FINAL REPORT

AAIU Synoptic Report No: 2007-002
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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 13 June 2006, appointed Mr. Frank Russell as the Investigator-in-Charge to carry out a Field Investigation into this Serious Incident and prepare a Synoptic Report.

Aircraft Type and Registration:	B737-800, EI-DCT
No. and Type of Engines:	2 x CFM 56-7B
Aircraft Serial Number:	33813
Year of Manufacture:	2004
Date and Time (UTC):	4 June 2006 @ 16.49 hrs
Location:	Cork Airport
Type of Flight:	Public Transport
Persons on Board:	Crew - 6 Passengers - 128
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence (ATPL Germany)
Commander's Details:	Male, aged 46 years
Commander's Flying Experience:	11,780 hours.
Information Source:	AAIU Field Investigation.

SYNOPSIS

The aircraft was on a routine scheduled passenger flight between London Stansted (EGSS) and Cork Airport (EICK). Weather conditions at EICK that afternoon were clear and sunny. The aircraft Commander was the Pilot Flying (PF), with the First Officer as the Pilot-Non-Flying (PNF) or the monitoring pilot. Approaching the South coast, the PNF asked Air Traffic Control (ATC) for permission to carry out a visual approach to Runway (RWY) 17. The aircraft was cleared by ATC for an unrestricted visual approach to RWY 17 at 4 NM from touchdown.

As the final part of this approach was too high the PNF asked ATC, at the PF's request, for permission to carry out a right hand orbit. This was approved by ATC. During this orbit manoeuvre the aircraft flew low over the Bishopstown area of Cork City on its base leg. As the aircraft turned onto finals the Enhanced Ground Proximity Warning System (EGPWS) "Glide Slope" CAUTION sounded twice. In addition, the EGPWS alert activated. The aircraft landed normally at 16.53 hrs. The Operator advised the AAIU of this Serious Incident on 13 June 2006.

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1. FACTUAL INFORMATION

1.1 History of the Flight

1.1.1 Air Traffic Control (ATC) Information

The aircraft was a routine scheduled afternoon flight between Stansted and Cork Airports. Weather conditions in the Cork area were warm and sunny, with light winds. There was only one other aircraft, a Cessna 172, under Cork ATC control when at 16.42:57 hrs the incident aircraft called ATC, *"[Aircraft callsign] we are requesting a visual, we got the field in sight"*. At 16.44:55 hrs, after some radar vectoring and descent, ATC advised, *"[Aircraft callsign] if you wish you can continue to position in for a visual approach runway one seven, left turn in initially not descending below altitude two thousand five hundred feet"*. That call was acknowledged and at 16.45:07 hrs ATC gave, *"Surface wind two three zero degrees zero niner knots"*. At 16.47:25 hrs ATC advised, *"[Aircraft callsign] you are now clear of the VFR traffic (a Cessna 172), cleared visual approach left turn in runway one seven number one for one seven"*. At 16.49:30 hrs ATC (Tower frequency) advised, *"[Aircraft callsign] good day cleared to land runway one seven, wind is two one zero, zero eight"*.

At 16.50:27 hrs the aircraft transmitted, "[*Aircraft callsign] is requesting a three sixty degrees on the right please"*. At 16.50:42 hrs ATC advised, *"Roger cleared for the right hand orbit I do have traffic east of the field"*. At 16.51:47 hrs the aircraft transmitted, *"Tower, [Aircraft callsign] we are beginning to turn on base"*. The final ATC clearance to land on RWY 17 gave the wind as, *"Two two zero, zero eight"*. The aircraft landed at 16.53:51 hrs.

1.1.2 Flight crew Information

The PNF recalled that everything was briefed before the Top of Descent (TOD) for an Instrument Landing System (ILS) RWY 17 at Cork. During the descent the PF asked the PNF to request a visual approach[1] to RWY 17, a change to the earlier briefing. There was a summarized briefing for this visual approach, which did not fulfill the requirements of the Operator's Standard Operating Procedures (SOP's). ATC approved this request and after some radar vectoring and altitude changes, the aircraft was cleared by ATC for an unrestricted visual approach to RWY 17, as number one in traffic. The PNF attempted to engage the PF in the landing checklist but was unsuccessful, so these were conducted as a self challenge.

