Aviation Safety Assessment
&
Aeronautical Assessment Report
– Additional Information –
[Planning reg. ref. SD22A/0065]

re
Warehouse Development
at
Magna Avenue and Magna Drive,
Citywest, Dublin 24
in South County Dublin

for
Rockface Development Ltd

May 2022

O'Dwyer & Jones Design Partnership
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Aviation Safety Assessment — 21st May 2022

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1. Purpose of this Report

1.1 This report addresses the aviation impact of a proposed Warehouse development for Rockface Development Ltd., on a 3.03 ha site at Magna Avenue and Magna Drive, Citywest, Dublin 24, for which the South Dublin County Council planning register reference no. is SD22A/0065.

1.2 In particular, this report addresses the aviation items mentioned in SDCC Decision Order no. 0505 of 19 April 2022, and listed (at no. 8) in South Dublin Planning Department's letter dated 22 April 2022 in which Additional Information was requested *[and summarised as follows]* :
"8. Aviation Safety—
(a) … As per the request of the Department of Defence, the applicant is invited to submit ***an Aviation Safety Assessment.***
(b) … The applicant is requested to provide ***a longitudinal section drawing****, with details [as listed in A.I. letter] — for the development… for the relevant aerodrome /airport… for the relevant "obstacle limitation surfaces"… and for the surroundings…*

1.3 This report also assesses all other aviation-related issues which might affect the site and the development.

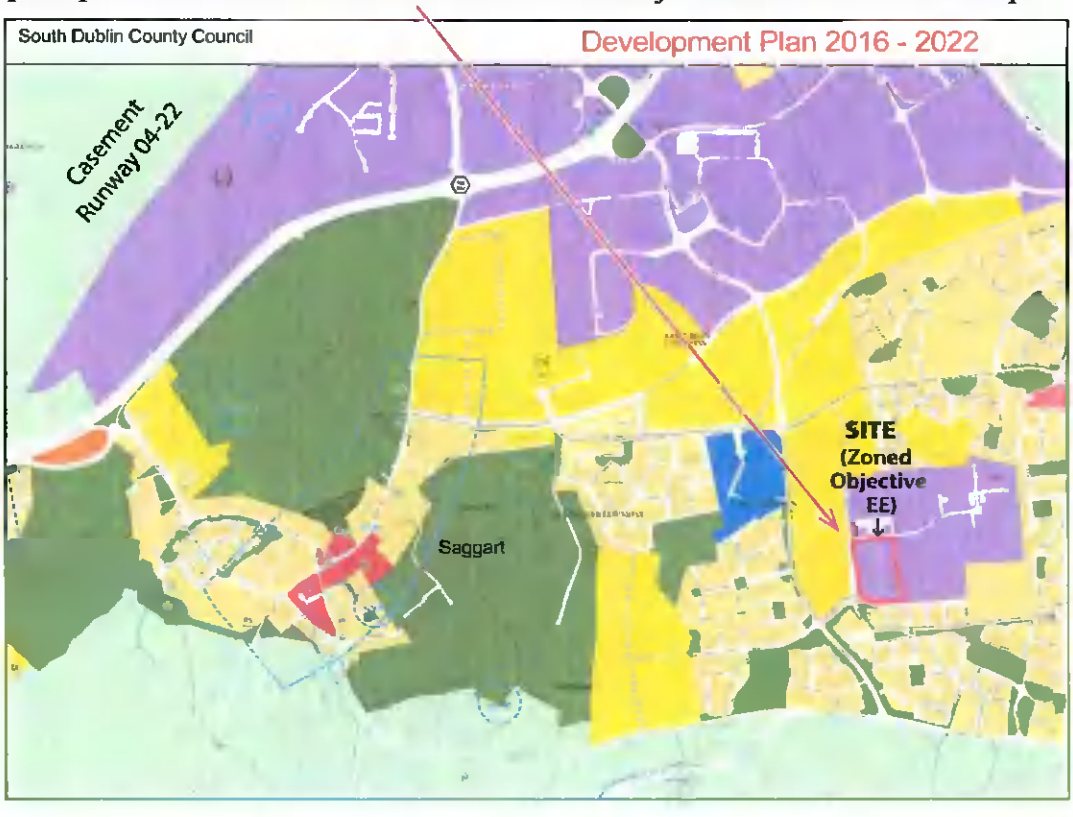
2. Description and Zoning of the Site

2.1 Site Description:

The site, of area 3.03 ha (*outlined in red on the aerial photo below*), is directly east of Magna Drive, north of Magna Avenue, and west of Magna Business Park, at Citywest, Co. Dublin. Ground elevations on the site vary from 118.5m OD to 127.2m OD, with the proposed Warehouse ground floor level at 122.8m OD.

2.2 Zoning:

In the current South Dublin County Council Development Plan 2016-2022, the Magna Business Park (which includes this site) is zoned **'Objective EE: To provide for enterprise and employment related uses'** (in which 'Warehousing' is 'permitted in principle'). *The site is outlined in red below on an extract from the 2016-2022 Plan Map 8.*



3. Relevant S.D.C.C. Development Plan Paragraphs

Of particular relevance to the aeronautical assessment of this site at Magna Avenue & Magna Drive are the paragraphs reproduced below from the South Dublin County Council Development Plan 2016-2022, which include —

3.1 Paragraphs 7.8.0 'Aerodromes & Airport' on page 135 of the Plan:

7.8.0 Aerodromes & Airport

This section sets out the general restrictions and requirements on development within the County for Dublin Airport, Casement Aerodrome and Weston Aerodrome.

The safeguarding requirements in the vicinity of civil aerodromes are principally set out as 'International Standards and Recommended Practices' within 'Annex 14 to the Convention on International Civil Aviation', which is published by the International Civil Aviation Organisation (ICAO) and the Irish Aviation Authority Guidance Material on Aerodrome Annex 14 Surfaces (2015). These provide dimensions and the basic criteria needed for the preparation of safeguarding maps for all civil aerodromes, with dimensions and criteria varying in relation to the size, shape and usage of different aerodromes.

The main Obstacle Limitation Surfaces for each instrument runway are mapped on the County Development Plan Map Index.

Casement Aerodrome, being a military aerodrome, does not fall under the control of the Irish Aviation Authority but the ICAO Standards and Recommended Practices are applied as policy by the Department of Defence at Casement Aerodrome.

and

3.2 Paragraphs 7.8.1 'Casement Aerodrome' on pages 136-137 of the Plan, including Policy Objectives IE8:

7.8.1 CASEMENT AERODROME

Casement Aerodrome is in continuous aviation use and is the only fully equipped military airbase in the State and serves as the main centre of Air Corps operations.

INFRASTRUCTURE AND ENVIRONMENTAL QUALITY IE8 Policy – Casement Aerodrome

It is the policy of the Council to safeguard the current and future operational, safety and technical requirements of Casement Aerodrome and to facilitate its ongoing development for military and ancillary uses, such as an aviation museum, within a sustainable development framework.

