Aeronautical Assessment Report

RE SITE AT
Cookstown, South County Dublin

FOR
Strategic Housing Development
Planning Application

BY
Pyrmont Property Development Ltd.

January 2019
1. **Description of the Site**

1.1 This report addresses the aviation impact of a proposed Strategic Housing Development planning application on a site (of 0.595 hectares) in South County Dublin, located beside Cookstown Luas Station and to the north-west of Tallaght Hospital.

   In the current South Dublin County Council Development Plan 2016-2022, this site (formerly part of Cookstown Industrial Estate) is zoned ‘Objective REGEN: To facilitate enterprise and/or residential-led regeneration.’ *(Site shown towards top of SDCC Map 9 extract below).*

1.2 Items of aeronautical significance affecting the site are:

   (i) The site lies under the Approach and Take-Off Climb Surfaces to/from Casement Aerodrome’s main runway 11/29 in South County Dublin, with its nearest corner at a distance of 4.08 km from the threshold of runway 29; and

   (ii) The site lies under the Inner Horizontal Surface at Casement military aerodrome *(see illustration in Section 7 on page 8)*; and

   (iii) The ground level at the site lies at about 10m higher than the ground level at the threshold of Casement Aerodrome’s runway 29.
2. **Obstacle Limitation Surfaces in Relation to the Site**

2.1 The Department of Defence has adopted the I.C.A.O. Obstacle Limitation Surfaces in relation to Casement Aerodrome. Being a military aerodrome, Casement is not bound by these Civil Aviation standards, but the Department of Defence has opted to apply these Standards (to protect aircraft in flight) at Casement. These Obstacle Limitation Surfaces – similar to the E.A.S.A. Specifications which now apply at Dublin and Weston airports – are set out by the International Civil Aviation Organization (based in Montreal) as *International Standards and Recommended Practices* in its Annex 14 – ‘Aerodromes’ document.

2.2 Obstacle Limitation Surfaces of relevance to this particular site at Cookstown are

(i) the Inner Horizontal Surface for Casement Aerodrome as a whole;
(ii) the Approach Surface to Runway 29; and
(iii) the Take-Off Climb Surface from Runway 11.

The Inner Horizontal Surface is a horizontal plane lying at 45m above the aerodrome’s datum level (a datum set at 86.6m OD at Casement). The Approach and Take-Off Climb surfaces are inclined planes (of different widths which increase as distance from the runway increases, and which rise at different slopes depending on the category of runway).

2.3 The entire site lies within the area of the Inner Horizontal Surface at Casement; and under the Approach Surface to Casement Runway 29 (both as designated by the Department of Defence, and as marked on the current South Dublin County Council Development Plan Index Map, *illustrated below*).
3. Relevant Development Plan Paragraphs

Of particular relevance to the aeronautical assessment of the site in question are the paragraphs reproduced below from the South Dublin County Council Development Plan 2016-2022, including —

3.1 (i) paragraph (a) referring to Casement runway 11/29 on page 137 of the Plan (under Section 7.8.1 ‘Casement Aerodrome’ – ‘IE8 Objective 2’):

The airspace of Casement is defined by the Obstacle Limitations Surfaces, prepared and mapped on the County Development Plan map in accordance with the ICAO Standards and the Irish Aviation Authority ‘Guidance Material on Aerodrome Annex 14 Surfaces (2015)’, including the following:

a). Prevent objects from penetrating the Obstacle Limitation Surfaces for runway 11/29. The existing main runway (11/29) is considered as an instrument approach Code 4 runway and the relevant Obstacle Limitation Surfaces of the Irish Aviation Authority ‘Guidance Material on Aerodrome Annex 14 Surfaces’ (2015) are applicable.

3.2 (ii) the paragraphs on ‘Outer Approach Area’ on page 229 of the Plan (under Section 11.6.6 ‘Aerodromes’):

Outer Approach Area
Under the Outer Approach Surface (outside the Inner Approach Area but within the approach funnels), graded heights of development below the Obstacle Limitation Surfaces of the runways may be permitted, subject to demonstration that the development is not an obstacle to the operation of the runway.

