

Aviation Public Safety Zone Assessment

Portmarnock South Development

Phase 1D

Quintain Developments Ireland Ltd

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CL-5598-RPT-002 V2.3

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Executive Summary

Quintain Developments Ireland Ltd is planning to develop the next phase 1D of the Portmarnock South residential housing lands, in the County of Fingal. This is an extension of an existing development, with previous phases 1A to 1C comprising 404 units completed or under construction.

The proposed development lies within the Outer Public Safety Zone associated with Runway 28L at Dublin International airport. Residential development within Public Safety Zones is limited a maximum density of 60 residents in any half hectare area.

Cyrrus Limited has been commissioned by Quintain Developments Ireland Ltd to provide advice and demonstrate compliance on this planned next housing phase with the Aviation Public Safety Zone requirements. Cyrrus has extensive experience of population density assessments using heat mapping to assess the number of persons affected by noise and visual disturbance by way of aircraft flight paths. The methodology is adapted to identify compliance of the proposed housing development with Public Safety Zone requirements

Cyrrus has worked with the developer on several iterations of the site layout to ensure they achieve compliance with Aviation Safety regulations.

The main findings of this assessment are:

- The site layout assessed within this report fully complies with the published Aviation Public Safety Zone requirements. Considering the whole of the Phase 1D development, the total site development area is approximately 5.33 hectares. The total residential occupancy is expected to be 461 persons based on an occupancy rate of 2.68 per dwelling. This results in an average residential population density of 43.25 persons per ½ hectare over the whole site.
- Of the identified ½ hectare grid squares, none exceed the stated maximum population density of >60 persons per ½ hectare.
- As requested in the An Bord Pleanála Opinion (1D pre-application-310235-21 110082021), our analysis confirms that this development does not compromise the population density and aviation analysis undertaken for earlier consented developments/phases of the Portmarnock South lands, or the current Fingal County Development Plan, the Portmarnock South Local Area Plan 2013 – 2019 (as extended) and relevant national and regional planning policy.
- Provided that the Fingal County Development Plan and Regional Spatial and Economic Strategy are implemented as published, the housing occupancy rate in Fingal should decrease over the coming years as more housing stock comes online, thereby ensuring ongoing compliance.

Full details of the assessment and evaluation are contained within the body of this report.

Abbreviations

EMRA Eastern and Midland Regional Assembly

PSZ Public Safety Zone

RPG Regional Planning Guidelines

RSES Regional Spatial and Economic Strategy

References

- [1] Aviation Public Safety Zones Report (2003), Environmental Resources Management Ireland (ERM)
- [2] Fingal Development Plan 2011-2017 – Fingal County Council
- [3] Fingal Development Plan 2017-2023 Variation 2– Fingal County Council
- [4] St. Marnock's II DAC & Clear Real Estate Investments plc. Portmarnock South Phase 1B Aviation Compliance Report - Ove Arup & Partners Ireland Ltd
- [5] Portmarnock South Development Framework - Phase 1D
- [6] Drawing 6158B-P-006 Project Portmarnock South Phase 1D
- [7] 2011 Census of Ireland – Central Statistics Office

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1. Introduction

1.1. General

1.1.1. Cyrrus Limited has been commissioned to provide an aviation safety assessment to the developers of Portmarnock Phase 1D housing development.

1.1.2. The site is located in Portmarnock South within Fingal County.



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Figure 1: Portmarnock Phase 1D housing development location

1.1.3. The development site is close to the extended runway centreline of Dublin Airport runway 28L. The site is 6.8km from the runway threshold.

1.2. Site Development

1.2.1. Phase 1D is an extension to an existing recent residential development at Portmarnock. Phase 1D is enclosed within the red line at Figure 2. The dwellings to the north include 'Phase 1A' and 'Phase 1B' of St. Marnock's bay, which are complete, and 'Phase 1C', which is under construction. The hatched dwellings to the North West are pre-existing.



Figure 2: Portmarnock South Development

2. Aviation Public Safety Zones

2.1. Public Safety Zones

- 2.2. It has been recognised that the incidence of aircraft accidents is highest in the immediate vicinity of busy runways. To address the risk of an aircraft accident to persons on the ground, Public Safety Zones (PSZ) are established around the runways. Public Safety Zones are areas of land at the ends of the runways at the busiest airports, within which development is restricted in order to control the number of people on the ground at risk of death or injury in the event of an aircraft accident on take-off or landing.
- 2.3. The PSZ at Dublin Airport were determined by Environmental Resources Management (ERM) Ireland in 2003 using best industry practice.
- 2.4. The blue lines at Figure 3 depict the outer PSZ, whereas the yellow lines represent the inner PSZ. The Portmarnock Phase 1D development lies within the outer PSZ.



