

APPENDIX A

RESPONSES RECEIVED ON DRAFT REPORT: 'TOUCHDOWN BEFORE THRESHOLD'

Reading guide: The fourth and fifth columns provide the literal text of the responses of the parties. The last column contains an explanation from the Dutch Safety Board of the way the responses were processed.

| No. | Organisation | Section | Text to be corrected (first ... last word) | Argumentation for response | Dutch Safety Board's response | Adopted? |
|-----|--------------|-----------------|---|--|---|----------|
| 1 | Airbus | Cover page | Risks associated with large aircraft landing on short runways | This subtitle may let the reader think that this report covers a safety study with multiple events, whereas it is a single incident. It is suggested to reword the subtitle. | The subtitle has been changed to singular. | yes |
| 2 | LVNL | Cover page | Risks associated with large aircraft landing on short runways | The report examines only one incident, and is not a treatise on all the risks associated with large aircraft on short runways. In addition, the subtitle suggests that this combination poses an implicit danger, and is the sole cause of the incident. Both implications are incorrect. Suggestion: remove subtitle. | The subtitle has been changed to singular. | yes |
| 3 | Airbus | Summary | encountered a complex landing scenario | The term 'complex' could be subject to interpretation. It is suggested to reword this sentence. | The term complex has been changed to complicated as there were several elements making it more difficult to land that day. | yes |
| 4 | Airbus | Summary | technical, environmental and operational factors | what were the technical factors encountered? There was no technical fault or failure on the aircraft. | No technical faults were encountered, however technical factors such as functioning of the Ground Speed Mini System had to be dealt with. | no |
| 5 | Airbus | Summary | lack of awareness of its limitations for wide body aircraft | This sentence is vague and could be subject to interpretation. It is suggested to reword this sentence. | The sentence has been reworded. | yes |
| 6 | LVNL | Summary | lack of awareness of its limitations for wide body aircraft... | The actual limitations (and being aware of them) were not important for the incident. It were imagined, not actual, limitations that led the crew to land early. Suggestion: replace with "the crew perceived the runway length as short, which brought unforeseen challenges." The next sentence: "The flight crew perceived it as short" then becomes redundant. | The sentence has been reworded. | yes |
| 7 | Airbus | Summary | apprehensions regarding the Ground Speed mini function | The term 'apprehension' is very strong and does not seem to reflect the other sections of the document where the issue seems more related to potential lack of knowledge and/or training regarding the behavior of the GS Mini function. It is suggested to reword this sentence. | The sentence has been rephrased in line with the text in Section 3.2.1. | yes |
| 8 | Airbus | Summary | ambiguities in the Standard Operating Procedures (SOPs) | As a general comment, applicable to several sections of the document, it should be clarified always that the SOP which are mentioned are the Operator's SOP, which it seems differ from the Airbus SOP. It would be interesting to highlight these differences in the analysis part to see if and how they could have contributed to the event. | The text has been adjusted to specify operator SOPs or OEM SOPs where applicable. The analysis of the differences between the two falls outside of the scope of this investigation. | yes |
| 9 | ILT | Recommendations | Furthermore, the lighting on Runway 22 is not in accordance with EASA certification specifications for a precision approach runway. | Runway 22 is geclassificeerd als een non-precision approach runway en voldoet aan de EASA certification specifications voor een non-precision approach runway. Opmerking: De PA CAT I operatie heeft als gevolg van het ontbreken van een precision approach Category I lighting system een gepubliceerde minimum DH van 250ft. | While the Runway 22 approach and runway lighting complies with EASA certification specifications, the operational use of this runway - particularly as it is sometimes used as a primary landing runway - warrants the upgrade to match the other runways at Schiphol following a precision approach. | yes |

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| 10 | AAS | Recommendations | Furthermore, the lighting on Runway 22 is not in accordance with EASA certification specifications for a precision approach runway. | Dit klopt maar is niet relevant omdat Baan 22 niet als precision approach runway is aangemerkt. De zin voegt dus niets toe en kan m.i. verwijderd worden. Translation Dutch Safety Board: This is correct but not relevant since Runway 22 is not designated as a precision approach runway. Therefore, the sentence adds nothing and can, in my opinion, be removed. | While the Runway 22 approach and runway lighting complies with EASA certification specifications, the operational use of this runway - particularly as it is sometimes used as a primary landing runway - warrants the upgrade to match the other runways at Schiphol following a precision approach. | yes |
| 11 | AAS | Recommendations | To Air Traffic Control the Netherlands: Discontinue the use of Runway 22 for landing operations involving Eye-to-Wheel Height Category 4 aircraft until the minimum threshold clearance for such aircraft can be achieved. | Het beperken van gebruik van luchthaven infrastructuur is een verantwoordelijkheid van de luchthavenexploitant, niet van de ANSP. Translation Dutch Safety Board: The limitation of the use of airport infrastructure is the responsibility of the airport operator, not the Air Navigation Service Provider (ANSP). | Changed the addressee of the recommendation to Amsterdam Airport Schiphol. | yes |
| 12 | ILT | Recommendations | To Amsterdam Airport Schiphol ... | Hieronder zijn twee aanbevelingen genoemd voor de langere termijn. Onduidelijk is of ook overwogen is om een note op te nemen in de approach chart(s) van RWY 22 dat het volledig volgen van het PAPI glide path voor wide body A/C resulteert in een verminderde / kleinere EWH . Translation Dutch Safety Board: Below are two recommendations for the long term. It is unclear whether there has also been consideration of including a note in the approach chart(s) for RWY 22 stating that full adherence to the PAPI glide path for wide-body A/C results in a reduced / smaller EWH. | The DSB considered this suggestion. However, the presence of a PAPI easily leads in it being used following a precision approach. Furthermore, it is not reasonable to think that EWH cat. 4 aircraft fly above the glide path guidance in order to meet the minimum threshold clearance, due to Runway 22's short landing distance available. | no |
| 13 | AAS | Recommendations | Upgrade Runway 22 approach and runway lighting to match those of Schiphol's other runways and EASA certification specifications. | Baan 22 is in de bijlage van het EASA Veiligheidscertificaat aangemerkt als een non-precision approach runway. Daarmee wijken de eisen t.a.v. de lichtconfiguratie van deze baan af van overige (precision approach) landingsbanen van Schiphol. Translation Dutch Safety Board: Runway 22 is designated as a non-precision approach runway in the annex of the EASA Safety Certificate. As such, the requirements regarding the lighting configuration of this runway differ from those of other (precision approach) runways at Schiphol. | The recommendation has been removed. | yes |
| 14 | LVNL | Introduction | The aim..is to increase insight..runways. | The document seems to focus on one specific incident. The suggestion that this document would be a complete study of large aircraft landing on short(er) runways is slightly misleading. | The investigation indeed focusses on one specific occurrence. The aim of an investigation is usually broader than the focuss. The text has been rephrased in order to clarify this. | yes |
| 15 | LVNL | Introduction | What role did the runway play | Why only mention the runway? The ILS and the PAPI and the geometry of the aircraft are more important factors. Suggestion: state more generally and do not anticipate possible causes. | The text has been rephrased. | yes |
| 16 | Delta Air Lines | 2.1 | the captain and the jumpseat pilot met at Detroit Metropolitan Wayne | Suggest changing this to "the captain and the first officer met at Detroit Metropolitan Wayne" The first officer, who was on the same rotation as the captain, met for the preflight briefing. The first officer, who was on a separate rotation (augmented first officer), was delayed in getting to the airport. | The text has been modified accordingly. | yes |

