

Appendix A

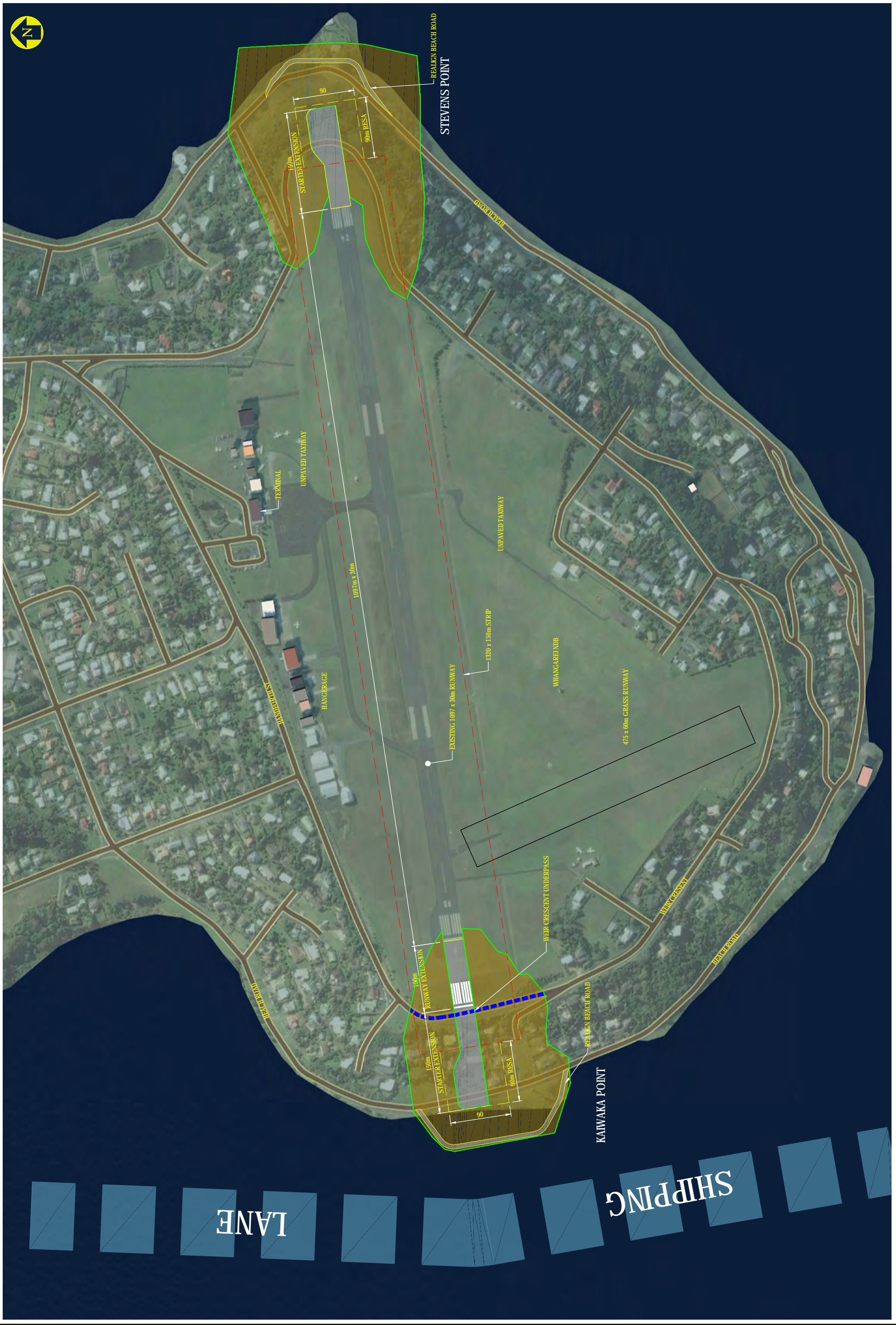
Drawings



ISSUED FOR INFORMATION No.		By: MAF Date: 29.10.14		Checked: KWN Date: 10.09.14		Approved For Construction: Date: 29.10.14		Approved For Construction: Date:	
ISSUED FOR INFORMATION Revision		By:		Checked:		Approved For Construction:		Approved For Construction:	
No.		By:		Checked:		Approved For Construction:		Approved For Construction:	
Revision		By:		Checked:		Approved For Construction:		Approved For Construction:	

