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**Appendix 15.1: Telecommunications Report**



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## Specific Assessment - Section 3.2 of the Building Height Guidelines (2018)

### DEVELOPMENT

### An Bord Pleanála Submission - Auginish Alumina Limited: BRDA Raise Development

05 August 2021

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## DEFINITIONS

<b>Author:</b>	Independent Site Management Limited (hereinafter referred to as "ISM")
<b>Mitigation Measures:</b>	means the allowances made for the retention of important Telecommunication Channels (hereinafter referred to as "Mitigation Measures")
<b>Planning Authority:</b>	means An Bord Pleanála (hereinafter referred to as the "Planning Authority")
<b>Radio Frequency:</b>	means a frequency or band of frequencies in the range 104 to 1011 or 1012 Hz, of the electromagnetic spectrum suitable for use in telecommunications.
<b>Microwave Links:</b>	means the transmission of information by electromagnetic waves with wavelengths in the microwave range (1 m - 1 mm) of the electromagnetic spectrum suitable for use in telecommunications.
<b>Telecommunication Channels:</b>	means Radio Frequency links & Microwave Transmission links (hereinafter referred to as "Telecommunication Channels")
<b>The Applicant:</b>	means Aughinish Alumina Limited (hereinafter referred to as the "Applicant")
<b>The Development:</b>	means the proposed development on Lands situated at Aughinish Island, Askeaton, Co. Limerick (hereinafter referred to as the "Development")

## EXECUTIVE SUMMARY

Independent Site Management ('ISM') has been engaged to provide a specific assessment that the proposal being made by Aughinish Alumina Limited (the "Applicant") within its submission to An Bord Pleanála (the 'Planning Authority'), allows for the retention of important Telecommunication Channels ("Telecommunication Channels") such as microwave links, to satisfy the criteria of Section 3.2 of the Building Height Guidelines (2018).

To provide this assessment, ISM reviewed the Applicant's proposed development (the "Development"), together with their proposed allowances to retain relevant Telecommunication Channels in the context of the immediate surrounding registered and documented telecommunication sites.

Pursuant to our review, ISM can conclude based on the findings outlined herein that the proposal being made by the Applicant within its submission to the Planning Authority allows for the retention of important Telecommunication Channels, such as Microwave links, and therefore satisfies the criteria of Section 3.2 of the Building Height Guidelines (2018).



## ABOUT THE AUTHOR

ISM is a consultancy firm and asset management company that provides telecommunication consultancy and services to developers and property owners.

ISM works closely with all providers of wireless and fixed line telecommunication services to bridge their infrastructure requirements with that of private and public development. ISM has successfully been providing this service in Ireland for 20 years.

ISM is a multidiscipline firm proficient in the 3 main areas in the delivery of telecommunication services:

- (1) Radio Frequency technology;
- (2) Microwave Transmission technology; &
- (3) Fixed Line fiber optic & copper technologies.

ISM has had an integral part in procuring, designing, building and subsequently managing over 300 mobile base station and/or fixed wireless sites, the vast majority of which originated in densely populated, urban environments.

ISM has designed built and operates 6 in-building distributed antenna systems, and 2 large area managed fibre optic networks.



## DEVELOPMENT DESCRIPTION

### Proposed Extension of Facility

#### (1) Proposed Increase in Height of the BRDA to Accommodate Additional Disposal Area

It is proposed that the permitted height of the overall BRDA be increased to accommodate the further storage of bauxite residue at the Facility to provide an additional 9-year capacity. It is proposed that the existing BRDA can facilitate an increase in height to Stage 16 (currently permitted to Stage 10), which would provide a perimeter elevation of 36mOD and a maximum central elevation of 44 mOD. The proposed development will provide for the disposal of c. 1 million cubic meters per year (c. 1.52 million tonnes per year) of Bauxite Residue on average and a total of c. 8 million cubic metres (c. 13.10 million dry tonnes) over the lifetime of the development.

The proposed method of raising the BRDA from Stage 10 to Stage 16 will be the upstream method, consistent with the construction methodology for the current BRDA and involves the construction of rock fill embankments (Stages), offset internally and founded on the previously deposited and farmed bauxite residue 4, in 2m high vertical lifts. This construction method is also consistent with Best Available Techniques (BAT) for the management of waste from extractive industries 5. The overall stack is raised systematically as the Stages are filled with bauxite residue, farmed, carbonated and compacted, prior to deposition of the next layer.

#### (2) Vertical Extension of the Salt Cake Disposal Cell

The existing crest height of the SCDC is 29.00mOD which ties into the overall height of the permitted BRDA at 32.00mOD. The proposed development comprises the vertical extension of the existing SCDC to a crest height of c. 31.25mOD which will have a maximum overall height of c. 35.50mOD when capped at cell closure. The extension of the SCDC will accommodate disposal for an additional c. 22,500 m<sup>3</sup> in total. Please refer to Drawing No. 07 prepared by Golder Associates for details of the Salt Cake Disposal Cell extension.



