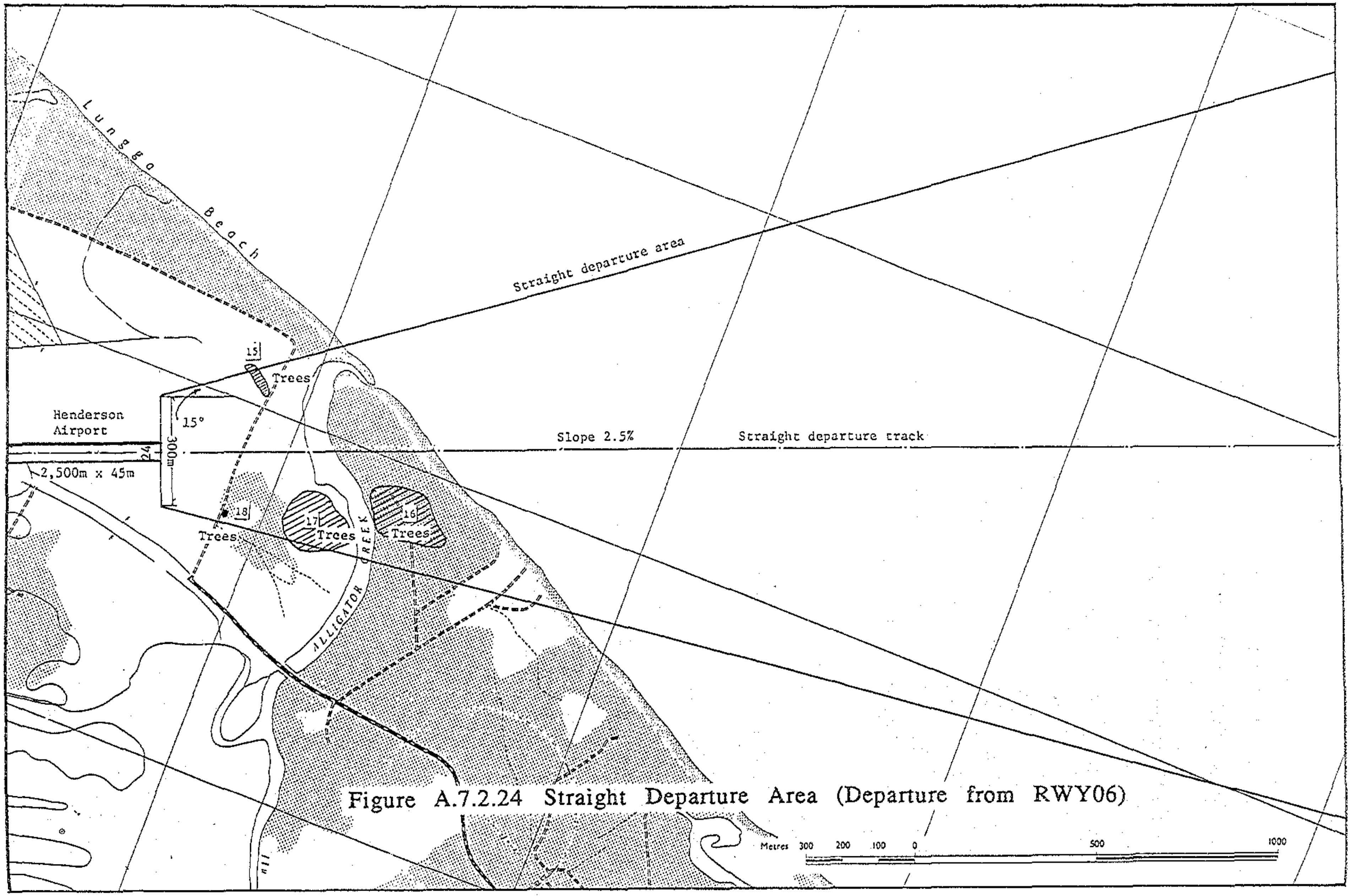
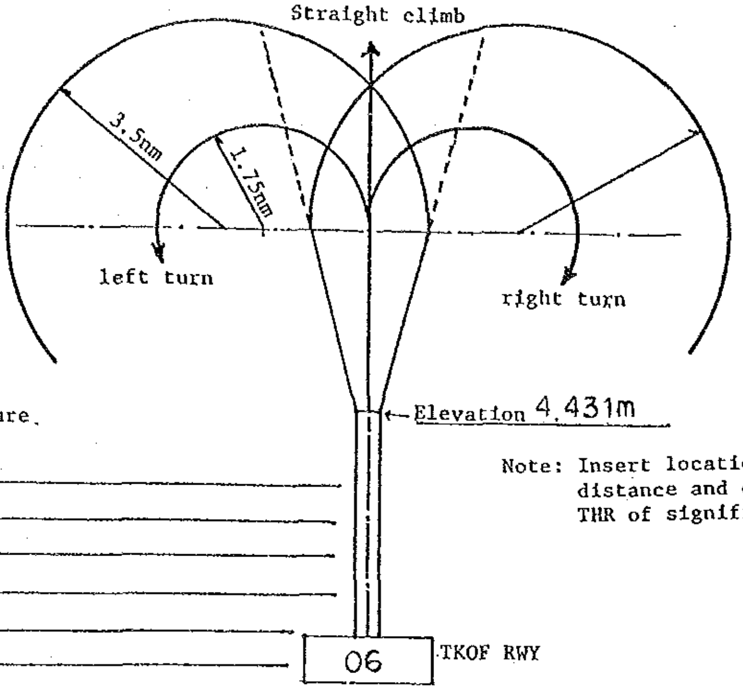


