Future Phase Development Study

Kilshane Power Plant

Report

Client:	Kilshane Energy Ltd	Document Reference:	110KIL002
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Executive Summary

Kilshane Energy Ltd (Kilshane) are proposing an additional two new gas turbines, Phases 2 and 3, to be contained within the existing Kilshane site located 2.66km west of the Dublin Airport. This study considers the original Kilshane development on the same site that has previous been submitted and accepted in the planning process.

This Study applies much of the concept work for the previous project and provided additional assessments to ensure there is no impact to the safe operations of aircraft of Dublin Airport.

An analysis of the Obstacle Limitation Surfaces (OLS) has determined that subject to acceptance of the Inner Horizontal Surface (IHS) being penetrated, the additional chimney stacks could be constructed to a height of up to 45.2m above ground level.

A Type A Surface analysis has found that the proposed Phase 2 chimney stack would need to be limited to 29.3m. The Phase 3 chimney stack does not impact the Type A Surface and therefore is only restricted by the OLS.

There is no cumulative increase in turbulence resulting from three chimney stacks operating simultaneously as the stacks are sufficiently spaced to ensure that turbulence is the same as a single chimney stack. As a result, the proposed development will not impact aircraft departing Runway 28L or arriving to land on Runway 10R.

An assessment of Dublin Airport's Air Navigation Equipment (AANE) has determined that although there is a penetration of the Building Restricted Areas (BRA) of certain systems, a detailed analysis concluded little or no impact to airport operations.

It is the opinion of this report that whilst there is opportunity to develop the chimney stacks to a height of up to 45.2m, there is no impact on the proposed design and layout up to a height of 29.3m and 33m above ground level respectively for Phases 2 and 3.

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Introduction

Overview

1. Kilshane Energy Ltd (Kilshane) are proposing an additional two new gas turbines to be contained within the existing Kilshane site located 2.66km west of the Dublin Airport threshold of Runway 10R (Figure 1).

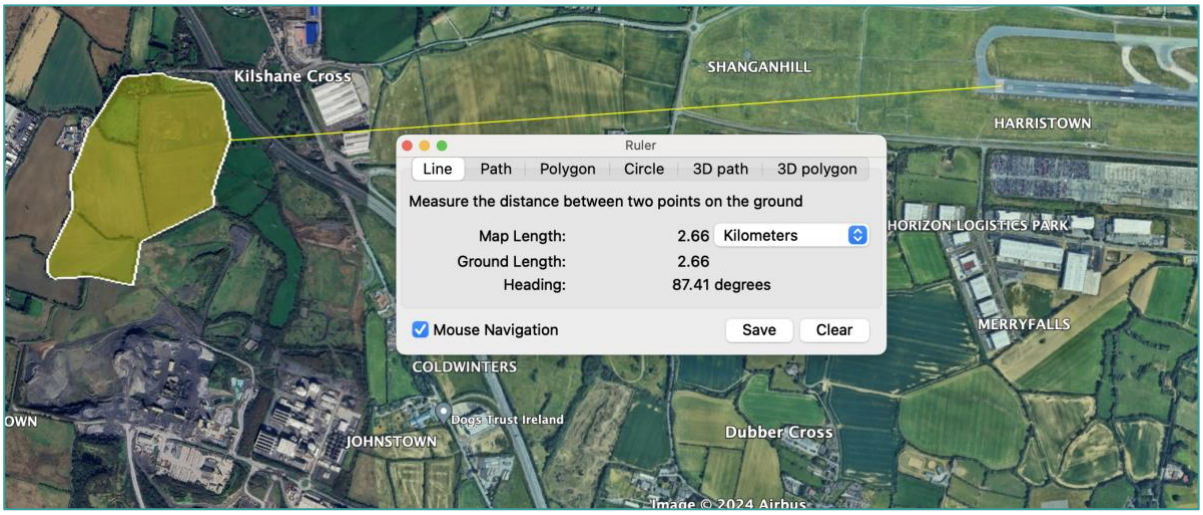

FIGURE 1: KILSHANE SITE LOCATION RELEVANT TO DUBLIN AIRPORT

2. Figure 2 provides an overview of the site with the location of the power plants.

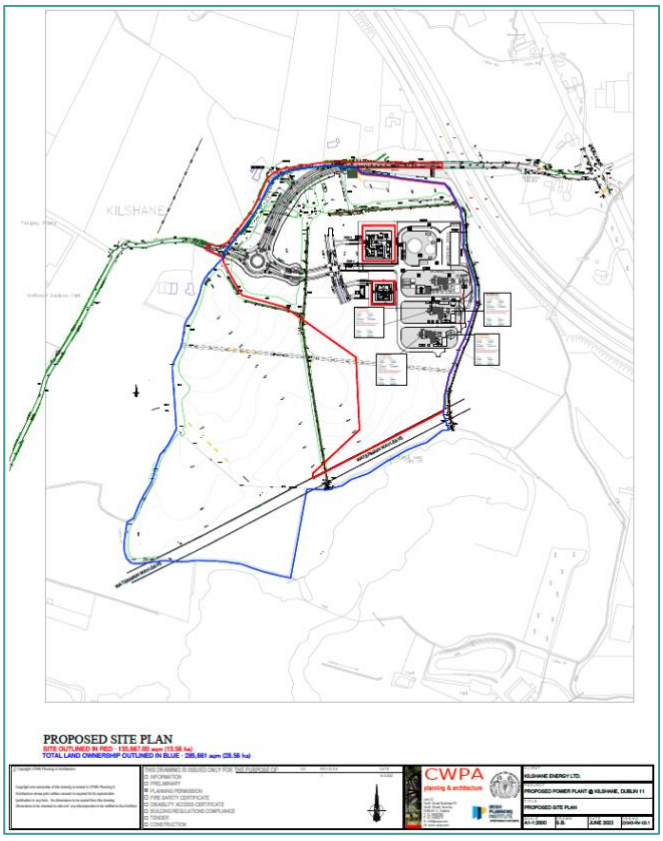

FIGURE 2: SITE LAYOUT

3. Figure 3 provides a zoomed in view of Phase 1 to the north and Phases 2 and 3 to the south. The round stacks are situated to the eastern edge of the site with the inlets to the left located centrally within each plot as depicted with the red and green lines.