(3) Extension of the Permitted Borrow Pit

It is proposed to extend the extraction area of the permitted Borrow Pit to the east of the existing BRDA to c. 9.1 hectares (from c. 4.5 hectares) which would provide a total of c. 820,000 m<sup>3</sup> of rock. The quantum of rock to be extracted from the extension area will be used in the construction of the proposed BRDA. It is proposed that blasts will occur in line with that already permitted under LCCC Reg. Ref. 17/714; ABP Ref. PL91.301011. Please refer to Drawing No. 08 and 08a prepared by Golder Associates which illustrates the extent of the proposed Borrow Pit.



# SITE LOCATION/LAYOUT MAP

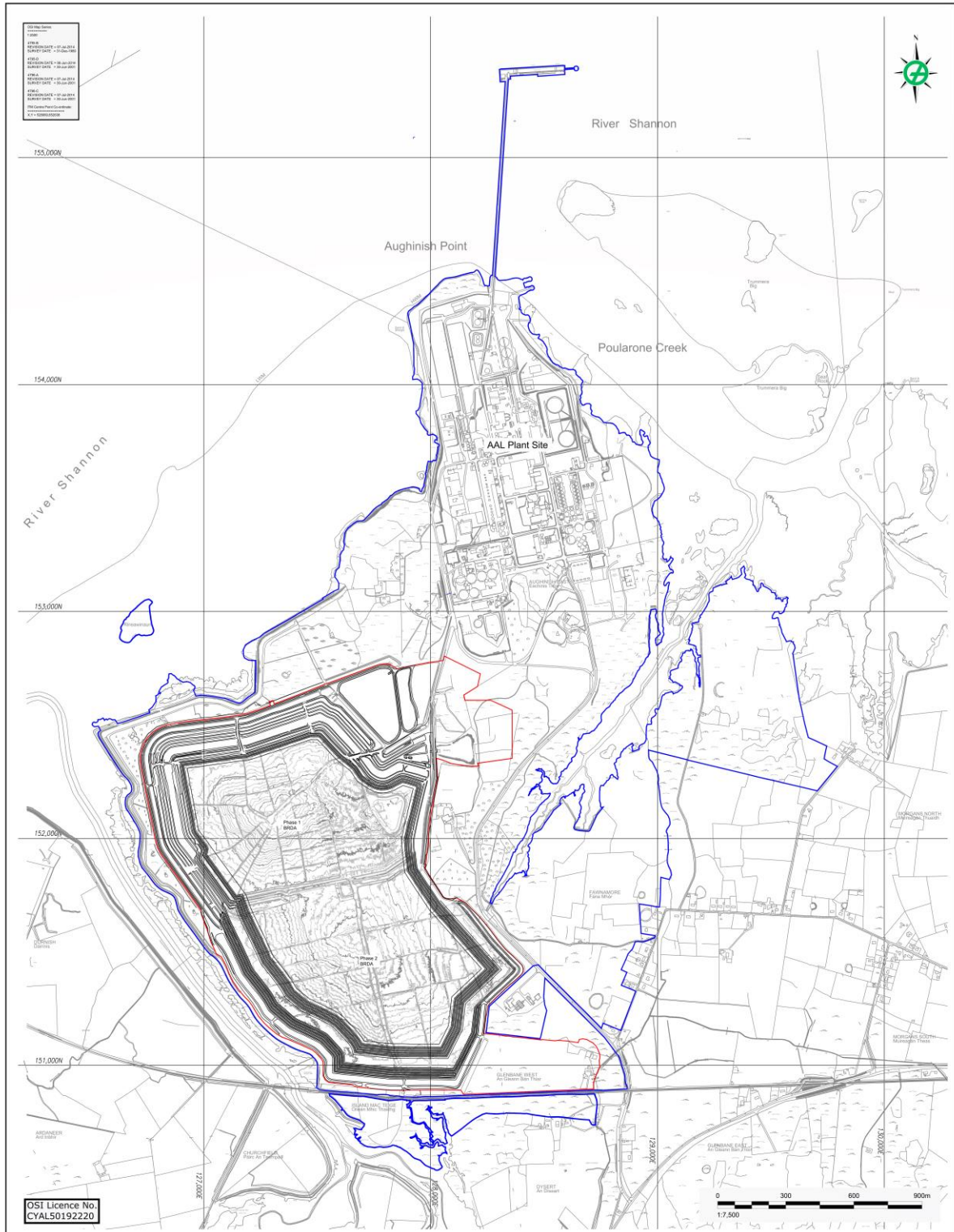


Figure 1



## TELECOMMUNICATION CHANNELS

This report assessed the two wireless Telecommunication Channels or networks of Telecommunication Channels that may be affected by the height and scale of a new development, Radio Frequency links & Microwave Transmission links