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| 17 | Delta Air Lines | 2.1 | The first officer arrived later and caught up with the other pilots | <p>The augmented first officer arrived later and caught up with the other pilots</p> <p>The first officer, who was on the same rotation as the captain, met for the preflight briefing. The first officer, who was on a separate rotation (augmented first officer), was delayed in getting to the airport.</p> | The text has been modified accordingly. | yes |
| 18 | Airbus | 2.1 | the latest touchdown point (LTP) | LTP does not exist in Airbus In-Flight Performance tools. It would be interesting to analyse if this is unique to the Operator or more widely spread, and if this could have an influence on the risk of runway undershoots on short runways. | The LTP performance tool remained outside of the scope of this investigation. The report suggests it could have contributed to the crew perceiving this runway as shorter during this event. | no |
| 19 | AAS | 2.1 | ...the lack of runway centreline lighting and the shorter – than he was accustomed to – array of approach lights. | <p>Opmerking/suggestie: dit onderstreept de noodzaak om in de AIP gegevens op te nemen over de 'runway type'. De internationale regelgeving biedt hier thans geen handvat voor maar publicatie van de 'runway type' zou de verwachtingen en mindset van vliegers kunnen verbeteren. Ik zou er voor willen pleiten om hier een aanbeveling voor EASA over te formuleren. Overigens staan alle karakteristieken van de baanverlichting per (landingsbaan) vermeld in de AIP en kunnen aircraft operators hier kennis van nemen.</p> <p>Translation Dutch Safety Board: Comment/Suggestion: This underscores the need to include 'runway type' information in the AIP. Current international regulations do not provide guidance on this, but publishing the 'runway type' could improve pilots' expectations and mindset. I would advocate for formulating a recommendation to EASA on this matter. Note, runway lighting characteristics for each runway are listed in the AIP and operators can take note of them.</p> | The pilots were aware of the absence of runway centerline lighting and the shorter array of approach lights. This investigation does not support that the absence of a 'runway type' in the aeronautical information publication contributed to the occurrence. | no |
| 20 | Airbus | 2.1 | This 5 knot speed increase surprised the pilots | Airbus as a general concern that the way the report is currently written, it may be erroneously understood that the Ground Speed Mini function did not behave appropriately during this incident. This 5 knots increase is consistent with the activation by the crew of the speed managed mode and the GS Mini function being activated. | A sentence was added in the Analysis section (3.1.1), reflecting that the Ground Speed Mini system functioned as designed. | yes |
| 21 | LVNL | 2.1 | glidepath | Entire document: "glide path" and "glide slope" are used interchangeably, and it is (as here) not clear everywhere whether the ILS GP or the PAPI glide path is meant. Suggestion: use the terms consistently and always indicate whether the glide path of the PAPI or ILS is meant. | The text has been modified accordingly. When used generally or in reference to the PAPI, the term path is used. When used in reference to the ILS the term slope is use. | yes |
| 22 | LVNL | 2.1 | The captain and the first officer noticed the deviation below the glidepath as evidenced by the PAPI indicating three red lights and one white light (see figure 1). | <p>The PAPI is a visual aid. Therefore, a PAPI is published on the Visual Approach Chart (VAC) and not on the Instrument Approach Chart (IAC).</p> <p>The PAPI is not part of an instrument flight procedure. The PAPI is often used in combination with an instrument approach to help pilots maintain the desired glide path below the published minimums. This concerns the visual segment of the instrument approach, where the pilot switches from following the instruments to visually observing the runway and the surrounding area to complete the landing. By interpreting the colors of the lights, the pilot can determine whether the aircraft is deviating from the intended descent path.</p> | The pilots have several ways to determine deviation from a glide path. Glide slope deviation on the Portable Document Format (PDF) and color of PAPI lights are two examples. The text intended to communicate that the pilots had multiple indications of deviation below the glide path. | yes |
| 23 | LVNL | 2.1 | They did not notice any abnormalities. | Apparently however, they felt the need to do a visual inspection. Is there an explanation why the crew did not notice any abnormalities (perhaps darkness?). | This remained outside of the scope of this investigation. | no |

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| 24 | AAS | 2.3 | The aft anti-rotation brake rod restraint cable of the 9 right main landing gear was broken (see figure 3). | In de tekst wordt het right main landing gear genoemd terwijl op figure 3 het left main landing gear wordt weergegeven. Translation Dutch Safety Board: The text refers to the right main landing gear, whereas Figure 3 shows the left main landing gear. | The picture shows the restraint cable of the left gear in one piece as an example. | no |
| 25 | AAS | 2.3 | As both main landing gears impacted obstacles during this undershoot occurrence,.... | De term 'obstacles' suggereert dat er ongeoorloofde obstakels op of rond Baan 22 aanwezig waren tijdens het incident. In de internationale wet- en regelgeving wordt onderscheid gemaakt tussen 'obstacle' en 'object' waarbij een 'obstacle' een 'object' is dat een potentieel gevaar vormt voor de luchtvaart. In het onderhavige geval kwam het landingsgestel in aanraking met het gras, de rand van de landingsbaan en een paar threshold lights. Deze laatste zijn frangible (breekbaar) uitgevoerd waardoor ze als 'object' aanwezig kunnen/mogen zijn binnen de runway strip. Suggestie: 'obstacles' vervangen door 'objects'. Translation Dutch Safety Board: The term 'obstacles' suggests that there were unauthorized obstacles on or around Runway 22 during the incident. International law and regulation differentiate between 'obstacle' and 'object', where an 'obstacle' is an 'object' that poses a potential hazard to aviation. In this particular case, the landing gear came into contact with the grass, the edge of the runway, and a few threshold lights. These lights are frangible (breakable) and therefore can/may be present as 'objects' within the runway strip. Suggestion: Replace 'obstacles' with 'objects'. | The text has been modified accordingly | yes |
| 26 | Delta Air Lines | 2.5 | age 49 | age 59 The first officer's age at the time of the event was 59 | Adjusted accordingly. | yes |
| 27 | Delta Air Lines | 2.5 | The jumpseat pilot, age 36, acted | The augmented first officer, age 49, acted The Augmented first officer was 49 at the time of the event. | Adjusted accordingly. | yes |
| 28 | ILT | 2.6.3 | 8,23 m (27 ft) | Uit het document 'Airbus Aircraft Data for Visual Aids Calibration' d.d. 25-12-2021 blijkt dat voor de A330-300 de eye-path to wheel-path height 10,82 m (35.5') bedraagt en de pilot's eye above wheels height 9,25m (30,3') bij standaard glide path van 3 graden, MLW, Vref + 5 ktsv Full flaps en CG 30%. Translation Dutch Safety Board: The document 'Airbus Aircraft Data for Visual Aids Calibration' dated 25-12-2021 indicates that for the A330-300, the eye-path to wheel-path height is 10.82 m (35.5 feet) and the pilot's eye above wheels height is 9.25 m (30.3 feet) at a standard glide path of 3 degrees, MLW, Vref + 5 knots, full flaps, and CG at 30%. | Values are obtained from the Airbus Aircraft Data for Visual Aids Calibration of 1 September 2023 (reference X06ME2319992). | no |
| 29 | ILT | 2.6.3 | Weergave ILS glide path | Dit figuur is niet volledig juist. In dit figuur loopt het ILS signaal door de cockpit en is daarmee gelijk aan het 'eye path' van de vlieger. Voor de A330-300 is dit niet juist; want de ILS receiver zit lager op de romp. De lijn van de ILS glide path zal dus lager weergegeven moeten worden om een juist beeld te schetsen. Translation Dutch Safety Board: This figure is not entirely accurate. In this figure, the ILS signal passes through the cockpit, aligning with the pilot's 'eye path'. This is incorrect for the A330-300; the ILS receiver is located lower on the fuselage. Therefore, the line of the ILS glide path should be depicted lower to provide an accurate representation. | Due to the added confusion of this figure, it was deleted. | yes |

