Environmental Impact Assessment Report

PROPOSED UNDERGROUND TRANSMISSION GAS PIPELINES GRANGE CASTLE, DUBLIN .

Volume 3 – Appendix

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Prepared for: Gas Networks Ireland

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RELEVANT PLANNING HISTORY WITHIN THE VICINITY OF THE SUBJECT SITE

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Table 1: *Relevant Planning History within the vicinity of the subject site*

Planning Reference, Application and Location	Development Description	Decision and Grant Date
SD22A/0412 Dublin Simon Community Lands at, Old Nangor Road, Clondalkin, Dublin 22	Social housing development consisting of 10 one bed units in a two to three storey apartment building, associated car parking and bicycle parking, bin store, water pump house, new vehicular access onto Old Nangor Road, new pedestrian access onto Old Nangor Road, landscaping, boundary treatments, public lighting and all associated site and engineering works necessary.	DECISION DUE 23 Oct 2023
SD23A/0121 Lidl Ireland GmbH Kilcarbery, Deansrath, Old Nangor Road, Dublin 22	Construction of a Discount Food store Supermarket with ancillary off-licence sales comprising of the construction of a single storey Discount Food store Supermarket with ancillary off-licence use (with mono-pitch roof, mezzanine plant deck and overall building height of c. 8 metres) measuring c. 2,307sq.m gross floor space with a net retail sales area of c. 11406sq.m; Construction of a single storey Cafe building measuring c. 146sq.m gross floor space (with overall building height of c. s metres); Construction of an interim/ temporary vehicular and pedestrian access point to the eastern site boundary to Corkagh Grange Avenue/ Ash Green (if necessary pending permanent access); Construction of a permanent vehicular and pedestrian access point to the western site boundary to permitted (Planning Ref: SHD3ABP-305267-19) / under construction 'Grange Avenue Road' including associated road/ carriageway reconfiguration; Provision of associated car parking, cycle parking, free standing and building mounted signage, free standing trolley bay cover/ enclosure, refrigeration and air conditioning plant and equipment, roof mounted solar panels, public lighting, hard and soft landscaping, boundary treatments, drainage infrastructure (including diversion of existing) and connections to services / utilities, electricity substation and switch room building and all other associated and ancillary development and works above and below ground level.	REQUEST ADDITIONAL INFORMATION 24 Jul 2023
SD23A/0012 Data & Power Hub Services Limited Within the townland of Milltown, located to the north of Peamount Road (R120) & Peamount Lane, Newcastle, Co. Dublin	Construction of a new Battery Energy System Storage (BESS) and Power Trunk building and all associated elements; Demolition of all existing structures on site associated with the current golf centre - including main clubhouse and a number of ancillary structures (total 1,009.84sq.m); Construction of a two storey power trunk building (maximum height 10.3m) over basement of 1,982.61sq.m containing MV switchgear; Construction of a BESS to reach a total capacity of 186.3 MWe; The facility will be within an open three storey structure (maximum height of 17.3m), totalling 18,560.9sq.m in area, containing 63 battery containers, & 63 no containers containing power invertors, step up transformers and electrical switchgear and roof level array of 1384 PV panels; 1 two storey administrative welfare buildings (298.26sq.m) associated with the BESS facility; It will be provided with a pre-cast wastewater treatment plant (up to 6 P.E.) discharging to percolation area with polishing filter for foul effluent; 1 single storey Fire Pump and	GRANT PERMISSION 11 July 2023

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	Water Service Plantroom of 174.1sq.m, with associated water tank -associated with the BESS facility; 1 underground rainwater harvesting tank (volume 125 cubic meters - associated with the BESS facility of 35sq.m; 9 car parking spaces (including 3 disabled and 2 electric vehicle charging parking spaces) and 8 cycle spaces; The removal of an existing 15m high telecommunication support structure; Internal road network and new servicing access road from an entrance on Peamount Lane - with amendments to the existing entrance, comprising widening the entrance, provision of new security checkpoint, setting back of the boundary to achieve sufficient visibility splays, and reinstatement of appropriate boundary treatment along the Peamount Lane frontage; Site landscaping, planting, berms and retaining walls along site boundaries and security fencing; and all associated site services, lighting, infrastructural works and attenuation (SUDS features, underground storage and an above ground pond).	
SD22A/0352 Dublin and Dun Laoghaire Education and Training Board Colaiste Chilliain, Old Nangor Road, Clondalkin, Dublin 22	Construction of two new three storey primary school buildings for Gaelscoil na Camoige agus Gaelscoil Chluain Dolcain providing 16 classrooms each, a shared general purpose area, ancillary teaching and staff accommodation; The development will also consist of the construction of a new single storey PE Hall building for Colaiste Chilliain; The development will also include two new pedestrian access routes, with one located on New Nangor Road and with another located at the junction of New Nangor Road and Old Nangor Road; A new vehicle entrance and exit onto Old Nangor Road to provide a one-way vehicle route with a bus/vehicle set down zone, conversion of existing vehicle entrance to Colaiste Chillian to an in-only entrance; 2 new hard play courts and play space at each primary school with site landscaping, bicycle parking spaces and car parking spaces for each primary school including accessible car parking spaces, internal refurbishment works to Colaiste Chilliain to facilitate the reintegration of teaching accommodation upon Gaelscoil Chluain Dolcain's move to the new school; Removal of the existing temporary changing room and relocation of car park at Gaelscoil Chluain to provide accessible parking spaces and associated works; Connections to public utility and drainage services, boundary treatments, installation of PV panels, alterations to existing drainage layout and associated site development works.	GRANT PERMISSION 29 Jun 2023
SD23A/0123 Pfizer Ireland Pharmaceuticals Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	Permission for development consisting of the completion of the development granted permission under Planning Application Reg. Ref. SD16A/0236 subject to the amendments and alterations to the previously approved biopharmaceutical manufacturing facility and warehouse extension and other additional, new development not forming part of SD16A/0236, located at the Pfizer site at Grange Castle Business Park, New Nangor Road; The modifications to the approved development will consist of alterations and modifications to previously approved site buildings and infrastructure required to support the proposed development they include, (a) A 6-level biopharmaceutical manufacturing building sized	GRANT PERMISSION 31 May 2023

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	approximately 30,469sq.m (previously approximately 34,650sq.m) and approximately 35 metres high (previously approximately 28.2m high), with stairwells approximately 38m high, and roof-mounted plant and equipment, including solar panels; Modifications to the existing Development and Manufacturing Facility including elevational alterations and modifications to existing plant and equipment; (b) A single-storey warehouse building extension with high-bay, sized approximately 3,200 square metres (previously approximately 1,142sq.m) and approximately 17.5m high, with roof-mounted plant and equipment, including solar panels; (c) A single-storey pedestrian and materials link sized approximately 1,687sq.m (previously approximately 750sq.m) and approximately 6.95m high; (d) A new, additional 4-level extension to the existing DS1 biopharmaceutical manufacturing building, to accommodate material lifts and storage areas, sized approximately 1,925sq.m and approximately 38.2m high, to the south elevation of the existing building; (e) A new, additional single-storey chiller building sized approximately 395 square metres and approximately 6.25m high, with roof-mounted plant and equipment; (f) A new, additional single-storey plant and utilities building sized approximately 256sq.m and approximately 6.25m high, with roof-mounted plant and equipment; (g) Provision of relocated car park from its previously permitted location at the northeast of the side to a new location to the southeast of the proposed biopharmaceutical facility; including approximately 273 additional car parking spaces, including accessible car parking spaces, electric vehicle charging, motorcycle parking, dedicated car-pooling spaces and cycle parking, all accessed from the internal Grange Castle Business Park roads. Mobility parking is located adjacent and directly north of the proposed facility; (h) A relocated, single-storey security building sized approximately 60 sq.m and 6m high; (i) The proposed site infrastructure includes additional cooling towers/heat exchangers, a tank farm, pipe-bridges, surface water harvest tanks, docks and yard areas, including associated items of plant and equipment, an electric vehicle charging and solar panel substation to service photovoltaic panels over new car parking spaces, photovoltaic solar panels located over new car parking spaces, electrical generators, underground pumping facilities and internal roads and paths, fencing and site lighting, and the use of the existing Pfizer site entrance (Gate No.3) for heavy goods vehicles; (j) The development includes modifications to and the extension of, the existing internal road network within the Pfizer Campus; (k) Proposed new landscaping includes new landscaped and planted areas, replacement and reinforcement of the existing landscaping and modifications to existing berms and perimeter security fencing and gates; (l) Proposed new signage based at ground level and on the building facades on the proposed new production building; (m) The works include temporary contractor compounds, temporary car parking and the temporary use of existing site entrances during construction activities; (n) Proposed new surface water	

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	management infrastructure for the site, consisting of underground attenuation systems, rainwater harvest cisterns and distribution pipework; (o) All associated site works including sustainability features described in points (a) to (l); Planning permission for the construction of a temporary contractors car park on land to the west of the Pfizer facility with access off Grange Castle Business Park and the reinstatement of the lands to agriculture after the need for the car park expires; The application is seeking permission of 5 years for the completion of the development granted permission under PA Ref: SD16A/0236 subject to the above amendments and alterations to the previously approved Biopharmaceutical Manufacturing Facility and Warehouse and other additional, new, development not forming part of SD16A/0236; This application consists of a development for an activity for which a licence under Part IV of the Environmental Protection Agency Act 1992 (as amended by the Protection of the Environment Act, 2003) is required; An Environmental Impact Assessment Report (EIAR) accompanies this planning application.	
SDZ22A/0010 Kelland Homes Ltd West of the Ninth Lock Road, south of the Dublin-Cork railway, line, north of Cappaghmore housing estate and whitton Avenue, and east of an existing carpark/park, & ride facility at the Clondalkin, Fonthill train station	Kelland Homes Ltd. intends to apply for permission for development on a site area of 6.3Ha, on lands within the townland of Cappagh, Dublin 22. The proposed development is located west of the Ninth Lock Road, south of the Dublin-Cork railway line, north of Cappaghmore housing estate and Whitton Avenue, and east of an existing carpark / park & ride facility at the Clondalkin Fonthill train station and the R113 (Fonthill Road). The proposed development is located within the Clonburris Strategic Development Zone (SDZ), within the development areas of (I) Clonburris South East (i.e. CSE-S1 & CSE-S2) and (ii) part of Clonburris Urban Centre (i.e. CUC-54), as identified in the Clonburris SDZ Planning Scheme 2019. The proposed development consists of the construction of 294 no. dwellings, creche and retail / commercial unit, which are comprised of: 118 no. 2, 3 & 4 bed, 2 storey semi-detached and terraced houses, 104 no. 2 & 3 bfd duplex units accommodated in 10 no. 3 storey buildings, 72 no. f' & 2 bedroom apartments in 2 no. 4 & 6 storey buildings, 1 no. 2 storey creche (c.520.2m2), 1 no. 2 storey retail /commercial unit (c.152.1m2).Access to the development will by via the permitted road network (under Ref. SDZ20A/0021) which provides access from the Ninth Lock Road to the east and the R113 (Fonthill Road) to the west. The proposed development will connect into the permitted Infrastructural works as approved under the Clonburris Strategic Development Zona Planning Scl1ame (2019) and permitted under Ref. SDZ20A/0021, with the proposed development connecting into the permitted surface water drainage attenuation systems i.e. 1 no. pond, 3 no. modular underground storage systems and 1 no. detention basin combined with modular underground systems. The proposed wastewater infrastructure will connect into a permitted foul pumping station and pipe network within proposed road corridors to facilitate drainage connections to future wastewater drainage infrastructure within the adjoining SOZ lands (Including future Irish Water pumping	GRANT PERMISSION 02 May 2023 (Decision Date)

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	station station permitted under SDZ21A/0006). The proposed development also provides for all associated site development works above and below ground, public & communal open spaces, hard & soft landscaping and boundary treatments, surface car parking (401 no. spaces), bicycle parking (797 no. spaces), bin & bicycle storage, public lighting, plant (M&E), utility services & 4 no. ESB sub-stations. This application is being made in accordance with the Clonburris Strategic Development Zone Planning Scheme 2019 and relates to a proposed development within the Clonburris Strategic Development Planning Scheme Area, as defined by Statutory Instrument No. 604 of 2015.	
SDZ23A/0004 Clear Real Estate Holdings Limited In the townland of Adamstown, Lucan, Co. Dublin	385 dwelling units (139 houses, 70 Build-to-Rent duplex / apartments, 72 duplex / apartments and 104 apartments), ranging between two to six storeys in height comprising the following: - Total of 139 houses consisting of 102 three bedroom two storey terraced houses (House Type: 0, E & F); 11 four bedroom two storey terraced houses (House Type: C); 26 four bedroom three storey terraced houses (House Type: A & B); Total of 70 Build-to-Rent duplex / apartments units consisting of 35 two bedroom units (House Type: J, L & O); 35 three bedroom units (House Type: K, M & P); Total of 72 duplex / apartment units consisting of: - 36 two bedroom units (House Type: J, L & O); 36 three bedroom units (House Type: K, M & P); Total of 104 apartment units accommodated in 2 blocks ranging from four to six storeys consisting of 48 one bedroom units (House Type: A1 & A2); 56 two bedroom units (House Type: B1 & B2); Private rear gardens are provided for all houses. Private patios / terraces and balconies are provided for all duplexes and apartments; Vehicular access to serve the development is provided off the Clonburris Southern Link Street permitted under SDCC Reg. Ref. SDZ20A/0021 and currently under construction. Pedestrian and cycle access is also provided to the Newcastle Road (R120) and to the Clonburris Southern Link Street; All associated and ancillary site development, infrastructural, hard and soft landscaping and boundary treatment works, including: - A single storey tenant amenity building (c. 170 sq.m); Areas of public open space (1.45Ha); 538 car parking spaces and 878 bicycle parking spaces (660 long-term spaces and 218 visitor spaces); Bin and bicycle stores; Plant provided at undercroft level and additional plant provided at roof level (including solar panels) of the proposed apartment blocks; 3 ESB Sub-stations; Demolition of remaining walls and hardstanding associated with a former agricultural building; The development proposed includes minor revisions to an attenuation pond, connections to water services (wastewater, surface water and water supply) and connections to permitted cycle/ pedestrian paths permitted under SDCC Reg. Ref. SDZ20A/0021 on a site (c. 8.94 Ha) in the townland of Adamstown, within the Clonburris Strategic Development Zone (Adamstown Extension). On lands generally bound by the Dublin-Cork Rail Line to the north; Hayden's Lane, the Griffeen River and the undeveloped lands of Clonburris Strategic Development Zone to the east;	REQUEST ADDITIONAL INFORMATION 06 Apr 2023

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	Lucan Pitch and Putt to the south; and Newcastle Road (R120) to the west. This site consists of Development Areas AE-Sl and AE-S2 within the Clonburris Strategic Development Zone, as prescribed by the Clonburris Strategic Development Zone Planning Scheme 2019; This application is being made in accordance with the Clonburris Strategic Development Zone Planning Scheme 2019 and related to a proposed development within the Clonburris Strategic Development Planning Scheme Area, as defined by Statutory Instrument No. 604 of 2015.	
SD21A/0217 / ABP-314461-22 Digital Netherlands VIII B. V. Profile Park, Nangor Road, Clondalkin, Dublin 22	10 year permission for development consisting of removal of an existing unused waste water treatment facility on site and the erection of two data centre buildings, gas powered energy generation compound, and all other associated ancillary buildings and works; the two data centre buildings, DUB 15 and DUB 16, will comprise a total floor area of c. 33,577sq.m over two storeys; the first 2 storey data centre building (DUB15), located to the southwest of the site, will comprise 16,865sq.m data storage use, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space; a second 2 storey data centre building (DUB16), located to the southeast of the site, will comprise 16,712sq.m data storage areas, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space; both data centre buildings will reach a height of 20m; emergency generators and associated emission flues and plant are proposed in compounds adjacent to each data centre building; gas powered energy generation is proposed to the north east corner of the site to provide electricity for the proposed development; the application proposes to re-route and widen an existing watercourse constructed following an earlier planning permission; it is proposed to reroute this watercourse along the eastern and southern boundary of the site; landscaping is proposed to the south of the site to screen the buildings; fencing and security gates are proposed around the site; new access roads within the site are proposed along with 71 car parking spaces and 26 cycle spaces, bin stores, site lighting, and all associated works including underground foul and storm water drainage attenuation and utility cables and all other ancillary works; a Natura Impact Statement will be submitted to the planning authority with the application.	DECISION DUE 09 Jan 2023
SD22A/0087 Gas Networks Ireland Lynch's Park, Lucan, Co. Dublin	Install a new LPG Safety Installation in a caged enclosure 1.8m x 1.2m x 1.2m (LxWxH) servicing the existing LPG storage installation with all ancillary services and associated site works.	GRANT PERMISSION 15 Dec 2022
SD22A/0349 Google Ireland Limited Dublin Google Data Centre, Grange Castle Business Park South, 22, Baldonnel Road, Dublin 22	Modifications to the existing main site entrance to comprise of minor realignment of the internal access road with adjusted road marking and roadside bollards; Removal of 3 existing security traffic arms; Installation of 3 new security traffic arms and installation of 3 underground lifting security road blockers together with associated communications and electrical services; Provision of 2 set-down only parking spaces and all associated site drainage and installation works.	GRANT PERMISSION 07 Dec 2022

Planning Reference, Application and Location	Development Description	Decision and Grant Date
SDZ22A/0013 Gas Networks Ireland Kishogue Park, Lucan, Co. Dublin	Install a new LPG Safety Installation in a caged enclosure 1.8m x 1.2m x 1.2m (LxWxH) servicing the existing LPG storage installation with all ancillary services and associated site works situated within the Clonburris SDZ (Strategic Development Zone) area.	GRANT PERMISSION 07 Dec 2022
SD228/0010 South Dublin County Council (Parks) St Cuthbert's Park, Clondalkin, Dublin 22	Proposed Upgrade of St. Cuthbert's Park, in the Townlands of Kilmahuddrick and Deansrath, Dublin 22. The development will consist of: • Proposed hard-surfaced primary walking/ cycling route with public lighting; traversing east-west, through the park; • Proposed hard-surfaced secondary walking/ cycling routes through the park; • 3 No. Nodal points with seating as required; • Proposed on-street car parking and pedestrian crossing points (subject to detailed design with SDCC Roads Dept.); • Proposed vantage point, seating and signage; • Proposed Teenspace area with equipment, seating and surfacing; • Proposed outdoor exercise area with calisthenics or similar; • Proposed natural and equipped playspaces for children; • Proposed performance/ events area; • Proposed dogs off-leash area with dog-friendly features; • Proposed arboretum with edible fruits and nut trees; • Proposed grass sports pitches; • Proposed Multi Use Games Area (MUGA) with floodlighting; • Proposed play/exercise trail along the walking / cycling routes. • Proposed new planting to include wildflower grassland with drifts of native bulbs; formal avenue trees; informal tree groups; community woodland; informal tree groups with native species; and other planting as required; • Vegetation clearance of St Cuthberts Church, Moated Site and Graveyard Site and further assessment of works to conserve the structure as advised; (Monuments of Archaeological Interest and a Protected Structure); • Seating, bicycle parking and signage; • Works to boundaries, accesses and entrances; • All associated landscape design including furniture and planting; • All ancillary works. https://consult.sdublincoco.ie/en/consultation/st-cuthberts-park-design-plan-clondalkin	PART 8 APPROVED BY COUNCIL 14 Nov 2022
SD22A/0303 Takeda Ireland Limited Grange Castle Business Park, Grange Castle, Dublin 22	Construction of a Volatile Organic Compound (VOC) Abatement system comprising of a thermal oxidiser (TO), associated plant equipment and scrubbers positioned on a bunded concrete plinth with a maximum single stack height of 12m along with two access platforms at 2.5 high and 5.0m high used for maintenance only; The system is set within a 489sq.m (including a bunded area of 213sq.m) concrete compound enclosed by a 2.4m high paladin weldmesh black fence to match the existing utilities perimeter fence; 135sq.m single storey utilities workshop will sit adjacent to the Volatile Organic Compound (VOC) abatement system compound with associated hardstanding area and soakpit; 55m (L) x 3.2m (W) x 5.6m (H) pipe rack extension with the addition of a second tier extension 118.6m (L) X 3.2M (W) 1.2m (H) to the existing pipe rack is required to service the new VOC abatement system compound; a contractor's compound 3,420sq.m comprising single stacked portacabins, workshops, parking for 30 contractors,	GRANT PERMISSION 17 Oct 2022

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	materials delivery and set down area; the compound will be enclosed by a 2.4m tall paladin weldmesh black fence; modifications to the existing internal access road will include the addition of a new access road and footpath around the VOC abatement system compound and utilities workshop; a permanent pedestrian crossing including associated signage at the existing access road giving access between the contractor's compound and the voe abatement system compound; modifications to the existing site lighting, signage, surface water, foul and process wastewater drainage, hard and soft landscaping including a 3m high planted berm to the north of the contractor's compound; An EIAR (Environmental Impact Assessment Report) will be submitted with the application; this application relates to development which comprises an activity requiring an Industrial Emissions Licence in accordance with the First Schedule of the EPA Act 1922 as amended.	
SD22A/0060 Circet Networks (Ireland) Ltd Cloverhill Industrial Estate, Cloverhill Road, Dublin 22	Change of use of 464sq.m of warehouse mezzanine storage, approved under planning reference SD18A/0031, to office use, as well as associated and ancillary internal works, elevational changes and external ground works to facilitate this new use.	GRANT PERMISSION 30 Aug 2022
SD22A/0148 Interxion Ireland DAC Grange Castle Business Park, Clondalkin, Dublin 22	1 screened bin compound to be relocated to the south-east corner of the site; 2 transformers within individual compounds and adjoining switch room (35.2sq.m) to be located to the east of the permitted data centre to replace screened transformer compound permitted to the south-east of the site; 1 new plantroom (19.8sq.m) and 1 water storage tank to be located to the west of the permitted data centre to replace previously approved fire suppression enclosure and new double gates to replace sliding gates at entrance into the permitted data centre site.	GRANT PERMISSION 30 Aug 2022
SDZ21A/0022 Cairn Homes Properties Ltd. Within the Townlands of Cappagh, Clonburris Little & Kishoge, Co. Dublin	The construction of 569 dwellings, a creche, innovation hub and open space in the Clonburris South West Development Area of the Clonburris SDZ Planning Scheme 2019 as follows: 173 houses comprising 8 two bedroom houses, 153 three bedroom houses and 12 four bedroom houses (147 dwellings in CSW-S4 consisting of 8 two bedroom houses, 127 three bedroom houses & 12 four bedroom houses & 26 three bedroom dwellings in CSW-S3}, all 2 storey comprising semi-detached, terraced, end terrace units (with parking and private open space); (B) 148 duplex apartments/apartments {88 in CSW-S4 & 60 in CSW-S3) comprising 74 two bedroom units and 74 three bedroom units, in 16 three storey buildings. In CSW-S4 Duplex Blocks A,B,C,D,E,F,G,J,K, comprise 8 units (4 two bed & 4 three bed units), Duplex Block H comprises 16 units (8 two bed & 8 three bed units), In CSW-S3 Blocks L, N & O comprise 8 units (4 two bed & 4 three bed units), Block M comprises 14 units (7 two bed & 7 three bed units), Block P comprises 10 units (5 two bed & 5 three bed units), Block Q comprises 12 units {6 two bed & 6 three bed units), all to have terraces/pitched roof; (C) 396 apartments as follows: within CSW-S4, Block 1 consists of 172 apartments (76 one bedroom, 91 two bedroom and 5 three bedroom apartments), in a 2-building	GRANT PERMISSION 23 Aug 2022