BECA Drawing Originator		Design: KWN Drawn: MMF		10.09.14 29.10.14	
Scale (A1): 1:2500 Scale of Site Plan: 1:5000		Design Checker:		Date:	
Refer to Revision 1 for Original Signature		Date:		Date:	

WHANGAREI DISTRICT COUNCIL		WHANGAREI DISTRICT AIRPORT STRATEGIC REVIEW		ONERAHI EXISTING AERODROME		CIVIL ENGINEERING	
Client:		Project:		Title:		Discipline:	
DO NOT SCALE		3232530-CE-K001		3232530-CE-K001		A	



No.	Revised	By	CHK.	Appr.	Date
B	ISSUED FOR INFORMATION	MMF			29.10.14
A	ISSUED FOR INFORMATION	KWN			10.09.14

Drawing Originator:		Design	Drawn	Checked	Approved For
Scale (A3)	1:2500	MMF	KWN		10.09.14
Scale of Site Plan	1:5000	Day Vender			29.10.14
		Design Check			
		* Refer to Revision 1 for Original Signature			

Client:		Project:		Title:	
Whangarei District Council		Whangarei District Airport Strategic Review		ONERAHI FUTURE 1350m CODE 3 RUNWAY	
Discipline:		Drawing No:		Rev:	
CIVIL ENGINEERING		3232530-CE-K010		A	