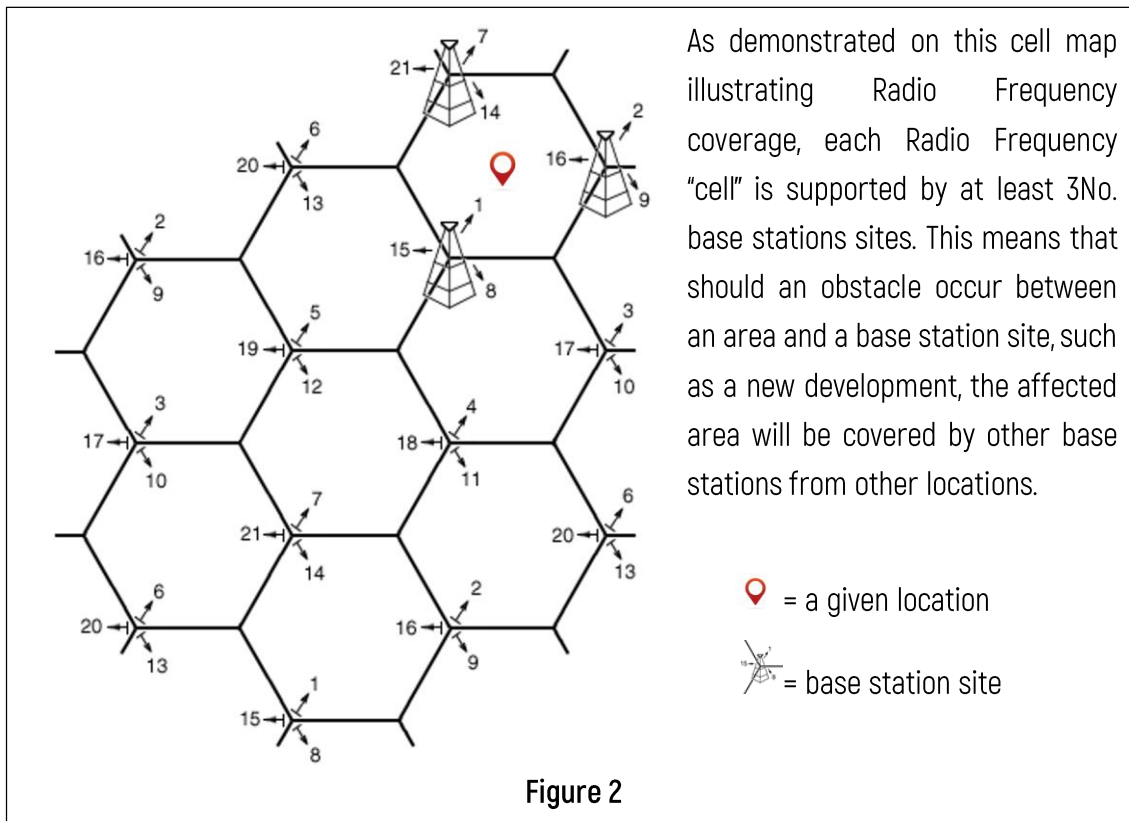
Radio Frequency links & Microwave Transmission Links are used in Ireland's mobile phone and fixed wireless networks and disseminate at an average above ground level height of 20m, making them the most relevant Telecommunication Channels to be assessed in relation to the height and scale of a new development and to that end what allowance the Applicant needs to make for their retention.

Mobile phones send and receive signals via links from nearby antenna sites or cellular towers, technically known as base stations, using Radio Frequency waves. Microwave Transmission links use microwave dishes to "transmit" from these base stations to other base stations forming a network. Radio Frequency waves operate at a lower power within lower frequencies of the radio spectrum, whereas Microwave Transmission operates at higher power within higher frequencies of the radio spectrum.

Radio Frequency waves are distributed over land areas in "cells", each served by at least one fixed-location transceiver (base station), but more normally by three cell sites or base stations. These base stations provide the cell with the network coverage, which can then be used for voice, data, and other types of content. A cell typically uses a different set of frequencies from neighbouring cells to avoid interference and provide guaranteed service quality within each cell.

When joined together, these cells provide Radio Frequency coverage over a wide geographic area (Cellular network). This enables numerous portable transceivers (e.g., mobile phones, tablets and laptops equipped with mobile broadband modems, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