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	arrangement both 6 storeys in height. Within CSW-S3, Block 2 {4 storeys) comprises 16 one bedroom apartments and 22 two bedroom apartments, Block 3 (4 storeys) comprises 16 one bedroom apartments and 22 two bedroom apartments (all apartments to have terrace or balcony); (D) Provision of an innovation hub (626sq.m) and creche (c. 547sq.m) in a part 3/4 storey 'local node' building in CSW-S4; (E) Vehicular access will be from the permitted Clonburris Southern Link Street (SDZ20A/0021) and R113 to the east {along with provision of internal haul routes {for construction) to connect to the R136 to the west); (F) Public Open Space/landscaping of c. 4.1 hectares (to include Local Park and MUGA in CSW-S3, Grand Canal Park, along the southern and eastern boundaries of the site to connect to existing Grand Canal towpath) as well as a series of communal open spaces to serve apartments and duplex units (c. 0.39 ha); (G) all ancillary development works including footpaths, landscaping boundary treatments, public, private open space areas, car parking (656 spaces) and bicycle parking (672 spaces), single storey ESB substations/bike/bin stores, 'Gateway' entrance signage (2), solar panels at roof level of apartments, and all ancillary site development/construction works; (H) Permission is also sought for revisions to attenuation permitted under SDZ20A/0021 as well as connection to water supply, and provision of foul drainage infrastructure; this application is being made in accordance with the Clonburris Strategic Development Zone Planning Scheme 2019 and relates to a proposed development within the Clonburris Strategic Development Planning Scheme Area, as defined by Statutory Instrument No. 604 of 2015; an Environmental Impact Assessment Report accompanies this planning application; the application applies for 7-year planning permission for development at this site of c. 17 .02 hectares (on two parcels of land to include entrance area) within the townlands of Cappagh, Clonburris Little & Kishoge, Co. Dublin all on wider lands bounded generally by undeveloped lands and the Dublin-Cork railway line to the north, undeveloped lands and the Grand Canal to the south, the R113 {Fonthill Road) to the east and the R136 to the west.	
SD21A/0360 Circle K Ireland Retail Limited 2, Ninth Lock Road, Dublin 22	Car wash & car wash plant room with water recycling system; re-location of the main ID sign and all associated structures, drainage and site development works.	GRANT PERMISSION 04 Aug 2022
SD228/0003 South Dublin County Council (Housing) Kishogue South West, Lynches Lane, East of R136 Outer Ring Road, DUBLIN	Proposed Social and Affordable housing development comprising of 263 residential units on a site located on lands within Clonburris SDZ, in the subsector known as Kishogue South West which is located on Lynches Lane to the East of the R136 Outer Ring Road.	PART 8 APPROVED BY COUNCIL 11 Jul 2022
TA29S.312290 Greenseed Limited	Strategic Housing Development of 750 no. residential units comprising a mix of one, two and three bed apartments. Non-residential uses will include retail/ commercial units, and a creche.	GRANT PERMISSION 16 Jun 2022

Planning Reference, Application and Location	Development Description	Decision and Grant Date
Park West Avenue and Park West Road, Park West, Dublin 12		
SD228/0001 South Dublin County Council (Housing) Bawnogue Road/Ashwood Drive, Clonburris, Clondalkin, Dublin 22	118 residential units made up of houses, duplexes, triplexes, an apartment building, landscape works, total site area approx. 2.5 ha (net). The works comprise: 11 Three-bed houses 11 Four-bed houses 25 Duplex Units comprising 2 units each (i.e. – 50 units) 9 3 stacked simplexes comprising 3 units each (i.e. – 27 units) A 4 storey Apartment building comprising 19 Apartments 112 parking spaces, 24 visitor cycle parking, ESB substation, high quality amenity spaces , landscape works, roundabout at the entrance to the development from Bawnogue Road, SUDS measures and all associated ancillary site development works. The proposal has undergone Appropriate Assessment (AA) Screening under the Habitats Directive (92/43/EEC) and screening for Ecological Assessment (EIA) under the EIA Directive (2014/52/EU). The planning authority has made a preliminary examination of the nature, size and location of the proposed development. The authority has concluded that there is no real likelihood of significant effects on the environment arising from the proposed development and a determination has been made that an AA and EIA are not required.	PART 8 APPROVED BY COUNCIL 13 Jun 2022
SD22A/0038 Cluid Housing Association Sandymills, Sandy Mill Lane, Old Nangor Road, Clondalkin, Dublin 22	Alterations to the elevations relating to planning number SD18A/0271 and as amended by further information received on the 19th December 2018.	GRANT PERMISSION 17 May 2022
SD22A/0022 Takeda Ireland Limited Takeda Ireland Limited, Grange Castle Business Park, Clondalkin, Dublin 22	The construction of a 2-storey extension and any associated site works to the south elevation of the existing engineering stores in the administration offices building which comprises of construction of circa 34sq.m area with a maximum height of 9.4m to accommodate two storey units at Grange Castle Business Park, Grange Castle, Dublin 22. The application relates to development which comprises of an activity, which requires an Industrial Emissions Licence in accordance with the First Schedule of the EPA Act 1922 as amended.	GRANT PERMISSION 05 May 2022
SD21A/0186 Equinix (Ireland) Ltd. Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22	Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level; the total gross floor area	GRANT PERMISSION 05 May 2022

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	excluding hot air plenums and external staircase is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues and lift overrun; provision of 5 external generators, 8 fuel tanks and ancillary plant contained within a plant yard to the north of DB8; provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8; provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm); provision of a delivery yard and loading bays, 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue; all associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing; no buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site; the area to the southwest of the site (temporary meadow) is reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application is accompanied by a Natura Impact Statement.	
SD21A/0149 EMO Oil Limited David Nestor Freight Services, Crag Avenue Business Park, Clondalkin, Dublin 22.	Change of use from haulage yard to filling station open to the public; additional diesel pumps; palisade fencing; illuminated and non-illuminated signage; all associated site and development works.	GRANT PERMISSION 28 Mar 2022
SD21A/0121 John Lydon Carpentry Limited Sites at 4 & 5, Station Grove, Station Road, Clondalkin, Dublin 22	Construction of 2 two and a half storey, three-bedroom terrace houses and associated site works attached to the existing two and a half storey house at No. 6 Station Grove which was constructed in 2006; the 2 houses will complete this partially finished housing development which was originally granted permission under planning reference SD05A/0125.	GRANT PERMISSION 24 Mar 2022
SD21A/0042 / PL06S.312749 EdgeConneX Ireland Limited Site within the townland of Ballymakaily, West of Newcastle Road (R120), Lucan, Co. Dublin	Construction of two single storey data centres with associated office and service areas; and three gas powered generation plant buildings with an overall gross floor area of 24,624sq.m that will comprise of the following: Demolition of abandoned single storey dwelling, remaining agricultural shed and derelict former farm building; Construction of 2 single storey data centres (12,797sq.m), both with associated plant at roof level, with 24 standby diesel generators with associated flues (each 25m high) that will be attached to a single storey goods receiving	GRANT PERMISSION 09 March 2022

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	area/store and a single storey office area (2,404sq.m) located to the west of the data centres as well as associated water tower and sprinkler tank and other services; Amendments to the internal access road and omission of access to loading bay permitted under SDCC planning Ref. SD19A/0042/ABP Ref. PL06S.305948 that include the relocation of permitted, and new, internal security gates; and new internal access roads to serve the proposed development that will provide access to 39 new car parking spaces (including 4 electric and 2 disabled spaces) and sheltered bicycle parking to serve the new data centres; The development will also include the phased development of 3 two storey gas powered generation plants (9,286sq.m) within three individual buildings and ancillary development to provide power to facilitate the development of the overall site to be located within the south-west part of the overall site. Gas plant 1 (3,045sq.m) will contain 20 generator units (18+2) with associated flues (each 25m high) will facilitate, once operational the decommissioning of the temporary Gas Powered Generation Plant within its open compound as granted under SDCC Planning Ref. SD19A/0042/ABP Ref. PL06S.305948. Gas plant 2 (3,045sq.m) will contain 20 generator units (18+2) with associated flues (each 25m high). and, Gas plant 3 (3,196sq.m) will contain 21 generator units (19+2) with associated flues (each 25m high). These plants will be built to provide power to each data centre, if and, when required. The gas plants will be required as back up power generation once the permitted power connection via the permitted substation is achieved; New attenuation pond to the north of the site; Green walls are proposed on the southern elevation of each power plant, as well as to the northern elevation of the generator compound of the data centres, and enclosing the water tower/pump room compound, and a new hedgerow is proposed linking east and west of the site; Proposed above ground gas installation compound to contain single storey kiosk (93sq.m) and boiler room (44sq.m). The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC planning Ref. SD19A/0042/ABP Ref. PL06S.305948. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC planning Ref.	
SD21A/0288 Microsoft Ireland Operations Limited Unit 75 (DUB12), Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	Erect 329sq.m or 67.34 KWp of photovoltaic panels on the roof of the building DUB12 in data centre; all associated site works.	GRANT PERMISSION 28 Jan 2022
SD21A/0280 Davenham Engineering Ltd.	New office space at first floor level (66.sq.m); minor alterations on the road frontage elevation (southeast) to include additional windows for new offices; all works proposed are ancillary to the use of the existing building and business.	GRANT PERMISSION 28 Jan 2022

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Unit 10-13, Block 1, Weatherwell Industrial Estate, Neilstown, Clondalkin, Dublin 22		
SD21A/0185 KN Network Services (Ire.) Ltd. Unit 19, Crag Avenue, Clondalkin Industrial Estate, Dublin 22	Full demolition of existing two storey 463sq.m building to make way for future development, subject to future separate planning application.	GRANT PERMISSION 21 Jan 2022
SDZ21A/0006 Irish Water Lands to the east of Fonthill Road (R113) and west of Cappaghmore, Cappagh, Clondalkin, Co. Dublin	Wastewater pumping station comprising of (a) below ground 24-hour emergency storage tank; (b) below ground inlet, wet well, flow meter and valve chambers; (c) control and welfare building with green roof and 2 odour control units; (d) boundary wall, fencing, entrance gate and landscaping; (e) site drainage system including a swale; (f) all associated ancillary and enabling works including hardstanding and access, located within the Clonburris Strategic Development Zone.	GRANT PERMISSION 08 Nov 2021
SD21A/0122 Securispeed Holdings Limited Elmfield, 9th Lock Road, Clondalkin, Dublin 22.	Erection of a marquee type structure with a floor area of 618sq.m as an extension to the side and rear of existing warehouse buildings.	GRANT PERMISSION 23 Aug 2021
ABP-209951-21 Edgeconnex Ireland Ltd Grange Castle Business Park, Grange, Dublin 22	Two no. underground 110kV transmission lines between the permitted and under construction Coolderrig 110kV substation and the Grange Castle - Kilmahud Circuits.	GRANT PERMISSION 22 Oct 2021
ABP-309146-21 CyrusOne Irish Datacentres Holdings Ltd. Grange Castle South Business Park, Baldonnel, Dublin 22.	Two no. 110kV transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation compound.	GRANT PERMISSION 19 Jul 2021
SD20A/0295 CyrusOne Irish Datacentres Holdings Ltd Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22	Amendments and modifications to the permitted data centre development granted under Reg. Ref. SD18A/0134 - ABP Ref. ABP-302813-18 and the temporary substation permission granted under SD19A/0300 to include: Demolition of the two storey dwelling of Weston House; single storey dwelling and outbuildings/ stables of Weston Lodge; and the single storey dwelling and converted garage of Kent Cottage. Retention of sprinkler tank and pump house to the south-west of Building A Data Centre to replace 4 sprinkler tanks; Retention of 40kW(p) PV panels on the roof of Building A Data Centre; Retention of revised size of northern attenuation pond and loss of permitted landscaping to its south; Retention of ramped access to rear of temporary substation permitted under SD19A/0300; Retention of revised flue arrangement for Building A Data Centre from 2 associated flues per generator to 1 associated flue per generator (16 in total) and grouped into 8 towers of two flues each (each 20m high); Retention of revised position of security fence to north, west and south of Building A Data Centre; and retention and modifications of landscape berm along Baldonnel Road and to east	GRANT PERMISSION & GRANT RETENTION 26 April 2021

Planning Reference, Application and Location	Development Description	Decision and Grant Date
	of Weston House. Development will consist of new works to include: Modifications of permitted vehicular entrance to the data centre to include a new single storey guard house (37sq.m) and two internal entrance gates; Modification to car parking so that the permitted entrance to the parking area from the east is closed off; Modifications of flue arrangement for Building B Data Centre from 2 associated flues per generator to 1 associated flue per generator (16 in total) and grouped into 8 towers of two flues each (each 20m high); Modifications to permitted landscape scheme to north and south of Building A Data Centre; Removal of roadside entrance to Erganagh House (demolished), Kent Cottage, and the former scaffolding yard; and removal of roadside entrance to Weston House and its replacement with a new agricultural gate and fence to be erected to facilitate access for maintenance and security purposes only all on a site of 9.7Ha located within lands in the Grange Castle South Business Park and the residential properties of Weston House, Kent Cottage and Weston Lodge as well as the former scaffolding yard on land within the townlands of Aungierstown and Ballybane; Ballybane; and Milltown and bounding Baldonnel Road to the west and south and Grange Castle South access road to the north, Baldonnel, Dublin 22.	
SD20A/0317 CK Hutchison Networks Ireland Limited Unit 6, The Enterprise Centre, Crag Crescent, Clondalkin Industrial Estate, Clondalkin, Dublin 22	Replace existing 18 metre telecommunications support structure (monopole design) previously granted under planning Ref. SD18A/0418 with a new 24 metre high structure (lattice structure design) carrying telecommunications equipment and ground level equipment cabin and fencing.	GRANT PERMISSION 15 Mar 2021
SD19A/0332 Metal Processors Ltd. Station Road, Clondalkin, Dublin 22	Installation of an above ground water retention tank (13.1m x 8.1m x 2.85m high); underground water retention tank (8.3m x 3.70m x 5m deep) and balancing system, located at the south-east corner of the site including the diversion of surface water drains to the existing foul sewer system via the proposed tank and all site works associated with the proposed development.	GRANT PERMISSION 18 Jan 2021
SD20A/0124 Moffash Ltd Profile Park, Ballybane, Clondalkin, Dublin 22	(1) Demolition of existing single storey dwelling (c.108.5sq.m); (2) construction of a Distribution Warehouse Building comprising warehousing and ancillary areas at ground floor and support offices, staff areas and plant across two floors; (3) the development will be accessed from the existing Profile Park estate road; (4) provision of car parking, cycle parking, security gatehouse, landscaping and boundary treatments (including security fencing and gates); (5) all associated site development and services works (including diversion/culverting/reprofiling of existing stream on site); (6) total gross floor area of the development c.17,006sq.m.	GRANT PERMISSION 17 Dec 2020
SD20A/0022 Spina Bifida Hydrochephalus Ireland Old Nangor Road, Clondalkin, Dublin 22.	New vehicle entrance in south boundary to provide access to Old Nangor Road; new security gates; new internal road to access new entrance and all ancillary works.	GRANT PERMISSION 10 Nov 2020

Planning Reference, Application and Location	Development Description	Decision and Grant Date
SD20A/0121 UBC Properties LLC Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22	Permission for a period of ten years for development at this site of 16.5 hectares that is located within lands in the Grange Castle South Business Park and includes the residential property of Ballybane, Old Nangor Road on land within the townlands of Milltown; Ballybane and; Aungierstown and Ballybane; and bounding Baldonnel Road to the west; both the Old and New Nangor Road to the north; and Grange Castle South Access Road to the South, Baldonnel, Dublin 22. The development will consist of the following: (1) The demolition of the existing two storey dwelling of Ballybane and associated farm buildings (565sq.m) and the construction of 3 two storey data centres with mezzanine floors at each level of each facility and associated ancillary development that will have a gross floor area of 80,269sq.m on an overall site of 16.5hectares. (2) 1 two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sq.m. and will include 26 emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 26 ventilation shafts which will be located above the northern end of each emergency generator that will measure 20m in height. (3) 1 two storey data centre (Building B) which will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sq.m and which will include 18 emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 ventilation shafts which will be located above the southern end of each emergency generator that will measure 20m in height. (4) 1 two storey data centre (Building C) which will be constructed last, will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sq.m. It will include 26 emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height. (5) Each of the three data centres will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility which will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators. (6) The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level. (7) 1 temporary and single storey substation (29sq.m). (8) 3 single storey MV buildings (each 249sq.m - 747sq.m in total) which manage the supply of electricity from the substations to each data centre and are located to the immediate west of the generator compound within buildings A and B, and to the south of the generator compound	GRANT PERMISSION 03 Sep 2020

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	withing building C. (9) 8 prefabricated containerised electrical rooms (65sq.m each and 520sq.m overall) that are stacked in pairs to the immediate south of the temporary substation. (10) Ancillary site development works, which will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network and installation of utility ducts and cables which will include the drilling and laying of ducts and cables under Baldonnel stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, service road, entrance gate, sprinkler tank house (72sq.m), security hut (30sq.m) and 150 car parking spaces and 78 sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west. The development will be accessed from the Grange Castle South Access Road from the south via the Baldonnel Road. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	
SD20A/0109 Dublin & Dun Laoghaire ETB Kishoge Community College, Thomas Omer Way, Lucan, Co. Dublin	2 storey modular classroom building and a single storey toilet building, steel framed covered walkway structure linking to the existing school, relocation of existing bicycle shelters and all associated site development works.	GRANT PERMISSION 19 Aug 2020
SD20A/0034 KN Network Services (Ire) Ltd. KN Group HQ, Cloverhill Industrial Estate, Cloverhill Road, Raheen, Dublin 22	Office accommodation extension to the rear of the existing office building (455sq,m at ground floor, 33.2sq.m at first floor); covered bicycle parking area to the front of the existing building 25.2sq.m; all necessary associated ancillary ground and drainage works.	GRANT PERMISSION 30 Jun 2020
21SD20A/0031 EdgeConneX Ireland Limited Grange, Newcastle Road, Lucan, Co. Dublin	Relocation of the temporary gas powered generation plant for a further two years from lands to the rear of the Takeda Ireland complex to the east of the site; to lands to the immediate north-west within the Edgeconnex campus and to the immediate east of the data centre granted and built under Reg. Ref. SD17A/0141 and SD17A/0392; the relocated temporary gas powered generation plant will be enclosed within a walled yard of 2,836sq.m containing 12 generator units with associated flues (each 15m high) that was permitted for a period of three years on the 15th May 2017 under condition No. 4 of permission granted under Reg. Ref. SD17A/0027; vehicular access to the generation plant will remain from the permitted service road into the Edgeconnex site and Grange Castle Business Park as originally permitted.	GRANT PERMISSION 30 Jun 2020
SD19A/0153 LBCG Ltd Milltown Cross, Nangor Road, Clondalkin, Dublin 22	3 new buildings. Block A: two storey with six industrial and office units; Block B: two storey with one industrial and office unit; Block C: three storey with ground floor café and office, first floor offices, second floor gym and ancillary areas; new perimeter wall and fence with two revised entrances and gates; surface car parking and all associated site works.	GRANT PERMISSION 22 June 2020
SD19A/0322 Deirdre Donoghue	Construction of 1 & 2 storey office building, c.9.43m in height providing a total GFA of 459sq.m.; provision of 11 total car parking spaces; 8 covered cycle parking	GRANT PERMISSION 17 Jan 2020

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The Grange, Ballymakaily, Newcastle Road, Lucan, Co. Dublin.	spaces; the removal of the existing temporary structures, landscaping, tree planting and all associated site and infrastructural works.	
SD19A/0300 CyrusOne Irish Datacentres Holdings Ltd. Grange Castle Business Park South, Townland of Milltown and bounding the Grange Castle South Access Road to the North, Baldonnel, Dublin 22	Single storey ESB substation (27sq.m) that will be accessed from the north off the Grange Castle South Access Road via the Baldonnel Road and off the permitted internal road granted under Reg. Ref. SD18A/0134, An Bord Pleanála Ref. ABP-302813-18 to the south; the proposal will result in a minor and temporary amendment to the landscaping and fencing permitted under Reg. Ref. SD18A/0134, An Bord Pleanála Ref. ABP-302813-18 that granted permission for a two storey data centre and delivery bays with associated three storey office block and services within the overall lands; no other changes to the permission granted under this decision are proposed under this application.	GRANT PERMISSION 09 Jan 2020
ABP-305267-19 Adwood Limited Lands at Kilcarbery, Corkagh Demesne, Deansrath, Nangor, Clondalkin, Dublin 22	The proposed development consists of a residential-led development comprising 1,034no. residential units, 1no. community facility, 1no. retail unit and 2no. childcare facilities in buildings ranging from 2 to 6-storeys.	GRANT PERMISSION 05 Dec 2019
SD19A/0004 EdgeConneX Ireland Ltd. Ballymakaily, Lucan, Co. Dublin	Enabling works to facilitate the future development of the site; topsoil strip and a cut and fill operation across the site; temporary construction access will be created off the R120 to facilitate the works within the townland of Ballymakaily to the west of the Newcastle Road (R120).	GRANT PERMSSION 28 May 2019
SD18A/0323 Interxion Ireland DAC Grange Castle Business Park, Clondalkin, Dublin 22	Construction of a two storey data centre with three storey central service spine (7,246sq.m) with plant at roof level, that includes a reception area (274.4sq.m), shipping area (264.3sq.m) and three data halls (each 582.5sq.m - total 1,747.5sq.m) plus service spine and ancillary space at ground floor; storage (476sq.m) at mezzanine level above the shipping area; and office (560sq.m), three data halls (each 582.5sq.m - total 1,747.5sq.m) plus service spine and ancillary space at first floor level; and service spine at second floor level only. The new data centre will include plant at roof level; associated support services, 7 standby generators with associated flues (each 17.29m high). The development with include a single storey sub-station (74.5sq.m), transformer 26.8sq.m and bin compound (33sq.m) and will connect to existing Grange Castle infrastructural services the will include a new access road that will provide independent vehicular access to the site off the northern spine road that provides access to the existing data centre granted under SD15A/0034. The development will include ancillary site works as well as fencing, signage, entrance gate, 22 car parking spaces that include 2 disabled car parking spaces, as well as sheltered bicycle parking. The development will also include modifications to the attenuation pond, and to the landscaping previously permitted under SD15A/0034. Temporary permission is also sought for 72 temporary construction worker parking spaces, temporary construction compound and temporary construction access from Grange Castle	GRANT PERMISSION 10 Dec 2018