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| 30 | ILT | 2.6.3 | Values Pilot's eyes, ILS antenna en MLG | <p>Onduidelijk is waar deze waarden op zijn gebaseerd. Op grond van het document 'Airbus Aircraft Data for Visual Aids Calibration' d.d. 15-12-2021 gelden voor de A330-300 de volgende waarden (ervan uitgaande dat de ILS receiver zich exact op de ILS glide slope bevindt): Pilot's eyes: 24,48 m (80,3'), ILS antenna: 15,24 m (50'), MLG: 7,19 m (23,6').</p> <p>Translation Dutch Safety Board: It is unclear what these values are based on. According to the document 'Airbus Aircraft Data for Visual Aids Calibration' dated 15-12-2021, the following values apply for the A330-300 (assuming the ILS receiver is exactly on the ILS glide slope): Pilot's eyes: 24.48 m (80.3 feet), ILS antenna: 15.24 m (50 feet), MLG: 7.19 m (23.6 feet).</p> | Values are obtained from the Airbus Aircraft Data for Visual Aids Calibration of 1 September 2023 (reference X06ME2319992). | no |
| 31 | Airbus | 2.6.5 | Sub-paragraph to be added. | As per previous comment, a sub-paragraph should therefore be added in this section to precise that the GS Mini function behaved appropriately and as expected during the event, and that the target speed converged towards VAPP during the final stage of the approach. | Added sentence in the Analysis section (3.1.1) that the Ground Speed Mini system functioned as designed. | yes |
| 32 | AAS | 2.8 | Runway 22 at Amsterdam Airport Schiphol is equipped with a category I ILS, and is therefore classified as a precision approach runway Category I. | <p>De conclusie die getrokken wordt m.b.t. de 'type of runway' is onjuist. De MDH/DH is bepalend voor de 'type of runway' en niet het feit of al al dan niet een ILS aanwezig is. ILS naderingen kunnen dus ook gevlogen worden naar non-precision approach runways, zolang de DH maar hoger is dan 250 ft.</p> <p>Translation Dutch Safety Board: The conclusion drawn regarding the 'type of runway' is incorrect. The MDH/DH (Minimum Descent Height/Decision Height) determines the 'type of runway', not the presence of an ILS (Instrument Landing System). Thus, ILS approaches can also be flown to non-precision approach runways, provided that the DH is higher than 250 feet.</p> | The text has been modified accordingly. | yes |
| 33 | AAS | 2.8 | Runway 22 at Amsterdam Airport Schiphol is equipped with a category I ILS, and is therefore classified as a precision approach runway Category I. The ILS glide path antenna is installed 260 m from the threshold and has a nominal 3° 07' 12" (3.12°) glideslope angle. | <p>In het rapport wordt sterk gefocussed op de karakteristieken van de PAPI 22 terwijl de focus op ILS 22 beperkt lijkt. In paragraaf 2.8 wordt bijvoorbeeld de RDH (Reference Datum Height) van GP 22 niet genoemd, terwijl deze, net als de MEHT van de PAPI, een rol kan hebben gespeeld in het ontstaan van het betreffende incident.</p> <p>Translation Dutch Safety Board: The report strongly focuses on the characteristics of PAPI 22 while the focus on ILS 22 appears limited. For example, in paragraph 2.8, the RHD (Reference Datum Height) of GP 22 is not mentioned, although this, like the MEHT (Minimum Eye Height over Threshold) of the PAPI, could have played a role in the occurrence of the incident.</p> | The ILS RDH Information has been added. | yes |
| 34 | LVNL | 2.8 | Runway 22 at Amsterdam Airport Schiphol is equipped with a category I ILS, and is therefore classified as a precision approach runway Category I. The ILS glide path antenna is installed 260 m from the threshold and has a nominal 3° 07' 12" (3.12°) glideslope angle. | Further suggest to avoid the term 'nominal'; a 'nominal' glideslope angle for the ILS does not exist and suggests possible deviations above and below. See diagram for the correct data. Source: AIP AD2.EHAM-IAC-22.1 | The text has been modified accordingly. | yes |

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| 35 | ILT | 2.8 | Runway 22 at Amsterdam Airport Schiphol is equipped with a category I ILS, and is therefore classified as a precision approach runway Category I. | Runway 22 is geclassificeerd als een non-precision approach runway en voldoet aan de EASA certification specifications voor een non-precision approach runway. Opmerking: De PA CAT I operatie heeft als gevolg van het ontbreken van een precision approach Category I lighting system een gepubliceerde minimum DH van 250ft. Translation Dutch Safety Board: Runway 22 is classified as a non-precision approach runway and meets the EASA certification specifications for a non-precision approach runway. Note: The PA CAT I operation, due to the absence of a precision approach Category I lighting system, has a published minimum Decision Height (DH) of 250 feet. | The text has been modified accordingly. | yes |
| 36 | Delta Air Lines | 2.8 | centerline at 277,5 m | Should this be "centerline at 2,775 m"? | The PAPI is positioned 277,5 m from the Runway 22 threshold. The sentence has been rephrased to clarify this. | yes |
| 37 | ILT | 2.8 | at a height of 0,454 m | Onduidelijk is of dit een hoogte t.o.v. maaiveld of t.o.v. runway centerline ter hoogte van de PAPI locatie is. Translation Dutch Safety Board: It is unclear whether this height is relative to ground level or relative to the runway centerline at the PAPI location. | The height is in relation to the runway and the text has been modified to reflect this. | yes |
| 38 | AAS | 2.10.2 | Short Approach Light System (SALS) | Simple Approach Lighting System (SALS) | The text has been modified accordingly | yes |
| 39 | ILT | 2.10.2 | Runway 22 has a Short Approach Light System (SALS) with a length of 450 m (1,500 ft) and medium intensity lights. | LIH i.p.v LIM. AIP EHAM AD 2.14 Approach and runway lighting > APCH LGT 22 LIH (Light Intensity High). | At the time of the incident, the EHAM AD 2.14 Approach and Runway lighting chart indicated Medium. It has since been adjusted to indicate High. | yes |
| 40 | AAS | 2.10.2 | EASA CS ADR-DSN.M.625 stipulates that on a precision approach runway Category I, a 900 m (3,000 ft) Approach Light System (ALS) should be provided, where physically practicable. | Dit klopt maar is niet relevant omdat Baan 22 niet als precision approach runway is aangemerkt. De zin voegt dus niets toe en kan m.i. verwijderd worden. Translation Dutch Safety Board: This is correct but not relevant since Runway 22 is not designated as a precision approach runway. Therefore, the sentence adds nothing and can, in my opinion, be removed. | The following text has been added: ", which conforms to EASA certification specification for a non-precision approach runway." | yes |
| 41 | AAS | 2.10.2 | The runway is equipped with yellow and white edge lights, | Suggestie: voor de volledigheid wellicht duiden welk deel van de edge lights wit licht uitstraalt en welk deel geel/amber licht uitstraalt. Translation Dutch Safety Board: Suggestion: For completeness, it might be useful to specify which part of the edge lights emits white light and which part emits yellow/amber light. | This information is not relevant to the incident. | no |
| 42 | AAS | 2.10.2 | The aeronautical information publication (AIP) of the Netherlands states that Runway 22 is suitable for category A-D aircraft. | Beter (en feitelijker) is om te stellen dat: '...for approaches to runway 22 OCA/OCH values are published for approach category A to D aircraft.' Dit om te voorkomen dat de lezer verward raakt door de verschillende 'categories' die in het rapport worden benoemd. Translation Dutch Safety Board: It would be better (and more factual) to state that: '...for approaches to runway 22, OCA/OCH values are published for approach category A to D aircraft.' This is to prevent confusion among readers due to the different 'categories' mentioned in the report. | The text has been modified to reflect the type of category. | yes |

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|-----|-----------------|---------|---|--|--|----------|
| 43 | ILT | 2.10.2 | The aeronautical information publication (AIP) of the Netherlands states that Runway 22 is suitable for category A-D aircraft. | Ter verduidelijking. Dit betreft de aircraft categories voor airspeed (ICAO Doc 8168) en niet de code letter aanduiding van vliegtuigen volgens de Aerodrome reference code (EASA No 139/2014 Aerodromes) met de indeling van vliegtuigen op basis van de wingspan. Translation Dutch Safety Board: For clarification, this concerns the aircraft categories for airspeed (ICAO Doc 8168) and not the code letter designation of aircraft according to the Aerodrome Reference Code (EASA No 139/2014 Aerodromes), which classifies aircraft based on wingspan. | The text has been modified to reflect the type of category. | yes |
| 44 | Delta Air Lines | 2.12.1 | The operator's Flight Operations Manual Paragraph 4.3.13, "Visual Approach Guide" | The operator's Volume 1 A330 Paragraph 4.3.13, "Visual Approach Guide" This section was located in the Volume 1 A330 manual | The text has been adjusted accordingly. | yes |
| 45 | Airbus | 2.12.1 | Note 2: If available, stay at or above the VASI/PAPI glide path until a lower altitude is necessary for a safe landing. | As mentioned above, it should be emphasized that this is specific to the Operator SOP and not present in the OEM SOP. | A footnote has been added to the text stating that note 2 is specific to the Operator SOP and not present in the Manufacturer SOP. | yes |
| 46 | ILT | 2.12.1 | Note 2 | Onduidelijk is waarom de operator niet stelt dat het PAPI signaal onder een bepaalde hoogte moet worden genegeerd. Het is toegestaan dat een PAPI op een kleiner toestel is ingesteld en daarmee een kleinere MEHT geeft. In dat geval is het niet wenselijk om tot het laatste moment 'at' the PAPI glide path te vliegen met een A330. Translation Dutch Safety Board: It's unclear why the operator doesn't state that the PAPI signal should be ignored below a certain altitude. It is permissible for a PAPI to be set for a smaller aircraft, thus providing a lower Minimum Eye Height over Threshold (MEHT). In such cases, it is undesirable to fly 'at' the PAPI glide path until the last moment with an A330. | At the time of the incident, the published PAPI MEHT was 62 feet and indicated sufficient threshold clearance. Deviating from the PAPI on approach to Runway 22 would result in a higher risk of an overrun. | no |
| 47 | Airbus | 2.12.1 | At the time of the incident the operator did not provide short runway training to Airbus A330 pilots. | The way the sentence is written may assume that other Operators provide such training. Is it the case? If yes, it would be worth adding this information. | If training at other operators was provided remained outside of the scope of this investigation. The operator incorporated short landing techniques after the occurrence (Section 2.15). | no |
| 48 | LVNL | 2.13 | landing runway. Runway 27 could also not be used as the primary landing runway due to | There was a need to have two landing runways (inbound wave). 18R/27 could not be used because of cloud base. 18R+22 was, with these winds, the only option. | A footnote has been added to the text. | yes |
| 49 | LVNL | 3.1.1 | This trajectory would have the aircraft's main landing gear cross the Runway 22 threshold at five metres (16.4 ft) and touch down 138 m (452 ft) beyond the runway threshold in the touchdown zone. | The RDH for rwy 22 is not at 50ft but at 46ft. A four feet difference. If the data from fig. 7 (source: Airbus) is 'translated' to runway 22, one would thus expect a 4ft difference from the indicated MLG height above threshold of 21.8 ft. Hence please check if the stated 16.4ft should not be 17.8ft (21.8 - 4.0 = 17.8) | The height over threshold and the distance between touch down and threshold were corrected based on this comment and the newer version of the document Aircraft Data for Visual Aids Calibration of 1 September 2023 (reference X06ME2319992). | yes |
| 50 | ILT | 3.1.1 | (16.4 ft) | Onduidelijk is of hierbij wordt uitgegaan van de juiste positie van de ILS receiver antenne van de A330-300? Zie opmerking op pagina 23. Translation Dutch Safety Board: It's unclear whether this assumes the correct position of the ILS receiver antenna of the A330-300. See note on page 23. | Due to the added confusion of this figure, it was deleted. | yes |

