PINNACLE
CONSULTING ENGINEERS

DB081
Profile Park, Grange Castle, Lucan, Co. Dublin

FLOOD RISK ASSESSMENT

June 2021

P210203

EQUINIX

STRUCTURAL · CIVIL · DUE DILIGENCE · ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT · INFRASTRUCTURE DESIGN
PRE-DEVELOPMENT ENGINEERING · BIM · TRANSPORTATION

SOURCES OF DATA

Office of Public Works (OPW)	Brock McClure
Met Eireann	
Land Survey Services Ltd.	
Google	

Executive Summary

This report was prepared for South Dublin County Council in connection with the planning application for a 3 storey (part 4 storey) data centre and addresses the potential flooding for the proposed development, located in Profile Park, Grange Castle, Dublin, near to the junction of the New Nangor Road.

Equinix (Ireland) Ltd. intend to apply for permission for development at this site of c.2.65ha on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue). The development will consist of the following:

- Construction of a 3 storey (part 4 storey) data centre known as "DB8" to include data halls, electrical/plant rooms, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level. The total gross floor area excluding hot air plenums and external staircase is c.9,601sqm. The overall height of the data centre ranges from c.16m to c.20m to roof level and c.20m to c.24m including roof top plant, flues and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a sprinkler pump room (c.23sqm), 2 no. sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). Total floor area of ancillary structures and plant (c.303sqm);
- Provision of a delivery yard and loading bays, 64 no. car parking spaces, 5 no. motorcycle spaces, bicycle shelter serving 14 no. spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of existing vehicular entrances from Falcon Avenue;
- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;
- The area to the south west of the site is reserved for a future data centre, subject of a separate application to South Dublin County Council;
- This application is accompanied by a Natura Impact Statement.

The Report should be read in conjunction with all associated Planning Drawings, and deals with the potential flood risk and mitigation measures proposed for the subject site.

2 Flood Risk Assessment

The Planning System & Flood Risk Management Guidelines for Planning Authorities, dated November 2009, as published by the OPW, sets out the process to be followed in assessing proposed developments relating to flood risk.

These guidelines introduce comprehensive mechanisms incorporating flood risk identification, assessment and management into the planning process.

Planning authorities, in implementing these guidelines, are to ensure that where relevant, flood risk is a key consideration in the preparation of development and local area plans and also in the assessment of planning applications.

The guidelines will also serve to assist county and local authorities in preparing planning guidelines which should be utilised by developers and the general public in assessing flood risk when submitting development proposals / planning applications. Flood risk is summarised through various levels of the planning system as set out in Figure 1.1 below.

Policy Documents / Instruments	Flood Risk Assessment Technique	Decision-making Tools	Key Chapters
National Spatial Strategy, National Planning Guidelines	Flood Risk Management Guidelines	n/a	1 2
Regional planning guidelines	Regional Flood Risk Appraisal, Catchment Flood Risk Management Plans	Sequential approach, Strategic Environmental Assessment	3 4
City / county development plan	Strategic Flood Risk Assessment, Catchment Flood Risk Management Plans	Sequential approach, dev plan Justification Test, SEA	3 4
Local area plan	Strategic Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA	3 4
Master plan, non-statutory plan, site brief	Site-specific Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA / Env. Impact Assessment	3 5
Planning application	Site-specific Flood Risk Assessment	Sequential approach, dev management Justification Test, EIA	3 5

Fig. 1.1: Flood risk management and the planning system

3 Source-Pathway-Receptor Model

In assessing the potential flood risk to the site, the above model, as described in The Planning System & Flood Risk Management Guidelines for Planning Authorities, was used. The following flood sources were considered and necessary mitigating measures proposed, where required:-

- Coastal Flooding
- Fluvial Flooding
- Pluvial Flooding
- Ground Water Flooding

3.1 Coastal Flooding

In considering the risk from coastal flooding, it is necessary to relate the location of the site relative to the coast and the associated height above sea level. The subject site is located circa 15.5km from the nearest point on the Irish coast (Dublin Bay) to the east and the average elevation of the site above sea level is circa 75.00m O.D. Malin Head.

Further to the above, coastal flooding is not considered a risk to the subject site.

3.2 Fluvial Flooding

Fluvial flooding is defined as flooding from a river or other watercourse. Further to site inspections and topographical surveys, there are no rivers flowing through the site. There is a dry ditch forming the southern boundary of the site, which ultimately connects into a tributary of the Camac.