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	Business Park lands to the west. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	
TA06S.305267 Adwood Ltd Outer Ring Road/ Grange Castle Road (R136), Old Nangor Road (L5254), Cherrywood Park, Kilcarbery Avenue and Corkagh Park, Townlands of Kilcarbery, Corkagh Demesne, Deansrath and Nangor, Co. Dublin.	The proposed development consists of a residential-led development comprising 1,034 no. residential units, 1no. community facility, 1no. retail unit and 2no. childcare facilities in buildings ranging from 2 to 6-storeys.	GRANT PERMISSION 05 Dec 2019
SD19A/0255 KN Partnership Unit 3-4, Crag Avenue Business Park, Clondalkin Industrial Estate, Dublin 22	Retention of: (i) change of use of part of ground floor warehouse area to reception area, canteen and wc's; (ii) curtain glazing and door at ground floor and windows at first floor level and double height glazed entrance lobby. Permission for: (i) ground floor lobby and wc's; (ii) extension of first floor mezzanine to provide open plan office and storage area.	GRANT PERMISSION & GRANT RETENTION 18 Nov 2019
SD198/0007 South Dublin County Council (Housing) New Nangor Road/Fonthill Road South, Clondalkin, Dublin 22	Social Housing development comprising of 93 units on undeveloped lands at the junction of New Nangor Road and Fonthill Road South to the east, Old Nangor Road to the south and Cherrywood Crescent to the west, in Clondalkin, Dublin 22 consisting of: 15 3-bedroom houses, 5-person, 2-storey; 18 own-door duplex units comprising 9 2-bed, 3-person ground floor units and 9 3-bed, 4-person, 2-storey upper units; 60 apartments in 2 x 30-unit blocks, each block comprising 6 1-bedroom units, 10 2-bedroom units, 4 3-bedroom units, 10 3-bedroom units. All units will be provided with private open space in compliance with the current South Dublin County Council Development Plan. Car-parking will be provided as required by Development Plan standards comprising 135 car-parking spaces in total. The development will also include 2 single-storey utility buildings including bin stores, sub-stations and a total of 16 internal long stay bicycle parking spaces and 8 external short stay bicycle spaces. The works include: New access to the east of the site off Old Nangor Road, new access to the west of the site off Cherrywood Crescent, landscaping works to boundaries, new park/play areas, ancillary works to landscape housing areas, and all necessary associated ancillary works on the site and adjacent areas. The proposed scheme has undergone an Appropriate Assessment Screening under the Habitats Directive (92/43/EEC). It has also undergone a preliminary examination for an Environmental Impact Assessment and the Planning Authority has concluded that there will be no real likelihood of significant effects on the environment arising from the proposed development and therefore an Environmental Impact Assessment is not required.	PART 8 APPROVED BY COUNCIL 14 Oct 2019
SD19A/0023 Toolfast Ltd	370sq.m side & rear extension & new entrance.	GRANT PERMISSION 26 Sep 2019

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Unit 18/1, Clondalkin Industrial Estate, Dublin 22		
SD19A/0098 Morehampton Foods Ltd Unit E20, Cloverhill Industrial Estate, Ballymanaggin, Clondalkin, Dublin 22	(1) Demolition of front single storey entrance building and rear storage area; removal of trees to facilitate vehicular entrance, road and associated site preparation work; (2) 630sq.m. two storey front entrance building including café and office space with flat roof and building signage; 206sq.m. single storey dispatch fridge with flat roof, level loading dock and canopy complete with associated plant; (3) roller shutter door and canopy and pedestrian doors to existing building; (4) enclosed bin store; (5) reorganisation of parking to provide 49 total parking spaces; (6) enlargement of the existing side plant enclosure; (7) all associated site, civil, drainage and landscaping works required for the construction and usage of the proposed building.	GRANT PERMISSION 16 Sep 2019
SD18A/0447 Dublin & Dun Laoghaire Education Board Colaiste Chillian, Nangor Road, Clondalkin, Dublin 22	Modifications to existing grant of permission, Reg. Ref. SD17A/0035, consisting of: material change of roof finish for the construction of two new 3 storey primary school buildings for Gaelscoil na Camóige agus Gaelscoil Chluain Dolcáin and a material change of roof finish for the construction of the new single storey PE hall building for Coláiste Chilliain; roof mounted photovoltaic (PV) panels for Gaelscoil na Camóige agus Gaelscoil Chluain Dolcáin and for the PE hall building; Gaelscoil na Camóige will accommodate PV panels on the east facing (rear roof); Gaelscoil Chluain Dolcáin will accommodate PV panels on the south facing (rear roof); the PE hall building will accommodate PV panels on the southwest facing (rear roof); the overall number of PV panels is 340 with an approximate area of 560sq.m.	GRANT PERMISSION 02 Apr 2019
SD18A/0288 KN Group KN Group HQ, Cloverhill Industrial Estate, Cloverhill Road, Raheen, Dublin 22	Additional car parking for staff use. Parking will be constructed in two phases providing 71 spaces (a nett increase in overall parking of 59 car park spaces). The order that the phases are constructed in will be determined by parking need at the time. The proposed works include all necessary associated ancillary ground and drainage works.	GRANT PERMISSION 25 Mar 2019
SD18A/0271 Rhonellen Properties Limited Old Nangor Road, Clondalkin, Dublin 22	Construction of a community housing scheme for the elderly arranged in 4 blocks of 1-5 storeys with lower ground floor entry level to Blocks A, B and C. The scheme will comprise 99 1-2 bedroom apartments consisting of 76 1-bedroom, 21 2-bedroom and 2 studio apartments for visitors with north west, south west, south east and north east facing balconies/terraces, ancillary areas including plant/stores to Blocks A and C, communal areas/facilities and entrance lobby in Block B (c.194sq.m) and bin storage and plant room in Block D (c.106sq.m), lobby, stair and lift access throughout. All associated site development works, services provision, drainage, new pedestrian and vehicular access, car and bicycle parking, roof plant including photovoltaic panels, ESB cabinet, open space, landscaping and boundary treatment works. The total gross floor area of the proposal is c8,229sq.m. This site of c.0.9986ha is on part of the former Clondalkin Paper Mills Pitch and Putt Club lands, Mill Lane, off the Old Nangor Road. The	GRANT PERMISSION 05 Mar 2019

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	subject site is bounded to the north by the River Camac, to the south by Mill Lane to the east by the Kingdom Hall of Jehovah's Witnesses and pitch and putt clubhouse/bar known as 'The Glue Pot' and to the west by Clondalkin Leisure Centre.	
SD18A/0388 James Stafford Old Nangor Road, Clondalkin, Dublin 22	Construction of a new part 2, 3 and 4 storey apartment development with 12 units; 4 two bed units, 7 one bed units and 1 studio unit; 1st, 2nd and 3rd floor roof gardens and recessed balconies at 1st, 2nd and 3rd floor onto Mill Lane; 12 car parking spaces and 18 bicycle spaces at ground floor level with a landscaped deck above; vehicular access to site with at Mill Lane and associated landscaping and site works at junction of Mill Lane and Leinster Terrace.	GRANT PERMISSION 04 Feb 2019
SD18A/0299 Martin O'Loughlin Unit 20 & Unit 21, Weatherwell Industrial Estate, Clondalkin, Dublin 22	New industrial unit for storage space facility, 98sq.m and 8.2m in height and all associated site works.	GRANT PERMISSION 27 Nov 2018
SD18A/0269 Gas Networks Ireland Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	Extension to an above ground natural gas installation consisting: of regulator/meter kiosk, boiler/generator kiosk, underground and aboveground pipework, 2.4m high chainlink and pallisade fencing, light columns and all ancillary services and associated site works.	GRANT PERMISSION 30 Oct 2018
SD188/0006 South Dublin County Council (Housing) New Nangor Road, Clondalkin, Dublin 22	Social Housing Development comprising of two and three storey housing and apartment units (44 units in total) on a site located at New Nangor Road, bounded by Riversdale Estate & Mayfield Park, Clondalkin, Dublin 22. The proposed development shall consist of: 19 3-bed, two storey houses, 1 two storey specially adapted unit and 24 2-bed apartments in 3 storey building. The works include: Landscaping works to boundaries and new park/play area, new pedestrian access routes to adjacent shopping facilities and transport, ancillary works to landscape housing areas, and all necessary associated ancillary works on the site and adjacent areas. The housing provision includes two storey houses in terraces and adjacent to the existing two storey housing, and three storey own door apartments of 3 units addressing the new Nangor Road.	PART 8 APPROVED BY COUNCIL 08 Oct 2018
SD18A/0169 Takeda Ireland Ltd. Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22.	New single storey electrical building at a height of 4.15m with an area of 136sq.m., an external utility yard for 2 low voltage containerised generators, 2 step up transformers and an above ground, double-skinned, bunded, bulk storage fuel tank for the purpose of standby power generation. Modifications to existing berm and the addition of a new grassed berm are also to be included all on a 10.3 hectare site. This application relates to development on a site which carries out an activity that requires an Industrial Emissions Licence in accordance with the First Schedule of the EPA Act 1992 as amended.	GRANT PERMISSION 20 Aug 2018
SD17A/0392 / ABP-300752-18 EdgeConneX Ireland Ltd.	Amendment and completion of the permission granted under SD17A/0141 to facilitate a 125sq.m extension to the north and south of the permitted stand-alone single storey data hall of 1,515sq.m to create an extended stand-alone single	GRANT PERMISSION 26 Jul 2018

Planning Reference, Application and Location	Development Description	Decision and Grant Date
Site within the townlands of Ballymakaily & The Grange, Newcastle Road, Lucan, Co. Dublin	storey data hall of 1,640s.qm. The permitted data hall will remain located as per SD17A/0141 - that is to the north of the data hall and its extension and to the west of the temporary gas powered generation plant permitted under Reg. Ref. SD16A/0214, SD16A/0345 and SD17A/0027 and to the immediate east of the R120. This amendment application will increase the height of the compound and data hall building by 1.2m - 1.96m and it will remain single storey. Internal alterations to the data hall layout are also proposed. No changes are proposed to the plant at roof level; associated support services, with a slight repositioning to the north of the 4 no. standby generators with associated flues (each 15m high). The development will include a revised location for the sprinkler tank and pump room, as well as revisions and extensions to the permitted service road and new access gate to provide vehicular access to the data hall and 3 car parking spaces permitted under SD17A/0141. The development will also include modifications to the landscaping to all frontages permitted under SD16A/0214, SD16A/0345 and SD17A/0141. This application also includes for revisions to the former access off the R120 that will allow emergency access only from this point into the site. It will continue to maintain local access to the rear of the property to the south of this former access as permitted and will reduce the number of car parking spaces permitted under SD16A/0214 from 26 to 25 car parking spaces. The development will continue to include ancillary site works, connections to existing Grange Castle infrastructural services as well as fencing and signage. No changes to the permitted attenuation pond is proposed. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.	
SD18A/0092 Takeda Ireland Ltd. Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22.	Amendments to the previously approved application SD17A/0354: Increase of total main building floor area over both floors of 163sq.m, minor amendments to building elevation including changes to external doors and windows to both electrical building and main building, the relocation of the approved electrical building and reduction in area, the relocation of the approved nitrogen tank and the inclusion of a CO2 tank compound of approximately 28sq.m, removal of approved pump house from site plan, removal of piperack connection to existing piperack, relocation of bicycle shelter, relocation and reduction of car parking spaces from 81 to 47 (of these 2 are accessible and 4 are E-Car spaces). An EIAR (Environmental Impact Assessment Report) will be submitted with this application, all on an 8.2 hectare site at Grange Castle Business Park. This application relates to development which comprises of an activity which requires an Industrial Emissions Licence in accordance with the First Schedule of the EPA Act 1992 as amended.	GRANT PERMISSION 25 Jun 2018
SD18A/0096 Gas Networks Ireland	A 3m high 'lamp post' style relief vent stack servicing the existing above ground natural gas pressure reduction unit with all ancillary services and associated site works.	GRANT PERMISSION 25 Jun 2018

Planning Reference, Application and Location	Development Description	Decision and Grant Date
Deansrath District Regulating Installation (DRI), Kilmahuddrick Avenue, Clondalkin, Dublin 22		
SD18A/0024 Cover Up Ltd Unit 15, Crag Crescent, Clondalkin Industrial Estate, Clondalkin, Dublin 22	A 347sq.m extension being single storey to the rear and 2 storey to the side containing light industrial storage and fabrication space.	GRANT PERMISSION 30 Apr 2018
SD17A/0384 Chandos Investments PLC The Mill Centre, Clondalkin, Dublin 22	(a) Removal of the existing signage on the front elevation, (b) the installation of illuminated fascia signage to the front elevation, (c) the erection of 1 Totem Pole to the Old Nangor Road entrance with recessed up-lighting installed at ground level, (d) 1 Totem Pole to the Ninth Lock Road entrance with recessed up-lighting installed at ground level and (e) associated site works.	GRANT PERMISSION 28 Mar 2018
SD17A/0143 / PL06S.248966 David Donnelly Units 2 & 3, 6, Besser Drive, Clondalkin, Dublin 22	New vehicular access for Unit 2, boundary fencing and related works.	GRANT PERMISSION 04 Dec 2017

APPENDIX 2.2

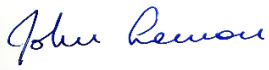
GNI GRANGECASTLE PIPELINES CONSTRUCTION METHODOLOGY

PREPARED BY FINGLETON WHITE

Gas Networks Ireland

GNI Grangecastle Pipelines Construction Methodology

CLIENT	Gas Networks Ireland		
PROJECT	GNI Grangecastle Pipelines		
CLIENT PROJECT NO.	48211670		
TITLE	Construction Methodology		
DOCUMENT NO.	1587-RT-0001	**Revision**	2

REVISION NO.: 2	**PURPOSE: Revised for EIAR Issue**		
Name	**Position**	**Signature**	**Date**
Ben McAlister Author	Graduate Design Engineer		26/09/2023
Eoghan O'Hora Co Author	Design Engineer		26/09/2023
Paul Lynch Co Author	Design Engineer		26/09/2023
John Lennon FW Approver	Design Engineer		27/09/2023

History of Issues / Approvals

REV	DATE	DESCRIPTION OF CHANGES	FILE NO.
0	13/06/23	Draft for Discussion with MIL	1587-RT-0001-R0
1	28/08/23	For Issue	1587-RT-0001-R1
2	27/09/23	Revised for EIAR Issue	1587-RT-0001-R2

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APPENDIX A: Pipeline Routes and Footprint for EIA (Redline Boundary)
APPENDIX B: Typical Trench Reinstatement Details
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APPENDIX D: GNI-134-06-001 Griffeen River Crossing Plan and Longitudinal Section
APPENDIX E: GNI-0101-DG-006-R0 Indicative Pipeline Temporary Construction Compound Layout
APPENDIX F: Badonnel Stream Crossing Plans and Longitudinal Sections

Introduction

The purpose of this document is to outline the construction techniques and methodology which will be implemented during construction of the proposed pipelines in the Grangecastle area which will connect the following proposed AGIs to the transmission gas network; Ballybane AGI, Milltown AGI, Kilcarbery AGI and Profile Park AGI. The purpose of this project is to provide natural gas to three new datacentres, Microsoft Operations Ireland Ltd. (Ballybane AGI), Data and Power Hub Services Ltd. (Milltown AGI) and Vantage DC (Kilcarbery AGI), in addition to a new Power Generation Plant for Greener Ideas Ltd (Profile Park AGI).

This document outlines all the pipelines required for this project. It is intended to be used as an aid to understand the methodologies to be employed during construction for the purposes of the environmental studies.

1.1 Pipeline Overview

Figure 1 gives an overview of all proposed pipelines in the Grangecastle area.

GNI134 Milltown Pipeline, will serve as a strategic main and will allow for multiple offtakes in the Grangecastle area. This pipeline shall be an offtake from the existing 900 mm NB Ballough to Brownsbarn pipeline, BGE/72. The Milltown pipeline shall be 400 mm NB as requested by GNI. The pipeline shall terminate within Milltown AGI (Gas to Bulmer) with multiple spur offtakes along the route for other projects / AGIs.

GNI135 Ballybane pipeline shall be a 200 mm NB spur off the GNI134 pipeline to feed Ballybane AGI (Gas to Microsoft). GNI136 Clonburris Pipeline will provide redundancy for Microsoft Operations Ireland Ltd. This pipeline is to be an offtake from the N.E.P. 1 Abbotstown to Brownsbarn pipeline, BGE/13. This pipeline shall be 200 mm NB and is designed to solely supply Microsoft Operations Ireland Ltd.

GNI137 Kilcarbery pipeline shall be a 200 mm NB spur off the GNI134 pipeline to feed Kilcarbery AGI (Gas to Greener Ideas Profile Park).

GNI142 Profile Park pipeline shall be a 200 mm NB spur off the GNI137 pipeline to feed Profile Park AGI (Gas to Vantage).

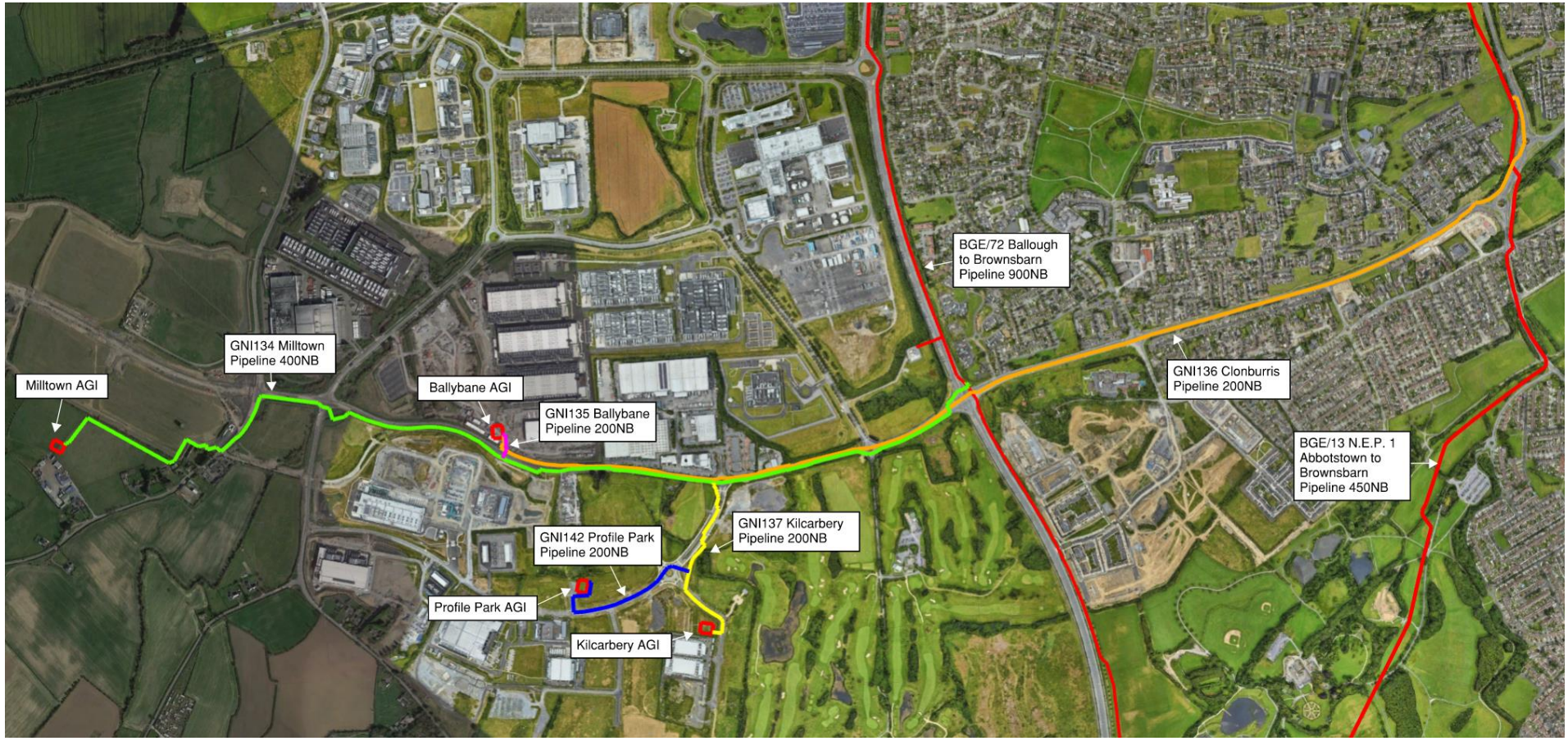

Figure 1 - Overview of the Grangecastle Pipelines

GNI134 Milltown Pipeline

Outline of GNI134 pipeline works:

- Install 3.0 km of 400 mm NB steel pipeline.
- Install 1 No. hot tap offtake valve arrangement at tie in location.
- 1 No. river crossing.

The 400 mm NB pipeline will tie in to the existing 900 mm NB Ballough to Brownsbarn pipeline at the intersection between R134, Nangor Road, and R136, the Outer Ring Road, Dublin 22. It will then route west along the New Nangor Road (R134), and south along the R120 until reaching the Old Nangor Road intersection. The pipeline then diverts west onto a South Dublin County council owned field. The pipeline runs along the perimeter of the field before crossing the site boundary and entering the Data and Power Hub Services Ltd. premises. The pipeline then follows an access roadway northwest to enter the AGI at the eastern corner.