DO NOT SCALE

Appendix B

Whangarei Aerodrome AIP Information

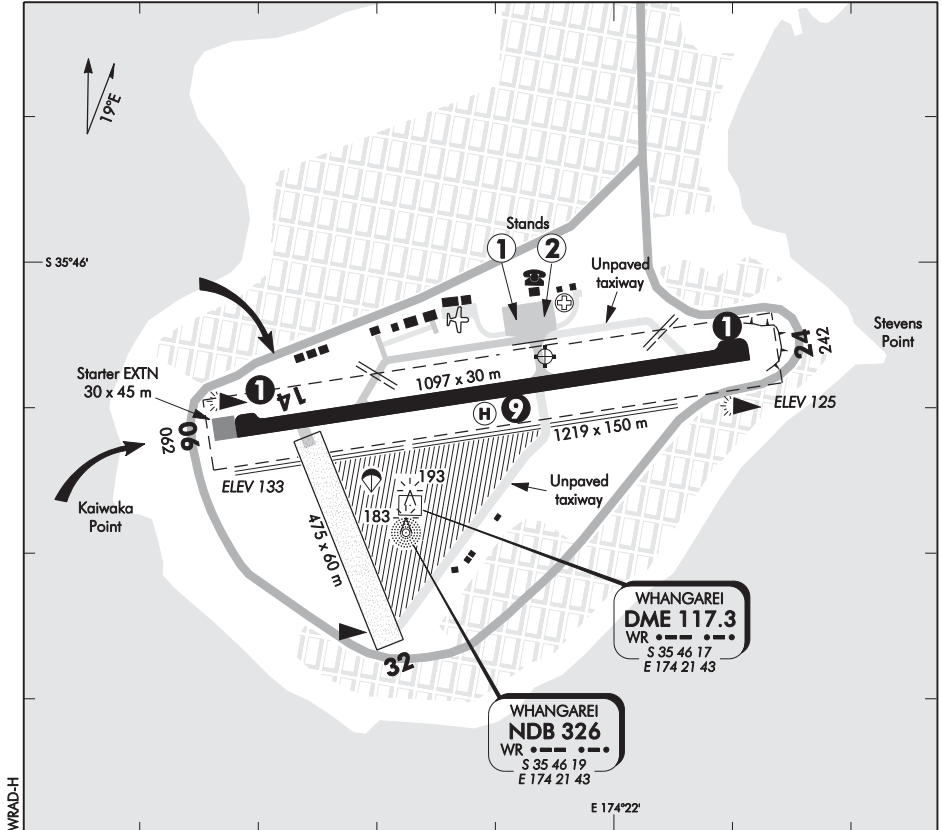
ELEV 133

NZWR

CERTIFICATED

**WHANGAREI
AERODROME**

FLIGHT INFORMATION: CHRISTCHURCH INFORMATION 124.9 AWIB: 119.8 UNATTENDED: 118.6



- ❶ No holding in turning bays.
2. All aircraft operations are confined to defined runway and taxiway areas.
3. U-turns on paved runway by aircraft above 5700 kg MCTOW are not permitted except in turning bays at runway ends.
4. Holding positions are marked by flush yellow concrete markers.
5. Grass taxiway is delineated by orange cone markers.
6. Runway lead-in light system (RLLS). Refer to page NZWR AD 2-46.1 (Vol. 3 IFR only).
7. Parking stands in front of terminal are for scheduled airline operators. Other aircraft may park outside the red equipment line.
8. **CAUTION:** Bird hazard, especially during periods of heavy rain or strong winds.
- ❸ Simultaneous operations from TLOF and runway not permitted.
10. Built-up areas around airport are noise sensitive. All approaches and departures (including helicopters) to be in line with runway vectors.
11. Airport staff available only between 0600 and 2000 NZST/NZDT.
12. **CAUTION:** Northerly winds may cause some turbulence from hangar buildings especially RWY 06 touch-down areas.
13. Main apron has two stands. Only one aircraft per stand. Only one aircraft may manoeuvre at a time.

WARNING RWY 24 PAPI use prohibited beyond 1 NM from THR due to obstacle clearance infringement

S 35 46 06 E 174 21 54

Effective: 24 JUL 14

© Civil Aviation Authority

**WHANGAREI
AERODROME**

Changes from 29 MAY 14: Insertion of stand locators.

WHANGAREI

OPERATIONAL DATA (1)

NZWR

RWY

RWY	SFC	Strength	Gp	Slope	ASDA	Take-off distance			LDG DIST
						1:20	1:30	1:62.5	
06 24	B	LCN 45 H=45	8	0.22D 0.22U	1097			1158	1067 ¹ 1097
14 32	Gr	ESWL 2540	3			475			475

¹ RWY 06 LDA reduced due to reduced strip width at eastern end.

MINIMA

IFR Take-off		
RWY	Day	Night
06/24	500–1500	500–1500

LIGHTING

PAL 118.6 Standard operation — activated by 5 rapid and short transmissions, collectively not exceeding 3 seconds. Duration of 10 mins, reset by any single transmission.

By day — PAPI is selected for both runways simultaneously at fixed intensity of 100%. Holding fifth transmission will cycle through the intensities.

By night — PAPI is selected for both runways simultaneously at fixed intensity of 10%.

RLLS: RWY 06/24 FLG A Gates, F A lead in lights.
Terrain limit LGT(5) F R on shore line from NE to SE of aerodrome.

Runway: 06/24 REIL R/W PAPI 3.0°/TCH 50 (Refer AD chart warning),
LIL RWY

Aerodrome: WDI

Taxiway: Edge HLDG PSN A

Standby power available — Runway lights, PAPI, REIL, windsocks.

No standby power on approach lighting (independent solar panels).

(continued)

WHANGAREI

OPERATIONAL DATA (2)

FACILITIES

Fuel: BP Avgas and Jet A1 available from swipecard operated pumps.
Cash sales may be available by arrangement through local operators.

Maintenance.

D

RFS: Fire extinguisher located in freight bay of terminal building.
Available for regular air transport passenger services.

SUPPLEMENTARY

Operator: Whangarei District Airport, PO Box 3226, Onerahi, Whangarei
Tel (09) 436 0047 Fax (09) 436 3274

Available for general use without the permission of the operator.

- Airport Manager's Office at Northland Aviation Ltd.
- Customs/MAF processing (by prior arrangement) at airport terminal.