IE8 Objective 1:

To ensure the safety of military air traffic, present and future, to and from Casement Aerodrome with full regard for the safety of persons on the ground as well as the necessity for causing the least possible inconvenience to local communities.

IE8 Objective 2:

To maintain the airspace around the aerodrome free from obstacles to facilitate aircraft operations to be conducted safely, including restricting development in the environs of the aerodrome.

IE8 Objective 3:

To implement the principles of shielding in assessing proposed development in the vicinity of Aerodromes, having regard to Section 3.23 of the Irish Aviation Authority 'Guidance Material on Aerodrome Annex 14 Surfaces (2015)'.

and

3.3 The paragraphs on the 'Inner Horizontal Surface' in Section 11.6.6 'Aerodromes' on pages 225 to 231 of the Plan:

Inner Horizontal Surface

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.

[correction: 131.6m O.D.]

The applicant shall be required to detail the OD height of the proposed development, in the context of the relevant Aerodrome.

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's datum level, 45m above which the IHS is established].

3.5 The site at Magna Avenue & Magna Drive that is the subject of this report lies well outside (and is not affected by) any Approach or Take-Off Climb Surfaces mentioned in the Development Plan (which are the more important obstacle limitation surfaces).

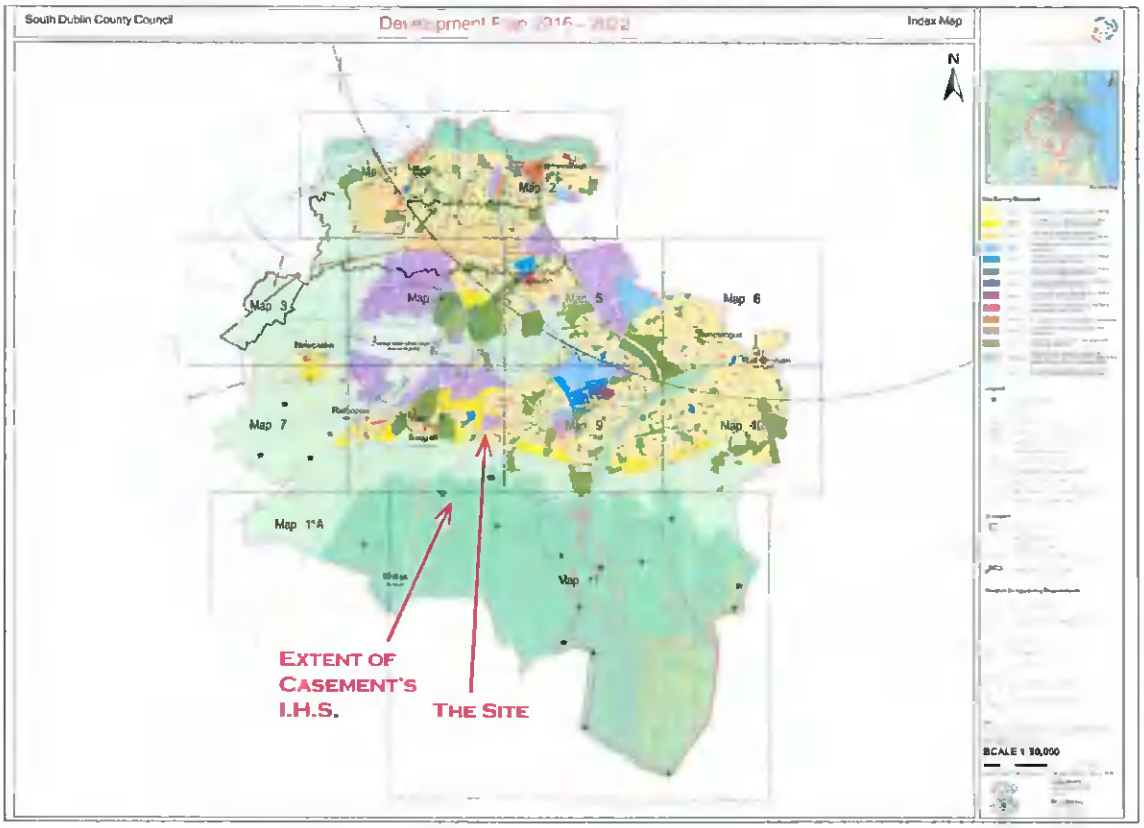
3.6 Due to a shift in magnetic variation, the runways at Casement Aerodrome have been redesignated in February 2019, so that where the S.D.C.C. Development Plan refers to Casement runways **11/29 and 05/23** (as in the paragraphs quoted above), these same runways are now designated (and referred to in this report) as Casement runways **10/28 and 04/22**.

The runways at Weston and Dublin Airports remain designated as described in the 2016-22 Development Plan. However, since December 2017, Dublin Airport has become subject to E.A.S.A. [European Aviation Safety Agency] standards rather than the I.C.A.O. 'Annex 14' Standards referred to in the S.D.C.C. Development Plan. These ICAO Standards & Recommended Practices (which do not necessarily apply to military aerodromes) are applied as policy by the Department of Defence at Casement Aerodome.

3.7 Much of the information concerning aviation and aerodromes in the SDCC Development Plan (including data for Casement military aerodrome) has been provided by this firm to SDCC (at the time of preparation of the previous Development Plan).

