

FINAL REPORT

AAIU Synoptic Report No: 2006-028

AAIU File No: 2006/0022

Published: 30/11/06

In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 4 April 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-DHX
No. and Type of Engines:	Two, CFM 56-7
Aircraft Serial Number:	33585
Year of Manufacture:	2005
Date and Time (UTC):	23 March 2006 @ 18.20 hrs
Location:	Ireland West Airport, Knock, Co. Mayo
Type of Flight:	Public Transport
Persons on Board:	Crew - 6 Passengers - 138
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	None
Commander's Licence:	ATPL
Commander's Details:	Male, aged 39 years
Commander's Flying Experience:	7,998 hours (of which 295 were on type) Last 90 days – 261 hours Last 28 days – 62.27 hours Last 24 hours – 5.33 hours
Information Source:	AAIU Field Investigation

SYNOPSIS

The aircraft was carrying out a routine scheduled passenger flight between London Gatwick Airport (LGW) and Ireland West Airport (EIKN), Knock, Co. Mayo. The major part of the flight was operationally uneventful until the approach phase to Ireland West was commenced. Here, some confusion arose with the cockpit crew as to the Runway (RWY) in use for landing. They had initially flight planned for RWY 09 but the EIKN Air Traffic Control (ATC) advised that their requested Non Directional Beacon (NDB) approach to RWY 09 was unavailable and cleared them for an Instrument Landing System (ILS) approach to RWY 27, from which they could carry out a Circling Approach to RWY 09. This ATC information led to an ILS approach to RWY 27 with the aircraft incorrectly configured. The approach was abandoned at about 400 feet above ground level (AGL), as the crew became visual with RWY 27, and a go-around was carried out. About this time, also, the Enhanced Ground Proximity Warning System (EGPWS) sounded.

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The aircraft was then flown to the Oscar Kilo (OK) NDB where the crew joined the holding pattern at that beacon. Subsequently, from there, the crew carried out a second ILS approach to RWY 27, followed by a Circling Approach to RWY 09, from which a normal landing was carried out. The AAIU was advised of this Serious Incident on 4 April 2006 by the Operator.

1. FACTUAL INFORMATION

1.1 History of the Flight

The crew of RYR 1293 were operating a rostered four sector day, with the first sector being an early afternoon Dublin – London Gatwick leg. Prior to departure from Dublin the crew would normally have been in possession of all weather and NOTAM¹ information for both of their scheduled destinations, LGW and EIKN, and for all relevant alternates.

On the second sector to EIKN the Aircraft Commander was the Pilot Flying (PF), with the First Officer as the Pilot Not Flying (PNF) or the monitoring pilot. The PF programmed the FMC (Flight Management Computer) for an NDB approach to RWY 09, in consultation with the PNF. The flight from UK into Irish controlled airspace proceeded as planned with RYR 1293 contacting Shannon Area Control Centre (ACC) for enroute communications. At 1750 hrs the PNF also contacted EIKN ATC requesting a weather update and the runway in use. ATC replied with a surface wind of 120°/13 kt, vis 7 kms, cloud BKN 1200; BKN 2000; Temp 3°C, QNH 995 hPa and also added “*you can have RWY 27 if you can accept it with that tail wind or else it will have to be a circle to land RWY 09*”. The PNF replied that it “*doesn’t look good for a straight in (RWY 27) at the moment*” and said that he would revert.

Concurrently, Shannon ACC was providing navigational assistance to ELPEN, a new temporary but significant navigation point that had been established on the extended centreline RWY 27, at 19.6 NM from EIKN Aerodrome Reference Point (ARP) (**APPENDIX A**). At 18.11 hrs, after changing from Shannon to EIKN ATC frequency, the PNF advised that they were descending FL080 (8000ft) and, “*we are direct to ELPEN*”. RYR 1293 was cleared to continue to ELPEN and to establish on the RWY 27 localizer and to call 20 miles from EIKN for further descent. RYR 1293 was then No.1 on approach.

At 18.14:40 hrs the PNF queried the cloud base. ATC replied broken at 900 ft. After some cockpit discussion the PNF advised ATC at 18.15:38 hrs that RYR 1293 would “*not be able to land with the tailwind at the moment for straight in for 27 ILS*”. ATC replied “*can you accept a visual circuit to land 09 off the ILS?*” To which RYR 1293 replied “*affirmative*”. At 18.15:46 hrs RYR 1293 advised just passed 20 miles and requested further descent. Descent to 3000ft was given and RYR 1293 advised established on the localizer. At 18.17.10 hrs RYR 1293 advised passing 5000ft for 3000ft and at 18.17:39 advised approaching 3000 ft. ATC replied with “*report breaking off*” and gave surface wind as 120°/15kt. At 18.19.41 hrs RYR 1293 advised “*breaking left*”, to which ATC replied “*Clear to land RWY 09, surface wind 120°/14 gusting 24 kt*”. RYR 1293 replied “*we’re unable to complete the approach, we’re just gonna climb out here on the 244° (radial).....to the Knock NDB and take up the hold*”.

At 18.20:01 hrs, ATC advised RYR 1293 to “*return to the OSCAR KILO (OK) please at 4000 ft on QNH 995*”. RYR 1293 acknowledged. At 18.22:42 hrs ATC asked RYR 1293 (now holding at OK) “*what did you observe the cloud base to be when you broke?*” RYR 1293 replied “*the cloud base was down around 1100 ft, the vis wasn’t great and we had a good tail wind. It was 25kt on the tail*”.

¹ Notice to Airman as issued by the Operator.

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At 18.24:31 hrs, in response to a query from RYR 1293, ATC advised *“the approach (to 09) is invalid because DME and the VOR are both off the air”*. In addition, ATC advised *“the only way in is off the ILS 27.....you would do an NDB ILS 27 with a visual break off”*. At 18.27:39 hrs ATC responded to a RYR 1293 query on the surface wind as *“120°/14 kts”*. Further met update data was given at 18.28:06 hrs. At 18.32:34 hrs RYR 1293 advised ATC on their circling minima of 1300 ft and some discussion ensued on the cloud base. ATC advised and confirmed airfield elevation of 665ft, above sea level (ASL).

