Volume 3: Appendices – Environmental Impact Assessment Report (EIAR)

Ardee 2040 Regeneration Project, Co. Louth

October 2025

Comhairle Contae Lú
Louth County Council

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

Contents

Appendix 8.1: Protected or Priority Species Recorded in a 10km buffer of site boundary

Species group	Species name	Record count	Date of last record	Designation
amphibian	Common Frog (Rana temporaria)	1	04/05/2018	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
bird	Barn Owl (Tyto alba)	1	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Barn Swallow (Hirundo rustica)	8	07/04/2019	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Black-headed Gull (Larus ridibundus)	3	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Common Grasshopper Warbler (Locustella naevia)	1	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Species group	Species name	Record count	Date of last record	Designation
bird	Common Kestrel (Falco tinnunculus)	4	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Kingfisher (Alcedo atthis)	6	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Linnet (Carduelis cannabina)	4	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Pheasant (Phasianus colchicus)	8	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species

Species group	Species name	Record count	Date of last record	Designation
bird	Common Snipe (Gallinago gallinago)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Starling (Sturnus vulgaris)	10	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Swift (Apus apus)	4	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Wood Pigeon (Columba palumbus)	11	30/09/2019	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species

Species group	Species name	Record count	Date of last record	Designation
bird	Eurasian Curlew (Numenius arquata)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Eurasian Tree Sparrow (Passer montanus)	4	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Eurasian Wigeon (Anas penelope)	1	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Herring Gull (Larus argentatus)	1	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >>

Species group	Species name	Record count	Date of last record	Designation
				Birds of Conservation Concern - Red List
bird	House Martin (Delichon urbicum)	6	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	House Sparrow (Passer domesticus)	10	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Little Grebe (Tachybaptus ruficollis)	2	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Mallard (Anas platyrhynchos)	3	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species

Species group	Species name	Record count	Date of last record	Designation
bird	Mew Gull (Larus canus)	1	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Mute Swan (Cygnus olor)	2	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Northern Lapwing (Vanellus vanellus)	2	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Peregrine Falcon (Falco peregrinus)	1	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
bird	Rock Pigeon (Columba livia)	9	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species

Species group	Species name	Record count	Date of last record	Designation
bird	Sky Lark (Alauda arvensis)	4	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Spotted Flycatcher (Muscicapa striata)	3	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Stock Pigeon (Columba oenas)	6	31/12/2011	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Whooper Swan (Cygnus cygnus)	1	31/12/2011	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Species group	Species name	Record count	Date of last record	Designation
bird	Yellowhammer (Emberiza citrinella)	14	10/04/2021	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bony fish (Actinopterygii)	European Eel (Anguilla anguilla)	1	25/07/2006	Threatened Species: OSPAR Convention || Threatened Species: Critically Endangered
fern	Water Fern (Azolla filiculoides)	1	27/02/2019	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Cherry Laurel (Prunus laurocerasus)	1	30/09/2019	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species
flowering plant	Japanese Knotweed (Fallopia japonica)	3	16/05/2016	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
flowering plant	Sycamore (Acer pseudoplatanus)	3	30/09/2019	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
insect - butterfly	Wall (Lasiommata megera)	2	10/08/1984	Threatened Species: Endangered

Species group	Species name	Record count	Date of last record	Designation
insect - hymenopteran	Large Red Tailed Bumble Bee (Bombus (Melanobombus) lapidarius)	1	25/08/2019	Threatened Species: Near threatened
insect - mayfly (Ephemeroptera)	Labiobaetis atrebatinus	2	31/12/1947	Threatened Species: Endangered
insect - mayfly (Ephemeroptera)	Procloeon bifidum	1	31/12/1947	Threatened Species: Vulnerable
mollusc	Jenkins' Spire Snail (Potamopyrgus antipodarum)	2	04/10/2011	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
moss	Bryum dichotomum	1	10/09/2012	Threatened Species: Least concern
moss	Pointed Spear-moss (Calliergonella cuspidata)	1	10/09/2012	Threatened Species: Least concern
moss	Rough-stalked Feather-moss (Brachythecium rutabulum)	1	10/09/2012	Threatened Species: Least concern
moss	Silver-moss (Bryum argenteum)	1	10/09/2012	Threatened Species: Least concern
moss	Swartz's Feather-moss (Oxyrrhynchium hians)	1	10/09/2012	Threatened Species: Least concern

Species group	Species name	Record count	Date of last record	Designation
terrestrial mammal	American Mink (Mustela vison)	1	02/10/2020	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
terrestrial mammal	Daubenton's Bat (Myotis daubentonii)	10	25/08/2012	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
terrestrial mammal	Eurasian Badger (Meles meles)	25	04/05/2018	Protected Species: Wildlife Acts
terrestrial mammal	European Otter (Lutra lutra)	2	12/02/2015	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
terrestrial mammal	European Rabbit (Oryctolagus cuniculus)	3	27/09/2011	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
terrestrial mammal	Pine Marten (Martes martes)	1	06/04/2021	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
terrestrial mammal	Soprano Pipistrelle (Pipistrellus pygmaeus)	1	16/07/2008	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex

Species group	Species name	Record count	Date of last record	Designation
				IV || Protected Species: Wildlife Acts
terrestrial mammal	West European Hedgehog (Erinaceus europaeus)	4	29/04/2021	Protected Species: Wildlife Acts

Appendix 9.1: Site Location Plan

App 9.1 Site Location

Legend

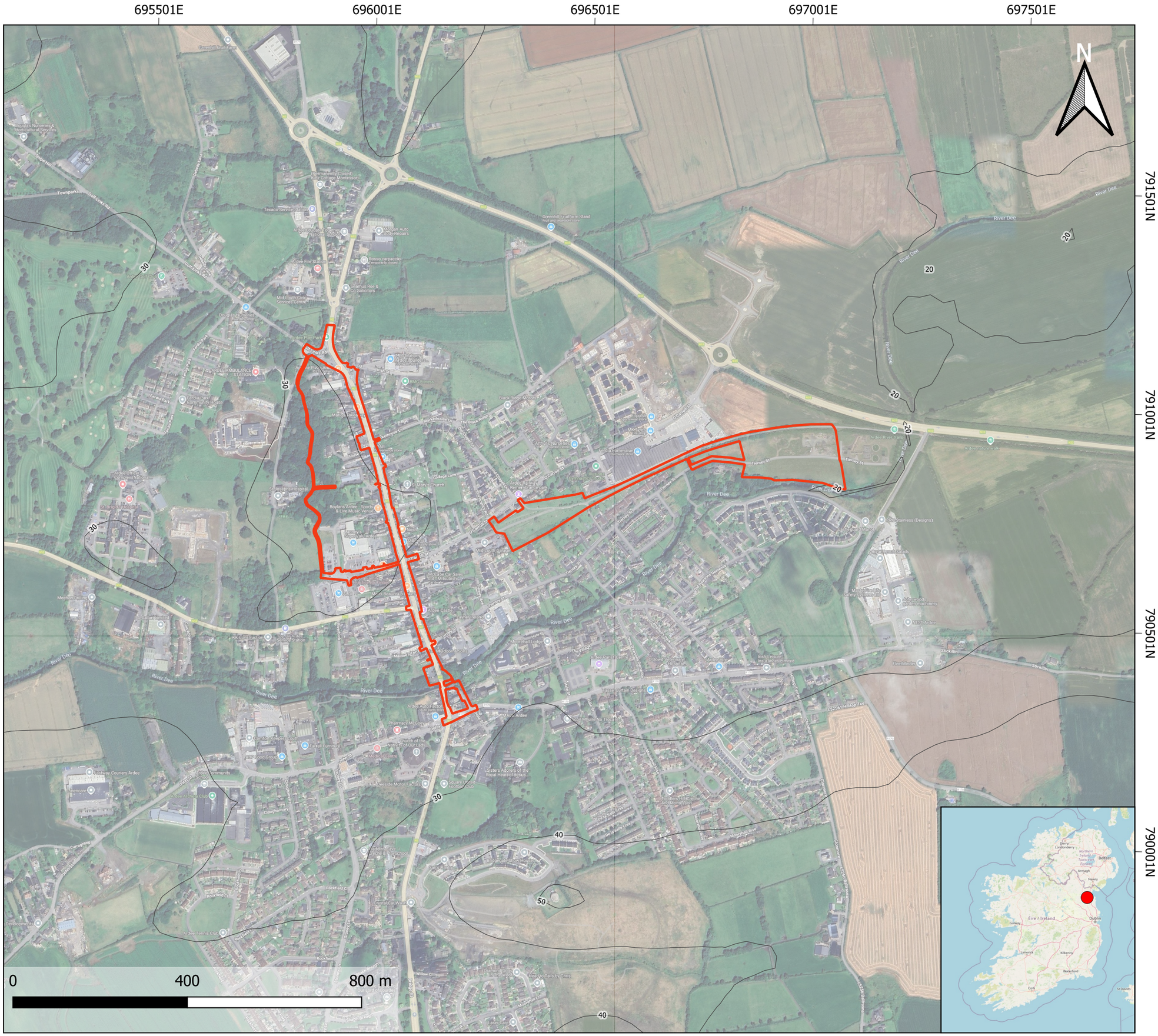
🟥 Redline Boundary

Topography

— DEM_10m_Contour

Base Layers

Google Satellite Hybrid



Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
Drawn by	DW
Reviewed by	AMcP
Version	09/05/2025

References/Sources:
Environmental Protection Agency (EPA)
Geological Survey Ireland (GSI)
Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)

Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design puporses.

Appendix 9.2 – Photographs of Site Surveying

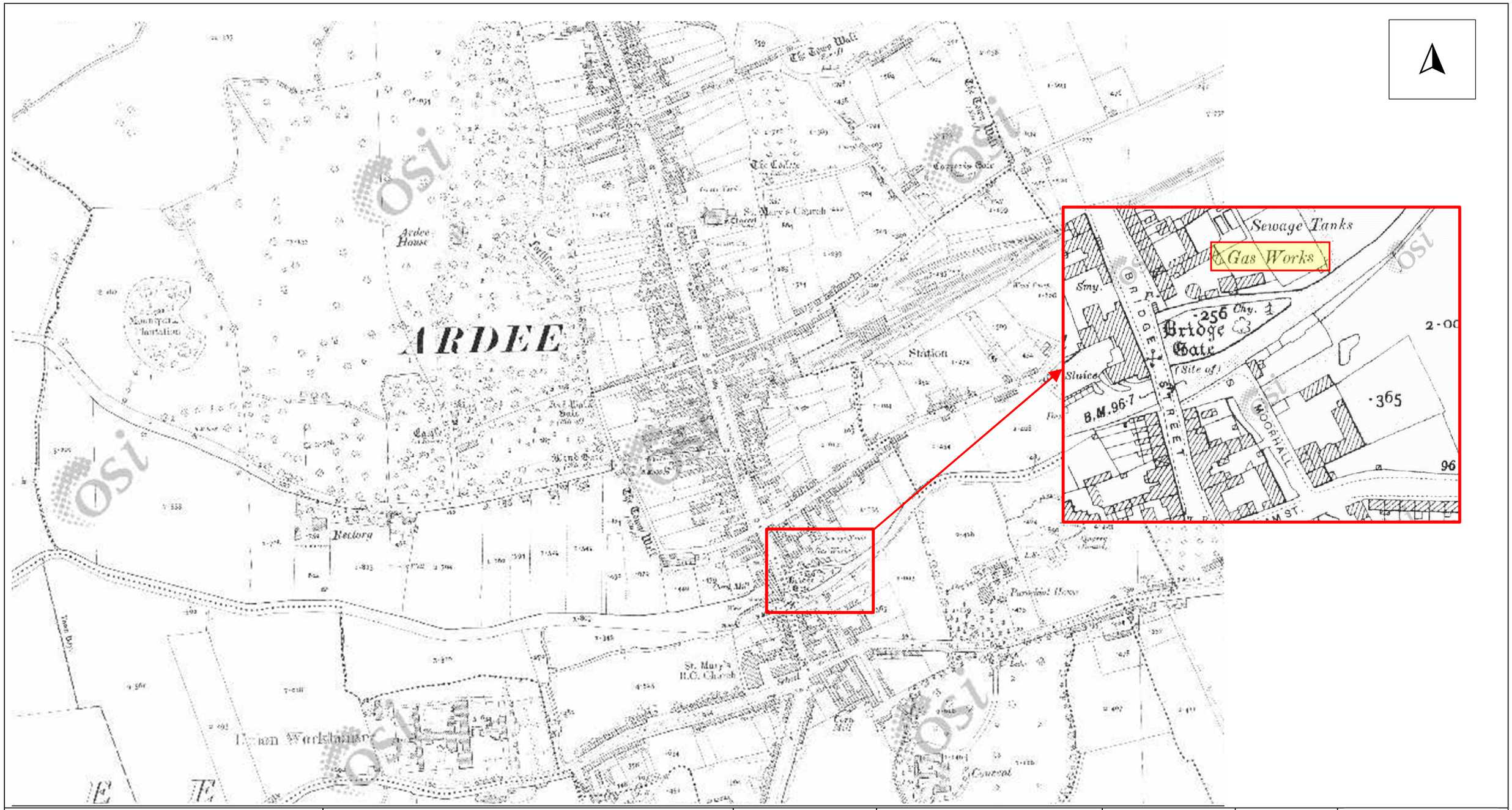
Turley

Ardee, Co. Louth Drogheda March 31, 2022

Turley

Turley

Appendix 9.3: Historic Maps



Site Name:	Figure No:	Project No:	603123 - 603902	Drawn by:	MD
Ardee Regeneration, Co Louth.	**Appendix 9.3**	**Client:**	Turley Planning	**Reviewed by:**	CMc
	Figure Name: **Historic 25" Map**	**Date:**	28/11/2022	**Technical Review:**	SK
		Revision:	01		

Note: Map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes. Source: GeoHive

Appendix 9.4: Mapped Land Use

App 9.4 Mapped Land Cover

Legend

Redline Boundary

Geology

CORINE Land Cover 2018

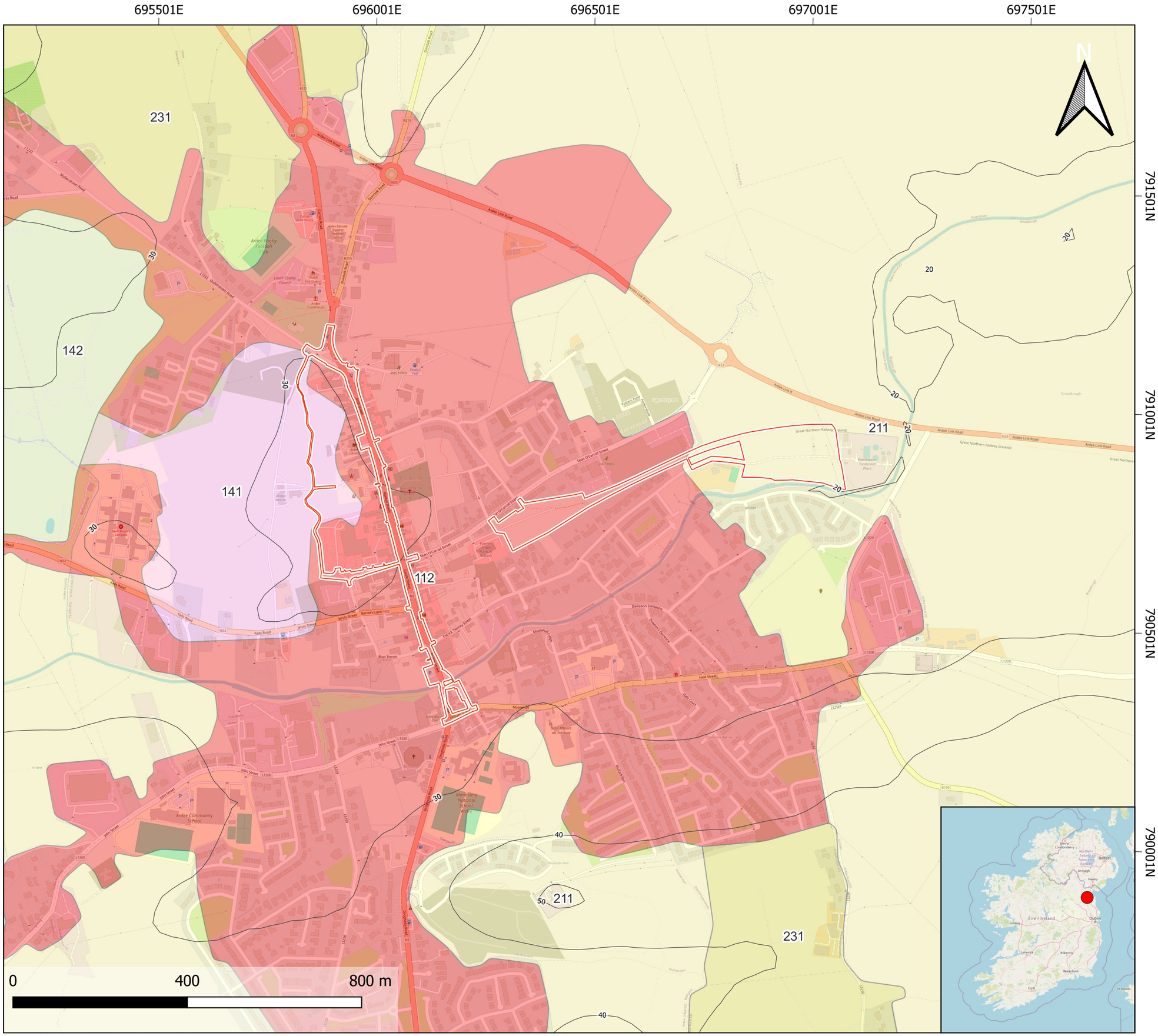
- 112 - Discontinuous urban fabric
- 141 - Green urban areas
- 142 - Sport and leisure facilities
- 211 - Non-irrigated arable land
- 231 - Pastures