3.8 SDCC Index Map

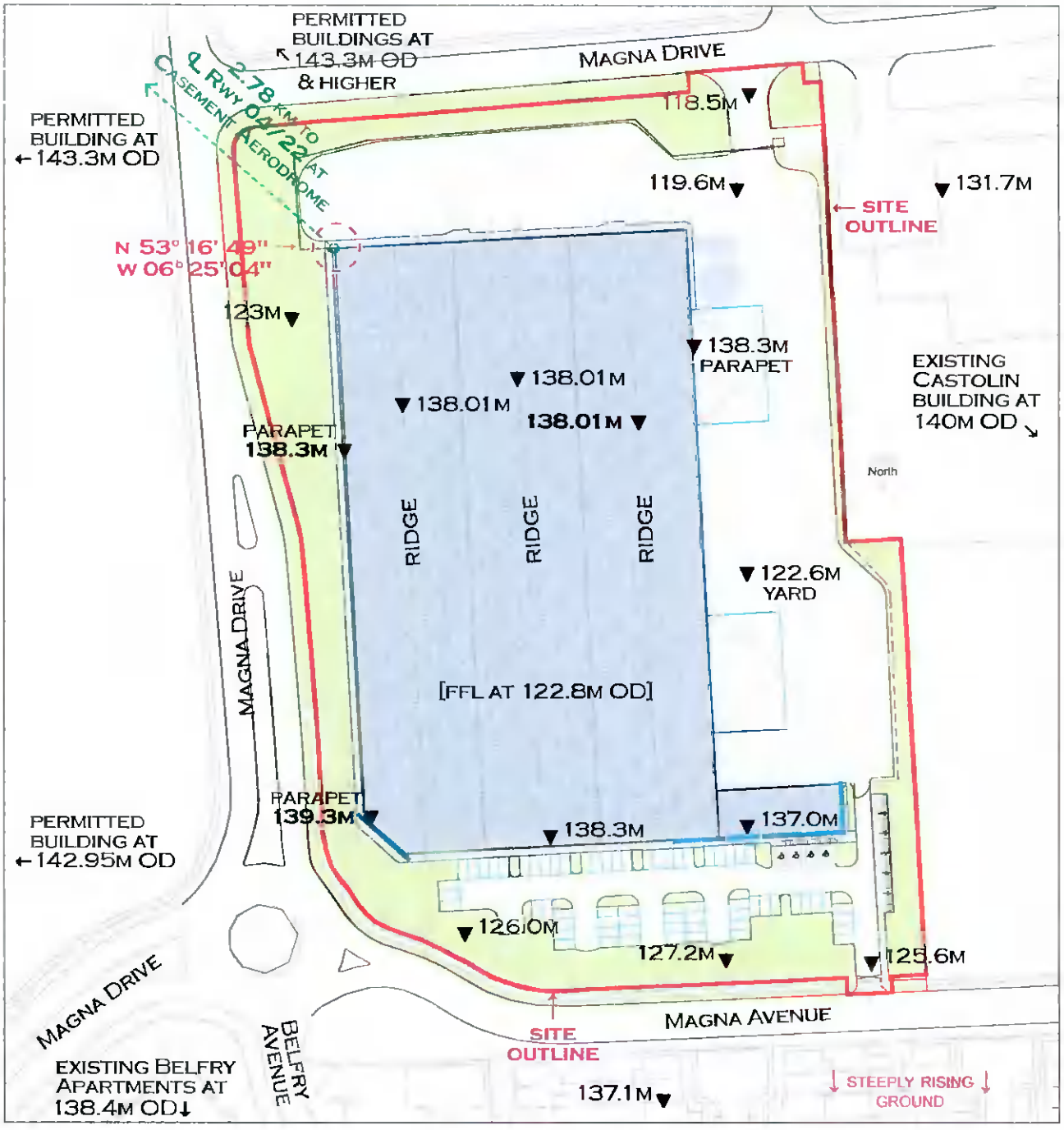
The S.D.C.C. Development Plan Index Map referred to in CDP paragraph 7.8.0 (quoted in this report on page 3 above) is illustrated below, with the site's location indicated by a red arrow.
This Index Map shows the outlines of various Obstacle Limitation Surfaces including Approach Surfaces (which do not affect this site) and Casement Aerodrome's Inner Horizontal Surface which lies above the site.



3.9 In addition to the re-designation of Casement Aerodrome's runways in 2019 *(see para 3.6 above – i.e. the runways referred to in the Development Plan as 11/29 & 05/23 now being designated 10/28 & 04/22 respectively)*, it should also be noted that there have been changes to all aerodromes' "obstacle limitation surfaces" in 2017 and 2018. These changes arose (and affected Dublin Airport) with the introduction of European Aviation Safety Agency Specifications in 2017, and in the following year ICAO adjusted its Annex 14 Standards to bring them in line with the new EASA Specifications. These 2018 adjustments to ICAO Annex 14 Standards (principally to Approach Surfaces and Transitional Surfaces) affect Weston and Casement aerodromes (where ICAO Standards continue to apply).

4. Roof Plan, with Elevations-OD & Coordinates

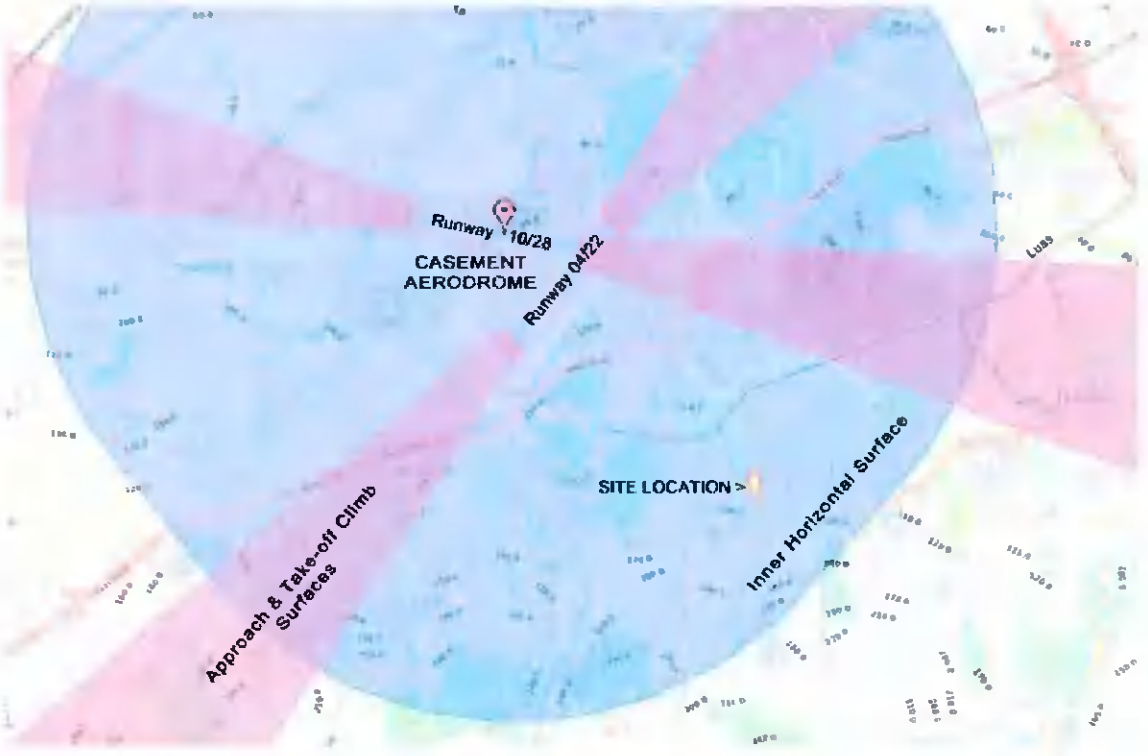
4.1 Below, to approximate scale 1:1500, is a Roof Plan of the proposed Warehouse development, with elevations (OD) of the highest elements, and coordinates of the corner nearest to Casement. *[Darker blue shading indicates higher roof elements.]*



ROOF PLAN OF PROPOSED DEVELOPMENT
WITH ELEVATIONS (O.D.) OF HIGHEST PARTS
SCALE 1: 1500 APPROX.

5. 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 was the elevation of the aerodrome's lowest runway threshold). On the diagram below [containing Irish Aviation Authority & Air Corps data] this I.H.S. is shown coloured blue, with the site's location inserted in red+yellow. Approach Surfaces (and the narrower Take-Off Climb Surfaces) are included in purple. —



5.1 It can be seen that the site (to south-east of Casement's main runway 10/28, and at 2.78 km laterally from Casement's subsidiary runway 04/22) falls **within the area of the aerodrome's Inner Horizontal Surface, but is well clear of all of the (more important) Approach and Take-Off-Climb Surfaces**.