At 18.35:40 hrs ATC cleared RYR 1293 for an NDB ILS approach to RWY 27 and to report localizer established. In addition, ATC reported a slight improvement in the cloud base, BKN at 900ft, occasionally 1000ft. At 18.39:09 hrs RYR 1293 called localiser established for RWY 27, with ATC replying *“wind check 120/15kts with a cloud base now of 1100ft”*. At 18.42:25 hrs RYR 1293 called *“we are breaking left now for a circle to land RWY 09.....we have about 25 kts on the tail”*. At 18.45:03 hrs ATC gave a final wind check of 120°/14 kts and RYR 1293 landed at 18.46:16 hrs.

Ireland West Airport Knock (EIKN) is a single runway, 27/09 orientation, non-radar controlled Airport. The runway is 2300 metres in length. The Airport elevation is 665 ft (ASL) which rises on a plateau above the surrounding countryside.

In flight planning for EIKN pilots can normally use a variety of Instrument Approach Procedures, based on ILS/VOR/DME or NDB approaches or such combinations as may be required by prevailing weather conditions. However, Aerodrome Improvements Works had commenced on the 20 February 2006, primarily to relocate to a nearby site the CON² DVOR/DME, and to install a new ILS RWY 09, among other physical works of apron extension, taxiway widening etc etc. The full details and notification of the works are to be found in Ireland AIP Supplement, 09/06, dated 02 February 2006 (**APPENDIX B**). The CON DVOR/DME was withdrawn from service for a period of approximately two (2) months (in fact, this period extended to 10 July 2006). As a result of the withdrawal the following Instrument Approach Procedures were not then available:

ILS/VOR/DME	RWY 27
VOR/DME	RWY 27
VOR/DME	RWY 09
NDB/DME	RWY 27
NDB/DME	RWY 09

In addition, a new significant Navigation Point – ELPEN – was established within the Shannon CTA on the Final Approach path RWY 27. As well as giving the point coordinates, radial and distance from DUB and BEL are also shown (R298/75.3 NM and R246/82.6 NM, respectively) in the Supplement.

Essential tactical information for all flights is supplied by the Operator, whose pilots, in turn, can electronically access and download this information to hard copy, at its various Bases. One of the documents routinely gathered in the “Flight Envelope” by the PNF concerned “Terminal and En-Route Navigation Facilities”, which stated *“EIKN CON/DVOR/DME frequency 117.4 mhz CH121X unserviceable due re-location. Ref: AIP Supplement 09/06, Flight level from SFC (Surface) to UNL (Unlimited), valid from 0930 27 Feb 2006 to 1800 21 Apr 2006, EST”*.

² CON, a declared enroute and terminal area navigational aid.

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The significant information contained in this AIP Supplement 09/06 was not available to the air crew to download on the day. The programming of the FMC for an NDB/DME RWY 09 approach, showed that both pilots were unaware of the Supplement's existence. This was further evidenced later in the flight when EIKN ATC reminded RYR 1293 that such an (NDB/DME) approach was "invalid", as the facility was off the air.

In accordance with procedures agreed with EIKN, radar monitoring of traffic is undertaken by Shannon ACC to FL080 inbound, with a handover to EIKN ATC (Tower) about that time. However, this radar coverage continues to be recorded beyond that point until such time as the Secondary Surveillance Radar (SSR) loses the MODE C signal, as an aircraft approaches for a landing. In the subject first approach event radar coverage was positive to less than one (1) mile from the airfield, indicating a height of approximately 1100 ft and 265 kt before the radar signal was lost.

An expanded radar sample indicated;

-14.0 miles from threshold	@ 7700 ft	@ 238 kt
-12.3 miles from threshold	@ 7000 ft	@ 243 kt
-11.0 miles from threshold	@ 5700 ft	@ 252 kt
-10.0 miles from threshold	@ 4900 ft	@ 256 kt
-9.0 miles from threshold	@ 4300 ft	@ 260 kt
-7.0 miles from threshold	@ 4000 ft	@ 259 kt
-6.0 miles from threshold	@ 3500 ft	@ 258 kt
-5.0 miles from threshold	@ 3100 ft	@ 258 kt
-4.0 miles from threshold	@ 2700 ft	@ 259 kt
-3.0 miles from threshold	@ 2200 ft	@ 257 kt
-2.0 miles from threshold	@ 1400 ft	@ 259 kt
-1.0 miles from threshold	@ 1300 ft	@ 262 kt
-0.0 miles from threshold	@ 1100 ft	@ 265 kt
- Radar coverage lost		

The above speeds represent the aircraft's Ground Speed (G/S), as calculated by the radar equipment and which also takes into account the strong tailwind referred to by the PNF to ATC. The average Rate of Descent (ROD) was 2200 fpm.

Information derived from the Operational Flight Data Monitoring (OFDM) System (**APPENDIX C**) showed that a high energy first approach was carried out to EIKN which contravened many of the Operators Standard Operating Procedures (SOP's), including the non deployment of flaps, landing gear, speed brakes, too high on glideslope (G/S) and culminating in an Enhanced Ground Proximity Warning System (EGPWS) Mode 4A alert, as the aircraft turned port in a Go-around (G/A) non-procedural manoeuvre. The System had triggered a, "*too low terrain*" alert. Mode 4A is active during the cruise and approach with gear and flaps up. It also provides alerting for protection against an unintentional gear up landing.

1.2 Meteorological Information

The Aviation Services Division of Met Eireann provided the following weather report for EIKN at 18.20 hours (UTC), 23 March 2006, as follows:

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1.2.1 General Meteorological Information

A complex area of low pressure centred to the Southwest of Ireland maintained a strong South-easterly airflow over the region of interest. Occluded frontal troughs were approaching the EIKN area at the time of the incident but synoptic reports and radar imagery (**APPENDIX D**) suggest that the main rain bands had not yet reached EIKN and that any precipitation occurring at the time of the incident would be light. Values for various Weather parameters at the time/location of the incident were:

Wind at surface: 110/15 kt, occasional gust c.25 kt
Gradient Wind: 14030-35 kt
Cloud ceiling: approx 800-1000 ft
MSL pressure: 996 hPa
Air Temp: 3°C
Dew Point Temp: 1°C
Visibility: Approx 4000m (plus/minus this value)
Weather: Generally misty but possibly some light rain or drizzle also
Freezing level: approx 3700 ft

1.2.2 Metar Reports

Metar Reports for around the time of the incident:

METAR EIKN: 231800Z 11013kt 090V150 5000
BR BKN009 BKN020 03/01 Q0995 =

METAR EIKN: 231830Z 11014kt 080V150 4000 BR
KN 008 BKN020 03/01 Q0995 =

1.2.3 Other Meteorological Information

The strong and gusty nature of the airflow covering the region suggests occasional light to moderate turbulence could have existed in the EIKN area.