Figure 3:PSZ at Dublin Airport

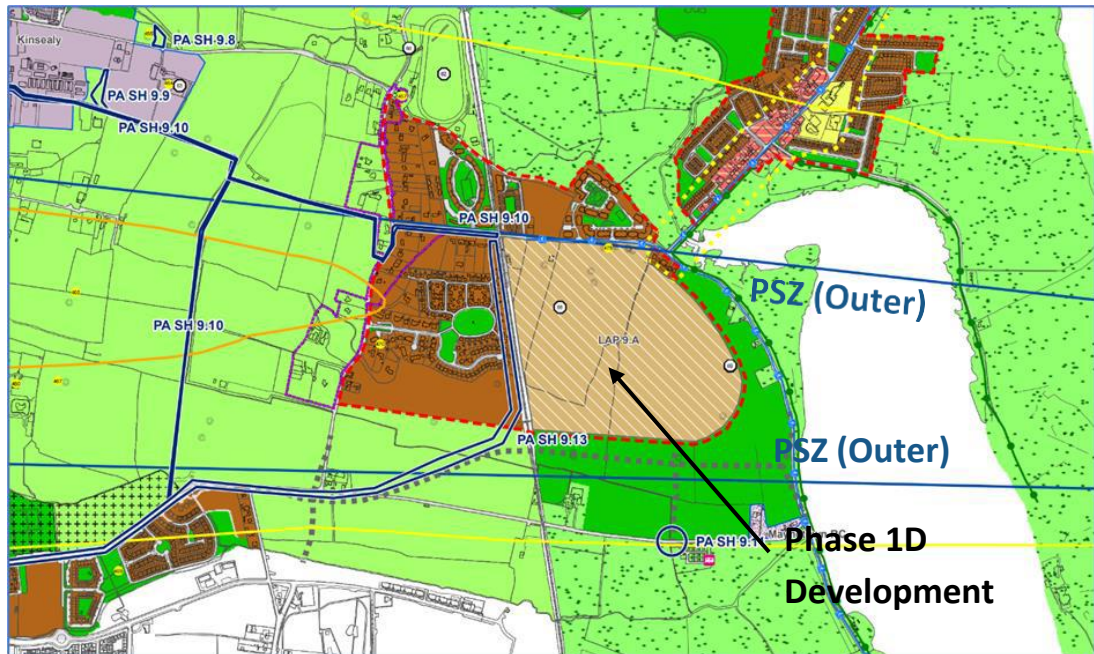


Figure 4: Development Site – Fingal development Plan – Sheet 9

2.4.1. The PSZ restrictions are shown at Figure 5.

Table 6.1 Permitted Developments (applicable to new applications for development)		
Permitted Developments	Public Safety Zone (PSZ)	
	Inner PSZ	Outer PSZ
All developments	No further development (existing developments remain)	see below (existing developments remain)
		Outer PSZ
1. Housing		≤ 60 persons/half hectare
2. Holiday Accommodation		≤ 100 beds per development
3. Retail/Leisure Facilities		≤ 85 persons/half hectare
4. Working Premises		≤ 110 persons/half hectare
5. Institutional Accommodation		No further development
6. Sports Stadia		No further development
7. Limited Use		≤ 220 persons/half hectare
	No restrictions on development beyond Outer PSZ	
Notes		
1. Housing - i.e. residential accommodation, persons at home.		
2. Holiday Accommodation - i.e. hotels, caravan parks.		
3. Retail/Leisure Facilities - i.e. shopping centres, sports halls, sports grounds, swimming pools, bowling alleys, golf clubs.		
4. Working Premises - i.e. factories, offices and facilities where persons are expected to congregate, such as railway stations.		
5. Institutional Accommodation - i.e. hospitals, schools, nurseries, care homes, prisons.		
6. Sports Stadia - i.e. football/rugby stadia.		
7. Limited Use - use not exceeding (approximately) a maximum of 12 hours in one week. i.e. Sunday markets, car boot sales, day fairs.		

Figure 5: PSZ Development Restrictions

2.4.2. From the ERM report:

6.2 In some cases, permitted developments are restricted to a maximum density of persons. This density is expressed as the number of persons per half hectare. A half hectare was chosen as this approximates the average maximum aircraft crash area. The maximum density should be applied to any single half hectare within which the proposed development is located.

2.4.3. The Phase 1D development area is restricted to a maximum occupancy of 60 persons in any ½ hectare.

2.4.4. The PSZ requirements and recommendations have been incorporated into the Fingal Development Plan as aviation safety objectives:

Safety

The Council will continue to follow the advice of the Irish Aviation Authority regarding the effects of proposed development on the safety of aircraft and the safe and efficient navigation thereof.

Objective DA13
Promote appropriate land use patterns in the vicinity of the flight paths serving the Airport, having regard to the precautionary principle, based on existing and anticipated environmental and safety impacts of aircraft movements.

Objective DA14
Review Public Safety Zones associated with Dublin Airport and implement the policies to be determined by the Government in relation to these Public Safety Zones.

