Intended for
Vantage Data Centers DUB13 Limited

Date
November **2022**

Project Number
1620014883

VANTAGE DUBLIN DATA CENTER

VOLUME 3: TECHNICAL APPENDICIES

RAMBOLL

Volume 3: Technical Appendices
Table of Contents

Technical Appendix 1.1: IEMA Quality Mark Checklist

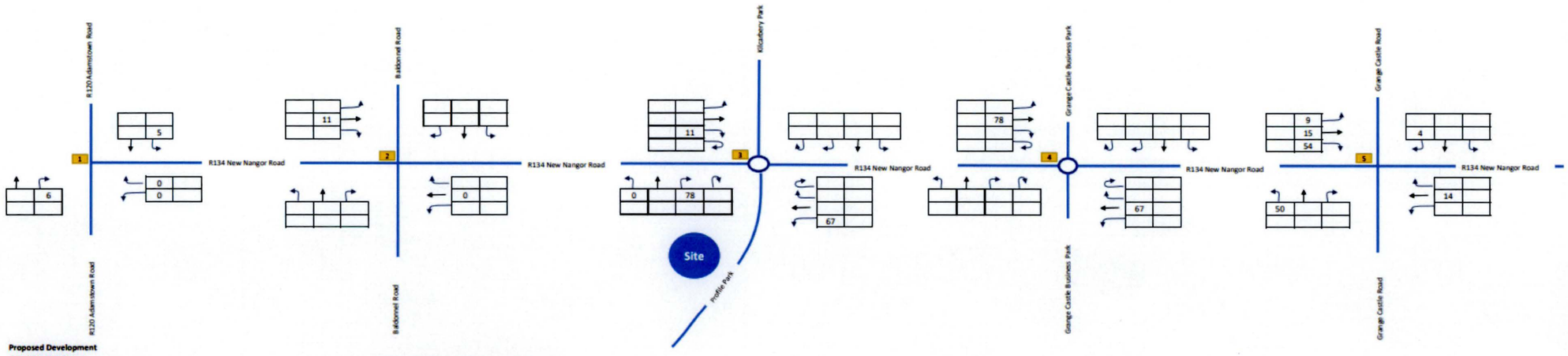
Table 1.1: IEMA Quality Mark Check	
EIA Commitment and ES Review Criteria	
EIA Commitment 1: Regulatory Compliance[1]	
a) Does the ES, in the light of the project being assessed, identify, describe and assess effects on:	√
- Human Beings	√
- Fauna & Flora	√
- Soil	√
- Water	√
- Air	√
- Climate	√
- Landscape	√
- Cultural Heritage	√
- Material Assets	√
b) Does the ES attempt to set out the interaction between the factors set out under criteria 1.a)?	√
c) Does the ES contain a clear section, or sections, providing a description of the project comprising information on the site, design and size of the project?	√
d) Does the ES contain a section, or sections, that describe the likely significant effects of the proposed project on the environment?	√
e) Does the ES contain a clear section, or sections, that provide a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects?	√
f) Does the ES contain a clear section, or sections, that provides the data required to identify and assess the main effects which the project is likely to have on the environment?	√
g) Does the ES contain a section, or sections, that outline the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects?	√
h) Has a Non-Technical Summary been produced containing an outline of the information mentioned in 1c) to 1h)?	√
EIA Commitment 4: EIA Context	
A) Scoping	
i) Has the ES clearly stated what effects will be addressed and how this decision was reached?	√
ii) Are the main environmental concerns and their locations, where relevant, clearly identified with an explanation of the risks posed from the project? Including relevant environmental issues beyond the boundary of the proposal?	√
iii) Does the ES identify the environmental issues that will not be assessed and explain why they are not being considered further?	√

[1] A number of the criteria under this Commitment cover similar issues to criteria set out in the other three Commitments, below. Where this occurs IEMA recognise that there will inevitably be some overlap between the criteria. However, the assessment of the criteria under this Commitment is focussed on the presence or absence of the issue, whereas the assessment of similar criteria, within the other three Commitments, will focus on the quality of the consideration of the issue in question.

Table 1.1: IEMA Quality Mark Check	
EIA Commitment and ES Review Criteria	
iv) Is the sub-topic scope undertaken in relation to each of the topics included in the EIA appropriate and focussed	√
B) Alternatives, including iterative design	
i) Does the ES set out the main alternatives that were considered at different points during the development of the proposal?	√
ii) Are the main reasons for the selection of the proposal over distinct alternatives and design iterations easily identifiable?	√
iii) Does the ES clearly indicate how the EIA process, environmental issues and consultee responses influenced the iterative design process that led to the proposed project?	√
EIA Commitment 5: EIA Content	
A) Baseline	
i) Does the ES describe the current condition of those aspects of the environment that are likely to be significantly affected by the development?	√
ii) Is the sensitivity / importance of the baseline environment clearly evaluated?	√
iii) Are limitations in the baseline information identified and clearly set out?	√
B) Assessment	
i) Are the methods for establishing the magnitude of impacts on the receiving environment clearly defined?	√
ii) Does the ES set out a generic methodology for the assessment and evaluation of significance OR clearly explain and justify a specific method for each environmental issue?	√
iii) Does the assessment of significance consider the impact's deviation from the established baseline condition? (e.g. the sensitivity of the environment, the extent to which the impact is reversible, etc.).	√
iv) Does the ES identify the significance of impacts that would be anticipated to remain following the successful implementation of any mitigation set out in the ES?	√
vii) Does the ES give appropriate prominence to both positive and negative effects relative to their significance?	√
C) Environmental Management	
i) Does the ES describe the measures proposed to be implemented to avoid, reduce, and if possible, remedy significant adverse impacts of the proposed development?	√
ii) Is an indication of the effectiveness of the stated mitigation measures provided?	√
iii) Are details provided related to any management plans that the ES indicates should be implemented to deliver the mitigation measures and/or monitor the environmental impact of the project?	√
iv) Does the ES identify the general groups who will be responsible for the follow-up programme?	√

Table 1.1: IEMA Quality Mark Check	
EIA Commitment and ES Review Criteria	
EIA Commitment 6: EIA Communication	
A) Consultation	
i) Does the description of any consultation include details of those who were contacted, including statutory and non-statutory consultees, and the public?	√
ii) Does the main text of the ES provide a summary of the main issues raised by consultees?	√
iii) Does the ES set out if any of the issues raised by consultees will not be dealt with in the ES?	√
If so is clear justification set out as to why the issue has been scoped out?	√
B) ES Quality	
i) Does the ES provide appropriate illustrations through the use of maps and/or diagrams? In particular this should cover:	
- the location of the site, site layout and boundary,	√
- operational appearance,	√
- main environmental receptors and	√
- impacts displayed in a visual format where appropriate.	√
ii) Is the area of proposed land clearly described and indicated on an appropriate map or diagram?	√
iii) Are the anticipated timescales of construction, operation and (where appropriate) decommissioning of the proposal clearly set out in the main text?	√
iv) Is the information in the ES presented in a manner in which a non-specialist would be able to logically identify information they were seeking?	√
v) Are technical terms kept to a minimum, with a glossary provided?	√
C) Non-Technical Summary (NTS)	
i) Does the NTS provide sufficient information for the non-specialist reader to understand the main environmental impacts of the proposal without reference to the main ES?	√
ii) Are maps and diagrams included in the NTS that, at a minimum, illustrate the location of the application site, the footprint of the proposed development, and the location of relevant key features?	√
iii) Is it clear that the NTS was made available as a separate, stand-alone document to facilitate a wider readership?	√

Technical Appendix 7.1: Traffic Flow and Distribution Diagrams



Proposed Development

Construction Stage

Trip Generation

	Arriv	Dep
Total Vehicles	78	78

Site	MW	Construction Movements
DUB11	56	440
DUB13	20	156

Trip Distribution:

Light construction vehicles have been distributed across the surrounding network in the same manner as the 2019 traffic surveys.

All heavy construction traffic travels to the site from the N7 National Road and from the M50 artirial motoriway via the R34 and R136 and departs along the same routes.

KEY

Client

Vantage Data Centers Dub11 Limited

Project Title

VDC DUB 13

Project Number

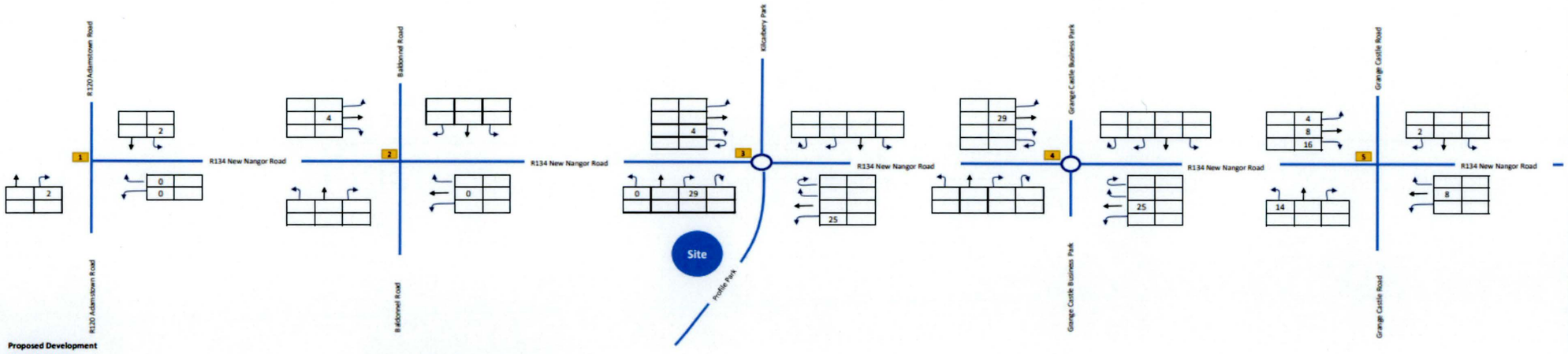
1620014883

Figure Title

Proposed Development Construction Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No. 1620014883/EIAR/7.312	Revision



Proposed Development
Operation Stage
Trip Generation

	Arriv	Dep
Total Vehicles	29	29

Site	MW	Operational Movements
DUB11	56	164
DUB13	20	58

Trip Distribution:
Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

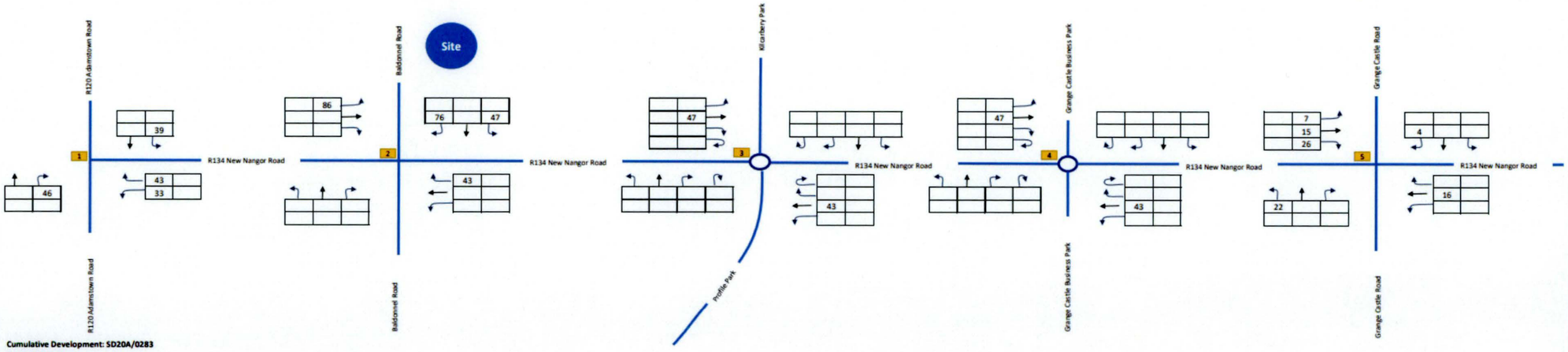
Project Number
1620014883

Figure Title
Proposed Development Operation Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No. 1620014883/EIAR/7.313	Revision

Technical Appendix 7.2: Accident Data



Cumulative Development: SD20A/0283
Operation Stage
Trip Generation

		Arriv	Dep
Total Vehicles		128	123

Trip Distribution:
Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client
Vantage Data Centers Dub11 Limited

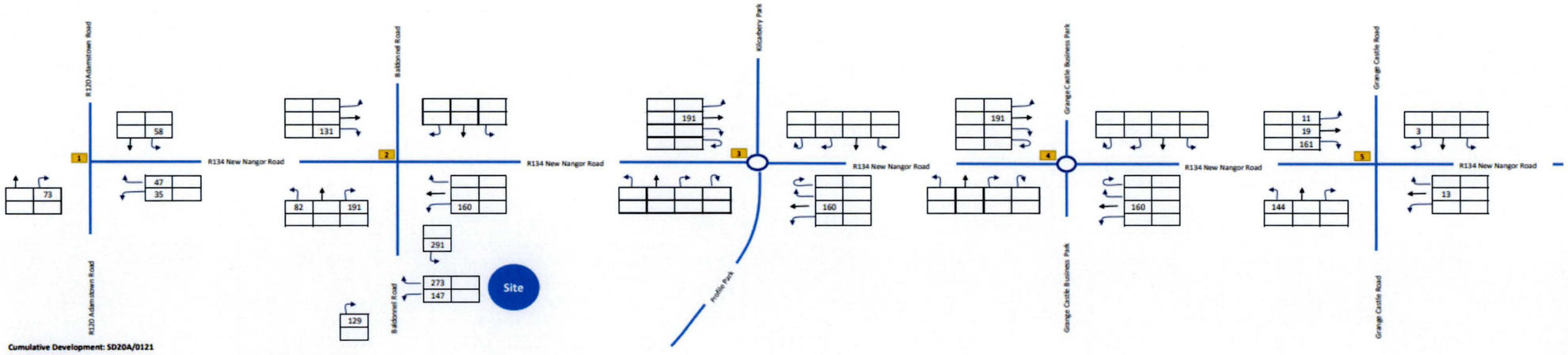
Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SD20A/0283" Operation Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No. 1620014883/EIAR/7.31	Revision