1.3 Jeppesen Airways Manual

On 23 March 2006 the Jeppesen Airways Manual contained six (6) charts relating to Connaught, Ireland, Knock (EIKN), as Ireland West Airport Knock was previously known. All are dated 8 March 2002. One general chart gives the RWY operations length and position of buildings etc. The other five specify in detail the various approaches that can be flown at EIKN as follows:

- VOR DME ILS RWY 27
- NDB DME RWY 27
- VOR DME RWY 09
- VOR DME RWY 27
- NDB DME RWY 09

The Jeppesen Airway Manual is an integral part of the extensive flight library carried on board all the Operator's aircraft and is a vital source of airports information and flight procedures for pilots. It is used worldwide. Jeppesen collates information for its publication from the various national AIP (Aeronautical Information Publication) sources and, in Ireland, this publication is known to the aviation industry as "AIP Ireland". AIP Supplement, 09/06, dated 02 Feb 2006, was emailed to Jeppesen in February 2006 and a hard copy was sent by mail.

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This supplement and other relevant information was routinely sent to Jeppesen, the Operator and other clients by the Aeronautical Information Service (AIS) of the Irish Aviation Authority (IAA).

In response to a query from the Investigation, Jeppesen advised that the information in the 09/06 Supplement was added on 12 May 2006. Per Jeppesen procedures, AIP supplements are received on a case-by-case basis. In those cases where the contents of an AIP supplement effects data published by Jeppesen the appropriate Chart NOTAMs are issued. However, in this particular case, the Chart NOTAMs were not issued until the matter was brought to Jeppesen's attention by the AAIU Investigation.

1.4 Flight Crew Experience

Both pilots were experienced with the Operator. The PF had accumulated over 7900 hours, the majority of which was on the B737-200 series aircraft. He converted to the Boeing 737-800 series aircraft in late 2005 and had flown 296 hours up to the event date. The PNF had accumulated over 3800 hours, the majority of which was on the B737-200 series aircraft. He, too, converted to the B737-800 aircraft in late 2005 and had flown 398 hours up to the event date.

1.5 OFDM

The UK Civil Aviation Authority (CAA) facilitates the "UK Flight Data Monitoring Operations Meeting" every six months. This forum was set up in 1999 and has been meeting regularly since then in anticipation of, and preparatory to, the introduction of the Joint Aviation Authority (JAA) JARS –OPS 1.037 Accident Prevention and Flight Safety Programme, which came into operation for European Airlines on 01 January 2005. These confidential meetings are attended by up to 30 UK based Airlines, including the Operator. They are a forum for an open exchange of Flight Data Monitoring (FDM) derived issues, from which to learn from each others experiences through shared risk identification. In brief, FDM is an important tool in maintaining standards of SOP adherence by aircrew and, indeed, these proactive meetings are seen as a very positive contribution in the ongoing pursuit of aviation safety.

JAR- OPS 1.037, Accident Prevention and Flight Safety Programme states that "*an operator shall establish and maintain an accident prevention and flight safety programmefrom 1 January 2005, a flight data monitoring programme for those aeroplanes in excess of 27,000 Kg. MCTOM*".

The Digital Flight Data Recorder (DFDR) derived data from this event was recorded on the Operators OFDM System. OFDM is defined as the systemic, pro-active and non-punitive use of flight data from routine operations to improve flight safety. This fully functioning programme forms an integral part of the Operators Safety Management System and is compliant with the Recommendations of JAR OPS 1.037. In practice, data that is produced during a flight is transmitted from the aircraft after each flight. This data is replayed on a ground-based computer using specialist software. Selected parameters and their associated trigger levels are aligned with the Operator's SOP's. (Full DFDR and Cockpit Voice Recorder (CVR) data had been copied over by the time the AAIU was notified of the subject event). The OFDM data is not a complete set of the data available, in that many DFDR parameters are not available in the OFDM data. Thus, the full analysis of events is restricted by the non-availability of the full DFDR data.

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2. ANALYSIS

2.1 The chain of events which led to the abandoning of the first approach to EIKN at an unsafe altitude and with the aircraft incorrectly configured began during the flight planning stage by the pilots at LGW. The Top Of Descent (TOD) point in the FMC was based on a descent profile for the NDB/DME approach for RWY 09. However, when the ILS to RWY 27 became an option the crew were required to expedite the descent, as the TOD point for RWY 27 was some thirty miles due EAST of the planned descent point for RWY 09. To recover this lost airspace, the crew conducted a high speed, high energy descent in an effort to regain the vertical profile for RWY 27. However, they were unable to do so and remained high and fast on the glide slope until the point to where the go-around was executed.

RYR 1293 had been cleared direct to ELPEN by Shannon ACC but, as this temporary waypoint was not in the FMC database it had to be created by the PNF in the Supplementary database by manually loading its coordinates/radials, or entering bearing and distance from a geographical fix. This routine action should have taken approximately 30 seconds. It was at about this point that confusion began, leading to an increasing lack of situational awareness by both pilots during the descent from cruising level. Landing on RWY 27 was not ultimately an option due to the increased tailwind component and, in discussing the circle to land option and concerns about the cloud base, no definitive briefing was carried out on the type of procedure to be flown. Also, no descent or approach briefing was carried out, contrary to the Operator's SOPs.

Both pilots had undergone Crew Resource Management Courses (CRM) with the Operator. CRM means, in practice, the retrieval and use of all resources available (hardware, software, liveware) that combine to maximise flight safety. Technical competence is assumed in CRM training, which focuses instead on the links that bind human or personal performance to technical competence. CRM is team driven and, above all, open communications in the cockpit between the PF and the PNF. The CRM Module in the Operator's training programme includes specific reference to task management and delegation. The Course lays much emphasis on the need for a more questioning attitude to cockpit and other external factors by either crew member. In this event, by continuing to concentrate on loading the required data in the FMC and ignoring the fundamental requirement for the PF to fly the aircraft and the PNF to perform those duties, normal CRM was compromised to a serious degree.