The Planning Authority will consult with the DoD and the IAA, as required, in this assessment. The Planning Authority will require the applicant to submit a longitudinal section through the relevant Approach Surface funnel. The section drawing shall include the following:

→ The Ordnance Datum (OD) of the relevant runway,
→ The approach surface slope for the relevant runway in accordance with Table 3 & 4 of the IAA Guidance Material on Aerodrome Annex 14 Surfaces (2015) and set out in Table 11.26 below,

Table 11.26: Aerodrome Surface Slopes

<table>
<thead>
<tr>
<th>APPROACH RUNWAY</th>
<th>SURFACE SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casement Runways 11/29</td>
<td>2% for first sector (3000m)</td>
</tr>
<tr>
<td>Casement Runways 05/23</td>
<td>3.33% (non-instrument runway)</td>
</tr>
<tr>
<td>Weston Runway 07/25</td>
<td>4%</td>
</tr>
</tbody>
</table>

→ The OD of the highest point and OD of the predominant height of the proposed development,
→ A range of OD reference points for the existing ground levels on the subject site,
→ The horizontal distance of the subject site from the Aerodrome, and
→ Heights of existing permanent obstacles in the vicinity of the site if applying the principle of shielding (see Section 3.23 of the Irish Aviation Authority Guidance Material on Aerodrome Annex 14 Surfaces, 2015).

The distance from threshold shall be taken into account in the section drawing.

For significant developments and in instances of marginal cases, the applicant may be requested to submit an individual aeronautical assessment.
and

3.3 (iii) the paragraphs on ‘Inner Horizontal Surface’ on page 230 of the Plan (also under Section 11.6.6 ‘Aerodromes’):

<table>
<thead>
<tr>
<th>IMPLEMENTATION</th>
<th>SOUTH DUBLIN COUNTY COUNCIL DEVELOPMENT PLAN 2016 - 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Horizontal Surface</td>
<td>Generally, development will be acceptable in this zone, subject to the development having an OD height below the height restriction of the Inner Horizontal Surface (generally 45 metres above the elevation datum of the Aerodrome). In general, this will be applicable to development above the prevalent building height (based on OD) of the area. The Inner Horizontal Surface of Casement is 86.6 metres OD and Weston is 91.3 metres OD. Similar to development within the Outer Approach Surface, the applicant should demonstrate that the proposed development is not an obstacle to the Aerodrome airspace. The applicant shall be required to detail the OD height of the proposed development, in the context of the relevant Aerodrome.</td>
</tr>
</tbody>
</table>

3.4 We have noted that there is a misprint in the Development Plan in the paragraph reproduced directly above: the Inner Horizontal Surface of Casement Aerodrome is in fact set at 131.6 metres OD [not at 86.6m OD as written, which is the aerodrome elevation datum from which the IHS is established (at 45m higher)]. We understand this misprint is to be corrected in the Plan text.

3.5 Approach and Take-Off Climb Surfaces are among the more significant Obstacle Limitation Surfaces at an aerodrome.

Below (in Section 4) are our calculations in relation to the Approach Surface to Casement Runway 29 (rising at slopes of 2% and 2.5%) as provided for in the SDCC Development Plan.

We also include calculations (in Section 5) in relation to the Take-Off Climb Surface from Casement Runway 11, because – for this category of runway (code 4, precision approach) – the Take-Off Surface is lower at the site’s location than the Approach Surface. [The Take-Off Climb Surface rises continuously (for 15km) at a 2% slope, while the Approach Surface slope changes from 2% to 2.5% after 3km).

For this category of runway, the Take-Off Climb Surface (which starts at 180m width) is narrower than the Approach Surface (which starts from the flight strip at 300m width). This difference in width is not relevant however for this site, which is located below the centre-line of both Surfaces.