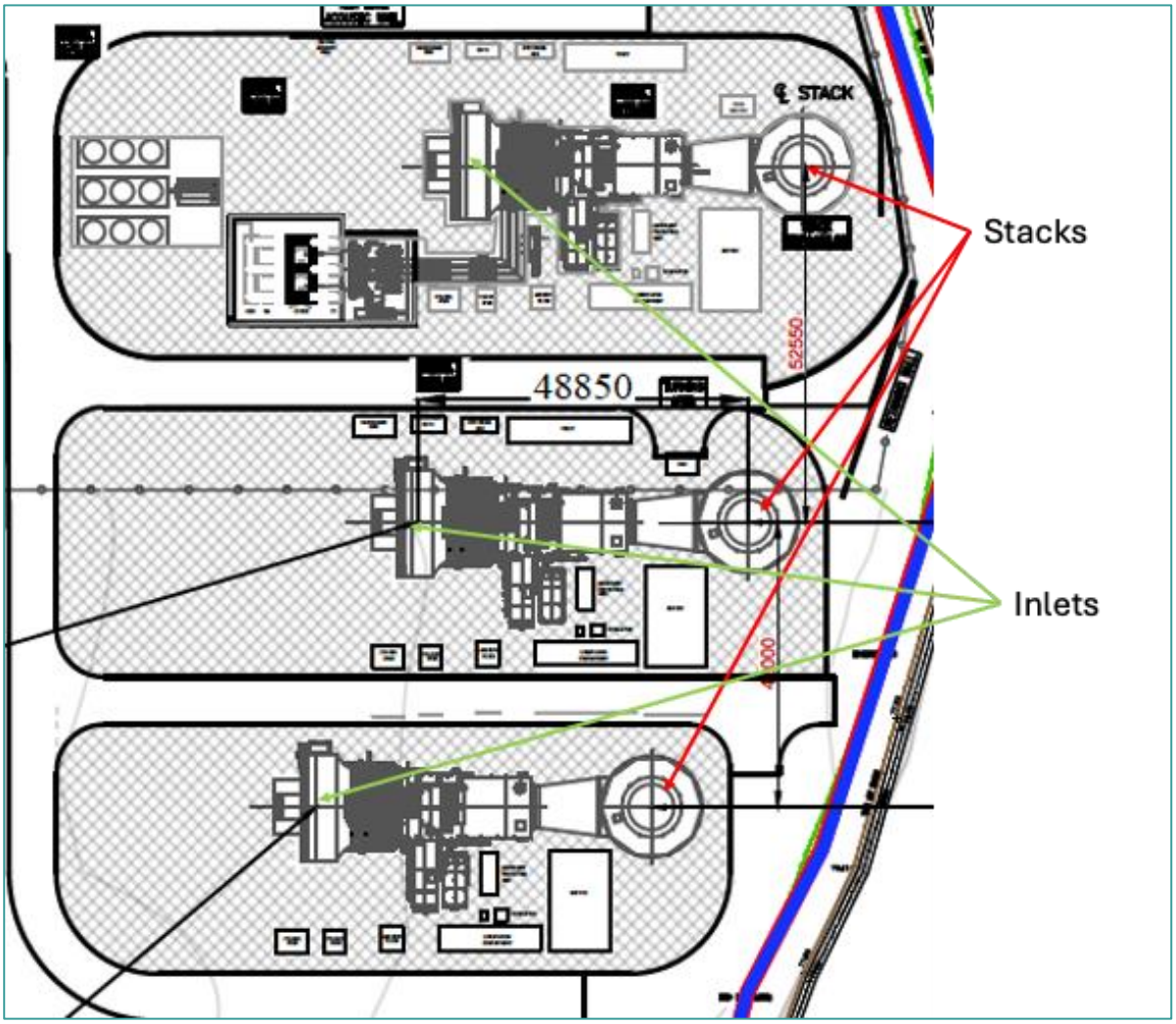

FIGURE 3: POWER PLANT LOCATIONS

4. The additional gas turbines are intended to be used either on an individual basis or operating simultaneously as demand requires.
5. This Study will assume a worst-case environment of all three power plants operating simultaneously and to provide an evidence-based approach to support the development of the proposed Phase 2 and 3 gas turbines to support the safe operation of aircraft for Dublin Airport.
6. A previous study was undertaken for Phase 1 and supporting information is referenced in this Study where data is relevant.

7. The format of this document is as follows:
    - An Obstacle Limitation Surfaces (OLS) assessment was undertaken and reported in the first section to determine maximum permissible stack height. Phases 2 and 3 were assessed separately and notified as the North and South sites.
    - Based on maximum heights, the next section covers the operational impact, on the Airport, by considering the plume dispersal including cumulative effect of the stacks of the three phases.
    - The last section summarises the first two sections and proposes stack heights for the subsequent phases with supporting arguments.