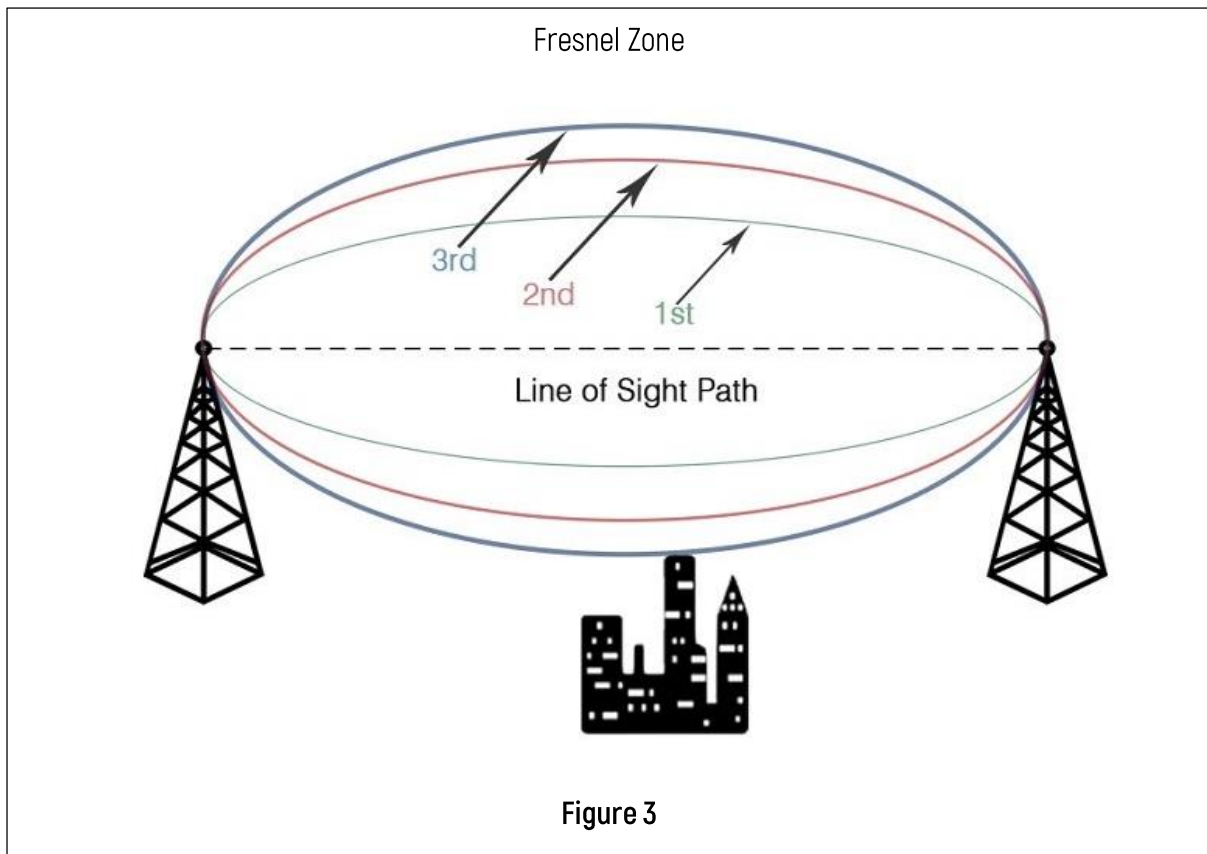




Cellular networks offer a number of desirable features, but most notably, additional cell towers can be added indefinitely and are not limited by the horizon, therefore it can be considered **indeterminable** as to whether a new development affects the Radio Frequency coverage of a geographical area which is being served by multiple base stations, not necessarily the closest.

Conversely, Microwave Transmission links are point-to-point links, which are easily determined to be affected, or not, by the height and scale of a new development. In point-to-point wireless communications, it is important for the line of sight between two base stations to be free from any obstruction (terrain, vegetation, buildings, wind farms and a host of other obstructions). As any interference or obstruction in the line of sight can result in a loss of signal.

While installing Microwave links, it is important to keep an elliptical region between the transmitting Microwave link and the receiving Microwave link free from any obstruction for the proper functioning of the system. This 3D elliptical region between the transmit antenna and the receive antenna is called the **Fresnel Zone**. The size of the ellipse is determined by the frequency of operation and the distance between the two sites.



Essentially, if there is an obstacle in the Fresnel zone, part of the radio signal will be diffracted or bent away from the straight-line path. The practical effect is that on a point-to-point Microwave link, referred to herein, the refraction will reduce the amount of energy reaching the receiving microwave dish. The thickness or radius of the Fresnel zone depends on the frequency of the signal – the higher the frequency, the smaller the Fresnel zone. Microwave links are high frequency radio links used for point-to-point transmission.

## FINDINGS

ISM's assessment did not identify any Microwave links that will require the Applicant to make specific allowances for their retention ("Mitigation Measures").

Our assessment has not identified any Radio Frequency links that will require the Applicant to make specific allowances for their retention.

ISM carried out a full assessment of neighbouring registered and documented telecommunication sites to assess what Microwave links would be impacted by the height and scale of the Development. Refer to Figure 4 & 5 of the appendices for full analysis.

ISM carried out a full assessment of neighbouring registered and document telecommunication sites to assess what Radio Frequency links might be impacted by the height and scale of the Development. To asses this, we carried out a drive test throughout the surrounding areas to ascertain what cells were serving the street areas to the north, south, east & west of the Development site. Refer to Figure 6 of the appendices for full analysis

Our assessment identified Radio Frequency coverage for the local geographic area is served by several cells at strategic distances away from the development site on a 360° basis which is typical cell pattern for urban Radio Frequency coverage. The walk test data determined that the business, residential and public road areas to the north, south, east & west of the Development are adequately covered by the cell sites identified in figure 6 and are not reliant on Radio Frequency coverage from any one cell that would be obstructed by the Development.