The final approach intercept angle resulted in intercepting the extended runway centre-line too close in and too high. Secondary Surveillance Radar (SSR) returns show that the aircraft joined the centre line at 1¾ nautical miles (NM) from the threshold RWY 17 at 1700' above sea level (ASL). The localiser was initially captured at 1.4 NM. The PNF pointed out to the PF that they were too high, that there were 4 whites indicated on the Precision Approach Path Indicator (PAPI's). This indication represented a glide slope (G/S) of 3.5° or greater. A normal approach path is two whites, two reds, indicating a 3° G/S. Simultaneous radar returns indicated a 6° G/S. The PNF advised the PF that, *"We are too high its better to make a go-around"*.

[1] Visual Approach is also referred to by the Operator as a, "Non-Precision Approach".

The PF replied that, *"We are in good ground contact, ask for a 360° to the right"*. The PNF complied and, with ATC permission, the aircraft broke to it's right and commenced an orbit, still in the landing configuration, gear down and Flap 30 selected (Flap 40 was later selected on short finals).

1.1.3 Radar/DFDR Information

Radar returns show that the aircraft climbed initially to 1100' ASL (visual maneuvering height) at the commencement of the orbit, ½ NM west of the airfield at 140 kt IAS. A momentary bank angle exceedence of 31.99 deg occurred about this time (30 deg being the bank angle limit). Gradually the speed built up to a maximum of 153 kt IAS, but altitude was lost during this orbit. The lowest altitude recorded was 553' ASL, which is 51' above the airport elevation. The lowest radio altimeter (RADALT) recorded height was 425' above ground level (AGL). Part of the downwind and base leg of this orbit took the aircraft over the residential Bishopstown area of Cork City. This area, northwest of the airport, is considerably lower than the airport elevation of 502' ASL. From Bishopstown the ground gradually rises southward from the valley of the River Lee in the direction of the airport. The flight of the aircraft in this area was witnessed and reported on to the Cork Airport Authority by at least sixteen upset residents, whose independent and consistent complaints, submitted by phone and in writing, referred to noise and how low the aircraft was being flown. The PNF recalled hearing two EGPWS *"Too low" G*lide Slope CAUTION s during the latter part of the orbit and that these annunciations were silenced by the PF. He also recalled that there were 4 reds indicated on the PAPI's on final approach. DFDR data also indicated a 1 to 1.5 degree glide slope and an EGPWS alert. After a normal landing and post-flight discussion on events the PF conceded to the PNF that maybe a standard Go-around would have been a better decision in the circumstances. At a later debrief neither pilot considered fatigue a factor in this event. See **Appendix A** of DFDR generated aerial view of the two approaches and **Appendix B** for extract of DFDR readout.

1.2 Aeronautical Information Publication (AIP) Ireland

The following extract from AIP Ireland (EICK AD 2.22 Flight Procedures) is relevant to the ATC procedures correctly followed by the controller:

1.4 Visual Manoeuvring (Circling) approaches

Visual Manoeuvring (circling) approaches are permissible, on request, to all runways.

Missed approaches for aircraft conducting visual manoeuvring (circling) approaches shall be as shown on chart EICK AD 2.24-6 (Procedures for Missed Approach in the event of Radio Failure).

Note 1: *However, the above procedure prescribed on EICK AD 2.24-6 would be superseded by Cork MATS Part 2, Volume, 3 Section 2.11, Missed Approach Procedure which states:*

The missed approach for all Runways shall be; Climb straight ahead to altitude 3,000 ft QNH and then as directed by ATC.

Note 2: *The Controller would have the right to clear an Aircraft for a right visual orbit back onto finals from a missed approach if he/she could ensure separation between that aircraft and all other aircraft as prescribed by ICAO Doc 4444/ATM501 (Ref: Reduced Minima Separation 6.1 and Visual Approach 6.5.3)*

EICK AD 2.24 (Instrumental Approach Chart-ICAO) specifies on it the Obstacle Clearance Altitudes/Heights for visual manoeuvring with reference to the four different Categories of Aircraft i.e A,B,C or D as follows:

Visual Manoeuvering Altitudes (Heights above aerodrome level AAL) are Cat A = 960ft QNH (458), Cat B = 1000ft QNH (498), Cat C = 1100ft QNH (598), Cat D = 1200ft QNH (698)"

The aircraft involved in this particular event is classified as Cat C.