3.6 Prior to submission of this report, we have consulted with – and provided details of the proposed development to – the Air Corps, the Department of Defence, and the Irish Aviation Authority.

3.7 We also point out that much of the information concerning aviation and aerodromes (including for Casement military aerodrome) has been provided by our own firm to S.D.C.C. (at the time of preparation of the previous Development Plan).
4. **Calculations with regard to the Approach Surface to Runway 29**

4.1 **Relevant Data:**

The relevant runway threshold (29) is stated on the Aerodrome Chart to be at 315ft AMSL elevation, i.e. at 96m OD and this is the elevation of its Approach Surface which commences at 60m from the runway threshold.

We calculate that – measured along the centre of the Approach Surface (i.e. the extended centre-line of runway 29) – the overall site lies at between 4.02km (at its nearest western corner) and 4.14km (at its farthest eastern corner) from the start of the Approach Surface to Casement’s Runway 29.

4.2 The ground elevation on the site is at 106.85m OD. The small variations in existing ground levels across the site can be ignored because all proposed building heights are related to this established ground elevation of 106.85m OD.

4.3 The slopes of the **Approach Surface** to Runway 29 (as stated in the Development Plan – and as per ICAO for a Code 4 instrument runway) are 2% for the first 3,000 metres and 2.5% for the next 3,600 metres.

Thus, at the site’s nearest proposed structure (at 4,025m from the Flight Strip to Runway 29), the Approach Surface lies at 181.625m OD*, and therefore lies 74.77m above the 106.85m OD ground elevation at that part of the site.

*calculated as follows —

\[
(3000 \times 2\%) + (1025 \times 2.5\%) + 96m OD = 60 + 25.625 + 96m = 181.625m OD
\]

And at the site’s farthest corner from Runway 29 (at 4,140m from the Flight Strip) the Approach Surface lies at 184.5m OD** (77.65m above ground level).

**calculated as follows —

\[
(3000 \times 2\%) + (1140 \times 2.5\%) + 96m OD = 60 + 28.5 + 96m = 184.5m OD
\]

4.4 Residential building heights of 6 to 9 storeys are proposed on this site, with the highest part being of 32.45m height, i.e. extending to 139.3m OD. This height is well below the 181.625m OD elevation of the Approach Surface above the site, and the proposed development complies with the requirements of the S.D.C.C. Development Plan with regard to that Surface.

4.5 A **Longitudinal Section Diagram** (on page 7 following) illustrates the above features and dimensions (and a roof plan of the proposed building is included on page 9).
5. Calculations with regard to the Take-Off Climb Surface from Runway 11

5.1 The slope of the Take-Off Climb Surface from Runway 11 (as defined by the International Civil Aviation Organization for Code 4 runways in its Annex 14 [Aerodromes] to the Convention on International Civil Aviation) is 2%.

Thus, above the proposed development at site's north-western corner, the Take-Off Climb Surface from Runway 11 is at 176.5m OD* (and therefore at 69.6m above the ground in this location).

* calculated as follows —
\[ 4025 \times 2\% + 96m \text{ OD} = 80.5 + 96m = 176.5m \text{ OD} \]

And at the site’s south-eastern corner, the Take-Off Surface from Runway 11 is at 178.8m OD** (and therefore at 71.9m above the ground in this location).

** calculated as follows —
\[ 4140 \times 2\% + 96m \text{ OD} = 82.8 + 96m = 178.8m \text{ OD} \]

5.2 Thus the proposed development (which extends to 139.3m OD) will not affect the Take-Off Climb Surface from Casement Runway 11 (as defined by I.C.A.O.), which lies in excess of 37m above his highest point.

5.3 I.C.A.O. includes a recommendation (in paragraph 4.2.26 of its Annex 14 – Aerodromes’) that ‘If no object reaches the 2% take-off climb surface, new objects should be limited to … a surface down to a slope of 1.6%…’ We therefore include the following calculation in relation to a possible 1.6% Take-Off Climb Surface, which lies at 160.4m OD*** above the north-western corner of the site.