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap



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Appendix 9.5: Mapped Soil

App 9.5 Mapped Soils

Legend

Redline Boundary

Geology

Soils

Soil Type

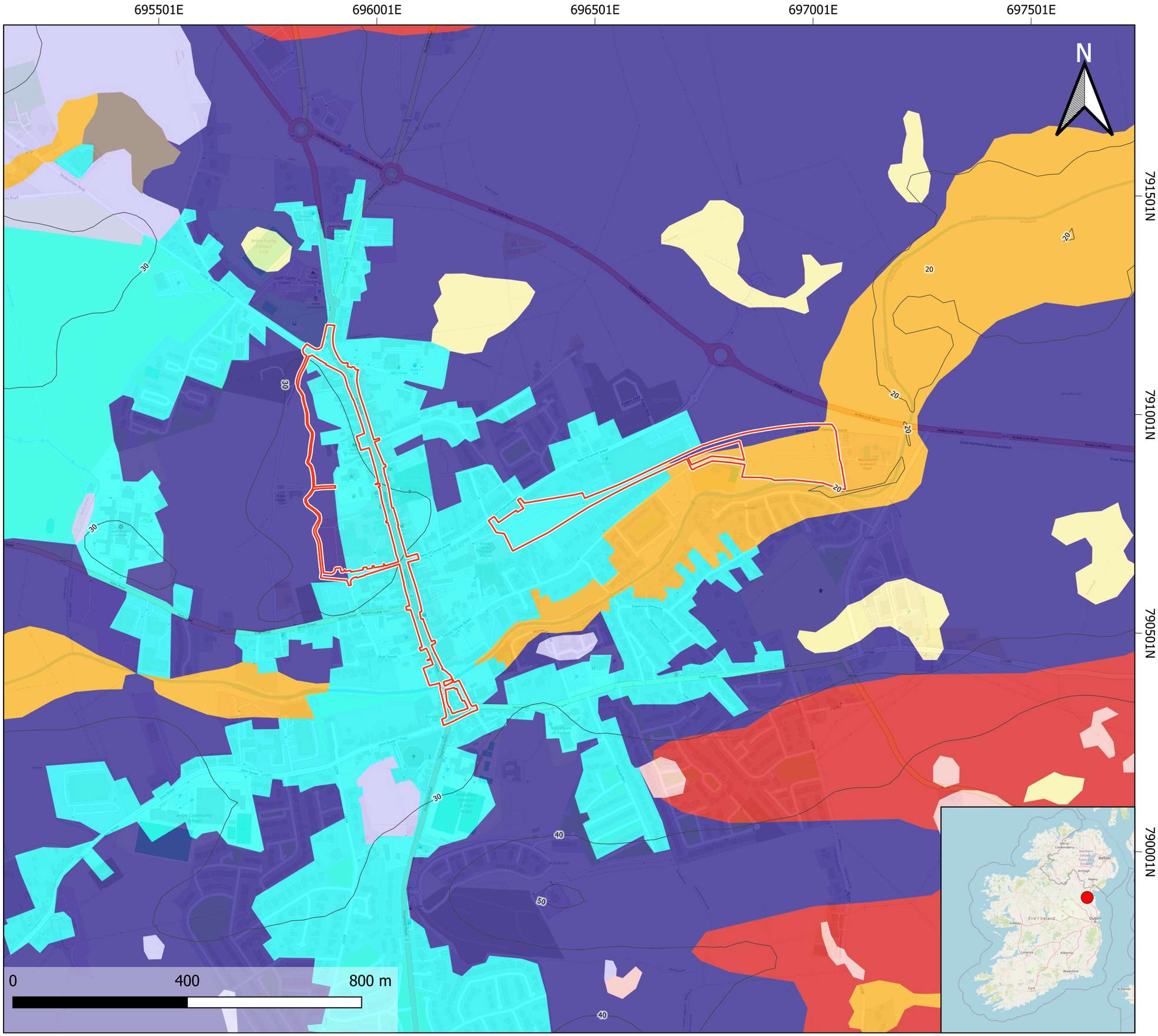
- AlluvMIN - Mineral alluvium
- AminDW - Acid Brown Earths / Brown Podzolics
- AminSW - Lithosols / Regosols
- BminDW - Grey Brown Podzolics / Brown Earths Basic
- BminSW - Renzinas / Lithosols
- Cut - Raised Bog cutaway/cutover
- Lac
- Made

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap



Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
Drawn by	DW
Reviewed by	AMcP
Version	09/05/2025

References/Sources:
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RSK

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Appendix 9.6: Mapped Subsoils

App 9.6 Mapped Subsoils

Legend

Redline Boundary

Geology

Subsoils

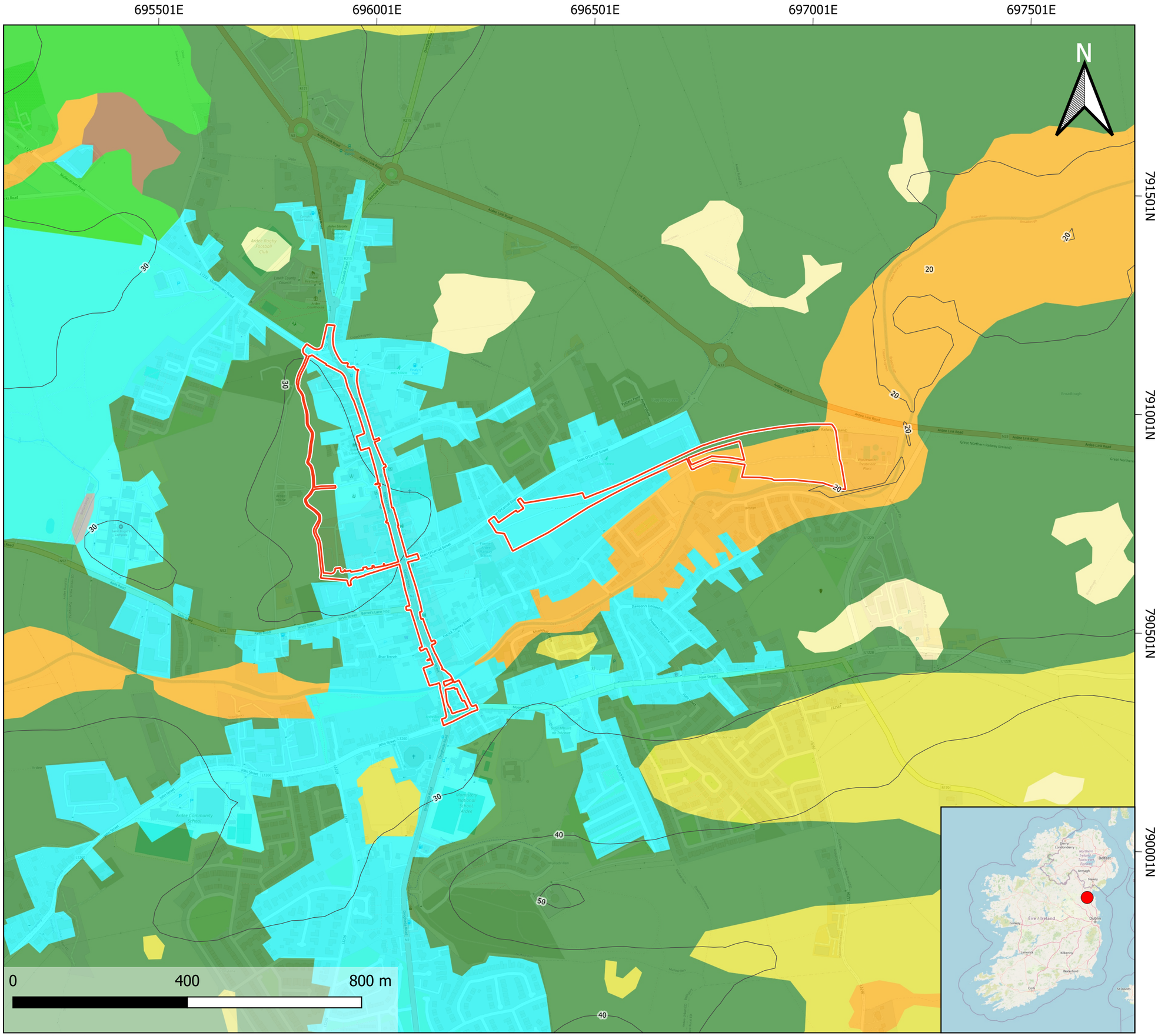
- A - Alluvium undifferentiated gravelly
- Cut - Cutover peat
- GLs - Limestone sands and gravels Carboniferous
- KaRck - Karstified limestone bedrock at surface
- L - Lake sediments undifferentiated
- Made ground
- Rck - Bedrock at surface
- TLPSsS - Sandstone and shales till Devonian/ Carboniferous
- TLs - Limestone till Carboniferous

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap



Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
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Appendix 9.7: Mapped Geology

App 9.7 Mapped Geology

Legend

Redline Boundary

Geology

Bedrock_Outcrop_ITM_2018

Geological_Linework_100k_2018

- Fault
- Synclinal Axis
- Unconformity, dots on younger side

Bedrock_Polygons_ITM_2018

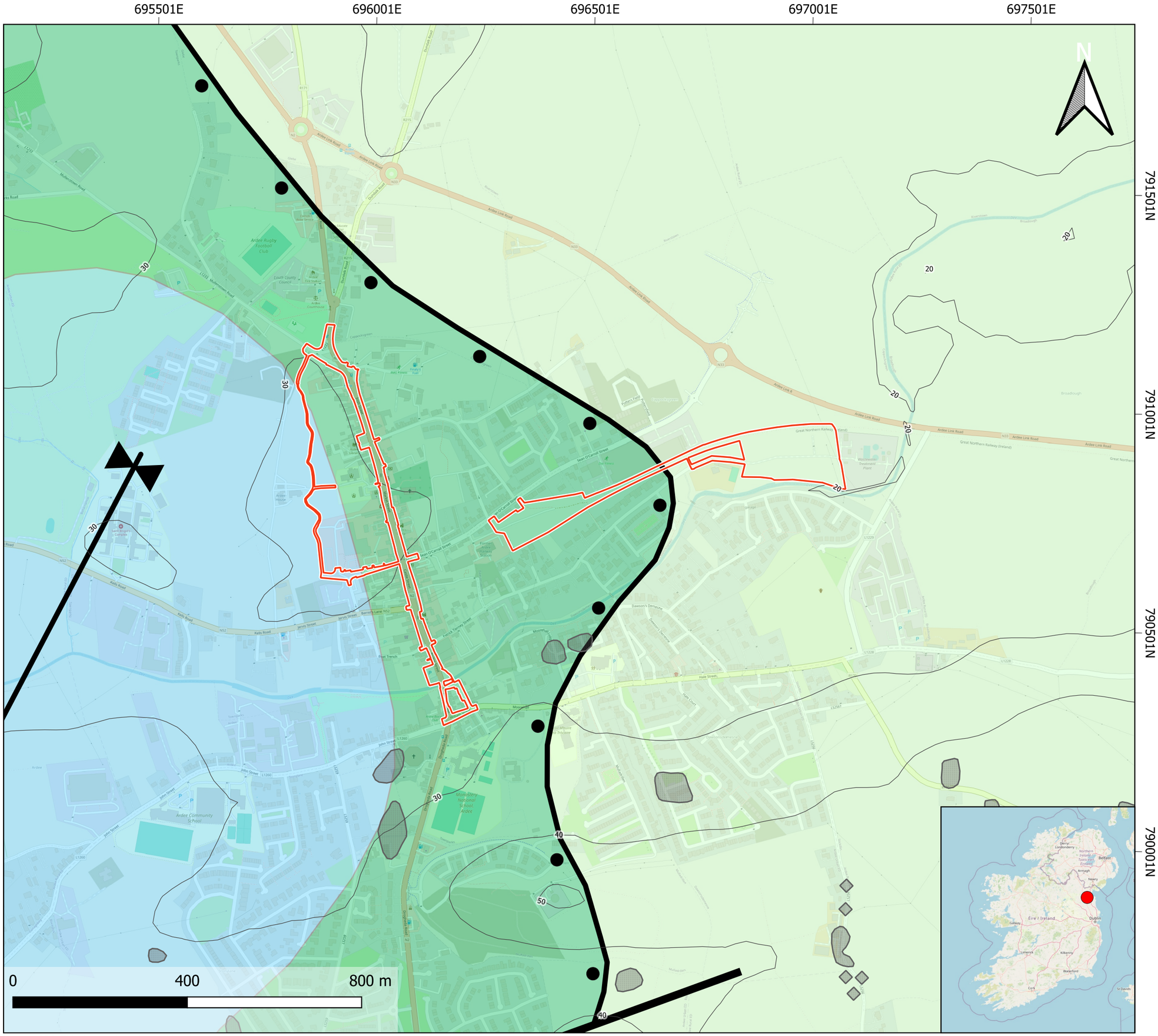
- Cruicetown Group (undifferentiated)
- Navan Beds
- Clontail Formation

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap



Project ID	603902
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Reviewed by	AMcP
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References/Sources:
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Appendix 9.8: Mapped Designated & Protected Areas

App 9.8 Mapped Designated and Protected Areas

Legend

Redline Boundary

Hydrology

WATER_RivNetRoutes

Designated areas

pNHA 2015 (NPWS)

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap

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Appendix 10.1: Site Location Map

App 10.1 Site Location

Legend

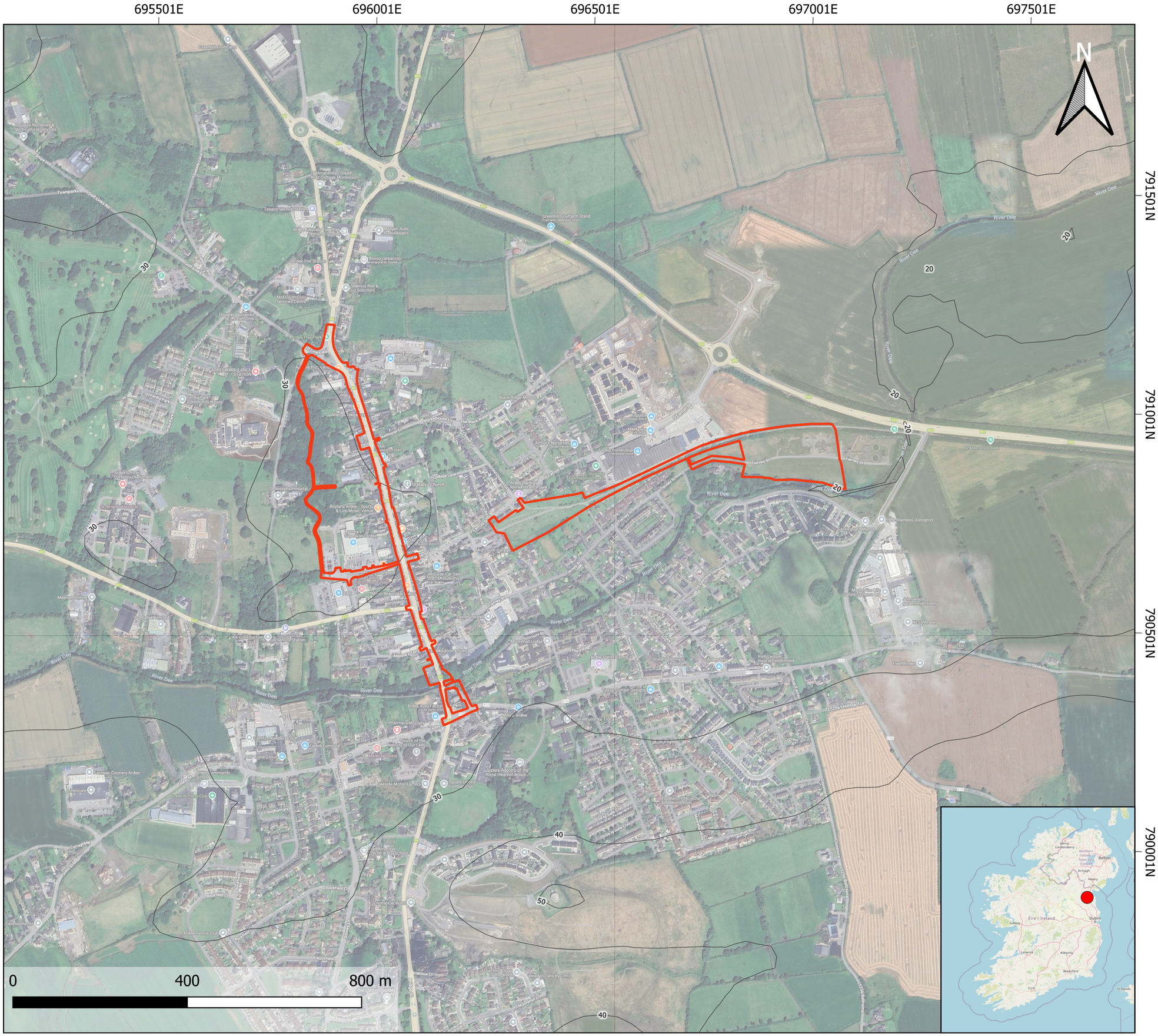
Redline Boundary

Topography

DEM_10m_Contour

Base Layers

Google Satellite Hybrid



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Appendix 10.2 – Photographs of Site Surveying

Turley

Ardee, Co. Louth Drogheda March 31, 2022

Turley

Turley

Turley

Turley

Appendix 10.3: Local and Regional Hydrology

App 10.3 Local and Regional Hydrology

Legend

- Redline Boundary
- SW sampling locations

Watercourse crossings

- Existing
- New

Topography

- DEM_10m_Contour

Hydrology

- WATER_RivNetRoutes
- WFD_Subcatchments

WFD_RiverSubBasins

- DEE_060
- DEE_070
- DEE_080

Base Layers

OpenStreetMap

Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
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Reviewed by	AMcP
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References/Sources:
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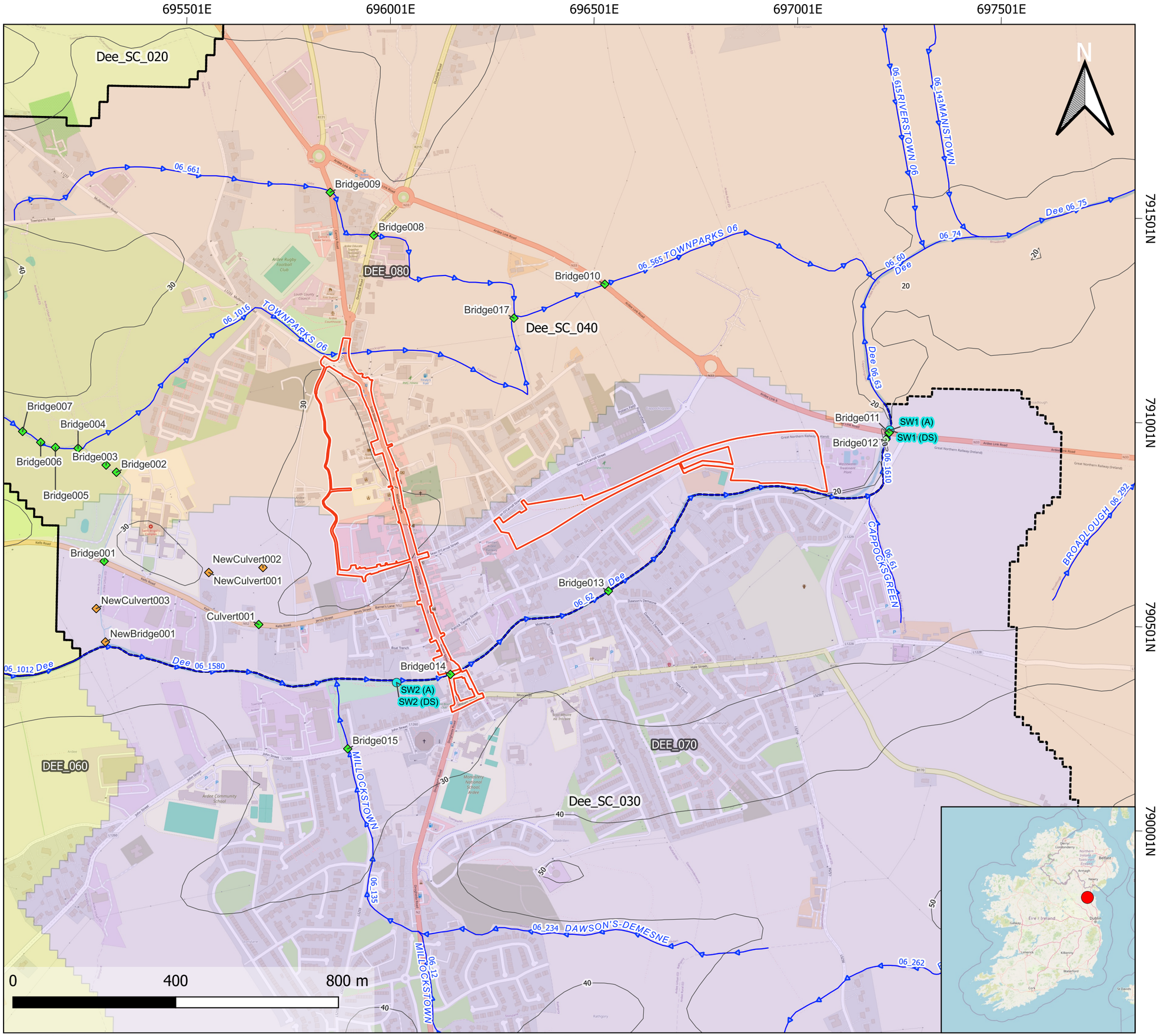