Appendix C

PAPI Evaluation

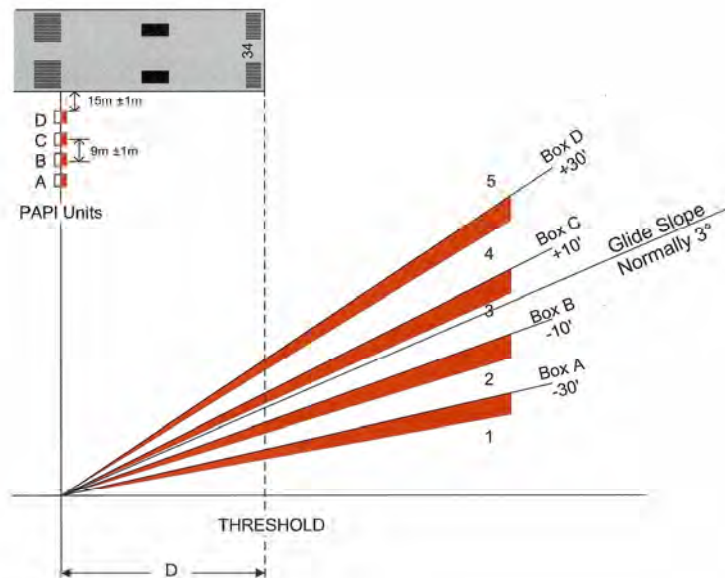
Whangarei Airport Study

1 PAPI Threshold Crossing Height Impact on Landing Distance

1.1 General Description

Precision Approach Path Indicator (PAPI) is the standard visual navigation aid adopted globally by the International Civil Aviation Organisation (ICAO) for the provision of visual approach slope guidance to pilots. It is normally set up to provide an on-path approach slope of 3° to the runway touchdown point located usually at 300 metres (m) in from the runway threshold.

The system consists of four light source units each providing a red and white light beams. The units are set up so that on the desired path slope the pilot sees two red light and two white lights as depicted below.



An aircraft receives a graduated display of slope guidance reference to the desire approach slope of 3° as depicted in Figure 2 below:

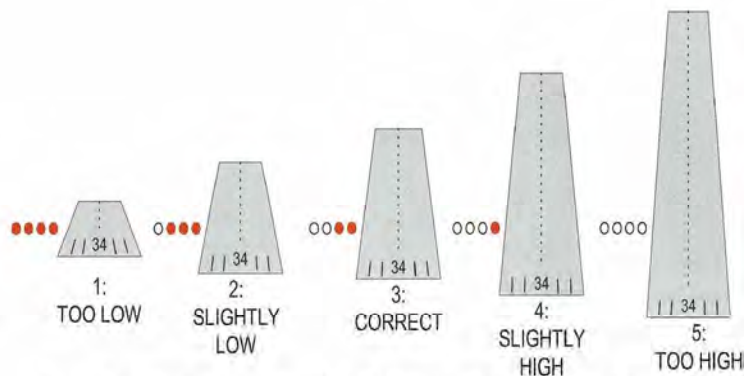


Figure 2 - The Arrangement of PAPI Units and the resulting display.

Where additional visual guidance is required PAPI units can be mounted on both sides of the runway (double sided PAPI). Another version is the Abbreviated PAPI (A-PAPI) consisting of only two light units thus providing a less precise slope guidance.

1.2 Runway Threshold Crossing Height

The PAPI is set up to ensure safe threshold crossing height (TCH) over the runway threshold. This height is termed the minimum eye height over threshold (MEHT). The MEHT is normally set to a standard height of 50 feet (15m). This is consistent with the regulatory requirement of landing distance available as detailed in Civil Aviation Rules Part 121 (Air Operations – Large Aeroplanes) and 125 (Air Operations – Medium Aeroplanes):

CAR 121.221

(b) Each holder of an air operator certificate shall ensure that, for each aeroplane it operates, the landing weight for the estimated time of landing at the destination aerodrome and at any alternate aerodrome allows a full stop landing on a dry runway from a point 50 feet above the threshold within—