Cumulative Development: SD20A/0121

Construction Stage

Trip Generation

		Arriv	Dep
Total Vehicles		420	420

SD20A/0121 (80,269sqm)

10 HGVs per hour and direction

up to 300 vehicles per direction for commuting

Working hours: 07:00-19:00

12 hours

Trip Distribution:

Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client

Vantage Data Centers Dub11 Limited

Project Title

VDC DUB 13

Project Number

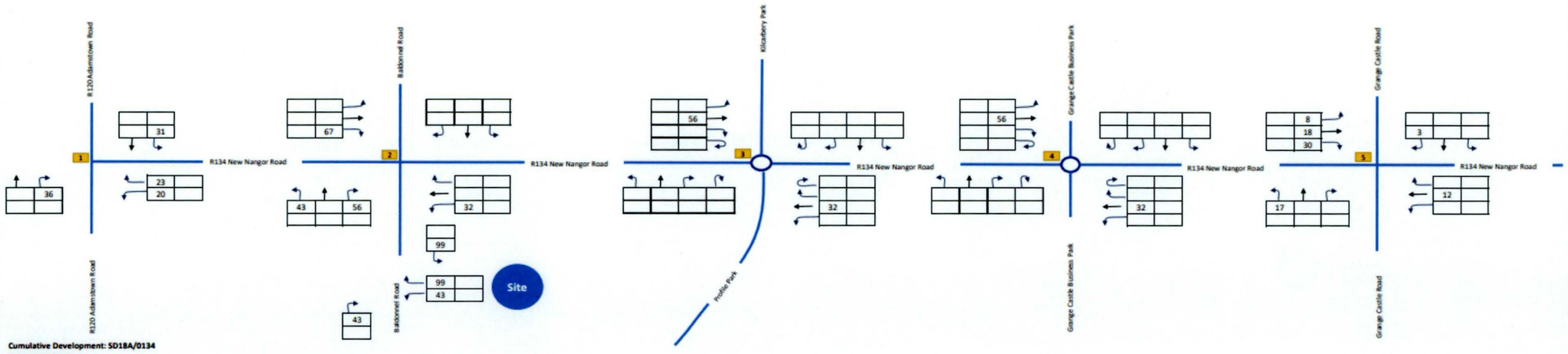
1620014883

Figure Title

Cumulative Scheme "SD20A/0121" Construction Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No.	**Revision**
1620014883/EIAR/7.32	



Cumulative Development: SD18A/0134

Operation Stage

Trip Generation

		Arriv	Dep
Total Vehicles		142	142

Trip Distribution:

Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client

Vantage Data Centers Dub11 Limited

Project Title

VDC DUB 13

Project Number

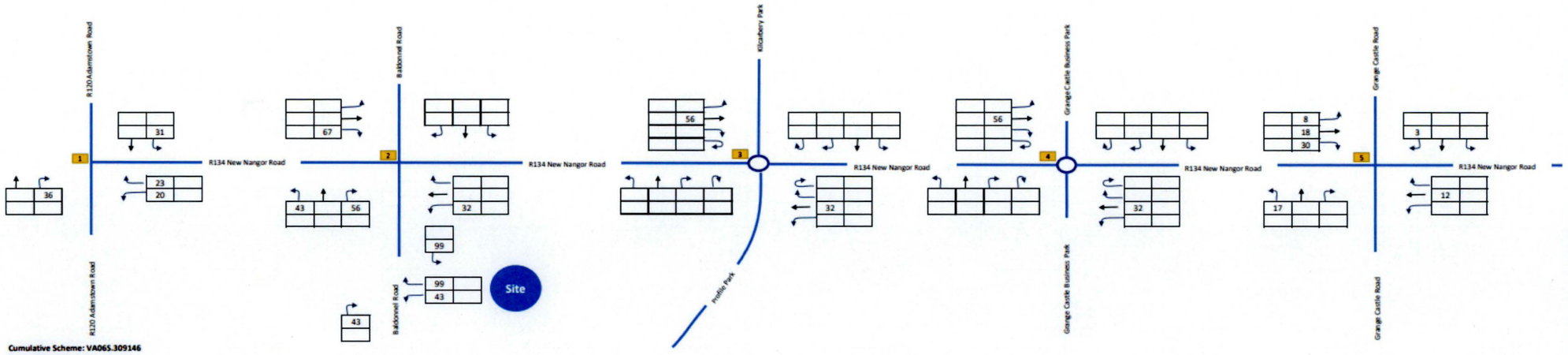
1620014883

Figure Title

Cumulative Scheme "SD18A/0134" Operation Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No.	**Revision**
1620014883/EIAR/7.33	



Cumulative Scheme: VA06S.309146
Operation Stage
Trip Generation

	Arriv	Dep
Total Vehicles	142	142

Trip Distribution:
Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client
Vantage Data Centers Dub11 Limited

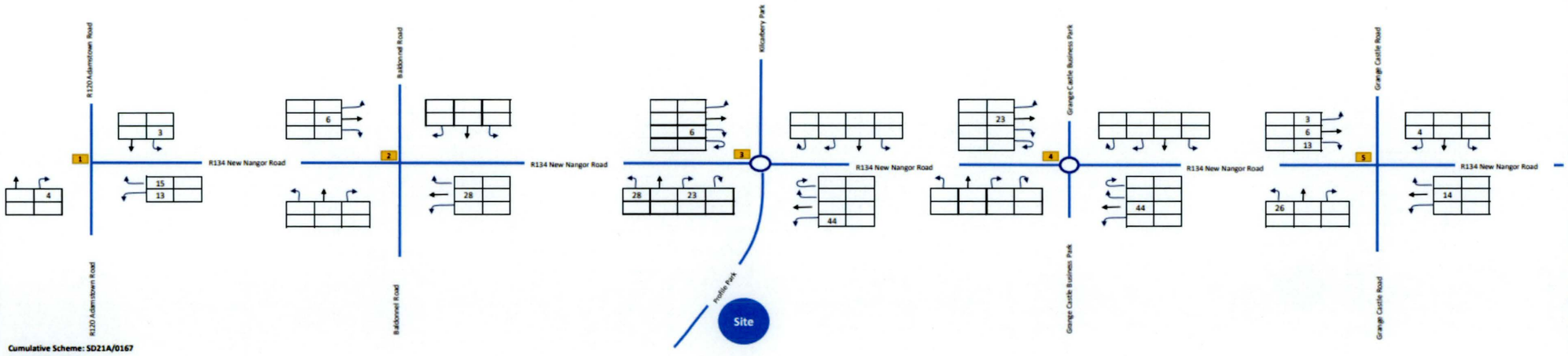
Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "VA06S.309146" Operation Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No.	Revision
1620014883/EIAR/7.34	



Cumulative Scheme: SD21A/0167
Construction Stage
Trip Generation

		Arriv	Dep
Total Vehicles		50	50

Trip Distribution:
Development traffic is distributed at Junction 3 based upon the survey data presented in SD21A/0167 EIAR and then distributed on the wider study area based upon the 2019 survey data presented in SD20A/0121 TIA

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Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SD21A/0167" Construction Stage Daily Traffic Flows

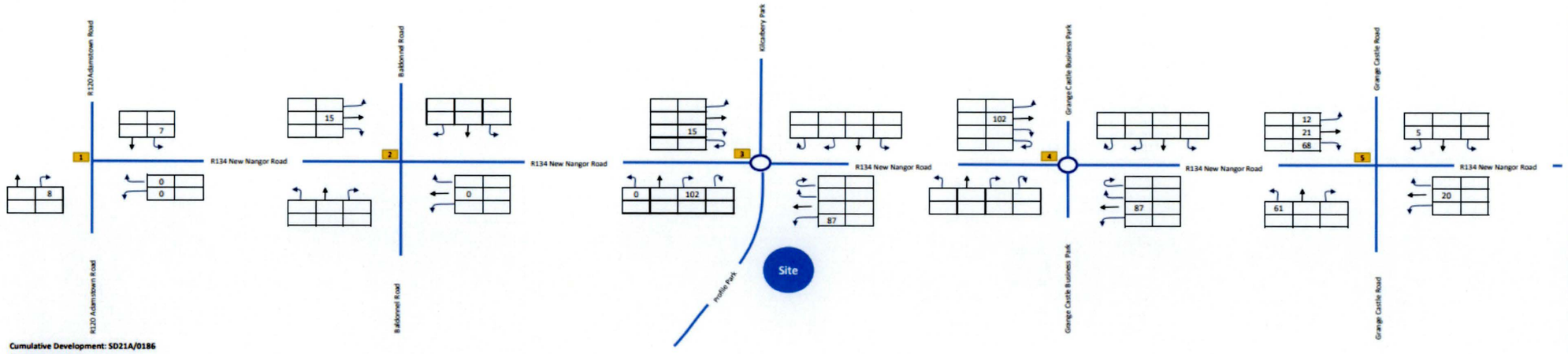
RAMBOLL

Date
26/09/2022

Prepared B

Figure No.
1620014883/EIAR/7.35

Revision



Cumulative Development: SD21A/0186
Construction Stage
Trip Generation

		Arriv	Dep
Total Vehicles		102	102

Trip Distribution:
Light construction vehicles have been distributed across the surrounding network in the same manner as the 2019 traffic surveys.
All heavy construction traffic travels to the site from the N7 National Road and from the M50 artirial motoriway via the R34 and R136 and departs along the same routes.

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

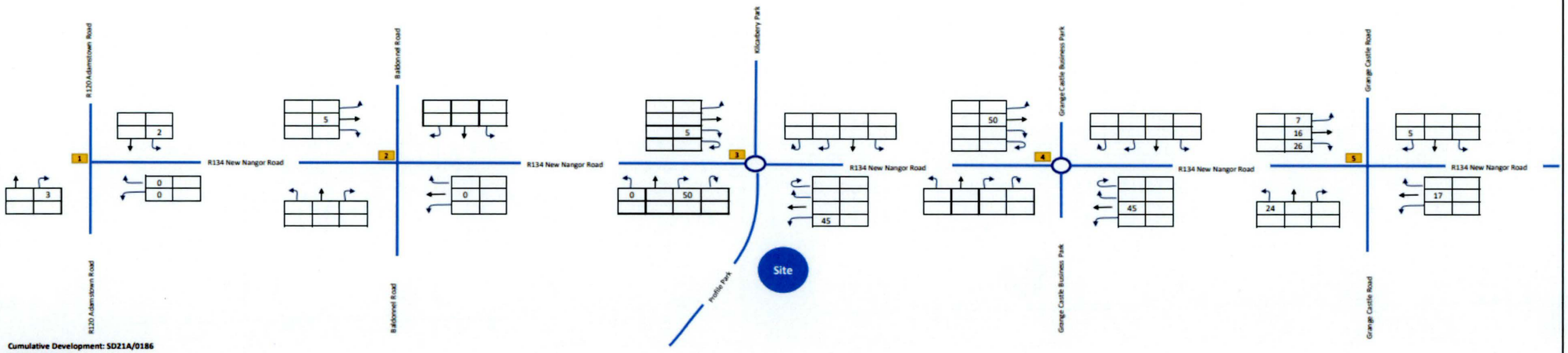
Project Number
1620014883

Figure Title
Cumulative Scheme "SD21A/0186" Construction Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	

Figure No.	Revision
1620014883/EIAR/7.36	



Cumulative Development: SD21A/0186
Operation Stage
Trip Generation

	Arriv	Dep
Total Vehicles	50	50

Trip Distribution:
Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SD21A/0186" Operation Stage Daily Traffic Flows

RAMBOLL

Date
26/09/2022

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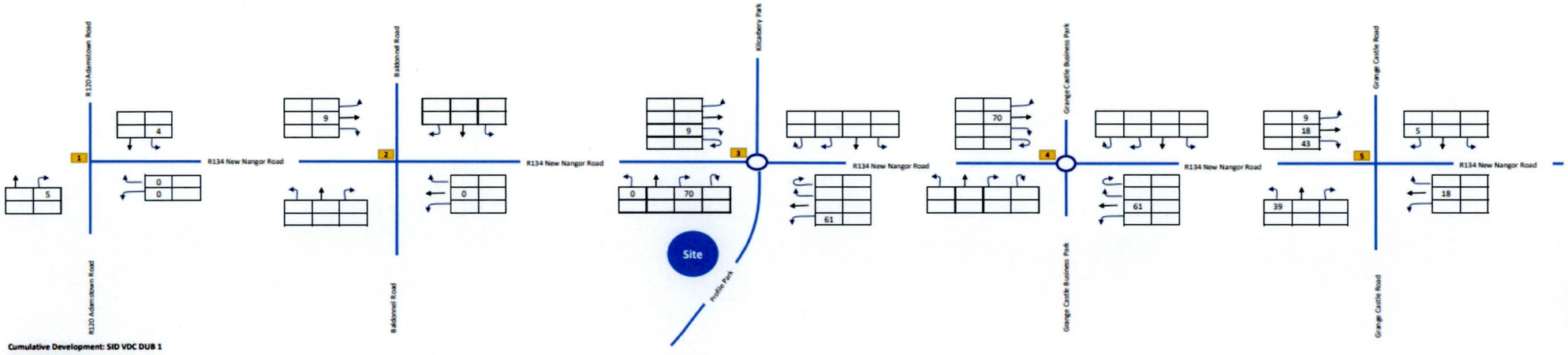
Figure No.
1620014883/EIAR/7.37

Revision



Cumulative Development: SID VDC DUB 1
Construction Stage
Trip Generation

	Arriv	Dep
Total Vehicles	70	70

Trip Distribution:
Light construction vehicles have been distributed across the surrounding network in the same manner as the 2019 traffic surveys.
All heavy construction traffic travels to the site from the N7 National Road and from the M50 artirial motoriway via the R34 and R136 and departs along the same routes.