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Appendix 10.4: Surface Water Sampling Locations

App. 10.4 Surface Water Sampling Locations

Legend

Project Data

- Redline Boundary
- Sampling Water Locations

Constraints

Hydrology

- River Waterbodies Cycle 3 (EPA)
- River SubBasins Cycle 3 (EPA)
- Subcatchments (EPA)

Base Layers

- GDEM 10 m Contours

Google Satellite

OpenStreetMap

Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
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Drawn by	CCa
Reviwed by	MK
Version	11/01/2024

References/Sources:
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Appendix 10.5: Groundwater Aquifer Vulnerability

App 10.5 Groundwater Aquifer Vulnerability

Legend

Redline Boundary

Hydrogeology

Groundwater Vulnerability 40K (GSI)

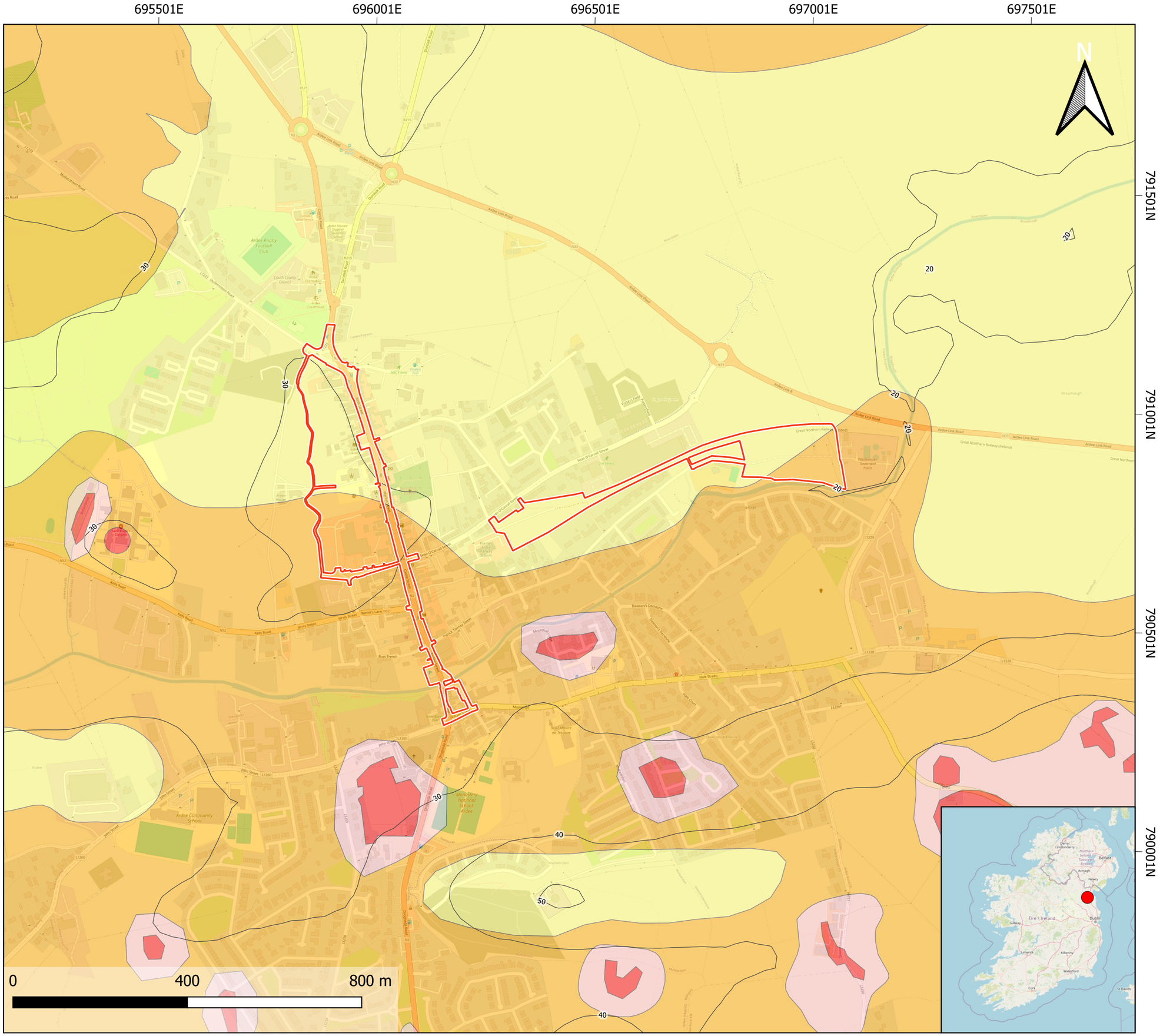
- Rock at or near Surface or Karst (X)
- Extreme (E)
- High (H)
- Moderate (M)

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap



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Appendix 10.6: Surface Water WFD Status

App. 10.6 Surface Water WFD Status

Legend

Project Data

Redline Boundary

Constraints

Hydrology

WDF Status 2016-2021 Active (EPA)

River Waterbodies

Good

Moderate

Ground Waterbodies

Good

Base Layers

GDEM 10 m Contours

Google Satellite

OpenStreetMap

Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
Drawn by	CCa
Reviwed by	MK
Version	11/01/2024

References/Sources:
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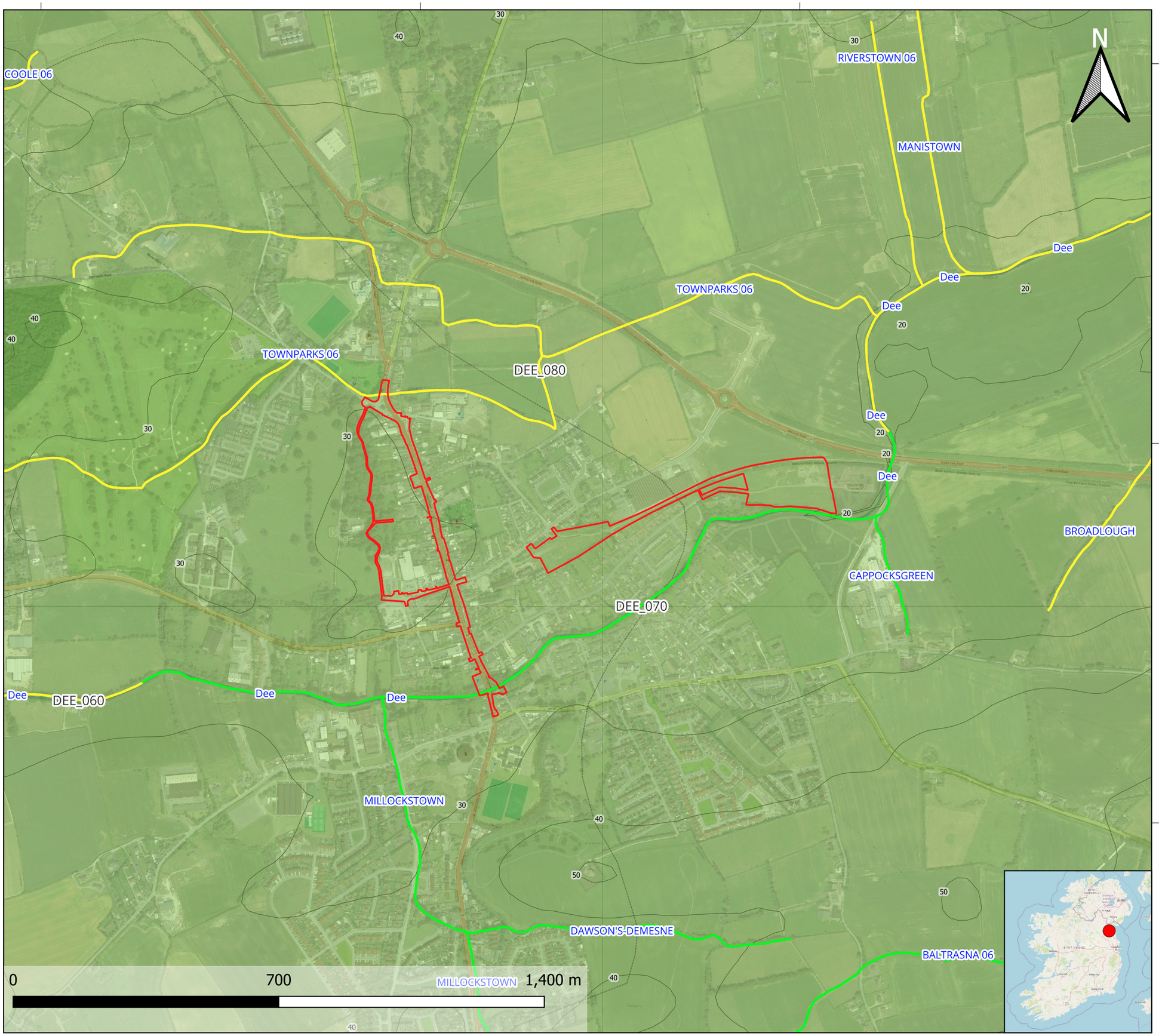
Geological Services Ireland (GSI)
Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)

RSK



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Appendix 10.7: Mapping Designated and Protected Areas

App 10.7 Mapped Designated and Protected Areas

Legend

Redline Boundary

Hydrology

WATER_RivNetRoutes

Designated areas

pNHA 2015 (NPWS)

Topography

DEM_10m_Contour

Base Layers

OpenStreetMap

Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
Drawn by	DW
Reviewed by	AMcP
Version	09/05/2025

References/Sources:
Environmental Protection Agency (EPA)
Geological Survey Ireland (GSI)
Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)

Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design puporses.

Appendix 10.8: Development Constraints

App 10.8 Development Constraints

Legend

- Redline Boundary
- SW sampling locations

Watercourse crossings

- Existing
- New

Topography

- DEM_10m_Contour

Hydrology

- WATER_RivNetRoutes
- Surface Water 50m Buffer
- WFD_Subcatchments
- WFD_RiverSubBasins

Designated areas

- pNHA 2015 (NPWS)

Hydrogeology

- Public Water Supply Source Protection Areas (GSI)
- Wells10to50
- Wells1km_500B

IE_GSI_Karst_Landforms_40K_IE32_ITM

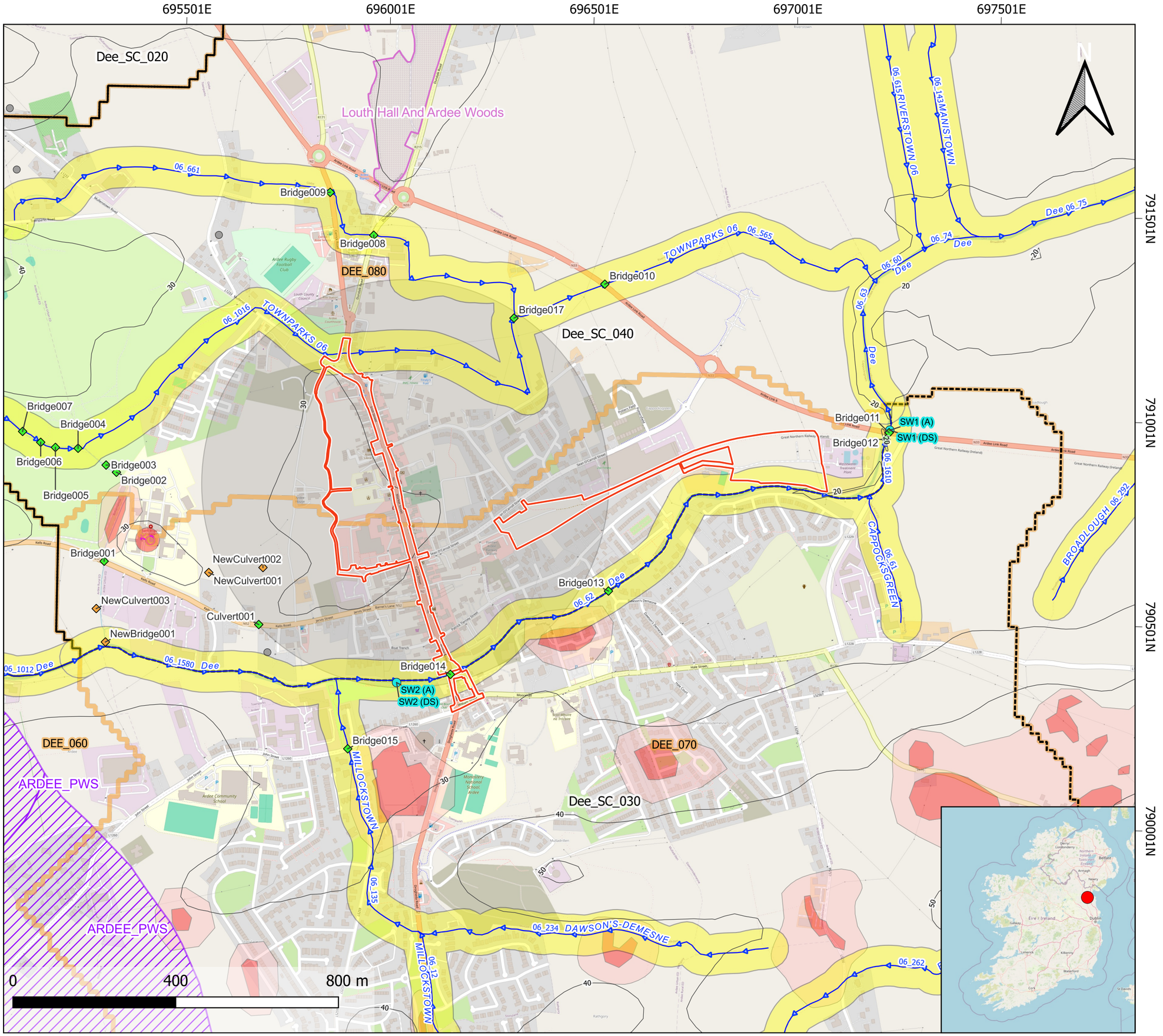
- Borehole

Groundwater Vulnerability 40K (GSI)

- Rock at or near Surface or Karst (X)
- Extreme (E)

Base Layers

OpenStreetMap



Project ID	603902
Project Name	Stage 2 Ardee 2040 Turley
Projection	ITM
Drawn by	DW
Reviewed by	AMcP
Version	09/05/2025

References/Sources:
Environmental Protection Agency (EPA)
Geological Survey Ireland (GSI)
Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)

RSK

Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design puporses.

Appendix 10.9: Surface Water Baseline Database and Laboratory Certificates

Appendix 10.9 - Surface Water Database

Sample Details		LIMITS re EIA (Ref. NRA) Indicative Limits Re.: Bathing, Drinking Surface Water reg's.				
Sample ID			SW1 (A)	SW2 (A)	SW1 (DS)	SW2 (US)
Project COC Reference			603123 SW (DS)	603123 SW (US)	603123 SW (DS)	603123 SW (US)
Sample Type	*Medum*		Surface Water	Surface Water	Surface Water	Surface Water
Date Sampled	*dd/mm/yyyy*		31-Mar-22	31-Mar-22	10-May-22	10-May-22
Grid Reference for Sampling Location	*ITM*		662985.586, 5970688.588	661795.92, 5970028.86	662985.586, 5970688.588	661795.92, 5970028.86
Field Data Discharge Data						
Surface Water Feature	*Type*		River	River	River	River
Description of sample location	*Type*		Downstream	Upstream	Downstream	Upstream
Tidal Status			High Tide	HIgh Tide	Low/Mid Tide	Low/Mid Tide
Colour			None	None	None	None
Odour			None	None	None	None
pH	*pH Units*	>6 & <9	7.47	7.53	8.16	8.26
Conductivity	*mS/cm*	2.5	6.51	6.93	677	624
Temperature	*deg. C*	21.5	10.4	10.7	15.1	15.6
Laboratory data						
Conductivity @ 20 deg.C	*mS/cm*	2.5	0.61	0.59	0.55	0.58
pH	*pH Units*	>6 & <9	8.2	8.1	8.3	8.2
Carbon, Organic (diss.filt)	*mg/l*		4.6	4.7	5.3	5.3
Ammoniacal Nitrogen as N (low level)	*mg/l*	0.02	**1.6**	**1.6**	**0.42**	**0.37**
Nitrate as NO3	*mg/l*		8.2	16	14	14
Nitrite as NO2	*mg/l*	0.05	0.036	0.059	**0.094**	**0.1**
Nitrogen, Kjeldahl	*mg/l*		18	11	<1.0	<1.0
Suspended solids, Total	*mg/l*	25	**67**	**43**	**26**	**94**
Turbidity	*ntu*		<1.0	<1.0	**3.1**	**7.1**
Copper (diss.filt)	*µg/l*	5	2.4	2	2.5	1.8
Phosphorus (diss.filt)	*µg/l*		21	28	<0.020	<0.020
Zinc (diss.filt)	*µg/l*		**95**	<2.5	<2.5	4.9
Copper (tot.unfilt)	*µg/l*	2000	2.5	2	3.1	2.5
Hardness, Total as CaCO3 unfiltered	*mg/l*		320	310	290	280
Phosphorus (tot.unfilt)	*µg/l*		0.021	0.029	<0.020	<0.020
Zinc (tot.unfilt)	*µg/l*	30	<2.5	<2.5	0.01	0.0058
TPH / Oil & Greases	*mg/l*	No Impact on Fish	<0.01	<0.01	<0.01	<0.01

Note/s:

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	22-12907-1		
Initial Date of Issue:	20-Apr-2022		
Client	RSK Ireland		
Client Address:	Unit B, Bluebell Business Centre Old Nass Road Dublin 12 IRELAND		
Contact(s):	Sven Klinkenbergh Colleen McClung		
Project	603123 - Ardee		
Quotation No.:	Q22-26937	**Date Received:**	06-Apr-2022
Order No.:	P2022192	**Date Instructed:**	06-Apr-2022
No. of Samples:	2		
Turnaround (Wkdays):	5	**Results Due:**	12-Apr-2022
Date Approved:	12-Apr-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Water