5.2 Ground levels on the site rise from 118.5m to 125.6m OD, i.e. just 6m below the Inner Horizontal Surface. The topmost item of the warehouse (a parapet at south-west corner) is 16.5m above the FFL level of 122.8m – i.e. at 139.3m OD – and will therefore extend by 7.7m above Casement's Inner Horizontal Surface.

5.3 Consequently this report assesses whether the 7.7m intrusion above Casement's Inner Horizontal Surface might have any significant effect on aviation within this sector to south-east of Casement.
An assessment of the warehouse's "shielding" by existing and permitted objects is provided in Section 6 on the following pages 8-9; a Longitudinal Section Drawing & Map – showing the warehouse's relationship to Casement Aerodrome – are provided on page 10; and further consideration of various relevant aspects of Casement's Inner Horizontal Surface are on pages 11-17 *(in Section 8)*.

6. Application of the Principle of "Shielding"

6.1 For this particular development, the Principle of "Shielding" – as defined by ICAO – confirms that the small amount (7.7m) by which it projects above Casement Aerodrome's Inner Horizontal Surface *"would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes"* [– using ICAO's wording in para 4.2.21 of Annex 14], for the reason that it is shielded by multiple existing (and permitted) immovable objects. ICAO provides (in its *Airport Services Manual* para.2.9.3) that "*the formula for shielding should be based on a horizontal plane projected from the top of each obstacle away from the runway* [etc.]"

6.2 **The principal nearby objects which provide this "shielding" to the proposed warehouse (the top of which is at 139.3m OD elevation) are as follows:**

at **140.95m OD**, a permitted building beside Magna Drive to the south-west;
at **143.3m OD**, a permitted apartment building beside Magna Drive to north-east;
at **140.6m, 140.6m, 140.8m, 142.05m & 142.55m,** five more permitted apartment buildings directly between the proposed warehouse and Casement Aerodrome;
[The ABP planning ref. no. of the above Glenveagh development is TA06S.306602]

at **140m OD**, the existing Castolin Eutectic building on Magna Ave to the east;

at **140.9m, 140.9m, 143.3m, and 143.7m+**, four more permitted apartment blocks at Fortunestown, directly between the warehouse site and Casement Aerodrome.
[The ABP planning ref. no. of this Cairn Homes development is TA06S.302398]

These nearby objects ***(all above 140m OD)*** *are indicated as larger red+yellow dots below –*

6.3 These nearby and immediately adjoining existing and permitted taller objects (listed and illustrated on the previous page) which surround the proposed warehouse (of 139.3m elev) **provide complete shielding to it**, so that it could not adversely affect the safety or the regularity of operations of aeroplanes *(in the wording expressed by ICAO in its Annex 14 Recommendation 4.2.21).*

6.4 An existing permanent ('immovable') object of particular significance in the Saggart-Citywest development area is the Church tower at Saggart (of 30.7m height above a ground contour of 125.45m OD) which extends to 156.15m OD. It is additionally significant (in regard to extent of "shielding") that this long-standing permanent object – which projects above Casement's Inner Horizontal Surface by 24.55 metres at a distance of 1.47km from the aerodrome's Runway 04/22 (i.e. considerably closer to Casement than the Magna Avenue & Drive area) has never been identified as an "obstacle" on Casement Aerodrome's charts, and is not fitted with any aviation warning lights. Because its location will therefore be unclear to pilots flying in poor visibility, this church tower would provide a shielding at 156m OD over a wide area in Saggart-Citywest.

The location of this church tower is indicated in the diagrams on the preceding page and on the following page.

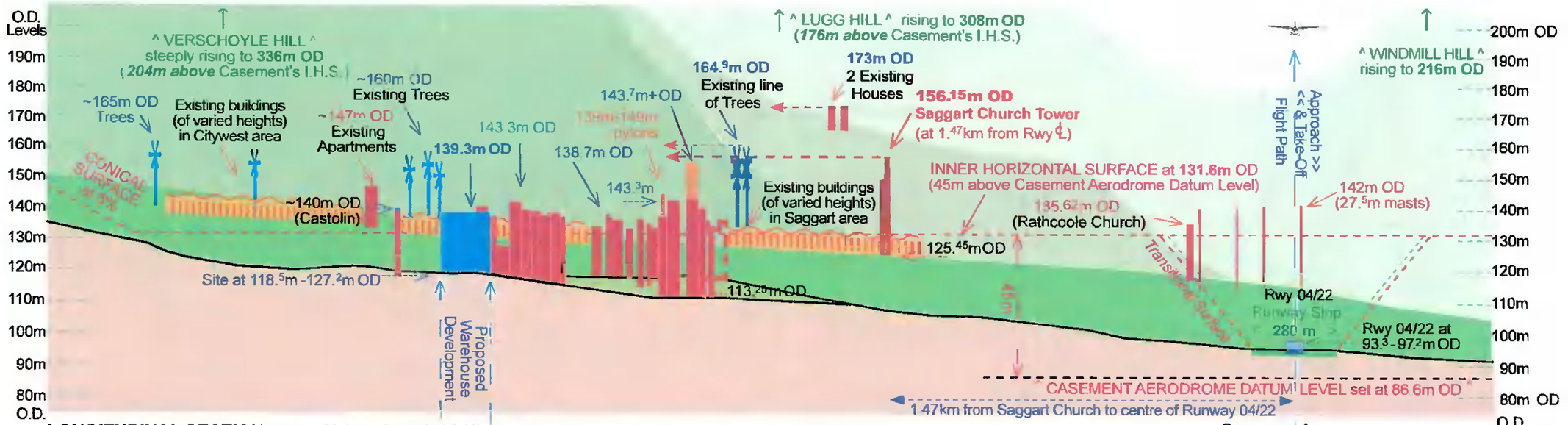
6.5 Other existing tall objects (tall trees, and a line of pylons) located closer to the subject site than Saggart Church *[also indicated in the diagrams on the preceding and following pages]* also provide shieldings of 147m- 149m OD – well in excess of the proposed max. development height of 139.3m OD.

6.6 **Summary in regard to "Shielding"**

In summary with regard to "shielding" (and quite apart from the other considerations relating to Casement's Inner Horizontal Surface which are outlined in Section 8 following), the existing and upcoming buildings in the immediate vicinity of the proposed development at Magna Avenue & Magna Drive provide full shielding for all of the proposed warehouse development, so that (in I.C.A.O.'s terms) it "*would not adversely affect the safety or affect the regularity of operations of aeroplanes.*"

7. Longitudinal Section Drawing & Aerial Map

[AT A3-SIZE — 1:30,000 HORIZONTAL SCALE & 1:3,000 VERTICAL SCALE APPROX.]