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SID VDC DUB 1" Construction Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
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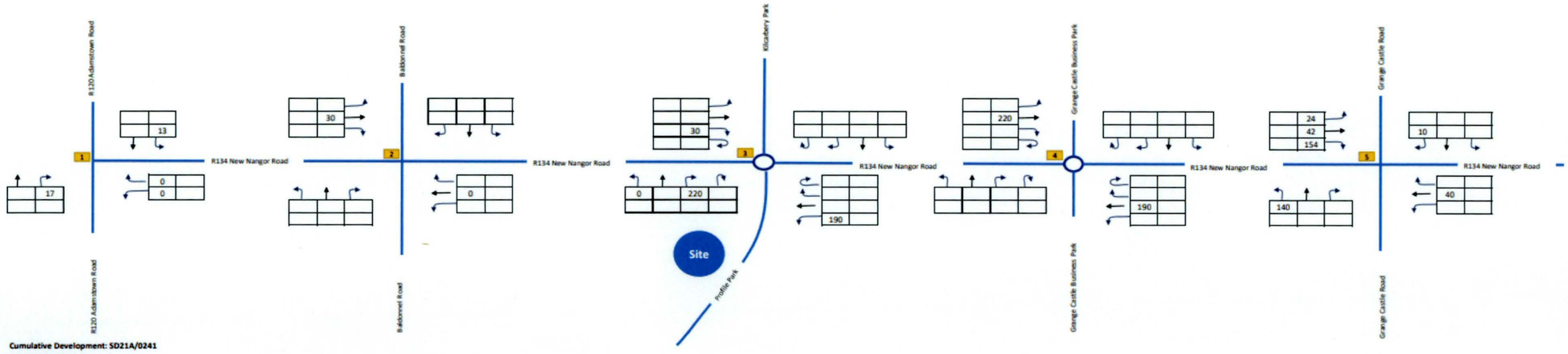
Figure No.	Revision
1620014883/EIAR/7.38	



Cumulative Development: SD21A/0241

Construction Stage

Trip Generation

	Arriv	Dep
Total Vehicles	220	220

SD20A/0121 (80,269sqm)
10 HGVs per hour
up to 300 vehicles per direction for commuting

SD21A/0241 (41,105sqm)
5 HGVs per hour
157 vehicles per direction for commuting

Working hours: 07:00-19:00
12 hours

Trip Distribution:

Light construction vehicles have been distributed across the surrounding network in the same manner as the 2019 traffic surveys.

All heavy construction traffic travels to the site from the N7 National Road and from the M50 artirial motoriway via the R34 and R136 and departs along the same routes.

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SD21A/0241" Construction Stage Daily Traffic Flows

RAMBOLL

Date	Prepared By
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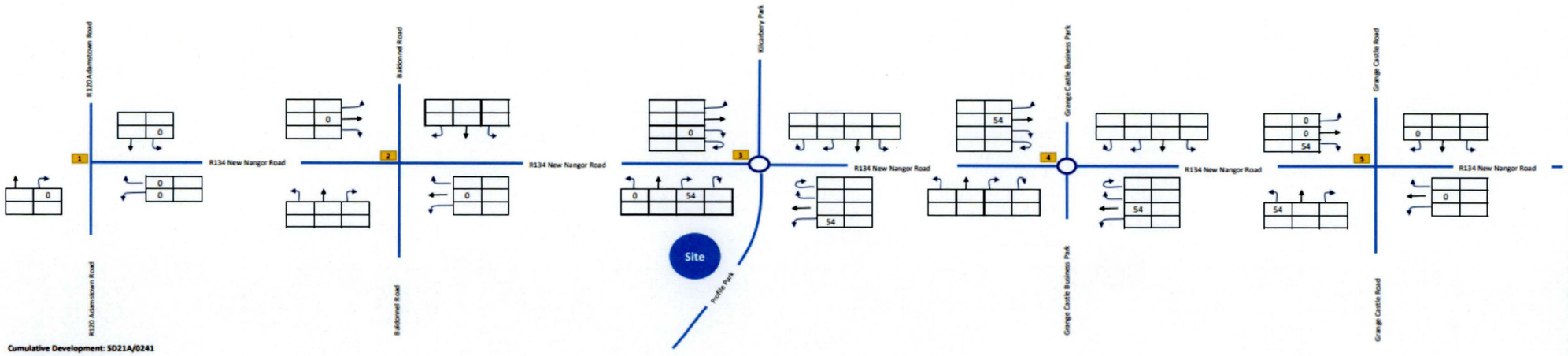
Figure No. 1620014883/EIAR/7.39	Revision



Cumulative Development: SD21A/0241

Trip Generation

	Arriv	Dep
Total Vehicles	54	54

It should be noted that the multifuel generation plant will power DUB 11 directly up to approximately Q1 2025 using HVO as the fuel source and this would require an additional 54 HGV a day

Trip Distribution:

All Fuel HGVs travel to the site from the N7 National Road and from the M50 artirial motoriway via the R34 and R136 and departs along the same routes.

KEY

Client

Vantage Data Centers Dub11 Limited

Project Title

VDC DUB 13

Project Number

1620014883

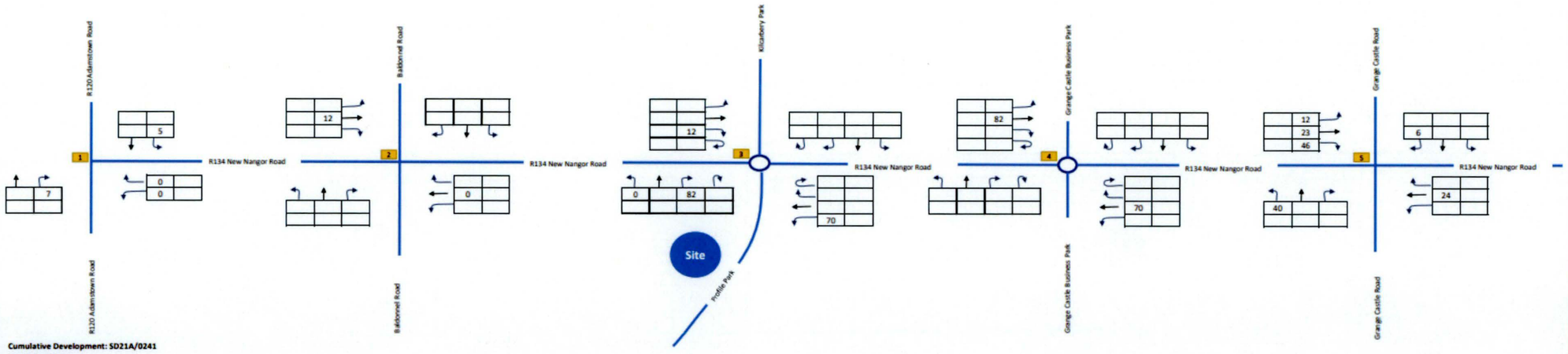
Figure Title

Cumulative Scheme "SD21A/0241" Operation Stage HVO Daily Traffic Flows

RAMBOLL

Date	Prepared By
26/09/2022	

Figure No.	Revision
1620014883/EIAR/7.310	



Cumulative Development: SD21A/0241
Operation Stage
Trip Generation

		Arriv	Dep
Total Vehicles		82	82

Trip Distribution:
Development traffic is distributed onto the network according to the directional splits recorded by the 2019 traffic survey. Traffic continues straight along Nangor Road (R134).

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Cumulative Scheme "SD21A/0241" Operation Stage Daily Traffic Flows

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Date	Prepared By
26/09/2022	
Figure No.	**Revision**
1620014883/EIAR/7.311	

Technical Appendix 7.3: Cumulative Schemes Daily Traffic Flow Diagrams

Legend

Red Line Boundary

Accident Severity

- Fatal
- Severe
- Slight

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Accident Data (2021-2016)

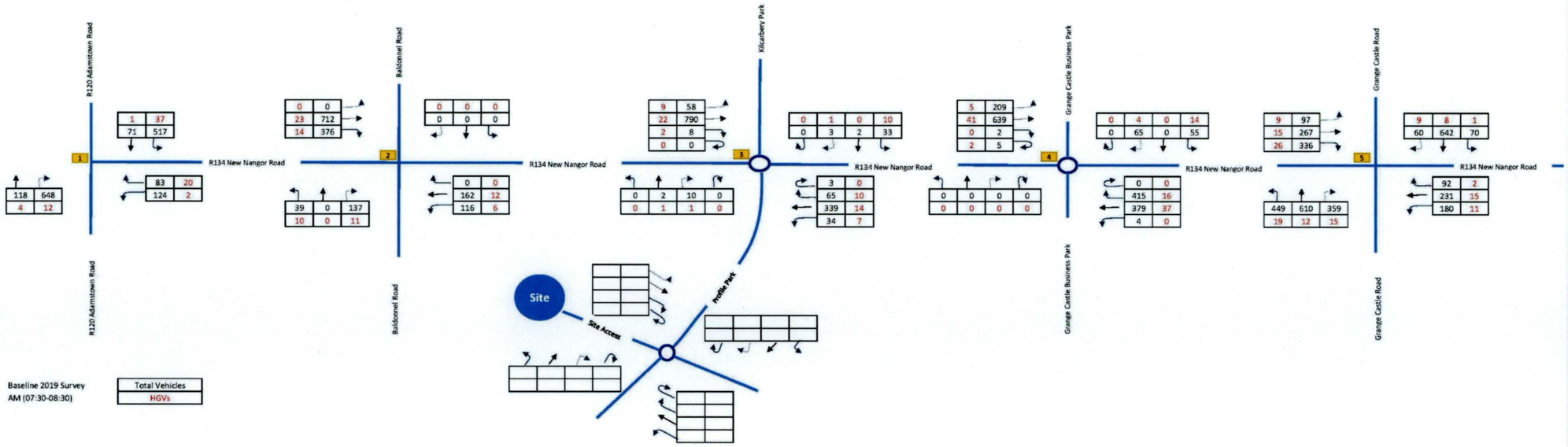
RAMBOLL

Date	Prepared By
30/09/2022	NS
Figure No. 1620014883/EIAR/7.21	Revision

DUB13_Accidents.pagx

Coordinate System: TM65 Irish Grid. Projection: Transverse Mercator. Datum: TM65

Technical Appendix 7.4: Proposed Development Trip Generation



KEY

Client
Vantage Data Centers Dub11 Limited

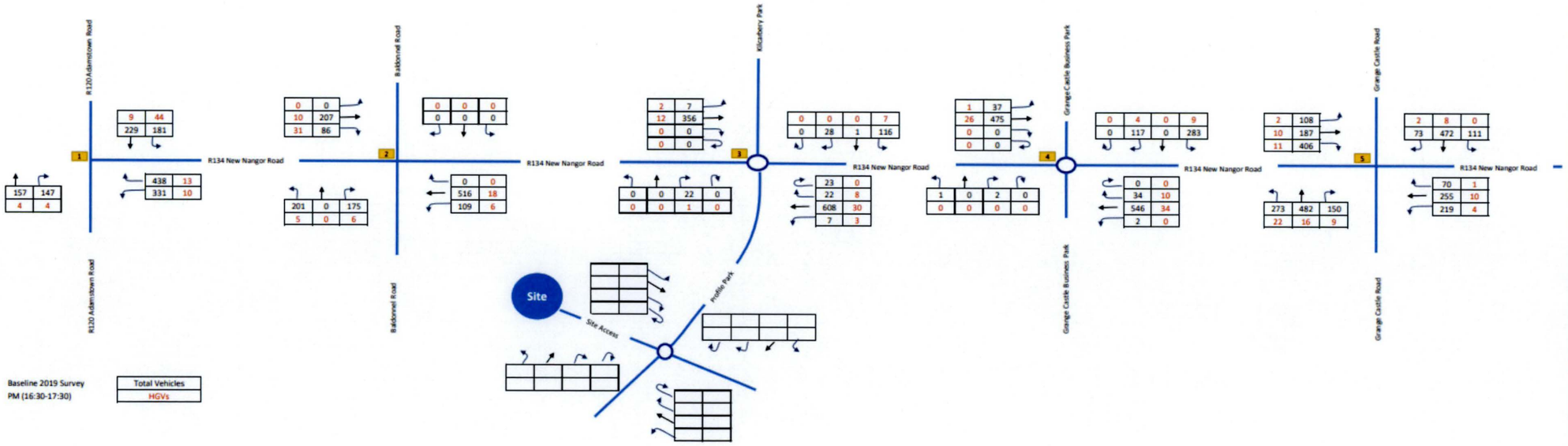
Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Baseline 2019 Traffic Flows AM Peak