2.2 Commercial pilots worldwide are highly regulated and checked, in that they must undergo at least one annual medical examination (two, if over forty years of age) to maintain their State issued Flight Licence and are subject to Aircraft Simulator and Line Checks at least twice a year and other Flight Checks and related Courses (including CRM), as required by the Operator (the PF had flown his periodic Line Check to EIKN the day before the incident flight). In this way, standardising procedures leads to a safe cockpit environment whose fundamental objective is safe travel for passengers and the prevention of accidents. The Operator completes the safety aspect of this *complex human/machine* interface by providing aircraft, maintenance and management to achieve their stated safety and financial goals. Management, in turn, through the Flight Operations Department, provide the necessary backup information necessary for pilots to carry out their duties. In this serious event there were two important pieces of information not available to the pilots of RYR 1293. In flight planning for a NDB/DME approach to RWY 09 they were clearly unaware of the contents of the AIP Supplement 09/06.

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The Operator had erred in not providing the Supplement on the day (it was subsequently issued) and thus the first and critical opportunity was lost to the pilots to input the most up-to-date information in the FMC. In addition, had the pilots resorted to their Jeppesen Airways Manual in flight, it would have misinformed them in relation to the published information charts for EIKN. While Jeppesen had been routinely copied with Supplement 09/06 in February 2006 by the IAA, they did not issue a Chart NOTAM as to its effect and, as a result, all five approach procedures to EIKN were shown as valid. Subsequent to both of these information deficits, the crew of RYR 1293 “*got behind with the airplane*” at the flight planning stage on the ground at LGW and only fully recovered the situation in the lengthy hold at OK.

- 2.3 Both pilots were relatively inexperienced on the EFIS/FMS B737-800 which differs significantly from the older B737-200. Each pilot was interviewed by the Investigation. They were well rested before coming on duty, neither of them considered fatigue or any other matter as a factor in the turn of events. They both listed a number of factors that might have contributed to this non-configured approach, including low hours on type and its Electronic Flight Information System (EFIS) instrumentation. They felt that without the correct and current airport information, that they were “*sucked in*” and mentally attuned to carrying out an NDB/DME approach to 09. The marginal cloud base at EIKN delayed the final decision as to which approach to execute, if at all. The lack of DME information decreased their situational awareness considerably, the work overload meant that normal routine checks were not carried out and there was no questioning of the developing situation by either pilot. When they finally broke clear of cloud at about 400 ft over EIKN, the spatial reality finally dawned on both pilots as the PF disengaged the Autopilot and executed a non procedural Go Around, as he recalled“*I went to manual on the way to the OK....I returned to basics handling*”, as he climbed to 4000ft to enter the OK holding pattern. While in the hold a further two arriving aircraft were stacked above RYR 1293. After some 25 minutes in the hold RYR 1293 carried out an ILS RWY 27, with a Circling Approach to land on 09, at 18.46 hrs.

3. CONCLUSIONS

(a) Findings

1. The Captain and First Officer were properly licensed in accordance with Joint Aviation Authorities (JAA) requirements.
2. The aircraft was serviceable in accordance with JAA requirements.
3. ATC communications were normal.
4. Uncertainty on the changing weather conditions impaired the pilots decision making process, as did their lack of familiarity with the waypoint ELPEN.
5. The late commencement of descent 5 miles West of ELPEN (as plotted on Shannon radar) led to a high energy non-configured ILS approach to RWY 27 at EIKN, the intention of which was to carry out a circle to land approach to RWY 09.
6. This descent went below the Operator’s minimum circling approach height of 1,300 ft. This was in contravention of the Operator’s Standard Operating Procedures (SOP’s).

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7. The SSR Mode C signal was lost at around 1,100 feet ASL. The ILS Decision Altitude (DA) at EIKN is 865ft ASL or 200ft AGL. The EGPWS Mode 4A warning horn sounded, indicating “too low terrain”, as the aircraft turned left for a missed approach. The OFDM data shows that the aircraft descended to 410ft AGL, radar data indicates a groundspeed of 265 knots.
8. What ensued in the cockpit in the latter part of the cruise and descent phase to EIKN, did not conform, in any way with the Operator’s SOP’s or CRM requirements.
9. The Captain and First Officer were so engrossed in trying to reprogramme the FMC that they both lost their critical situational awareness for a time. Contributing to this was their relatively low time and knowledge of the electronically sophisticated B737-800 aircraft as opposed to the older generation electromechanical B737-200 aircraft, on which both pilots were most experienced. This cognitive deficit led to their difficulties in managing and interacting with the B737-800 automations.
10. The Captain filed a Safety Alert Initial Report (SAIR) with the Operator on 23 March 2006. This Report was less than complete and the Operator’s own investigation led to the delay in reporting the occurrence to the AAIU until 4 April 2006. This delay is unacceptable and contrary to the requirement of Section 11 Air Navigation (Notification and Investigation of Accidents and Incidents) Regulations, 1997, S.I. No. 205 of 1997.
11. AIP Supplement 09/06, dated 02 February 2006, was not available to the pilots at the critical flight planning stage. It is the responsibility of the Operator to provide such information. This was a systemic failure.
12. The Jeppesen Company had been routinely copied by the IAA in February 2006, both electronically and by hard copy, of AIP Supplement 09/06. However, no relevant Chart NOTAM was issued to their Jeppesen Airways Manual until 12 May 2006. This was a systemic failure.
13. The Missed Approach procedure at EIKN, as published in the Jeppesen Airways Manual, is climb on track 266° to 3000ft and contact ATC. The PF carried out a non-procedural Missed Approach, contrary to the Operator’s SOP’s.
14. While the non-availability of the AIP Supplement was a triggering factor in this unorthodox approach, the Pilot’s overall airline experience was such that they should have utilized other options that were available to them on the descent and approach to EIKN.
15. This Serious Incident is defined in ICAO Annex 13 as controlled flight into terrain (CFIT) only marginally avoided.

(b) Cause

1. This serious incident was precipitated by both pilot’s becoming involved in manually programming the FMC with the ELPEN navigation point during descent, thus diverting their attention from safety-critical tasks contrary to the Operator’s SOP’s and leading to a non-briefed and non-configured high speed approach to RWY 27, followed by a non-procedural overshoot.
2. Contributing to this serious incident was the systemic failure of both the Operator and Jeppesen to provide current information on AIS published procedures/restrictions on Ireland West Airport Knock to the pilots.