2. ANALYSIS

The chain of events leading to this serious incident began in the descent and approach phase into Cork Airport. Flying conditions were excellent and, with only one other item of VFR traffic in the Cork circuit, a routine landing should have followed the first visual approach to RWY 17. The PF was well experienced on the B737-800, with almost 8,000 hours on type. The PNF was relatively inexperienced on the B737-800, with 850 hours on type. Both pilots had undertaken the Operator's Mandatory Crew Resource Management (CRM) Course, the purpose of which is to instill maximum flight safety awareness in pilots through teamwork and open communications in the cockpit environment. The Course lays much emphasis on the need for a more questioning attitude to cockpit and other external factors by either crew member. A fundamental understanding and prerequisite of the Course is the willingness of pilots to accept and implement its practical guidelines in their own work interest and that of flight safety. However, while this is the theory propounded by CRM courses, its application in practice does not always follow the theory, as is demonstrably evident in this human factors event.

Initially, the PF briefed for an ILS approach to RWY 17, but later elected to conduct a visual approach to RWY 17, and carried out a summarized briefing for the visual approach with the PNF. The PNF attempted to engage the PF in the landing checklist but was unsuccessful, so these were conducted as a self challenge. On the first approach the PNF saw 4 whites ('*too high'*) on the PAPI's and suggested a "Go-around", but the PF declined, saying that he had good ground contact and requested a right hand orbit to regain the correct approach altitude. A "Go-around" or missed approach would have entailed climbing straight ahead to altitude 3,000 ft QNH and then as directed by ATC.

The orbit that followed the first abandoned approach was flown by the PF, who was flying the aircraft from his customary left hand seat. From this seat the PF's awareness of the position of his aircraft relative to the ground in a steep right hand turn was considerably less than that of the PNF, who had a direct view of the ground from his side. On reaching 1,100 ft with the aircraft still configured for landing, the PF allowed the aircraft to descend, with the PNF repeatedly advising the PF of this height loss, but to no avail. It was during this descent and configuration that the aircraft passed over the Bishopstown area of Cork City and alarmed many of its residents, both because of its unexpectedly low height above the ground and the engine noise levels. The lowest radio altimeter (RADALT) recorded height was 425' above ground level (AGL). On this second approach to RWY 17, the PNF recalled hearing an aural *"Glide Slope"* CAUTION twice. Visual contact with the ground and PAPI's (*4 reds*) showed them to be too low and flat on the approach, so a climb was initiated to a height from which a safe landing was effected.

The Human Factors elements in aviation incidents are statistically high and are the weak link in the incident prevention chain. These are constantly being addressed by operators worldwide to achieve pilot conformity to laid down industry standards and procedures.

However, adherence by pilots to these criteria cannot be total and complete due to the complex and changing nature of their work environment and the human condition itself. The two subject approaches raise questions for standard CRM Courses pursued by the wider aviation industry, in general. In particular, to what degree can the PNF assert himself or herself when the PF is not responding to or disregarding inputs from the right hand seat? The "experience gradient" between the PF and the PNF in this instance was steep, but not unusual in day-to-day operations, and may have been a contributory factor in the PF's attitude to the PNF. Regardless, the PNF did endeavor to comply with CRM principles as trained. His inputs had little effect. However, this is not to excuse the aberrant deviation from the Operator's SOP's, which require that the aircraft be fully stabilized in the landing profile by 500 ft AGL on a visual approach, and adherence to CRM procedures by the PF.

3. CONCLUSIONS

(a) Findings

1. The Captain and First Officer were properly licenced in accordance with Joint Aviation Authorities (JAA) requirements.
2. The aircraft was serviceable in accordance with JAA requirements.
3. ATC communications were normal. The ATC approval of the requested right hand orbit was in compliance with Cork AD 2.22 Flight Procedures.
4. Weather was not a factor in this serious incident.
5. The Operator's SOP's were not adhered to on either of the two approaches to RWY 17. However, the PNF complied with CRM principles to the extent of his ability.
6. The base leg of the second approach to RWY 17 was flown fully configured for landing over the Bishopstown area of Cork City at altitudes at or below 500' AGL while in a constant right hand turn.
7. The various written and oral complaints made to the Cork Airport Authority by individual Bishopstown residents concerning the flightpath of the aircraft were fully justified in the circumstances of this flight.