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No.	**Revision**
1620014883/EIAR/7.11	



Baseline 2019 Survey
PM (16:30-17:30)

Total Vehicles
HGVs

KEY

Client
Vantage Data Centers Dub11 Limited

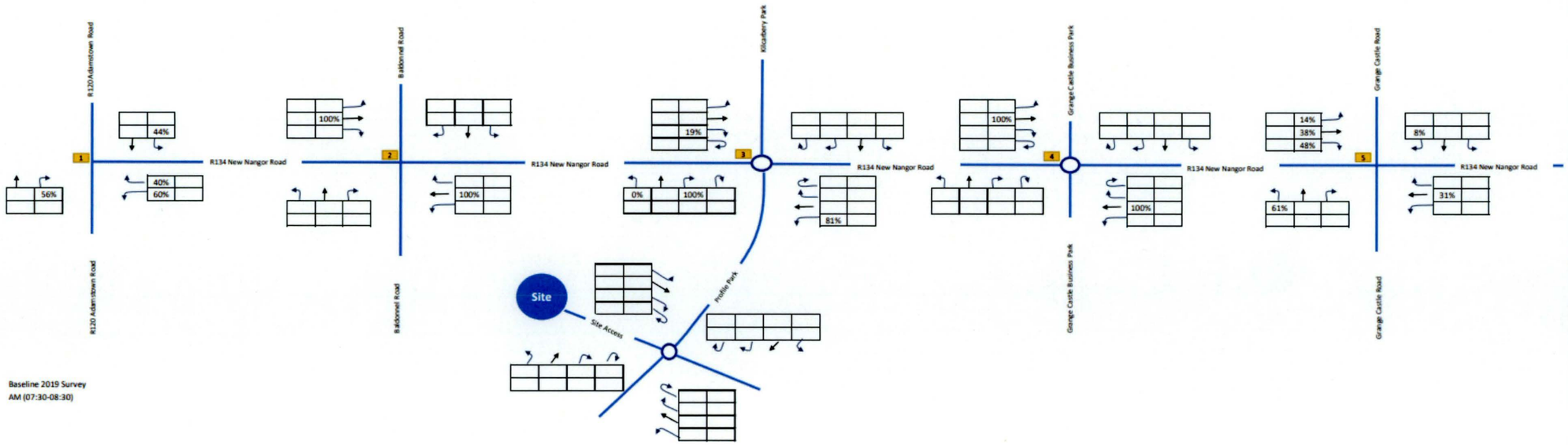
Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Baseline 2019 Traffic Flows PM Peak

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No. 1620014883/EIAR/7.12	Revision



Baseline 2019 Survey
AM (07:30-08:30)

KEY

Client
Vantage Data Centers Dub11 Limited

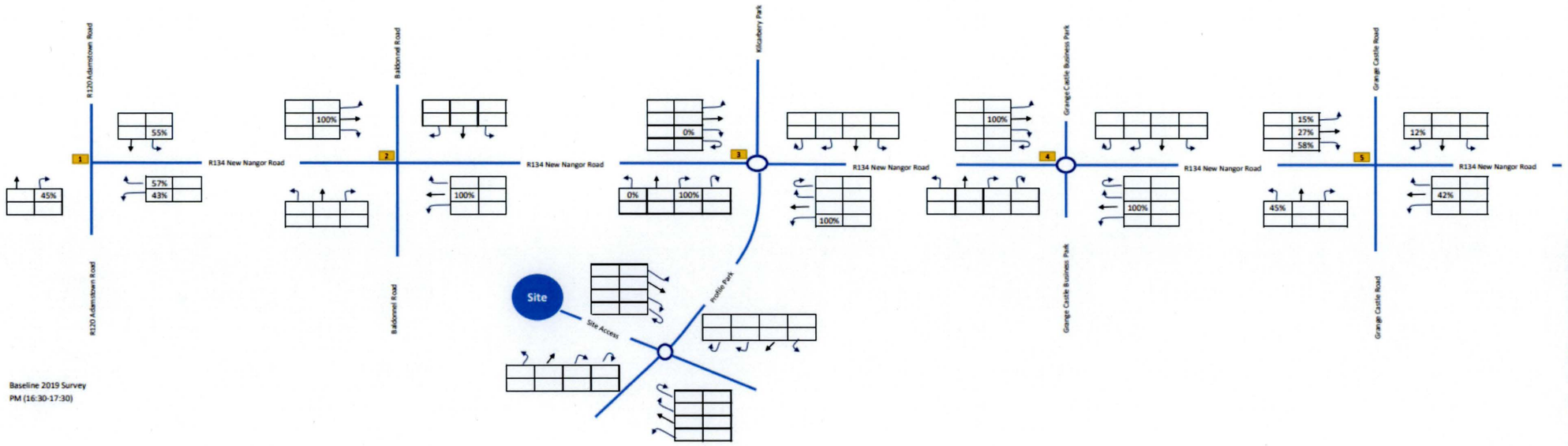
Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Baseline 2019 Trip Distribution AM Peak

RAMBOLL

Date	Prepared By
26/09/2022	
Figure No. 1620014883/EIAR/7.13	Revision



Baseline 2019 Survey
PM (16:30-17:30)

KEY

Client
Vantage Data Centers Dub11 Limited

Project Title
VDC DUB 13

Project Number
1620014883

Figure Title
Baseline 2019 Trip Distribution PM Peak

RAMBOLL

Date	Prepared By
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Figure No. 1620014883/EIAR/7.14	Revision

Technical Appendix 8.1: Air Quality Detailed Methodology, Modelling Approach and Data

1. DUST RISK ASSESSMENT METHODOLOGY

Table 1.1: Determining Dust Emission Magnitude

Large	Medium	Small
Demolition		
• total building volume >50,000 m^3 • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20 m above ground level	• total building volume 20,000m^3 – 50,000 m^3 • potentially dusty construction • demolition activities 10-20 m above ground level	• total building volume <20,000 m^3 • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10 m above ground • during wetter months
Earthworks		
• total site area >10,000 m^2 • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8 m in height • total material moved >100,000 tonnes	• total site area 2,500 m^2 - 10,000 m^2 • moderately dusty soil type (e.g. silt) • 5-10 heavy earth moving vehicles active at any one time • formation of bunds 4 m – 8 m in height • total material moved 20,000 - 100,000 tonnes	• total site area <2,500 m^2 • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4 m in height • total material moved <20,000 tonnes • earthworks during wetter months
Construction		
• total building volume >100,000 m^3 • piling • on-site concrete batching • sandblasting	• total building volume 25,000 m^3 - 100,000 m^3 • potentially dusty construction material (e.g. concrete) • piling • on-site concrete batching	• total building volume <25,000 m^3 • construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout		
• >50 HGV (>3.5t) movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100 m	• 10-50 HGV (>3.5t) movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 m – 100 m	• <10 HGV (>3.5t) movements in any one day • surface material with low potential for dust release • unpaved road length <50 m

Table 1.2: Determining Receptor Sensitivity

High	Medium	Low
Sensitivities of People to Dust Soiling Effects		
• users can reasonably expect enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property would not reasonably be expected to be present continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.	• the enjoyment of amenity would not reasonably be expected; or • property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or • there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.
Sensitivities of People to the Health Effects of PM_{10}		
• locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Locations where human exposure is transient. • indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of Receptors to Ecological Effects		

Table 1.2: Determining Receptor Sensitivity

• locations with an international or national designation *and* the designated features may be affected by dust soiling; or • locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.	• locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • locations with a national designation where the features may be affected by dust deposition. • indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	• locations with a local designation where the features may be affected by dust deposition. • indicative example is a local Nature Reserve with dust sensitive features.

Table 1.3: Determining Sensitivity of the Area - Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 1.4: Determining Sensitivity of the Area – Human Health Impacts

	Annual Mean PM_{10} concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	>28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	>24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium		>1	High	Medium	Low	Low	Low
Low		>1	Medium	Low	Low	Low	Low

Table 1.5: Determining Risk of Dust Impacts - Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 1.6: Determining Risk of Dust Impacts - Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 1.7: Determining Risk of Dust Impacts – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 1.8: Determining Risk of Dust Impacts –Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

2. MODEL INPUTS AND RESULTS PROCESSING TOOLS

2.1 ADMS 5

2.1.1 The predicted impacts on local air quality associated with point source emissions associated with the operation of the scheme was assessed using Cambridge Environmental Research Consultants (CERC) atmospheric dispersion modelling system for industrial installations (ADMS-5)[1]. ADMS 5 is used by several consultancies in the UK and across the world for air quality management and assessment studies of complex situations in large industrial areas.

2.1.2 The ADMS suite of models have been developed and validated by CERC. CERC was established in 1985 and has a leading position in environmental software development by encapsulating advanced scientific research into a number of computer models, providing user-friendly front-ends on PC based Windows platforms.

2.1.3 ADMS 5 model is an advanced dispersion model used to model the air quality impact of existing and proposed industrial installations. It was originally developed for regulatory authorities in the UK. Its many features include allowance for the impacts of buildings, complex terrain, coastlines and variations in surface roughness; dry and wet deposition; NOx chemistry schemes; short term releases (puffs); calculation of fluctuations of concentration on short timescales, odours and condensed plume visibility; and allowance for radioactive decay including γ-ray dose. It can predict long-term and short-term concentrations, as well as calculations of percentile concentrations. The science of ADMS 5 is significantly more advanced than that of most other air dispersion models in that it incorporates the latest understanding of the boundary layer structure and goes beyond the simplistic Pasquill-Gifford stability categories method with explicit calculation of important parameters.

2.1.4 The ADMS 5 model validation process includes comparisons against available measured data obtained from real world situations, field campaigns and wind tunnel experiments, with the results being published on CERC's model validation page[2]. Validation of the ADMS dispersion models has been performed using many experimental datasets that test different aspects of the models, for instance: ground/high level sources, passive and buoyant releases, buildings, complex terrain, chemistry, deposition and plume visibility. CERC is also involved in European programmes on model harmonisation, and their models were compared favourably against other EU and U.S. EPA systems. Further information in relation to this is available from the CERC web site at http://www.cerc.co.uk/environmental-software/modelvalidation.html.

2.2 Point Sources

2.2.1 The operation of the emergency generators has been assessed according to the methodology published by the UK Environmental Agency guidance[3,4]. The UK guidance is a conservative probabilistic approach which uses the emergency generators maximum hourly emissions to determine the number of hours that all the generators could operate simultaneously in any one year with a 1% chance of exceeding the 1-hour mean objective based on the worst modelled meteorological year.

2.2.2 Following the UK Environmental Agency methodology, the hourly emissions and the allowable operating hours for emergency operation were estimated from a statistical analysis of the likelihood of breaching the 1-hour objective for NO_2 concentrations by using the hypergeometric distribution function. The allowable operating hours were calculated for a 1% probability of exceeding the one-hour mean objective at the most impacted receptor location. In accordance with the emissions from specified generators guidance, in an emergency when the operating period is greater than one hour, the calculated probability has been multiplied by 2.5. For compliance with the annual mean objectives, the predicted concentrations were scaled to the total annual operating hours that the generators were determined to run for the 1% probability of exceeding the one-hour mean objective.

2.2.3 The likelihood of exceeding the 1-hour mean objective also considers the baseline pollutant concentrations in the vicinity of the site. For the short-term assessment, the background concentration is assumed to be twice the annual mean background concentration. As the dispersion modelling was undertaken for NOx emissions, for estimating the number of exceedances of the hourly mean NO_2 objective, the exceedance concentration in the model was set as follows:

- Model exceedance concentration = (200 – twice annual mean background)/0.35.

2.2.4 For this assessment, the conversion of NOx to NO_2 has been estimated using the worst-case assumptions set out in the UK Environment Agency guidance:

- For the assessment of long term (annual mean) impacts at receptors 70% of NOx is converted to NO_2; and
- For the assessment of short term (hourly mean) impacts at receptors 35% of NOx is converted to NO_2.

2.2.5 For the annual average the PC is added to the baseline concentrations (process environmental contribution- PEC) and for the short-term assessment, the baseline concentrations are assumed to be twice the annual mean determined from the roads modelling assessment.

2.2.6 The dispersion modelling has been undertaken with five years of hourly sequenced meteorology data for the years 2015 to 2019 inclusive, from Casement Aerodrome which is approximately 1 km to the south of the site. The Casement Aerodrome windroses are presented in Table 2.1.

2.2.7 To undertake the assessment the emergency generators were allocated their own flues which were combined in ADMS in triples or quadruples when adjacent, according to the plans configuration. The location and flues parameters used in the model are shown are shown in Technical Appendix 8.1 in the EIAR Volume 3.

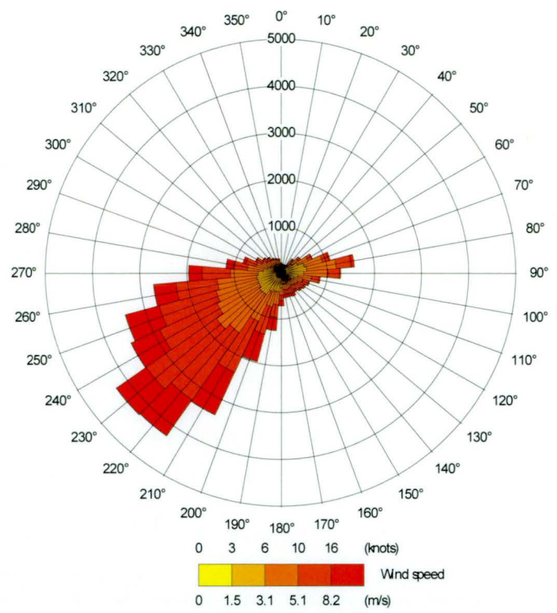
2.2.8 Further information on the model set up is provided in Table 2.1 and shown in Figure 2.1 and Figure 2.2.