The pipeline route includes 1 no. river crossing approximately 1.9 km west of the hot tap location. It is proposed that, with the exception of the Griffeen River crossing, the open cut method is utilised for installation of the whole pipeline route. It has been advised that due to the high level of biodiversity in the area, the Griffeen River crossing should be trenchless. For more details on the trenchless crossing and open cut method refer to Sections 7.1.1 and 7.1.3 respectively.

2.1 Proposed Pipeline Route

The location of the proposed AGI, pipeline and tie in point is shown in Figure 2. BGE/72, Ballough to Brownsbarn pipeline, is the nearest gas transmission pipeline and hence the chosen tie in point. The majority of the proposed pipeline is located within the roadway. It should be noted that there are several sections of the route in which the verge can be utilised to avoid third party services and road closures. All areas for which the verge may be utilised are shown in Figure 3, Figure 4 and Figure 5 below. Additionally, a South Dublin County Council owned field to the west of Old Nangor Road is entered for a length of 180m to avoid a high-density area of third party services along the R120. The grassy area southeast of the R134-Baldonnel Road intersection is also utilised for launch and reception pits for the trenchless Griffeen river crossing.

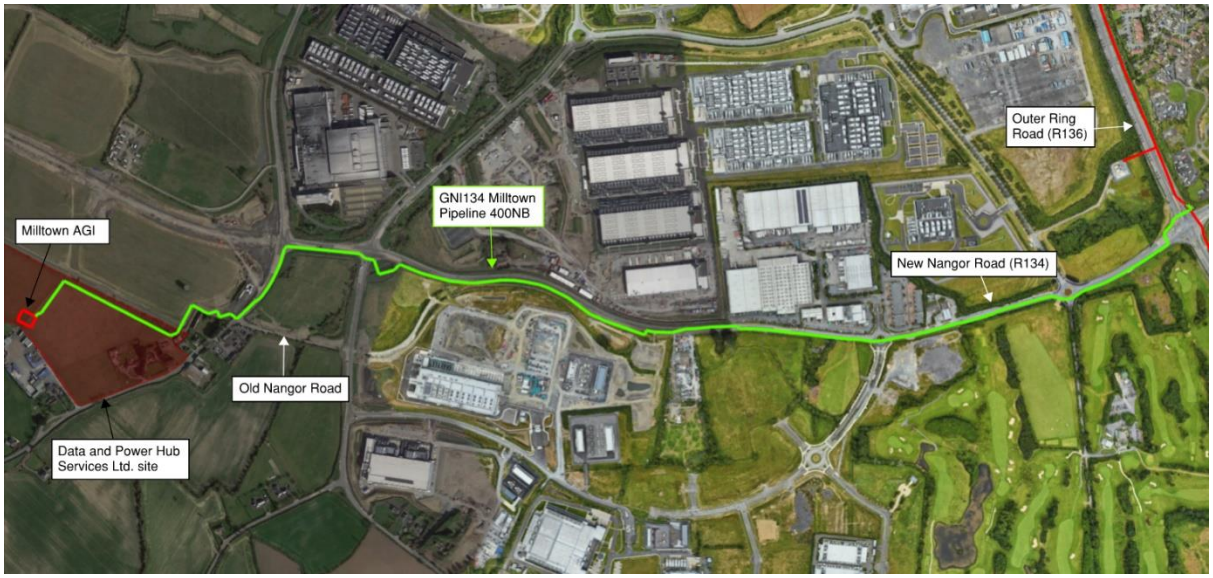

Figure 2 - Overview of Data & Power Hub Services Site, GNI134 Pipeline Route, AGI Location, and Location of Nearby Transmission Network

Figure 3 shows the pipeline entering the verge after crossing the R136.

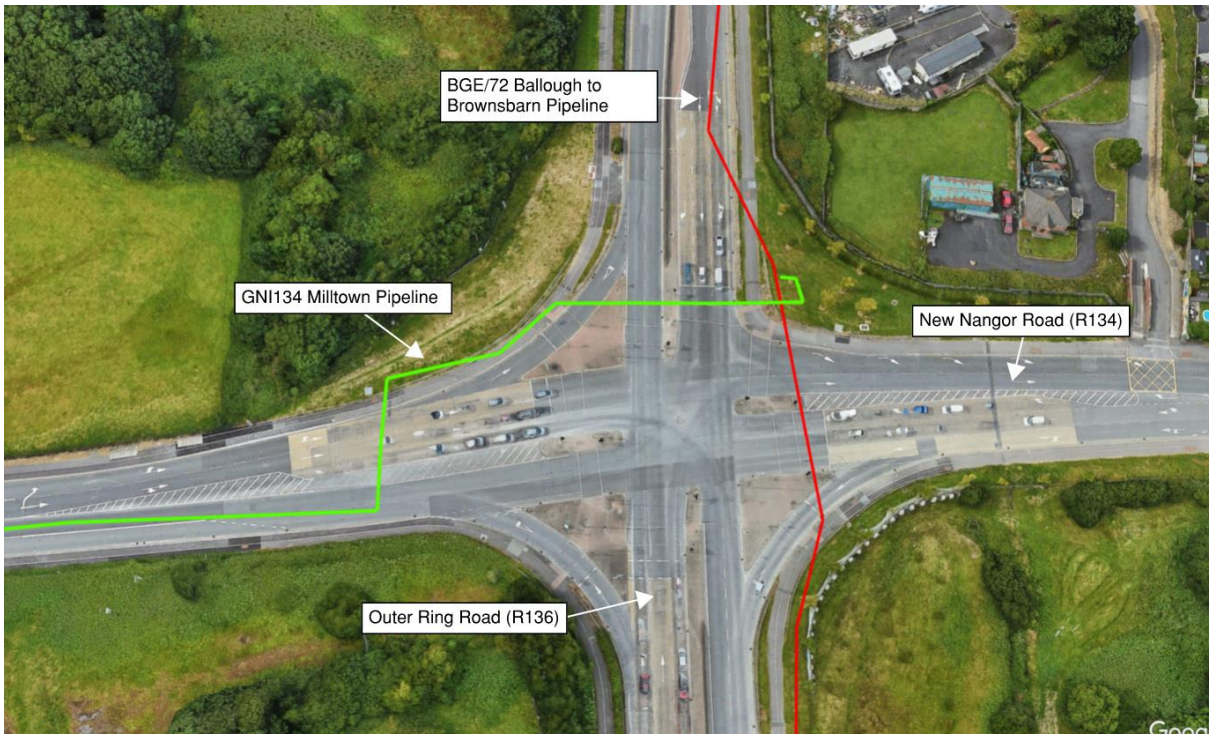

Figure 3 - Verge utilised at the west side of the R136

Figure 4 shows the pipeline route through the Grange Castle Golf Club roundabout. It is proposed to divert the into the bus lane and continue within the grass verge to avoid running in close proximity to a high voltage electrical service which is running parallel.

Figure 4 - Verge utilised at Grange Castle Golf Club roundabout

Figure 5 shows pipeline route within the grass verge and cycle path of the New Nangor Road for approximately 650 m from Boland's Car Centre to the Griffeen River. Figure 6 shows the area where the pipe enters the grass verge from the centre of the road.

Figure 5 - Grass verge and cycling path utilised along New Nangor Road

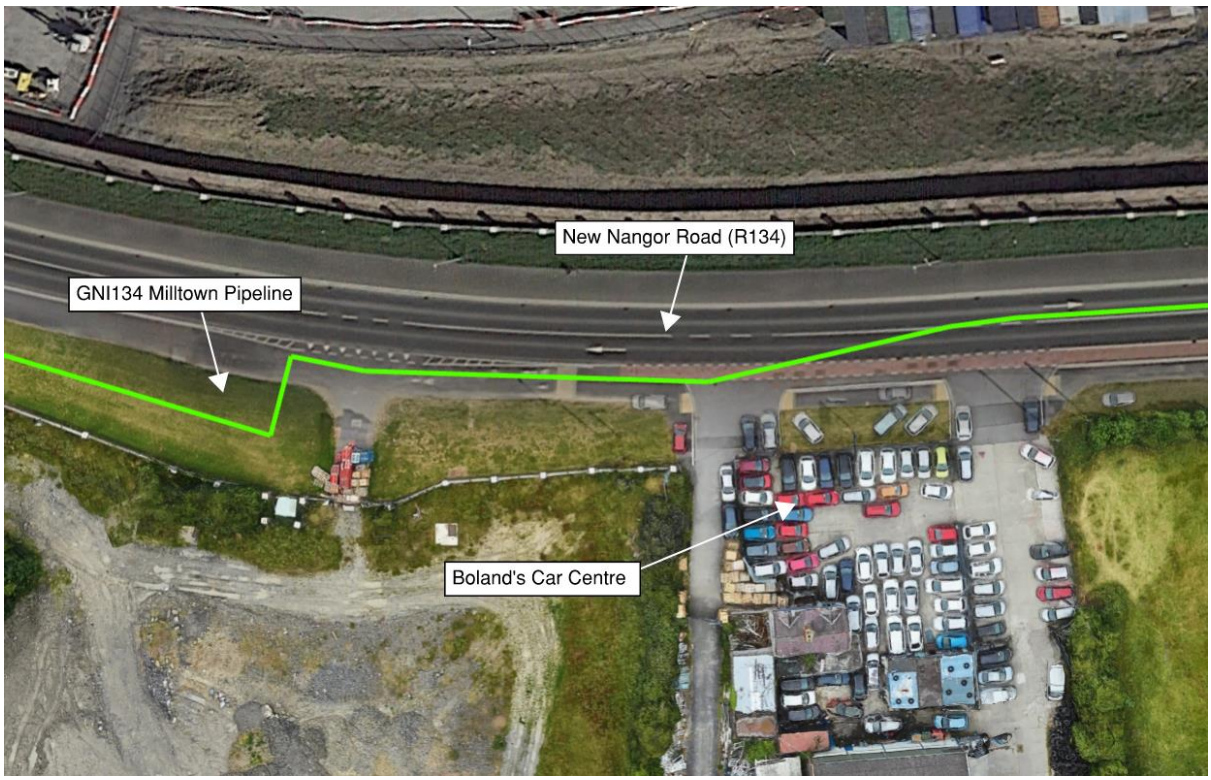

Figure 6 - Pipeline route turns onto cycling path then grass verge at Boland's car centre

Figure 7 depicts the pipeline route along the R120 and into Data & Power Hub Services site. The pipeline follows the R120 along the eastern side of the road, the route then diverts west upon reaching the Old Nangor Road intersection into a South Dublin County Council owned field. The pipeline follows along the perimeter of the field before entering the Data & Power

Hub Services premises through the north-eastern corner. The pipeline is routed through the berm onto a site access roadway which it follows westward, to enter the AGI on the north-eastern corner.

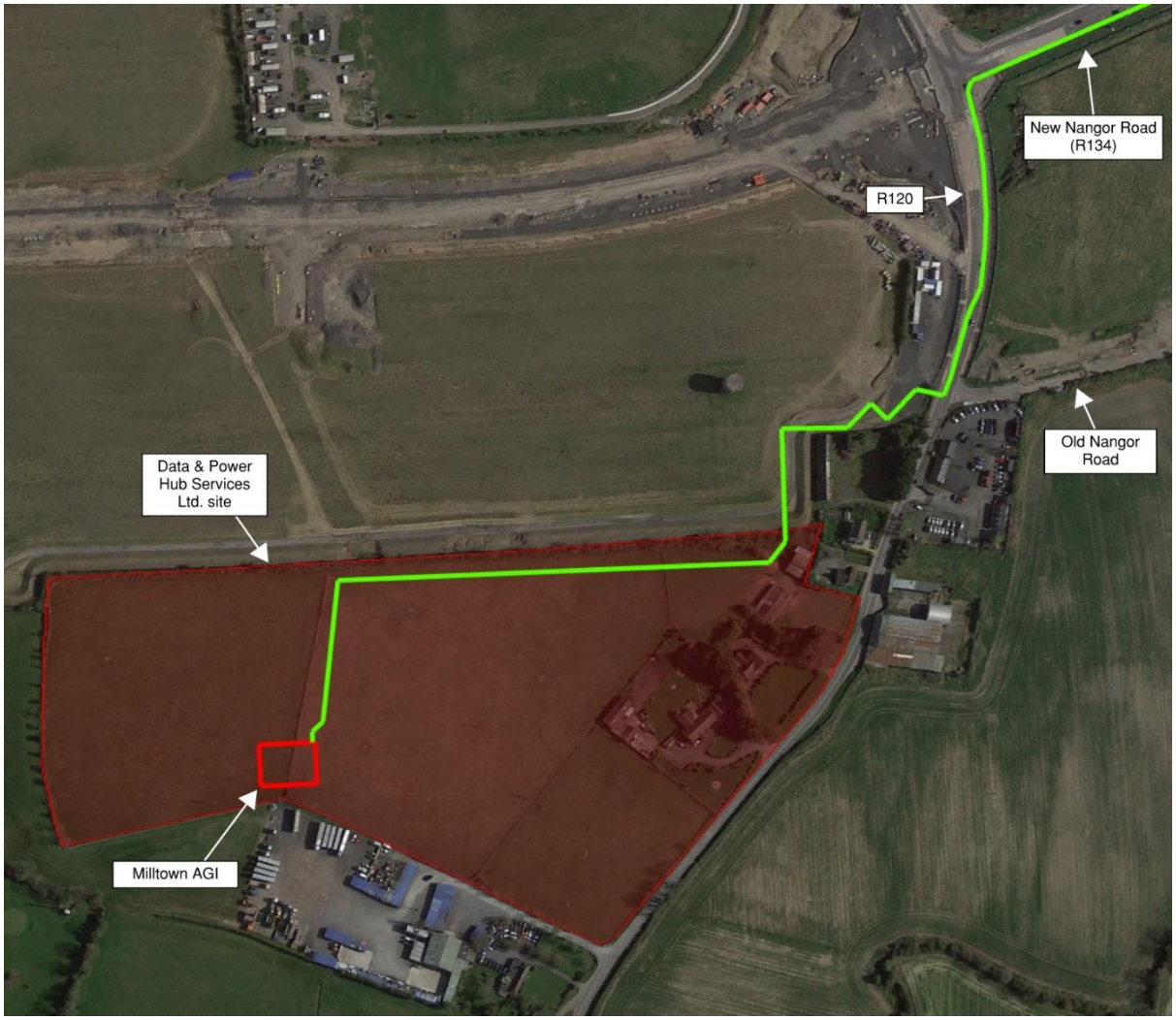

Figure 7 - Pipeline Route into Data & Power Hub Services site

2.1.1 Tie-in Point

The tie in point will be at the north-east verge of the intersection between R134, Nangor Road, and R136, the Outer Ring Road, as shown in Figure 8, Figure 9 and Figure 10. An approximate 3.7 m deep excavation is required to perform the hot tap works, based on current as-laid depth of cover information for the existing BGE/72 Ballough to Brownsbarn pipeline. An excavated length of 10 m from the hot tap is required to facilitate the drilling equipment. The proposed hot tap valve arrangement is shown in Figure 11. Note, the whole verge will be utilised as a temporary works area during the hot tapping process, refer to Figure 8 for a typical working area required at this location to perform the works.

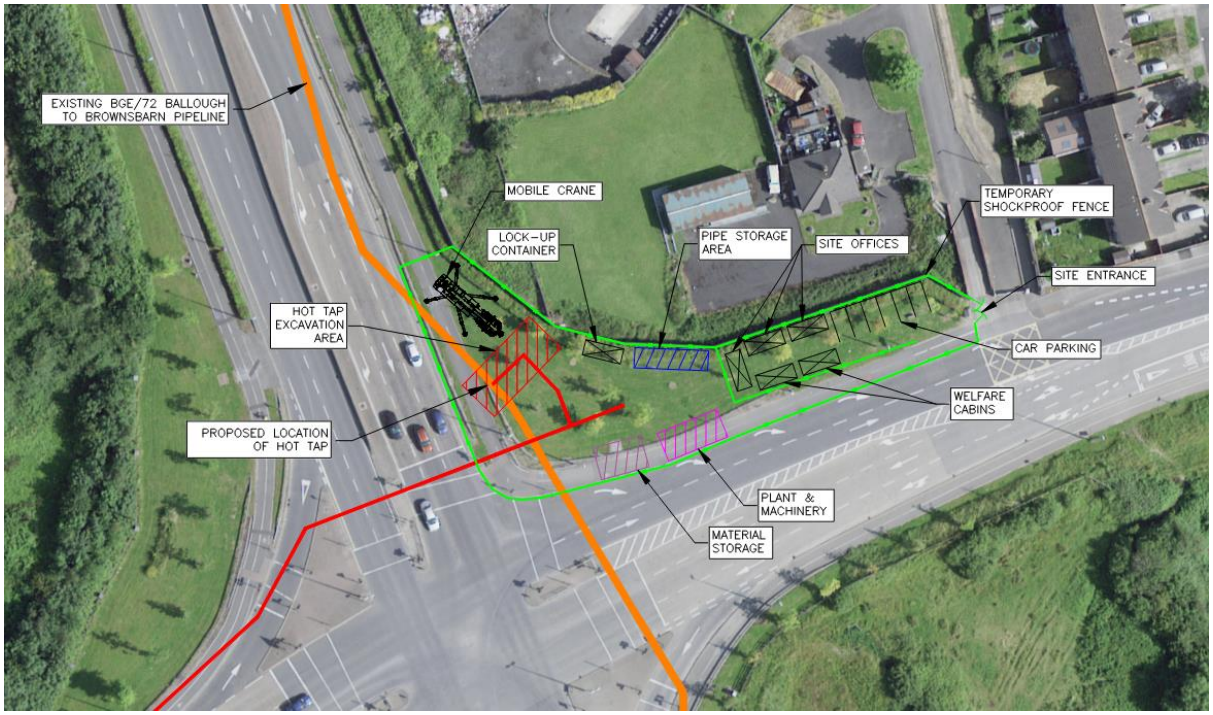

Figure 8 - Tie-in Location Plan View

Figure 9 - Tie-in Location Street View

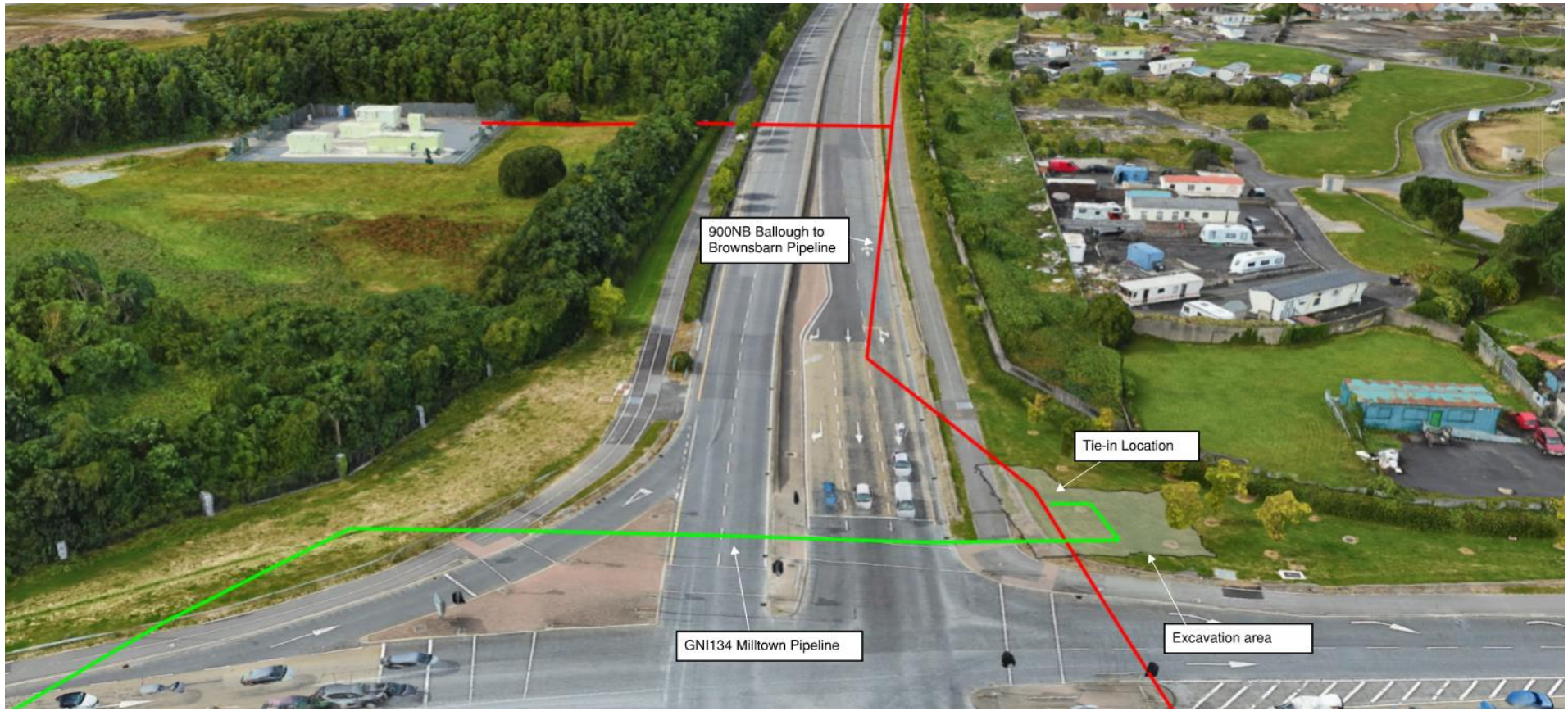

Figure 10 - Tie-in location 3D view

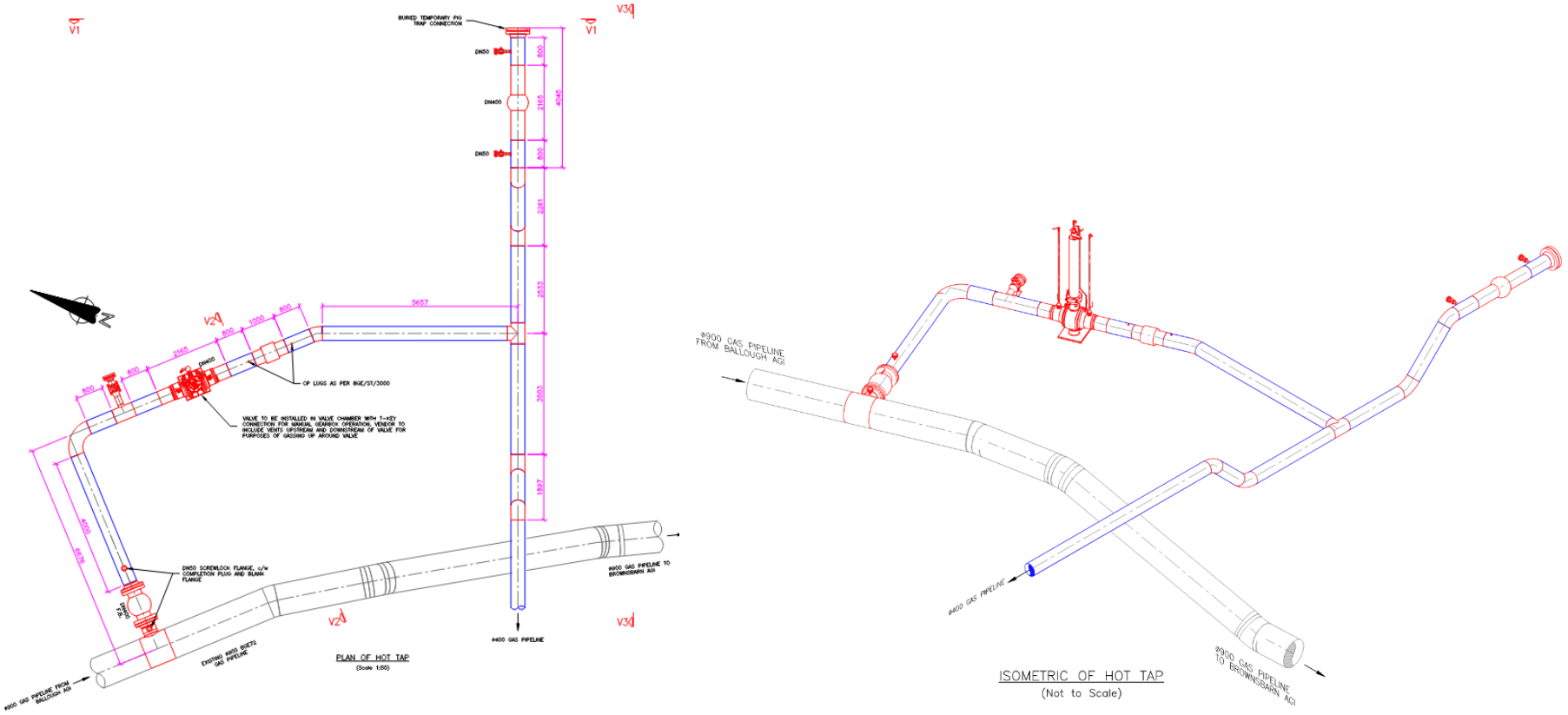

Figure 11 – Valve Arrangement at Tie-In

2.1.2 Main Pipeline Route in Roadway

The pipeline route crosses one major traffic junction, the R134-R136 intersection at the hot tap location. This junction is shown in Figure 3. The pipeline crosses perpendicular to R136, which at this location comprises of two footpaths/cycling lanes and six traffic lanes. It is expected that pipeline construction in this area will involve single lane isolation, where the pipe is laid and the road reinstated one lane at a time, thereby minimising the works effect on traffic flow in the area. It may also be prudent to restrict works to non-peak times such as weekends or evenings for this area. The contractor shall produce a traffic management plan for the entirety of the works, and this shall be agreed with the local authority.