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| 51 | LVNL | 3.1.2 | The flight crew...focused more on speed management than maintaining the glide slope | We have the impression, and it is stated elsewhere in the document, that the pilot was trying to land the plane at the beginning of the runway. Clearly a lot of attention was paid to the glide slope. Suggestion: don't make a comparison. The crew was busy with both the speed and short touchdown. This occurs in several places in the document. | The crew's efforts to manage both speed and prevent a late touchdown were contributing factors in their approach. Adjustment for an earlier touchdown required deviation from the standard glide path. | no |
| 52 | AAS | 3.1 | Analysis... | De karakteristieken en (juiste) werking van het ILS 22 (en dan met name GP 22) zijn geen onderdeel geweest van de analyse. Translation Dutch Safety Board: The characteristics and correct operation of the ILS 22 (especially GP 22) were not part of the analysis. | The ILS RDH Information has been added in Section 2.8. Analysis and a Section on the analysis of the ILS configuration has been added (Section 3.1.4). | yes |
| 53 | Airbus | 3.1.2 | The aircraft descended below the glide path after the autopilot disconnection, because the flight crew focussed more on speed management than on flightpath management, thereby compromising safety margins for preventing undershoots. | This statement is not understood as the PF actions on the sidestick, which were in the nose-down direction, would be consistent with the objective to increase the airspeed, whereas it was reportedly already considered excessive (as above VAPP). | The PF action on the sidestick in the nose-down direction, would not increase the airspeed with the autothrust engaged. | no |
| 54 | ILT | 3.1.3 | Calculation of the minimum eye height over the threshold | Onduidelijk is waarop de berekening van de MEHT is gebaseerd. De 'lower bound of the 'on slope' indication' die in dit geval moet worden aangehouden voor de berekening van de MEHT bedraagt 2 graden 53'. (2' lager dan de instelling van de tweede unit te weten 2 graden 55'). Met een PAPI op 277,5 m afstand van de baandrempel en een PAPI lenshoogte van 0,545 meter boven de runway C/L levert dit een MEHT van 14,52 m ($277,5 \times \tan(2 \text{ graden } 53') + 0,545$). Met een eye-to-wheel height van 9,24 m voor de A330-300 levert dit een threshold clearance (main landing gear over threshold) op van 5,28 m. Translation Dutch Safety Board: It's unclear what the calculation of the MEHT is based on. The 'lower bound of the 'on slope' indication' to be used for calculating the MEHT in this case is 2 degrees 53'. (2' lower than the setting of the second unit, which is 2 degrees 55'). With a PAPI located 277.5 meters from the runway threshold and a PAPI lens height of 0.545 meters above the runway centerline, this yields a MEHT of 14.52 meters ($277.5 \times \tan(2 \text{ degrees } 53') + 0.545$). With an eye-to-wheel height of 9.24 meters for the A330-300, this results in a threshold clearance (main landing gear over threshold) of 5.28 meters. | The value of the MEHT is in agreement with the value shared in a report of Amsterdam Airport Schiphol regarding the PAPI of Runway 22 at Amsterdam Airport Schiphol. The values of the A330-300 are obtained from a newer version of the Airbus document, namely the Airbus Aircraft Data for Visual Aids Calibration of 1 September 2023 (reference X06ME2319992). | no |
| 55 | ILT | 3.1.3 | Table 8 | Referentie naar deze tabel in de tekst ontbreekt. Onduidelijk is of dit de exacte waarden zijn van de A330-300 tijdens het incident. Dit lijkt niet het geval omdat de height over THR van het main landing gear in dat geval lager was dan 0 m. Onduidelijk is wat de waarden in de tabel 8 dan weergegeven. Wordt hier uitgegaan van het nominale PAPI glijdpad, of van het nominale ILS glijpad? De waarden sluiten in die gevallen niet volledig aan bij de waarden die kunnen worden afgeleid uit het document 'Airbus Aircraft Data for Visual Aids Calibration' d.d. 15-12-2021. Translation Dutch Safety Board: Reference to this table is missing in the text. It's unclear if these are the exact values for the A330-300 during the incident. This seems unlikely because the height over the threshold (THR) of the main landing gear in that case was lower than 0 meters. It's unclear what the values in Table 8 represent. Are they based on the nominal PAPI glide path or the nominal ILS glide path? In either case, the values do not fully align with those that can be derived from the document 'Airbus Aircraft Data for Visual Aids Calibration' dated 15-12-2021. | Changed the caption of the table and added that these are calculated values when following the PAPI glide path. The values do not agree, because the DSB obtained them from a newer version of the document, namely from the Airbus Aircraft Data for Visual Aids Calibration of 1 September 2023 (reference X06ME2319992). | yes |