[1] http://www.cerc.co.uk/environmental-software/ADMS-model.html

[2] http://www.cerc.co.uk/environmental-software/model-validation.html

[3] Guidance Specified generators: dispersion modelling assessment. Available at: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment [Accessed on 04/08/2021]

[4] UK Environmental Agency. Guidance Specified generators: dispersion modelling assessment. Available at: https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/supporting_documents/Specified%20Generators%20Modelling%20GuidanceINTERIM%20FINAL.pdf [Accessed on 04/08/2021]

Table 2.1: Roads Emissions Model Inputs	
Meteorological Data	2015-2019 Hourly meteorological data from Casement Aerodrome Station has been used in the model. The 2015-2019 combined wind rose is shown below. 
ADMS	ADMS5 version 5.2
Latitude	53.3
Surface Roughness	Topographic features, buildings or vegetation increase the ground's surface roughness which impact son the vertical mixing of a plume and changes the wind-speed profile at elevated heights due to mechanical turbulence generated as the air moves over the ground. Given the rural setting of the study area, a value of 0.3 m for Agricultural areas was used to represent the modelled area and the meteorological station site.
Minimum Monin-Obukhov length	The Minimum Monin-Obukhov provides a measure of the stability of the atmosphere and allows for the effect of heat production in cities, which is not represented by the meteorological data. The minimum standard value of 10 for small towns was used to represent the modelled area and the meteorological station site.

2.3 Terrain

2.3.1 The terrain in the vicinity of the site is flat with no slopes more than 10% and no large changes in surface roughness are expected. Following ADMS 5 manual recommendation, the terrain effects have not been included within the modelling.

2.4 Buildings

2.4.1 Tall buildings can have a substantial impact on the dispersion of pollutants from stacks, as a result of building downwash i.e., pollutants being drawn down in the wake of a building, giving rise to high concentrations close to the base of the buildings. Buildings within five times the stacks height have been considered in the assessment. The nearby buildings may also have an impact on the dispersion, and therefore these have also been included. The buildings set out in Table 2.2 and shown in Figure 2.1 and Figures 2.2 have been included within the ADMS 5 model.

Table 2.2: Scenario 1 and 2 Buildings Dimensions

Name	X (m)	Y (m)	Height (m)	Length (m) / Diameter (m)	Width (m)	Angle (Degrees)
DUB 11.1 & 11.2	703658	703658	14.2	85.4	127	67.0
DUB 12 A	703671	730668	14.2	83	62.0	78.0
DUB11 B	703653	730832	14.2	63.7	43.7	67.0
DUB12 B	703683	730632	14.2	74.1	13.0	258.0
DUB11.1 ChillerA	703642	730822	18.5	53.0	21.2	67
DUB11.1 ChillerB	703643	730797	18.5	22.7	36.4	157.0
DUB11 Elc Stor	703631	730766	19.1	9.3	123.1	67
Power Plant DUB 11	703582	730712	14	22.1	63.0	83.5
DUB11.2 ChillerA	703667	730761	18.5	53.0	21.2	67.0
DUB11.2 ChillerB	703668	730736	18.5	22.7	36.4	157.0
DUB12 Elc Stor	703645	730662	19.1	8.69	63.1	78.0
Kilcarbery Park	703773	730990	19	291.7	84.6	280.6
Kilcarbery BP A	703985	730951	12	26.5	87.0	93.1
Kilcarbery BP B	704023	730948	12	19.4	76.0	93.1
Google DC	703206	730497	12	138.5	123.6	115.1
AWS	702910	730677	12	258.3	68.2	104.5
Power Plant DUB 12	703578	730610	14	23.1	50.1	103.9
Dub 11.1 Lift Shaft	703622	730834	21.6	13.8	9.3	67.4

Table 2.2: Scenario 1 and 2 Buildings Dimensions						
DUB13	703815	730819	14.2	81.2	64.1	30.2
DUB13 Elc Stor	703800	730796	19.1	8.7	63.1	30.1
DU13 B	703850	730804	14.2	73.1	12.7	209.6
DUB13 Chiller	703820	730821	18.5	53.0	45.6	30.1

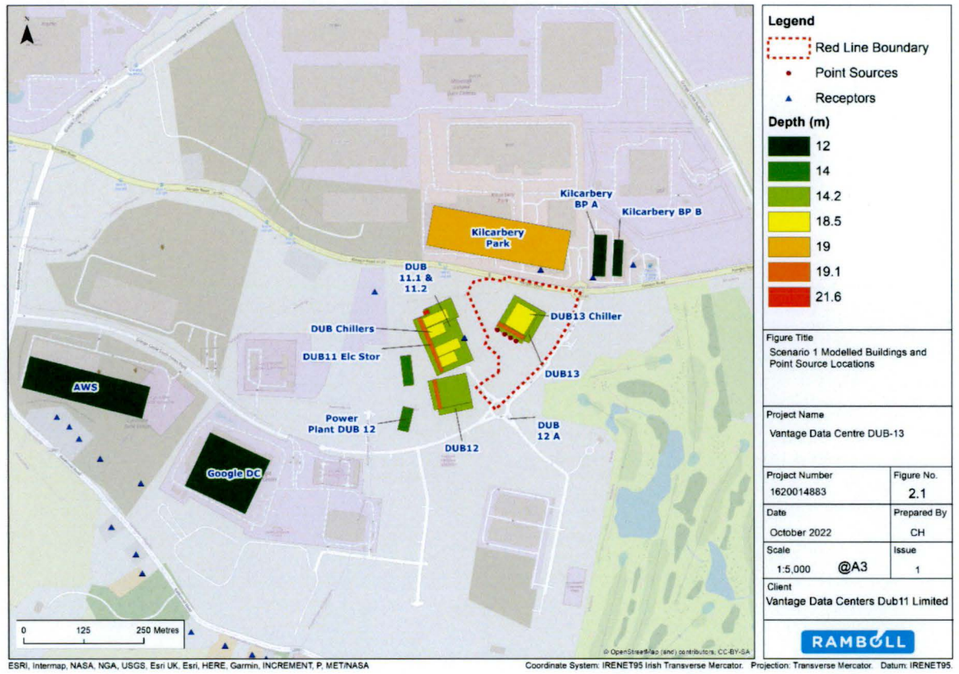


Figure 2.1: Scenario 1 Modelled Buildings and Point Source Locations

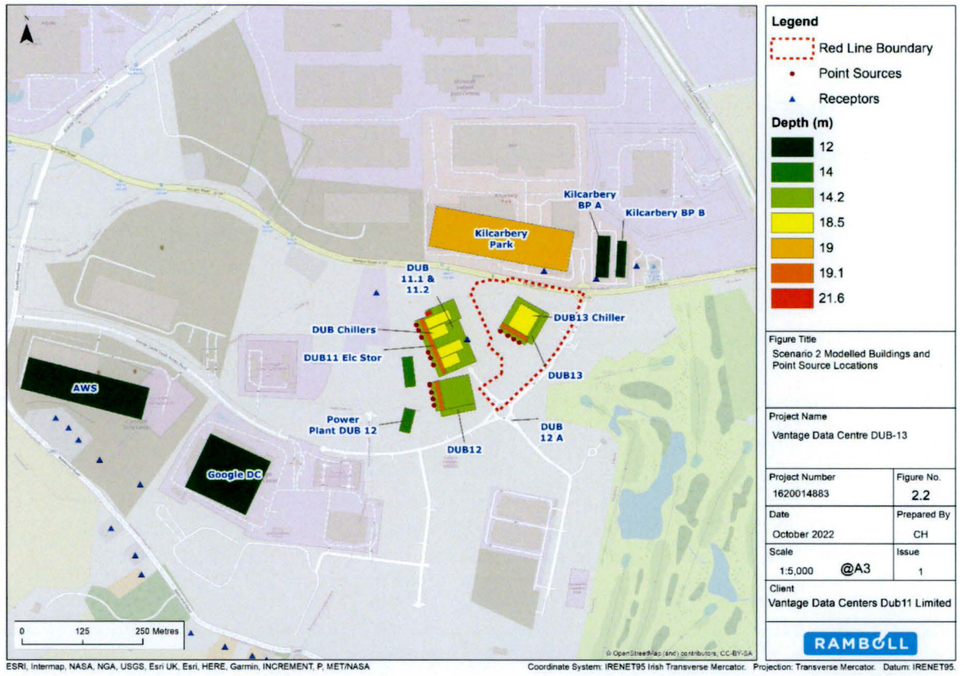


Figure 2-2: Scenario 2 Modelled Buildings and Point Source Locations

2.5 Grid

2.5.1 Concentrations were predicted at three grids. These consist of numerous receptors modelled at a height of 4.5m. The contour plots are centred at the coordinates 703610, 730726 with the spacing as defined in Table 2.3. Contours were modelled at 4.5m height. This was the height which modelled receptors experiences the highest concentration, and represent the second or top floor of a building. full receptor results are shown in Appendix 8.2 in Volume 3.

Table 2.3: Modelled Grids				
Outer Grid 5x5 km				
Ref	Start	Finish	No. points	Spacing (m)
x	708610	698610	21	500
y	735726	725726	21	500
z	4.5	4.5	1	
Middle Grid 3x3 km				
x	706610	700610	61	100
y	700610	727726	61	100
z	4.5	4.5	1	
Inner Grid 500x500m				
x	703110	704110	50	20
y	730226	731226	50	20

Table 2.3: Modelled Grids				
z	4.5	4.5	1	

2.6 Hypergeometric Distribution Function

2.6.1 A worked hypothetical example as provided in Environment Agency guidance[4] is presented below.

The applicant applies for an environmental permit to operate:

- an aggregated diesel specified generator site with a capacity of 40 MWth
- any time of the year for up to a maximum of 400 hours per year

Operations are expected to last up to 4 hours when needed.

Therefore, the operating envelope is all 8760 hours in the year. There are 400 operational hours within the operating envelope.

Dispersion modelling over the full year shows that the Predicted Environmental Concentration (PEC) exceeds the hourly mean limit value of 200mg/m^3 for 300 hours at a sensitive receptor over the worst modelled meteorological year.

This gives:

- 400 operational hours - the sample size denoted by 'N'
- an 8760 hour operating envelope - the population size denoted by 'M'
- 300 exceedance hours - or the number of failures in the population denoted by 'e'
- 8460 non-exceedance hours - the number of successes in the population denoted by 'K', where K = M - e = 8760 - 300 = 8460

The probability of randomly selecting 19 or more exceedance hours (failures) in 400 sample trials, is the same as selecting at most 'N' minus 19 non-exceedance hours (successes) in 400 sample trials (N - 19 = 400 - 19 = 381). So you can calculate the probability of an exceedance, 'P' by using the cumulative hypergeometric distribution.

$$P = \sum_{i=0}^{N-19} \frac{\binom{K}{i}\binom{M-K}{N-i}}{\binom{M}{N}}$$

Based on these data the cumulative hypergeometric distribution is 9.3%. As the continuous operations can be up to 4 hours, you multiply this probability by 2.5, giving a probability of exceedance of 23.25%. This indicates there is potential for an exceedance of the hourly standard.

The cumulative hypergeometric distribution calculates the probability to be less than 1.8% when there are 330 operational hours. Again multiplying this by the 2.5 factor gives a probability of 4.6%, indicating short term exceedances are unlikely.

Therefore we would propose to permit the generator and restrict the operational hours to 330 hours per year.