Please note that telecommunication networks are always evolving, and as such, these findings remain subject to change.



## MITIGATION MEASURES

ISM did not identify any Telecommunication Channels that would as a consequence of the height and scale of the Development, require specific mitigation measures in order to retain them.

The Applicant already possess an active telecommunication site within its property which, if required, has ample capacity to provide necessary mitigation measures should retention of any Microwave links be required (subject to planning permission if applicable). Refer to Figure 7 of the appendices for full analysis.

ISM can therefore conclude that the proposal being made by the Applicant within its submission to the Planning Authority allows for the retention of important Telecommunication Channels, such as Microwave links, to satisfy the criteria of Section 3.2 of the Building Height Guidelines (2018).

## APPENDICIES

Figure 4: Identification of neighbouring registered and document telecommunication sites  
(Area Telecommunication Analysis)

Figure 5: Identification of Microwave links disseminating from neighbouring registered and  
document telecommunication sites (Microwave Link Analysis)

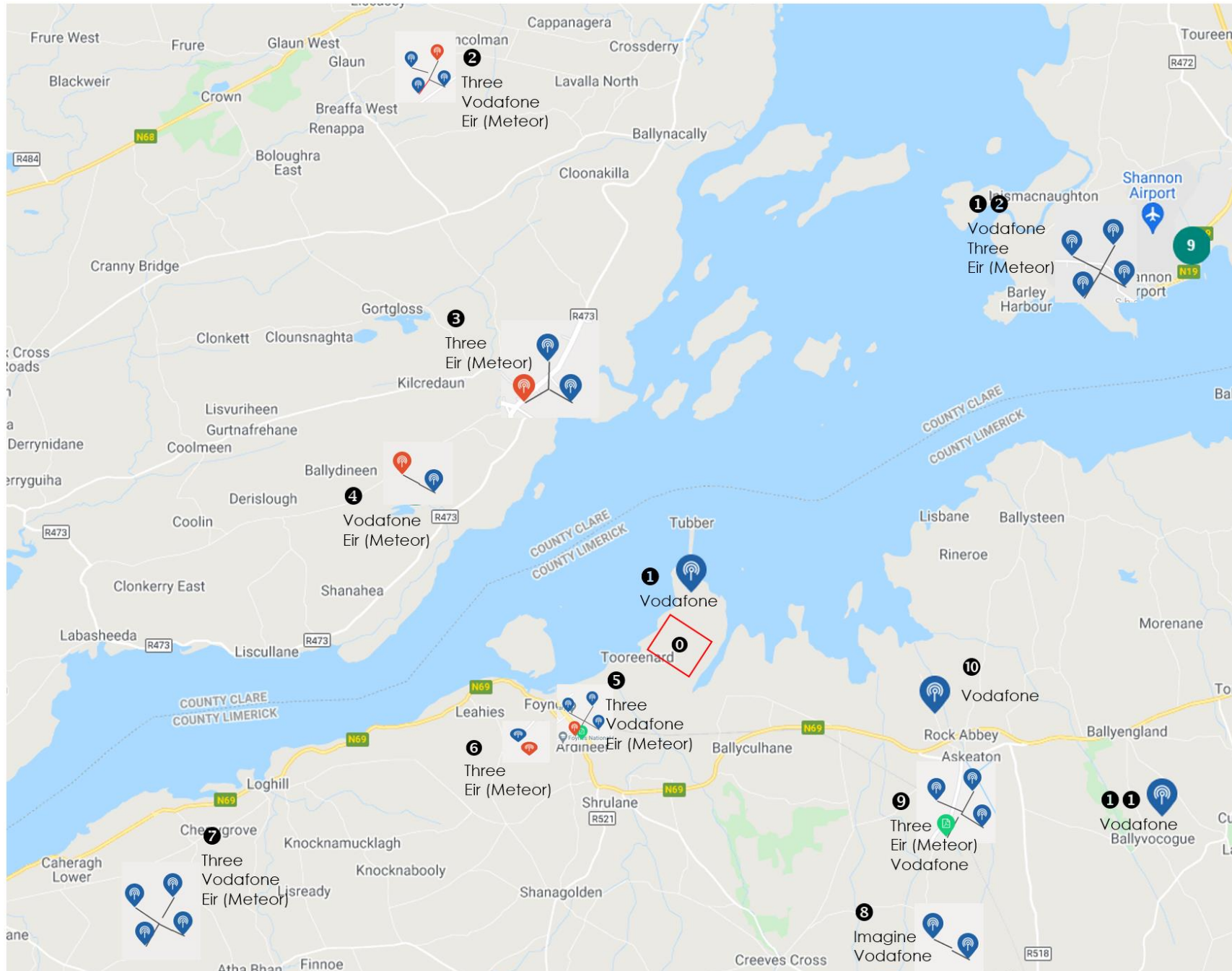
Figure 6: Identification of local area Cells by Cell ID (Cell Identification Analysis)