A number of minor junctions are also crossed, including two roundabouts and the R134-Baldonnel Rd. intersection.

Figure 12 – Profile Park Roundabout

The R134-Baldonnel Rd. intersection involves crossing three lanes of the Baldonnel road, while routing the pipeline along a west bound lane in R134. As with the R134-R136 intersection it may be prudent to restrict works to non-peak times such as weekends or evenings for this area. The R134-Baldonnel Rd. intersection is shown in Figure 13 below.

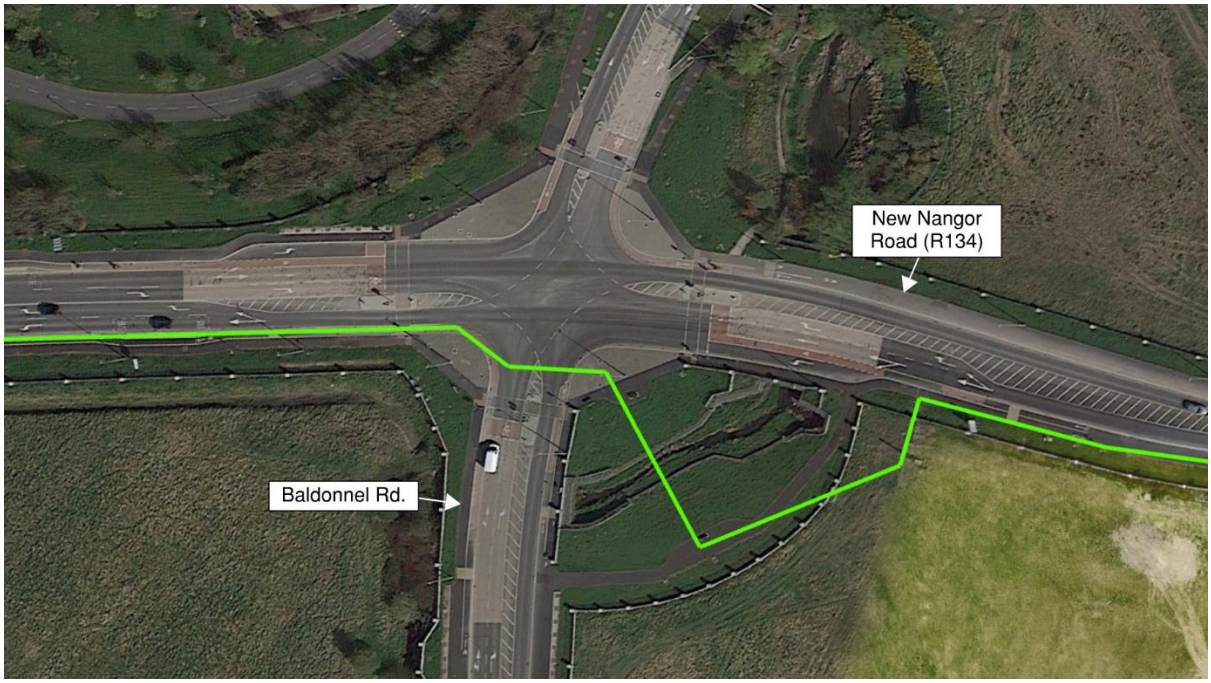

Figure 13 – R134–Baldonnel Rd. Intersection

The location of each road / intersection crossing can be found in Figure 14 below.

Figure 14 - Road crossings for pipeline GNI134

2.1.3 River Crossing

The pipeline route crosses the Griffeen River approximately 1.9 km east of the hot tap location. The location of the river crossing is shown in Figure 15 and Figure 16 (approx. coordinates 53°19'13.8"N 6°27'22.0"W). Initially it was thought an open cut method would be

suitable for the river crossing. However, review with the project ecologist found the area to have high local biodiversity value (SDCC area). The presence of otter is well known by SDCC biodiversity officers, and NPWS would be highly concerned about any potential impacts on water quality. There are also White claw Crayfish and Trout that are stocked in the river by Anglers Association/Inland Fisheries Ireland. Overall, there would be a high risk to the project with a trenched crossing solution. As a result, specialist advice was sought to determine the feasibility of a trenchless crossing.

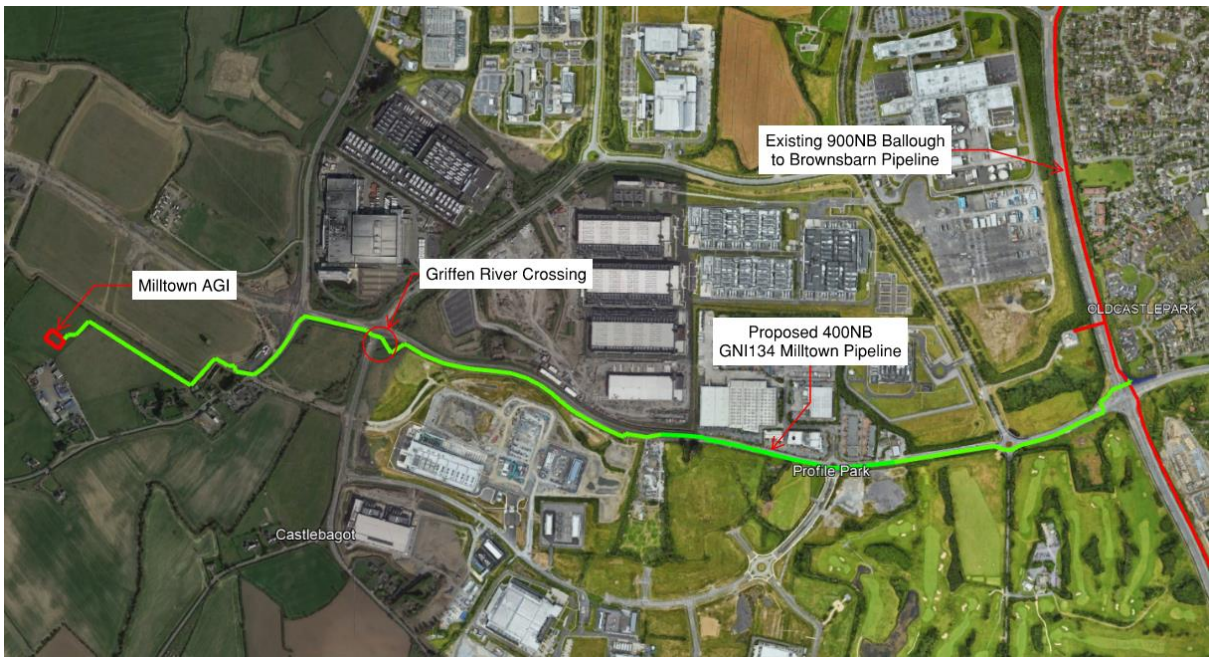

Figure 15 - Overview of the Proposed GNI134 Pipeline Route with River Crossing Location

1587-RT-0004-R0 Griffeen River Trenchless Crossing Feasibility Report was produced to assess the feasibility of a trenchless crossing and, if feasible, which construction technique would be most appropriate for this crossing. The report found that trenchless crossing would be feasible, and an unguided auger bore would be the most suitable technique given the short nature of the pipeline crossing.

The trenchless crossing method is described in more detail in section 7.1.1. A plan and section view of the river crossing can be seen in Appendix D.

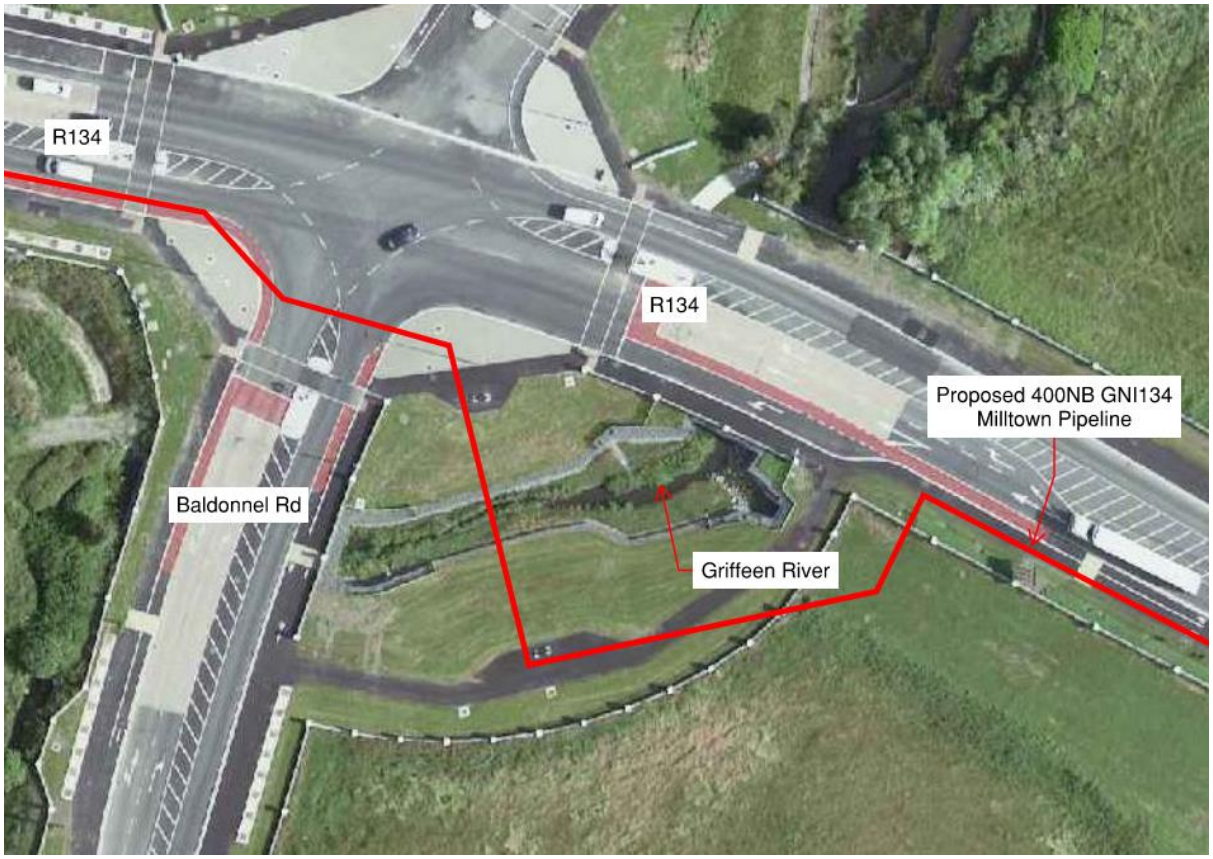

Figure 16 - Plan View of Griffeen River Crossing Location

GNI135 Ballybane Pipeline

Outline of GNI135 pipeline works:

- Install 0.08 km of 200 mm NB steel pipeline.
- Install offtake from GNI134 pipeline.

The 200 mm NB pipeline will tie in to the proposed 400 mm NB GNI134 pipeline in the New Nangor Road, south of the proposed Ballybane AGI. It will cross the Nangor Road and then route north through Microsoft Operations Ireland Ltd.'s site before entering Ballybane AGI. There are no significant crossings along the proposed route, hence the open cut method is proposed for the entire pipeline length. For more detail, please refer to section 7.1.3.

3.1 Proposed Pipeline Route

Figure 17 depicts the location of the proposed AGI, pipeline, and tie in point. The GNI135 pipeline will tie-in with the new GNI134 pipeline within R134 grass verge / footpath. A 400 mm x 200 mm barred tee and a buried valve arrangement shall be installed to facilitate a tie-in with GNI135. The construction of GN135 will start once the tee has been installed. The GNI135 pipeline shall cross the New Nangor Road, R134, and enter Microsoft Operations Ireland Ltd.'s new proposed site, routing north before turning 90 degrees to enter Ballybane AGI.

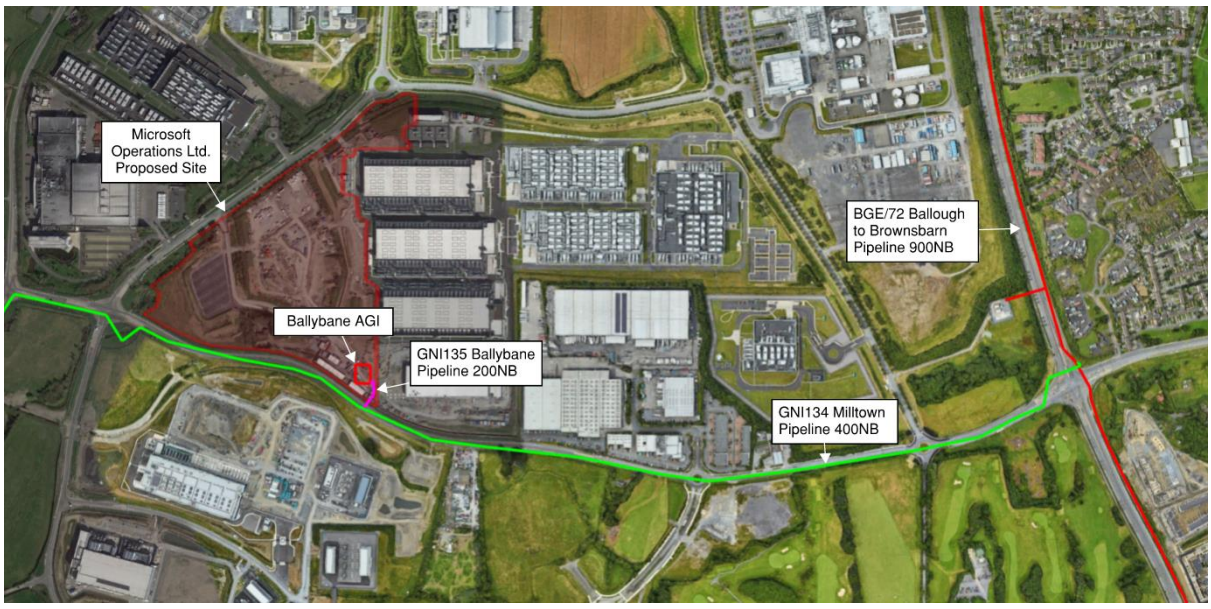

Figure 17 - Overview of Microsoft Operations Ireland Ltd. premises, AGI Location and GNI135 Pipeline Route

GNI136 Clonburris Pipeline

Outline of GNI136 pipeline works:

- Install 3.35 km of 200 mm NB steel pipeline.
- Install 1 No. hot tap offtake valve arrangement at tie in location.

The 200 mm NB pipeline will tie in to the existing 450 mm NB N.E.P. 1 Abbotstown to Brownsbarn pipeline at the southern section of the R113, Dublin 22. It will then route southwest crossing two major roundabouts and continues west along the New Nangor Road (R134), before turning north to enter Microsoft Operations Ireland Ltd.'s premises.

The pipeline route includes no river crossings. It is proposed that the open cut method is utilised for installation of the whole pipeline route. For more details on the open cut method, please refer to section 7.1.3.

4.1 Proposed Pipeline Route

The location of the proposed AGI, pipeline, and tie in point is shown in Figure 18. Microsoft Operations Ireland Ltd. has made a request for an additional pipeline to ensure redundancy for their AGI system. They have specified that the two pipelines should be linked to separate transmission lines in order to eliminate the risk of gas flow disruption in case one of the lines experiences a catastrophic failure. The new 400 mm NB GNI134 pipeline will tie into the nearest transmission pipeline; BGE/72, Ballough to Brownsbarn. BGE/13 N.E.P. 1 Abbotstown to Brownsbarn is the next nearest transmission pipeline. There is an adjacent GNI project in close proximity that intends to utilize this pipeline as a hot tap tie-in point to connect their AGI supply pipeline. This hot tap will serve as a connection for both projects.

The majority of the pipeline is located within the roadway. However, it should be noted that there are several sections of the route in which the verge and cycling paths are utilised to ensure a sufficient separation distance between both third-party services and the proposed GNI134 pipeline. Figure 19 depicts the run of pipeline for which the verge and cycling paths are entered.

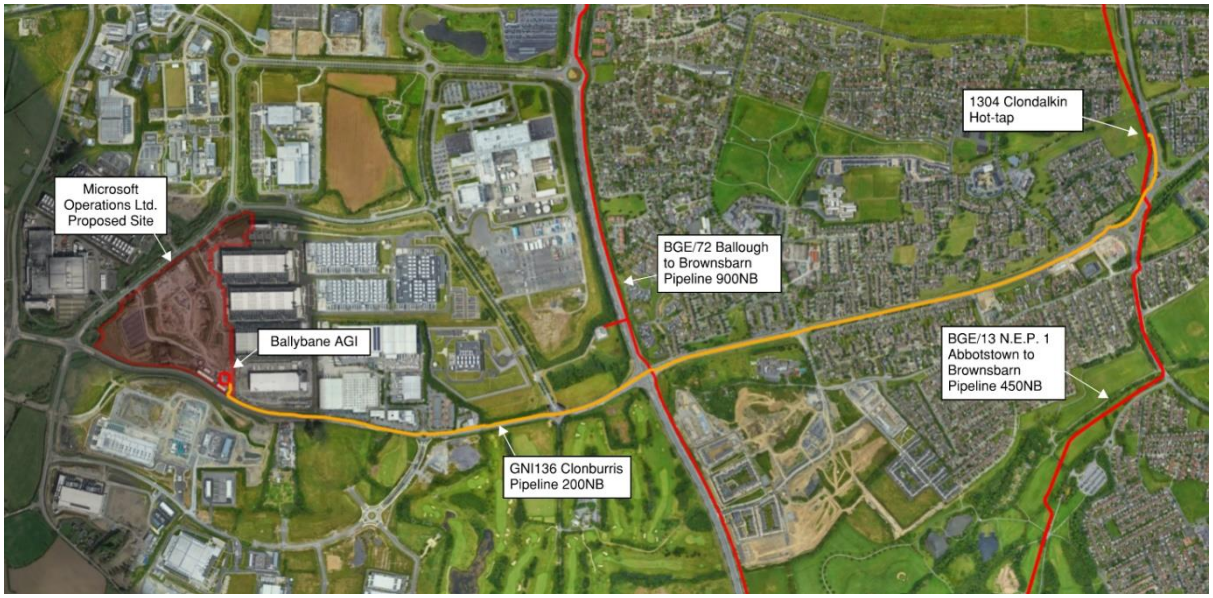

Figure 18 - Overview of Microsoft Operations Ireland Ltd., GNI136 Pipeline Route, AGI Location, and Location of Nearby Transmission Network

Pipeline GNI136 enters the cycling lane/footpath after the Grange Castle Golf Club roundabout to provide adequate separation distance between it and GNI134 pipeline. The pipeline exits the verge to cross the Profile Park roundabout and continues in the roadway for 150m before again entering the cycling lane/footpath due to proximity to GNI134, see Figure 20.