Technical Appendix 8.2: Air Quality Results

1. SCENARIO 1 DUB-13 EMERGENCY GENERATORS MODEL RESULTS

1.1 Scenario 1 DUB-13 Emergency Generators

Table 8.2.1: Scenario 1 DUB-13 Emergency Generators Maximum Annual Mean Concentrations for 62 hours Operation

Receptor	Height (m)	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS	Number Exceeding Hours*	Probability Exceedance for 62h operation
R1 GF	1.5	0.36	0.89	17.4	17.8	44.4	85.4	0.0%
R1 TF	18	0.79	1.99	17.4	18.2	45.5	1446.0	1.0%
R2 GF	1.5	0.43	1.07	17.4	17.8	44.6	459.7	0.0%
R2 TF	12	0.59	1.49	17.4	18.0	45.0	785.8	0.0%
R3 GF	1.5	0.45	1.12	17.4	17.8	44.6	456.8	0.0%
R3 TF	4.5	0.45	1.14	17.4	17.9	44.6	470.9	0.0%
R4 GF	1.5	0.05	0.12	17.4	17.4	43.6	11.1	0.0%
R4 TF	4.5	0.05	0.12	17.4	17.4	43.6	12.1	0.0%
R5 GF	1.5	0.12	0.31	17.4	17.5	43.8	135.4	0.0%
R5 TF	12	0.21	0.53	17.4	17.6	44.0	236.2	0.0%
R6	1.5	0.10	0.24	17.4	17.5	43.7	0.0	0.0%
R7	1.5	0.11	0.28	17.4	17.5	43.8	0.0	0.0%
R8	1.5	0.11	0.28	17.4	17.5	43.8	0.0	0.0%
R9	1.5	0.01	0.02	17.4	17.4	43.5	0.0	0.0%
R10	1.5	0.01	0.02	17.4	17.4	43.5	0.0	0.0%
R11	1.5	0.01	0.02	17.4	17.4	43.5	0.0	0.0%
R12	1.5	0.01	0.03	17.4	17.4	43.5	0.0	0.0%
R13	1.5	0.01	0.03	17.4	17.4	43.5	0.0	0.0%
R14	1.5	0.01	0.03	17.4	17.4	43.5	0.0	0.0%
R15	1.5	0.02	0.04	17.4	17.4	43.5	0.0	0.0%
R16	1.5	0.02	0.05	17.4	17.4	43.6	0.0	0.0%
R17	1.5	0.02	0.06	17.4	17.4	43.6	0.0	0.0%
R18	1.5	0.03	0.07	17.4	17.4	43.6	0.0	0.0%
R19	1.5	0.04	0.10	17.4	17.4	43.6	0.0	0.0%
R20	1.5	0.04	0.11	17.4	17.4	43.6	0.0	0.0%
R21	1.5	0.04	0.11	17.4	17.4	43.6	0.0	0.0%
R22	1.5	0.04	0.11	17.4	17.4	43.6	0.0	0.0%
R23	1.5	0.04	0.10	17.4	17.4	43.6	0.0	0.0%
AQS		**40**					-	

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

2. SCENARIO 2 DUB-13 AND DUB-1 CAMPUS EMERGENCY GENERATORS MODEL RESULTS

2.1 Scenario 2 DUB11 and DUB12 Emergency Generators

Table 8.2.1: Scenario 2 DUB-13 and DUB-1 Campus Emergency Generators Maximum Annual Mean Concentrations for 29 hours Operation

Receptor	Height (m)	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS	Number Exceeding Hours*	Probability Exceedance for 62h operation
R1 GF	1.5	0.58	1.45	17.4	18.0	45.0	2727.3	0.0%
R1 TF	18	0.89	2.22	17.4	18.3	45.7	3426.7	0.9%
R2 GF	1.5	0.56	1.39	17.4	18.0	44.9	1957.1	0.0%
R2 TF	12	0.66	1.64	17.4	18.1	45.1	2286.1	0.0%
R3 GF	1.5	0.51	1.28	17.4	17.9	44.8	1824.3	0.0%
R3 TF	4.5	0.52	1.29	17.4	17.9	44.8	1842.4	0.0%
R4 GF	1.5	0.08	0.21	17.4	17.5	43.7	241.3	0.0%
R4 TF	4.5	0.09	0.22	17.4	17.5	43.7	257.6	0.0%
R5 GF	1.5	0.44	1.10	17.4	17.8	44.6	732.2	0.0%
R5 TF	12	0.53	1.33	17.4	17.9	44.8	1214.6	0.0%
R6	1.5	0.14	0.34	17.4	17.5	43.8	0.0	0.0%
R7	1.5	0.15	0.38	17.4	17.6	43.9	0.0	0.0%
R8	1.5	0.15	0.38	17.4	17.6	43.9	0.0	0.0%
R9	1.5	0.02	0.05	17.4	17.4	43.5	47.3	0.0%
R10	1.5	0.02	0.04	17.4	17.4	43.5	37.2	0.0%
R11	1.5	0.01	0.03	17.4	17.4	43.5	35.2	0.0%
R12	1.5	0.02	0.04	17.4	17.4	43.5	36.2	0.0%
R13	1.5	0.02	0.04	17.4	17.4	43.5	42.2	0.0%
R14	1.5	0.02	0.05	17.4	17.4	43.6	40.2	0.0%
R15	1.5	0.03	0.06	17.4	17.4	43.6	39.7	0.0%
R16	1.5	0.04	0.10	17.4	17.4	43.6	76.3	0.0%
R17	1.5	0.05	0.12	17.4	17.4	43.6	96.6	0.0%
R18	1.5	0.06	0.14	17.4	17.5	43.6	112.9	0.0%
R19	1.5	0.08	0.20	17.4	17.5	43.7	228.0	0.0%
R20	1.5	0.09	0.22	17.4	17.5	43.7	249.4	0.0%
R21	1.5	0.09	0.22	17.4	17.5	43.7	242.3	0.0%
R22	1.5	0.09	0.21	17.4	17.5	43.7	228.0	0.0%
R23	1.5	0.08	0.20	17.4	17.5	43.7	187.3	0.0%
AQS		**40**					-	

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

Technical Appendix 9.1: Glossary of Noise and Vibration Terminology

1. TERMINOLOGY RELATING TO NOISE

Table 1.1: Noise Terminology

Term	Definition
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 ($_{s1}/_{s2}$). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the time period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$ or Background Noise Level	A noise level index defined as the noise level exceeded for 90% of the time over the time period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 metres
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS5969.
Rating Level ($L_{Ar,Tr}$)	To BS 4142:2014+A1:2019, the rating level is defined as the equivalent continuous A-weighted sound pressure level produced by the specific sound source over a given reference time interval, Tr plus any adjustment for the characteristic features of the sound (tonality, impulsivity, etc).
NSR	A Noise Sensitive Receiver is any receiver that is classed as being sensitive to noise sources, (residential properties, churches, music studios etc).
$R_w + C_{tr}$	Weighted Sound Reduction index (R_w) with low frequency sound correction factor (C_{tr}). $R_w + C_{tr}$ is used when increased control of low frequency sound sources is required such as amplified music, and traffic or aircraft noise

2. TERMINOLOGY RELATING TO VIBRATION

Table 2.1: Vibration Terminology

Term	Definition
VDV	Vibration Dose Value
Displacement, Acceleration and Velocity Root Mean Square (r.m.s.) and Peak Values Peak Particle Velocity (PPV)	Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far from the equilibrium position that something moves), velocity (how fast something moves), or acceleration (the rate of change of velocity). When describing vibration, one must specify whether peak values are used (i.e. the maximum displacement or maximum velocity) or r.m.s. / r.m.q. values (effectively an average value) are used. Standards for the assessment of building damage are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV), whilst human response to vibration is often described in terms of r.m.s. or r.m.q. acceleration.

Technical Appendix 9.2: Preliminary Construction Noise Assessment

1. PLANT ITEMS AND NOISE LEVELS USED IN THE ASSESSMENT

Table 1.1: Demolition and Construction Noise Plant and Sound Power Levels Used in Assessment

Activity	Plant	Sound Power Level L_{wA} dB	No. of plant	Overall L_{wA} dB	On-time (% of hour)	Reference
Site enabling works	Wheeled excavator	94	2	97	50	BS 5228 Table C4.no.10
	Dumper	111	2	114	20	BS 5228 Table C.2 ave no.s 30-31
	Loading lorries	106	2	109	10	BS 5228 Table C1. no.7
	Scaffold erection	108	1	108	20	BS 5228 Table C.2 ave no.s 26-28
	Generator	102	1	102	100	BS 5228 Table D.7 no.1
	Electric drills	104	2	107	10	BS 5228 Table C.4 no. 32
	Metal cutter	107	2	110	5	BS 5228 Table D.6 no.54
	Electric bolter	104	2	107	10	BS 5228 Table C.1 no.18
	Road sweeper	104	1	104	10	BS 5228 Table D.6 no.54
	Telescopic handler	102	1	102	20	BS 5228 Table C.4 no.45
Demolition	Dozer	106	1	106	20	BS 5228 Table C.8 no. 6
	Pneumatic breaker	116	2	119	50	BS 5228 Table D.2 ave 7-10
	Excavator (tracked)	110	2	113	50	BS 5228 Table D.3 ave no.s 34-40
	Dumper	101	2	104	33	BS 5228 Table D.7 ave no.s 81-92
	Generator	102	1	102	10	BS 5228 Table C.4 no. 32
Substructure	Excavator (tracked)	110	2	113	50	BS 5228 Table D.3 ave no.s 34-40
	Lorry mounted concrete pump	107	2	110	80	BS 5228 Table D.6 ave no.s 34 & 36
	Dumper	101	2	104	50	BS 5228 Table D.7 ave no.s 81-92

Table 1.1: Demolition and Construction Noise Plant and Sound Power Levels Used in Assessment

Activity	Plant	Sound Power Level L_{wA} dB	No. of plant	Overall L_{wA} dB	On-time (% of hour)	Reference
	Road sweeper	104	2	107	30	BS 5228 Table C.4 no.90
	Generator	102	1	102	10	BS 5228 Table C.4 no. 32
	Crane	97	1	97	100	BS 5228 Table C.3 ave no.s 28-30
Superstructure	Lorry mounted concrete pump	107	2	110	50	BS 5228 Table D.6 ave no.s 34 & 36
	Crane	106	1	106	50	BS 5228 Table C.4 no. 38
	Generator	102	1	102	100	BS 5228 Table C.4 no. 32
	Electric drills	104	2	107	30	BS 5228 Table D.6 no.54
	Metal cutter	107	2	110	20	BS 5228 Table C.1 no.18
	Electric bolter	104	2	107	20	BS 5228 Table D.6 no.54
	Hydraulic access platforms	95	2	98	70	BS 5228 Table C.4 no. 57
	Road sweeper	104	2	107	10	BS 5228 Table C.4 no.90
Internal works / Fit-out	Generator	102	1	102	100	BS 5228 Table C.4 no. 32
	Welding plant	102	2	105	30	BS 5228 Table C.3 no. 31
	Electric drills	104	3	109	10	BS 5228 Table D.6 no. 54
External works	Generator	102	1	102	100	BS 5228 Table C.4 no. 32
	Excavator (tracked)	110	2	113	50	BS 5228 Table D.3 ave no.s 34-40
	Road sweeper	104	2	107	10	BS 5228 Table C.4 no.90
	Dumper	101	2	104	33	BS 5228 Table D.7 ave no.s 81-92
	Cement mixer truck	105	2	108	10	BS 5228 Table C.4 ave no.s 18 & 20

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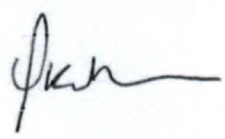
APPROVALS

	Name	Signature	Position	Date
Prepared by	S. O'Reilly		Associate	05/09/2022
Reviewed by	J. Mayer		Director	06/09/2022
Approved by	J. Mayer		Director	07/09/2022

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
0	S. O'Reilly	08/09/2022	Planning Draft
1	Ronan Kearns	25/10/2022	Issued for planning

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SOURCES OF DATA

Burns McDonnell	Land Survey Services Ltd.
Google	Marston Planning

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Technical Appendix 10.1: Engineering Planning Strategy

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DB13, Profile Park, Grange Castle, Lucan, Co. Dublin

Engineering Planning Report

September 2022

P210501

VANTAGE™
DATA CENTERS

Document No.: DUB13-RP-00-C001-V0-WS3-PIN

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

REPORT CONTENTS

Executive Summary

This report was prepared for South Dublin County Council in connection with the planning application for a data centre development and addresses the existing and proposed civil infrastructure, for the proposed development, located in Profile Park, Grange Castle Business Park, Lucan, Co. Dublin.

Vantage Data Centers Dub 11 Ltd. are applying for permission for development at this site on the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 8.7 hectares.

The development will consist of the demolition of the two storey dwelling (207.35sqm) and associated outbuildings and farm structures (348.36sqm); and the construction of 1 no. two storey data center with plant at roof level and associated ancillary development that will have a gross floor area of 12,893sqm that will consist of the following:

- 1 no. two storey data center (Building 13) with a gross floor area of 12,893sqm. It will include 13 no. emergency back-up generators of which 12 will be double stacked and one will be single stacked within a compound to the south-western side of the data center with associated flues that each will be 22.316m in height and 7 no. hot-air exhaust cooling vents that each will be 20.016m in height;
- the data center will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators;
- The data center will have a primary parapet height of 14.246m above ground level, with plant and screen around plus a plant room above at roof level. The plant room has an overall height of 21.571m;
- Construction of an internal road network and circulation areas, with a staff entrance off Falcon Avenue to the east, as well as a secondary vehicular access for service and delivery vehicles only across a new bridge over the Baldonnel Stream from the permitted entrance as granted under SDCC Planning Ref. SD21A/0241 from the south-west, both from within Profile Park that contains an access from the New Nangor Road (R134);
- Provision of 60 no. car parking spaces (to include 12 EV spaces and 3 disabled spaces), and 34 no. cycle parking spaces;
- Signage (5.7sqm) at first floor level at the northern end of the eastern elevation of the data center building; and
- Ancillary site development works, will include footpaths, attenuation ponds that will include an amendment to the permitted attenuation pond as granted to the north of the Baldonnel Stream under SDCC Planning Ref. SD21A/0241, as well as green walls and green roof. The installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping that will include an amendment to the permitted landscaping as granted under SDCC Planning Ref. SD21A/0241, lighting, fencing, signage, services road, entrance gates, and sprinkler tanks.

The development will be accessed from Falcon Avenue from within the Profile Park Business Park that contains an access from the New Nangor Road (R134).

The site is bounded to the south by an estate road known as Falcon Avenue, to the north by Nangor Road (R134), to the east by existing greenfield and to the west by existing commercial units and greenfield.

The report should be read in conjunction with our engineering planning drawings, and deals with existing foul, surface water and water mains present within the surrounding area, and the proposals for the site with regards to these services.