*** calculated as follows —
\[ 4025 \times 1.6\% + 96m \text{ OD} = 64.4 + 96m = 160.4m \text{ OD} \]

5.4 In addition, I.C.A.O. includes a provision (in paragraph 3.8.1.1 of its Annex 4 – Aeronautical Charts’) that any obstacle projecting above a 1.2% slope in the Take-Off path be considered a significant obstacle, and be shown on Aeronautical Charts. We therefore include an additional calculation in relation to a 1.2% slope, which lies at 144.3m OD**** above the site (and higher than the proposed development).

**** calculated as follows —
\[ 4025 \times 1.2\% + 96m \text{ OD} = 48.3 + 96m = 144.3m \text{ OD} \]

5.5 Thus the proposed development will not affect a lower Take-Off Climb at 1.6% slope, and does not constitute a significant obstacle in respect of the 1.2% slope.
Aviation Report re Site at Cookstown, South County Dublin

Typical Take-Off Location

170m OD
160m
150m
140m
130m
120m
110m
100m
90m
80m OD
70m
60m
50m
40m
30m
20m
10m
0m

AERIAL PHOTO MAP

PLAN SCALE [A4-SIZE] 1:30,000 APPROX.

With 10m CONTOURS and OBSTACLES AS MARKED ON CASEMENT CHARTS

SITE OUTLINE: 10m CONTOURS: OBSTACLES: MAST (UNLIT) BUILDING

O’Dwyer & Jones Design Partnership
Aviation Planning Consultants © 8-2018

Casement Aerodrome Runway 11-29

Approach Surface at 2% slope
Take-Off Climb Surface at 2%
7. **The Site in Relation to the Inner Horizontal Surface at Casement**

As noted above, the **Inner Horizontal Surface** at Casement Aerodrome is at 131.6 metres OD (being 45m above the Department of Defence’s chosen datum of 86.6m – which is the elevation of the aerodrome’s lowest runway threshold). On the following drawing [containing Irish Aviation Authority & Aer Corps data] this IHS is shown coloured blue (with the site’s location inserted here in yellow). Approach Surfaces (and the narrower Take-Off Climb Surfaces) are included in purple. —

7.1 It can be seen that, although it lies at more than 4 km from Runway 11/29, all of the site falls just within the area of the Inner Horizontal Surface of Casement Aerodrome (as well as being under – but not projecting above – the Approach and Take-Off-Climb Surfaces to/from Runways 11/29).

7.2 Ground level on the site lies at 106.85m OD, i.e. at 24.75m below the Inner Horizontal Surface. This means that the small part of the proposed development which extends to 32.45m above ground level will project above the Inner Horizontal Surface by 7.7 metres (with two other parts reaching 138.8m and 136.1m OD). [This is indicated (in blue) in the Longitudinal Section Diagram on the previous page 7, with a plan of the various proposed roof levels on the following page 9.]

7.3 Although the proposed development is well clear of the more significant Obstacle Limitation Surfaces (the Approach and Take-Off Climb Surfaces) by 37 to 42 metres, the projection by part of it above the Inner Horizontal Surface at Casement Aerodrome requires an aeronautical assessment, which is provided on the following two pages, in Section 7.4.
7.4 In assessing the projection above Casement’s **Inner Horizontal Surface** in this location, the following factors must be taken into account:

(i) While it is a ‘Standard’ of I.C.A.O. (i.e. a requirement, set out in paragraphs 4.2.19 and 4.2.15 of **Annex 14**) that new objects should not project above an aerodrome’s Approach Surface or its Take-Off Climb Surface, it is merely a ‘Recommendation’ (defined by I.C.A.O. as ‘desirable’), under paragraph 14.2.20 of **Annex 14**, that ‘new objects should not be permitted above … the inner horizontal surface, except when …shielded by an existing immovable object or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.’ An Inner Horizontal Surface – while it should normally be protected – is not regarded by I.C.A.O. as one of the more critical Obstacle Limitation Surfaces.