Project: 603123 - Ardee

Client: RSK Ireland			**Chemtest Job No.:**		22-12907	22-12907
Quotation No.: Q22-26937			**Chemtest Sample ID.:**		1406185	1406186
			Client Sample ID.:		603123 SW1US	603123 SW1DS
			Sample Type:		WATER	WATER
			Date Sampled:		31-Mar-2022	31-Mar-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	8.1	8.2
Electrical Conductivity	U	1020	µS/cm	1.0	590	610
Suspended Solids At 105C	U	1030	mg/l	5.0	43	67
Colour	N	1050	Hazen unit	1.0	6.0	31
Turbidity	N	1060	NTU	1.0	< 1.0	< 1.0
Alkalinity (Total)	U	1220	mg/l	10	320	270
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	320	270
Ammoniacal Nitrogen	U	1220	mg/l	0.050	1.6	1.2
Nitrite	U	1220	mg/l	0.020	0.059	0.036
Nitrate	U	1220	mg/l	0.50	16	8.2
Phosphorus (Total)	N	1220	mg/l	0.020	0.029	0.021
Orthophosphate as PO4	U	1220	mg/l	0.050	0.086	0.063
Phosphorus (Dissolved)	U	1220	mg/l	0.020	0.028	0.021
Total Hardness as CaCO3	U	1270	mg/l	15	310	320
Copper (Dissolved)	U	1455	µg/l	0.50	2.0	2.4
Zinc (Dissolved)	U	1455	µg/l	2.5	< 2.5	95
Copper (Total)	N	1455	µg/l	0.50	2.0	2.5
Zinc (Total)	N	1455	µg/l	2.5	< 2.5	95
Dissolved Organic Carbon	U	1610	mg/l	2.0	5.5	4.8
Total Organic Carbon	U	1610	mg/l	2.0	4.7	4.6
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10
Total Kjeldahl Nitrogen	N	1340	mg/l	1.0	11	18

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1030	Total Suspended Solids	Total suspended solids	Filtration of a mixed sample through a standard glass fibre filter and determination of the mass of residue retained dried at 105°C.
1050	Colour	Colour	Spetctrophotometry
1060	Turbidity	Turbidity	Spetctrophotometry
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1340	Total Nitrogen in Waters	Total Nitrogen and organic Nitrogen	Persulphate digestion followed by colorimetry.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	22-17641-1		
Initial Date of Issue:	18-May-2022		
Client	RSK Ireland		
Client Address:	Unit B, Bluebell Business Centre Old Nass Road Dublin 12 IRELAND		
Contact(s):	Colleen McClung Sven Klinkenbergh		
Project	603123 - Ardee, Co. Louth Baseline SW Sampling (Round 2)		
Quotation No.:	Q22-26937	**Date Received:**	12-May-2022
Order No.:	COC2-1	**Date Instructed:**	12-May-2022
No. of Samples:	2		
Turnaround (Wkdays):	5	**Results Due:**	18-May-2022
Date Approved:	18-May-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Water

Project: 603123 - Ardee, Co. Louth Baseline SW Sampling (Round 2)

Client: RSK Ireland			**Chemtest Job No.:**		22-17641	22-17641
Quotation No.: Q22-26937			**Chemtest Sample ID.:**		1427480	1427481
Order No.: COC2-1			Client Sample Ref.:		Grab Sample	Grab Sample
			Client Sample ID.:		SW1US	SW1DS
			Sample Location:		River Dee	River Dee
			Sample Type:		WATER	WATER
			Date Sampled:		10-May-2022	10-May-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	8.2	8.3
Electrical Conductivity	U	1020	µS/cm	1.0	580	550
Suspended Solids At 105C	U	1030	mg/l	5.0	94	26
Colour	N	1050	Hazen unit	1.0	21	18
Turbidity	N	1060	NTU	1.0	7.1	3.1
Alkalinity (Total)	U	1220	mg/l	10	290	320
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	290	310
Ammoniacal Nitrogen	U	1220	mg/l	0.050	0.37	0.42
Nitrite	U	1220	mg/l	0.020	0.10	0.094
Nitrate	U	1220	mg/l	0.50	14	14
Phosphorus (Total)	N	1220	mg/l	0.020	< 0.020	< 0.020
Orthophosphate as PO4	U	1220	mg/l	0.050	< 0.050	< 0.050
Phosphorus (Dissolved)	U	1220	mg/l	0.020	< 0.020	< 0.020
Total Hardness as CaCO3	U	1270	mg/l	15	280	290
Copper (Dissolved)	U	1455	µg/l	0.50	1.8	2.5
Zinc (Dissolved)	U	1455	µg/l	2.5	4.9	< 2.5
Copper (Total)	N	1455	µg/l	0.50	2.5	3.1
Zinc (Total)	N	1455	µg/l	2.5	10	5.8
Dissolved Organic Carbon	U	1610	mg/l	2.0	5.3	5.3
Total Organic Carbon	U	1610	mg/l	2.0	5.0	5.1
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10
Total Kjeldahl Nitrogen	N	1340	mg/l	1.0	< 1.0	< 1.0

Test Methods

SOP	Title	Parameters included	Method summary
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1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1030	Total Suspended Solids	Total suspended solids	Filtration of a mixed sample through a standard glass fibre filter and determination of the mass of residue retained dried at 105°C.
1050	Colour	Colour	Spetctrophotometry
1060	Turbidity	Turbidity	Spetctrophotometry
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
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1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection

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I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 11.1: Air Quality and Climate Change Standards

The Air Quality Framework Directive (1996) established a framework under which the European Commission (EC) could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been, or will be set in, subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

The air quality standards (AQSs) in Europe are set in EU directives, the Clean Air for Europe (CAFE) Directive was published in 2008. The CAFE directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011.

The relevant standards for Europe to protect human health are summarised in Table A9.1

Table A9.1: Air Quality Standards Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2)	1 calenda year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calenda year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 calenda year	N/A	20

Local Air Quality Management Review and Assessment Technical Guidance published by the Department for Environment, Food and Rural Affairs (Defra) advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emissions limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of four transboundary pollutants, nitrogen oxides (NO_x), sulphur dioxide (SO_2), volatile organic compounds (VOCs) and ammonia (NH_3), has been in place since April 2005. The data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_x. COM (2013) 920 Final is the "proposal for

a Directive on the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC", which will apply the 2010 NECD limits until 2020 and establish some new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_x, non-methane volatile organic compounds (NMVOC), NH_3, and methane (CH_4). Irelands reduction targets are shown in Table A9.2.

Table A9.2: The reduction targets for Ireland, shown as a percentage reduction from 2005 levels, for four transboundary pollutants (SO2, NOx, VOCs, NH3) and PM2.5

Pollutant	Percentage reduction below 2005 level	
	2020-2029	2030
SO_2	65%	83%
NO_x	49%	75%
VOC	25%	32%
NH_3	1%	7%
$PM_{2.5}$	18%	53%

Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002. For the purpose of the European Union burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998, Ireland agreed to limit the net growth of the six Greenhouse Gases under the Kyoto Protocol to 13% above the 1990 level over the period 2008-2012.

Ireland is also committed to the Paris Agreement, which aims to limit global temperature increase to no more the 2°C above pre-industrial levels, and the "2030 Climate and Energy Policy framework" agreed by the EU, which endorsed a binding EU target of at least a 40% reduction in greenhouse gas emissions by 2030 compared to 1990.

The Government published the Climate Action Plan 2019 (Government of Ireland, 2019). This Plan is "committed to achieving a net zero carbon energy systems objective for Irish society and in the process, create a resilient, vibrant and sustainable country". This Plan sets out policies and measures aimed to help Ireland achieve its decarbonisation goals.

The Government published a draft of the Climate Action and Low Carbon Development Bill in 2021. If ratified, this legislation would put Ireland in a similar position as countries such as the UK and France where legislation to reach net zero GHG emissions by 2050 is in place.

Appendix 11.2: Construction Dust Assessment Methodology

This appendix contains the construction dust assessment methodology to assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM construction dust guidance. The assessment follows the steps recommended in the guidance.

Step 1 and Step 2 methods from the IAQM construction dust guidance are described in this Appendix to assign dust risk categories for each of the construction activities.

Step 1: Screen the requirement for assessment
The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor':
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition
The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- large: total building volume >50,000 m^3, potentially dusty construction material, on-site crushing and screening, demolition activities > 20m above ground level;
- medium: total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10m – 20m above ground level; and
- small: total building volume <20,000 m^3, construction material with low potential for dust release, demolition activities < 10m above ground, demolition during wetter months.

Earthworks
The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- large: total site area >10,000 m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- medium: total site area 2,500 – 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 – 8m in height, total material moved 20,000 – 100,000 tonnes; and
- small: 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 <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- large: total building volume > 100,000 m^3, piling, on site concrete batching;
- medium: total building volume 25,000 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- small: total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- large: > 50 HDV (> 3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;
- medium: 10 – 50 HDV (> 3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and
- small: < 10 HDV (> 3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length < 50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of pm_{10}, the local background concentration; and
- site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A9.3 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A9.4 to A9.6 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A9.3: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	• Users can reasonably expect an enjoyment of a high level of amenity. • The appearance, aesthetics or value of their property would be diminished by soiling. • 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. • Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• 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) • 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 with an international or national designation and the designated features may be affected by dust soiling. • 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. • 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.
Medium	• 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. • The appearance, aesthetics or value of their property could be diminished by soiling. • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Examples include parks and places of work.	• Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for pm10 (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). • Examples include office and shop workers, but will generally not include workers occupationally exposed to pm10, as protection is covered by health and safety at work legislation.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. • Locations with a national designation where the features may be affected by dust deposition. • Example is a site of special scientific interest (sssi) with dust sensitive features.

Low	• The enjoyment of amenity would not reasonably be expected. • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. • 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. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local nature reserve with dust sensitive features.

Table A9.4: Sensitivity of the area to 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 A9.5: Sensitivity of the area to Human Health Impacts

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

	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

* The IAQM guidance recommends a further breakdown of 'medium risk' categories, although these are less conservative and have therefore not been utilised in this assessment.

Table A9.6: Sensitivity of the area to Ecological Impacts

Receptor sensitivity	Dust Emission Magnitude	
	Large	Medium
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A9.7 to A9.9 indicate the method used to assign the level of risk for each construction activity.

Table A9.7: Risk of Dust Impacts from Demolition

Receptor sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table A9.8: Risk of Dust Impacts from Earthworks/Construction

Receptor sensitivity	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 A9.9: Risk of Dust Impacts from Trackout

Receptor sensitivity	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

Appendix 11.3: Traffic Data

Table A9.10 Traffic Data

Link	AADT		
	Baseline 2022	Do Minimum 2027	Do Something 2027*
ATC No.1: N52 (East of St Brigid's Hospital)	6,526	7,259	7,259
ATC No.2: N2 (North of Golf Links Road Junction	14,677	16,315	16,315
ATC No.3: O'Carroll's Street (East of Old Chapels Lane)	3,347	3,736	3,736
ATC No.4: Tiereny Street (East of Tiereny Avenue)	754	836	836
ATC No.5: N2 (South of Monastery National School)	14,536	16,169	16,169
ATC No.6: N2 – Ardee Town Centre	11,333	12,569	12,569
* No change to traffic flows is expected as a result of the proposed development			

Appendix 11.4: DMRB Screening input

Table A9.11: Do Minimum DMRB Screening Input

Link		Distance from link centre to receptor (m)	AADT	Annual average speed (km/h)	Road type	Total % LDV	Total % HDV
R1							
	N2 Castle St	10.3	12569	48	A	88.8	11.2
	O'Carroll's St	5.4	3736	35.5	B	81.3	18.7
R2							
	N2 Castle St	10.3	12569	48	A	88.8	11.2
	N52 Jervis	6.5	7259	56.9	A	85.4	14.6
R3							
	N2 Castle St	10.3	12569	48	A	88.8	11.2
	Tiereny St	3.4	836	56.9	B	89	11

Table A9.12: Do Something DMRB Screening input

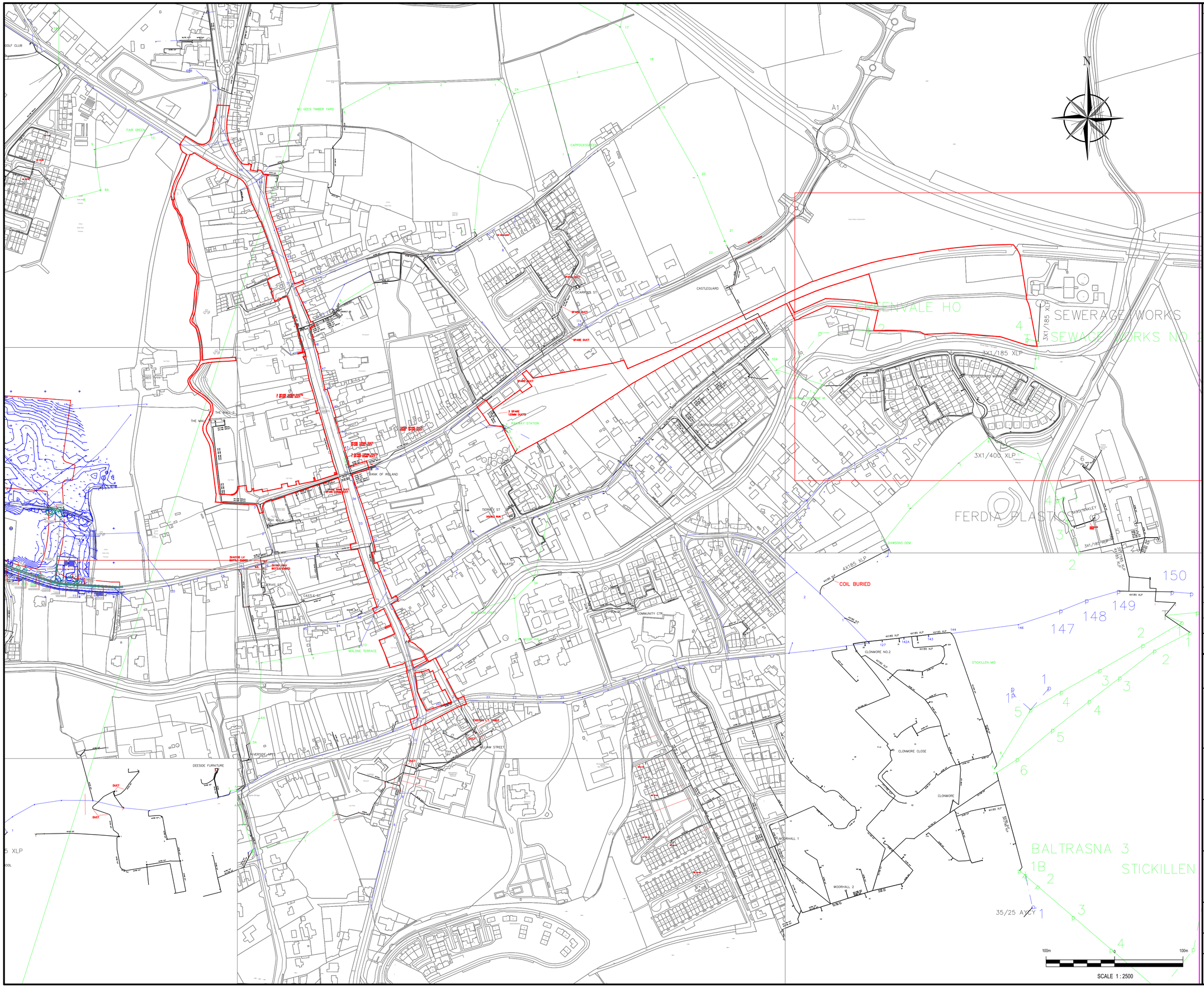
Link		Distance from link centre to receptor (m)	AADT	Annual average speed (km/h)	Road type	Total % LDV	Total % HDV
R1							
	N2 Castle St	10.3	12569	30	A	88.8	11.2
	O'Carroll's St	5.4	3736	35.5	B	81.3	18.7
R2							
	N2 Castle St	10.3	12569	48	A	88.8	11.2
	N52 Jervis	6.5	7259	56.9	A	85.4	14.6
R3							

N2 Castle St	10.3	12569	48	A	88.8	11.2
Tiereny St	3.4	836	56.9	B	89	11

Table A9.13: DMRB Screening Results

Receptor	NO_2 (µg/m^3)			PM_{10} (µg/m^3)		
	DM	DS	Change	DM	DS	Change
R1	22.78	23.79	1.01	14.97	15.32	0.35
R2	25.15	26.13	0.98	15.29	15.64	0.35
R3	20.61	21.63	1.02	14.62	14.97	0.35

Appendix 15.1: Site Service and Utility Drawings Obtained



NOTES

REV	DATE	DESCRIPTION	D	C	A
P02	11/07/2025	RED LINE BOUNDARY UPDATED	PMcD	DR	TF
P01.1	08/09/2021	FIRST ISSUE	PMcD	DR	TF

PROJECT No. 80186

STAGE: FOR INFORMATION

NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park,
Nutgrove Avenue, Dublin 14
T +353 1 296 9000
F +353 1 296 9001
E dublin@nodwyer.com
W www.nodwyer.com

CLIENT

PROJECT: ARDEE

TITLE: ELECTRICAL MV LAYOUT

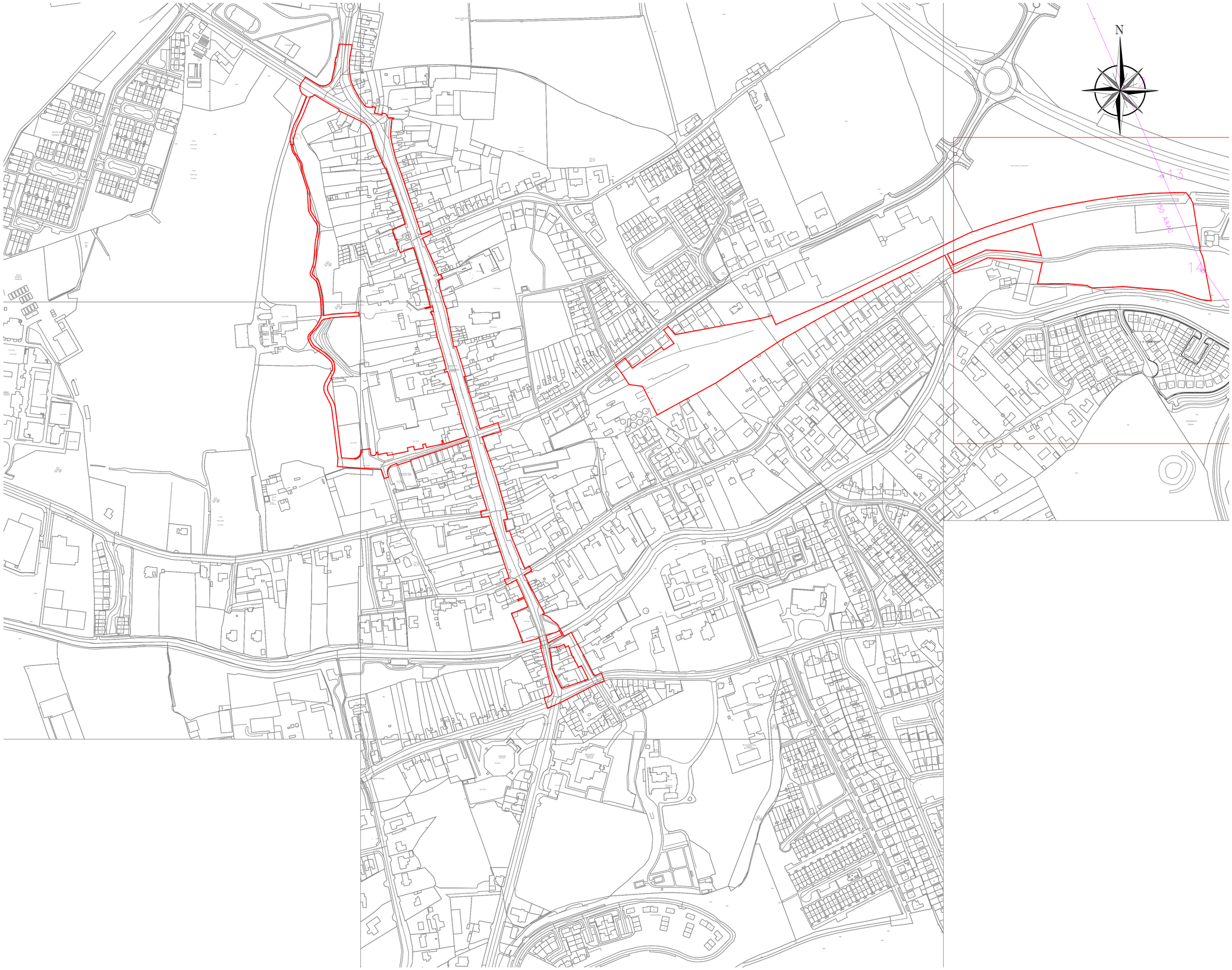
SCALES @ A1	DRAWN	CHECKED	APPROVED
1:2500	JW	DR	TF
	DATE 08/09/21	DATE 08/09/21	DATE 08/09/21