Figure 7: Mitigation Measures

Figure 4

Area Telecommunication Analysis

Source: Comreg



Note  
 All Dimensions to be checked on site  
 No Dimensions to be scaled from this Drawing  
 This drawing to be read with relevant  
 Consultant Drawings

- ① Proposed Development
- ① Aughinish Alumina
- ② Concolman Mast
- ③ Kildysart Gard Station
- ④ Effernan Lough
- ⑤ Foynes Gard Station
- ⑥ Corgrigg Wood
- ⑦ Rosdila
- ⑧ JH Livestock
- ⑨ Askeaton Water Tower
- ⑩ Wyeth Nutritionals
- ①① Curraghchase
- ②① Shannon Airport

FINAL



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Client  
 Golder

Project  
 Aughinish Alumina

Option	1
Date	05/08/2021
File Name	Aughinish Alumina

Drawing:

Area Site Analysis			
Building	Drawing No.	Zone	Rev
SPN	E 1221		1

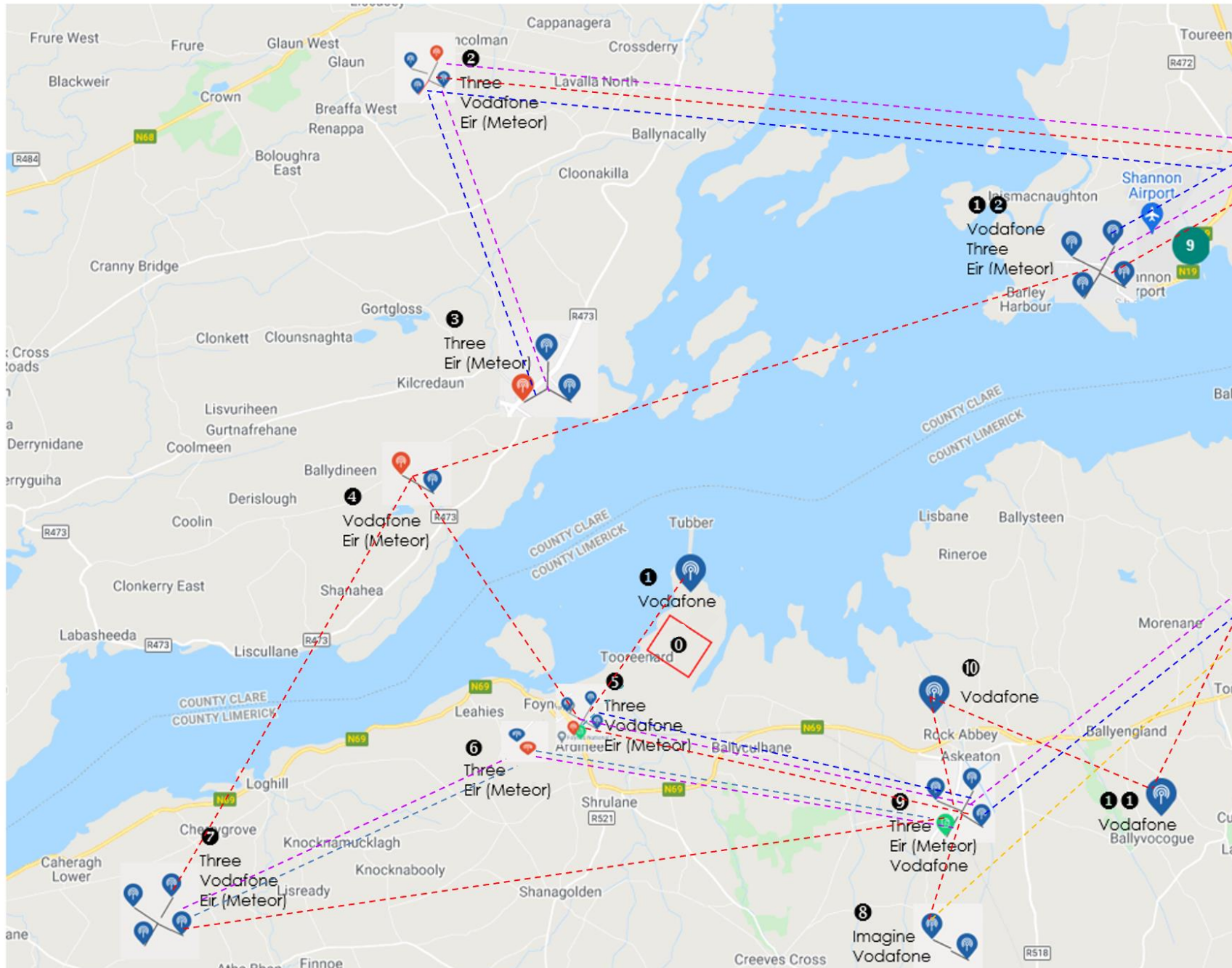
© Independent Site Management Limited



Figure 5

Microwave Link Analysis

Source: Comreg ISM Vodafone Three & Eir Mobile



Note  
 All Dimensions to be checked on site  
 No Dimensions to be scaled from this Drawing  
 This drawing to be read with relevant  
 Consultant Drawings