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| 56 | LVNL | 3.1.3 | drawings | Drawings are (very much) not to scale. Please indicate this and warn the reader. | Added note: The figure is not drawn to scale and is intended for illustrative purposes only. | yes |
| 57 | Airbus | 3.2.1 | Furthermore, the pilots were concerned about the approach speed calculated by the GS mini function of the A/THR | Referring to the comment above on page 24, it should be clarified directly in the text, and not only through the footnote [27], that the Ground Speed Mini function behaved appropriately during this incident. | The text has been moved from the footnote to the main text. | yes |
| 58 | Airbus | 3.2.1 | They had never seen such a large speed increment of 24 knots on short final | This crew statement should be substantiated again regarding the actual behavior of the GS Mini function and the crew experience on the aircraft type. | It has been clarified in the previous sentence that the GS mini function behaved the way it was designed. | yes |
| 59 | Airbus | 3.2.1 | The pilots' focus on speed management was increased further due to their concern about the correct functioning of the GS mini system | It would be important to analyse the concern of this crew related to the GS mini function, which is a basic function on all Airbus types since the A320. It would be interesting to understand if the issue is related to knowledge, training or other aspects. | The reasons behind the pilots' concern were outside the scope of this investigation. | no |
| 60 | Airbus | 3.2.2 | Complete paragraph. | This paragraph is misleading as the information regarding EWH is available in the Operational Manuals. In addition, this information is normally not used for a manual landing where visual references should be used. Consider rewording or deleting this paragraph. | Although information can be derived from available information, in practice flight crew do not do that. The section has been rephrased and replaced to Section 3.3.2. | yes |
| 61 | LVNL | 3.2.2 | contributing to the compromised safety margins during the landing approach. Information | The text before states this information is not regularly used by pilots, nor in training. What then, is the relevance of the information on the approach plate? Did the crew consult the approach plate with respect to the EWH? Please clarify whether this was the case. | Although information can be derived from available information, in practice flight crew do not do that. The section has been rephrased and moved to Section 3.3.2. | yes |
| 62 | ILT | 3.2.2 | Information regarding the specific characteristics of Runway 22, particularly the threshold crossing height, was incorrectly presented on the approach plate and this further compromised their judgment. | Op de approach plate (AIP-NL) is een ILS RDH van 46ft aangegeven. Onduidelijk is welke approach plate bedoeld wordt. Translation Dutch Safety Board: The approach plate referred to is the Aeronautical Information Publication for the Netherlands (AIP-NL), which indicates an ILS Reference Datum Height (RDH) of 46 feet. However, it's unclear which specific approach plate is being referenced. | The section has been rephrased and moved to Section 3.3.2. The concerning sentence has been deleted. | yes |
| 63 | AAS | 3.2.3 | ...the PAPI system's calibration for aircraft with a significantly different Eye-to-Wheel Height... | De term 'calibration' wekt de indruk dat de PAPI is 'ingesteld' voor bepaalde vliegtuigtypen. Dit is feitelijk onjuist omdat de afstand t.o.v. de THR de MEHT bepaalt bij een 'vaste' daahoeke die congruent dient te zijn met het ILS. Het is dus meer de positionering van de PAPI die de MEHT bepaalt dan de 'instelling'. Translation Dutch Safety Board: The term "calibration" may imply that the PAPI is "set" for specific aircraft types. This is factually incorrect because the distance from the threshold (THR) determines the Minimum Eye Height over Threshold (MEHT) at a fixed glide path angle that should be congruent with the ILS. Therefore, it's more about the positioning of the PAPI that determines the MEHT rather than the "setting". | The term calibrations has been changed to design. The MEHT is a function of both the PAPI distance from the runway threshold as well as the angle. | yes |
| 64 | AAS | 3.2.4 | Runway 22, certified as a non-precision approach runway | Hier wordt Baan 22 (terecht) aangemerkt als een non-precision approach runway terwijl de baan eerder in het rapport als 'precision approach runway' wordt gedefinieerd. Dat deze beide typeringen worden gebruikt i.r.t. Baan 22 is in conflict met elkaar. Translation Dutch Safety Board: Here, runway 22 is rightly identified as a non-precision approach runway, while earlier in the report, the same runway is defined as a precision approach runway. The use of both classifications regarding runway 22 is conflicting. | The text has been rephrased for clarity. | yes |

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| 65 | AAS | 3.2.4 | ...which results in a mismatch with the EASA Certification Standards for appropriate lighting systems. | <p>Wat is precies de 'mismatch' en waarom is er sprake van een 'mismatch'?</p> <p>Translation Dutch Safety Board: What exactly is the 'mismatch' and why is there a 'mismatch'?</p> | Mismatch was indeed not a suitable term for the situation regarding the lighting conditions of runway 22. The text has been rephrased. | yes |
| 66 | AAS | 3.2.4 | The runway's distinct lighting features, notably its shorter and lower intensity approach lighting without centerline and touchdown zone illumination, could contribute to visual illusions. | <p>Dit mag dan wellicht waar zijn, maar de genoemde features voldoen aan de vereisten voor non-precision approach runways. Wellicht maakt de aanwezigheid van een ILS het verhaal verwarrend: men verwacht de verlichting van een precision approach runway te zien, maar de werkelijkheid is anders. Dit is geen tekortkoming van het lighting system van de runway. Overigens is de aanwezigheid van runway centre line lights geen vereiste voor een precision approach category I runway. Ook zijn touchdown zone lights alleen een verplicht element voor precision approach category II/III runways.</p> <p>Translation Dutch Safety Board: While this may be true, the mentioned features meet the requirements for non-precision approach runways. The presence of an ILS might make the situation confusing: one would expect the lighting of a precision approach runway, but the reality is different. This is not a shortcoming of the runway's lighting system. Moreover, the presence of runway centerline lights is not a requirement for a precision approach category I runway. Additionally, touchdown zone lights are only a mandatory element for precision approach category II/III runways.</p> | Runway 22 meets the requirements of a non-precision approach runway. Nevertheless, the distinct lighting features could contribute to visual illusions. The text has been rephrased to clarify this point. | yes |
| 67 | ILT | 3.2.4 | The runway's distinct lighting features, notably its shorter and lower intensity approach lighting without centerline and touchdown zone illumination, could contribute to visual illusions. | <p>Opmerking betreft de centerline en touchdown zone illumination: Runway centre line lights en runway touchdown zone lights zijn niet vereist voor een non-precision approach runway en voor een precision approach runway Category I zijn runway touchdown zone lights niet voorgeschreven.</p> <p>Translation Dutch Safety Board: Regarding the centerline and touchdown zone illumination: Runway centerline lights and runway touchdown zone lights are not required for a non-precision approach runway. Additionally, for a precision approach runway Category I, runway touchdown zone lights are not prescribed.</p> | Runway 22 meets the requirements of a non-precision approach runway. Nevertheless, the distinct lighting features could contribute to visual illusions. The text has been rephrased to clarify this point. | yes |
| 68 | LVNL | 3.2.4 | The narrower width of the runway | All runways are 45 m wide. Except 18R, which is wider. Runway 22 is not narrower than other runways (ex. 18R) | The visual illusion due to a narrow runway is not applicable and the sentence has been removed. | yes |
| 69 | AAS | 3.2.4 | The narrower width of the runway could have created an illusion of being at a higher altitude... | <p>Baan 22 is 45 meter breed; dit is de standaard baanbreedte. De shoulders van Baan 22 zijn smaller dan van de overige landingsbanen (7,5m i.p.v. 15m) maar dat zal bij duisternis geen rol hebben gespeeld in de visuele perceptie omdat de buitengrenzen van de shoulders niet verlicht zijn. Bij duisternis is de visuele perceptie van de breedte van Baan 22 niet anders dan bij andere landingsbanen omdat de edge lights van Baan 22 over dezelfde breedte van de baan staan dan bij andere landingsbanen (m.u.v. baan 18R want die is 60 m breed...)</p> <p>Translation Dutch Safety Board: Runway 22 is 45 meters wide, which is the standard runway width. The shoulders of runway 22 are narrower than those of the other runways (7.5m instead of 15m), but this would not have played a role in visual perception during darkness because the outer boundaries of the shoulders are not illuminated. During darkness, the visual perception of the width of runway 22 is no different than that of other runways because the edge lights of runway 22 are positioned over the same width of the runway as with other runways (except for runway 18R, which is 60 meters wide).</p> | The visual illusion due to a narrow runway is not applicable and the sentence has been removed. | yes |

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| 70 | ILT | 3.2.4 | The narrower width of the runway | <p>Wat wordt bedoeld met 'narrower width'? Runway 22 heeft een baanbreedte die gelijk is aan de andere vier banen op Schiphol. M.u.v. runway 18R met een breedte van 60m.</p> <p>Translation Dutch Safety Board: What is meant by 'narrower width'? Runway 22 has a runway width that is equal to the other four runways at Schiphol. Except for runway 18R, which has a width of 60 meters.</p> | The visual illusion due to a narrow runway is not applicable and the sentence has been removed. | yes |
| 71 | AAS | 3.2.4 | Runway 22's lighting systems are below the recommended standards for a precision approach runway. | <p>Dit is feitelijk een juiste constatering ware het niet dat Baan 22 als non-precision approach runway is geclassificeerd. Deze conclusie wekt onterecht de indruk dat de verlichting van Baan 22 niet voldoet aan de eisen.</p> <p>Translation Dutch Safety Board: This is indeed a correct observation, except that runway 22 is classified as a non-precision approach runway. This conclusion falsely implies that the lighting of runway 22 does not meet the requirements.</p> | The text has been rephrased for clarity. | yes |
| 72 | Airbus | 3.3.2 | The ambiguities in the SOPs | This statement is strong but not really substantiated. What are the elements from the Operator's SOP that are ambiguous? This paragraph should be completed with a more detailed and comprehensive analysis. | The paragraph has been rephrased to explain the ambiguities and has been moved to Section 3.4.1. | yes |
| 73 | LVNL | 3.3.2 | ambiguities | Which ambiguities in which SOPs are meant? | The paragraph has been rephrased to explain the ambiguities and has been moved to Section 3.4.1. | yes |
| 74 | Airbus | 3.4.1 | Complete paragraph. | Again it should be clarified here that the analysis is based on the Operator SOP and differences with the Airbus SOP could be highlighted. | The SOP and training aspects have been explained in further detail in section 3.4.1. | yes |
| 75 | LVNL | 3.4.1 | due to misinterpretations of SOPs | This supposed connection between misinterpretation of SOPs and early landing is not substantiated anywhere. A much simpler explanation is that rwy 22 seems uncomfortably short for such a large aircraft, especially if you have no experience with it. That has little to do with procedures. Suggestion: mention the misinterpretation only as a possible cause, but do not mention that this is "substantiated" by other early landings. | The paragraph has been rephrased. | yes |
| 76 | LVNL | 3.4.1 | However, due to the associated undershoot risk, further study of the operator's use of short runways seems prudent. | One would expect this to appear in the recommendations. | The operator has taken mitigating actions by providing flight crews with short field landing training as well as prohibit the A330 from landing on Runway 22 at Amsterdam Airport Schiphol (see section 2.15 Post Incident Safety Actions). | no |
| 77 | DGLM | 3.4.2 | However, for the relief pilot, already fatigued from his ongoing rotation 17 and sleep debt, the first rest break might not allow him adequate sleep. | Supporting fatigue factors of the jumpseat pilot in Appendix E is missing. | The appendix has been added. | yes |
| 78 | DGLM | 3.4.3 | The Predictive Windshear System and Enhanced Ground Proximity Warning System did not generate any warnings as the alert and warning boundaries were not exceeded. These systems have proven very effective. However, they only work when the aircraft flies outside of certain parameters. | For clarity include the tolerances of the parameters as indicated in Appendix A.2 EGPWS for mode 1 and 5. | The tolerances are envelopes and limits based on variables such as altitude. Specific parameters for this flight can be found in chapter 2.11. | no |