Background

8. A series of assessments were undertaken as part of the Kilshane Phase 1 development, these included the standard safeguarding criteria related to Obstacle Limitation Surfaces (OLS), Instrument Flight Procedures (IFP) and technical systems consisting of the Airport Air Navigation Equipment (AANE).
9. Furthermore, plume analysis was conducted together with flight analysis to understand the characteristics of plume dispersal on aircraft operations. A summary of assessment and outcomes is provided below:
    - Aviation Study, reference CL-5691-RPT-003 V1.0, dated 20 August 2021.
        - This study provided a high-level assessment of the safeguarding criteria related to the OLS, IFP and AANE.
        - The study identified that the most constraining considerations were the OLS and AANE. The OLS criteria were clearly identified, however the potential impact to the AANE was further assessed in the next report.
    - Technical Safeguarding Assessment, reference CL-5836-RPT-002 V1.0, dated 01 August 2022.
        - This assessment determined no impact to the navigational systems at Dublin Airport for Phase 1, including penetrations of the AANE surfaces where defined.

      Note: The information provided in the above two reports provide guidance to the remaining site boundary area and as such, fair assumptions can be made on available data. This will be explored in the height considerations for Phase 2 and 3.
    - Aviation Study, Plume Impact to Dublin Airport, Reference 29100, Version 1.0, dated 14 September 2022.
        - The study undertook a detailed review of the plume velocity and the associated potential impact to aircraft operations at Dublin Airport and included analysis of emergency and general aviation aircraft.
        - Plume velocity and flight analysis will be used for this Study for Phase 2 and 3.

Obstacle Limitation Surface

10. A detailed OLS assessment was conducted using data of the site provided by Kilshane Energy together with surveyed OLS data provided by Dublin Airport. The methodology and conclusion are provided below.
11. Each Phase (2 and 3) were independently modelled and analysed and described in this section as North Site (Phase 2) and South Site (Phase 3).
12. The Coordinates for the mains stacks and inlet towers have been taken directly from "22045-PL-03 Proposed Site Plan-3A-S.1" and plotted by using X/Y values (referred to the UTM 29 North projection), this is depicted in Figure 4.

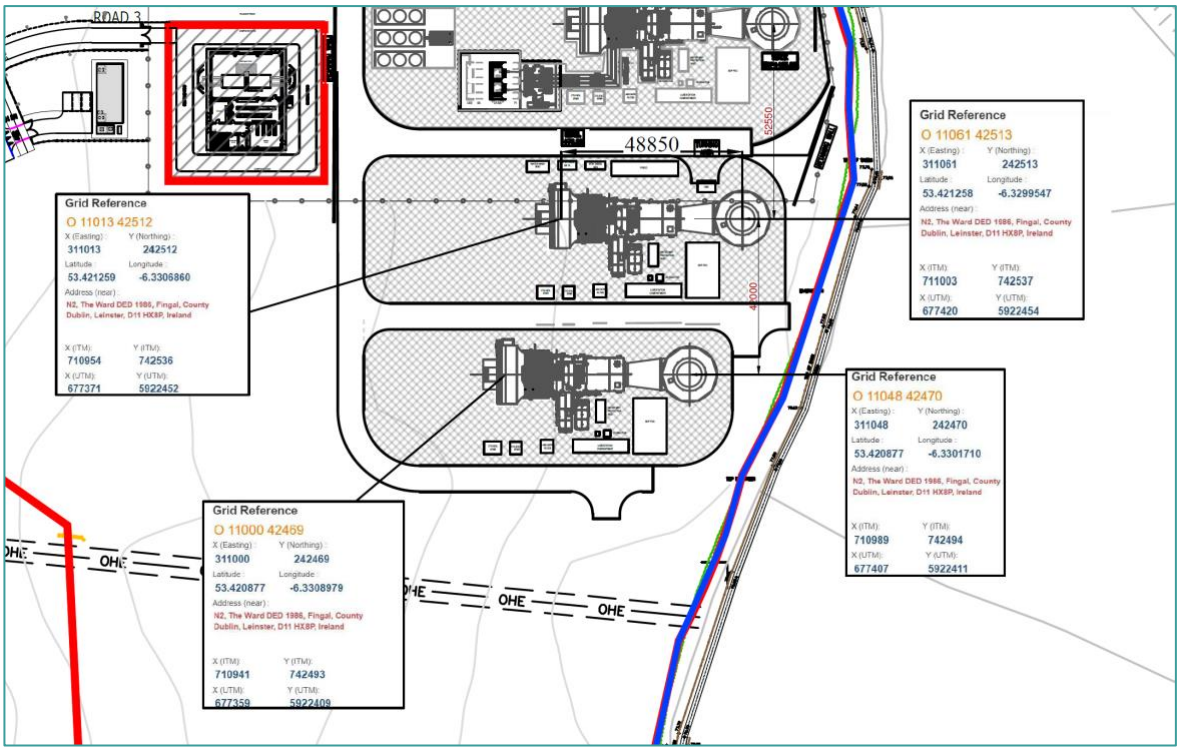

FIGURE 4: PROPOSED SITE DATA WITH GRID REFERENCE DATA

13. A diameter of 6.7m has been applied around the center point defined by the coordinates reported above to consider the horizontal extension of both stack and inlet tower. The position on Google Earth is reported in Figure 5 and overlays the input file received for the analysis.

FIGURE 5: KILSHANE PHASES 2 AND 3 DEPICTED WITH OLS

14. The following assumptions have been taken into consideration for the final calculation:

- **Assumption 1:**
  A diameter of 6.7m has been applied for both stacks and inlet towers.
- **Assumption 2:**
  Both sites, North and South, have been converted to a model based on a flat terrain site. Therefore, a terrain analysis has been conducted for both proposed locations (as per North and South Site further in this report) in order to have the stack tower and inlet tower at the same terrain elevation.
  Reference for the analysis are:
  - Google Earth.
  - 22045-PL-03 Proposed Site Plan-3A-S.1 (terrain contours).
    No formal terrain data is available and therefore NASA SRTM files are considered too conservative for this specific analysis.
- **Assumption 3:**
  No ICAO deviation have been applied.
- **Assumption 4:**
  No vertical and/or lateral buffers have been applied for the proposed sites.