Figure 19 – Verge utilised along the north side of the New Nangor Road from the Grange Castle Gold Club Roundabout until the GNI136 pipeline enters Microsoft Operations Ireland Ltd.'s site

Figure 20 – GNI136 Pipeline re-enters the roadway for a run of 150m after Profile Park roundabout

Figure 21 – GNI134 and GN136 pipelines separate as two high voltage cables enter and run parallel along the R134 roadway

4.1.1 Tie-in Point

The tie in point will be a grass verge area east of the R113, as shown in Figure 22 and Figure 23. An approximate 3.0 m deep excavation is required to perform the hot tap works

based on current as-laid depth of cover information for the existing BGE/13 N.E.P. 1 Abbotstown to Brownsbarn pipeline. An excavated length of 10 m from the hot tap is required to facilitate the drilling equipment. The proposed hot tap valve arrangement is shown in Figure 24. Note that there are serval trees within the excavation area and proposed new pipeline route that may obstruct hot tap activities. These trees will have to be removed before the hot tap works can commence. For an indicative temporary works compound, see Appendix G.

Figure 22 - Tie-in Location Street View

Figure 23 - Tie-in location 3D view

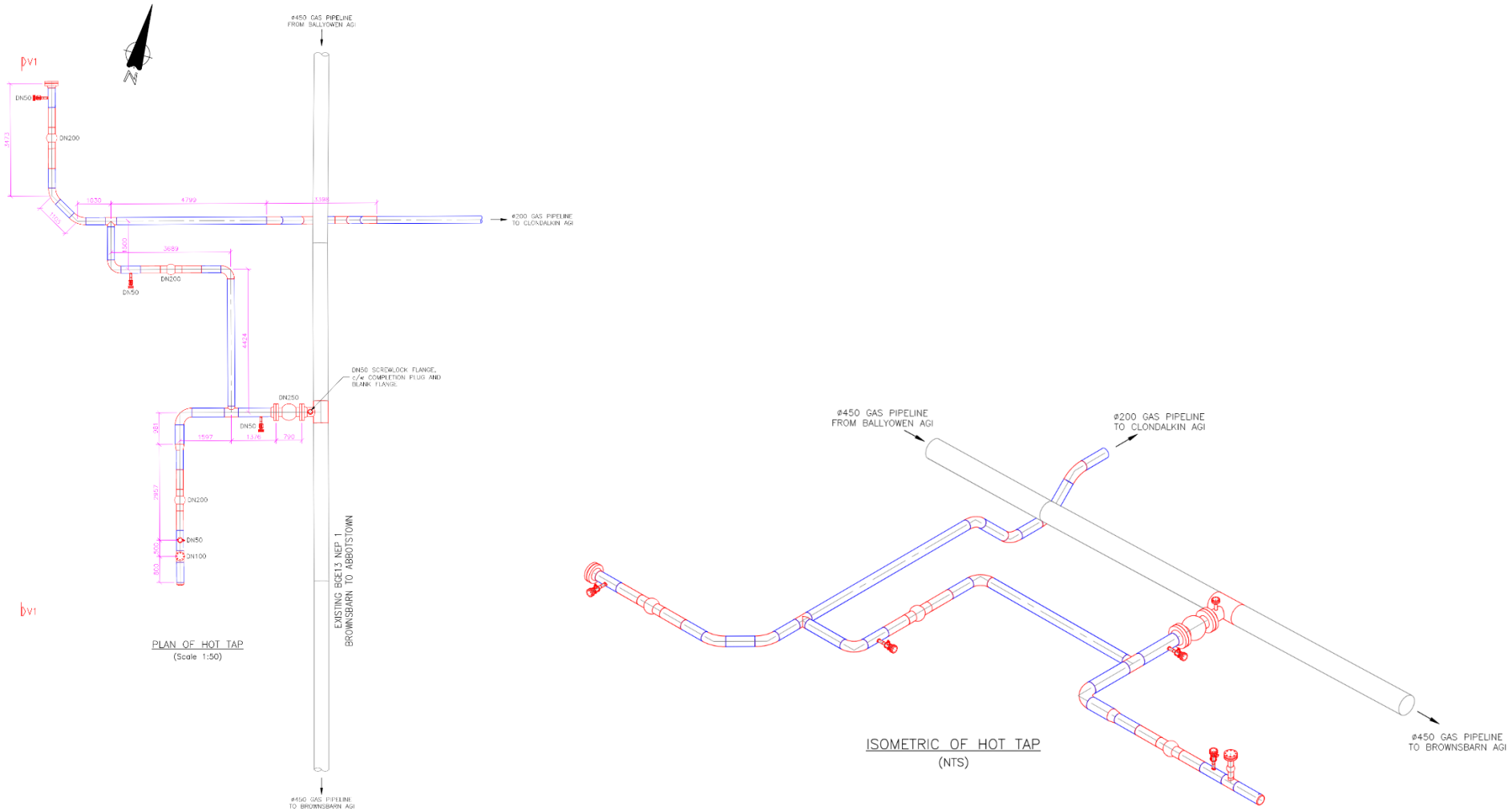

Figure 24 – Valve Arrangement at Tie-In

4.1.2 Main Pipeline Route in Roadway

The 3.35 km pipeline will be constructed using open cut method. The pipeline route crosses several major traffic junctions, including two major roundabouts near the hot tap location as well as two busy traffic intersections:

1. From the tie in location the pipeline routes south towards the first major roundabout. To avoid services running parallel on either side, GNI136 routes through the left-hand lane of R113, then straight through the roundabout as shown in Figure 25

Figure 25 - First major roundabout (R113-R134), south of Clondalkin Hot Tap

2. The second major roundabout is positioned 170m southwest of the first. The services previously running parallel in close proximity to the pipeline move to the verge, allowing the route to utilise the bus lane. This minimises the effect on traffic flow and negates the requirement to disturb the existing roundabout structure, see Figure 26. Upon exiting the roundabout, the pipeline crosses the R134, moving to the south side of the road.

Figure 26 - Second major roundabout (R113-R134)

3. The pipeline routes towards the middle of the road to avoid services on either side and remains here until the first major intersection. At the Old Nangor Road- R134 intersection, the pipeline angles south to continue on the south side of R134, see Figure 27.

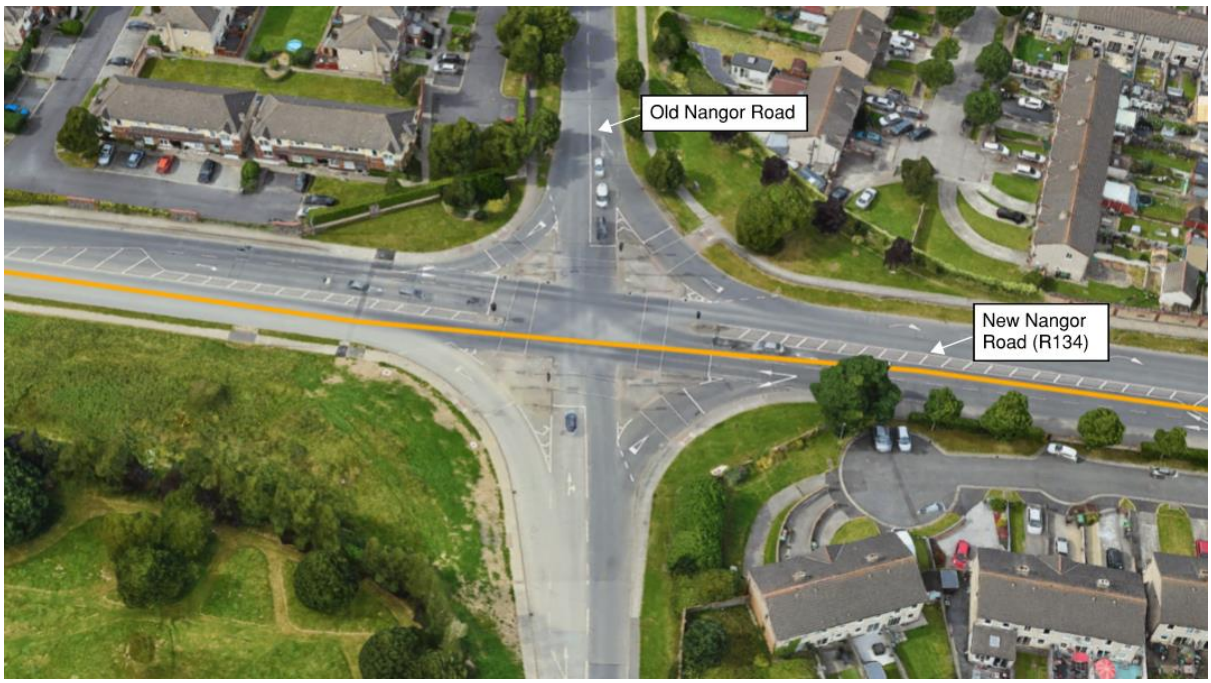

Figure 27 - 1st Major intersection (R134-Old Nangor Road)

4. The pipeline continues in the southern side of the road until reaching the R134-R136 intersection where the Deansrath Hot Tap is located. GNI136 repositions to the north side of the road before crossing the junction to ensure a sufficient separation distance is maintained between it and the proposed GNI134 pipeline.

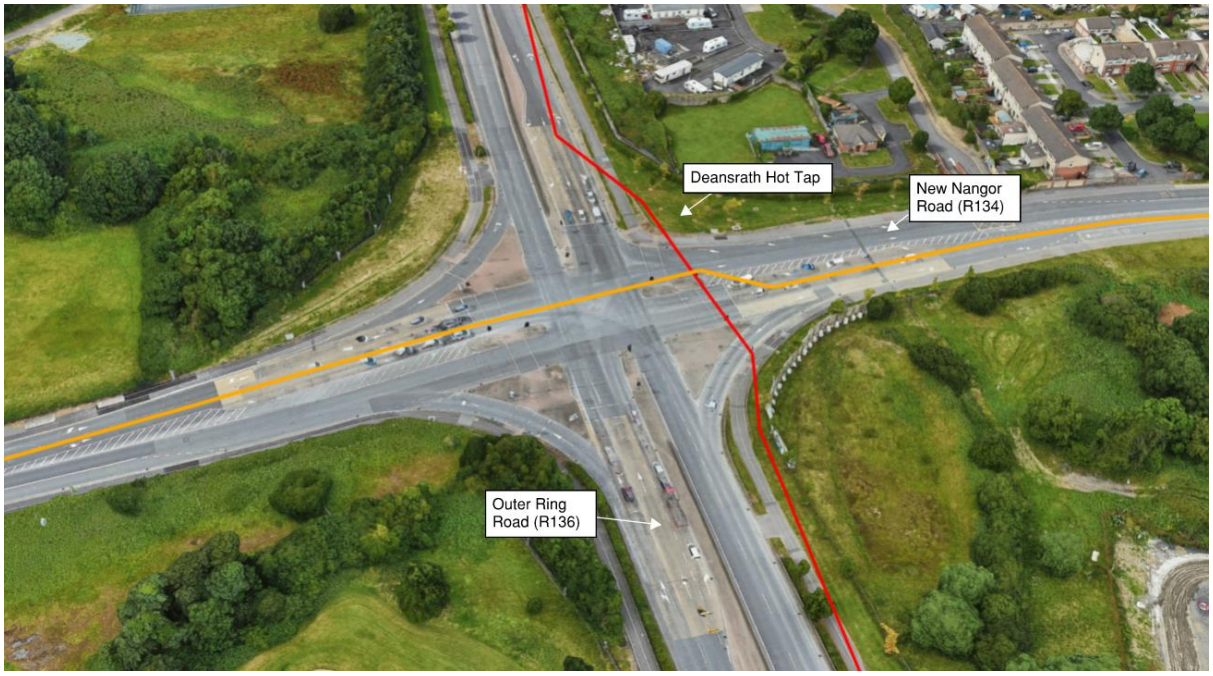

Figure 28 -2nd Major intersection (R134-R136)

A number of minor junctions are also crossed including two roundabouts; Grange Castle Golf Club roundabout and Profile Park roundabout which are also crossed by GN134 and shown in Section 2.1.2.

GNI137 Kilcarbery Pipeline

Outline of GNI137 pipeline works:

- Install 0.55 km of 200 mm NB steel pipeline.
- Install offtake from GNI134 pipeline.
- 2 no. open steam crossings

The 200 mm NB pipeline will tie into the proposed 400 mm NB GNI134 pipeline in the New Nangor Road. It will route south along the Profile Park road and turn south east at the first roundabout in Profile Park. The pipeline will continue southeast approx. 200 m at which point it will turn 90 degrees and enter the Greener Ideas site.

The pipeline route includes 2 no. open stream crossings. It is proposed that the open cut method is utilised for installation of the whole pipeline route. For more details on the open cut methods, please refer to sections 7.1.2 and 7.1.3.

5.1 Proposed Pipeline Route

The location of the proposed AGI, pipeline and tie in point is shown in Figure 29. GNI have advised that the strategic main Milltown pipeline (GNI134) is to serve as the feeder main for Kilcarbery AGI. A 400 mm x 200 mm barred tee and buried valve arrangement shall be installed to facilitate this tie -in. An offtake named Profile Park Offtake will be provided along the GNI137 pipeline as part of the works to facilitate a connection for the GNI142 pipeline to Profile Park AGI.

The majority of the pipeline is located within Profile Park Road. However, it should be noted that there are several sections of the route in which the verge is utilized to ensure a sufficient separation distance between third party services.

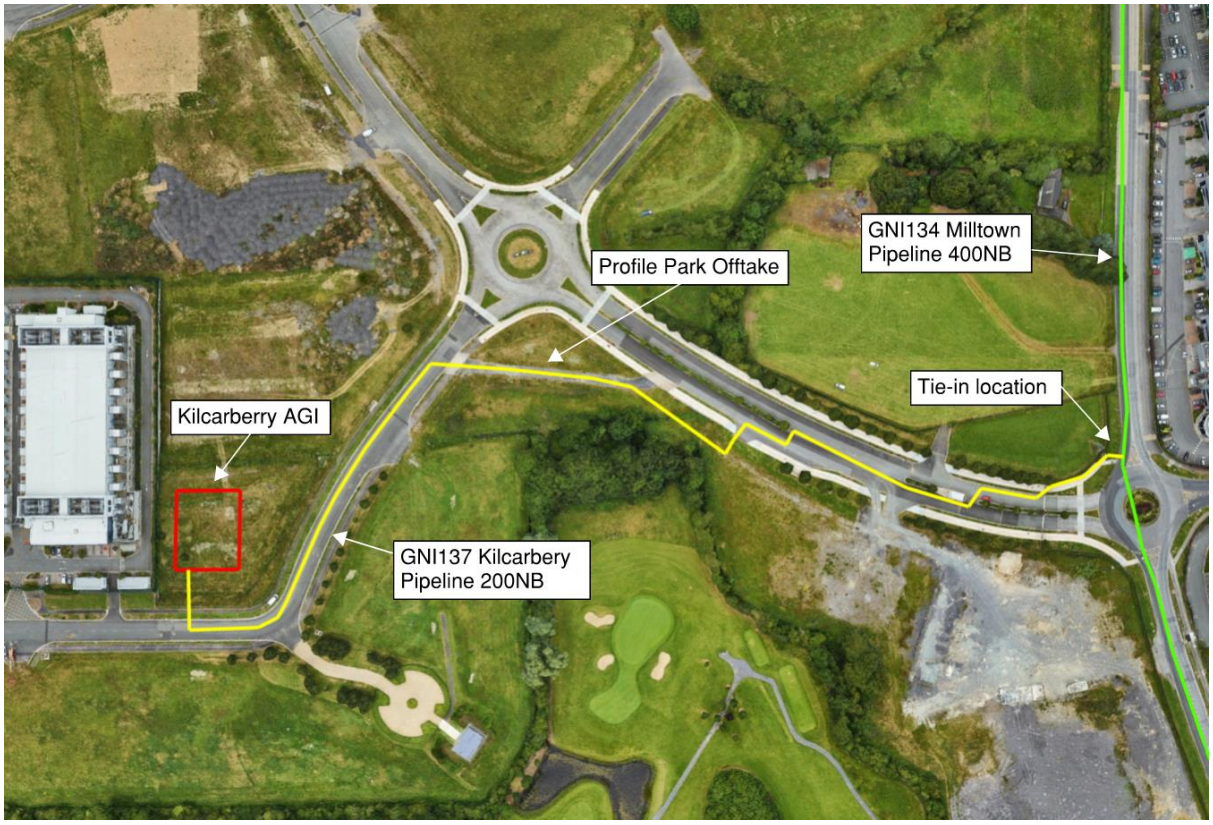

Figure 29 - Overview of GNI137 Pipeline Route and AGI location

5.1.1 Tie-in Point

The tie in pint will be located in the verge south west of New Nangor Road roundabout shown in Figure 30. GNI137 pipeline will tie-in into the proposed GNI134 pipeline near the grass verge as shown. A 400 mm x 200 mm barred tee and a buried valve arrangement shall be installed to facilitate the tie-in with GNI134. The valve arrangement shall be installed within the grass verge.

Figure 30 - Tie-in Location Street View

5.1.2 Main Pipeline Route in Roadway

The 550 m pipeline will be constructed using open cut method. The pipeline will be routing within a private road, Profile Park Road, after the offtake from the GNI134 pipeline. There are 2 no. open stream crossings. These are shown in Figure 35.

1. From the tie-in in location in the verge of the Nangor Rd the pipeline routes south-east. To avoid services the pipeline routes into the left-hand lane of Profile Park Rd.

2. The pipeline routes south along the west lane of the Profile Park road, before switching side into the eastern lane and continuing parallel to the high voltage electrical cables located within the roadway. See Figure 31.

Figure 31 - Pipeline routing from the Nangor Road roundabout in the Profile Park Road

3. The pipeline will cross the high voltage cable and continues southwards before turning into the grass verge / field east of the Profile Park Road to facilitate the crossing of the first open stream along the route. See Figure 32.

Figure 32 - Pipeline routing into grass area adjacent to the Profile Park Road

4. The pipeline routes within the grass verge crossing the open stream and then continues along the pathway as shown in Figure 33. The offtake for GNI142 pipeline will be left in this section.

Figure 33 - Pipeline routing through the pathway adjacent to the first roundabout on the Profile Park road

5. The pipeline routes southeast along the profile park road before turning 90 degrees and crossing the open stream again and entering into the Kilcarbery AGI site as shown in Figure 34.

Figure 34 - Pipeline routing along the Profile Park Roadway and into Kilcarbery AGI

5.1.3 Baldonnel Stream Crossing

The pipeline route crosses a stream/culvert at three locations south of the tie in location. The locations of the stream crossings are shown in Figure 35. Crossing 1 and 3 shown in Figure 35 are open streams while Crossing 2 is a concrete culvert in the road. Open cut method is proposed for these stream / culvert crossings.

Figure 35 - Location of stream/culvert crossings

5.1.4 Contaminated Land

The customers GIL (Greener Idea) has informed us that the mound/banking at entrance to the site is made up of contaminated land. More information is being sought about the nature of this contamination.

GNI142 Profile Park Pipeline

Outline of GNI142 pipeline works:

- Install 0.45 km of 200 mm NB steel pipeline.
- Install offtake from GNI137 pipeline.

The 200 mm NB pipeline will tie in to the proposed 200 mm NB GNI137 Kilcarbery pipeline in Profile Park. It will then route through a roundabout and before turning north to enter Vantage DC Ltd.'s premises. The pipeline will then route through the Vantage DC's site access road before entering the AGI.

It is proposed that the open cut method is utilised for installation of the whole pipeline route. For more details on the open cut method, please refer to section 7.1.3.

6.1 Proposed Pipeline Route

Figure 37 and Figure 37 below depicts the location of the proposed AGI, pipeline, and tie in point. The GNI142 pipeline will tie-in with the new GNI137 pipeline within the Profile Park Road grass verge. A 200 mm x 200 mm barred tee and a buried valve arrangement shall be installed to facilitate a tie-in with GNI137. The construction of GN142 will start once the tee has been installed. The GNI142 pipeline shall cross the profile park road, route west, through a roundabout and then route through profile park before turning north to enter the Vantage site, routing through Vantage's site access road and entering the proposed Profile Park AGI.

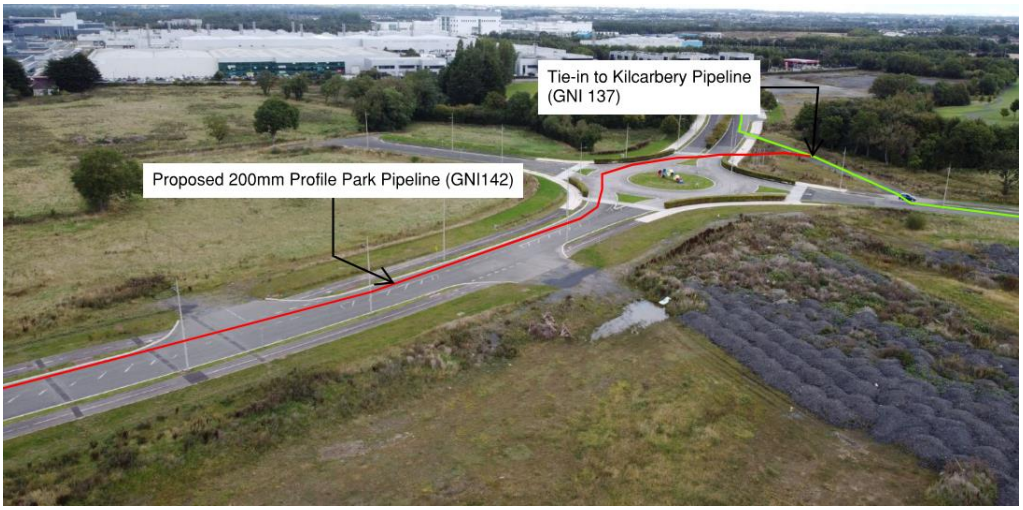

Figure 36 - GNI 142 Pipeline Route, AGI location and Tie in Point

Figure 37 - GNI142 Pipeline Route, AGI location and Tie in Point

6.1.1 Tie-in Point

The tie in point will be located in the grassy area south east of the roundabout as shown in Figure 37. GNI142 pipeline will tie-in with the new GNI137 pipeline within a grass verge on Profile Park Road. A 200 mm x 200 mm barred tee and a buried valve arrangement shall be installed to facilitate a tie-in with GNI137.

6.1.2 Main Pipeline Route in Roadway

The pipeline route for GNI142 will be on the Vantage DC side of Profile Park Road west of the roundabout. The pipeline will cross a minor roundabout about after the offtake from the Kilcarbery Pipeline but will have no significant crossings further along the route. GNI142 will be 0.5 km and does not include any river crossings. This can be seen in Figure 37. It is proposed that the open cut method is utilised for installation of the pipeline route. For more details on the open cut method, please refer to section 7.1.3.

7.1.1 Auger Bore Methodology – Griffeen River Crossing

An auger bore will be used for the trenchless crossing of the Griffeen River, as determined by 1587-RT-0004-R0 Griffeen River Trenchless Crossing Feasibility Report.