Further to the above, this is considered to be very low risk, given the fact that the records of fluvial flooding on the site or environs, i.e. 0.1% AEP Extreme Event (1:1000yr), indicates a water level of between 0.5m – 1m. Refer the attached CFRAMS mapping as contained in Appendix A.

From a levels perspective, it appears that the peak water level, as taken from the above mapping, is circa 74.50m on the east to 72m in the south. The lowest building finished floor level has been set at 75.50m, which is well in excess of the required 500mm above the highest known 1:1000yr flood level.

Further to the above, any flood extents indicated, in this instance only the 0.1% AEP Extreme Event (1:1000yr) is tabled, which indicates this flood event as displacing water well to the south of the subject site and not impacting on the proposed development.

Additionally, the topographical survey is based on ITM (Irish Transverse Mercator), GPS compatible mapping and is used extensively by Ordnance Survey Ireland, whereas, the CFRAM mapping relies on Lidar (Light Detection & Ranging) survey, which is not nearly as accurate as a topographical survey, as it is conducted by air. The accuracy of Lidar survey varies between 50mm – 200mm vertically and between 400mm – 1500mm horizontally.

4 Impact on Downstream Network

There are no impacts on the downstream network based on the following:-

- The site has been sustainably managed in accordance with the relevant guidelines and specifications of the time
- SuDS measures have been incorporated in the form of a surface water attenuation tank
- Surface water attenuation has been provided and sized based on a Q-bar run-off rate of 4.4 l/s
- A Hydrobrake mechanism has been installed to restrict the outflow into the existing network accordingly, i.e. 4.4 l/s
- Water quality is maintained as the outflow passes through approved Petrol / Oil Interceptors

The above methods will ensure that all surface water on-site will be sustainably managed and discharged off-site, via approved run-off rates into the existing Local Authority sewer network.

Appendix A

OPW - CFRAM Mapping

302600 302800 303000 303200 303400 303600 303800 304000

230600 230400 230200 229800 229600 229400

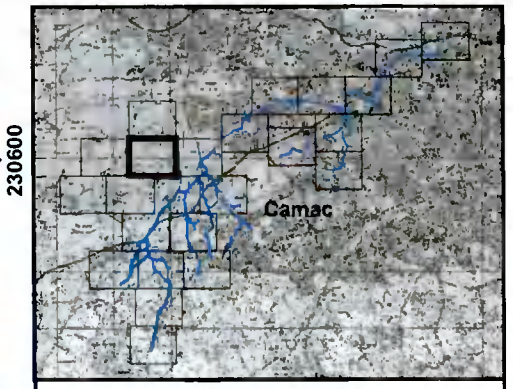
For flooding from the Griffeen River see also Baldonnel AFA flood extent maps

AUNGIERSTOWN and BALLYBANE
Baile Áinséir agus An Baile Bán

KILBRIDE
Cill Bhríde

KILMACTALWAY
Cill Mhic Thalmhaigh

BALDONNEL UPPER



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% AEP Fluvial Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline

AFA Extents

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY

OPW

RPS

The Office of Public Works
Jonathan Swift Street
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74 Boucher Road
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BT12 6RZ

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Map:
Camac Fluvial Flood Depths

Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 27 October 2017
Checked By : A.S.	Date : 27 October 2017
Approved By : S.P.	Date : 27 October 2017
Drawing No. : E09CAM_DPFCD001_F1_13	
Map Series : Page 13 of 24	
Drawing Scale : 1:5,000 @A3	

0 50 100 200 300 400 500 Metres

302600 302800 303000 303200 303400 303600 303800 304000

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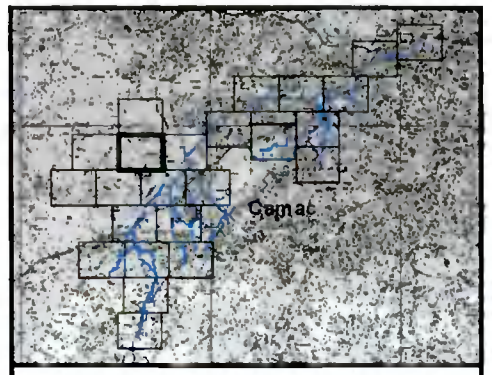