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4. SAFETY RECOMMENDATIONS

It is recommended that:

1. The Operator, on becoming aware of an OFDM derived Serious Incident, as listed in ICAO ANNEX 13, should put in place procedures to ensure that the full DFDR data is immediately preserved for any ensuing State Investigation. In addition, the Operator should report any such Serious Incident without undue delay to the State of Occurrence. **(SR 19 of 2006)**

Response/Action

The Operator accepts this Safety Recommendation and replied: *Operations Manual Part A, 8.9.5 (Issue 3 Revision 2 Oct 1 2006) contains a substantial list of incidents/events, which require the CVR data to be preserved by the operating crew. It instructs the crews how to preserve the CVR data and make a tech log entry. A tech log entry requiring the CVR to be removed will automatically lead to the FDR being removed. A series of planned Safety presentations scheduled for Autumn 06 will reinforce this requirement.*

2. The Operator should reinforce its Procedures to aircrew that requires them to carry out a comprehensive briefing for all Approaches, including Visual approaches. **(SR 20 of 2006)**

Response/Action

The Operator accepts this Safety Recommendation and replied: *Operations Manual Part A contains extensive instructions to crews as to the conduct of any approach. This manual also contains extensive instruction on the when, how, where, and content/structure of briefings. A series of planned Safety presentations scheduled for November 2006 will reinforce this requirement.*

3. The Operator should reinforce its Procedures to aircrew that requires them to re-brief where the type of approach is changed, e.g. from ILS to Visual approach, or other. **(SR 21 of 2006)**

Response/Action

The Operator accepts this Safety Recommendation and replied: *Operations Manual, Part A, Flight Crew Operations Manual (FCOM 1) and all Training instruction is specific on the requirement to brief again for a changed approach. A series of planned Safety presentations scheduled for November 2006 will reinforce this requirement.*

4. The Operator should review the procedures and responsibilities in Part C-Route Manual of its Operations Manual, Part A, to ensure that all current charts, plates and other pertinent information are available to aircrew. **(SR 22 of 2006)**

Response/Action

The Operator accepts this Safety Recommendation and replied: *There is a very extensive description of the Jeppesen System in the Company, Jeppesen being the approved provider of the Route Manual. The application of this procedure is the subject of a regular Quality Audit and corrective actions as they arise are addressed. The recommendation from this report will be included in the next Audit schedule.*

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5. The Jeppesen Company should review its procedures in relation to the processing of AIP Supplements where the content of an AIP Supplement affects data previously published by Jeppesen, so that timely and appropriate Chart NOTAMS are issued. **(SR 23 of 2006)**

Response/Action

Jeppesen accepts this Safety Recommendation and replied: *“Written change was made to procedures documentation to ensure that announced temporary changes with unknown or approximate effective dates are reviewed for appropriate NOTAM or charting action.*

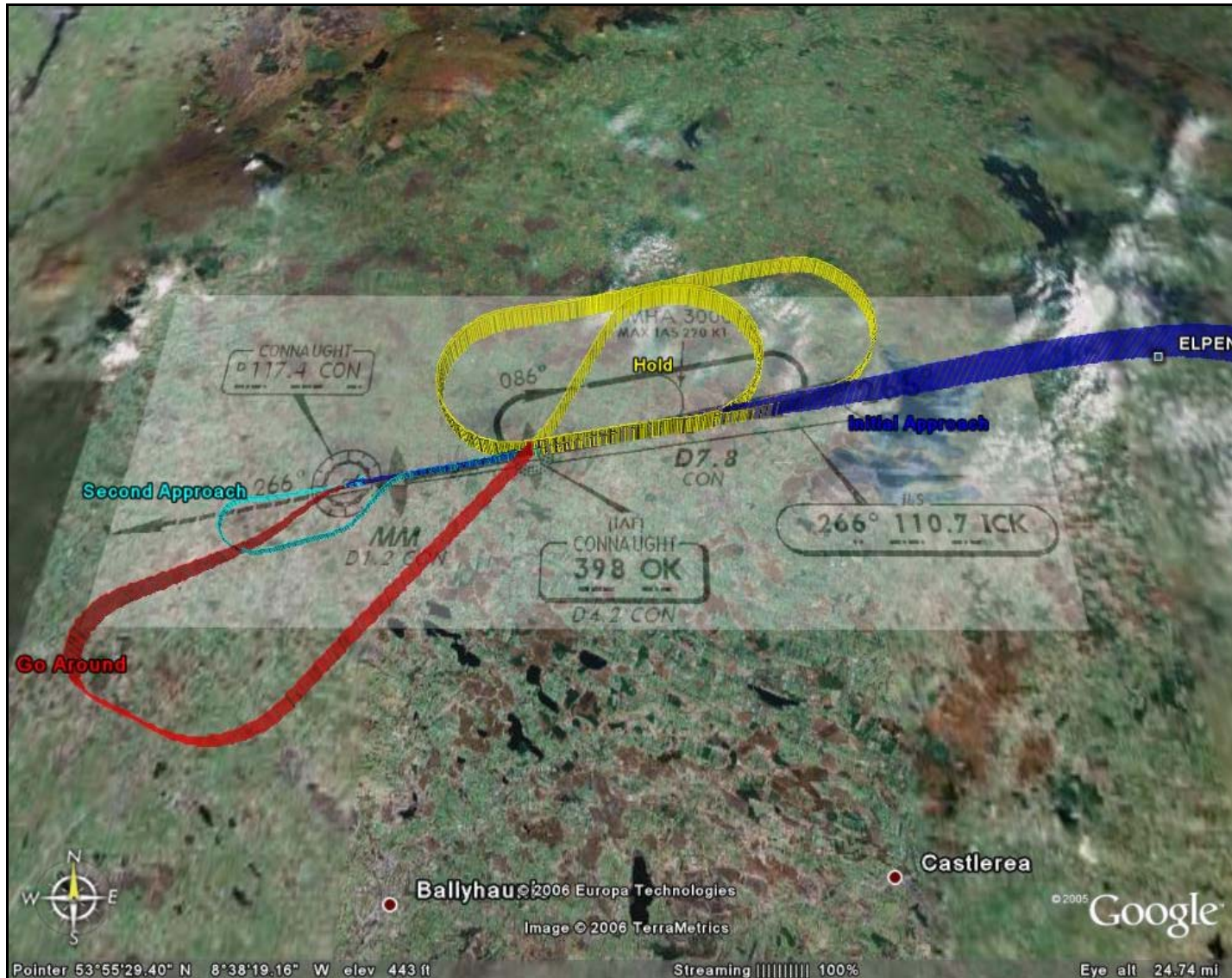
6. The IAA should initiate and facilitate dedicated Flight Data Monitoring Operations meetings for Irish based Operators, on similar lines and objectives to the UK’s equivalent forum. **(SR 24 of 2006)**