LONGITUDINAL SECTION X¹-X [A4-SIZE]: TO HORIZONTAL SCALE 1:20,000 APPROX. WITH VERTICAL SCALE 1:2,000 APPROX.
PERPENDICULAR TO RUNWAY 04/22, LOOKING SOUTH (NOTE AERONAUTICAL SECTION: VERTICAL SCALE =10X HORIZONTAL SCALE)

CASEMENT AERODROME SUBSIDIARY RUNWAY 04/22 (CODE 3)

AERIAL PHOTO MAP PLAN SCALE [A4-SIZE] 1:20,000 APPROX.
WITH 10M CONTOURS AND OBSTACLES AS MARKED ON IAA 'ASSET' DATA:

SITE OUTLINE: ▭ NEARBY OBJECTS ABOVE I.H.S.: ●
OBSTACLES: ✳ TREE ⊙ POLE/PYLON ⚠ MAST (UNLIT)

O'DWYER & JONES DESIGN PARTNERSHIP
AVIATION PLANNING CONSULTANTS © 5-2022

8. Other Aspects Concerning Casement's Inner Horizontal Surface

In assessing the projections above Casement's Inner Horizontal Surface, further factors (in addition to "Shielding") are worth noting:

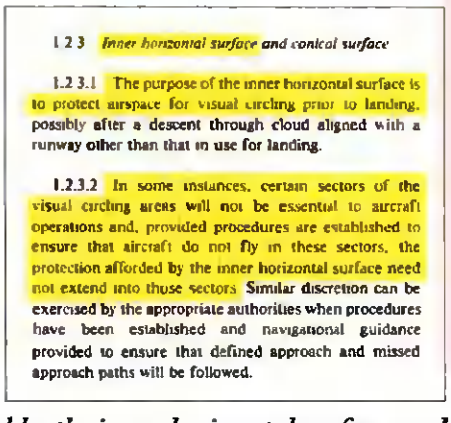
(i) The relative importance assigned by I.C.A.O. to the different Obstacle Limitation Surfaces, including the Inner Horizontal Surface.
(ii) The purpose of an Inner Horizontal Surface as stated by I.C.A.O.
(iii) The nature of the topography in the sector surrounding the site; and the existence of other nearby objects which project above the I.H.S.; and whether these provide additional "shielding".
(iv) The nature of flying operations in the sector surrounding the site.
(v) The choice of datum used for the setting of Casement's Inner Horizontal Surface level, and how it compares with national and international practice.

8.1 Relative Importance of the Various Surfaces:

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 its *Annex 14*) that new objects should not project above an aerodrome's Approach or its Take-Off Climb Surfaces, 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.'* The first additional consideration is that 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.

8.2 Purpose of an Inner Horizontal Surface:

The purpose of an Inner Horizontal Surface is stated by I.C.A.O. (in Section 1.2.3 of its *Airport Services Manual* >) as being *'to protect airspace for visual circling prior to landing'*. It also goes on to say that *'In some instances, certain sectors of the visual circling areas will not be essential to aircraft operations, and provided procedures are established to ensure that aircraft do not fly in these sectors, the protection afforded by the inner horizontal surface **need not extend** into those sectors.'*



1.2.3 *Inner horizontal surface and conical surface*

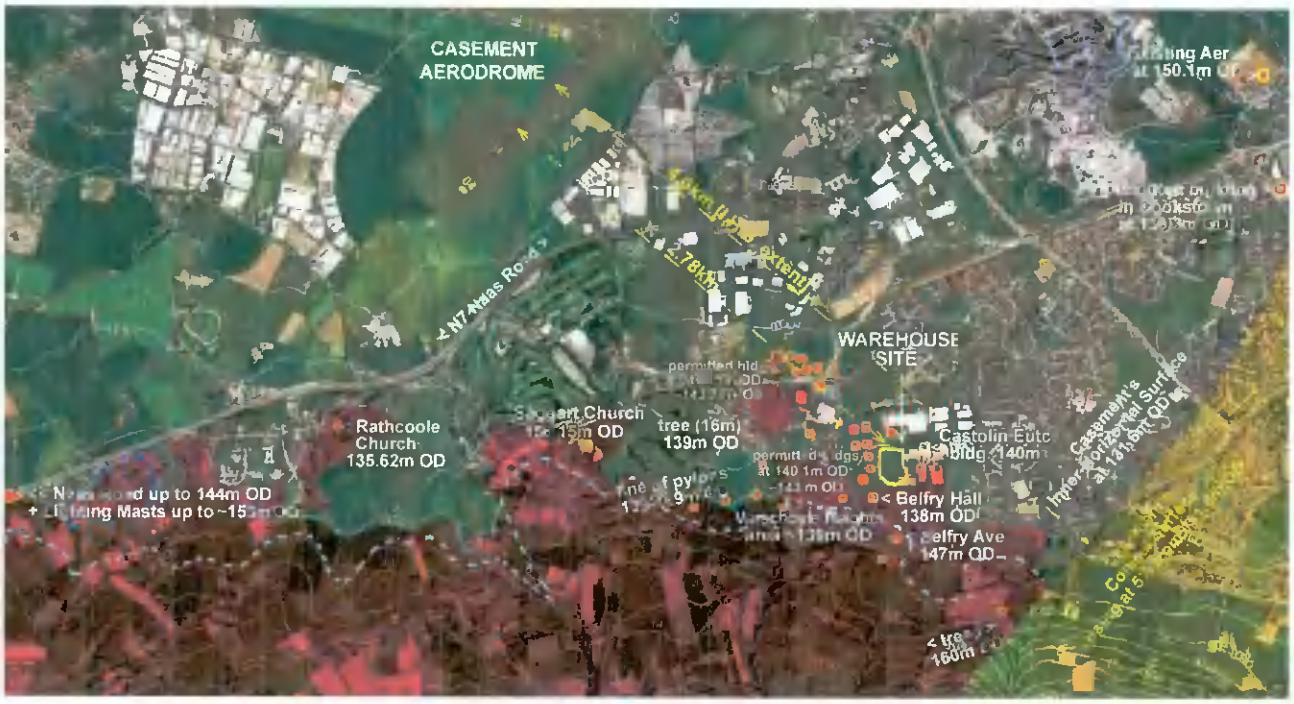
1.2.3.1 The purpose of the inner horizontal surface is to protect airspace for visual circling prior to landing, possibly after a descent through cloud aligned with a runway other than that in use for landing.

1.2.3.2 In some instances, certain sectors of the visual circling areas will not be essential to aircraft operations and, provided procedures are established to ensure that aircraft do not fly in these sectors, the protection afforded by the inner horizontal surface need not extend into those sectors. Similar discretion can be exercised by the appropriate authorities when procedures have been established and navigational guidance provided to ensure that defined approach and missed approach paths will be followed.

8.3 Existing Terrain and Objects Above Casement's Inner Horizontal Surface:

(i) To the east and south of Casement Aerodrome the land rises steeply, so that the ground itself – including 1 kilometre length of the Naas Road *(see following page)*, and a large number of existing structures – penetrate Casement's I.H.S. to a significant extent. This means that aircraft cannot fly (or circle) anywhere near the elevation of Casement's Inner Horizontal Surface: they are required to fly at much higher 'obstacle clearance altitudes/heights' *[as in the Chart on page 14]*. The existing intrusions above Casement's Inner Horizontal Surface include Verschoyle's Hill, directly to the south of the Magna Avenue & Magna Drive area. This Hill projects above Casement's Inner Horizontal Surface to an elevation of **336m OD**, which is **a projection of 204m** – more than 4½ times the height of the Surface itself.