Objective DA15
Take into account relevant publications issued by the Irish Aviation Authority in respect of the operations of and development in and around Dublin Airport.

Objective DA16
Continue to take account of the advice of the Irish Aviation Authority with regard to the effects of any development proposals on the safety of aircraft or the safe and efficient navigation thereof.

Objective DA17
Have regard to the safety and environmental impacts of aircraft movements associated with Weston Aerodrome in the assessment of any relevant development proposal.

Figure 6: Fingal Development Plan - Aviation Safety Objectives

3. Methodology

3.1. Cyrrus

3.1.1. Cyrrus has extensive experience of population density assessments using heat mapping to assess the number of persons affected by noise and visual disturbance by way of aircraft flight paths. The methodology is readily adapted to identify compliance of the proposed housing development with PSZ requirements.

3.2. Process

3.2.1. Initially, the layout drawings of the Portmarnock development were imported into a Geographic Information System (GIS) program. An information point with an attribute of household occupancy was added to each dwelling as shown at Figure 7. This was carried out for the Phase 1D development (red), the previous development to the north (blue) comprising Phase 1B (recently completed) and Phase 1C (currently under construction), the pre-existing dwellings to the west (green), and potential future development to the east (orange).



Figure 7: Occupancy points overlaid on original site layout

3.2.2. A population density heatmap was generated to validate the process:

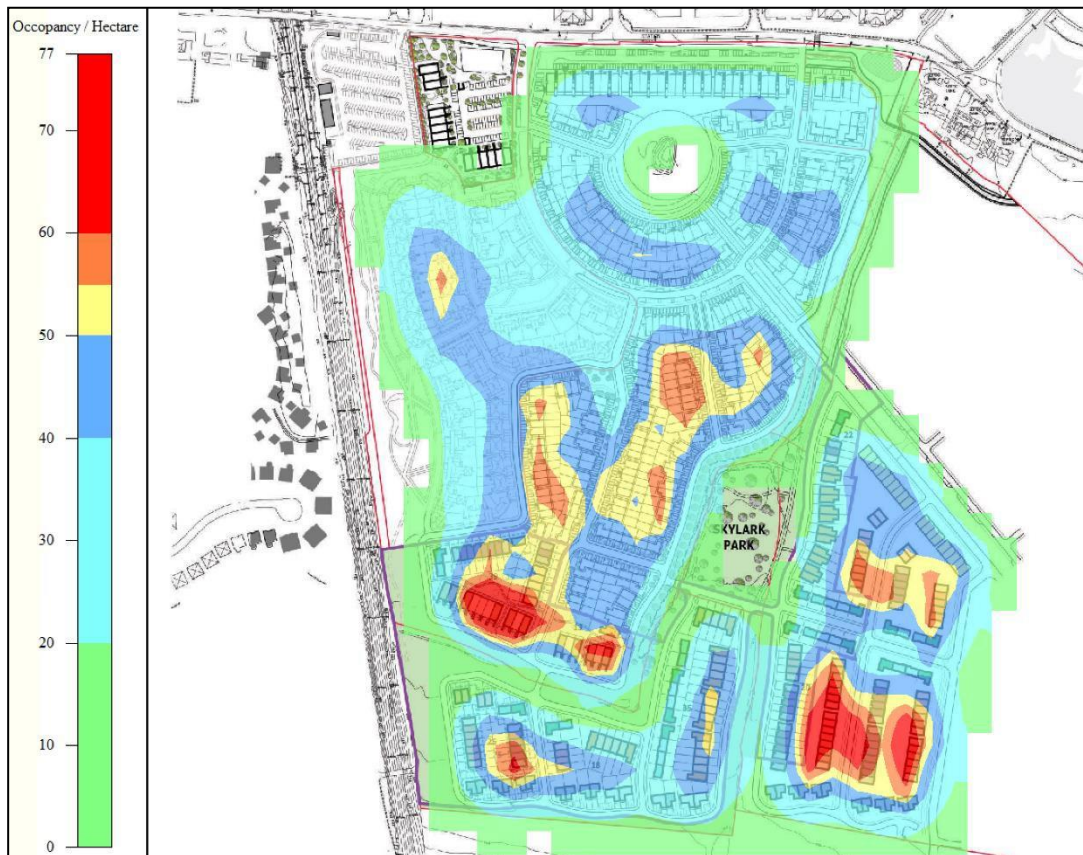


Figure 8: Initial population density heatmap

3.2.3. The initial heatmap demonstrated that the existing dwellings indicated a population density of less than 60 persons per ½ hectare. The Phase 1D and future development to the east show areas where this population density may be exceeded.

3.2.4. The red shaded areas indicate where further investigation is necessary. Further investigation is only considered for Phase 1D and the immediately adjacent existing dwellings and dwellings under construction.

3.2.5. Identified problem areas are overlaid with a ½ hectare grid square to establish a population density figure for the area in question.