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| 79 | LVNL | Conclusions | subconscious...glide path. | See comment above 3.1.2. We have the impression, and it is stated elsewhere in the document, that the pilot was trying to land the plane at the beginning of the runway. Clearly a lot of attention was paid to the glide slope. Suggestion: don't make a comparison. The crew was busy with both the speed and short touchdown. | The crew's efforts to manage both speed and prevent a late touchdown were contributing factors in their approach. Several factors led the crew to overestimate the risk of an overrun and underestimate the risk of an undershoot. These factors are explained in section 3.3. | no |
| 80 | Airbus | Conclusions | incomplete trust in the aircraft's speed computations | This sentence shall be reworded for 2 aspects:a) the crew reportedly expressed concerned regarding the speed increment, however they continued the approach in managed mode, so it can be considered that they trusted the level of automation they had decided to use, otherwise they could have reverted to selected modes.b) the Ground Speed Mini has no influence on the speed computations, but only on the managed speed target, which is a different topic. | Part of the sentence has been removed. | yes |
| 81 | LVNL | Conclusions | This gap..could also have played | Speculation, unsubstantiated. Suggest to remove. | The gap has been removed and the paragraph has been rephrased. | yes |
| 82 | Airbus | Conclusions | the operator may need to evaluate threshold crossing height | Is this the role of the Operator to perform this assessment or is it the responsibility of the Airport/ATC who knows which aircraft are landing on the airport? | As the Dutch Safety Board's analysis of touchdown points on Runway 22 shows, multiple early touchdowns reveal a possible pattern that warrants further study by the operator. Suitability of the runway regarding TCH for EWH category 4 aircraft is the responsibility of the Airport. | no |
| 83 | AAS | Conclusions | ...did not meet EASA and ICAO standards for an A330 | Ook hier wordt weer de suggestie gewekt dat de PAPI niet is 'ingesteld' voor grotere vliegtuigen. Omdat de PAPI dichterbij de THR is geplaatst, is de MEHT lager en daarmee minder geschikt voor grotere vliegtuigen. Vandaar dat de MEHT een verplicht gegeven is om te publiceren in de AIP. De 'oude' MEHT van 62 ft wekte onterecht de indruk dat er voor de A330 werd voldaan aan de minimaal vereiste 6 meter WTH; deze is inmiddels gerectificeerd naar 48 ft waardoor operators nu weten dat de PAPI 22 geen 6 meter WTH waarborgt voor grotere vliegtuigen. Het is aan de operator om daar gebruiksconsequenties aan te verbinden. Translation Dutch Safety Board: Here again, the suggestion is made that the PAPI is not "set" for larger aircraft. Because the PAPI is positioned closer to the THR, the MEHT is lower, making it less suitable for larger aircraft. Hence, the MEHT is a mandatory data to publish in the AIP. The "old" MEHT of 62 ft falsely suggested that the A330 met the minimum required 6-meter WTH; this has since been rectified to 48 ft, indicating that the PAPI 22 does not ensure a 6-meter WTH for larger aircraft. It is up to the operator to draw operational consequences from this. | The minimum eye height over the threshold (MEHT) is indeed published in the aeronautical information publication (AIP). This gives operators the opportunity to assess whether the runway is suitable for landing with their aircraft. However, the continued use of the runway by Eye-to-Wheel Height Category 4 aircraft of other operators is evidence that the risk of crossing the runway threshold at a low altitude is not sufficiently mitigated. Therefore, the DSB chooses to issue the present recommendation to discontinue the use of Runway 22 by Eye-to-Wheel Height Category 4 aircraft. A similar text is added to the report in Chapter 5. | no |

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| 84 | AAS | Conclusions | When the pilot the threshold. | <p>Er wordt aangegeven dat wanneer de vlieger het PAPI signaal volgt deze mogelijk te laag over de threshold zou kunnen vliegen. Feitelijk is dit correct op basis van de instellingen van de PAPI echter is de conclusie dat het resultaat hiervan is dat het vliegtuig te vroeg zou kunnen landen niet correct. Wanneer het PAPI signaal gevolgd wordt dan zal het vliegtuig op de juiste positie landen weliswaar met een te geringe hoogte over de threshold. Tevens wordt in deze alinea nadrukkelijk aangegeven dat de mismatch tussen de PAPI en het vliegtuig type te weinig marge heeft gelaten voor onverwachte afwijkingen wat in combinatie met wind en de reactie van de vlieger oorzakelijk is voor het te kort landen. Echter de feitelijke oorzaak van de te korte landing is het afwijken van het glidepath door de piloot en zgn contributing factoren zijn de geconstateerde windvlagen en de mismatch tussen PAPI en vliegtuigtype waarmee de foutmarges beperkt zijn.</p> <p>Translation Dutch Safety Board: It is stated that when the pilot follows the PAPI signal, they could potentially fly too low over the threshold. Factually, this is correct based on the settings of the PAPI; however, the conclusion that as a result, the aircraft could land too early is incorrect. When the PAPI signal is followed, the aircraft will land at the correct position, albeit with insufficient height over the threshold. Additionally, this paragraph explicitly states that the mismatch between the PAPI and the aircraft type has left too little margin for unexpected deviations, which, combined with wind and the pilot's reaction, is causative for the short landing. However, the actual cause of the short landing is the deviation from the glidepath by the pilot, and the so-called contributing factors are the observed wind gusts and the mismatch between the PAPI and the aircraft type, which limit the error margins.</p> | The sentence has been deleted. | yes |
| 85 | LVNL | Recommendations | This shortfall stems primarily from the configuration of the Precision Approach Path Indicator (PAPI) and Instrument Landing System (ILS). | It is not a shortfall. It is the characteristic of RWY 22, correctly published in the AIP. Suggest to avoid the term 'shortfall'. | The text has been modified. | yes |
| 86 | LVNL | Recommendations | These systems.... | The ILS GP installation is correct. Only the PAPI installation should be addressed. | The installations of ILS and PAPI for Runway 22 are technically correct and in line with existing standards. The focus on the threshold crossing height due to the PAPI is to address the specific operational safety concerns for Category 4 aircraft due to the unique combination of runway length and aircraft performance characteristics. Acknowledging the shared responsibilities, the recommendation aims to enhance safety without unnecessarily limiting airport infrastructure use. | no |
| 87 | AAS | Recommendations | These systems are positioned in a way that provides insufficient threshold crossing clearance for such aircraft during landing, rendering them less suitable for larger aircraft. | <p>Opmerking: LVNL is eigenaar van het ILS en Schiphol is eigenaar van de PAPI. Uit de specificatie van dit eigenaarschap zou voor de positionering van de GP-antenne en het niet behalen van voldoende threshold clearance een aanbeveling voor LVNL moeten volgen. Op Schiphol (en veel andere luchthavens) bepaalt LVNL de karakteristieken van non-visual aids, en niet de luchthavenexploitant. Hiermee is LVNL verantwoordelijk voor de juiste plaatsing van non-visual aids.</p> <p>Translation Dutch Safety Board: Note: LVNL owns the ILS, and Schiphol owns the PAPI. From the specification of this ownership, a recommendation for LVNL should follow regarding the positioning of the GP antenna and the failure to achieve sufficient threshold clearance. At Schiphol (and many other airports), LVNL determines the characteristics of non-visual aids, not the airport operator. Therefore, LVNL is responsible for the correct placement of non-visual aids.</p> | The delineation of responsibilities between airport operators and Air Navigation Service Providers (ANSPs) is acknowledged. The addressee of the recommendation has been changed to Amsterdam Airport Schiphol. | yes |