Response/Action

The IAA accepts this Safety Recommendation and replied: *The Authority will examine this Recommendation with a view to implementing it under ACJ OPS 1.037(a) (4) regarding the sharing of information.*

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APPENDIX A



Terrain image courtesy of Google Earth™ mapping service

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APPENDIX B

IRELAND
AERONAUTICAL INFORMATION SERVICE
IRISH AVIATION AUTHORITY
CONTROL TOWER
SHANNON AIRPORT

Tel +353 61 703750 Fax +353 61 471965 AFTN EINNYYX

**AIP
SUPPLEMENT**

09/06
02 FEB

CONNAUGHT AIRPORT (EIKN) – AERODROME IMPROVEMENT WORKS
and
RELOCATION OF CON DVOR/DME

Note: This Supplement replaces AIP Supplement 06/06

Introduction

Aerodrome improvements are planned to take place at Connaught Aerodrome to include the following –

- (a) Relocation to new site of CON DVOR/DME (CON).
Note – CON DVOR/DME is declared enroute and terminal area navigational aid.
- (b) New ILS Rwy 09
- (c) Apron Extension, Taxiway Widening, Runway End Safety Areas, Turn-pads, Security Fencing & Associated Inspection Road, Apron Connection Road and Car Parking,

Work will commence in February 2006 and is expected to continue for a period of approximately 6 months

1. The following is a brief description of the works:

Item 1 – Grading of levels to provide 240 metre long Runway End Safety Areas as described in Annex 14 and grading of ground to form Glidepath Beam Forming Area as per attached drawing. These works will be carried out outside the operational hours of Ireland West Airport, Knock.

Item 2 - Construction of new Turn pads to both ends of the runway as per annex 14, including associated guidance markings and adjustments to AGL. These works will be carried out outside the operational hours of Ireland West Airport, Knock.

During the works described above (items 1, 2), personnel and equipment will be working on the airfield when the airport is not in operation. Runway 09/27 will therefore be closed at nighttimes for the duration of these works. The work areas will be inspected prior to the commencement of operations to ensure the areas are adequately reinstated for operations to commence.

Item 3 – Erection of new 2.4 metre high security/ safety fencing and inspection road at approximately 160 metres from the runway centre line. This work will be carried out during the operational hours of Ireland West Airport, Knock.

Item 4 – The installation of concrete bases for the new Glidepath, Localiser, IRVR, NDBs, DVOR and DME, associated shelters and approach lighting. These works will be carried out during the operational hours of Ireland West Airport, Knock.

Item 5 – Widening of existing Taxiway “A” with non-structural shoulders to protect engine overhangs. These works will be carried out during the operational hours of Ireland West Airport, Knock.

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Item 6 – Extension to existing Apron to provide 2 additional parking stands. These works will be carried out during the operational hours of Ireland West Airport, Knock.

Item 7 – Installation of new and adjustments to existing approach lighting, threshold lighting, and taxiway guidance lighting leading to apron. These works will be carried out during the operational hours of Ireland West Airport, Knock. This may necessitate the withdrawal of approach lighting at intervals. Exact times will be promulgated by NOTAM.

Item 8– Installation of new Localizer, Glidepath, DME, DVOR, NDB and associated shelters for Runway 09. These works will be carried out during the operational hours of Ireland West Airport, Knock.

Item 9 – Recommissioning and Flight Checking of new Navigational Equipment, resurveying of obstacles and publication of new aeronautical charts and maps.

During the works described above (items 3, 4, 5, 6, 7, 8, 9), personnel and equipment will be working in the airfield during daytime operations and they will vacate from the runway strip 15 minutes prior to a scheduled arrival or as advised/ instructed by ATC. Operatives and equipment will also remain outside the strip for a period of 15 minutes following departure of air traffic or as advised/ instructed by ATC.

Item 10 -Provision of additional land side new car parking.

Item 11

Cranes / excavators will operate at the location of the apron extension details as follows.

Operating area - approximately 480 metres west of the threshold of runway 09, offset 220 metres to the north of the centreline of the runway. Maximum operating height 19.6 ft AGL, altitude 692ft AMSL.

Marked and lighted flashing amber.

Crane hours of operation will be promulgated by NOTAM.

Item 12-Relocation of CON DVOR/DME

1. Cranes will operate at two locations at intervals during the relocation, details as follows.

2. Operating area 1 (existing location of CON DVOR/DME) radius 25 metres 535447N 0084904W, approximately 1044 metres west of the threshold of runway 10, offset 300 metres to the north of the extended centreline of the runway. Maximum operating height 30 ft AGL, altitude 679 ft AMSL. Marked and lighted flashing amber.

3. Operating Area 2 (proposed new location of DVOR/DME) radius 25 metres 535429N 0084912W approximately 1300 metres west of the threshold of runway 27, offset 227 metres to the south of the extended centreline of the runway. Maximum operating height 30 ft AGL, altitude 607 ft AMSL. Marked and lighted flashing amber.

Crane hours of operation will be promulgated by NOTAM.

4. It is expected that the CON DVOR/DME will be withdrawn from service on the 20th February 2006 for a period of approximately two months.

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5. For the duration of the withdrawal period the following Instrument Approach Procedures will not be available:

ILS/VOR/DME RWY 27	EIKN AD 2.24-4
VOR/DME RWY 27	EIKN AD 2.24-6
VOR/DME RWY 09	EIKN AD 2.24-7
NDB/DME RWY 27	EIKN AD 2.24.8
NDB/DME RWY 09	EIKN AD 2.24-9

6. A new Significant Point – ELPEN -has been established within the Shannon CTA on the Final Approach Path Runway 27. The position ELPEN should be entered as a hand amendment on EIKN AD 2.24-5 (ILS/NDB RWY 27).

The co-ordinates of ELPEN are as follows:

53° 58' 21''N 008° 15' 52''W

DUB R298/ 75.3NM

BEL R246/82.6NM

7. During the withdrawal period, Shannon ACC will provide navigation assistance to ELPEN. After ELPEN aircraft should navigate to the OK NDB – 398 kHz for the ILS/NDB RWY 27 (EIKN AD 2.24-5) approach.