3.2.6. The process was repeated by using 4 points per dwelling rather than just one to account for dwellings that bisect the boundary of areas under investigation¹.

3.3. Average Household Occupancy

3.3.1. The analysis process for a planned development relies on accurately assessing average household occupancy.

¹ The length of sides of a square with an area of ½ hectare is only 70.71m.

3.3.2. The Central Statistics Office Census of Population recorded an occupancy rate (persons/dwelling) across the whole of Ireland of 2.67 in 2006 and 2011, but this rose to 2.75 in 2016:

Census of Population 2016 - Profile 1 Housing in Ireland

Census 2016 revealed that the average number of persons per household recorded an increase for the first time since 1966. In 2011 there were on average 2.73 persons per households. The equivalent figure stood at 2.75 in 2016.

The largest increase in average household size between 2011 and 2016 occurred in Fingal (2.92 to 3.03), followed by Dublin City where the average number of persons in a private dwelling increased from 2.40 to 2.48. Four counties (Fingal, Meath, Kildare, South Dublin) had at least three persons per household on average in April 2016.

The growth in household size was confined to the urban areas (i.e. settlements with a population of 1,500 persons or more) with an increase from 2.64 to 2.69. However in rural areas, the downward trend in the average number of persons per household continued in the 2011-2016 intercensal period (2.87 to 2.84).

3.3.3. The Fingal Development Plan 2011-2017 published a Regional Planning Guideline occupancy rate of 2.58 persons per dwelling for 2016, a figure used in previous approved planning applications.

HOUSEHOLD SIZE

The average occupancy rate i.e. persons per household or pph, has been decreasing and this trend is set to continue, **Table 3** indicates this decrease.

TABLE 3: AVERAGE OCCUPANCY RATES (PERSONS PER HOUSEHOLD)					
	2002	2006	2010	2016	2022
Dublin City	2.74	2.50	2.39	2.26	2.02
DLR	2.99	2.77	2.61	2.42	2.17
Fingal	3.23	2.95	2.81	2.58	2.32
South Dublin	3.25	3.03	2.83	2.65	2.38
Dublin Region	2.96	2.82	2.58		

Source: 2002 & 2006 Census, RPG April 2007 Update, RPG 2010-2022.

Figure 9: Fingal Development Plan 2011-2017

3.3.4. The Fingal Development Plan has subsequently been superseded by the Fingal Development Plan 2017-2023. The occupancy rates were adjusted as shown at Figure 10.

Fingal	Census 2006	Census 2011	RPG Target 2016	RPG Target 2022	Estimated RPG Target 2023
Population	239,992	273,992	287,547	309,285	
Housing Stock	89,909	102,793	118,646	142,144	145,340
Persons per hhd*	2.66	2.66	2.42	2.17	

Figure 10: Fingal Development Plan 2017-2023

3.3.5. The RPGs have been superseded by the Regional Spatial and Economic Strategy for the Eastern and Midland Regional Assembly (RSES EMRA). This has been incorporated into the Fingal Development Plan 2017-2023 by way of Variation No. 2 (July 2020). The section of the Development Plan referenced here, including the Table in Figure 10, has all been superseded by this Variation. Variation No. 2 provides a target of 2.68 persons per household by 2023.

3.3.6. Using the same methodology for Phases 1B and 1C, the adjusted figure of 2.68 persons per dwelling has been determined in the Phase 1D development.

4. Analysis of Population Density

4.1. Initial Assessment

- 4.1.1. The initial heatmap assessment determined some areas where the population density would exceed the required 60 persons per ½ hectare. This was mostly centred on areas with Duplex apartments.
- 4.1.2. The architect worked with Cyrrus to revise the layout to relocate some of the units from the high-density areas to the lower density areas. This was an iterative process to ensure all areas remain below the prescribed occupancy limit.
- 4.1.3. Subsequent assessments detailed here refer to Drawing 6158B-P-006 Project Portmarnock South Phase 1D.

4.2. Layout Drawing 6158B-P-006

- 4.2.1. The housing site layout is shown at Figure 11. Phase 1D is the area bounded by the red line.



Figure 11: Layout 6158B-P-006

4.3. Occupancy Rates

4.3.1. Occupancy points were added to the planned dwellings and to those existing dwellings immediately adjacent to the development. This is to ensure that Phase 1D does not compromise existing developments and cognisance is taken of the effect of existing developments on Phase 1D .



Figure 12: Occupancy points overlaid on dwellings

4.3.2. Each dwelling has 4 points allocated which are placed within the dwelling boundary towards the corners of the property. This is to address the case whereby the ½ hectare area under investigation bisects a property. This methodology has been applied in the previous phases also, therefore, a consistent approach in terms of density assessment is being and has been applied as the Portmarnock lands are incrementally developed.

4.3.3. Each point is allocated an Occupancy attribute of 0.67 persons to give an overall occupancy rate of 2.68 for 4 points per single dwelling.