- Three Transmission Link
- Vodafone Transmission Link
- Eir Transmission Link
- Imagine Transmission Link
- Imagine Transmission Link


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**ISM** INDEPENDENT  
 SITE MANAGEMENT

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 Golder

Project  
 Aughinish Alumina

Option	1
Date	05/08/2021
File Name	Aughinish Alumina

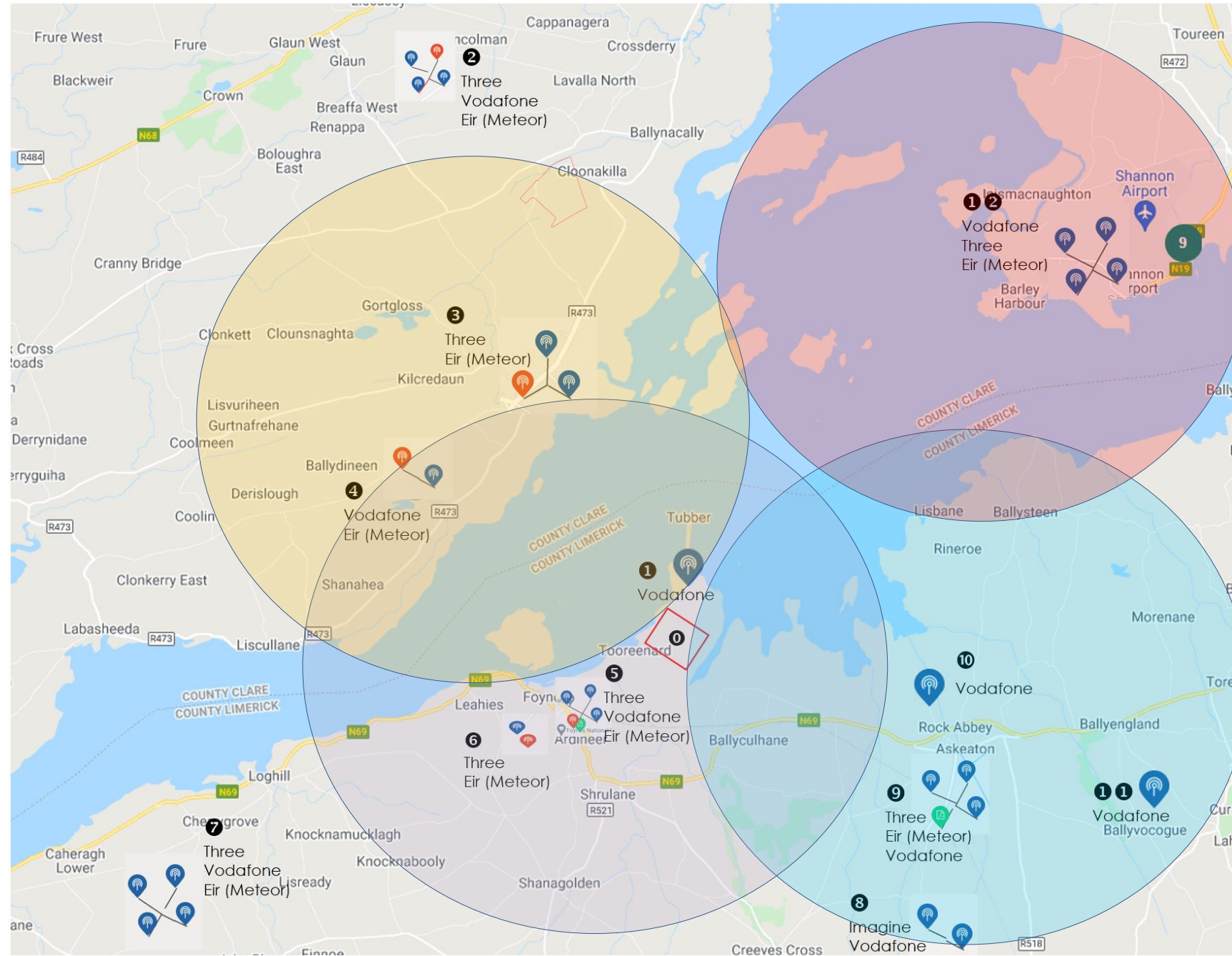
Drawing:  
 Link Analysis

Building	Drawing No.	Zone	Rev
SPN	E 1221		1

Figure 6

Walk Test Data

Source: Comreg, ISM



Note  
 All Dimensions to be checked on site  
 No Dimensions to be scaled from this Drawing  
 This drawing to be read with relevant  
 Consultant Drawings

- Multiple Cell IDs
- 1. Kildysart Gard Station
- 2. Effernan Lough
- Askeaton Water T. Cell ID
- Shannon Airport Cell ID
- Foynes Gard Station Cell ID