Traditional auger-boring is a method where basic, horizontal bores can be “drilled” through the ground on a generally straight alignment using equipment that consists of an external, rail mounted auger-boring rig positioned in an excavation. Where the excavation depth exceeds a few metres, the auger can be installed utilising a launch and reception cofferdam structure installed either side of the crossing as shown in Figure 38.

The mechanical power component is located outside of the bore and is uninfluenced and unrestricted in terms of power by the confines of the bore diameter. The auger rig drives steel sleeves that contain an Archimedes screw (continuous flight augers), and a cutting head is attached to the lead auger. Sectional lengths are installed by pushing the sleeve into the ground using hydraulic jacks on the auger-boring rig, whilst simultaneously rotating the augers and cutting head via a hexagonal coupling. Excavated material (in its natural untreated state) is transported back to the pit by the screw and is discharged in the pit for removal to the surface using conventional muck skips or an excavator.

Figure 38 - Typical Auger-boring Set Up for Deep Crossing

Once complete, the cutting head is removed and the augers withdrawn, leaving the installed pipe in situ in the ground. The cutting head has a nominal over-cut facility that enables the sleeve to be installed without picking up excessive friction from the surrounding soil. The

sleeve is then left in place, and the nominal annular space between the outside of the sleeve and the excavated ground is not grouted. Sacrificial sleeves (if used) are usually steel and can be up to 12m long. They are welded together in sufficient lengths to achieve the total crossing length. Alternative methods exist for shorter pipe lengths, including facilities to use clay pipes, and whilst traditional methods are usually non-steerable, modern equipment can now include for a degree of steering, with other variations also including “guided auger-boring” using a pre-driven pilot bore and reverse auger boring method.

Soft rock is theoretically possible by utilising a conventional hard cutter head, but in reality conventional auger heads are fairly low-tech and are generally limited to being able to deal with highly weathered rocks n/e 25MPa Unconfined Compressive Strength (UCS). For harder rocks, a special hard rock cutter head (SBU) is used - this is similar to an MTBM rock cutter head, but is still driven by the auger-boring unit identified as shown in Figure 39.

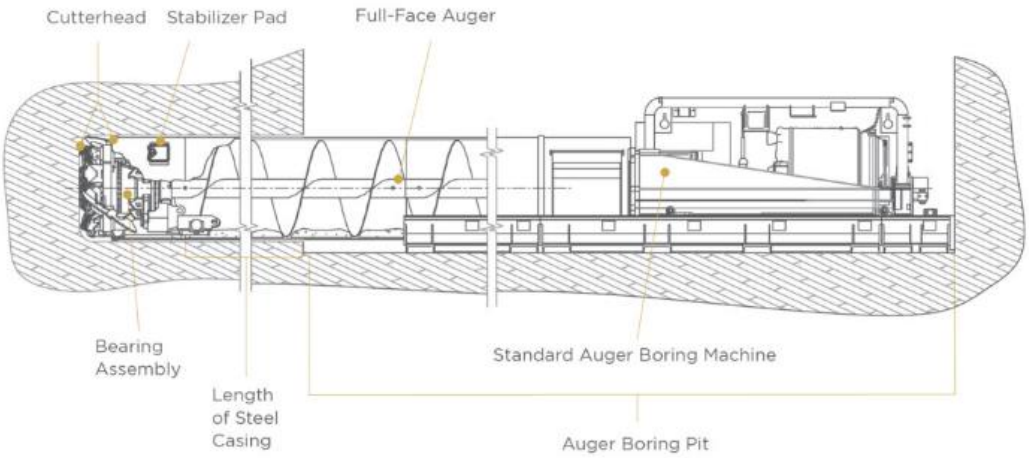

Figure 39 - Auger boring with a Rock Head

7.1.1.1 Griffeen River Crossing

The auger bore is routed so that it crosses the river at 90° as seen in Appendix D. This option results in a crossing length of approximately 30m. The detailed route and preliminary alignment are outlined in drawing GNI134/04/001, attached in the appendices.

The boring depth will be determined by both the depth of the rock head and riverbed depth. A minimum clearance of 1.6m from the bottom of the riverbed to the top of pipe is required as per IS 328:2021 and GNI standard drawing BGE/ST/2002. The auger bore method will require a reception and launch pit on either side of the river. The pits/shafts and tunnel are essentially Temporary Works and detailed design of these pits/shafts will be carried out by

the main works contractor. Refer to section 7.1.1.2 for typical detail on construction of the shafts.

It is expected that the Griffeen river crossing will need to be undertaken in rock, but this will be confirmed upon receipt of SI. The minimum size of the rock cutter head is ~600mm. It will be required to circulate out the sacrificial steel sleeve with concrete pipes prior to installing the final gas pipe to prevent interference with cathodic protection measures. For installation of a 400mm NB pipe, it is likely that sacrificial sleeves of 1100mm OD will be used.

Concrete jacking pipes of an equivalent outside diameter are used, and the steel sacrificial pipe is cut off in sections in the reception pit as the string is pushed forward by the jacking pipes, which effectively replaces the sacrificial steel auger-bored sleeve in entirety. The HP Gas Pipeline can then be threaded inside the concrete sleeve in the same way it would be done for a micro-tunnel crossing.

All excavated material (in its natural untreated state) is transported back to the pit by the Archimedes screw (continuous flight augers) and is discharged in the pit for removal to the surface using conventional muck skips or an excavator.

The basic design parameters for proposed auger-bore crossing of the Griffeen River are outlined in Table 1.

Table 1 - Basic Design Parameters for Proposed Auger-bore Crossing Technique

Parameter	Specification
Total Bored Tunnel Length	Approximately 30m
Vertical Alignment	Straight - depth TBC post SI and bathy survey.
Horizontal Alignment	Straight.
Launch Shaft	*TBC (typically 15m x 3.5m, but can be shorter, 8m x 3.5m, if half pipes are used), see section 7.1.1.2
Reception Shaft	*TBC (typically 3.5m x 3.5m, subject to depth), see section 7.1.1.2
Sacrificial Steel Sleeve OD	1100mm
Auger Machine Type	American Auger / Robbins ABM 36-630
Cutter Head	Robbins SBU-A42 (bore diameter 1120 mm to match sacrificial)
Concrete Jacking Pipe	FP McCann DN900 (1100mm OD to match sacrificial)
Jacking Pipe Type	RC jacking pipes to BS EN 1916 and BS 5911-1, steel banded
Pipe Length	2.5m
Packer Type	68mm MDF / self-lubricating joint gasket

7.1.1.2 Launch and Reception Shaft Construction

Prior to any boring, the thrust and reception pits (temporary works) will need to be carefully planned, designed, set-out and fully excavated. The design of the shafts is temporary works and is to be undertaken by the contractor. The detail presented here is typical of auger bore shaft construction for the size and depth of the proposed crossing.

Thrust and reception shafts will incorporate adequate tolerances to allow the auger-boring process to be executed safely and will consider any other relevant considerations regarding the final product pipe installation method including pipe length and overall pipe-string length and the requirement to carry out hot works below ground.

Shafts for auger-boring can be constructed in relatively small open sheet-piled excavations extending to very large piled cofferdams. It is envisaged the that shafts will be constructed for this crossing using a steel sheet piled cofferdam structure.

Steel sheet piled cofferdams are a specific form of deep open-trench construction for pipelines that is essentially a ‘temporary works’ solution. The main purpose of a cofferdam is to enable safe and efficient excavation (and hold back soil pressure and/or water) to form a safely supported trench excavation where pipeline construction/installation can take place.

Cofferdams are formed using steel sheet piles acting either in cantilever or being supported by internal steelwork bracing frames or external anchorages. The exact design solution will be dependent on a number of factors including final depth of excavation, external design forces, surcharge from heavy equipment, pipeline construction methodology and pipe-string lengths, and installation/welding and tie-in methodology. An example of a steel sheet piled cofferdam is shown in Figure 40.

As part of the detailed design, the typical size and the general geometry of the Piled Cofferdam will be developed. However, the Sheet Piled Cofferdam will remain Temporary Works and its design will be the responsibility of the Contractor appointed to carry out the gas pipeline diversion. Only the gas pipeline (and its associated geometry) will comprise the Permanent Works.

Once the pipe concrete sleeve and gas pipe has been installed, the Cofferdam will be backfilled in a structured sequence that allows security of the bottom frame before its removal. When suitably compacted, the bottom frame is then removed carefully in strict accordance with the sequence specified in the Contractors temporary works design. This typically requires the pressure on the bottom frame to be released carefully and the frame

lowered onto the base of the pit where it is usually dismantled and lifted out in sections, taken cognisance of the installed pipe locations.

Once the bottom frame (and subsequent frames) are removed, compacted backfilling can be carried out in accordance with any specified requirements to inhibit surface settlement due to compaction. When all shoring has been removed and the shaft is fully backfilled and compacted the steel sheet piles can be removed, typically using a dedicated pile extractor.

Suitable compaction density testing (i.e. Clegg or similar) should be carried out on each compacted layer to ensure the specified limits are achieved.

Figure 40 - Example of a Sheet Piled Excavation

GNI-134-04-001, attached in the appendices, shows the proposed pipeline route and pit locations for the trenchless crossing of the Griffeen River. The ground level at both sides of the river is steep, with an approximate 2 m change in elevation from the road / footpath level (approx. 68 m A.O.D.) to the riverbank level (approx. 66 m A.O.D.). The depth of the launch and reception shafts required for the Griffeen is to be confirmed following receipt of SI (borehole information) but they are estimated to be in the region of 6-8m deep. A typical launch pit requires an area of c. 15m x 3.5m (L x W) if full 12m long pipe spools are to be used. However, due to spacing constraints, it was determined half-pipes will be used, allowing a reduced pit size of 8m x 3.5m (L x W).

A temporary site compound will be set up at the launch shaft side (south of the river) and at the smaller reception shaft (north of the river). Both of these compounds will be arranged to minimise disruption to roadway and footpath users. The temporary compound layout drawing, GNI-0101-DG-006-R0, will be provided south of the Griffeen river and will be kept at a minimum distance of 20m from the river bank.

An outline construction method for each compound would be expected to consist of a reduced dig to lower the ground level and establish a safe plant operating area. Once in place a sheet pile installation will be undertaken. Before any excavation is undertaken a sufficient ground and surface water mitigation system will need to be in place.

7.1.2 Open Cut Trench Methodology – Baldonnel Stream Crossing

It is proposed that entire length of this pipeline will be constructed using the open cut trench method. The following step by step methodology will apply for this technique for the 2 no. open Baldonnel stream crossings:

1. During the initial stages of construction, trees or hedges lining the banks of water crossings are cleared, along with neighbouring topsoil.

2. The stream is left undisturbed until a few days (approx. 2-3) prior to the scheduled pipeline installation. The banks are then graded back to bed level. Topsoil shall be stored separately to the subsoil.

3. Flume pipes, designed to accommodate the volume of floodwater, are inserted into the watercourse. The contractor will ensure they extend past the area of the proposed trench and running track. The flume pipes are surrounded with sandbags to create a seal. Straw bales are placed downstream to capture sediments as required. Refer to Figure 41. It should be noted that depending on the time of year, the Baldonnel stream at these 2 no. locations is dry.

4. The pipe trench is excavated below the flume pipe. This excavated material is stored separately to the topsoil and subsoil, only this excavated material will be used to backfill the watercourse trench. If dewatering is required, particular care will be taken to ensure appropriate sediment control is taken.

5. The pipeline is installed in the trench. For stream crossings a distance of 1600mm will be maintained from the top of the pipeline to the bottom of the true cleaned stream. A precast marker slab will be laid 300mm above the pipeline.

6. The trench is backfilled such that it is level with the rest of the watercourse bed. The watercourse banks are then reformed to their original profile.

7. The dams and flume are removed, and the watercourse is allowed to flow normally for the remainder of construction.

8. Where appropriate the stream banks are reinstated with native plants as agreed with the landowner.

Open cut water crossings are carried out as quickly as possible (typically 3-4 days) to minimise the potential environmental impact. Please see Appendix F for the Baldonnel Stream Crossing drawings.

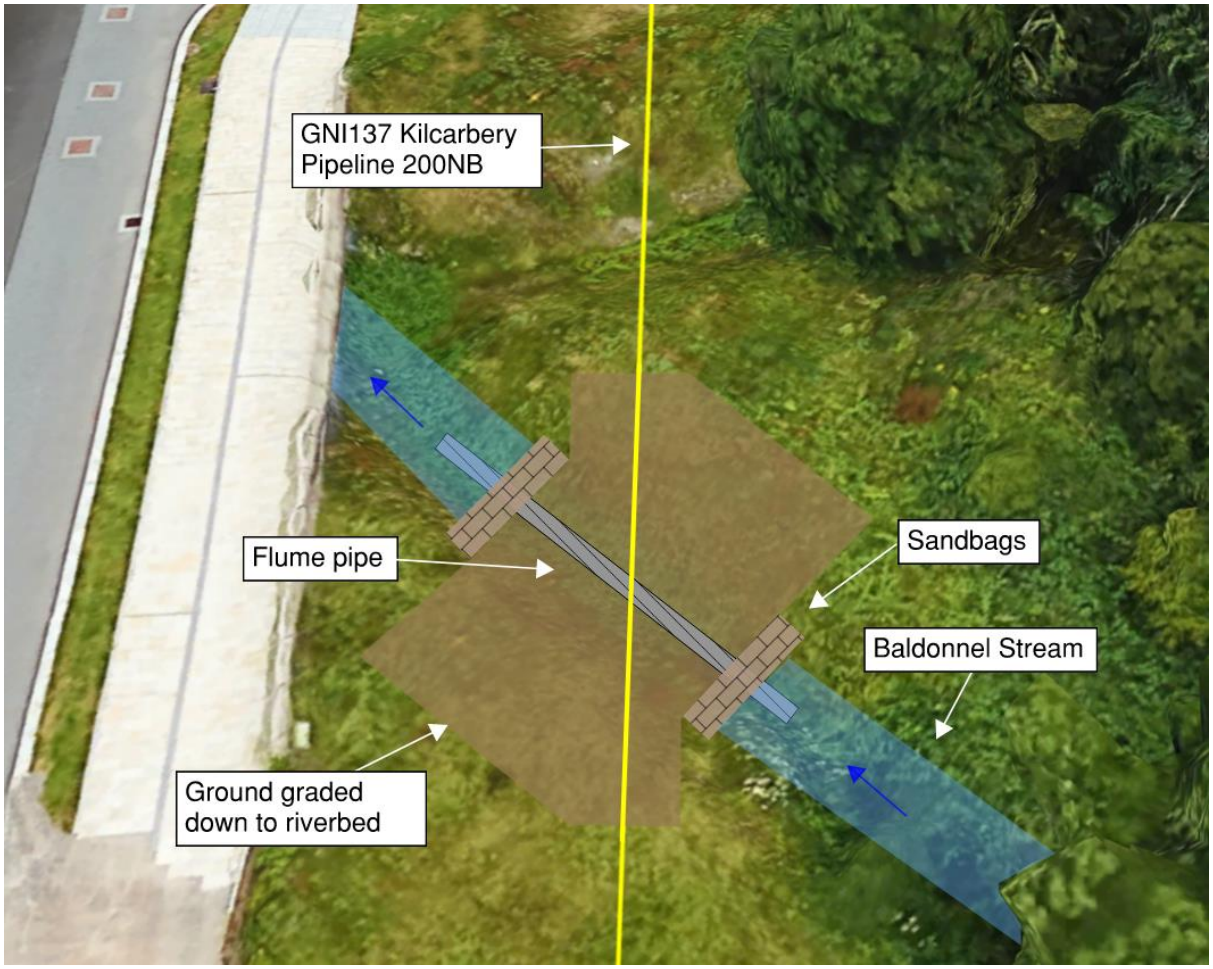

Figure 41 - Sketch of Flumed Crossing of Baldonnel Stream

7.1.3 Open Cut Trench Methodology – Roadway and Verge

The following is a step-by-step methodology for the open cut trench technique:

1. For GNI134, the 400mm NB pipe will require excavation to a **minimum** depth of 1750 mm (to base of trench) and minimum width of [1]700 mm (at base of trench) and 700 mm width (at ground level). For GNI135, GNI136, GNI137 and GNI142, the 200mm NB pipe will require excavation to a **minimum** depth of 1600 mm (to base

[1] To be confirmed by contractor

of trench) and [2]500 mm width (at base of trench) and 500 mm width (at ground level). These excavations will extend locally every 12 – 24 m at bell hole locations to facilitate welding activities. Note that trench depths will be determined based on existing service crossings etc. along the pipeline route. The minimum depths are given above to achieve minimum depths of cover required on the pipeline as per I.S. 328: 2021. Please refer to Figure 42 for example of streetworks excavation.

2. Place bedding layer of CL.503 material in accordance with IS 328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book) and compact.

3. Lay the pipeline as detailed on the design drawings.

4. Carefully surround and cover pipe with CL.503 material in accordance with the design drawings, IS 328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book) and Appendix B.

5. Place gas pipeline marker tape on compacted CL.503 and subsoil, 500 mm from the top of the pipe and 250 mm from the surface.

6. For concrete and asphalt/bitmac road sections, carry out immediate temporary reinstatement in accordance with the design drawings and *IS 328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book*) and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities. The roads will then be permanently reinstated at a later date as agreed with the local authority / landowners, with either full or half road width reinstatement.

7. For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 200 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.

8. Clean and test the pipework in accordance with the IS328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book)

9. For each construction crew, the length of working area at any one time is expected to be 100 m. Note it is expected that there will be 2 – 3 working sections of 100 m

[2] To be confirmed by contractor

along all the routes during construction. These working sections will be separated by a distance as agreed with the local authorities / business parks so that traffic disruption is minimised.

10. The advance rate is expected to be 18 – 24 m per day.

The approximate quantity of material expected to be excavated and taken off site is detailed below in Table 2.

Table 2 - Approximate Quantity of Material to be Excavated

Works Area	Quantity (m^3)	Description
7208 Deansrath Hot Tap	740	3.7 m deep excavation over an area of 200 m^2
1304 Clondalkin Hot Tap	1581	3.0 m deep excavation over an area of 527 m^2
Pipeline GNI134	3675	Based on 1.75 m deep x 0.7 m wide excavation
Pipeline GNI135	64	Based on 1.6 m deep x 0.5 m wide excavation
Pipeline GNI136	2680	Based on 1.6 m deep x 0.5 m wide excavation
Pipeline GNI137	440	Based on 1.6 m deep x 0.5 m wide excavation
Pipeline GNI142	400	Based on 1.6 m deep x 0.5 m wide excavation

Figure 42: Example of Open Cut Streetworks Excavation for Gas Pipeline

Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the works area or within the temporary construction compound to be defined during detailed design/tendering of the project. Oils and fuels will not be stored on site and will be stored in an appropriately bunded area within the temporary storage compound.

Expected Site Personnel and Construction Duration

It is anticipated that the construction of the pipeline will be completed during normal construction hours i.e. 7am to 7pm Monday to Friday, and 8am to 2 pm on Saturdays. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. Sunday or evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance.

It is estimated that there will initially be 40-60 personnel on site on a typical day, however during peak construction periods this is expected to fluctuate up to a maximum of 80 site personnel and contractors on site per day. Site personnel will include management, engineers, construction crews, supervisors, environment health and safety personal, and pipeline specialist contractors.

Estimates for the duration of the construction works are included in Table 3 below. The overall start-to-finish duration is estimated to be 12 months. Construction is anticipated to commence in Q1 2024 and be completed by Q1 2025.

Table 3 - Estimated Construction Duration

Works Area	Estimated Construction Duration (Months)
Pipelines (GNI134, GNI135, GNI136, GNI137, GNI142)	10
Deansrath Hot Tap	3
Clonburris Hot Tap	3

Traffic Management

Traffic management and road signage for site access will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with South Dublin Co. Co. The contractor will prepare detailed traffic management plans for the project.

For the proposed street works, it is envisaged that each crew's working area will be restricted to 100m to allow a stop-go system be put in place using a single lane. It is anticipated that there could be 2 – 3 crews working on the pipeline routes at any one time, therefore 2 – 3 100m working sections along the entirety of the routes. A separation distance between these working sections will be maintained as agreed with the local authorities and business parks (1 km for example) so that traffic disruption is minimised and the areas do not cumulatively impact traffic.