(ii) The purpose of an Inner Horizontal Surface is stated by I.C.A.O. as being ‘to protect airspace for visual circling prior to landing’. However the steeply rising ground to the east and south of Casement (where the ground itself, including a 1km length of the Naas Road, and a very large number of existing obstacles penetrate Casement’s I.H.S. to significant extents) mean that aircraft cannot circle anywhere near the elevation of Casement’s Inner Horizontal Surface: they are required (by the **Rules of the Air Order**) to fly at significantly greater heights – a minimum of 150m above ground level or above any structure.

(iii) The choice of datum level for an Inner Horizontal Surface is subjective. It is up to each aerodrome to choose its own datum for the setting out of an I.H.S., and a particularly low datum (i.e. the aerodrome’s lowest threshold) was chosen at Casement, so that its I.H.S. is set at a relatively lower level than at other aerodromes. A frequent datum for setting out an I.H.S. is the elevation of the Aerodrome’s Reference Point – which for Casement is given [on the I.A.A. ‘Asset’ data] as 318.1ft /97m OD. If this 10.4m (34ft) higher datum had been chosen, the I.H.S. would lie at 142m OD, i.e. at a couple of metres above the tallest part of the proposed development (a lift-shaft which reaches 139.3m OD elevation – see roof plan above).

I.C.A.O. states (in its **Airport Services Manual, Part 6 ‘Control of Obstacles’**) that ‘selection of the datum’ for an I.H.S. ‘should take account of (a) the elevations of the most frequently used altimeter setting datum points;’ and ‘(b) minimum circling altitudes in use or required.’ [It is noted that I.A.A. recommends consideration of a midpoint between runway end elevations as the datum for setting out an Inner Horizontal Surface.]
7.4 (contd.)

(iv) Ordinarily, a site located at more than 4km from a runway threshold will lie under the aerodrome’s higher Conical Surface rather than under its Inner Horizontal Surface, because an I.H.S. for the highest category of runway extends to 4 km from its centreline. In this instance, the I.H.S. above the site (which lies at 4.08km from runway 29) is generated from Casement’s subsidiary runway 05/23, whose 23 end is closer to the site than the (displaced) threshold of runway 29. This has the effect of extending the I.H.S. to more than 4km from runway 29 (with a greater length of that runway’s more critical Approach and Take-Off-Climb Surfaces lying under the aerodrome’s Inner Horizontal Surface).

(v) While the site’s ground level is 10m higher than the threshold of Runway 29, it also lies between two significantly higher land areas: to the north (where the ground level beside Cookstown Road rises to 129.4m OD (i.e. to within 2.2m of the Inner Horizontal Surface), and a very extensive land area to the south where the N81 Blessington Road reaches the elevation of the Inner Horizontal Surface just beyond Jobstown, and the ground continues to rise above Casement’s Inner Horizontal Surface by 254 metres at Verschoyle’s Hill (whose elevation is 386m OD).

(vi) On the elevated ground beside Cookstown Road (at 590m north of the site, and also lying under the Approach Surface to Runway 29) there is an existing reservoir pump-house building constructed at a ground elevation of 129.4m OD which itself projects above the Inner Horizontal Surface, and on which there is an aerial extending to a height of 139.4m approx. – i.e. a less-easily-visible existing object which extends to a slightly higher elevation than the highest point of the proposed development. This item (illustrated at right, and in the Longitudinal Section Diagram on page 7) provides a ‘shielding’ effect (in relation to the Inner Horizontal Surface) for the proposed development.

(vii) A projection above the outer part of an Inner Horizontal Surface (close to where the Conical Surface gives much greater clearances) is much less significant than a more centrally located projection.