8. When Runway 09 is in use, the ILS/NDB RWY 27 (EIKN AD 2.24-5) should be utilised with visual manoeuvring to Runway 09.

9. In the event of communications failure inbound traffic should navigate to the OK NDB – 398 kHz at the last assigned level for an ILS/NDB RWY 27 (EIKN AD 2.24-5) approach.

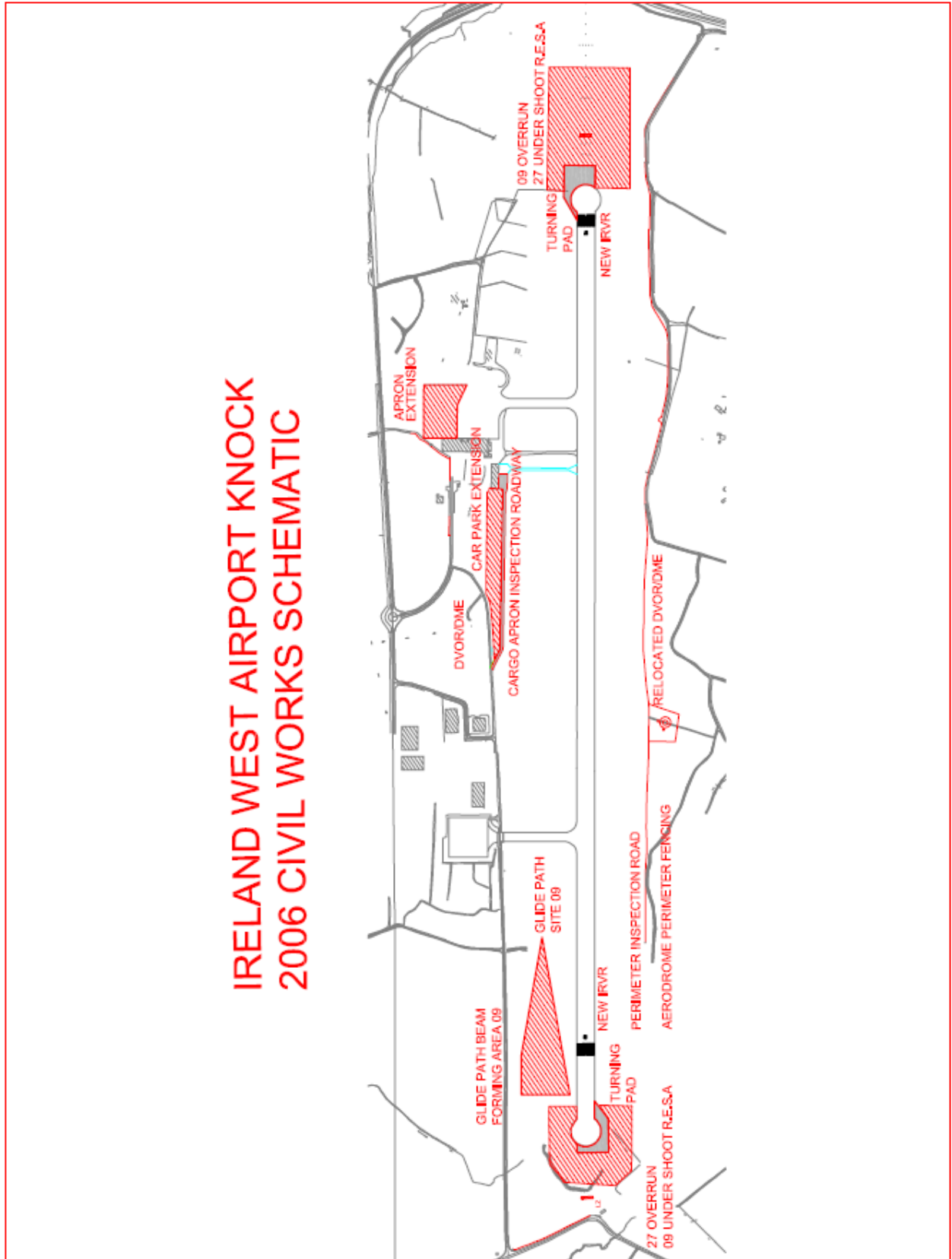
10. Permanent Flight procedures utilizing the new DVOR/DME will be published in accordance with AIRAC requirements after commissioning of the DVOR/DME.

11. Queries relating to the operational aspects of this project should be addressed to the SATCO, Air Traffic Control, Ireland West Airport- Knock, Charlestown, Co. Mayo. Tel: + 353 94 936 7055

2. Working areas will be marked and illuminated by day and night as per ICAO Annex 14.
3. The attached drawing shows the location of the site compound, works areas and security fencing and approximate position of the new DVOR / DME.
4. NOTAM will be promulgated providing exact dates and times of commencement of works and withdrawal of facilities. Introduction of operational facilities will be accomplished by AIRAC AIP amendment.