4.3.4. Duplex apartments are allocated 8 occupancy points to reflect the total occupancy of the unit. The Duplex units are shown shaded in brown and beige at Figure 13.



Figure 13: Detail of occupancy points

4.4. Population Density Heatmaps

4.4.1. A population density heatmap is generated to identify potential issues and areas for further analysis. The heatmap generates shaded levels of population density in ½ hectare (5,000m²) circles around each pixel on the map. The resultant heatmap is shown at Figure 14.

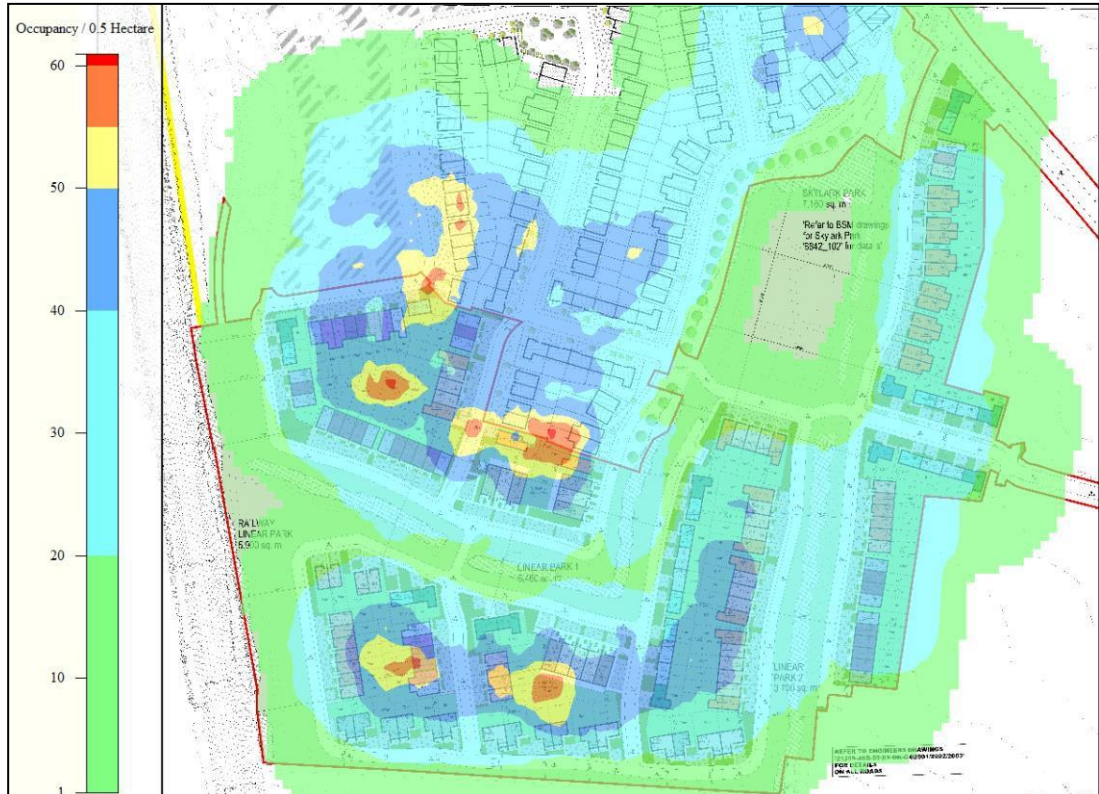


Figure 14: Layout 6158B-P-007

4.4.2. The heatmap identifies some pockets of predicted high population density, indicated by the red and orange shading. These areas are subject to further detailed investigation. These areas are shown in more detail at Figure 15 and Figure 16.