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| 88 | AAS | Recommendations | These systems are positioned in a way that provides insufficient threshold crossing clearance for such aircraft during landing, rendering them less suitable for larger aircraft. | <p>In de conclusies en aanbevelingen wordt enorm gefocussed op de PAPI en veel minder op het ILS. Dit terwijl de positie van de PAPI bij co-locatie met een ILS het gevolg is van de positie van de GP-antenne. De 'root cause' is feitelijk gelegen in het feit dat de baanlengte beperkt is waardoor het aiming point dichterbij de THR is gelegen dan bij een langere landingsbaan. Gevolg hiervan is dat de GP en PAPI dichterbij de THR staan en de MEHT van een kortere landingsbaan lager is dan die van een relatief langere landingsbaan waarvan het aiming point verder van de THR is gelegen.</p> <p>Translation Dutch Safety Board: In the conclusions and recommendations, there is a significant focus on the PAPI and much less on the ILS. However, the position of the PAPI when co-located with an ILS is a result of the position of the GP antenna. The root cause is actually the limited runway length, which results in the aiming point being closer to the THR than on a longer runway. As a consequence, both the GP and PAPI are positioned closer to the THR, and the MEHT of a shorter runway is lower than that of a relatively longer runway where the aiming point is further from the THR.</p> | The installations of ILS and PAPI for Runway 22 are technically correct and in line with existing standards. The focus on PAPI adjustments is to address the specific operational safety concerns for Category 4 aircraft due to the unique combination of runway length and aircraft performance characteristics. Acknowledging the shared responsibilities, the recommendation aims to enhance safety without unnecessarily limiting airport infrastructure use. | partially |
| 89 | AAS | Recommendations | These systems are positioned in a way that provides insufficient threshold crossing clearance for such aircraft during landing, rendering them less suitable for larger aircraft. | <p>De positionering van de ILS en PAPI 22 is niet afwijkend; ze staan zodanig opgesteld dat de de juiste guidance geven naar het aiming point van Baan 22. Wat er feitelijk aan de hand is, is dat de afstand tussen het aiming point en de THR zodanig is dat met een 3 graden glide slope voor grotere vliegtuigen onvoldoende WTH gewaarborgd wordt. Dit wordt in de AIP vermeld door de publicatie van de MEHT in paragraaf AD 2.14.</p> <p>Translation Dutch Safety Board: The positioning of the ILS and PAPI 22 is not unusual; they are arranged to provide proper guidance to the aiming point of runway 22. What actually occurs is that the distance between the aiming point and the THR is such that with a 3-degree glide slope, insufficient WTH is ensured for larger aircraft. This is stated in the AIP through the publication of the MEHT in paragraph AD 2.14.</p> | The installations of ILS and PAPI for Runway 22 are technically correct and in line with existing standards. The focus on threshold crossing height due to the PAPI is to address the specific operational safety concerns for Category 4 aircraft due to the unique combination of runway length and aircraft performance characteristics. Acknowledging the shared responsibilities, the recommendation aims to enhance safety without unnecessarily limiting airport infrastructure use. | no |
| 90 | LVNL | Recommendations | These systems are positioned in a way that provides insufficient threshold crossing clearance for such aircraft during landing, rendering them less suitable for larger aircraft. | The use of the term 'insufficient' is suggestive as it is still dependent on the operator to use the runway for landings. The ILS and PAPI 22 are positioned in such a way that they provide the correct guidance to the aiming point of runway 22. Suggestion is to use the wording 'less threshold crossing clearance than the other runways', which is factually correct. | Runway 22's ILS and PAPI and their compliance with EASA certification specifications are well-understood. The emphasis on its characteristics in the report and recommendation aims to highlight the operational safety margins for specific aircraft types, considering their unique landing performance requirements. | no |
| 91 | AAS | Recommendations | Furthermore, the lighting on Runway 22 is not in accordance with EASA certification specifications for a precision approach runway. | <p>Baan 22 is geen precision approach runway dus deze conclusie is onjuist.</p> <p>Translation Dutch Safety Board: Runway 22 is not a precision approach runway, so this conclusion is incorrect.</p> | The sentence has been deleted. | yes |
| 92 | AAS | Recommendations | To Air Traffic Control the Netherlands: | <p>Het beperken van gebruik van luchthaven infrastructuur is een verantwoordelijkheid van de luchthavenexploitant, niet van de ANSP.</p> <p>Translation Dutch Safety Board: Restricting the use of airport infrastructure is the responsibility of the airport operator, not the Air Navigation Service Provider (ANSP).</p> | The delineation of responsibilities between airport operators and Air Navigation Service Providers (ANSPs) is acknowledged. | yes |

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| 92 | AAS | Recommendations | Discontinue the use of Runway 22 for landing operations involving Eye-to-Wheel Height Category 4 aircraft until the minimum threshold clearance for such aircraft can be achieved. | <p>De voor iedere PAPI gepubliceerde MEHT is bepalend voor het wel/niet waarbogen van de minimum threshold clearance. Net als de gepubliceerde baanlengte is dit gegeven een variabele die door de operator in beschouwing moet worden genomen om te bepalen of op de betreffende baan wel of niet geland kan worden. Wanneer de MEHT beperking is gepubliceerd zou een 'verbod' op het gebruik voor bepaalde vliegtuigtypen dus niet nodig en bovendien niet proportioneel zijn. Op vele andere luchthavens zijn ook PAPI's geïnstalleerd waarvan een MEHT van rond 50 ft is gepubliceerd; op die betreffende landingsbanen landen ook grotere vliegtuigen zoals de A330. Indien een gepubliceerde MEHT lager is dan de optelsom van de EWH + WTH dan dient de operator een afweging te maken of en hoe deze gebruik maakt van de visuele indicaties van de PAPI. Als dit feit door een operator onderkend wordt dan kan de PAPI gebruikt worden tijdens de nadering maar dient in de final approach rekening te worden gehouden met een kleinere WTH dan de minimaal toegestane marge. De operator kan dit corrigeren door de final approach 'af te vlakken' of een landingsdoelpunt te kiezen achter het aiming point. Voorts kan het niet van een luchthavenexploitant verwacht worden dat zij van alle denkbare vliegtuigtypen de Eye-to-Wheel-Height (EWH) kent. Deze gegevens zijn immers nodig om, tezamen met het bekende MEHT de Wheel-to-Threshold Height (WTH) te bepalen. Ook is de EWH afhankelijk van de pitch angle van het vlieguig tijdens de eindnadering; deze gegevens staan ook niet ter beschikking van een luchthavenexploitant.</p> <p>Translation Dutch Safety Board: The Minimum Eye Height Above Threshold (MEHT) published for each PAPI is decisive for determining whether the minimum threshold clearance is met. Just like the published runway length, this factor is a variable that the operator must consider to determine whether landing can or cannot be performed on the respective runway. When the MEHT restriction is published, a 'ban' on the use for certain aircraft types would not only be unnecessary but also disproportionate. Many other airports also have PAPIs installed with a published MEHT of around 50 ft; larger aircraft like the A330 also land on these runways. If a published MEHT is lower than the sum of the Eye-to-Wheel Height (EWH) + Wheel-to-Threshold Height (WTH), the operator must assess whether and how to use the visual indications of the PAPI. If this fact is acknowledged by an operator, the PAPI can be used during the approach, but consideration must be given to a smaller WTH than the minimum allowable margin during the final approach. The operator can correct this by 'flattening out' the final approach or choosing a landing point beyond the aiming point. Furthermore, it cannot be expected of an airport operator to be familiar with the Eye-to-Wheel-Height (EWH) of all conceivable aircraft types. These data are needed, together with the known MEHT, to determine the Wheel-to-Threshold Height (WTH). Also, the EWH depends on the pitch angle of the aircraft during the final approach; these data are also not available to an airport operator.</p> | The minimum eye height over the threshold (MEHT) is indeed published in the aeronautical information publication (AIP). This gives operators the opportunity to assess whether the runway is suitable for landing with their aircraft. However, the continued use of the runway by Eye-to-Wheel Height Category 4 aircraft of other operators is evidence that the risk of crossing the runway threshold at a low altitude is not sufficiently mitigated. Therefore, the DSB chooses to issue the present recommendation to discontinue the use of Runway 22 by Eye-to-Wheel Height Category 4 aircraft. A similar text is added to the report in Chapter 5. | no |
| 94 | LVNL | Recommendations | Discontinue the use of Runway 22 for landing operations involving Eye-to-Wheel Height Category 4 aircraft until the minimum threshold clearance for such aircraft can be achieved. | <p>We regard this as a disproportionate recommendation. A new safety analysis would have to be performed to prove this does not introduce safety risks elsewhere e.g. landings with more crosswind on rwy 18R.</p> <p>Whilst landings on rwy 22 with a larger aircraft has (in our view) not been substantiated as a significant safety risk, the complications for handling air traffic with high crosswind speeds on other runways would have considerable disadvantages and complications for operators, capacity of the airport (and even environment).</p> | Our focus is on identifying specific safety enhancements, understanding that broader operational implications, such as crosswind challenges on Runway 18R, fall within the expertise of Amsterdam Airport Schiphol and Air Traffic Control the Netherlands. This does not preclude safety enhancements for threshold crossing clearance on Runway 22. | no |