The report also discusses the ground conditions present on the site, the current proposals for achieving the development plateau and sustainability measures incorporated with the development.

1 Introduction

The development will consist of the demolition of the two storey dwelling (207.35sqm) and associated outbuildings and farm structures (348.36sqm); and the construction of 1 no. two storey data center with plant at roof level and associated ancillary development that will have a gross floor area of 12,212sqm

The total subject site area extends to circa 9.36 acres (3.7ha) and is primarily a greenfield site. The site is bounded to the north by the New Nangor Road, to the south by Falcon Avenue and to the east by existing greenfield and to the west by existing commercial units and greenfield.

There are no known public sewer drainage pipes or watermains, presently located on the subject site.

This report has been prepared to outline the existing and proposed drainage, pollution control measures and water main infrastructure, in order to support the proposed development application.

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

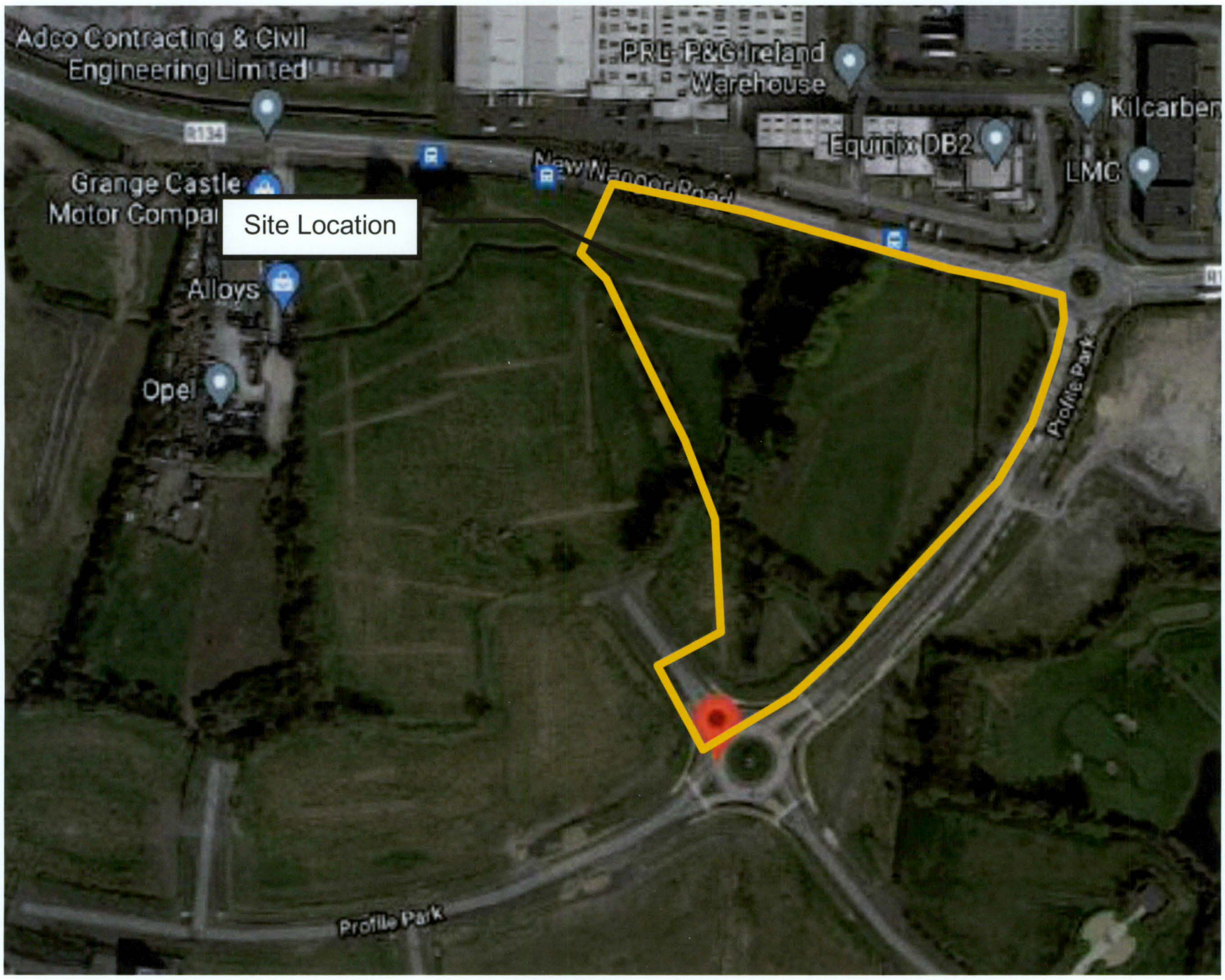

FIGURE 1 - Site Location (Source Google Maps)

2 Existing Drainage & Watermain Services

2.1 Existing Foul Drainage Networks

South Dublin County Council record drawings have identified a 225mm Ø mains network, located adjacent to the south-eastern boundary of the site & within Falcon Avenue. This line forms part of the reticulation netwrok for Profile Park.

The existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site and there are no known issues noted with the sewer reticulation network.

2.2 Existing Surface Water Drainage Networks

The topographical survey as carried out has identified an open channel / stream which runs along a portion of the western boundary, up to the north, prior to discharging to the west into a culverted system beneath Grange Castle Motor Company. This ditch network is referred to as Baldonnel Stream.

The Baldonnel Stream then runs in a westerly direction via a tributary into the Camac River.

The Baldonnel Stream has been identified as having capacity to accommodate the proposed restricted discharge from the subject site.

2.3 Existing Water Main Network

South Dublin County Council record drawings have identified an existing 6" (160mm) Ø main located along the south-eastern boundary of the property, within Falcon Avenue adjacent to the subject site. 1No. 160mm Ø capped connection with sluice valves, has been left off the aforementioned water main, in order to facilitate development of these lands.

There is also an existing 700mm Ø trunk water main running parallel to the New Nangor Road adjacent to the northern boundary of the subject site.

From discussions with the South Dublin County Council, it is understood that there is adequate capacity within the existing watermain network to supply the anticipated demand of the proposed development.

3 Proposed Site Drainage & Water Supply

3.1 Proposed Foul Water Drainage

It is proposed to discharge foul water from the proposed development, via a 225mm Ø gravity foul sewer outfall, laid from MH FWMH 2.1 and discharging into the existing 225mm Ø laid along Falcon Avenue, which then runs in a southerly direction.

The administration section of the building contains 6 No. WC's, with a predicted maximum number of daily staff being in the region of circa 48 people, over a 24hr period. Based on Irish Water's Code of Practice of 150ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.083l/s (@1DWF) & a peak discharge of 0.498l/s (@6DWF).

The proposed network connects into FW MH CON, with an invert level of 71.54m, prior to the ultimate outfall discharging into the Profile Park reticulation network, - refer Drawing No. DB13-DR-UG-C127-V2-WS3-PIN Rev. V2.

All on-site foul sewers have been designed to be a minimum 225mm Ø diameter pipes, with gradients designed to achieve self-cleansing velocities.

A Confirmation of Feasibility has been received from Irish Water in respect of both the foul sewer and water supply – Ref. No. CDS22006869, refer Appendix D.

3.2 Proposed Surface Water Drainage

Storm water from the proposed development has been designed in accordance with the GDSDS and ensures that Best Management Practice has been incorporated into the design.

It should be noted that the subject site currently comprises a greenfield site and the proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge, etc.

Further to the above, the SDCC Sustainable Drainage Explanatory Design and Evaluation Guide has been taken into account, with sustainable measures being implemented as described below. In addition, the previous concrete pedestrianised footpath areas around the building to the west, north & east have now been replaced with permeable paving.

Storm water from the rear roof areas of the proposed building units, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into Attenuation Pond 1 - refer Drawing No. DB13-DR-UG-C127-V2-WS3-PIN Rev. V2.

The front roof areas of the buildings drain into the permeable paving sub-base, prior to the ultimate discharge into the ditch / stream to the west via Attenuation Pond 1.

Based on the contributing area for this current application, i.e. circa 14,300m^2 (1.43Ha), the total attenuation volume required has been calculated as being circa 1,084m^3, which will be provided for as mentioned above, in 2 No. storage ponds & permeable paving - Refer Appendix B for Surface Water Calculations.

The following volumes have been provided for within the storage elements:-

- Attenuation Pond 1 provides a storage volume of 900m^3
- Attenuation Pond 2 provides a storage volume of 70m^3
- Permeable paving sub-base provides a storage volume of 114m^3

It should be noted that Attenuation Pond 1 discharges directly into the aforementioned ditch / stream to the west. Attenuation Pond 2 outfalls into the existing 1400mm Ø network to the south. This network then runs north and connects into the aforementioned ditch / stream.

Storm water from all car park areas and access roads / delivery areas will be drained as follows:-

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers
- Permeable Paving

Prior to discharging into the proposed ponds, the storm water from the car park and access roads, which is drained via the methods as described above, will be directed through an appropriately sized Conder Separators (or similar approved) petrol interceptor - refer Appendix A for Interceptor Details.

Site investigations have been carried out and the results have shown that the existing sub-soil would provide inadequate soil infiltration rates and thus it is not practical to install a soakaway system. The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The ponds and permeable paving sub-base areas have been designed to accommodate a 1:100 year storm event + 20% climate change.

The outflow from the proposed development, will be restricted by way of a Hydrobrake facility, which will limit the total discharge to 2.8l/s, which is the calculated QBAR greenfield run-off rate - refer Appendix B for Surface Water Calculations.

The surface water discharge for this application will incorporate the road areas, parking, service yard area and the roof water from the proposed data hall, which then ultimately feeds into the existing network as previously described. Refer Dwg. No. DB13-DR-SP-C130-V2-WS3-PIN Rev. V2 (External Works Layout), for a drawing indicating the various surface types of this application; all areas are hardstanding of various types, with the respective coefficients detailed below:-

- Access Road – Tarmac (2,395m^2) / c = 0.80
- Data Hall Roof Area (6,384m^2) / c = 1.00

- Yard Slab Area / Service Yard – Concrete (4,502m^2) / c = 0.80
- Open Space / Landscaping (15,305m^2) / c = 0.00
- Permeable Paving & Parking Areas (759m^2) / c = 0.60
- Concrete Footpath (394m^2) / c = 0.8

3.3 Proposed Water Mains

It is intended to serve the proposed development via connection off the aforementioned 160mm Ø PVC spur connection off the network, as located in Falcon Avenue - Refer Drawing No. DB13-DR-SP-C124-V2-WS3-PIN Rev. V2.

Hydrants will be installed in accordance with the Requirements of the Building Regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety, dated 2006, and these are detailed on our engineering drawings.

Water demand for the development has been based on Irish Water's criteria, i.e. 150 litres/hd/day = 7,200 litres/hd/day (based on 48 PE) = 0.083 litres/second.

Avg. Demand = 0.083 l/s x 1.25 = 0.104 litres/second

Peak Demand = 0.104 l/s x 5 = 0.520 litres/second

Water meters, sluice valves and hydrants, in line with Irish Water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains, as required.

A Confirmation of Feasibility has been received from Irish Water in respect of both the foul sewer and water supply – Ref. No. CDS22006869, refer Appendix D.

3.4 Standard Drainage Details

All standard drainage details including manhole details, pipe bedding, channels, hydrants etc. have been included within the planning pack. Details of the types and construction methods will be agreed with the local authority prior to construction.

Drains generally will consist of PVC (to IS 123) or concrete spigot and socket pipes to (IS 6).

Drains shall be laid to comply with the Requirements of the Building Regulations 2016 and in accordance with the recommendations contained in the Technical Guidance Documents, Section H, Drainage & Waste Water Disposal..

Strict separation of surface water and foul sewerage will be imposed on the development. Drains will be laid out to minimise the risk of inadvertent connections of sinks, dishwashers etc. to the surface water system.

In order to minimise the risk of floating contamination of the surface water system, road gullies will be precast trapped gullies to BS5911:Part2:1982.

Concrete bed and surround to the pipe runs will be used where the cover to the pipes is less than 900mm, where the pipes are sufficiently close to the building, or where the pipe runs are below the ground floor slab.

All works are to be carried out in accordance with Irish Water's Code of Practice for Water Infrastructure, dated July 2020 : Document IW-CDS-5020-03 and any subsequent revisions thereof.

4 Surface & Groundwater Impacts

4.1 Construction Phase

Water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors – C532 CIRIA Report (Masters-Williams *et al*, 2001), which provides information on these issues.

Pollutants can commonly include suspended solids, oil, chemicals, cement, cleaning materials and paints. These can enter controlled waters in various ways:

- directly into a watercourse
- via drains or public sewers
- via otherwise dry ditches
- in old field drains
- by seepage into groundwater systems
- through excavations into underlying aquifers
- by disturbance of an already contaminated site

The proximity of the site to streams, aquifers and water abstractions; potential sources, pathways and impacts of pollution; and the historical uses of the site and nearby areas should be examined early in project planning and design, to ensure that suitable redesign and mitigation measures are undertaken as necessary.

During construction, careful management and planning will help minimise water pollution. This may include adequate bunding of all oil tanks, wheel washers and dust suppression on haul roads, particular care to be taken near watercourses, and regular plant maintenance.

A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident.