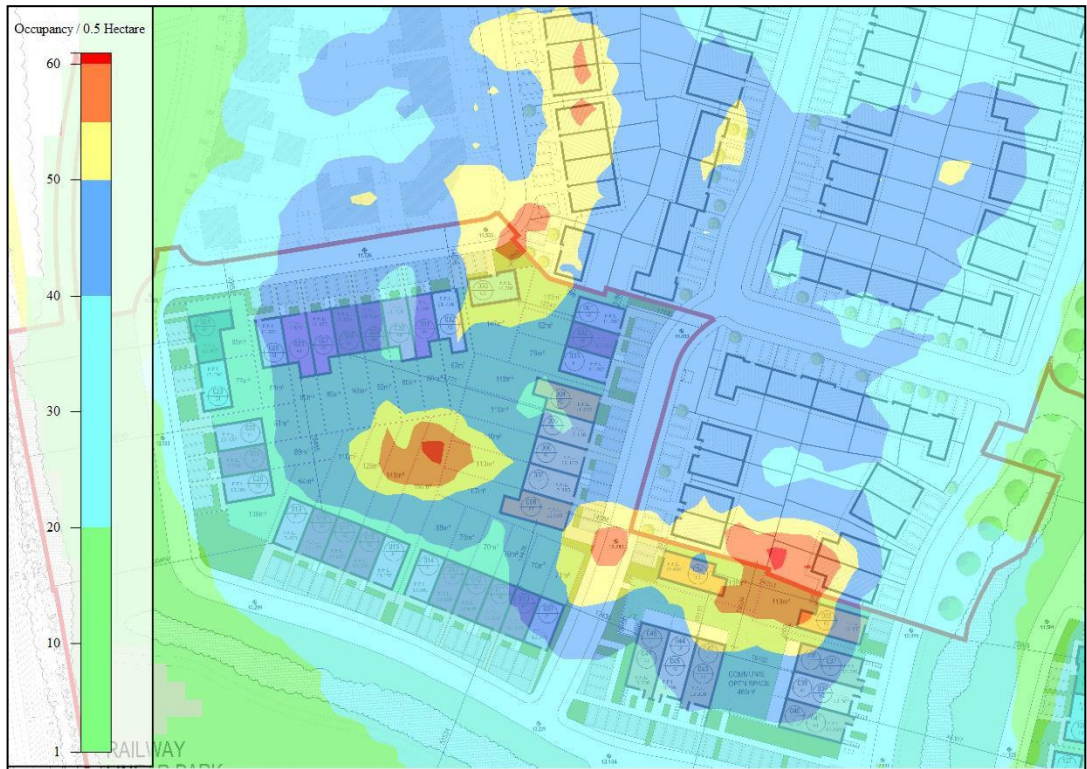


Figure 15: Heatmap detail for the North-Western part of Phase 1D development

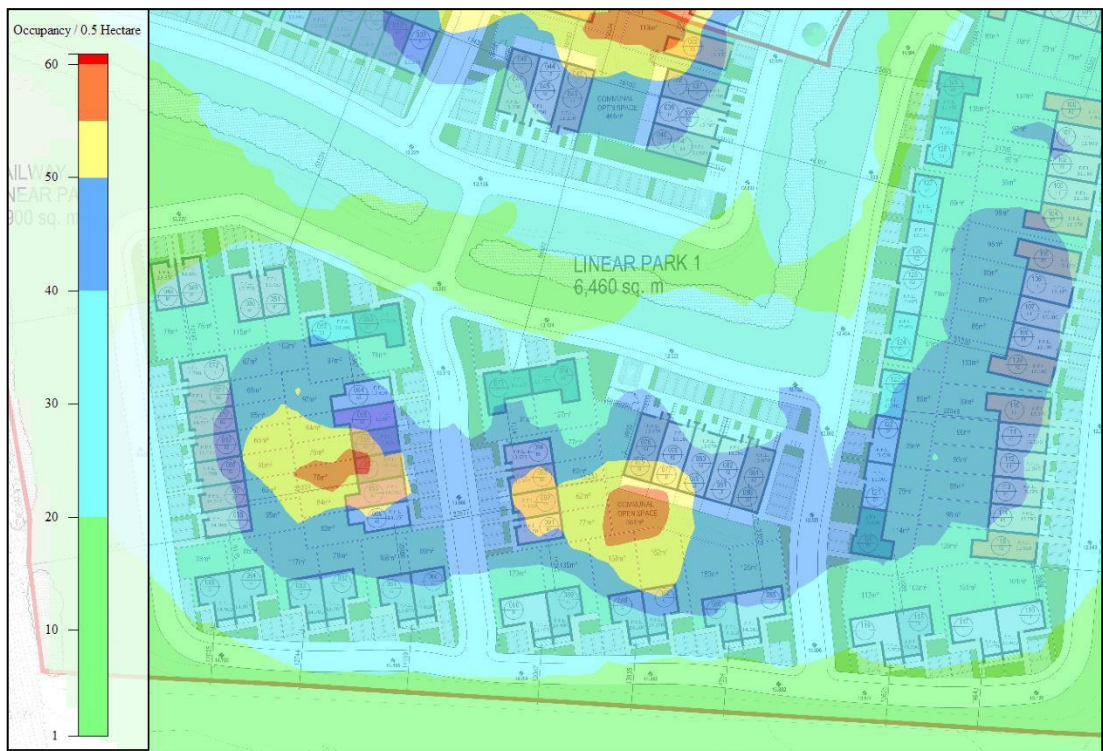


Figure 16: Heatmap detail for the South-Western part of Phase 1D development

4.5. Population Density Grids

- 4.5.1. In common with contemporary assessment methodology, ½ hectare grid squares are used to determine the actual population density.
- 4.5.2. A ½ hectare grid square is placed over the red and orange areas of the heatmaps. The squares are then manually moved to encompass the maximum number of occupancy points as shown at Figure 17 and Figure 18.