SUITABILITY CODE: S0

SUITABILITY DESCRIPTION: WORK IN PROGRESS

DRAWING No. 80186-NOD-ZZ-ZZ-DR-C-001

REVISION: P02



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REV	DATE	DESCRIPTION	D	C	A
P02	11/07/2025	RED LINE BOUNDARY REVISED	JW	DR	TF
P01.1	08/09/2021	FIRST ISSUE	JW	DR	TF

PROJECT No. 80186

STAGE FOR INFORMATION

NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park,
Nutgrove Avenue, Dublin 14
T +353 1 296 9000
F +353 1 296 9001
E dublin@nodwyer.com
W www.nodwyer.com

CLIENT

PROJECT

ARDEE

TITLE

ELECTRICAL HV LAYOUT

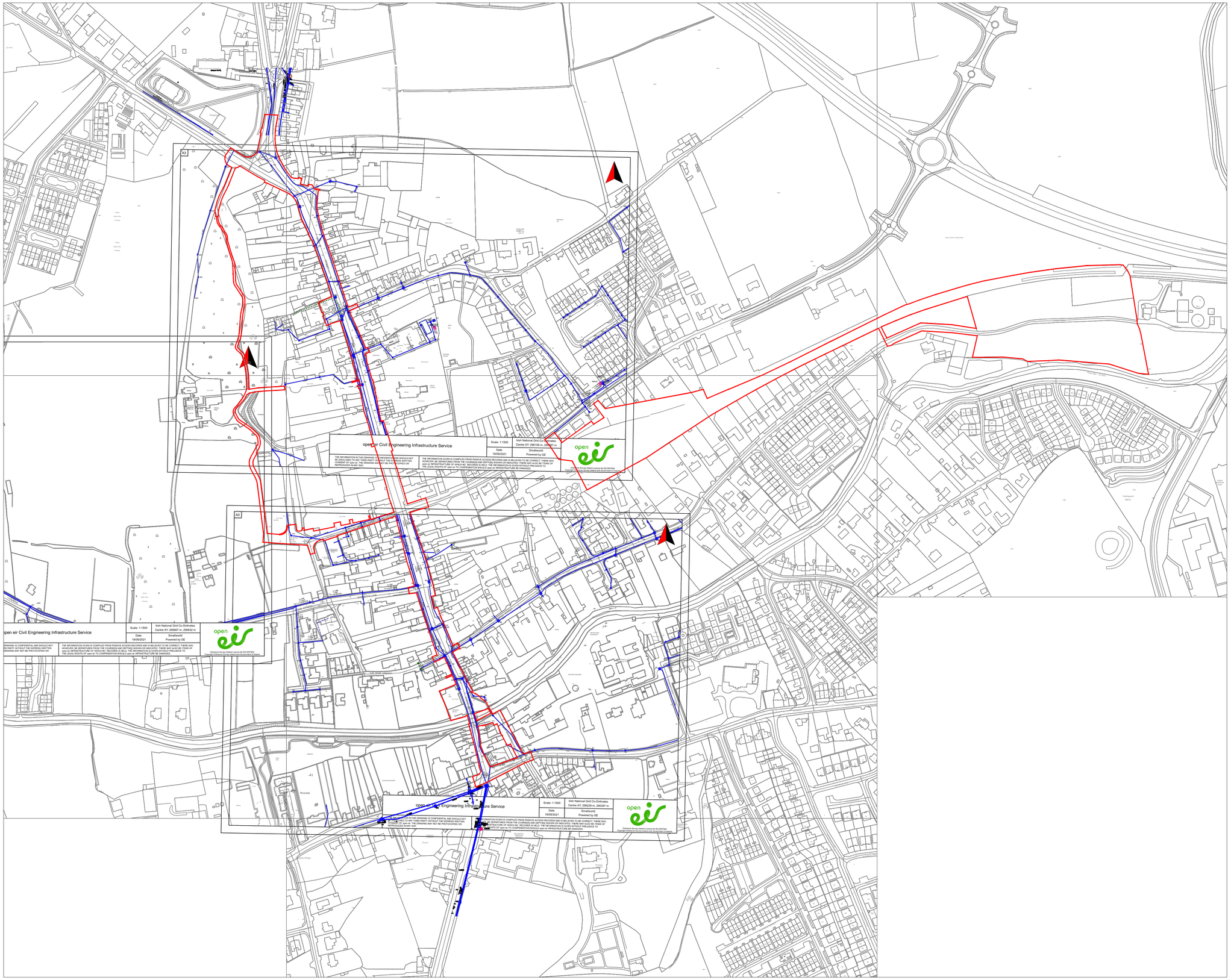
SCALES @ A1	DRAWN	CHECKED	APPROVED
1:2500	JW	DR	TF
	DATE 08/09/21	DATE 08/09/21	DATE 08/09/21

SUITABILITY CODE S0

SUITABILITY DESCRIPTION WORK IN PROGRESS

DRAWING No. 80186-NOD-ZZ-ZZ-DR-C-002

REVISION P02



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REV	DATE	DESCRIPTION	D	C	A
P02	11/07/2025	RED LINE BOUNDARY REVISED	FW	DR	TF
P01.1	08/09/2021	FIRST ISSUE	FW	DR	TF

PROJECT No. 80186

STAGE FOR INFORMATION

NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park,
Nutgrove Avenue, Dublin 14
T +353 1 296 9000
F +353 1 296 9001
E dublin@nodwyer.com
W www.nodwyer.com

CLIENT

PROJECT

ARDEE

TITLE

EIR NETWORK LAYOUT

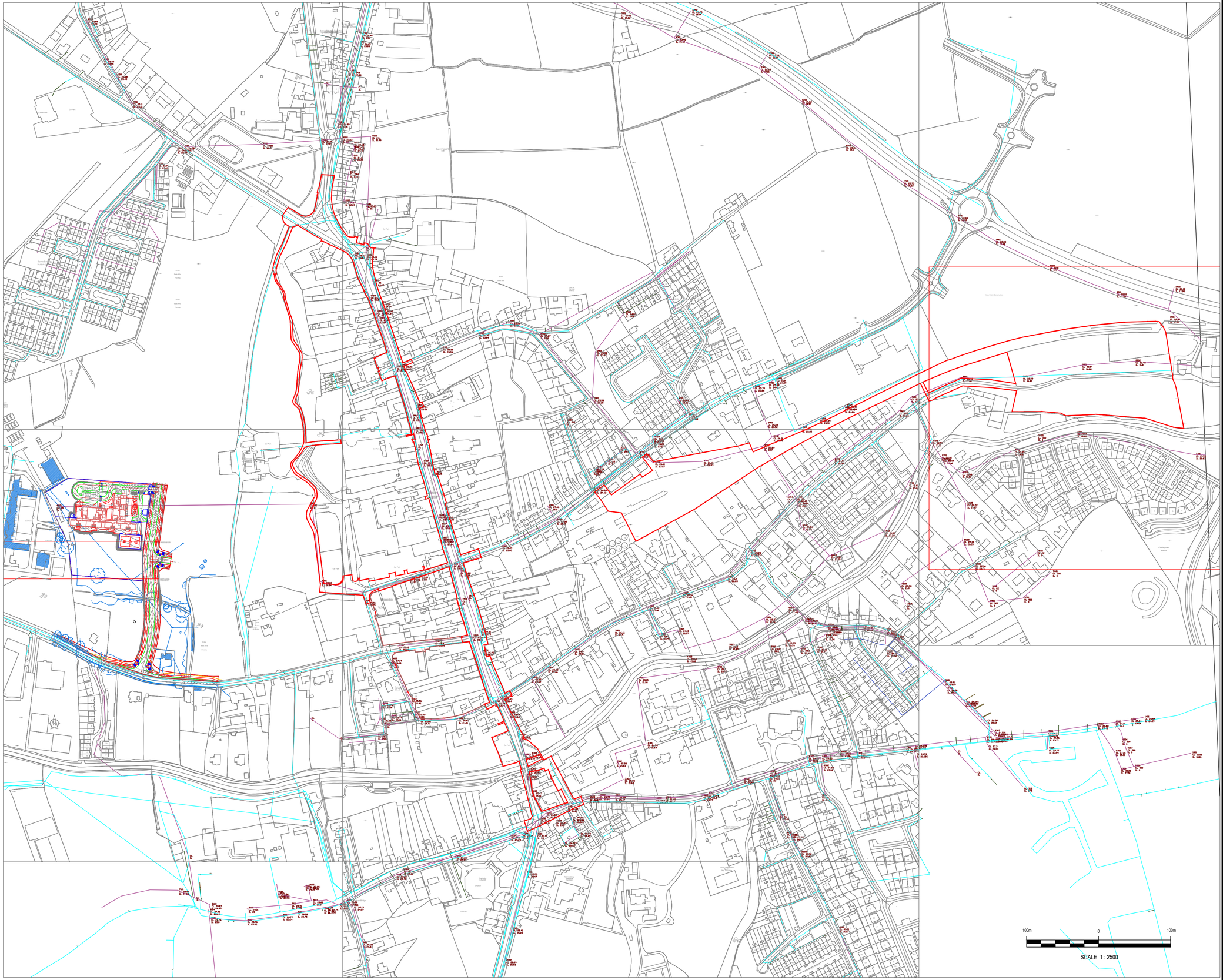
SCALES @ A1	DRAWN	CHECKED	APPROVED
1:2500	JW	DR	TF
	DATE 08/09/21	DATE 08/09/21	DATE 08/09/21

SUITABILITY CODE S0

SUITABILITY DESCRIPTION WORK IN PROGRESS

DRAWING No. 80186-NOD-ZZ-ZZ-DR-C-003

REVISION P02



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REV	DATE	DESCRIPTION	D	C	A
P02	11/07/2025	RED LINE BOUNDARY REVISED	JW	DR	TF
P01.1	08/09/2021	FIRST ISSUE	JW	DR	TF

PROJECT No. 80185

STAGE FOR INFORMATION

NICHOLAS O'DWYER

Unit E4, Nutgrove Office Park,
Nutgrove Avenue, Dublin 14

T +353 1 296 9000
F +353 1 296 9001
E dublin@nodwyer.com
W www.nodwyer.com

CLIENT

PROJECT

ARDEE

TITLE

IRISH WATER NETWORK

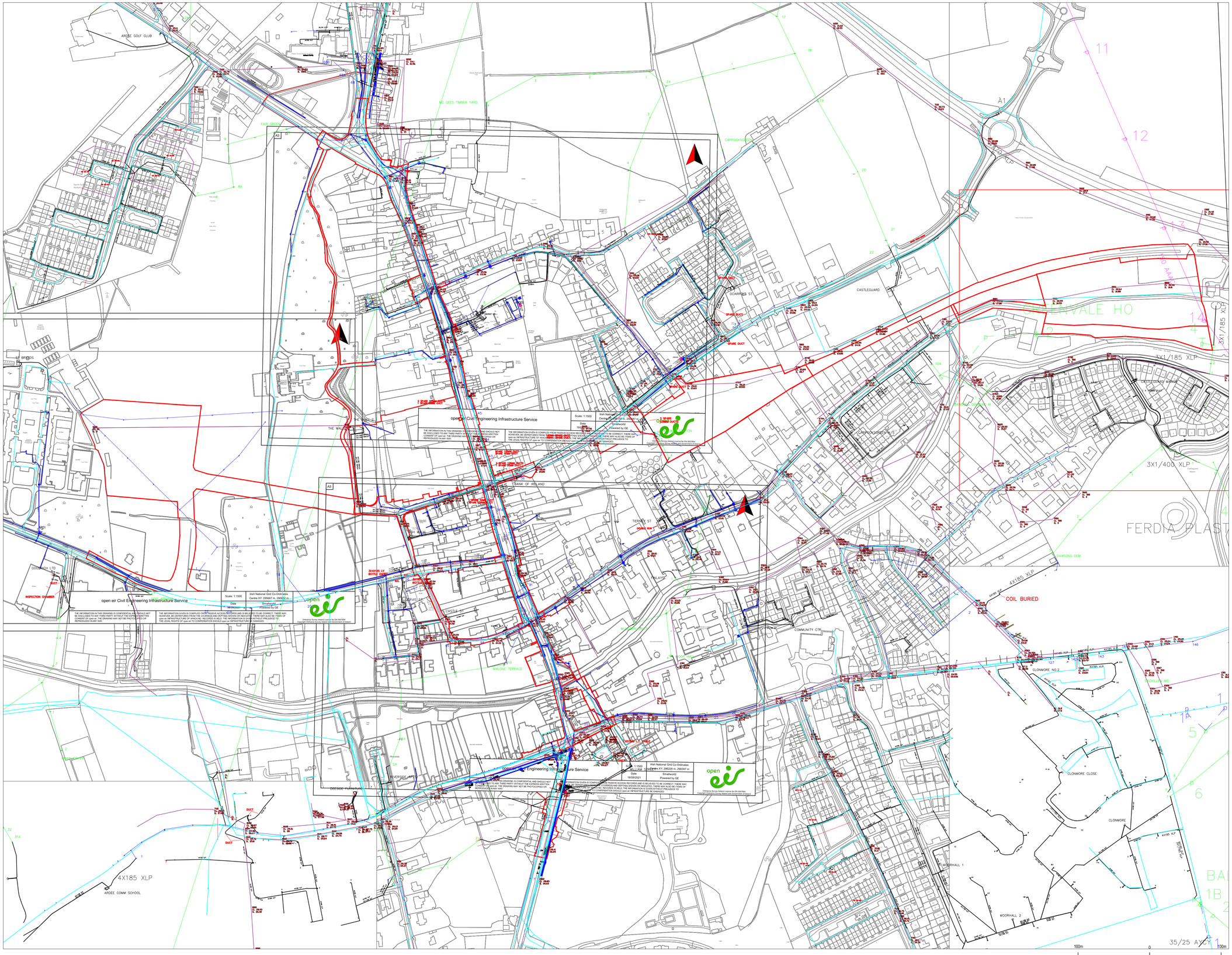
SCALES @ A1	DRAWN	CHECKED	APPROVED
1:2500	JW	DR	TF
	DATE 08-09-2021	DATE 08-09-2021	DATE 08-09-2021

SUITABILITY CODE S01

SUITABILITY DESCRIPTION WORK IN PROGRESS

DRAWING No. 80186-NOD-ZZ-ZZ-DR-C-010

REVISION P02



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NOTES

- EXISTING FOUL SEWER
- EXISTING WATERMAIN
- EXISTING ESB MV DUCTS
- EXISTING ESB HIGH VOLTAGE LINES
- EXISTING EIR DUCTS

REV	DATE	DESCRIPTION	D	C	A
P02	11/07/2025	RED LINE BOUNDARY REVISED	PMcD	DR	TF
P01	13.12.2021	FIRST ISSUE	JW	KMcG	KMcG

PROJECT No. 80186

STAGE: FOR INFORMATION

NICHOLAS O'DWYER
Unit E4, Nutgrove Office Park,
Nutgrove Avenue, Dublin 14
T +353 1 296 9000
F +353 1 296 9001
E dublin@nodwyer.com
W www.nodwyer.com

CLIENT

PROJECT

ARDEE

TITLE

COMBINED SERVICES

SCALES @ A1	DRAWN	CHECKED	APPROVED
1:2500	JW	KMcG	KMcG
	DATE 08/09/21	DATE 08/09/21	DATE 08/09/21

SUITABILITY CODE: S0

SUITABILITY DESCRIPTION: WORK IN PROGRESS

DRAWING No. 80186-NOD-ZZ-ZZ-DR-C-100

REVISION P02

Appendix 16.1: SMR/RMP Sites within the Surrounding Area

SMR No.	LH017-101
RMP Status	Scheduled for inclusion
Townland	Cappocks Green, Dawsons Demesne, Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696093 790636
Classification	Historic town
Dist. From Development	Within the scheme
Description	Currently the information for this record has not been uploaded.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101001
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696031 790914
Classification	Town defences
Dist. From Development	Within the scheme
Description	Currently the information for this record has not been uploaded. This record refers to the subsurface remains relating to the circuit of medieval town defences which form a U-shape around the town leading up to the banks of the River Dee at each terminus. There is no above-ground evidence for the walls today however the line is fossilised by the property boundaries. At least five gates are associated with the defences, Head Gate, Bridge Gate, Ash Walk Gate, Blind Gate, and Cappock's Gate.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101023
RMP Status	Scheduled for inclusion

Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696041 790765
Classification	Midden
Dist. From Development	Within the scheme
Description	A range of medieval kitchen middens is referred to (CLAJ 1928, 255) as having been found just inside the W footpath along Church Hill at Market Street. No archaeological investigation of the site was undertaken.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101018
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696142 790509
Classification	Castle - tower house
Dist. From Development	c. 5m east
Description	('The Courthouse') Almost rectangular in plan with westward-projecting towers at the NW and SW angles, it is constructed of roughly coursed limestone blocks, boulders and greywacke. It is four storeys high, has been modernised and is still occupied. The area between the westward-projecting towers has been filled with a two-storey modern addition through which the present entrance passes. The original doorway, which is constructed of hammer-dressed and chamfered limestone and has a two-centred arch, is situated in the N wall close to the NW angle. There is a murder hole behind the doorway in the passage area which leads to a large N-S barrel vault and to the stairwell which is situated in the NW angle-tower. There are garderobes at first-, second- and third-floor levels in recesses in the SE angle-tower which projects very slightly eastwards. Most of the original windows have been replaced except for those at third-floor level and in the projecting towers. A large ogee-headed ope, now blocked up, can be seen in the S wall at second-floor level, a twin-light cusped ogee-headed window in the E wall of the ground floor, and some plain slits at various levels, now blocked. All of the remaining original windows that are still open are constructed of hammer-dressed limestone and have ogee heads
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101015
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696082 790703
Classification	Castle - tower house
Dist. From Development	c. 6m east
Description	Known as 'Hatch's Castle', four storeys high and sub-rectangular in plan, it is constructed of uncoursed limestone rubble and greywacke. It is lived in and has been thoroughly modernised leaving little evidence of the original doors or windows. It has projecting towers at the SE and SW angles which are rounded, as are those at the NW and NE. Access to the castle is now through the modern doorway in the centre of the W wall but the original entrance was at the E end of the S wall. This gave access to the stairwell, which was in the SW angle-tower, and to the barrel-vaulted area of the ground floor. The doorway to the stairwell has a two-centred arch and is constructed of hammer-dressed limestone. The steps have been removed from the level between the ground floor and the first floor but are intact in the upper portions of the tower. There are garderobes at first- and second-floor levels in the NE angle-tower and the remains of one can be seen in the short mural passage at the second level. The second and third floors were wooden and were carried on corbels, but little remains of the original internal medieval features. At wall-walk level there is a projection in the centre of the N wall which rises above the parapet level and contains the chimney flues. The SW angle-tower, which rises above the level of the battlements, had a second storey to which access was gained by steps inserted into the N parapet wall. The wall and the top of the SW angle are crenellated but these are of recent origin. (Bradley 1984a, 275-9; Murtagh 1982, 66-72)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101032
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696227 790333