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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Wall
- Defended Area
- 1% AEP — Standard of Protection of Flood Defence
- 1% AEP — (Walls / Embankments)
- Node Point
- Node ID — Node Label

FINAL

REV:	NOTE	DATE:
01	SOP label updated (Pg 21) Removal of Def. Area (Pg 21)	13/11/2017

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Map Area:	HPW
Scenario:	CURRENT
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302600 302800 303000 303200 303400 303600 303800 304000

232000 231800 231600 231400 231200 231000 230800

GRANGE
An Ghráinseach

CLUTTERLAND
Talamh Chlutair

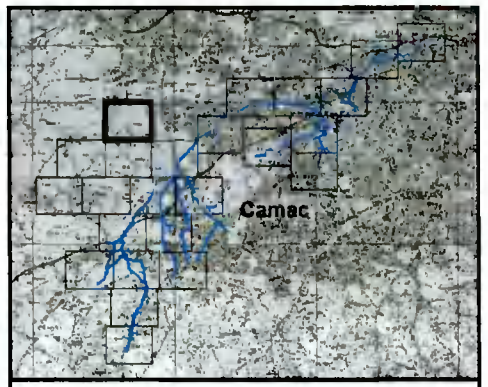
BALLYBANE
An Baile Bán

MILLTOWN
PART OF
Baile an Mhuilinn

TTERLAND

For flooding from the Griffeen River
see also Baldonnel AFA flood extent maps.

0 50 100 200 300 400 500 Metres



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Modelled River Centreline

AFA Extents

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Drawing No. :	E09CAM_DPFCD100_F1_15
Map Series :	Page 15 of 24
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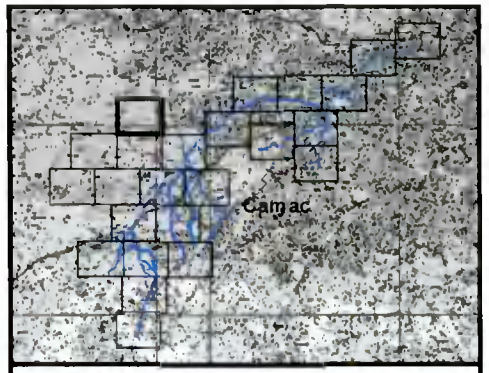

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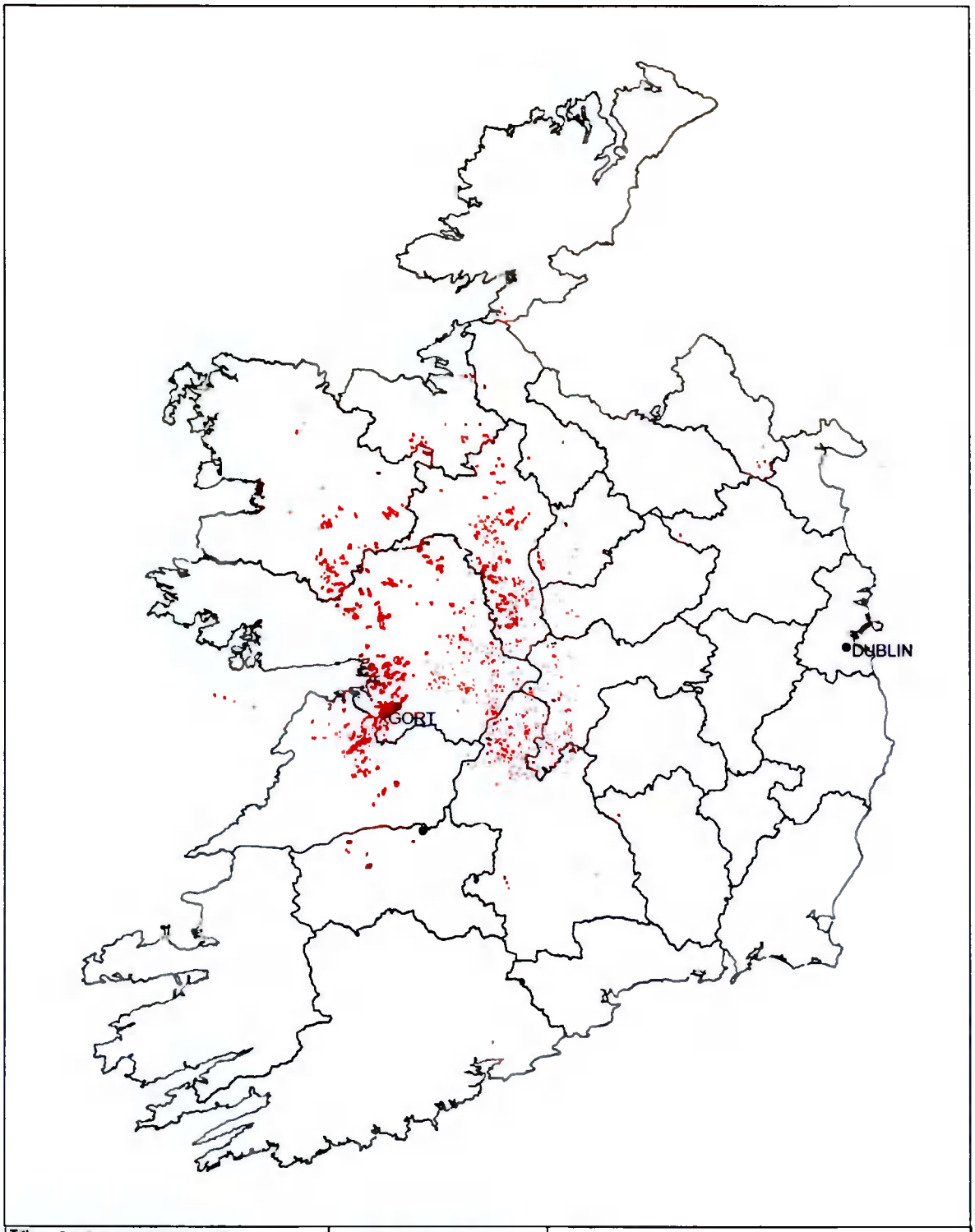
Appendix B