(ii) The diagram below indicates (in red) the extent of existing land and buildings that extend above Casement's Inner Horizontal Surface, with various significant structures (extending from 135m to 156m OD) marked with red+yellow dots. The dashed pale-blue line indicates land and buildings extending to 139.3m OD approx.



(iii) The SDCC Decision Order of 19 April '22 notes (at item 'C' on page 12) that the Department of Defence has put forward as a reason for objection that the Air Corps regularly overflies the area in "standard and low-level circuit patterns at altitudes 1,300ft AMSL **[396.24 m]** and 800ft AMSL **[243.84 m]**". In regard to this —
(a) we can confirm that flights at such altitudes would be unaffected by the proposed development (at more than 100m, and more than 257m below). However,
(b) we must also point out that flying at such altitudes would place aircraft dangerously lower – on 'low-level' circuits – than ground levels in the Inner Horizontal area ***which rise to 336m,*** and it would place aircraft dangerously lower – on 'standard' circuits – than land levels in the nearby Conical Surface area ***which rise to ~400m AMSL.***

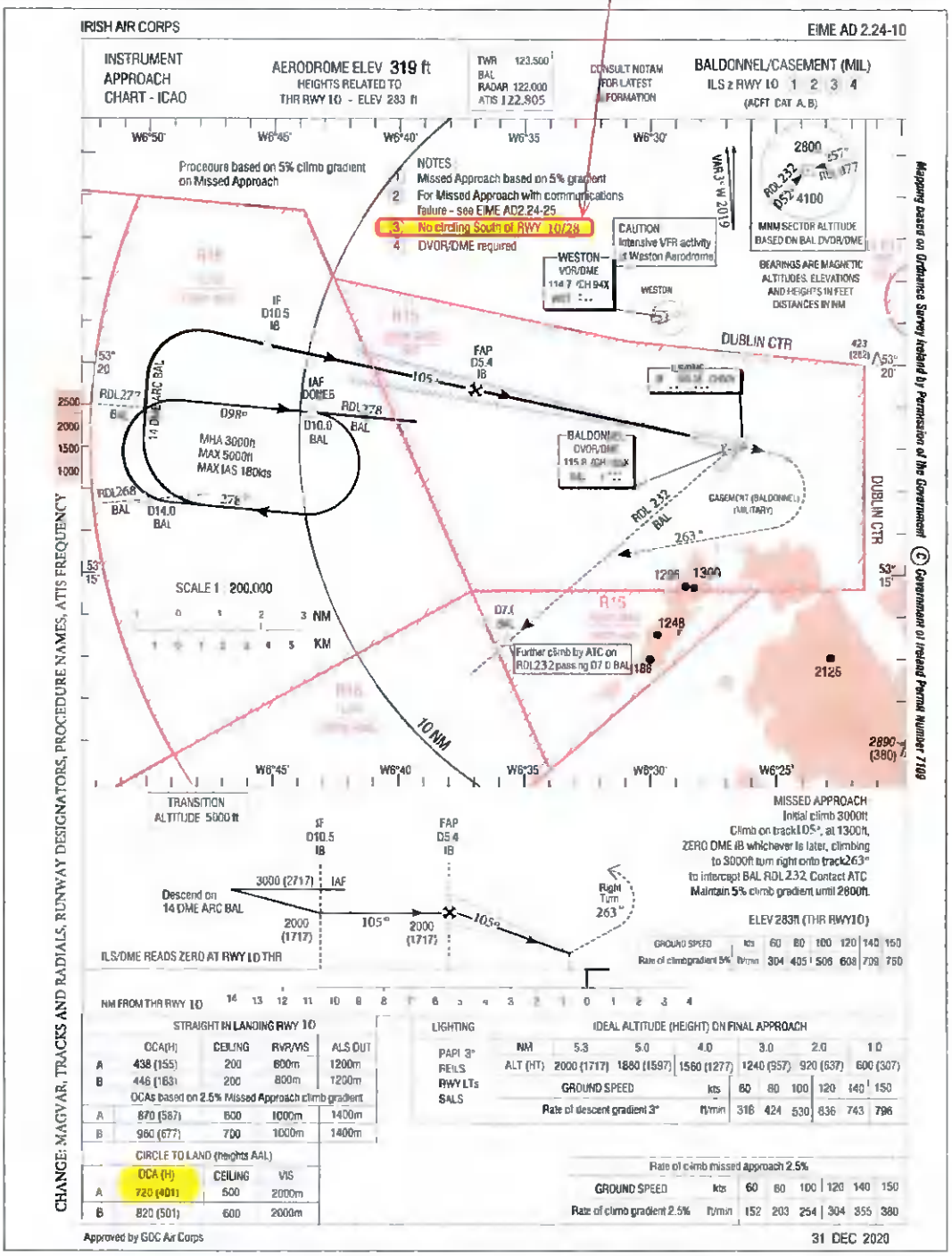
8.3 (iv)
Naas Road [N7]

The photo opposite [>] is taken where the Naas Road surface is at 144m O.D. This road surface lies 12.5m *above* Casement Aerodrome's Inner Horizontal Surface (with significantly greater projections by the roadsigns, lighting masts, and all vehicles on it).

This is very much greater than the 7.7m projection by the proposed warehouse (at one section of parapet).

[Further details of tall buildings, trees, and pylons close to the site at Magna Ave & Drive are listed and illustrated in sections 6 & 7 above.]

8.4 **"No Circling South of [Casement] Runway 10/28":**
Due to the extensive rising ground to the south and east of Casement Aerodrome, circling by aircraft is prohibited by GOC Air Corps and by the IAA in the area to south of Casement's main Runway 10/28, and this is the sector where the subject site at Magna Ave & Drive is located. **"No Circling South of Rwy 10/28" is stated on all current published Casement charts**, of which one example is shown below.