**NOTE**  
 The Anite Walker Air test kit was used to test and record the radio environment. This kit controls and logs the radio environment and the Cell ID the signal is coming from. Measurements were then mapped against the public roadway to provide the results

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Option	1
Date	05/08/2021
File Name	Aughinish Alumina

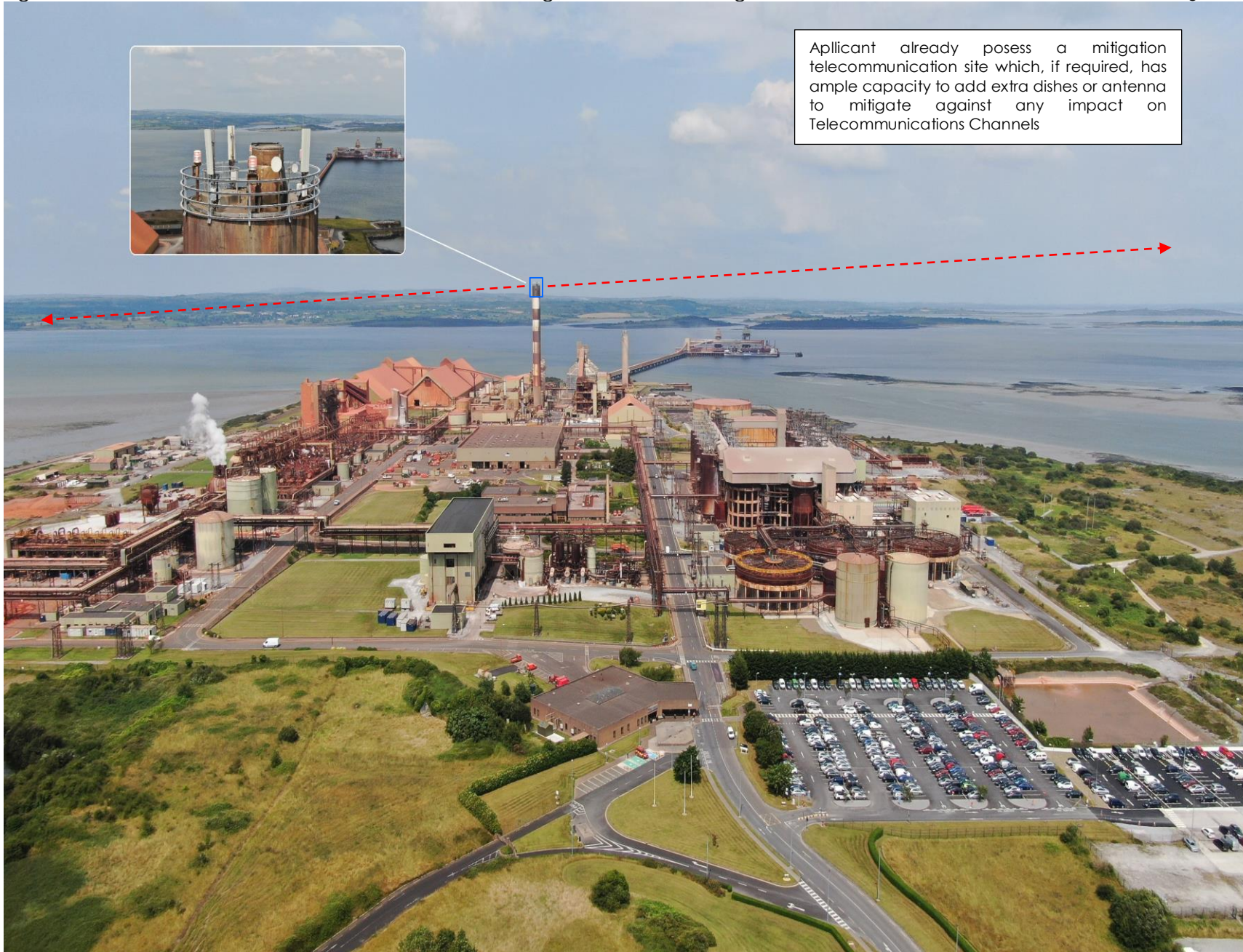
Drawing:  
 Cell Identification Analysis

Building	Drawing No.	Zone	Rev
SPN	E 1221		1

Figure 7

Mitigation Measure Design

Source: Comreg ISM



Applicant already possess a mitigation telecommunication site which, if required, has ample capacity to add extra dishes or antenna to mitigate against any impact on Telecommunications Channels

Note  
 All Dimensions to be checked on site  
 No Dimensions to be scaled from this Drawing  
 This drawing to be read with relevant Consultant Drawings

Typical Installation



--- Transmission Link

□ Location of mitigation area

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Option	1
Date	05/08/2021
File Name	Aughinish Alumina

Drawing:  
 Mitigation Measure

Building	Drawing No.	Zone	Rev
SPN	E 1221		1