- (1) 60% of the landing distance available at the destination and at any alternate aerodrome for a turbojet or turbofan powered aeroplane; and
- (2) 70% of the landing distance available at the destination aerodrome and at any alternate aerodrome for a propeller powered aeroplane; and

CAR 125.223

(b) Each holder of an air operator certificate shall ensure that, for each aeroplane it operates, the landing weight of the aeroplane for the estimated time of landing at the destination aerodrome and at any alternate aerodrome allows a full-stop landing from 50 feet above the threshold within—

- (1) for aeroplanes at or below 5700 kg MCTOW, 85% of landing distance available; and
- (2) for aeroplanes above 5700 kg MCTOW, 70% of the landing distance available.

Note the Air New Zealand Link/Eagle Airways Beech 1900 operates under a CAR 125 certificate and the Air New Zealand/Air Nelson Bombardier Q300 operates under a CAR 121 certificate.

For larger aircraft where there is considerably more vertical distance between the pilot's eye height and that of the main gear wheels the MEHT of 50Ft may be insufficient to ensure adequate vertical clearance over the runway threshold. ICAO Annex 14 and CAA AC139.6 publishes the following minimum and desired wheel clearance heights in the table below:

Table 5-2. Wheel clearance over threshold for PAPI and APAPI

Eye-to-wheel height of aeroplane in the approach configuration ^a	Desired wheel clearance (metres) ^{b,c}	Minimum wheel clearance (metres) ^d
(1)	(2)	(3)
up to but not including 3 m	6	3 ^e
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis shall be considered. The most demanding amongst such aeroplanes shall determine the eye-to-wheel height group.

b. Where practicable the desired wheel clearances shown in column (2) shall be provided.

c. The wheel clearances in column (2) may be reduced to no less than those in column (3) where an aeronautical study indicates that such reduced wheel clearances are acceptable.

d. When a reduced wheel clearance is provided at a displaced threshold it shall be ensured that the corresponding desired wheel clearance specified in column (2) will be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.

e. This wheel clearance may be reduced to 1.5 m on runways used mainly by light-weight non-turbo-jet aeroplanes.

The Boeing 747 with a pilot eye to wheel height of 13.5m in the approach configuration would require a PAPI MEHT setting of 22.5m (74ft) to achieve the desired wheel clearance and 19.5m (64ft) to achieve the minimum wheel clearance in the above table. Smaller aircraft with lesser eye to wheel heights on a PAPI set up for large jets will land further into the runway effectively having lesser runway landing distance available for stopping. Alternatively airports only serving small aircraft a PAPI set could be lowered even below the standard MEHT of 50ft to enable aircraft to land closer in to the threshold providing effectively more landing distance.

The largest aircraft currently operating into Whangarei Airport is the Bombardier Q300. With an eye to wheel height of approximately 3.1m a MEHT of 3.1+9.0m = 12.1m (40ft) could be implemented to provide the desired wheel to threshold height. There is no available aircraft certification performance data to quantify shorter landing runs achieved by lowering the MEHT below the standard setting of 50ft. In the case of Whangarei the airline operators would not be able to gain any operational advantage as the operating CAR Parts 121 and 125 define landing distance as commencing from a point 50ft over the runway threshold. The lower the aircraft crosses the landing threshold also increases the risk of wind shear causing the aircraft to touchdown prior to the runway however there is little in the way of accident data to quantify how much of a factor this is.

1.3 Conclusion

The standard set up for PAPI is normally a 3° glide slope with an MEHT of 50ft. A lower MEHT below 50ft can enable the aircraft to use less runway distance on landing. However, no allowance in reduced landing distance available is permitted for airlines as the CAR define landing distance available as commencing from a point 50ft over the runway threshold.

It is therefore concluded that Whangarei PAPI MEHT should be retained at its current setting of 3° and MEHT/TCH of 50ft.