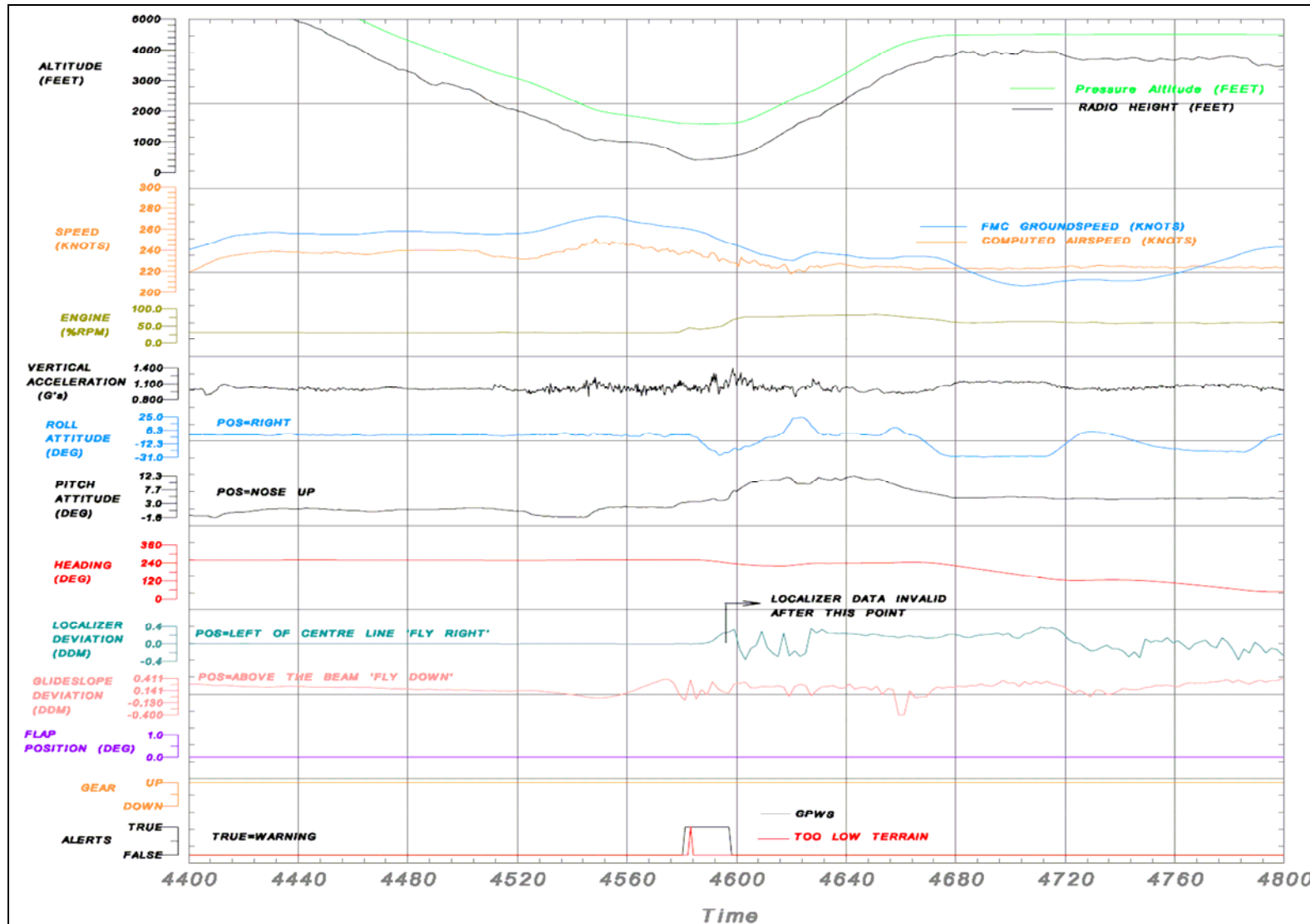
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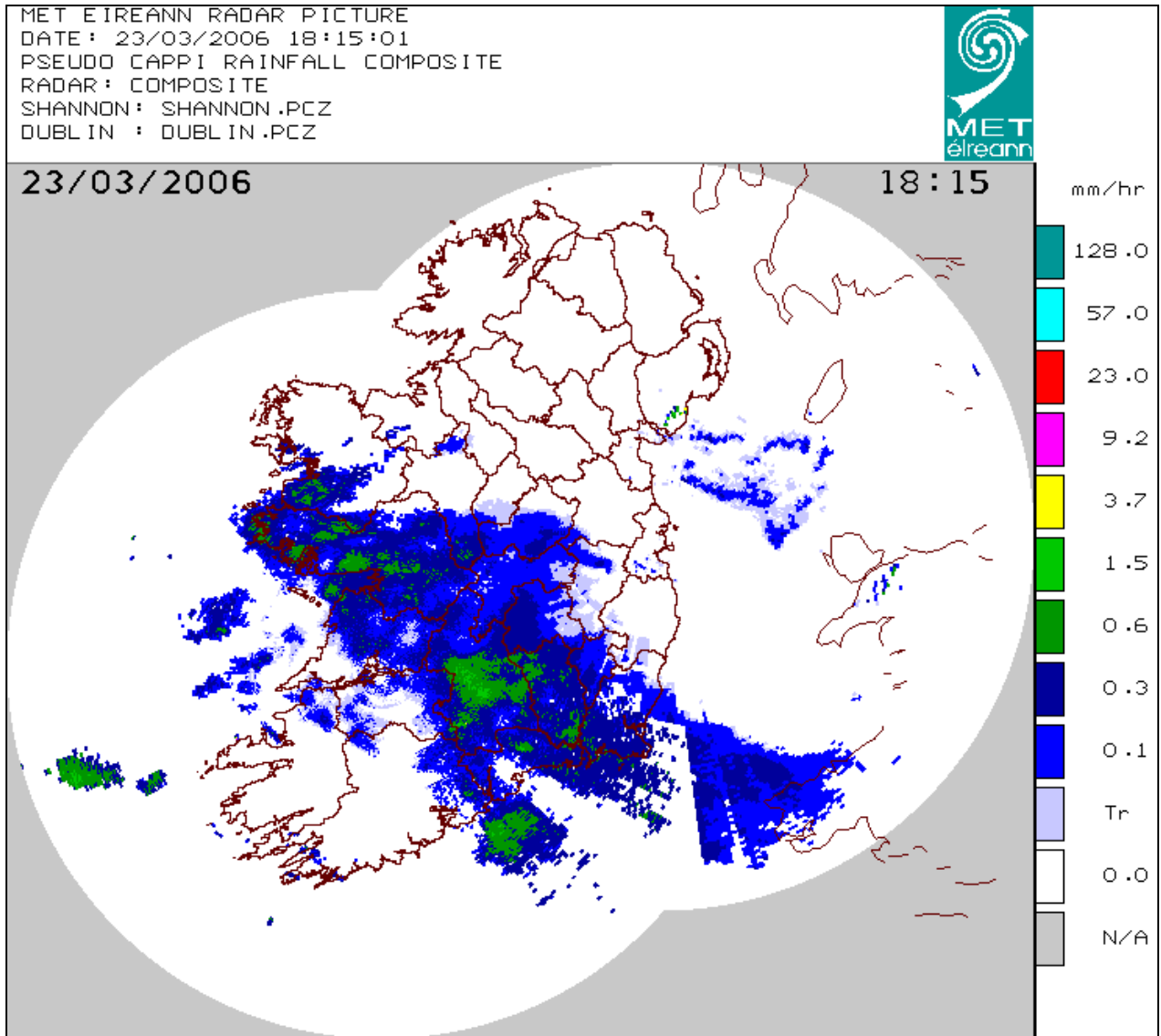
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APPENDIX C



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APPENDIX D



- END -