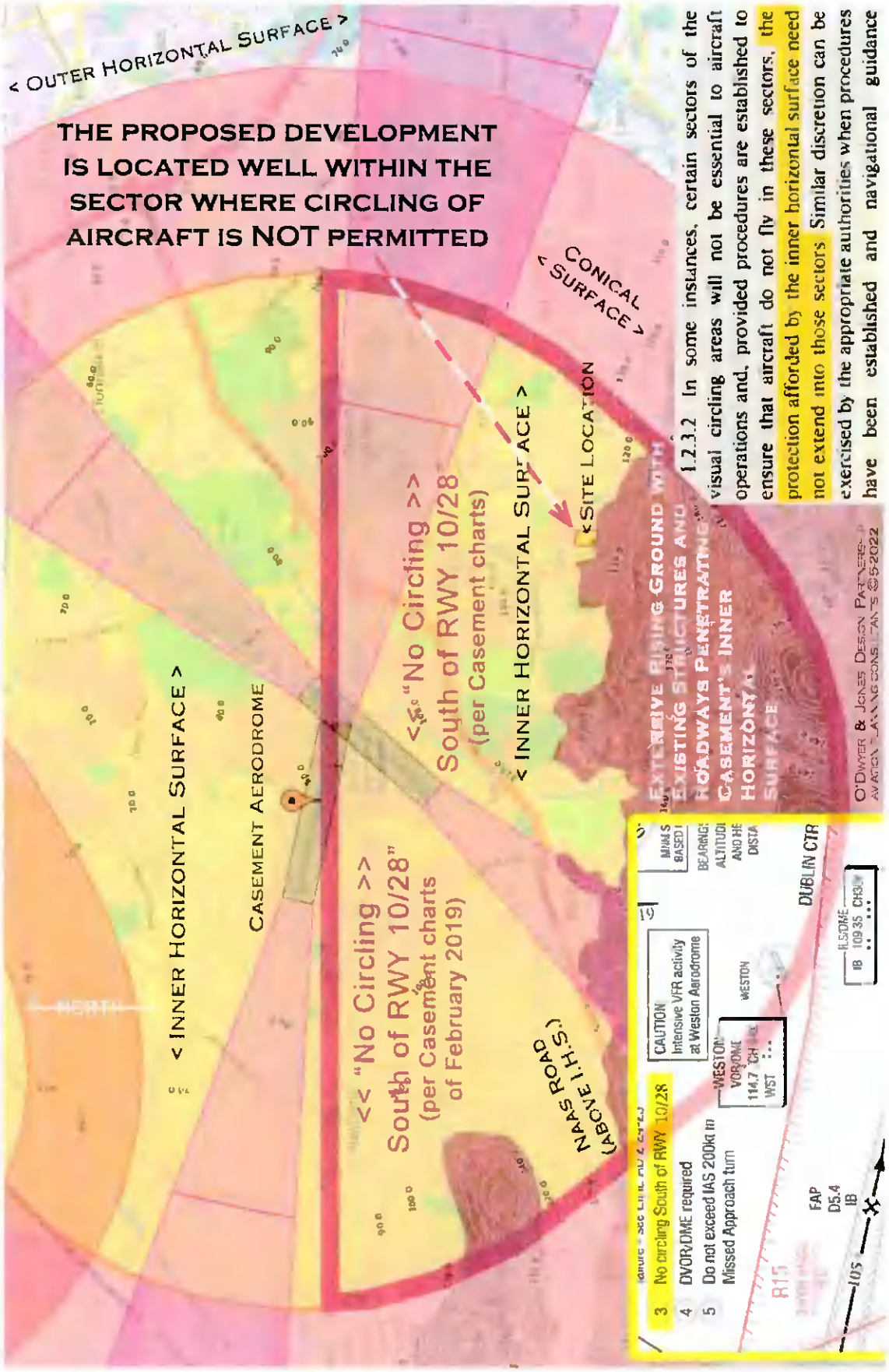


[<< *NOTE:* VERTICAL DIMENSIONS IN FEET, & HORIZONTAL DIMENSIONS IN METRES]

This means that the provisions of ICAO's paragraph 1.2.3.2 of its *Airport Services Manual* (quoted above in para. 8.2) applies – i.e. *"the protection afforded by the inner horizontal surface need not extend"* into the sector where the subject site is located.

[8.4 *contd.*]

Diagram with extracts from ICAO *Airport Services Manual* and 2019 *Aerodrome Chart* :



8.5 I.H.S. Choice of Datum at Casement:

(i) The choice of datum level for an Inner Horizontal Surface is, to a degree, subjective (unlike Approach and Take-Off-Climb Surfaces, the elevations of which are very precisely determined). It is up to each aerodrome to choose its own datum for the setting out of its I.H.S., and at Casement *a particularly low datum* (i.e. the level of the aerodrome's *lowest* threshold) was chosen, 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. well above all of the proposed warehouse development.


European Aviation Safety Agency

Certification Specifications

and

Guidance Material

for

Aerodromes Design

CS-ADR-DSN

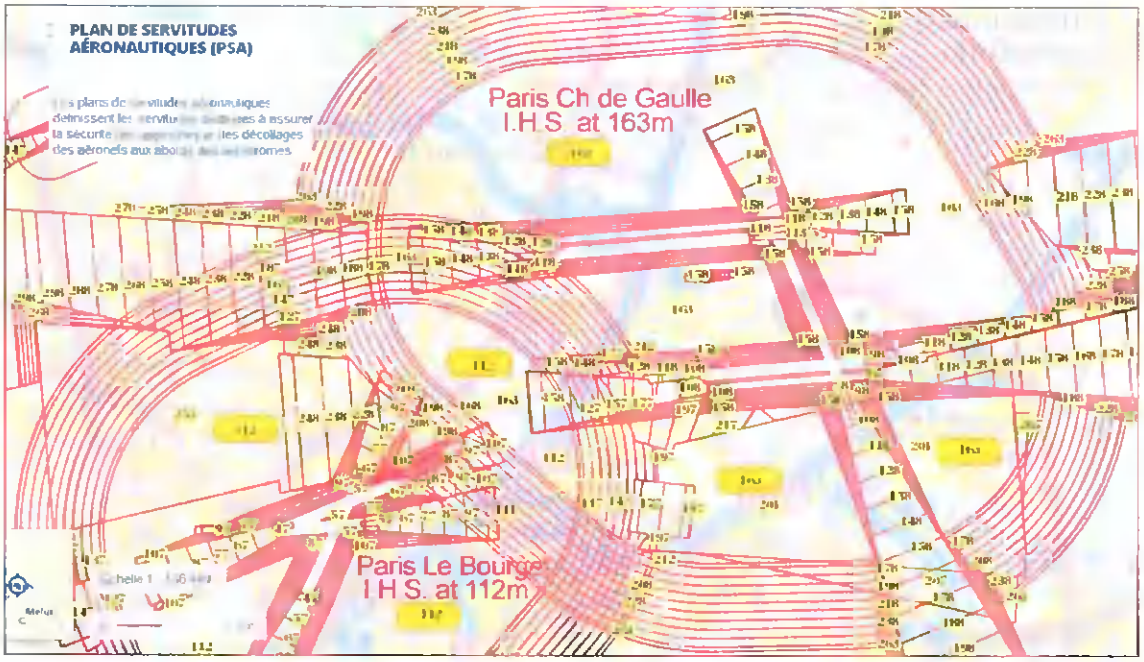
(ii) E.A.S.A. [The European Aviation Safety Agency] – which since the end of 2017 sets the standards for Dublin and Weston aerodromes etc. – provides (among others) the following guidance for the establishment of a datum for an Inner Horizontal Surface:
"the elevation of the highest point of the highest threshold of the related runway" or *"the aerodrome elevation"*, etc.
If either of these had been chosen for Casement Aerodrome, its Inner Horizontal Surface would lie at 142.2m OD (45m above the aerodrome elevation of 97.2m), i.e. above the proposed warehouse at Magna Ave & Magna Drive, and above most other nearby buildings.