Classification	Burial
Dist. From Development	c. 18m south
Description	Disturbed human remains discovered in November 1946 underneath the floor of a grain store (Cahill and Sikora 2011, vol. 2, 496)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101028
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696061 790846
Classification	Building
Dist. From Development	c. 23m east
Description	Currently the information for this record has not been uploaded.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101029
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696183 790464
Classification	Building
Dist. From Development	c. 27m east
Description	Currently the information for this record has not been uploaded.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101009
RMP Status	Scheduled for inclusion

Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696087 790799
Classification	Churchyard cross
Dist. From Development	c. 36m east
Description	Fragment of cross discovered in the grounds of St Mary's Church and erected on a concrete base and shaft. All that remains is part of a limestone disc head with one arm. The other arm, the top, the shaft and base are missing. A simple Crucifixion scene with canopy over is on the W face, the other side having a depiction of the Virgin and Child under an ogee-headed canopy. The cross, according to King (1983, 213), probably dates to the sixteenth century. (CLAJ 1943, 203, pl. I; King 1983, 210-14)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101010
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696086 790784
Classification	Font
Dist. From Development	c. 36m east
Description	A rectangular font of limestone (H 0.47m; Wth 0.6m; T 0.58m; internal diam 0.43m; internal D 0.2m). Originated in Mansfieldstown and is now located at the W end of the nave of St. Mary's church (LH017-101007-). Decorated at one angle with a biting beast's head and at the other three with a foliate design. Between the decorated angles chisel marks cover the plain surfaces. It is probably late medieval in date. (Bradley 1984, 284)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101013
RMP Status	Scheduled for inclusion
Townland	Townparks

Parish	Ardee
Barony	Ardee
I.T.M.	696085 790806
Classification	Architectural fragment
Dist. From Development	c. 38m east
Description	There is a crudely rounded granite fragment (H 0.36m; Wth 0.77m; D 0.3m) of a voussoir on the ground behind the N side of the W façade of St. Mary's Church. Beside the voussoir fragment, and almost completely buried in the ground, there is what appears to be a hexagonal granite piscina. (Bradley and King 1985, 26)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-106
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	697095 790986
Classification	Fulacht fia
Dist. From Development	c. 45m northeast
Description	Discovered prior to road construction (Excavation Licence No. 99E0458). Situated to the W of the River Dee. Consisted of an arc of burnt stones and charcoal-rich soil (max. L 6.6m; max. Wth 2.3m). Within this arc was a sub-rectangular concentration (1.15m x 0.75m) of similar material. Both deposits were no more than 0.8m in thickness. Excavation revealed a possible hearth below the sub-rectangular concentration but there was no evidence of a trough. The only artefact recovered was a waste flint flake from the arc of burnt material. (Seaver 2000, 188)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101007
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee

Barony	Ardee
I.T.M.	696107 790788
Classification	Church
Dist. From Development	c. 50m east
Description	The medieval remains incorporated into the present St Mary's Church of Ireland building are probably those of a church founded as a parish church at the beginning of the thirteenth century. The present structure consists of a nave, chancel, S aisle and tower. Two religious houses are recorded in Ardee, the Hospital of St John the Baptist (Fratres Cruciferi) established in 1207 and the Carmelite friary from later in the thirteenth century (Bradley 1984a, 285). According to Bradley (1984a, 283-5), the present remains are not on the site of either foundation. Grose (1791, pl. 41) illustrates the building prior to its reconstruction in 1812, and although it is obviously inaccurate in some respects his drawing clearly shows a ruined tower at the W, a vaulted ground floor, and only the upper storeys of the E wall remaining, with windows at the belfry and ringing stages. The nave was gabled and roofed while the north aisle was unroofed, had a doorway with a round-headed arch and three large rectangular window opes. The only obvious medieval remains now are the arcade of four arches which divides the nave from the S aisle, a piscina incorporated in the pier near the altar, and a recess with stairway in the E gable which led to the loft over the rood screen. A portion of the medieval tower probably survives within the modern structure but this is not obvious. E of the present chancel is a very ruined building which may be the remains of the medieval chancel, or at least indicate its original plan.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101012
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696108 790779
Classification	Graveslab
Dist. From Development	c. 51m east
Description	Two gravemarkers in St. Mary's graveyard (LH017-101025-). One to William Hynes is possibly of seventeenth century date. It is a limestone slab (H 0.6m, Wth 0.38m, T 0.05m), gabled on top with an incised Celtic cross and a small Latin cross on top of the circle. To the E of the church (LH017-101007-) there is a gravemarker (LH017-101027-) of uncertain date set in the ground. It is a crude

	limestone slab (H 0.8m, Wth 0.4m) with an incised Latin cross. (Bradley and King 1985, 26)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101027
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696108 790779
Classification	Graveslab
Dist. From Development	c. 52m east
Description	Two gravemarkers in St. Mary's graveyard (LH017-101025-). One to William Hynes (LH017-101012-) is possibly of seventeenth century date. It is a limestone slab (H 0.6m, Wth 0.38m, T 0.05m), gabled on top with an incised Celtic cross and a small Latin cross on top of the circle. To the E of the church (LH017-101007-) there is a gravemarker (LH017-101027-) of uncertain date set in the ground. It is a crude limestone slab (H 0.8m, Wth 0.4m) with an incised Latin cross. (Bradley and King 1985, 26)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101025
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696116 790812
Classification	Graveyard
Dist. From Development	c. 63m east
Description	Associated with St Mary's church which contains fragments of an earlier structure probably dating to the beginning of the thirteenth century (LH017-101007-). Rectangular shaped area (map dims.: max. Wth 92m; max. L 80m) with church in S half. At least two gravemarkers of pre-1700 date noted (LH017-

	101011- and LH017-101026-) along with a number of architectural fragments (LH017-101013-).
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101008
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696121 790794
Classification	Building
Dist. From Development	c. 64 east
Description	To the E of the present chancel of St Mary's Church of Ireland is a very ruined building which may be the remains of the chancel of a medieval church (LH017-101007-), or at least indicate its original plan. (Davies and Tempest 1943, 200-3; Bradley and King 1985, 25)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101034
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696192 790643
Classification	Excavation - miscellaneous
Dist. From Development	c. 66m west
Description	Archaeological test excavations carried out in 2003, prior to construction of an extension to the Girl Guides premises in O'Carroll Street (Excavation Licence No. 03E0753), uncovered two pits and a ditch all of which contained animal bone and medieval pottery. (Duffy 2006, 324)
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-009
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	695803 790541
Classification	Castle - tower house
Dist. From Development	c. 67m south
Description	Situated outside the town walls of Ardee, and constructed of roughly coursed limestone blocks, boulders and greywacke. It is almost square in plan (c. 8.8m N-S, c. 8m E-W) with no projecting towers, is three storeys high and is now used as a farm building. The original doorway is at the S end of the E wall. Its arch is missing but the original jambs of hammer-dressed limestone remain in position. The doorway leads to the stairwell in the SE angle and a N-S barrel vault. The barrel vault was lit by an ope almost in the centre of the S wall, now blocked, and another, also blocked, at the N end of the W wall. There are seven cubby-holes in the wall at ground-floor level and a large round arched recess in the E. In the W wall both at first- and second-floor levels there is a rectangular window constructed of hammer-dressed and chamfered limestone.
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101026
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696117 790813
Classification	Graveslab
Dist. From Development	c. 68m east
Description	The oldest noted grave-slabs in the graveyard at St. Mary's (LH017-101025-) are those of Thomas Smart, dated 1683 and Mary Hatch dated 1695 (LH017-101026).
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101011
RMP Status	Scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696111 790807
Classification	Graveslab
Dist. From Development	c. 68m east
Description	The oldest noted grave-slabs in the graveyard at St. Mary's (LH017-101025-) are those of Thomas Smart, dated 1683 and Mary Hatch dated 1695 (LH017-101026).
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101030
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696308 790579
Classification	Kiln - pottery
Dist. From Development	c. 91m southwest
Description	-
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101031
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696308 790579
Classification	Kiln - pottery

Dist. From Development	c. 91m southwest
Description	-
Reference	www.archaeology.ie/ SMR file

SMR No.	LH017-101033
RMP Status	Not scheduled for inclusion
Townland	Townparks
Parish	Ardee
Barony	Ardee
I.T.M.	696183 790763
Classification	Building
Dist. From Development	c. 98m northwest
Description	An excavation at the former Ardee Credit Union site in 2003 (Excavation Licence No. 03E0058) revealed a continuous sequence of occupation from the 13th to the 20th century. Two timber buildings represented the first phase of occupation above which lay series of different buildings. A boundary ditch, a cobbled surface, refuse pits and sand and gravel extraction pits all dating to the medieval period were uncovered. All features were removed with the exception of a medieval cesspit which is preserved in situ beneath a suspended ground-beam. (Clutterbuck 2006, 322-4)
Reference	www.archaeology.ie/ SMR file

Appendix 16.2: Topographical Files of the National Museum

Museum No	-
Townland	Townparks
Parish	Ardee
Barony	Ardee
Find	Tomb
Find Place	St Marys R.C. Church
Description	Tomb (Medieval)
Reference	NMI Topographical Files

Museum No	IA/57/59
Townland	Townparks
Parish	Ardee
Barony	Ardee
Find	Bones
Find Place	Bridge Street
Description	Human and animal bones
Reference	NMI Topographical Files

Museum No	1979:111-118
Townland	Townparks
Parish	Ardee
Barony	Ardee

Find	Metal and flint
Find Place	Golf Links Road
Description	Metal Slag (:111); 7 Waste Flints (:112-8)
Reference	NMI Topographical Files

Museum No	-
Townland	Townparks
Parish	Ardee
Barony	Ardee
Find	Stone
Find Place	Kells Road
Description	Decorated upper stone of rotary quern
Reference	NMI Topographical Files

Appendix 16.3: Legislation Protecting the Archaeological Resource

PROTECTION OF CULTURAL HERITAGE
The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997.

THE ARCHAEOLOGICAL RESOURCE
The National Monuments Act 1930 to 2014 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

OWNERSHIP AND GUARDIANSHIP OF NATIONAL MONUMENTS
The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

REGISTER OF HISTORIC MONUMENTS
Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

PRESERVATION ORDERS AND TEMPORARY PRESERVATION ORDERS
Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

RECORD OF MONUMENTS AND PLACES
Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Housing, Local Government and Heritage) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s

showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the European Communities (Environmental Impact Assessment) Regulations 1989, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

THE PLANNING AND DEVELOPMENT ACT 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Louth County Development Plan, 2021-2027

Policy Objectives:

BHC 1 To protect and enhance archaeological sites and monuments, underwater archaeology, and archaeological objects listed in the Record of Monuments and Places (RMP), and/or the Register of Historic Monuments and seek their preservation (i.e. presumption in favour of preservation in situ or in exceptional cases, at a minimum, preservation by record) through the planning process and having regard to the advice and recommendations of the National Monuments Service of the Department of Housing, Local Government and Heritage and the principles as set out in the 'Framework and Principles for the Protection of the Archaeological Heritage' (Department of Arts, Heritage, Gaeltacht and the Islands 1999).

BHC 2 To protect the built heritage assets of the county and ensure they are managed and preserved in a manner that does not adversely impact on the intrinsic value of these assets whilst supporting economic renewal and sustainable development.

BHC 3 To protect known and unknown archaeological areas, sites, monuments, structures and objects, having regard to the advice of the National Monuments Services of the Department of Housing, Local Government and Heritage.

BHC 4 To promote awareness and knowledge of the archaeological resources of the County and support initiatives where appropriate that provide better access to the historic built environment.

BHC 5 To protect all sites and features of archaeological interest discovered subsequent to the publication of the Record of Monuments and Places (i.e. preservation in situ or in exceptional circumstances, at a minimum preservation by record) having regard to the advice and recommendations of the National Monuments Section of the Department of Housing, Local Government and Heritage.

BHC 6 To ensure any development, either above or below ground, adjacent to or in the immediate vicinity of a recorded monument or a Zone of Archaeological Potential (including formerly walled towns) shall not be detrimental to or detract from the character of the archaeological site or its setting and be sited and designed to protect the monument and its setting. Where upstanding remains exist, a visual impact assessment may be required.

BHC 7 To require applicants seeking permission for development within Zones of Archaeological Potential and other sites as listed in the Record of Monuments and Places to include an assessment of the likely archaeological potential as part of the planning application and the Council may require that an on-site archaeological assessment is carried out by trial work, prior to a decision on a planning application being taken.

BHC 8 To protect and preserve in situ all surviving elements of medieval town defences (both upstanding and buried) and associated features in accordance with the Conservation and Management Plans as applicable and with 'National Policy on Town Defences' (Department of Environment, Heritage and Local Government 2008).

BHC 9 To retain the surviving medieval street pattern, building lines and burgage plot widths in historic walled towns.

BHC 10 To require, as part of the development management process, archaeological impact assessments, geophysical surveys, test excavations and monitoring, as appropriate, where development proposals involve ground clearance of more than half a hectare or for linear developments over one kilometre in length or for developments in proximity to areas with a density of known archaeological monuments and history of discovery, as identified by a licensed archaeologist.

Ardee Local Area Plan 2010-2016
It is a policy of the plan:

NBE 29 To ensure that any development, whether above or below ground, adjacent to a site of special archaeological interest shall not be detrimental to the character of the archaeological site or its setting and be sited and designed with care to protect the monument and its setting.

NBE 30 To require applicants to include an assessment of the likely archaeological potential of their site as part of the planning application for all development within the Ardee Area of Special Archaeological Interest and other sites of archaeological potential and where the Council considers it appropriate, require that an onsite assessment is carried out by trial work prior to a decision on a planning application being taken.

NBE 31 To ensure that monuments, sites and buffer areas included in the Record of Monuments and Places in zoned lands be excluded from development and included within areas of open space.

Appendix 16.4: Impact Assessment and The Cultural Heritage Resource

POTENTIAL IMPACTS ON ARCHAEOLOGICAL AND HISTORICAL REMAINS

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2017). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.

- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.

- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.

- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.

- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.

- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.

- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

PREDICTED IMPACTS

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

Appendix 16.5: Mitigation Measures and The Cultural Heritage Resource

POTENTIAL MITIGATION STRATEGIES FOR CULTURAL HERITAGE REMAINS
Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce, or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved in situ.

DEFINITION OF MITIGATION STRATEGIES

ARCHAEOLOGICAL RESOURCE
The ideal mitigation for all archaeological sites is preservation in situ. This is not always a practical solution. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation in situ are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality, and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c)

Appendix 18.1: Photomontages

Turley

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Ardee 2040 Regeneration Project

Verified Views

Applicant: Louth County Council

+353 (0) 1 2880186
info@3ddesignbureau.com
www.3ddesignbureau.com

May 2025
job ref. 23256

A3 print size

Project Title :	Applicant Name :	Image Title : Viewpoint location map
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel. +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202314:57:44

Project Title : Ardee 2040 Regeneration Project	Applicant Name : Louth County Council	Image Title : Baseline VVM 1

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202314:57:44

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 1

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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202314:53:44

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 2

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

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Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 2

3D DESIGN BUREAU
Tel: +353 (0) 1 2880186
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Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 3

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

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Project Title :	Applicant Name :	Image Title : Proposed VVM 3
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

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Project Title :	Applicant Name :	Image Title : Baseline VVM 4
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202315:05:08

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 4

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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202315:09:50

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 5

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202315:09:50

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 5

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202310:28:43

Project Title :	Applicant Name :	Image Title : Baseline VVM 6
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202310:28:43

Project Title :	Applicant Name :	Image Title : Proposed VVM 6
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202315:19:56

Project Title :	Applicant Name :	Image Title : Baseline VVM 7
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202315:19:56

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 7

3D DESIGN BUREAU
Tel: +353 (0) 1 2880186
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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202311:42:31

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 8

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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : - | Date & Time : 20/06/202311:42:31

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 8

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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202310:54:50

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 9

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/202310:54:50

Project Title :	Applicant Name :	Image Title : Proposed VVM 9
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/2023,13:27:47

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 10

3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 24mm | Approx. Distance : - | Date & Time : 20/06/2023,13:27:47

Project Title :	Applicant Name :	Image Title : Proposed VVM 10
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : 314.00m | Date & Time : 20/06/2023,11:09:40

Project Title :	Applicant Name :	Image Title : Baseline VVM 11
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : 314.00m | Date & Time : 20/06/2023,11:09:40

Project Title :	Applicant Name :	Image Title : Proposed VVM 11
Ardee 2040 Regeneration Project	Louth County Council	3D DESIGN BUREAU Tel: +353 (0) 1 2880186 www.3ddesignbureau.com

Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : 384m | Date & Time : 20/06/2023,15:19:56

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Baseline VVM 12

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Camera type : Canon EOS 5D Mark IV | Lens type : EF16-35mmf/4LISUSM | Focal Length : 16mm | Approx. Distance : 384m | Date & Time : 20/06/2023,15:19:56

Project Title :
Ardee 2040 Regeneration Project

Applicant Name :
Louth County Council

Image Title : Proposed VVM 12

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APPENDIX

Methodology
Verified Views Montages (VVM)

+353 (0) 1 2880186
info@3ddesignbureau.com
www.3ddesignbureau.com

Table of Contents

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1. Overview

This methodology appendix has been prepared by 3D Design Bureau to explain the production process of Verified View Montages (VVM) for the purposes of planning applications. The preparation and presentation of reliable verifiable visual information is a key component to the writing of Landscape/Townscape Visual Impact Assessment reports (LVIA/TVIA). It should be noted that VVMs are technical images and should be produced and used in a technically appropriate manner.

This booklet maybe accompanied by the inclusion of a number of presentation CGIs from various viewpoint locations within the proposed site. These images, taken from a close range perspective, have been produced to give a better understanding of the design intent. They are images from the digital 3D model produced for the project. Whilst soft landscaping, that reflects the proposed design, has been included as accurately as possible, artistic license may have been used for certain low level planting and trees with regard to species, size and exact locations.

Note: All images/photographs included in this appendix section are for illustrative purposes only. They do not relate to the project that is subject of this application and which this booklet has been produced for. They are included as a visual aid to the accommpanying text to better explain the technical process of the various stages of VVM production.