7.5 Conclusion:

Taking into account the factors described above [at paragraphs 7.4 (i) to (vii)], the proposed projection by 7.7m above the outer part of this I.H.S. would not normally be considered aeronautically significant, in particular if the projecting part is provided with suitable aeronautical obstacle lighting (as is proposed).
8. **Other Aviation Considerations Relevant to this Site**

8.1 **Tallaght Hospital Helipad**

We have checked with the Irish Aviation Authority, the Coast Guard, and the Air Corps in relation to any possible effect that the proposed development might have on helicopter operations into or out of the existing helipad at Tallaght Hospital. Being a private helipad, it has no published flight procedures or established obstacle limitation surfaces.

We are informed by Air Corps ‘Heli Ops’ that the proposed development is not expected to have any effect on operations to/from the helipad (which is located to the other side of Tallaght Hospital, at more than 610m from the site). The typical direction of approach to, and take-off from, this helipad is to the south-west (for reasons of wind direction, and to minimize overflight of inhabited areas) and this takes helicopters away from the Cookstown site. The helipad currently faces (at the other side of Belgard Square North, directly to its south-east) existing buildings of similar height.

8.2 **Outer Horizontal Surfaces to Dublin Airport and to Weston Aerodrome**

The site and the proposed development lies about 1km outside the Outer Horizontal Surface to Dublin Airport, which is unaffected by the development.

The site lies under (and towards the outer edge of) a new Outer Horizontal Surface established for Weston Airport; however this surface is significantly higher than the proposed development [196.33m OD] and is unaffected by it.

8.3 **Solar Panels – Glint & Glare**

This aspect is the subject of a separate ‘glint & glare’ study by Innovision Media Ltd., with whom we have consulted. We understand that non-reflective solar panels are proposed, and that these panels (being directed towards the south) will inevitably be oriented away from the east-west flight directions of the relevant runway(s) 11/29.

8.4 **External Lighting**

Being under the centre of the Approach and Take-Off Climb Surfaces to and from runway(s) 11/29, any external lighting (including any street lighting) should be of the cut-off type (showing no light above the horizontal).

8.5 **Tower Cranes During Construction**

It is likely that any tower cranes used in the construction of the proposed development will project above the Inner Horizontal Surface, and may reach Take-Off Climb or Approach Surfaces. It will be necessary [under S.I. 215 of 2005 – ‘Irish Aviation Authority (Obstacles to Aircraft in Flight) Order’] for prior notification of use of any tower crane to be submitted, 30 days in advance, to the Irish Aviation Authority and to Casement Aerodrome, who may need to issue the necessary notifications to pilots.
9. Summary

9.1 Approach & Take-Off Climb Surfaces

The Approach Surface and the Take-Off Climb Surface to Casement Runway(s) 11/29 are the significant Obstacle Limitation Surfaces in relation to this site, and the proposed development lies significantly lower than both of these surfaces, i.e. its highest point lies at over 42 metres below the Approach Surface, and at over 37 metres below the Take-Off Climb Surface. The development is also lower than the 1.2% slope which would require it to be notified as an obstacle on aeronautical charts.

9.2 Inner Horizontal Surface

Part of the proposed development extends to 139.3m OD, which therefore projects by 7.7m above the Inner Horizontal Surface at Casement. This however is a less significant surface, and – taking into the factors listed in Section 7.4 (on pages 9-10 above), and in particular taking into account the existing aerial erected on nearby elevated ground at Cookstown Road which extends to 139.4m OD approx. – this projection is not considered significant or likely to affect the operation of aeroplanes. It is proposed that aeronautical obstacle lighting will be provided at the highest part.

9.3 General

We consider that the proposed residential development complies with the aviation and aeronautical requirements affecting the site.

During the preparation of this report, we have consulted with the Air Corps at Casement Aerodrome, with the Department of Defence, and with the Irish Aviation Authority, to all of whom we have provided details of the proposed development and of our aeronautical calculations in relation to it.

J. Declan O’Dwyer B.Arch MBA RIBA
14th January 2019
O’Dwyer & Jones Design Partnership
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