North Site

15. The North Site is composed by the coordinates provided in the client grid reference data as provided in Figure 4.
16. In the absence of formal terrain data, a terrain elevation analysis was conducted as an informal yet acceptable validation process.

- **Google Earth analysis:**
  The terrain elevation at O 11013 42512 (inlet tower) is equal to 81m while at O 11061 42513 is equal to 79m. Therefore, the lower value (79m) has been considered for the analysis.
- **22045-PL-03 Proposed Site Plan-3A-S.1 analysis:**
  The contour line at O 11013 42512 (inlet tower) is equal to 79.5m while at O 11061 42513 is equal to 79m. Therefore, the lower value (79m) has been considered for the analysis.

17. The final value of 79m has been taken for the final calculation as it's the common value between Google Earth and the survey file and no differences have been found.
18. The North Site is located between the 1st Section of the Approach Surface for Runway (RWY) 10R and the Take-Off Climb Surface (TOCS) RWY28L.

Approach Surface RWY10R Analysis

19. The following parameters have been used for the final calculation of the Approach Surface RWY 10R:
    - Slope: 2%
    - Divergence angle: 15% (each side)

20. The distance between the North Site, given by the projection along the extended runway centerline of the stack tower, and the origin of the Approach Surface is equal to 2563m.
21. The elevation at the origin of the Approach Surface is equal to 74m, therefore an elevation difference (Δel) equal to 5m has been detected:
    - North Site elevation (79m) – Approach Surface elevation at origin point (74m) = 5m

22. The final maximum height is equal to:
    - $[Distance\ from\ origin\ (2563m) * tan\ 2\%] - \Delta el\ (5m) = 51.3m - 5m = 46.3m$

23. The value is calculated before it penetrates the Inner Horizontal Surface (IHS) since the surface is based at an altitude of 112m. The elevation of the maximum height calculated above is equal to:
    - $maximum\ theoreitcal\ height\ (46.1m) + terrain\ elevation\ (79m) =\ 125.1\text{m}$

Take Off Climb Surface RWY28L analysis

24. The following parameters have been used for the final calculation of the Take Off Climb Surface RWY10L:
    - Slope: 2%
    - Divergence angle: 12.5% (each side)

25. The distance between the North Side, given by the projection along the extended runway centerline of the stack tower, and the origin of the Take Off Climb Surface is equal to 2409m.

26. The elevation at the origin of the Take Off Climb Surface is equal to 76m, therefore an elevation difference (Δel) equal to 3m has been detected:
    - North Site elevation (79m) – Take Off Climb Surface elevation at origin point (76m) = 3m

27. The final maximum height is equal to:
    - $[Distance\ from\ origin\ (2409m) * tan\ 2\%] - \Delta el\ (3m) = 48.2m - 3m = 45.2m$

Inner Horizontal Surface Analysis

28. The above calculated values penetrate the Inner Horizontal Surface (IHS) since the surface is based at an altitude of 112m[1]. The height value of the TOCS (as the lowest value) calculated is equal to:
    - $maximum\ theoretical\ height\ (45.2m) + terrain\ elevation\ (79m) = 124.2m$

29. Therefore, a penetration of 12.2m is detected with the IHS.

South Site

30. The South Site is composed by the coordinates provided in the client grid reference data as provided in Figure 4 and is located in the 1st section of the Approach Surface of RWY10R.
31. The terrain elevation followed the same validation process for the North Site and demonstrated below.
    - **Google Earth analysis:**
      The terrain elevation at O 11000 42469 (inlet tower) is equal to 79m while at O 11048 42470 is equal to 78m. Therefore, the lower value (78m) has been considered for the analysis.
    - **22045-PL-03 Proposed Site Plan-3A-S.1 analysis:**
      The contour line at O 11013 42512 (inlet tower) is equal to 79.5m while at O 11061 42513 is equal to 79m. Therefore, the lower value (79m) has been considered for the analysis.

32. The final value of 79m has been taken for the final calculation as more conservative than 78m (detected by using Google Earth).

Approach Surface RWY 10R Analysis

33. The following parameters have been used for the final calculation of the Approach Surface RWY10R:
    - Slope: 2%
    - Divergence angle: 15% (each side)

34. The distance between the South Side, given by the projection along the extended runway centerline of the stack tower, and the origin of the Approach Surface is equal to 2573m.

[1] IHS value obtained from Dublin Airport Document reference DIR.114, version 3.1, dated 09 November 2022

35. The elevation at the origin of the Approach Surface is equal to 74m, therefore an elevation difference (Δel) equal to 5m has been detected:
    - South Site elevation (79m) – Approach Surface elevation at origin point (74m) = 5m

36. The final maximum height is equal to:
    - $[Distance\ from\ origin\ (2573m) * tan\ 2\%] - \Delta el\ (5m) = 51.5m - 5m = 46.5m$

Inner Horizontal Surface Analysis:

37. The above calculated values penetrate the Inner Horizontal Surface (IHS) since the surface is based at an altitude of 112m[2]. The height value of the Approach Surface calculated is equal to:
    - $maximum\ theoreitcal\ height\ (46.5m) + terrain\ elevation\ (79m) = 125.5m$

38. Therefore, a penetration of 13.5m is detected with the IHS.

Summary

39. The worst case for both North and South Site model is given by the stack tower in each plot.
40. Only the Approach Surface for RWY10R (1st Section), TOCS for RWY28L and the Inner Horizontal Surface are impacted.
41. The maximum height due to the TOCS for RWY28L is equal to 45.2m, this value penetrates the IHS.
42. The maximum height due to the Approach Surface for RWY10R is equal to 46.5m, this value penetrates the IHS.
43. The IHS is the controlling surface of the OLS. If the approval for the IHS penetration is not supported, then the maximum permissible height is 33m for both sites.