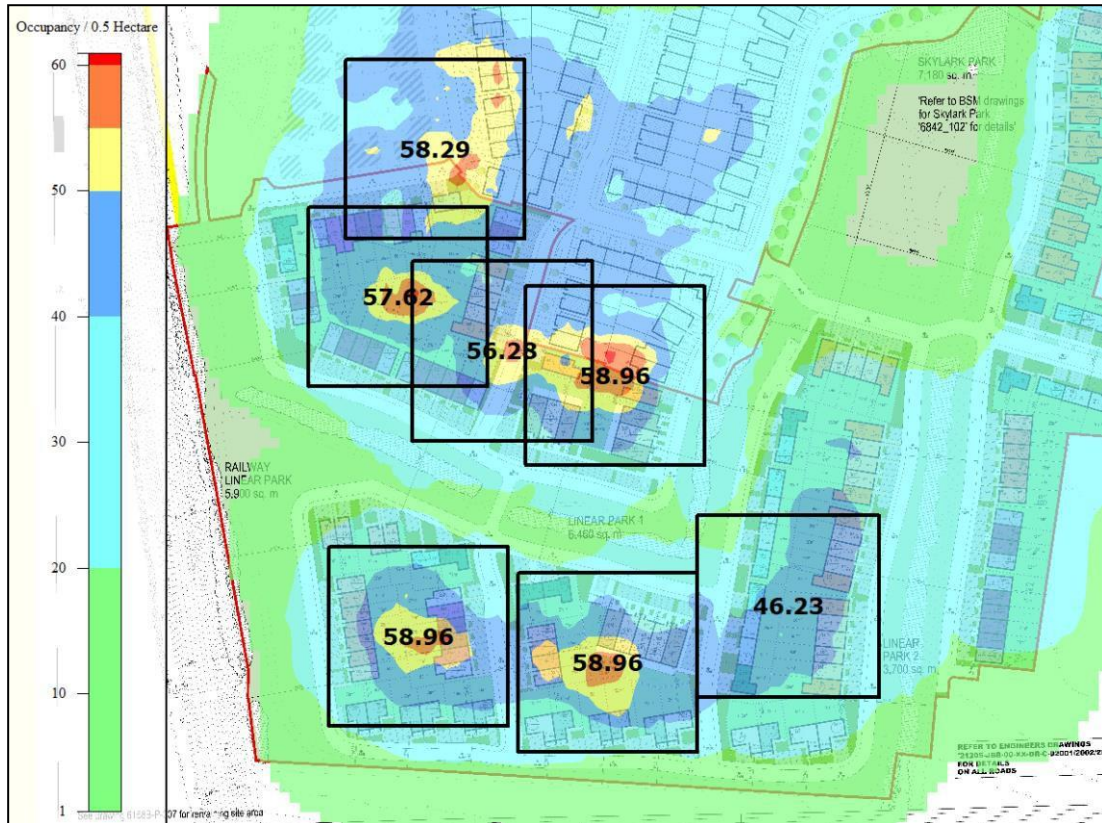


Figure 17: ½ Hectare Grid Squares overlaid on heatmap

- 4.5.3. The numbers within the grid squares are the residential population density per ½ hectare square.