OPW – Preliminary Groundwater Flood Hazard Map



Title	Preliminary Groundwater Flood Hazard Map		
Figure 6.6	Size A4	Drawn	RAH
		Checked	SB
Drawing No: 262128BA/2.1		Approved	SB
Date: 24/06/2010		Rev No	01

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www.mottmac.com

Legend

- County boundary
- Location
- Area at risk of groundwater flooding

5 Conclusion

In conclusion, the proposed development of the site will be carried out in a wholly sustainable manner, as described and will not pose any flooding issues. This holds true for the developable site itself or for any lands / properties downstream of the proposed development.

Any fluvial flooding adjacent to the environs of the site is considered to be of an extreme nature, i.e. 1:1000 year storm event and would not jeopardise the proposed development of the site, particularly as the site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner in accordance with all relevant guidelines and specifications.

Further to the above, based on the indicative flood mapping, the development site is located within Flood Zone C "Low Probability". Additionally, as mentioned, the site is classified as "Less Vulnerable" and therefore the development is classified as appropriate.

3.3 Pluvial Flooding

This type of flooding is applicable to all sites and is caused by summer thunderstorms or high intensity rainfall during longer duration events. This flooding is then generated by overland flows prior to the run-off entering watercourses / sewers (pipe networks).

Further to the above, any future occurrence of this form of flooding taking place, will be mitigated by the fact that the proposed development has been designed in accordance with the relevant guidelines and specifications of the time, with a surface water attenuation pond being provided, together with a hydrobrake flow control mechanism limiting the total outflow to the Q-bar run-off rate of 4.4 l/s. These measures have been utilised in the sites overall network drainage system in order to mitigate pluvial flooding and provide for a wholly sustainable development.

3.4 Ground Water Flooding

This form of flooding is not considered to be of any risk to the site. This is borne out by the fact that trial holes had previously been dug on the site and the results gathered from this excavation work have indicated that minimal groundwater was encountered.

Additionally, the OPW Preliminary Flood Risk Assessments Groundwater Flooding Report concludes that ground water flooding is largely confined to the West Coast of Ireland, due to the hydrogeology of the area.

Refer Appendix B for the Groundwater Flood Hazard map, clearly indicating that ground water flooding is not considered a risk in this area of County Dublin.