[2] IHS value obtained from Dublin Airport Document reference DIR.114, version 3.1, dated 09 November 2022.

Type A Surface

44. Aside from the protection of safety surfaces (OLS), consideration must also made to the Type A surfaces for Dublin Airport. The Type A surfaces are promulgated to provide aircraft operators the obstacle data information for the departure area, this permits the crew to calculate performance criteria in the event of an engine failure known as a One-Engine Inoperative procedure (OEI).
45. Aircraft operators calculate their OEI procedure against the dominant obstacle penetrating the sloping Type A surface. The dominant obstacle is not necessarily the highest obstacle but that which penetrates the surface the most.
46. The Type A surface is similar to the TOCS surface but with a slope of 1.2%. This study considered the published Type A surface chart and obstacle data as published in the Irish Aeronautical Information Publication (AIP)[3]. The chart reference is EIDW AD 2.24-3 and represents the Type A surface for both RWY10R and RWY28L. The Kilshane development is in the departure area for RWY28L, and the assessment will focus on that area only.
47. The Phase 2 proposed development (North Site) falls within the lateral boundary of the Type A surface (red line). Phase 3 (South Site) falls outside the lateral surface limit of the Type A surface and therefore does not require further analysis.

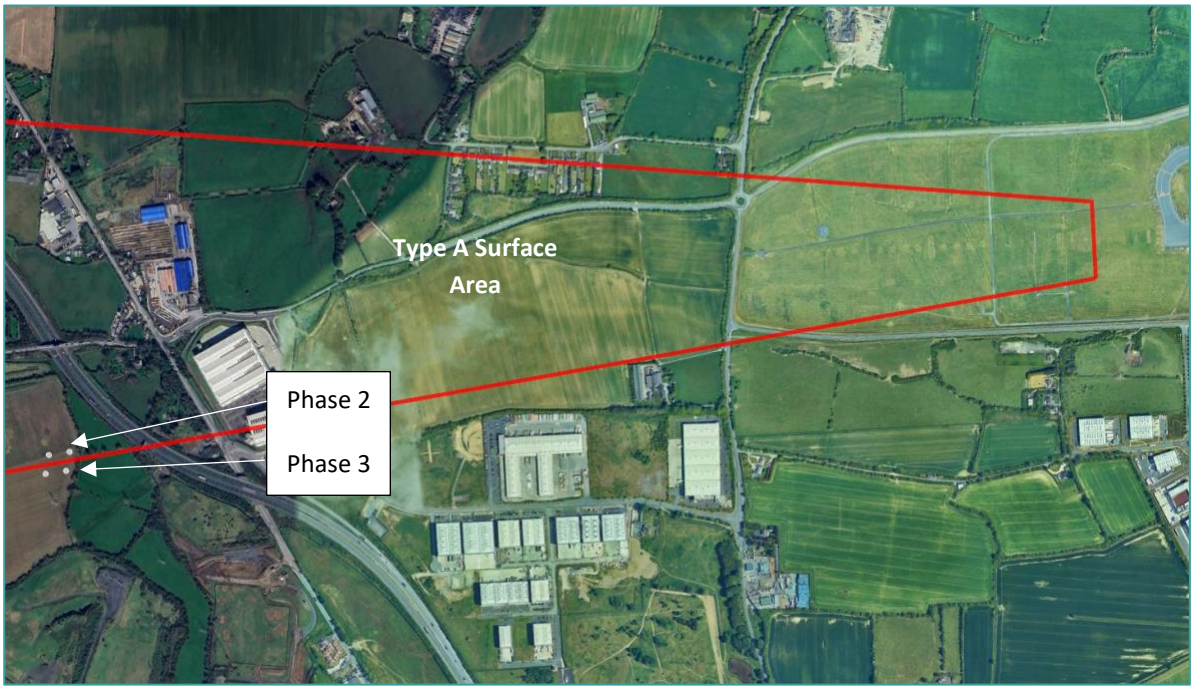

FIGURE 6: RWY28L TYPE A SURFACE AREA

[3] AIRAC AIP AMDT 011/24, Effective date 28 November 2024.

48. The analysis will focus of the existing Type A surface obstacle environment to ensure the proposed development does not introduce an obstacle that exceeds the existing environment, i.e., does not penetrate the Type A surface resulting in a new dominant obstacle. The purpose is to ensure that the proposed development falls within the shadow of existing obstacles for performance and OEI calculations.

North Site

49. The North Site is located under the Type-A Surface for RWY28L. Two assessments were undertaken to capture any variances in data accuracy, one assessment with a horizontal buffer and another without.

50. The following parameters have been used for the final calculation of the Type-A Surface RWY28L considering the shadow effect produce by the dominant obstacle identified as 'obstacle 103' (indicated in the red circle – lateral and top view) in Figure 7.