Appendix D

Cost Estimate for Runway Extension to 1350m

Whangarei Airport Strategy

3232530

28/10/2014

Onerahi Airport Upgrading - Extension to provide 1350m TORA

Rough Order Cost Estimate

Prefeasibility (no concept design undertaken) - Accuracy approximately +/- 30%

Item	Unit	Quantity	Rate	Amount	Comment
East End RESA					
East End Fill	m3	650,000	\$ 18	\$ 11,700,000	Comment 1
Seawall 300m long	m3	3,000	\$ 150	\$ 450,000	
Stabilisation	LS	1	\$ 5,000,000	\$ 5,000,000	Comment 2
Runway/Starter Extn Pavement 150 x 30m	m2	5,400	\$ 190	\$ 1,026,000	
Property	No	20	\$ 500,000	\$ 10,000,000	
Stripping	m2	60,000	\$ 4	\$ 240,000	
Site Preparation, Sediment Control	LS			\$ -	
Road 300 x 7.5	m2	2,500	\$ 130	\$ 325,000	
Lighting, Furniture	LS	1	\$ 300,000	\$ 300,000	
Services	LS	1	\$ 300,000	\$ 300,000	
West End Extension (100m) and RESA					
West End Fill	m3	1,000,000	\$ 18	\$ 18,000,000	Comment 3
Seawall 300m long	m3	4,500	\$ 150	\$ 675,000	
Stabilisation (Foundation)	LS	1	\$ 10,000,000	\$ 10,000,000	Comment 4
Slope Stabilisation (MSE)	LS	1	\$ 10,000,000	\$ 10,000,000	Comment 5
Tunnel (10m dia Armco Steel)	LS	1	\$ 2,000,000	\$ 2,000,000	
Runway/Starter Extn Pavement 250 x 30m	m2	8,400	\$ 190	\$ 1,596,000	
Property	No	20	\$ 500,000	\$ 10,000,000	
Stripping	m2	38,000	\$ 4	\$ 152,000	
Site Preparation, Sediment Control	LS			\$ -	
Road 2 x 300 x 7.5	m2	4,500	\$ 130	\$ 585,000	
Lighting, Furniture	LS	1	\$ 600,000	\$ 600,000	
Services	LS	1	\$ 600,000	\$ 600,000	
Subtotal				\$ 83,549,000	
Add 3% Environmental Compliance				\$ 86,055,470	
Add 6% Temporary Works and Traffic Management				\$ 91,218,798	
Add 9% MSQA Fees and costs				\$ 99,428,490	
Add 9% D&PD Fees and costs				\$ 108,377,054	
Add 30% Contingency				\$ 140,890,170	
TOTAL ESTIMATE (Rounded)				\$ 141,000,000	

Comments

1. Assumes 10km haul
2. Site investigation and Concept Design Required to refine this
3. Assumes 10km haul
4. Site Investigation and Concept Design Required to refine this
5. Concept design required to refine this

Appendix E

Acronyms

AC	Advisory Circular
AIP	Aeronautical Information Publication
AKL	Auckland (ICAO Airport Designation)
AMSL	Above Mean Sea Level
ARFF	Airport Rescue Fire Fighting
AWS	Automated Weather System
CAR	Civil Aviation Rule
CBD	Central Business District
DME	Distance Measuring Equipment
GBAS	Ground Based Augmentation System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICAO	International Civil Aviation Authority
ILS	Instrument Landing System
LDA	Landing Distance Available
MCTOW	Maximum Certified Take Off Weight
MOC	Minimum Obstacle Clearance
NDB	Non- Directional Beacon
NoR	Notice of Requirements
NRC	Northland Regional Council
NRCP	Northland Regional Coastal Plan
OAS	Obstacle Assessment Surfaces
OLS	Obstacle Limitation Surfaces
PANS OPS	Procedures for Air Navigation Services, Operations (Aviation)
PAPI	Precision Approach Path Indicator
RNAV	Area Navigation (Random Navigation)
RNP(AR)	Required Navigation Performance (Authorisation Required)
RPS	Regional Policy Statement
RLTS	Regional Land Transport Strategy
TODA	Take Off Distance Available
TORA	Take Off Run Available
WA	Whangarei Airport
WDC	Whangarei District Council
WLG	Wellington (ICAO Airport Designation)
VOR	Very High Frequency Omnidirectional Range