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| 95 | AAS | Recommendations | Upgrade Runway 22 approach and runway lighting to match those of Schiphol's other runways and EASA certification specifications. | <p>De basis voor deze aanbeveling is in mijn beleving niet stevig genoeg. Baan 22 is een non-precision approach runway en daarmee anders dan de meeste overige banen. De verlichting van Baan 22 voldoet aan de eisen die EASA stelt aan non-precision approach runways.</p> <p>Translation Dutch Safety Board: The basis for this recommendation, in my opinion, is not sufficiently solid. Runway 22 is a non-precision approach runway and therefore different from most other runways. The lighting of runway 22 meets the requirements set by EASA for non-precision approach runways.</p> | The recommendation has been removed. | yes |
| 96 | AAS | Recommendations | | <p>Zijn er geen aanbevelingen voor de aircraft operator? De inhoud van het rapport en de conclusies wijzen erop dat er (wel degelijk) verbetermogelijkheden zijn voor deze partij... Door het ontbreken van deze aanbevelingen ontstaat er m.i. een eenzijdig beeld m.b.t. de oorzaken van het incident. Als ik me als lezer beperk tot het lezen van alleen de aanbevelingen dan lijkt het er op dat de PAPI de 'boosdoener' is geweest terwijl er eerder is gesteld dat de MEHT (slechts) een 'contributing factor' heeft kunnen zijn...</p> <p>Translation Dutch Safety Board: Are there no recommendations for the aircraft operator? The content of the report and the conclusions suggest that there are (indeed) opportunities for improvement for this party... The absence of these recommendations creates, in my opinion, a one-sided view regarding the causes of the incident. If I, as a reader, limit myself to reading only the recommendations, it seems that the PAPI was the 'culprit', while it has been previously stated that the MEHT could have been a 'contributing factor' at most...</p> | The operator has taken mitigating actions by providing flight crews with short field landing training as well as prohibit the A330 from landing on Runway 22 at Amsterdam Airport Schiphol (see section 2.15 Post Incident Safety Actions). | no |
| 97 | AAS | Recommendations | | <p>Suggestie: in het rapport aanbevelingen opnemen voor EASA om: (1) luchthaven de 'type of runway' te laten publiceren in de AIP zodat er meer awareness ontstaat bij vliegers over de te verwachten (licht)configuratie per landingsbaan; (2) in Guidance Material duidelijkheid te scheppen over de 'hardheid' van een MEHT waarde. In mijn beleving dient de luchthaven de MEHT per PAPI te publiceren als ontwerpwaarde en is het aan de aircraft operator om te beoordelen of deze gebruik maakt van de betreffende PAPI en door welke vliegtuigtypen. Het is zover mij bekend niet de bedoeling van de regelgever om op basis van MEHT waarden het gebruik van een landingsbaan te verbieden.</p> <p>Translation Dutch Safety Board: Here's a suggestion for including recommendations in the report for EASA:</p> <ol style="list-style-type: none"> 1. Encourage airports to publish the 'type of runway' in the AIP to enhance awareness among pilots about the expected (lighting) configuration for each runway. 2. Advocate for clarity in EASA's Guidance Material regarding the 'firmness' of a MEHT value. In my view, the airport should publish the MEHT per PAPI as a design value, and it is up to the aircraft operator to assess whether to utilize the respective PAPI and which aircraft types. It is not, to my knowledge, the intention of regulators to prohibit the use of a runway based on MEHT values. | The Dutch Safety Board's focus is on direct safety improvements for Runway 22, as the use of this runway by large aircraft indicates issues beyond awareness of existing rules. Our recommendation aims for actionable changes that directly enhance safety, rather than emphasizing adherence to current guidelines. | no |
| 98 | LVNL | Recommendations | | <p>One would expect recommendations to the aircraft operator. The ILS installation is correct. Runway lighting meets specs. Crew came out low 2 dots below the ILS. Role of the PAPI is minimal. That there is one technical recommendation and one to discontinue the use of the runway, but no advice to the operator, is unbalanced.</p> | The operator has taken mitigating actions by providing flight crews with short field landing training as well as prohibit the A330 from landing on Runway 22 at Amsterdam Airport Schiphol (see section 2.15 Post Incident Safety Actions). | no |

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| 99 | Delta Air Lines | Appendix D | | Can you clarify the source material for this section? It is difficult to identify if the references are from Airbus' manuals, the operator's manuals, or both. | The title of the appendix has been rephrased for clarity. | yes |
| 100 | LVNL | Recommendations | Blz. 7 en blz. 48: "While Runway 22 at Amsterdam Airport Schiphol is structurally capable of accommodating the landing of an Airbus A330, its safety level for large and long aircraft (Eye-to-Wheel 3 Height Category 4 aircraft) is not on par with other runways at the airport. This shortfall stems primarily from the configuration of the Precision Approach Path Indicator (PAPI) and Instrument Landing System (ILS). These systems are positioned in a way that provides insufficient threshold crossing clearance for such aircraft during landing, rendering them less suitable for larger aircraft. This issue is particularly critical for longer aircraft, where the margins for safe landing are already reduced." | PAPI and ILS are linked in this text, which we believe is not entirely justified. The ILS22 has been correctly installed and classified and meets all requirements for the ILS, including for this category of aircraft. The positioning, operation and categorization of the PAPI is separate from the ILS. | The installations of ILS and PAPI for Runway 22 are technically correct and in line with existing standards. The focus on PAPI adjustments is to address the specific operational safety concerns for Category 4 aircraft due to the unique combination of runway length and aircraft performance characteristics. Acknowledging the shared responsibilities, the recommendation aims to enhance safety without unnecessarily limiting airport infrastructure use. | no |
| 101 | LVNL | Recommendations | | The report correctly states that ILS/DME-22 has an ILS Facility Performance CAT I with an RDH of 46 ft. What we are missing in the report is the AIP-NL published ILS Classification: CAT I/C/1 (see EHAM AD 2.19). This means that ILS-22 must provide course guidance to ICAO point C and that the DH is located around point B. ICAO point C is defined on the GP flight path where the altitude is 30m (100ft). This is about 300 meters before threshold. ICAO point B on which the DH for CAT I is defined is 1050m (3500ft) before threshold. The report states that from 0.6 nm (\approx 1111 m) the aircraft is 1/2 dot below GP slope and this increases to 2 dots below GP towards the runway, see pages 14 and 15. The importance of the ILS signal in the final part of the landing trajectory is therefore only limited. For ILS CAT I the DH is at ICAO point B (1050 m=0.57 nm). | Our report aims to examine the threshold crossing clearance for EWH Category 4 aircraft. While we examine the design aspects of both the ILS and PAPI, the emphasis is on the PAPI since these requirements are more restrictive. | no |
| 102 | Delta Air Lines | Appendix C | X | The figure for the Aerodrome Chart is missing | Added. | yes |