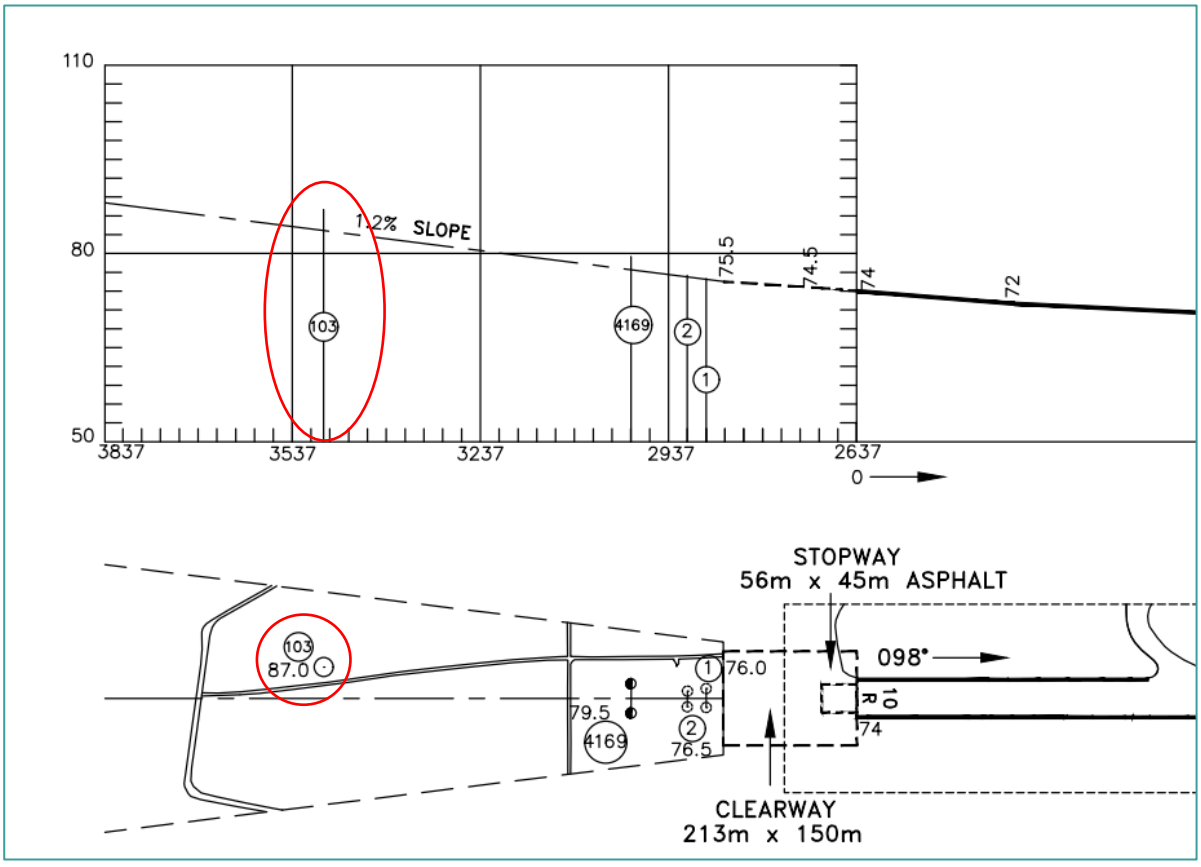

FIGURE 7: TYPE A CHART FOR RWY28L EXTRACTED FROM EIDW AD 2.24-3

51. The following assumptions and parameters have been sued for the analysis:

- The obstacle 103 (VOR antenna) is located at an approximate distance of 840m from the THR28R, where such value has been derived as followed: 3537m – 60m – 2637m = 840m.

- The obstacle 103 has been located 60m before the vertical line representing 3537m from THR28L to account for a possible horizontal tolerance.
- A 1.2% sloping Type-A surface 60m prior the line of 3537 m.

52. The distance between the North Side, given by the projection along the extended runway centerline of the stack tower, and the origin of the Shadowing effect for the Type-A Surface is equal to 1782 m.
53. The elevation at the origin of the Type-A Surface is equal to 75.5m, therefore an elevation difference (Δel) equal tom has been detected:
54. The maximum elevation related to the Stack Tower is equal to:
    - $[Distance\ from\ origin\ (1782m) * tan\ 0.012] + Obs\ el\ (87m) = 21.3m + 87m\ = 108.3m$
55. Therefore, the maximum height is equal to:
    - $[Distance\ from\ origin\ (1782m) * tan\ 0.012] + Obs_{(103)} - Terrain\ el\ (79m) = 21.3m + 87m - 79m = 29.3m$
56. Assuming a refined methodology where DAP VOR coordinates are taken into consideration, and no horizontal buffer is assumed for the antenna, then the final maximum elevation is equal to:
    - $[Distance\ from\ origin\ (1769m) * tan\ 0.012] + Obs\ el\ (87m) = 21.2m + 87m\ = 108.2m$
57. Therefore, the maximum height is equal to:
    - $[Distance\ from\ origin\ (1769m) * tan\ 0.012] + Obs_{(103)} - Terrain\ el\ (79m) = 21.2m + 87m - 79m = 29.2m$

Summary

58. The South Site does not penetrate the Type-A Surface.
59. The North Site penetrates the Type-A Surface and is restricted to height to be contained within the shadow of the existing dominant obstacle as follows:
    - The maximum height due to the Type-A Surface is 29.3 m, with a horizontal buffer linked to Obstacle 103.
    - The maximum height due to the Type-A Surface is 29.2 m, without a horizontal buffer linked to Obstacle 103.