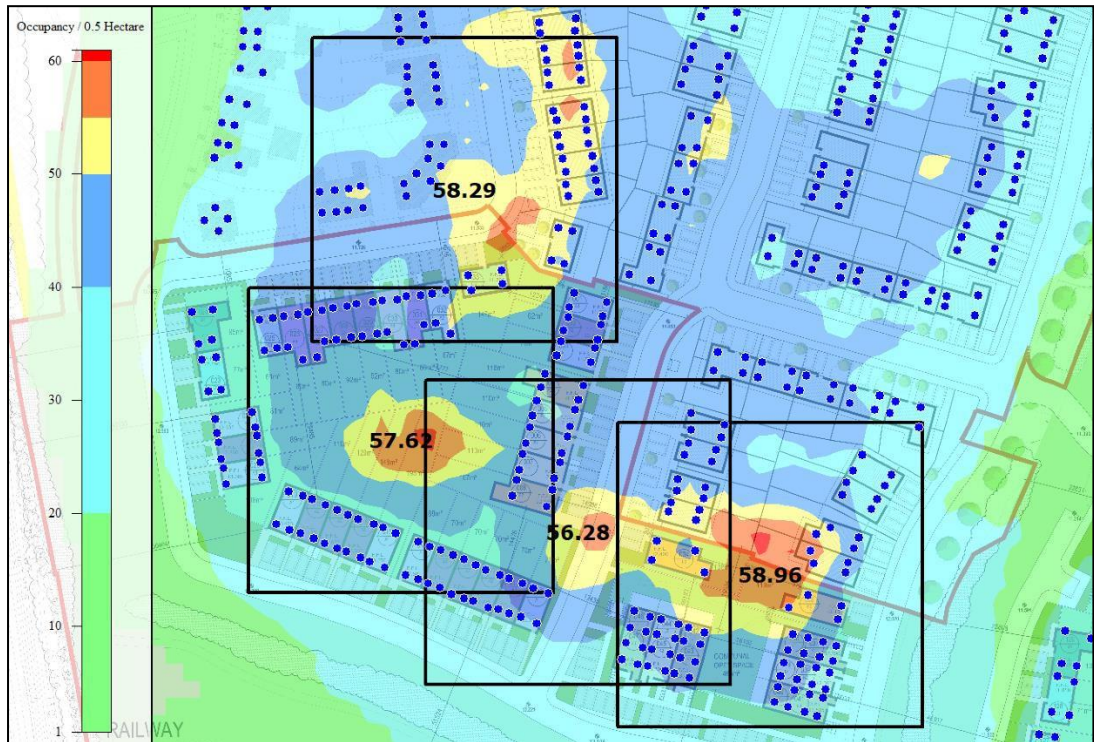


Figure 18: Detail of North-Western area grid squares

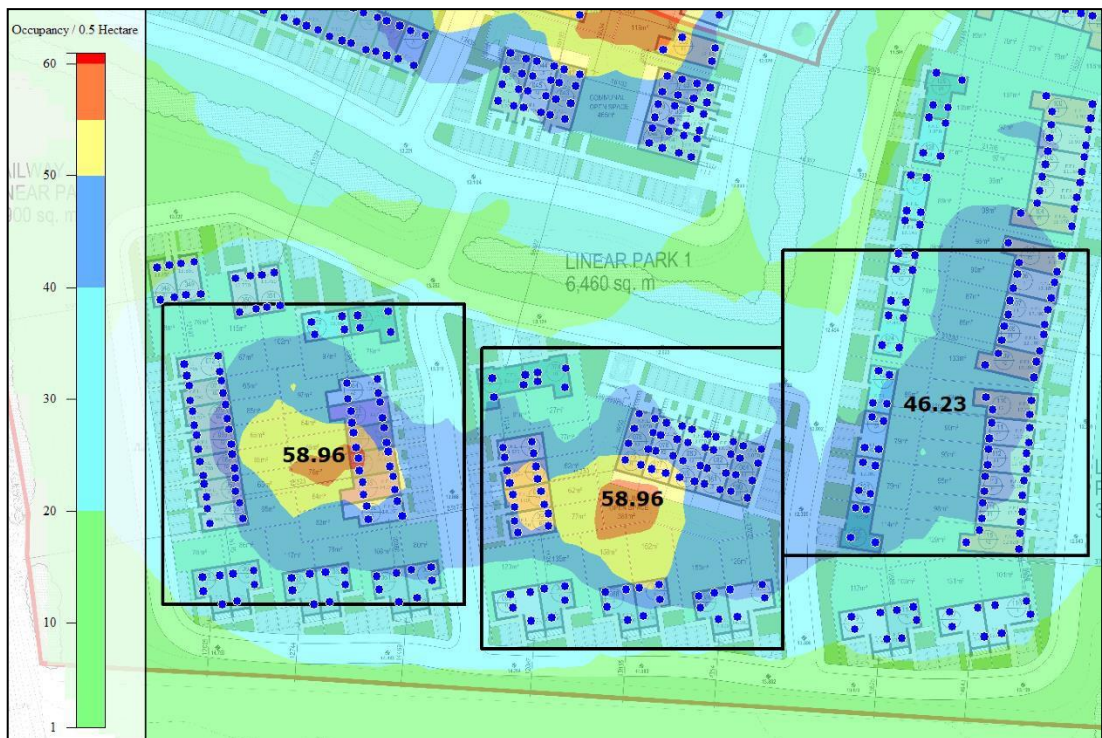


Figure 19: Detail of South-Western area grid squares

4.5.4. Figure 18 and Figure 19 show how the grid squares have been aligned to encompass the maximum number of occupancy points centred around the peaks of the heatmap.



Figure 20: North-Western Area Population Density



Figure 21: South-Western Area Population Density

4.6. Summary

- 4.6.1. Of the identified ½ hectare grid squares, none exceed the stated maximum population density of >60 persons per ½ hectare.
- 4.6.2. This development does not compromise the population density of earlier phases of the development or pre-existing dwellings.
- 4.6.3. Provided that the Fingal County Development Plan and RSES-EMRA is implemented as published, the housing occupancy rate in Fingal should decrease over the coming years as more housing stock comes online. The resultant numbers will therefore be expected to reduce over time.
- 4.6.4. The site layout assessed within this report fully complies with the published Aviation Public Safety Zone requirements. Considering the whole of the Phase 1D development, the total site developments area is approximately 5.33 hectares. The total residential occupancy is expected to be 461 persons based on an occupancy rate of 2.68 per dwelling. This results in an average residential population density of 43.25 persons per ½ hectare over the whole site. Of the identified ½ hectare grid squares, none exceed the stated maximum population density of >60 persons per ½ hectare.



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