The CIRIA document (2001), recommends that a contingency plan for pollution emergencies should address the following:

- containment measures
- emergency discharge routes
- list of appropriate equipment and clean-up materials
- maintenance schedule for equipment
- details of trained staff, location, and provision for 24-hour cover
- details of staff responsibilities
- notification procedures to inform the relevant environmental protection authority
- audit and review schedule

- telephone numbers of statutory water undertakers and local water company
- list of specialist pollution clean-up companies and their telephone numbers

4.2 Operational Phase

The sources of pollution that could potentially have an effect on surface or groundwater during the operational phase of the development will be oil and fuel leaks from parked cars, service vehicles, HGV delivery's etc. Hydrocarbon interceptors will be provided on storm water drainage sewers from car parking areas as required.

Storm water attenuation measures will be incorporated into the scheme as mentioned previously.

It is not anticipated that flooding of the site will occur, however, an independent Site Specific Flood Risk Assessment has been submitted as part of the planning submission pack.

4.3 Mitigation Measures

The construction management of the building project will incorporate protection measures to minimise as far as possible the risk of spillage that could lead to surface and groundwater contamination.

All appropriate methods will be utilised to ensure that surface water arising during the course of construction activities will contain minimum sediment, prior to the ultimate discharge to the proposed attenuation ponds and the existing stream.

Storm water attenuation measures will be incorporated into the scheme as mentioned previously. Hydrocarbon interceptors will be provided on storm water drainage sewers from service yard areas as necessary. Grease traps will be installed on foul sewers where necessary.

Best practice in design and construction will be employed for the installation of surface water and sanitary drainage.

5 Sustainability

5.1 Site Development

In order to minimize material export and import to the site and the impact of this on the surrounding road network, we are proposing to maintain existing on-site levels as far as is practical. Where this is not feasible, a terrain model has been produced, which will indicate the volumes of cut/fill material, based on the proposed levels and a levels balance will be struck across the site, thereby mitigating any import/export of material for site development.

5.2 Site Drainage

Storm water drainage proposals for the site have been designed in accordance with the GDSDS and incorporate on site storm water attenuation in order to limit discharge of storm water from the developed site to the equivalent Q-bar run-off rates.

The attenuation system proposed is in keeping with other similar developments within Grange Castle Business Park. The pond area not only provides flood storage, but also provides ecological benefits as well.

6 Conclusion

In conclusion, the proposed development of the site by the applicant, for use as a Data Centre development, is considered a suitable use of the site. Local infrastructure has the capacity to serve the proposed development.

The site will be developed in a sustainable manner, in order to minimise the impact of the development during construction and throughout the lifespan of the proposed development.

Accordingly, there are no reasons in relation to the drainage elements as to why this scheme should not be granted planning permission, and with this in mind, the Planning Authority is respectfully requested to recommend a grant of planning permission.

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Appendix A

Conder Petrol Interceptor Details

Appendix B

Surface Water Calculations

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Appendix C

Permeable Paving

Appendix D

IW Confirmation of Feasibility

CDS22006869

Technical Appendix 10.2: Site-Specific Flood Risk Assessment

KILGALLEN & PARTNERS

CONSULTING ENGINEERS

Vantage Data Centres Ltd.

Proposed Industrial Development, DUB13, Profile Park, Grangecastle, Co. Dublin

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Report on Site-Specific Flood Risk Assessment

Vantage Data Centres Ltd.	**Document Ref. No.**	**Kilgallen & Partners Consulting Engineers Well Road, Portlaoise Co. Laois**
	22050-R-SSFRA Issue PL1	

REVISION HISTORY

Client	Vantage Data Centres Ltd.
Project	Proposed Industrial Development, DUB13, Profile Park, Grangecastle, Co. Dublin
Title	Report on Site-Specific Flood Risk Assessment

Date	Detail of Issue	Issue No.	Origin	Checked	Approved
27/10/2022	Initial issue	PL1	CP	PB	PB

TABLE OF CONTENTS

1. INTRODUCTION

Vantage Data Centres Ltd. ['the Applicant'] intends to apply to South Dublin County Council for planning permission for an industrial development ['the proposed development'] on lands to the south of the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 3.79hectares ['the Site].

The Applicant appointed Kilgallen and Partners Consulting Engineers to :

- carry out a Site-Specific Flood Risk Assessment ['SSFRA'] for the proposed development in accordance with the 'Planning System and Flood Risk Management – Guidelines for Planning Authorities' ['the Guidelines'];
- prepare a report presenting the findings of the SSFRA to support the application for planning permission;

This is the report referred to above.

2. PROCESS FOR SITE-SPECIFIC FLOOD RISK ASSESSMENT

The initial stage of the SSFRA comprises an assessment of available flood risk data to identify flood risk indicators in the Study Area. If the Site is identified to be at risk of flooding, the SSFRA will proceed to a detailed assessment.

2.1 Potential Sources of Flood Risk

Potential flood risk mechanisms are summarised in Table 2-1.

Source	Mechanism
Fluvial:	Overtopping of Rivers and Streams
Pluvial:	The intensity of rainfall events is such that the ground cannot absorb rainfall run-off effectively or urban drainage systems cannot carry the run-off generated.
Groundwater:	Rising water table
Coastal:	Tidal levels and / or wave action
Infrastructure	Failure of flood protection or drainage infrastructure

Table 2-1 Flood Risk Mechanisms

As an inland site upstream of tidal influences and possible wave action, the Site is not subject to coastal flood risk and so this mechanism does not need to be considered further in this assessment.

The assessment will therefore consider the following mechanisms:

- Fluvial;
- Pluvial;
- Groundwater;
- Drainage Infrastructure *(considered under Section 9 – Residual Flood Risk)*

2.2 Flood Risk Indicators

Indicators of flood risk are identified using available data, most of which is historically derived. Typically, this data is not prescriptive in relation to flood return periods and neither predictive nor inclusive of climate change analysis.

Flood risk indicators include:

- Records available on the OPW's National Flood Risk Website. As part of the National Flood Risk Management Policy, the OPW developed the www.floodinfo.ie web-based data set, which contains

information concerning historical flood data and displays related mapped information and provides tools to search for and display information about selected flood events;
- PFRA & CFRAM mapping produced under the CFRAM programme;
- The Strategic Flood Risk Assessment carried out to inform the making of the Local Area Plan;
- Geological Survey of Ireland (GSI) mapping - Hydrogeological mapping maintained by the GSI and made available through its website www.gsi.ie;
- Ordnance Survey mapping - Ordnance Survey maps include areas which are marked as being "Liable to Floods". Generally, these areas are only shown identified indicatively and suggest historical flooding, usually recurrent. In addition, the maps indicate areas of wet or hummocky ground, bog, marsh, springs, rises and wells as well as surface water features including rivers, streams, bridges, weirs and dams;
- Topographical survey information;
- Records of previous floods from other sources;
- Flood Studies, Reports and Flood Relief Schemes carried out in the vicinity of the Study Area;
- Site Walkover.

2.3 Identification of the Presence and Extent of Fluvial Flood Risk

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of fluvial flooding, the study progresses to the next stage, which is a detailed flood risk assessment. This is based on field measurements and hydrological modelling and enables mapping of the zones of Flood Risk within the Site to be established.

In accordance with the Guidelines, flood risk zones are categorized as follows:

Flood Zone A where the probability of flooding in any year is greater than 1% (i.e. Flood Zone in respect of a flood with a return period of 100years);

Flood Zone B where the probability of flooding in any year is between 0.1% and 1% (i.e. Flood Zone in respect of a flood with a return period of between 100years and 1,000years);

Flood Zone C where the probability of flooding in any year is less than 0.1% (i.e. Flood Zone in respect of a flood with a return period of greater than 1,000years).

2.4 Identification of the Presence and Extent of Pluvial Flood Risk

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of pluvial flooding, the study progresses to the next stage, which is a detailed assessment to establish the extent of pluvial flood risk at the Site.

2.5 Identification of the Presence and Extent of Groundwater Flood Risk

Where the initial process of examining flood risk indicators demonstrates the existence of a risk of flooding from groundwater, the assessment progresses to the next stage, which is a detailed assessment to establish the extent of groundwater flood risk at the Site.

2.6 Assessment of Proposed Development

As described in the previous paragraphs, the first stages of the assessment process are concerned with identifying whether the Site is at risk of pluvial, fluvial or groundwater flooding and establishing the extent of any such flood risks.

The next steps in the assessment process are:

- Determination of the impact that any of the identified flood risks will have on the proposed Development;
- Determination of any impact that the Development itself might have in terms of increasing the level of flood risk elsewhere outside the Site;
- Identification of mitigation measures in respect of any such impacts and identification of any residual risks after those mitigation measures are put in place;
- Applying the Development Management Justification Test if appropriate;
- Providing a conclusion as to the appropriateness of the proposed development in terms of flood risk.

3. SITE DESCRIPTION

Figure 3-1 shows the Site in the context of its immediate surroundings and Figure 3-2 shows the main drainage features and site topography indicatively.

The Site is located in Profile Park Business Park. It is bounded:

- to the north by the R134 New Nangor Road;
- to the east by a distributor road ['the Park Road'] through Profile Park;
- to the west and south by unused agricultural lands which are the site for a recently approved industrial development (Pl Reg. Ref. No. SD21A/0241).

The Site is undeveloped and does not appear to be used for any purpose.

Main Drainage Features

The Baldonnell Stream ['the Stream'] crosses under the Park Road and enters the Site close to its southern boundary. The Baldonnell Stream flows through the Site for approximately 45m and then exits the Site at its west boundary. 190m downstream of the Site the Stream flows through a short 600mm dia. culvert. 300m downstream of the Site, the Stream discharges to a long twin-pipe culvert.

There is no evidence of pluvial drainage entering the Site.

The vegetation is suggestive of poorly draining upper soils but there is no evidence of standing groundwater.

Topography

The Site can be described as relatively flat, with a general shallow fall from northeast to southwest.

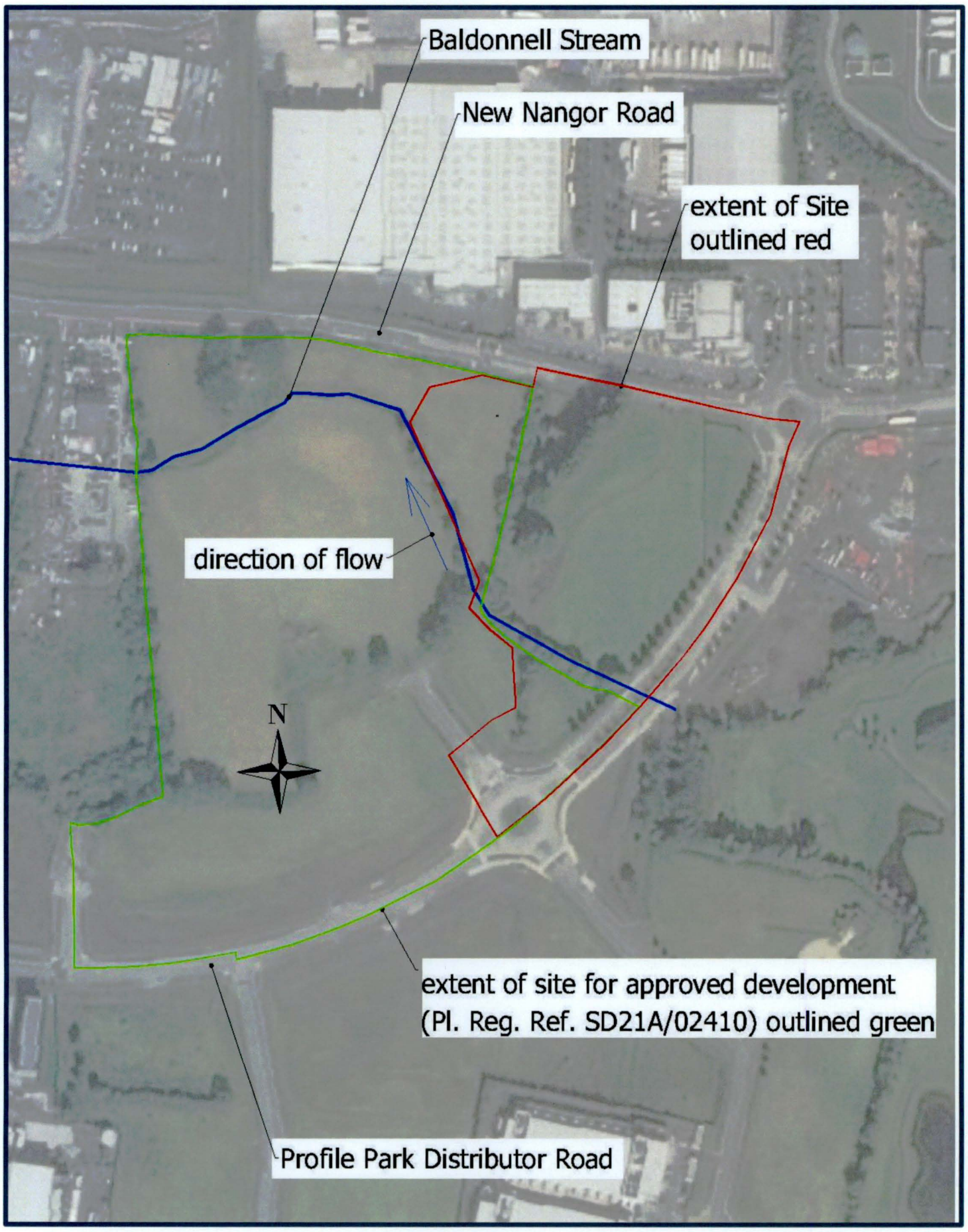

Figure 3-1 Site Context