Operational Impact

60. The operational impact of the Kilshane Power Plant has to consider the two additional turbine stacks in relation to the permitted turbine.
61. The formation of turbulence is the main concern to operations for Dublin Airport. In this regard, cumulative or enhanced effect must be considered. Cumulative or enhanced effect is the combined impact of the plume of the three chimney stacks resulting in a stronger turbulence effect with the net result being turbulence being present at a higher altitude.
62. It was previously demonstrated [4] that the plume velocity from the first chimney stack would not impact operations at Dublin Airport. The previous report considered both arriving and departing aircraft using Runway 10R and Runway 28L considering a number of varying aircraft types and capability. In addition, live traffic data was used to evidence actual aircraft track and altitude.
63. This section will use the data from the above previous report to demonstrate that the additional, proposed stacks will not present a cumulative impact as a single chimney stack or as three chimney stacks operating simultaneously. AWN Consulting Limited provided further guidance and reference material in the determination of cumulative or enhanced turbine stack effect.
64. In the first instance, it needs to be demonstrated that the proposed development layout and distance between chimney stacks does not result in a cumulative effect. In effect, each chimney stack is independent of the other resulting in the turbulence being no worse than if a single chimney stack or all three stacks were operating at the same time.
65. The Ontario Ministry of Environment [5][6] states that plume rise can be enhanced from multiple closely spaced stacks, while the New Zealand Ministry for the Environment [7] notes that *"multiple stacks close together will have enhanced buoyancy and a higher plume rise, and will therefore generate lower ground-level concentrations than would be the case if the flues or stacks were modelled as separate sources"*.
66. Enhanced plume rise is also applicable to plume parameters such as temperature, oxygen content and vertical velocity, relevant for determining turbulence effects on overhead aircraft. Enhanced plume rise would result in higher plume temperatures, higher oxygen content and higher vertical velocity, increasing the risk of turbulent air flow. Where flues have similar diameters and flows rates

[4] Straten CSL Aviation Study, Plume Impact to Dublin Airport, reference 29100, dated 14 September 2022.
[5] Proposed Guidance for Air Dispersion Modelling, Lakes Environmental Consultants Inc., for the Ontario Ministry of the Environment, reference SSB-034875, dated 10 November 2003.
[6] Air Dispersion Modelling Guideline for Ontario [Guideline A-11], Version 3.0 under Ontario regulation 419/05, dated February 2017.
[7] New Zealand Ministry for the Environment (2004) Good Practice Guide for Atmospheric Dispersion Modelling.

and are adjacent to each other (within three stack diameters), a stack cluster can be modelled as one stack i.e., one pseudo stack that has an equivalent diameter, equivalent volume flow and emission rate as the stack cluster.

67. The Ontario Ministry guidance states in Section 2.3.1., page 21, second paragraph that the PRIME (Plume Rise Model Enhancements) algorithm was designed, inter alia, with regards to enhanced plume dispersion coefficients due to the turbulent wake. Further in Section 4.5.3. under the title of Multiple Stacks (page 58) they state that plume rise is enhanced when stacks are closer together. The definition of being considered close together is "*less than a single stack diameter apart*".
68. Further study of the New Zealand guidance states after 'Recommendation 21', page 49, that stacks that have similar diameters and flow rates are considered adjacent when within three stack diameters.
69. The guidance provided applies the same methodology of applying stack diameter as a distance measure to determine whether the stacks are in a cluster or separated for the determination of cumulative or enhanced turbulence effect. For the purpose of this exercise, the higher valued measure of a diameter distance equal to three times stack diameter is applied.
70. The permitted and proposed turbines both have associated 6.7m diameter stacks. For the plumes of these three stacks to interact significantly and create an enhanced plume rise effect they would need to be within three stack diameters of each other, or within 20.1m of each other.
71. The proposed turbine stacks will be located more than 42m apart, this will be more than double the recommended distance within which enhanced plume rise due to multiple stacks is likely to occur.
72. The likelihood for enhanced plume rise due to multiple turbines is highly unlikely. The effect of additional turbines on turbulence will be similar to, and no greater than, the effect of the permitted turbine at the proposed stack distances.

Summary

73. The proposed development will not impact aircraft departing Runway 28L or arriving to land on Runway 10R.
74. This conclusion is on the basis that the cumulative effect of three turbine stacks operating simultaneously will not enhance the turbulence effect. The turbine stacks are sufficiently spaced so as to assure that the combined turbulence effect will be no worse than a single turbine stack operating and as demonstrated in the Straten CSL Aviation Study.

Technical Safeguarding

75. Airports have a responsibility, in terms of their licencing conditions, to provide a safe environment for day-to-day flight operations. Various types of Safeguarding are employed at, and in the vicinity of, airports – amongst them the requirement to ensure that the accuracy and integrity of signals from Airport Air Navigation Equipment (AANE) are not impacted, or otherwise degraded, by buildings and structures on, or near, the airport.
76. Cyrrus Ltd were tasked to undertake a detailed assessment of the AANE environment for Dublin Airport. The results are summarised below with further detail contained in the Technical Safeguarding Assessment, reference CL-6103-RPT-002, version 1.0, dated 28 October 2024. The Cyrrus report is appended to this summary report.
77. A computer model of the proposed Energy Facility was created and assessed against relevant AANE as published in the Irish Aviation Authority (IAA) Aeronautical Information Publication (AIP).
78. Relevant navigational equipment includes the Doppler Very High Frequency Omni Range (DVOR) navigational aid, Distance Measuring Equipment (DME), and elements of the Instrument Landing Systems (ILS) associated with Runway 10R/28L as depicted in FIG.