2. What is a Verified View Montage

A Verified View Montage (VVM) is an accurate visual representation of the potential impact (or lack there of) that a proposed development may have on its surrounding environment, if built as proposed. VVMs are produced using technical scientific verification methods, through the use of photography, surveying, 3D modelling, rendering and post-production.

Verified View Montages are produced by using survey data of the subject site and its surrounding environment, coupled with the correct geospatial insertion of the proposed development into the existing landscape using accurate and detailed digital 3D models of both the proposed scheme and surrounding existing context. This allows for a photorealistic view of the planned development in its intended location from selected viewpoint locations around the subject site.

The correct combination of all these fields of expertise will deliver a result in which 3DDB believe and trust to be accurate, for official usage by the client for their intended purposes (ex. Planning applications, impact studies,...).

3. Methodology

3.1 Pre-Production : Project Planning

Following 3DDB's appointment to a project, a desktop study is carried out to identify a full set of possible viewpoint locations for the VVMs. A full list of suggested views is drawn up for review by the design team, specifically the planning consultant and/or LVIA consultant, prior to visiting the site. A Zone of Theoretical View study (ZTV) can also be carried out to determine all or some of the locations. A ZTV is a more detailed desktop visual assessment of the development (in massing form and carried out in specific software) to assess viewpoint locations, particularly sensitive or protected views, to the subject site.

Note: If a Landscape Visual Impact Assessment (LVIA) report is being written by a third party, (landscape architect or planning consultant), the medium to long range views, and particularly any protected views to the site, will be guided by them.

Once all suggested viewpoint locations are identified, the photographic site visit to capture the baseline photography is scheduled in. Time of day and weather conditions are carefully assessed to ensure the most optimum photos are obtained, whether that be winter or summer time shots. It should be noted that in some instances, projects require both summer and winter time VVMs. This is to demonstrate best and worst case scenarios from a visual impact point of view, when trees are in full foliage and without foliage.

Note: 3D modelling of the proposed scheme can, and usually is, commenced prior to the photographic site visit taking place.

3.2 Data Capture : High Resolution Baseline Photography

Every baseline photograph is captured in raw settings using a high-resolution digital SLR camera. This allows for the maximum possible information to be retained in the digital file. It also avoids the file being altered by any internal camera processing definitions, which retains the maximum control and fidelity on the end results.

The focal lengths used depend on the surrounding context and proximity to the subject site. 3D Design Bureau use high quality lenses with focal lengths that allow for capturing enough surrounding context without compromising quality and fidelity, by avoiding excessive barrelling, distortion, or aberrations. All shots are taken horizontally with the use of a 50mm lens (where possible) and wider angle also where necessary. This is common in dense urban environments where viewpoint locations are in close proximity to the subject site and therefore require wider angles to ensure the proposed development is captured in the VVM. However, all VVMs that are of a wider angle, contain the 50mm guideline on the image.

Note: Although the 50mm focal length represents the perceived scale of the human eye, it does not represent the human field of view and therefore should not necessarily be used to show the proposed development in its context. Peripheral vision needs to be accounted for and whilst the 50mm lens option is recommended in the British Landscape Institute Technical Guidance Note (TGN 06/19), this does not take into account the dynamic movement of the human eye.

Furthermore, despite panoramic VVMs being described in the British Landscape Institute Technical Guidance Note (TGN 06/19), 3DDB do not produce these type of images for planning submissions. Panoramic VVMs are made up of a series of individual VVMs stitcthed together. The stitching process is a non repeatable action which can result in different outputs of the same image each time. Therefore, accuracy and verifiability can be called into question and it is for this reason 3DDB produce individual VVM imagery.

3. Methodology

3.2 Data Capture : High Resolution Baseline Photography (cont`d)

To ensure that each chosen photo, from the suite of photos taken, is accurately surveyed, the position of each photo location is carefully recorded and marked as follows:

On-Site:

The tripod location on site is paint marked and photographed in context to existing elements. (Fig. 1 below)
The location of each photo is manually marked on a printed map while on site.
The camera height, at which the photo was taken, is recorded.

In-Studio:

All baseline photographs go through post processing back in the studio. The full set of photos along with a viewpoint location map (Fig 2 below) are prepared and issued to the design team for review, in particular the planning consultant and LVIA consultant. From the suite of photos taken, the best views, that will demonstrate the visual impact that the proposed scheme may/may not have, are selected. For each photo at each location, two focal lengths are issued – the 50mm option and a wider field of view option. The most appropriate shot will be chosen depending on the surrounding context and location of the view. See further explanation earlier in this section 3.2.

Fig.1: Camera location and height marked, recorded and photographed.

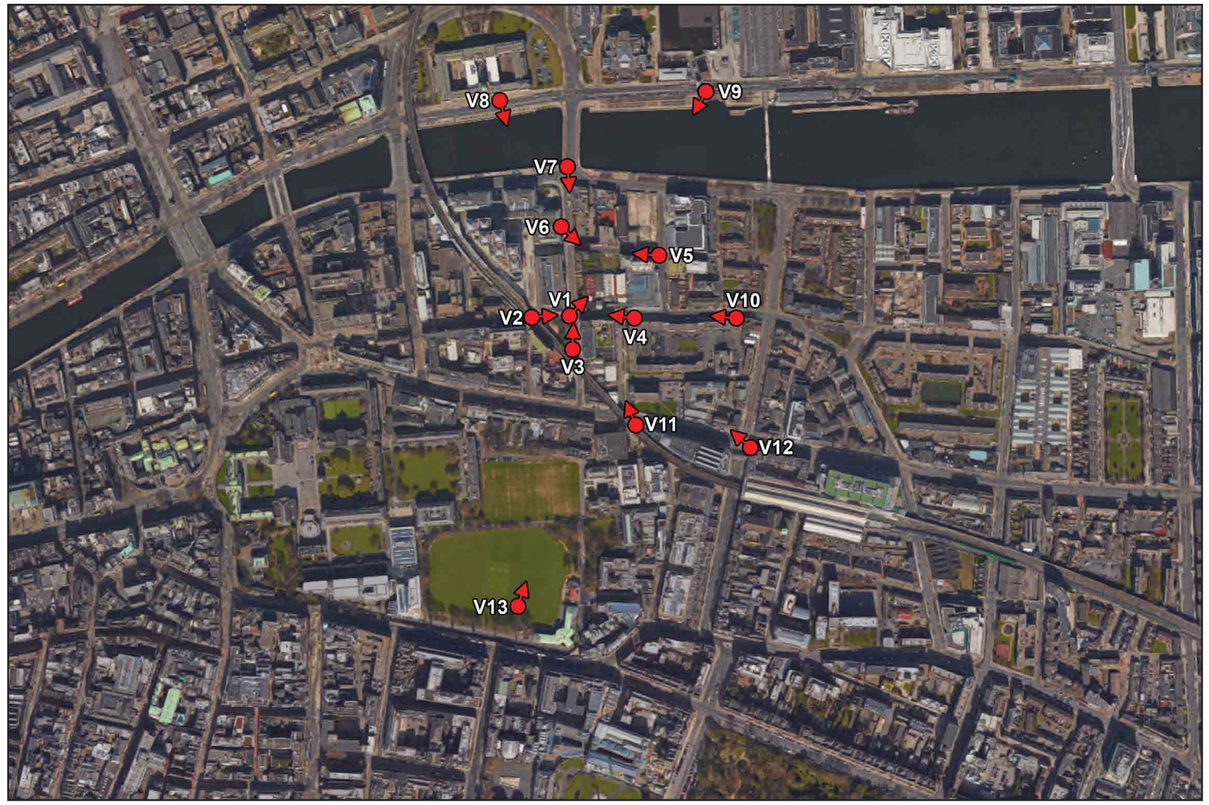

Fig.2: Viewpoint location (VL) map prepared, post site visit In-Studio.

3. Methodology

3.2 Data Capture : High Resolution Baseline Photography (cont`d)

The following images are a sampling of baseline photographs captured during a photo site visit and prior to selection of the chosen views for the VVMs. (See Fig.2 previous page for the accompanying Viewpoint location (VL) map). All baseline photos below are shown prior to any markup for surveying purposes.

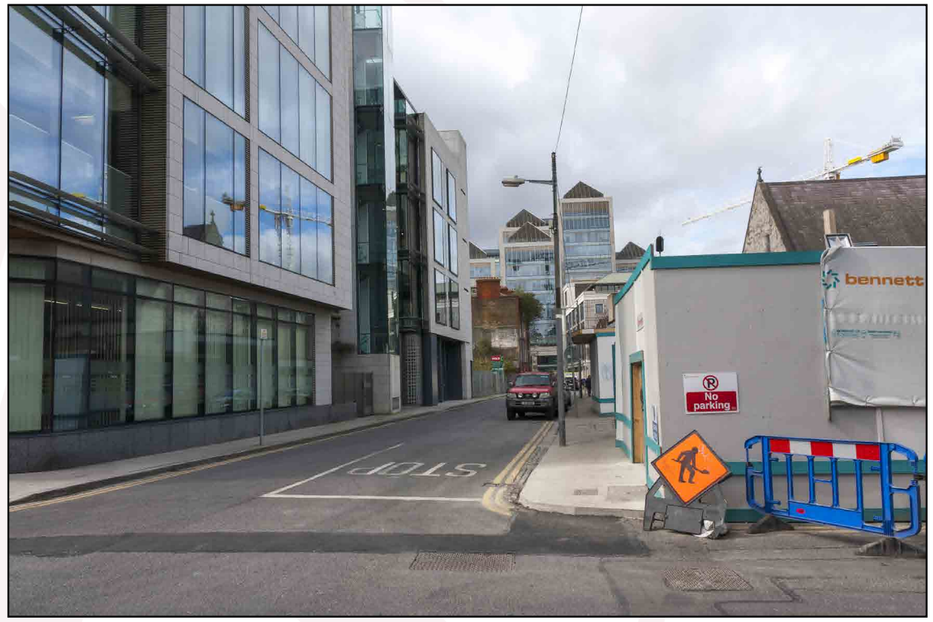

Fig.3: Baseline photo-View 5 from VL Map.

Fig.4: Baseline photo-View 3 from VL Map.

Fig.5: Baseline photo-View 4 from VL Map.

Fig.6: Baseline photo-View 9 from VL Map.

3. Methodology

3.3 Surveying : Baseline Photography

Following the selection of all views for the production of the VVMs, all of the chosen baseline photos are carefully and precisely marked up and labelled for field surveying purposes (see per Fig 7 below.) Fixed reference points within each photo, such as parapet heights, kerbing, lamp posts etc are coloured coded on the baseline photos. All 'marked up' baseline photos are then issued to our qualified topographical surveyor for a thorough survey from each viewpoint.

On site, the survey team records the camera/tripod position using GPS and Total Station to an accuracy of +/-1cm Northing and Easting and to an accuracy of +/- 2cm Elevation. The 'marked up' fixed reference points identified in each photo are then surveyed to establish exact orientation of the view and to verify the photomontage process. They are clearly numbered to ensure ease of modelling. (Fig 8 below). This survey data is fed back to the production team and subsequently 3D modelled and included in the digital 3D model of the proposed development allowing for accurate positioning of the digital model within each baseline photo. (See section 3.4)

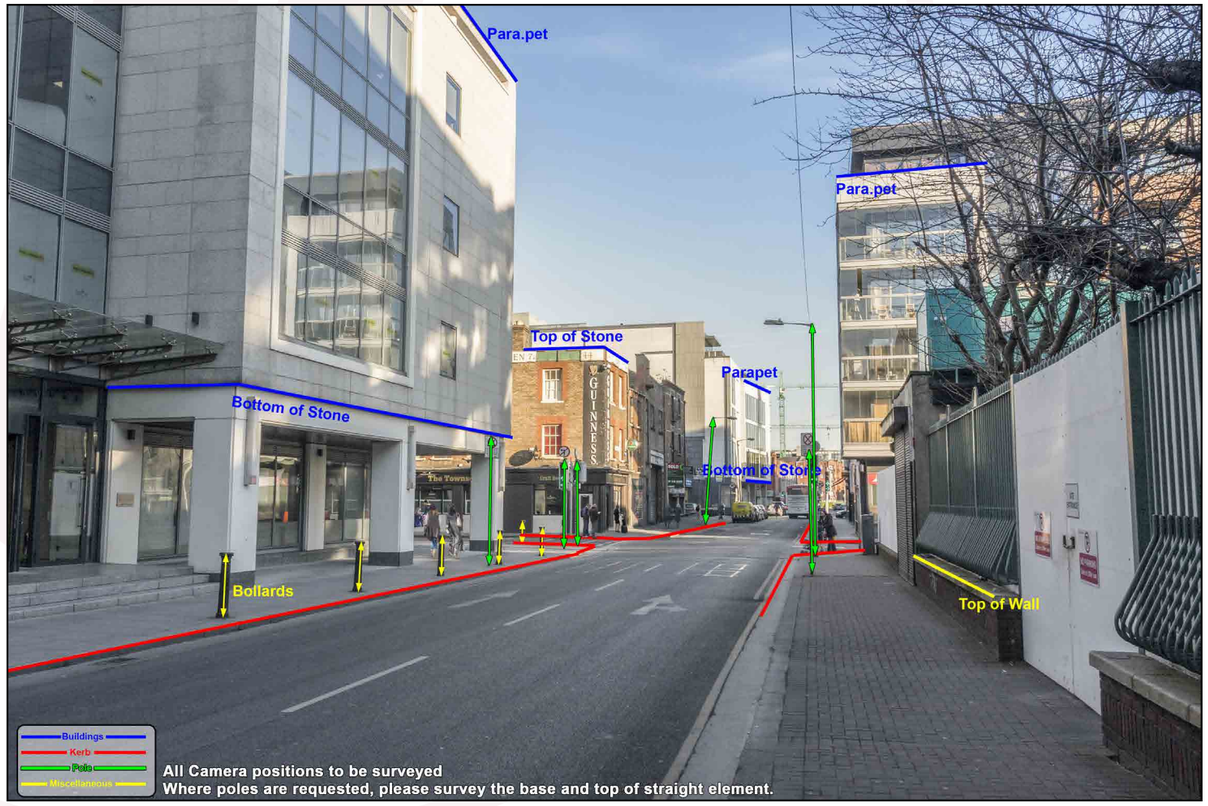

Fig.7: Fixed reference points marked for surveyor in each chosen baseline photo.

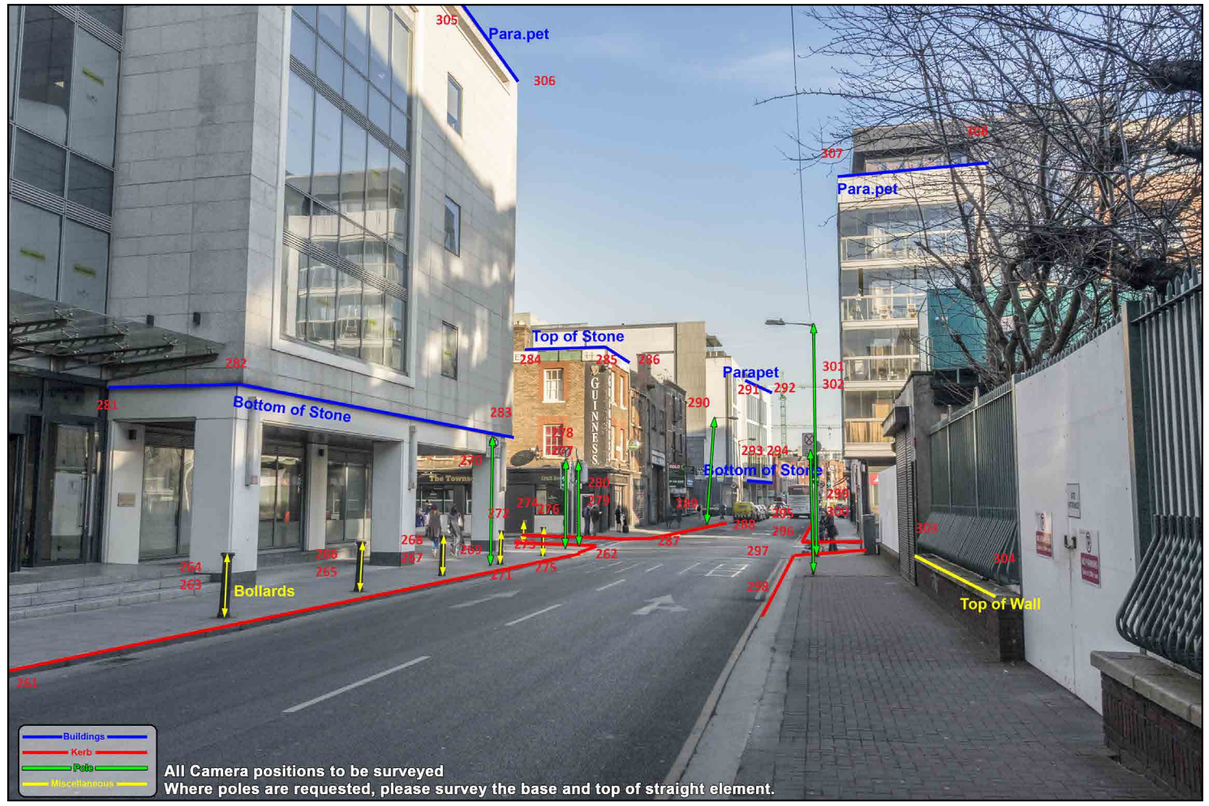

Fig.8: Fixed reference points fully surveyed and numbered.

3. Methodology

3.4 The Digital Model

3.4.1 - 3D Modelling

An accurate digital 3D model of the 'proposed' development is produced using 3D software of choice. All of 3D Design Bureau's 3D modelling is carried out within AutoDesk's Revit. The digital 3D model is created from a combination of the third party architectural, engineering and landscape drawings and/or supplied models. The 'masterfile' for a project follows 3DDB's strict internal processes and workflows, including modelling techniques, worksets, linked and bound models etc. Depending on the type of project being produced, the appropriate file set for the digital model will be employed.

The 'marked up' fixed reference points (see section 3.3) which have been surveyed, are also 3D modelled along with any other relevant survey information from the supplied topographical survey drawings. This 3D data is federated into the 'Masterfile' model of project and geospatially positioned relative to the proposed model. This process is imperative to ensure the accurate positioning and camera matching of the proposed digital 3D model within each chosen baseline photograph.

3.4.2 - 3D Visualisation

Once the digital 3D Revit model is complete, it is handed over to 3DDB's 3D visualisation team for this next stage of production. This visualisation stage involves the application of textures & finishes to the model (buildings and site), lighting setup to accurately match daylight/evening time conditions in the baseline photographs and asset population for the proposed scheme, such as soft landscaping, street furniture etc.

This visualisation process ensures the accurate visual representation of the digital 3D model is as close as possible to the intended future 'As Built' development. Note: For accurate camera matching of the digital 3D model to the chosen baseline photography (which can take place prior to the visualisation process) please see Section 3.5.

There are various 3D visualisation software's that are widely used for this stage of production. 3D Design Bureau use Autodesk 3D Studio Max as its main software of choice for the visualisation process. This is accepted as the leading industry standard for architectural visualisation work and production of VVMs.

3. Methodology

3.4 The Digital Model (cont`d)

Fig.9: 'Masterfile' digital 3D model containing the proposed scheme and survey elements.