(b) Cause

This serious incident was precipitated by the PF not adhering to the Operators explicit SOP's in the two approaches to RWY 17 and also by not conforming to established CRM principles in relation to the PNF.

4. SAFETY RECOMMENDATIONS

This Report does not sustain any Safety Recommendations. However, a recently published AAIU Report No. 2006-028, dealt in some detail with requirements for flight crews to adhere to laid down Procedures and made two Safety Recommendations (SR's) to the Operator. The Operator accepted these SR's and is in the process of implementing them through a series of planned Safety Presentations to its Flight Crew.

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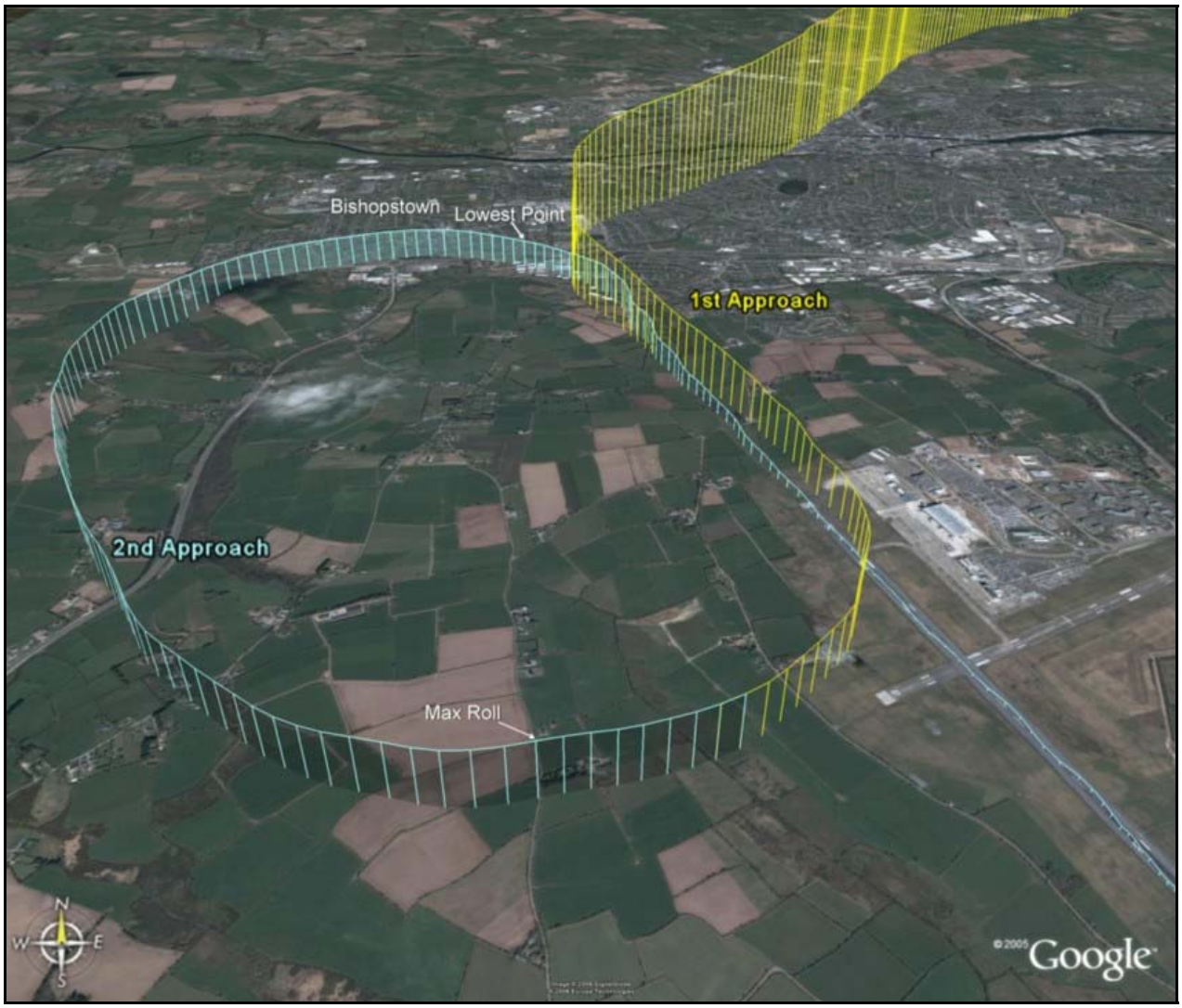
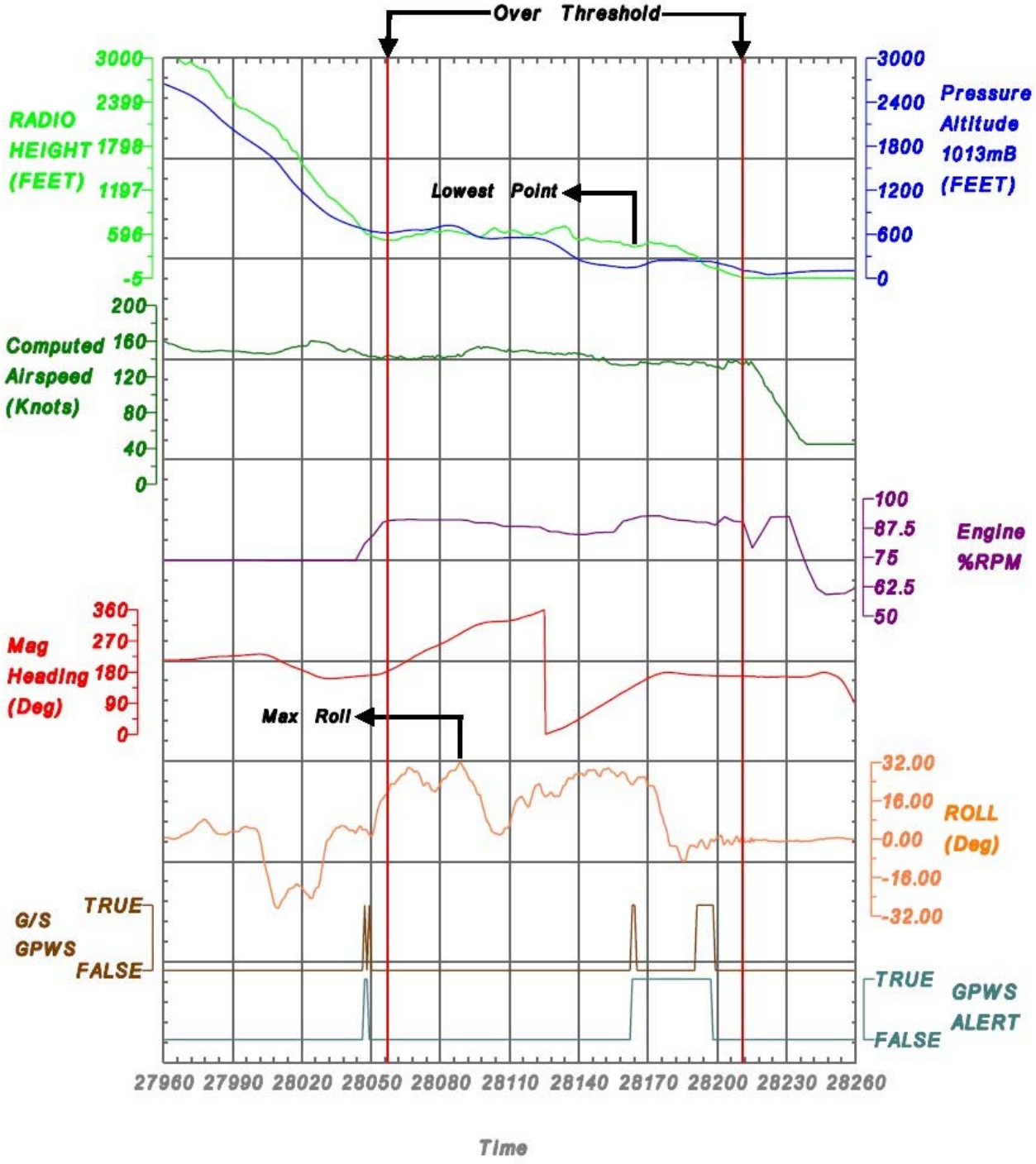
Appendix A

DFDR generated aerial view of the two approaches



Terrain image courtesy of Google Earth™ mapping service.

Appendix B



Extract of DFDR for EI-DCT

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