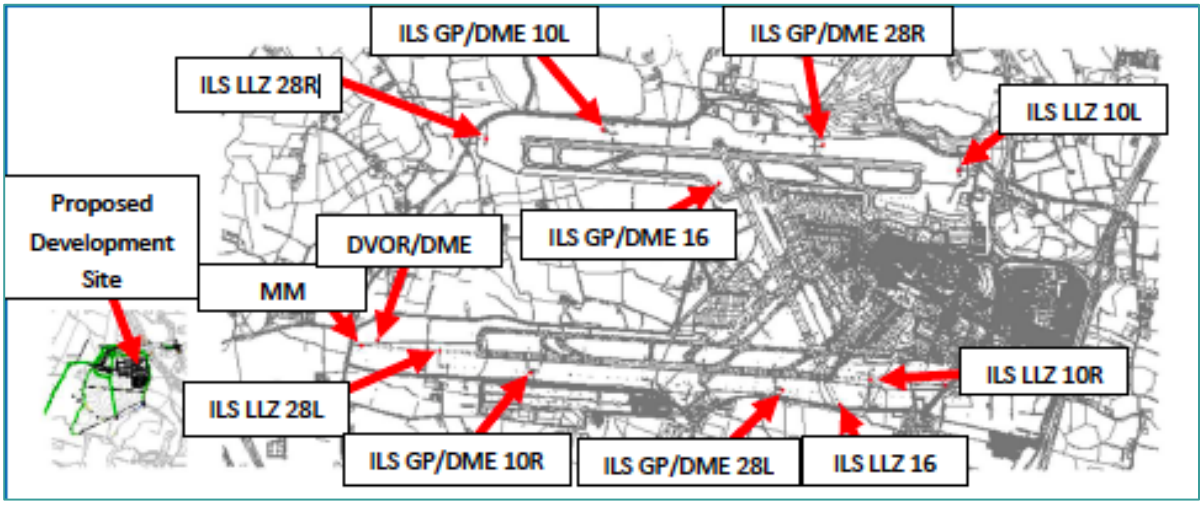

FIGURE 8: DEVELOPMENT SITE RELATIVE TO AANE AT DUBLIN AIRPORT, CYRRUS LTD, 2024

79. The minimum safeguarded areas for these technical facilities are defined by the International Civil Aviation Organisation (ICAO) in the document ICAO EUR DOC015. The purpose of these safeguarded areas is to identify developments with the potential for causing unacceptable interference to navigation facilities. Developments that infringe a safeguarded area must undergo technical assessment to determine the degree of interference, if any.

80. The summary findings of the Technical Safeguarding Assessment, against chimney stacks of 33m above ground level, are as follows:

Instrument Landing System (ILS) Localiser

- The proposed developments do not infringe the Building Restricted Areas (BRAs) of ILS Localiser (LLZ) 10L, 16, 28L and 28R.
- The proposed developments infringe the BRA of ILS LLZ 10R.
- The results of the worst-case modelling indicate that the Phase 2 and 3 energy plant developments will have a minor impact on ILS LLZ 10R. The actual effects are expected to be significantly less than those predicted by the worst-case model.

ILS Glidepath

- The proposed developments do not infringe the BRAs of ILS Glidepath (GP) 10L, 16, 28L and 28R.
- The proposed developments infringe the BRA of ILS GP 10R.
- The results of the worst-case modelling indicate that the proposed developments will have a minor impact on ILS GP 10R performance. The actual effects are expected to be significantly less than those predicted by the worst-case model.

ILS Distance Measuring Equipment (DME)

- The proposed developments do not infringe the BRAs of ILS DME 16, 28L and 28R.
- The proposed developments infringe the BRAs of ILS DME 10L and 10R.
- The results of worst-case calculations show that ILS DME 10L and 10R multipath interference from the Phase 2 and 3 energy plant developments will have no impact on users of the facility.
- Line of sight modelling predicts that the Phase 2 and 3 developments will not cause shadowing for aircraft during approaches from 15 Nautical Miles at 4,000ft.

Conclusion

81. An analysis of the Obstacle Limitation Surface (OLS) has determined that subject to acceptance of the Inner Horizontal Surface (IHS) being penetrated, the additional chimney stacks could be constructed to a height of up to 45.2m above ground level.
82. If Dublin Airport was unable to accept a penetration of the IHS, a maximum construction height of 33m above ground level would keep the development clear of the OLS.
83. However, the Type A Surface for RWY28L limits the Phase 2 chimney stack (North Site) to a maximum height of 29.3m (subject to detailed terrain analysis).
84. The Phase 3 chimney stack (South Site) does not impact the Type A Surface and therefore is restricted by the OLS environment only.
85. There is no cumulative impact of increased turbulence as a result of three chimney stacks operating simultaneously. The stacks are sufficiently spaced to ensure that turbulence is no worse than a single chimney stack operating. As a result, the proposed development will not impact aircraft departing Runway 28L or arriving to land on Runway 10R.
86. An assessment of Dublin Airport's Air Navigation Equipment (AANE) has determined that although there is a penetration of the Building Restricted Areas (BRA) of some systems, a detailed analysis concluded little to no impact.
87. It is the opinion of this report that whilst there is opportunity to develop the chimney stacks to a height of up to 45.2m, there is no impact on the proposed design and layout up to a height of 29.3m and 33m above ground level respectively for Phase 2 and Phase 3.
88. This report must be read in conjunction with a number of supporting documents detailed below:
    - Technical Safeguarding Assessment, Cyrrus Ltd, reference CL-6103-RPT-002, version 1.0, dated 28 October 2024.
    - Aviation Study, Straten CSL, reference 29011, version 1.0, dated 14 September 2022.
    - Letter to Irish Aviation Authority (Airnav Ireland), Straten CSL, reference 29011, dated 05 August 2022.
    - Expanded Model for Determining the Effects of Vertical Plumes on Aviation Safety, The MITRE Corporation, Centre for Advanced Aviation System Development, reference 13-0183, dated 2012.
    - Kilshane 293MW Flex Gen Project, Kilshane Energy, dated August 2022.