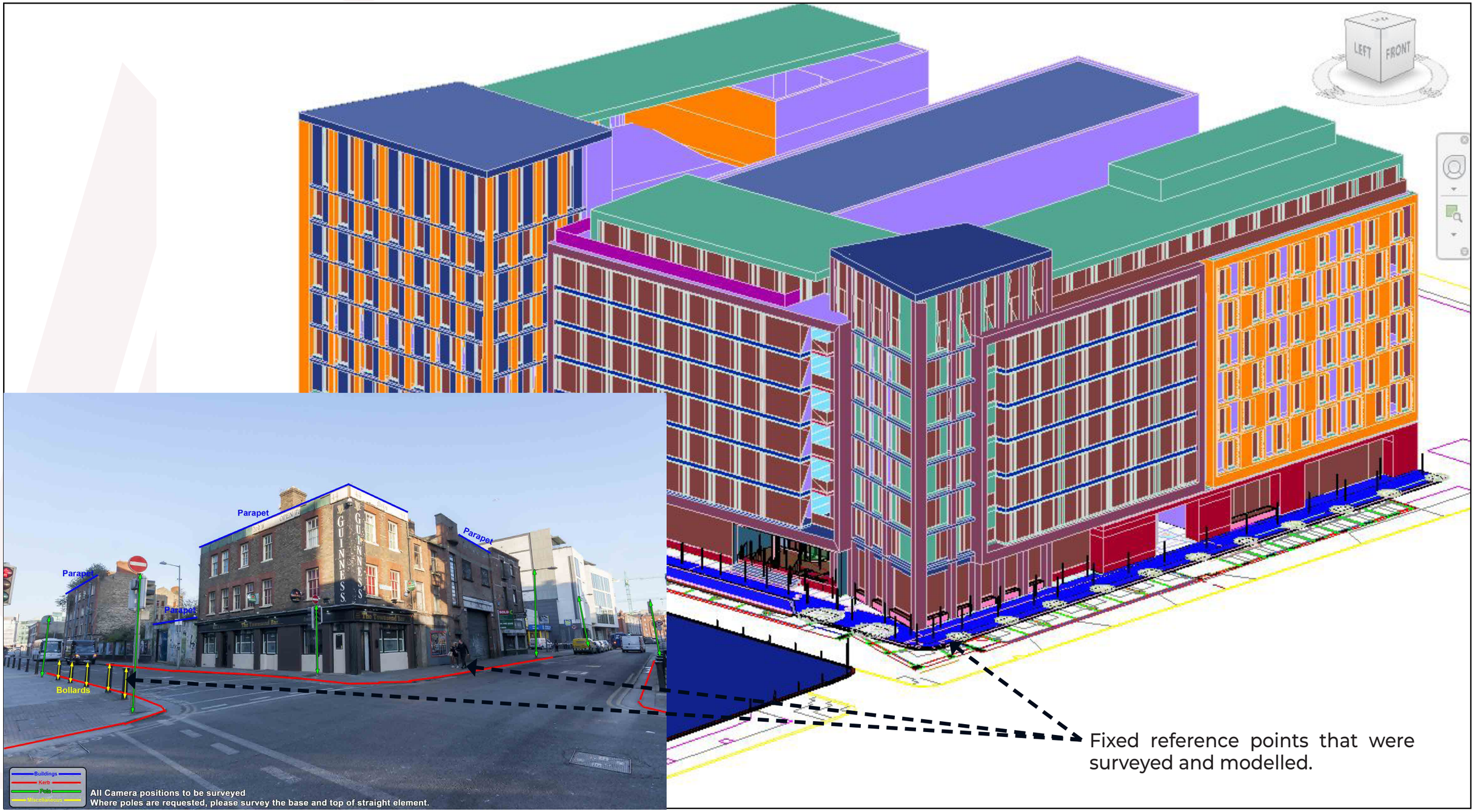

Fig.10: Fixed reference points, surveyed, modelled and included in the digital model

3. Methodology

3.5 The Verification Process

The following section is an integral part of the verification process for all verified view montages (VVMs). Following the completion (but in some instances prior/ in parallel) of the 3D visualisation process, Section 3.4, the below methodology is implemented ensuring views are verifiable.

3.5.1 Camera Matching: Real World to 3D Scene

All of the information recorded at the time of the baseline photographic site visit, that is, camera co-ordinates, angle of view, and direction of view, is programmed into the virtual camera within the 3D software package of choice - 3D Studio Max. Insertion of 'virtual' cameras within the software, with the matching attributes and settings to replicate the 'real life' cameras, is carried out.

All elements of the photo survey (the reference points), that have been modelled into the digital 3D model, and that have been geolocated relative to the proposed development, are a key component to the camera matching process. It is these surveyed elements, contained within the 3D model, that are matched to their real world counterparts in the baseline photos with the replica 'virtual' camera.
This careful camera placement methodology ensures that the size, position, and height, of the proposed development in each VVM is correct to an accuracy of 0.33% i.e. +/- 1mm on an A3 print.

See Fig 11. next page for illustrations of the 'virtual' cameras inserted within a 3D scene.

3.5.2 Image Rendering

Once all selected views have had the camera matching and 3D visualisation processes completed, each of the views are 'rendered' at high resolution and placed onto their matching baseline photograph. Software of choice for this part of the VVM process is Adobe Photoshop.

The mathematical accuracy is then double checked and verified by ensuring the existing 'marked up' fixed reference point features, which are present in the 'rendered' images, line up and match their real life counterparts in the baseline photo. See Fig 12. on page 12 for an illustration of this.

3.5.3 Post Production

Post production for each of the selected views is the last stage in the VVM process. The VVM specialist determines which existing features, within the baseline photo, such as buildings, infrastructure and vegetation, are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. Careful attention is paid to existing trees and foliage in particular, to ensure a true representation of any potential visual impact is shown/screened.

Disclaimer: Where existing background information, which is not visible in the baseline photo but revealed when the proposed development is shown in the view, is unattainable due to coverage/blocking of elements in the baseline photos, 3DDB use various methods and online information to portray these elements as accurately as possible. Some tolerance should be allowed for such views.

When it is found that the development is not visible due to foreground features, its extremities will be indicated with a red outline. Furthermore on selected wide angle views, the extent of the 50mm lens is identified on the final shot. See Figure 14.2 for an example of this.

3. Methodology

3.5 The Verification Process (cont`d)

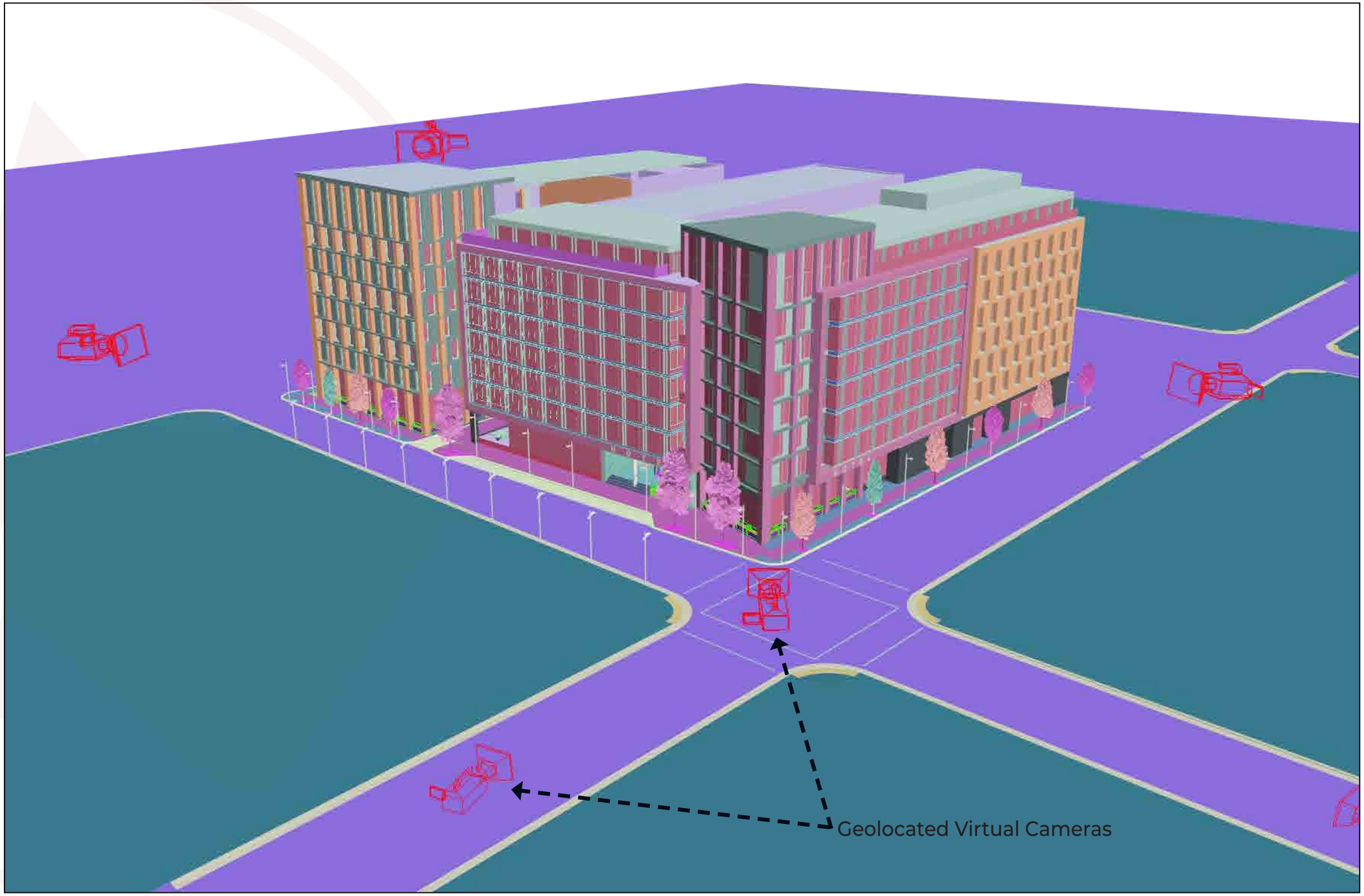

Fig.11: View from the 3DsMax model with the geolocated virtual cameras placed

3. Methodology

3.5 The Verification Process (cont`d)

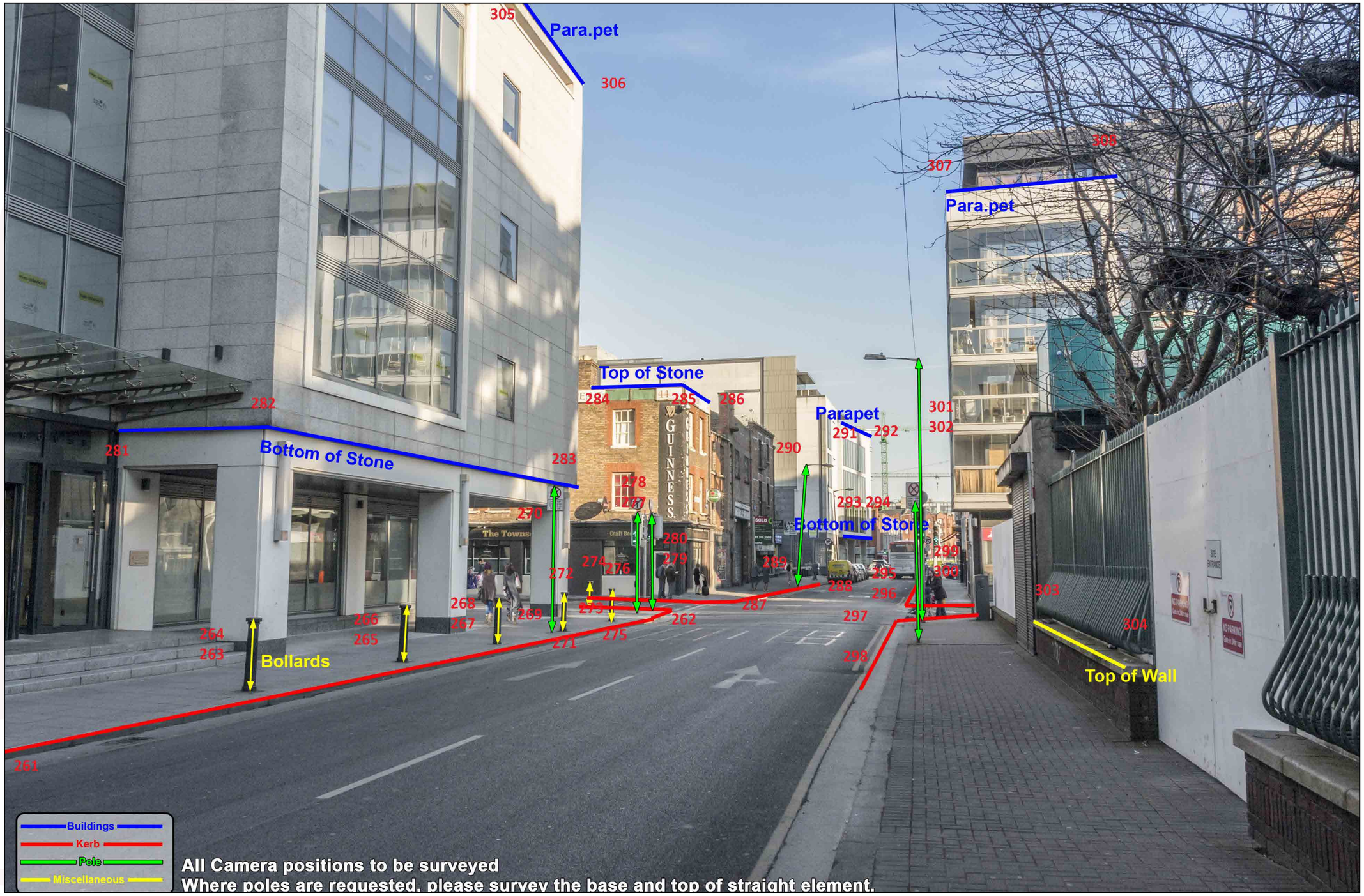

Fig.12: Fixed reference points from surveyor on baseline photo.

3.5 The Verification Process (cont`d)

Fig.13: Fixed reference points modelled, 'rendered' and overlaid on baseline photo confirming accuracy

4. Final Results

The final VVMs, having gone though the aforementioned extensive process, are considered as accurate and verified representations of the proposed development as viewed from the selected photo locations. The final imagery determines, as closely as possible, any future visual impact a proposed development may, or may not have on the surrounding environment and existing buildings. It should be noted that the foundation of any Landscape/ Townscape Visual Impact Assessment (LVIA / TVIA) report are accurate verified view montages in which the selected baseline photography and resulting VVMs are compared and commented upon by a suitably qualified consultant.

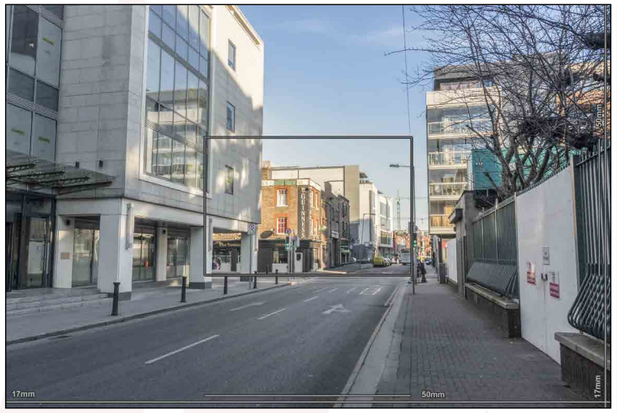

Fig.14.1: Baseline (w/ 50mm lens extents)

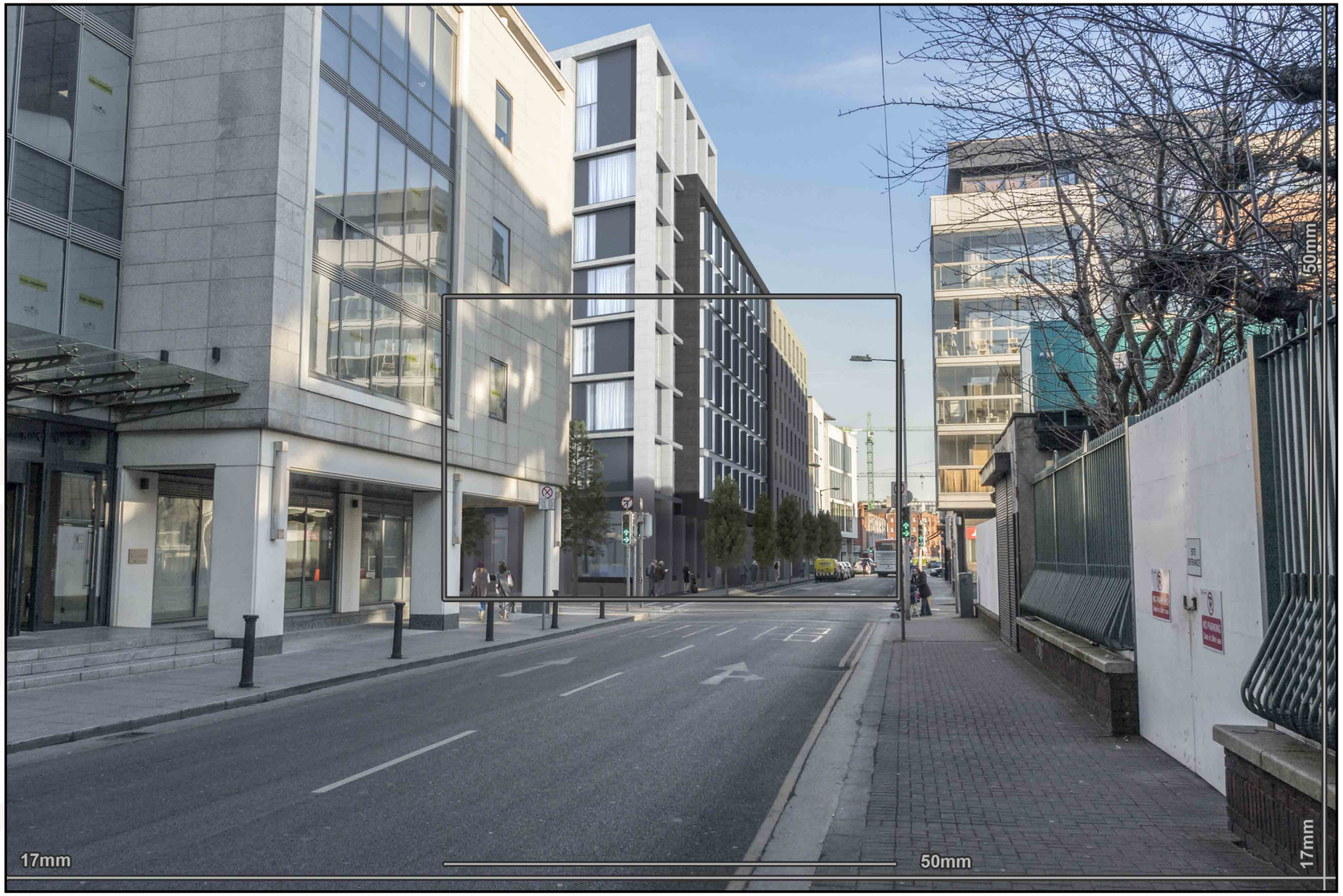

Fig.14.2: Proposed (wide angle view with 50mm lens extents included as standard)