Using the sequential approach as described in Chapter 3 of the aforementioned guideline document, including confirmation that the site is classified as "Less Vulnerable" and therefore classified as appropriate and in conjunction with assessing available flood data, i.e. OPW, PFRA & CFRAMS mapping etc., it has been determined that the site has been categorised as falling into Zone C, (see Flood Zone definitions below), from a flooding perspective. It is proposed to apply the Source-Pathway-Receptor Model in providing the necessary mitigating measures.

Flood zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types or levels of flood zones defined for the purposes of these Guidelines.

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

Fig. 2.3: Indicative flood zone map extract

1 Introduction

The applicant proposes to construct a 3 storey (part 4 storey) data centre, which will be accessed off Falcon Avenue adjacent to and to the west of the site. Profile Park is located in Grange Castle and connects to the New Nangor Road to the north. The purpose of this report is to address any potential flooding elements of the proposed data centre development, on lands as indicated on the site location map below.

The total subject site area extends to circa 6.55 acres (2.65 ha), with the site being greenfield.

The location of the site is indicated indicatively on the map extract below - Figure 1.

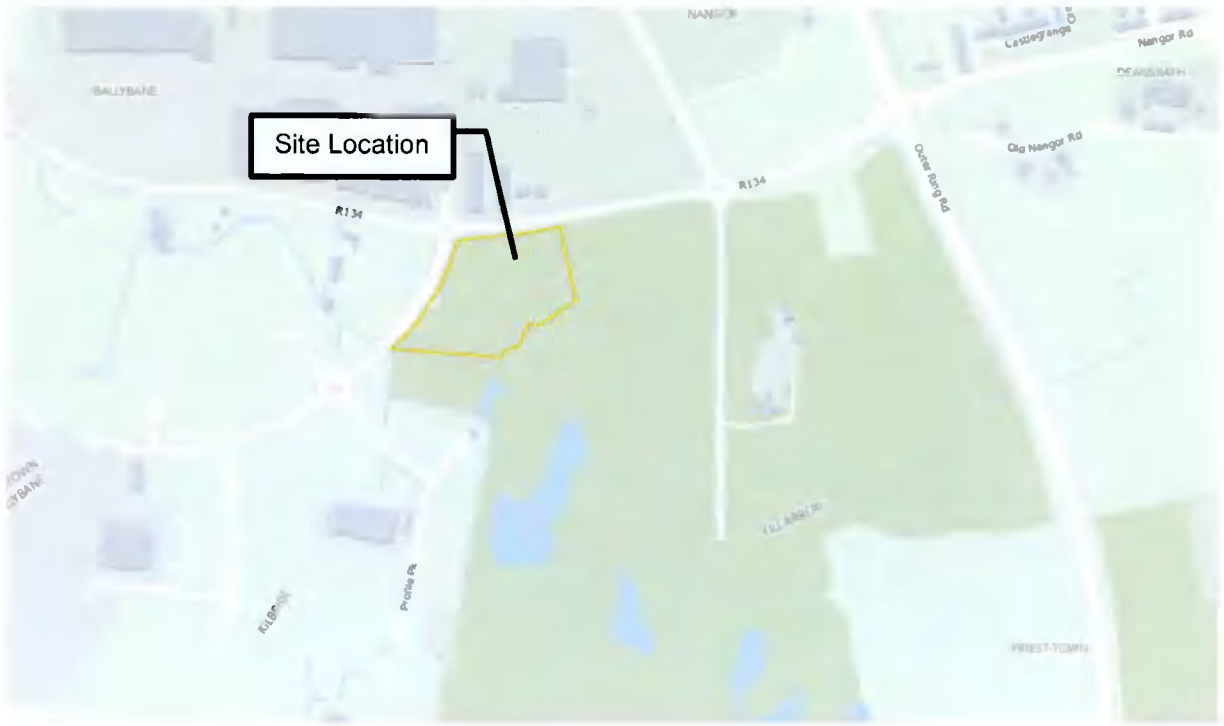

FIGURE 1 - Site Location (Source Google Maps)

REPORT CONTENTS

CONTACT DETAILS

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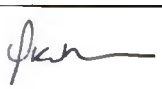
APPROVALS

	Name	Signature	Position	Date
Prepared by	S. O'Reilly		Associate	08/06/2021
Reviewed by	J. Mayer		Director	10/06/2021
Approved by	J. Mayer		Director	12/06/2021

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	16/06/2021	Planning Submission