(iii) 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.'* If the altimeter setting datum at Casement were adopted as the datum for its I.H.S., as indicated by I.C.A.O., its I.H.S. would lie significantly higher, at between 136m OD and 142.2m OD.

(iv) The I.A.A. recommends consideration of a midpoint between runway end elevations as the datum for setting out an Inner Horizontal Surface (as done at Dublin Airport), which if applied at Casement would place its I.H.S. at up to 5.15m higher.

(v) Internationally, the choice of datum for the setting out (45m higher) of an Inner Horizontal Surface varies from country to country: Germany and Spain tend to use the elevation of the aerodrome's reference point [ARP], while France uses the elevation of the airport's/aerodrome's *highest* runway threshold. On the following page is a diagram of the overlapping Obstacle Limitation Surfaces around Paris Charles de Gaulle and Paris Le Bourget Airports, at both of which the elevation of the *highest* runway threshold is the datum for their I.H.S.:

data:	Paris Ch. de Gaulle	lowest threshold = 97m	highest threshold = 118m *
			I.H.S. at 118m + 45m = 163m
	Paris Le Bourget	lowest threshold = 44m	highest threshold = 67m *
			I.H.S. at 67m + 45m = 112m



At Paris Charles de Gaulle Airport ↑ (with 76m passengers & 498,000 movements in 2019), and at other French airports, any object at up to 45m above the airport's *highest* runway threshold – the equivalent of 142.2m OD at Casement – would lie below the Inner Horizontal Surface, and would *not* be considered an 'obstacle' in relation to it.

8.6 Summary with Regard to Other Inner Horizontal Surface Aspects

(i) The Inner Horizontal Surface is considered by ICAO as a less significant surface, and the avoidance of new projections above it is an ICAO *"Recommendation"* (i.e. "desirable") rather than an ICAO "Standard" (i.e. "necessary").

(ii) Inner Horizontal Surface protection is not required in sectors where the visual circling of aircraft is not permitted.

(iii) In addition to the immediately adjoining permitted buildings (as listed in Section 6) which give full "shielding" to the proposed warehouse, there are large numbers of other existing projections (of much greater height) – both land and structures – in the vicinity of the subject site at Magna Avenue & Magna Drive.

(iv) For this reason, circling of aircraft is not permitted by the I.A.A. or the Air Corps in the sector (south of Casement's main runway) where this site is located.

(v) The Inner Horizontal Surface at Casement has been set at an unusually low elevation, and if a higher datum had been chosen (in accordance with current E.A.S.A. and other international guidelines) – e.g. at 45m above 97.2m OD – the Inner Horizontal Surface would be at 142.2m OD, and the proposed development would lie entirely below it.

We are fully satisfied, for the reasons given above (and for reasons of "shielding" as described in Section 6), that the intrusion above Casement's Inner Horizontal Surface by up to 7.7m will not – in I.C.A.O.'s wording – "adversely affect the safety or affect the regularity of operations of aeroplanes".

9. Other Aviation Considerations

9.1 Aircraft Warning Lights

The subject site at Magna Avenue & Magna Drive is not in a location where Aviation Obstruction Lighting is essential, as it does not lie under any Approach Surface, or in a sector where visual circling of aircraft prior to landing is permitted.

9.2 Solar/PV panels

No solar/PV panels are being provided as part of this development, so that no Glint & Glare Study arises.

9.3 Cranes etc During Construction

(i) Notifications:
Any crane used in the construction of the proposed development will also project above the Inner Horizontal Surface. It will therefore be necessary [under S.I. 215 of 2005 – *'Irish Aviation Authority (Obstacles to Aircraft in Flight) Order'*] for prior notification of any crane/s to be submitted, at least 30 days in advance, to the Irish Aviation Authority and to Casement Aerodrome, who may need to issue the necessary notifications to pilots, any who may require to have cranes fitted with obstruction lighting.

(ii) 'PANS-OPS*' Considerations:
As well as the Annex 14 Surfaces described above, there are other higher PANS-OPS* Surfaces *[>>]*. These are used to establish flying minima [OCA/H**] in the vicinity of an aerodrome, which are published in the Aerodrome's Approach/Departure Charts (as in the example on page 14 above).

* = *Procedures for Air Navigation Services – Aircraft Operations.*
** = *Obstacle clearance altitude/heights.*

It is beyond the scope and purpose of this report to enter into any detailed PANS-OPS calculations.† These will have been prepared by the Air Corps for Casement Aerodrome (based on a survey of all controlling obstacles), and consultation with the Aerodrome is advised prior to construction on site, to ensure that any proposed temporary structures (in particular any tower cranes) will not interfere with PANS-OPS surfaces or affect the aerodrome's published OCA/H.

† Our own outline calculation (per ICAO *Doc 8168 I*; for a Runway 22 'missed approach' turn [as sketched onto the aerial photo on page 8]) indicates an 'MOC' *(minimum obstacle clearance)* above the Magna Ave & Drive site at 34.4m approx*** above the highest element on this site, i.e. at (or above) an elevation of 174.5m / **572.5ft** OD.
*[*** 2.7^8 km laterally = 4.3 km semicircular distance × 0.8% slope = 34.4m MOC.]*

As the lowest OCA/H published for this more elevated sector is 219.5m / **720 ft** OD *[see Chart on p.12, with heights given in feet]* it would seem that this 45m / 147.5ft distance between the MOC and OCA/H indicates that no amendment of procedural minimum altitudes is anticipated.

10. SUMMARY

10.1 Obstacle Limitation Surfaces in General

The subject site at Magna Avenue & Magna Drive lies well clear of all Approach Surfaces, Take-Off Climb Surfaces, and Transitional Surfaces at Casement Aerodrome, which are the more important I.C.A.O. Obstacle Limitation Surfaces.

10.2 Casement Aerodrome's Inner Horizontal Surface

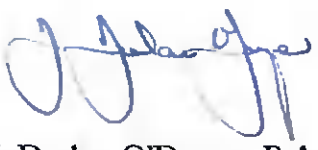
Ground level on the site of the proposed 16.5m-tall warehouse lies between 4m-13m below Casement Aerodrome's Inner Horizontal Surface, so that the highest points of its roof and parapets will project above this Surface by up to 7.7m.

However, the proposed warehouse is fully shielded [per ICAO definitions] by other taller existing and permitted structures on adjoining sites *(as listed in Section 6)*, so that the 7.7m projection above the I.H.S. is not in any way aeronautically significant or [in I.C.A.O.'s wording] likely to "affect the safety or the regularity of the operation of aeroplanes". Additional reasons leading to the same conclusion are outlined in Section 8 on pages 11-17.

10.3 General

In this report we have considered all aviation aspects referred to in SDCC's letter of 19 April 2022 in which Additional Information was requested, and we have provided *(on pages 6 & 10)* the Site and Longitudinal Section Drawings that were specifically requested.

We are satisfied that the proposed warehouse development at the site at Magna Avenue and Magna Drive complies fully with all aviation and aeronautical requirements affecting the site.



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