Figure A.7.2.24 Straight Departure Area (Departure from RWY06)

Table A.7.2.9 Check Sheet for Obstacles in the TKOF Climb Area (3)

Henderson TKOF RWY: 06 Elevation: 4.431

2500mx45m Runway St. 2620mx300m TKOF Direction: Straight climb



Draft of SID Procedure.

	Height of Obstacle (MSL)m	Dist. btwn THR & Obst.	Height of 1/40 at Obst. Point	Elev.+4	Compare with 2 & 5	Height of 1/30 at Obst. Point plus Elev.	Compare with 2 & 7	Height of 1/20 at Obst. Point plus Elev.	Compare with 2 & 9
1	2	3	4	5	6	7	8	9	10
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15	12.45	240	6.00	15.1270	OK				
16	15.30	570	14.25	23.3770	OK				
17	17.24	320	8.00	17.1270	NO				
18	13.26	170	4.25	13.3770	OK				
19									
20									
21									
22									
23									
24									
25									

Table A.7.2.10 Relationship between the Obstacles and the Surfaces

			Runway 2,200m (Present)	Runway 2,500m
OLS ICAO Annex-14	Approach Surface (First Section)	RWY06	Two trees infringe the surface.	Two trees infringe the surface.
		RWY24	Two clusters of trees infringe the surface.	Two clusters of trees infringe the surface.
	Extended Approach Surface	RWY06	Mountains infringe the horizontal section.	Mountains infringe the horizontal section.
		RWY24	No obstacles.	No obstacles.
OAS ICAO PANS/OPS	Approach to RWY06	GP 3.0°	Trees may infringe the surface. (Need investigation)	Trees may infringe the surface. (Need investigation)
		GP 3.1°		
	Approach to RWY24		No obstacles except trees. The turning missed approach should be conducted.	No obstacles except trees. The turning missed approach should be conducted.
OIS ICAO PANS/OPS	Departure from RWY24		The right turning departure should be conducted.	The right turning departure should be projected.
	Departure from RWY06		The straight departure is possible if a cluster of trees is felled.	The straight departure is possible if a cluster of trees is felled.

b) Feasibility of the precision category-I ILS approach

As a result of the study, the following are concluded for the precision approach to the runway 06 of existing 2,200 m long runway.

a) Although hilly terrain to the southwest of the airport considerably protrudes upon horizontal section of the approach surface, precision approach to the runway 06 is feasible based on an analysis with obstruction assessment surface defined by ICAO PANS/OPS.

b) However, it should be confirmed by the Study Team that trees taller than 17 m on a hill located 8,700 m from the runway 06 threshold on the extended runway centerline, and those taller than 26 m on a hill 10,400 m from the threshold on the same can be felled to secure obstruction assessment surface for glide path angle of 3.0 degrees.

c) Application of 3.1 degree glide path angle will alleviate the requirement of above height restriction by about 10 m. Only trees with more than 26 m on the hill 8,700 m from the runway 06 threshold should be felled.

In case of 2,500 m long runway extended by 300 m towards the southwest, a similar conclusion with stricter height restriction is obtained as follows:

a) Precision approach to the runway 06 is feasible provided that trees taller than 9 m on the hill 8,700 m from the runway 06 threshold on the runway centerline and those taller than 17 m on the hill 10,400 m from the threshold on the same are felled to secure obstruction assessment surface for glide path angle of 3.1 degrees.

b) Application of 3.1 degree glide path angle will alleviate the requirement of above height restriction by about 10 m. Trees to be felled will be those taller than 17 m and 27 m respectively for the two hills mentioned in a).

There will be no major difficulty in establishing necessary airspace for the precision approach to the runway 24.

c) Take-off from the Runway 24

There is no difficulty in securing obstruction identification surface (OIS), for both 2,200 m and 2,500 m long runway cases, by conducting a curved take-off with a right turn. Although aircraft noise may influence the eastern part of Honiara town, the degree of influence is minimum. This is because occurrence of take-offs of jet aircraft for this direction are very limited with less than 10% of the total operations.