APPENDIX A: Pipeline Routes and Footprint for EIA (Redline Boundary)

OVERALL PIPELINE ROUTE MAP

SCALE: 1:1,000

LEGEND:

- PROPOSED ø200 PIPELINE GNI142 PROFILE PARK
- PROPOSED ø200 PIPELINE GNI137 KILCARBERY
- AGI BOUNDARY

EIAR

ISSUE	REVISION	REV. BY	A	B	C	D	E	F	G
0	EIAR	JD 27/09/23	RMD 27/09/23	JL 27/09/23					

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C	STRATEGY/PLANNING	CHECKED R.McDONNELL
D	DESIGN MANAGEMENT	APPROVAL J.LENNON
E	OPERATONS	
F	CONSTRUCTION	DATE 03/07/23
G	AM/AO ADDITIONAL	

PROJECT
46897294 Gas to Vantage DC, Profile Park

TITLE
EIAR Survey Boundary
Profile Park Pipeline

DRAWING NUMBER
GNI142/002/01

SCALE
1:1000 @A1

SHEET
01 OF 01

Gas Networks Ireland
P.O Box 51, Gasworks Road, Cork, Rep of Ireland
T +353 21 4534000

OVERALL PIPELINE ROUTE MAP

SCALE: 1:5,000

LEGEND:

- PROPOSED ø200 PIPELINE GNI136 CLONBURRIS
- EXISTING BGE/72 BALLOUGH TO BROWNSBARN PIPELINE
- EXISTING BGE/13 NEP1 ABBOTSTOWN TO BROWNSBARN PIPELINE
- AGI BOUNDARY

EIAR

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PROJECT
45924567 Gas to Microsoft, Grangecastle

TITLE
EIAR Survey Boundary
Clonburris Pipeline

DRAWING NUMBER
GNI136/002/01

SCALE
1:5,000 @A1

SHEET
01 OF 01

APPROVALS

A	DRAWING OFFICE	DRAWN BY M.ABOU HAJAR
B	DESIGN ENGINEERING	
C	STRATEGY/PLANNING	CHECKED R.McDONNELL
D	DESIGN MANAGEMENT	
E	OPERATONS	APPROVAL J.LENNON
F	CONSTRUCTION	DATE 04/07/2023
G	AM/AO ADDITIONAL	

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OVERALL PIPELINE ROUTE MAP

SCALE: 1:1,000

LEGEND:

- PROPOSED ø200 PIPELINE GNI137 KILCARBERY
- PROPOSED ø400 PIPELINE GNI134 MILLTOWN
- AGI BOUNDARY

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C	STRATEGY/PLANNING	
D	DESIGN MANAGEMENT	APPROVAL: J.LENNON
E	OPERATONS	
F	CONSTRUCTION	DATE: 03/07/23
G	AM/AO ADDITIONAL	

PROJECT
46527670 Gas to Greener Ideas, Profile Park

TITLE
EIAR Survey Boundary
Kilcarbery Pipeline

DRAWING NUMBER: GNI137/002/01

SCALE: 1:1,000 @A1

SHEET: 01 OF 01

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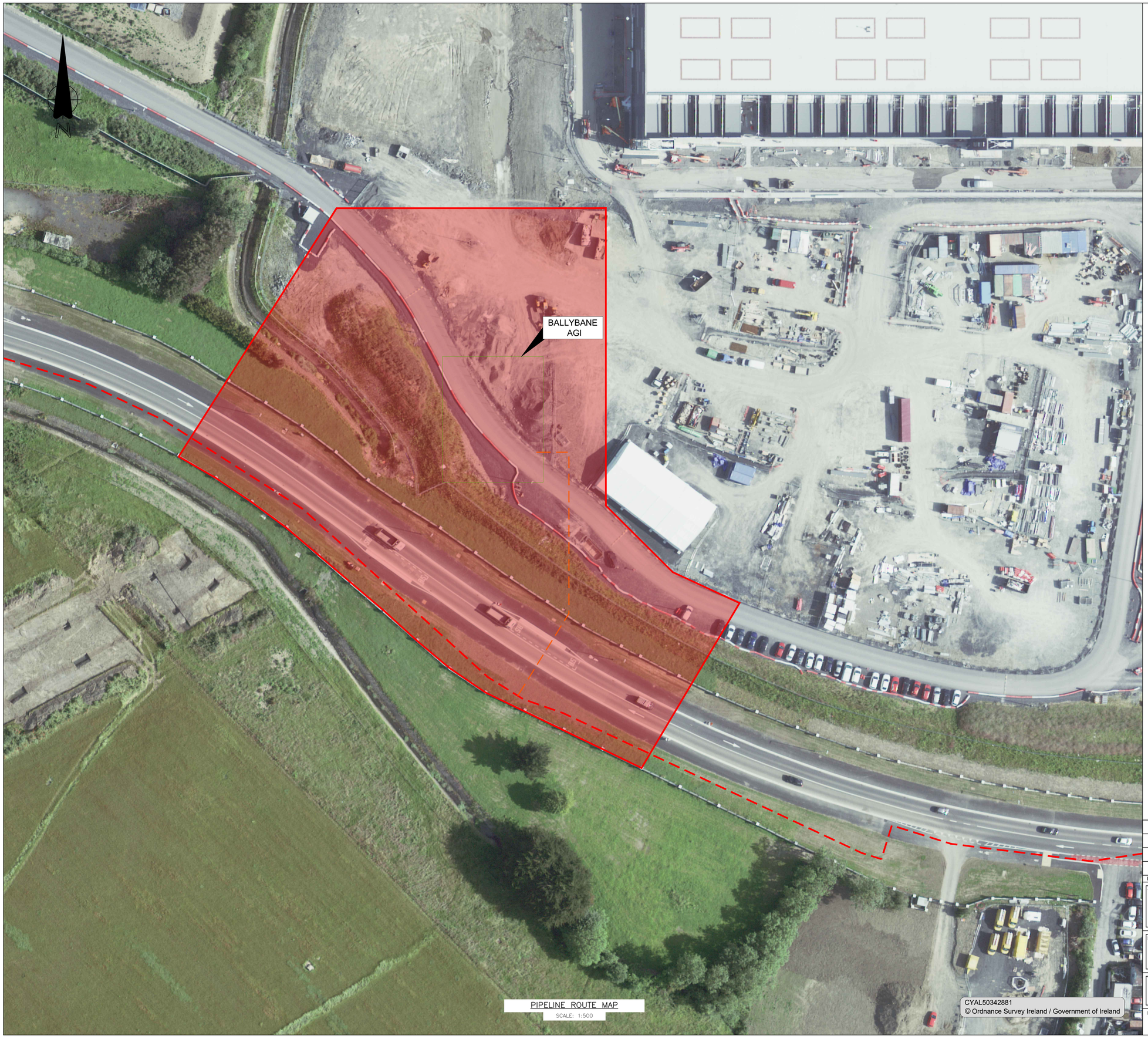

PIPELINE ROUTE MAP

SCALE: 1:500

LEGEND:

PROPOSED ø400 PIPELINE GNI134 MILLTOWN

PROPOSED ø200 PIPELINE GNI135 BALLYBANE

AGI BOUNDARY

EIAR

ISSUE	REVISION	REV. BY	A	B	C	D	E	F	G
		JD	RMD	JL					
0	EIAR	27/09/23	27/09/23	27/09/23					

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PROJECT
45924567 Gas to Microsoft, Grangecastle

TITLE
EIAR Survey Boundary
Ballybane Pipeline

DRAWING NUMBER
GNI135/002/01

SCALE
1:500 @A1

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01 OF 01

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E	OPERATONS	
F	CONSTRUCTION	DATE 04/07/2023
G	AM/AO ADDITIONAL	

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PIPELINE ROUTE MAP

SCALE: 1:5,000

LEGEND:

- PROPOSED ø400 PIPELINE GNI134 TO MILLTOWN
- EXISTING BGE/72 BALLOUGH TO BROWNSBARN PIPELINE
- AGI BOUNDARY

EIAR

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PROJECT
45924538 Gas to Bulmer. Grange Castle

TITLE
EIAR Survey Boundary
Milltown Pipeline

DRAWING NUMBER
GNI134/004/01

SCALE
1:5,000 @A1

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01 OF 01

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F	CONSTRUCTION	
G	AM/AO ADDITIONAL	DATE 03/07/2023

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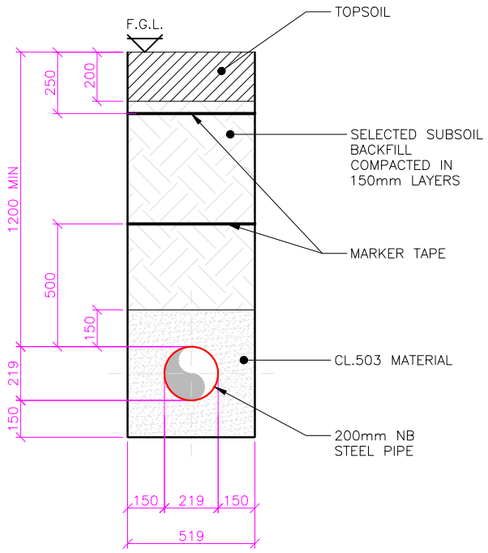
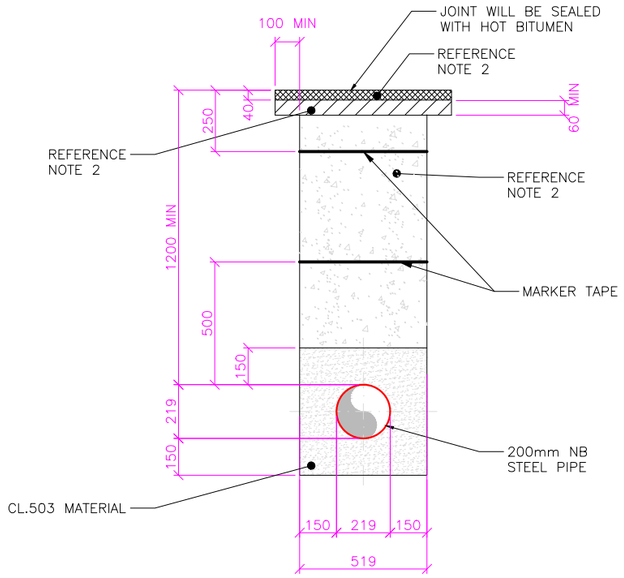
APPENDIX B: Typical Trench Reinstatement Details



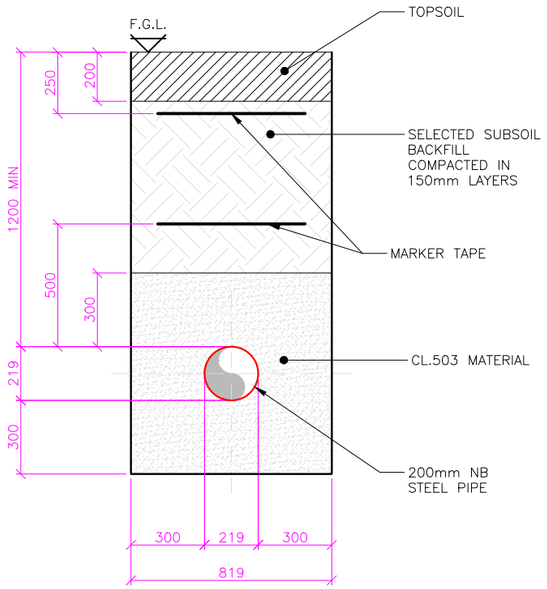
TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (GRASS VERGE EXCAVATION)

(SCALE: 1:25)



TYPICAL ROAD/FOOTPATH REINSTATEMENT DETAIL FOR 200mm NB PIPELINE

(SCALE: 1:25)



TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (ROCK EXCAVATION)

(SCALE: 1:25)

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D	DESIGN MANAGEMENT	DATE	27/09/2023
E	OPERATONS		
F	CONSTRUCTION		
G	AM/AO ADDITIONAL		

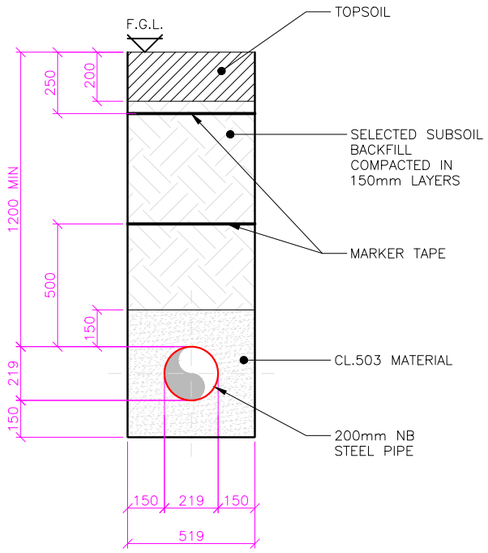
PROJECT: 46897294 GAS TO VANTAGE DC, PROFILE PARK

TITLE: TYPICAL REINSTATEMENT DETAIL

DRAWING NUMBER: GNI142/01/RD/001

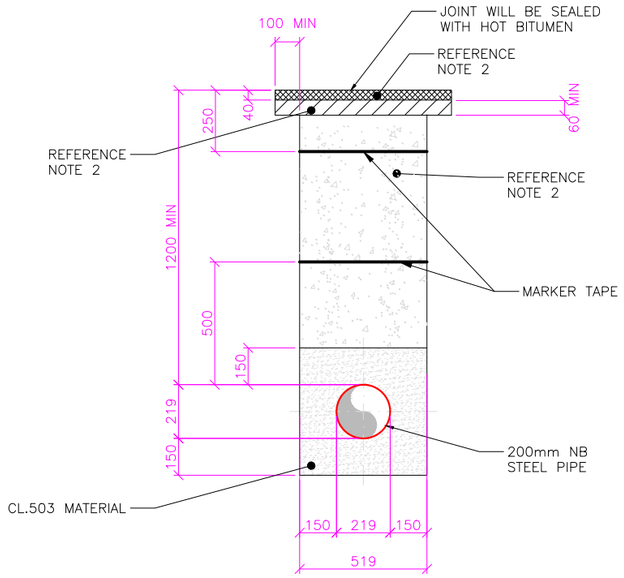
SCALE: AS STATED @A3

SHEET: 01 OF 01



TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (GRASS VERGE EXCAVATION)

(SCALE: 1:25)



TYPICAL ROAD/FOOTPATH REINSTATEMENT DETAIL FOR 200mm NB PIPELINE

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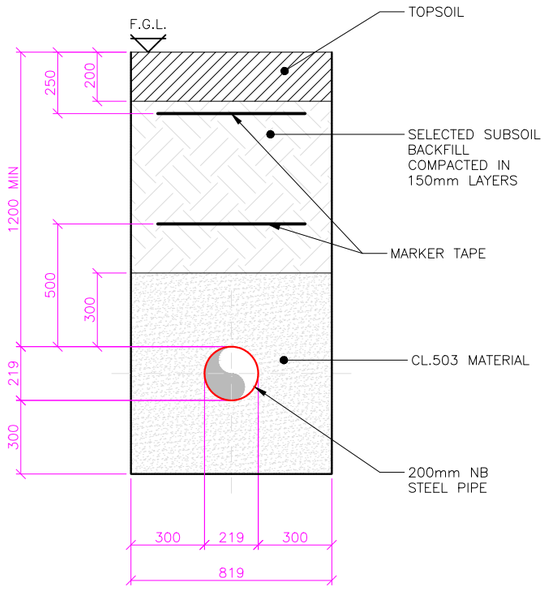

TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (ROCK EXCAVATION)

(SCALE: 1:25)

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F	CONSTRUCTION	
G	AM/AO ADDITIONAL	

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DRAWN BY: J.DELANEY

CHECKED: R.McDONNELL

APPROVAL: J.LENNON

DATE: 27/09/2023

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PROJECT: 45924538 - Gas to Bulmer, Grange Castle

TITLE: TYPICAL REINSTATEMENT DETAIL

DRAWING NUMBER: GNI137/01/RD/001

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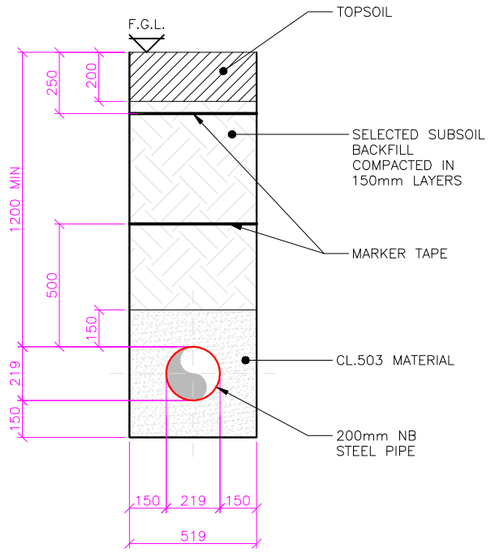
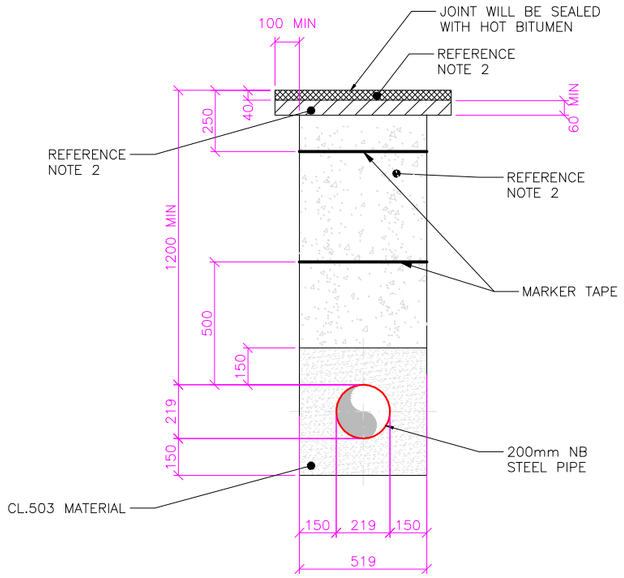


TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (GRASS VERGE EXCAVATION)

(SCALE: 1:25)



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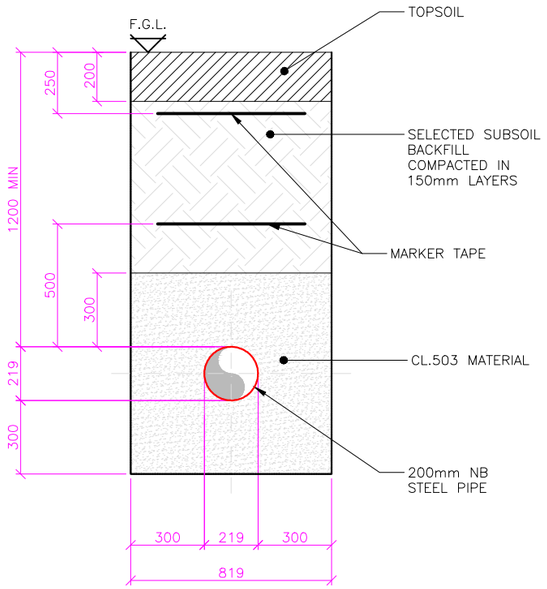

TYPICAL REINSTATEMENT DETAIL FOR 200mm NB PIPELINE (ROCK EXCAVATION)

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PROJECT: Clonburris Pipeline

TITLE: TYPICAL REINSTATEMENT DETAIL

DRAWING NUMBER: GNI136/01/RD/001

SCALE: AS STATED @A3

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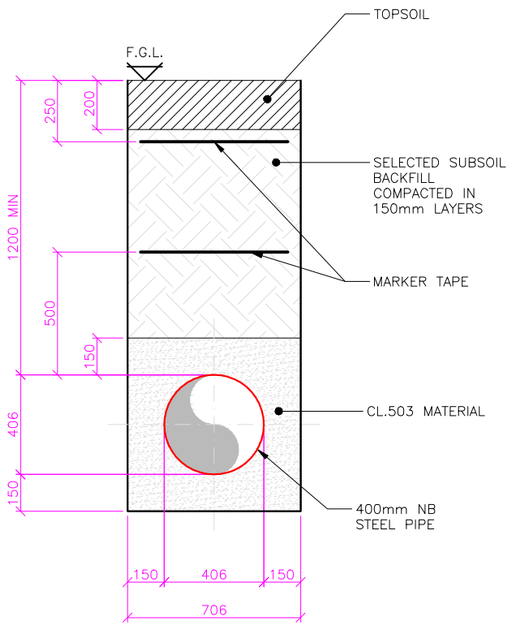

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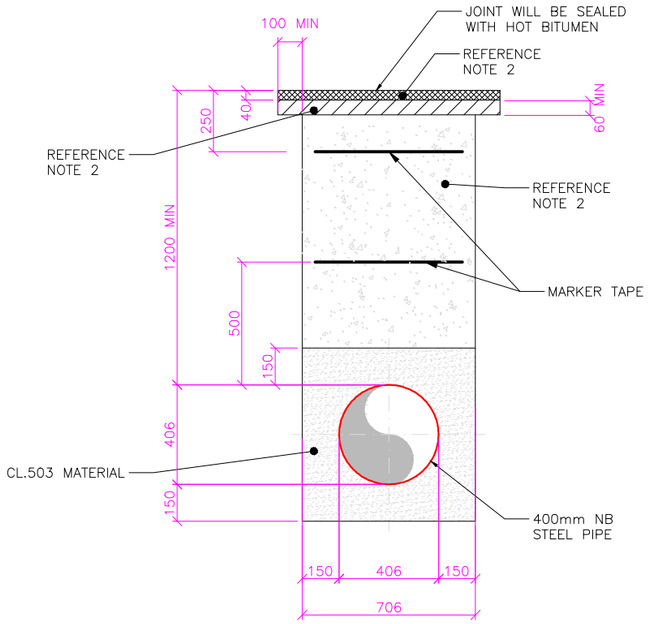

TYPICAL ROAD/FOOTPATH REINSTATEMENT DETAIL FOR 400mm NB PIPELINE

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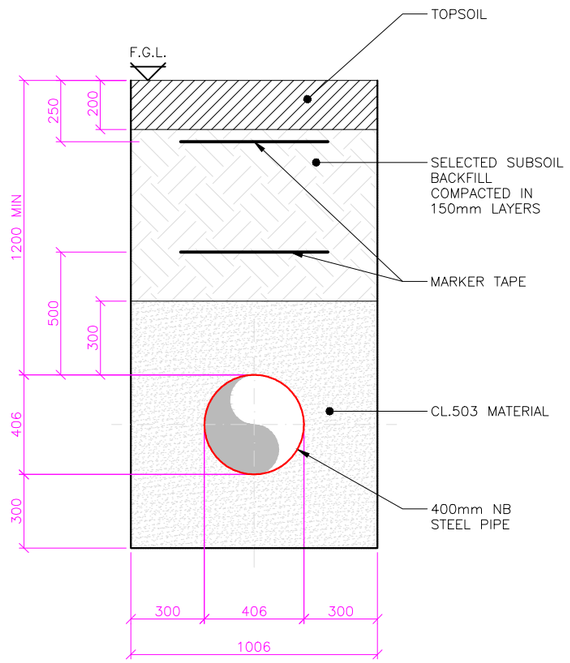

TYPICAL REINSTATEMENT DETAIL FOR 400mm NB PIPELINE (ROCK EXCAVATION)

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D	DESIGN MANAGEMENT	
E	OPERATONS	APPROVAL: B.McALISTER
F	CONSTRUCTION	
G	AM/AO ADDITIONAL	DATE: 10/05/2023

PROJECT: 45924538 GAS TO BULMER, GRANGE CASTLE

TITLE: TYPICAL REINSTATEMENT DETAIL

DRAWING NUMBER: GNI134/01/RD/001

SCALE: AS STATED @A3

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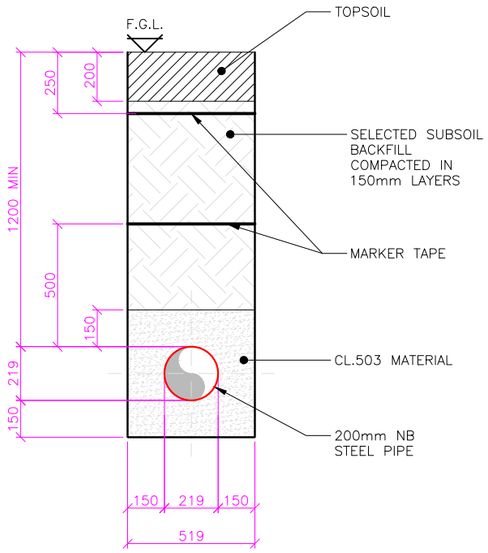

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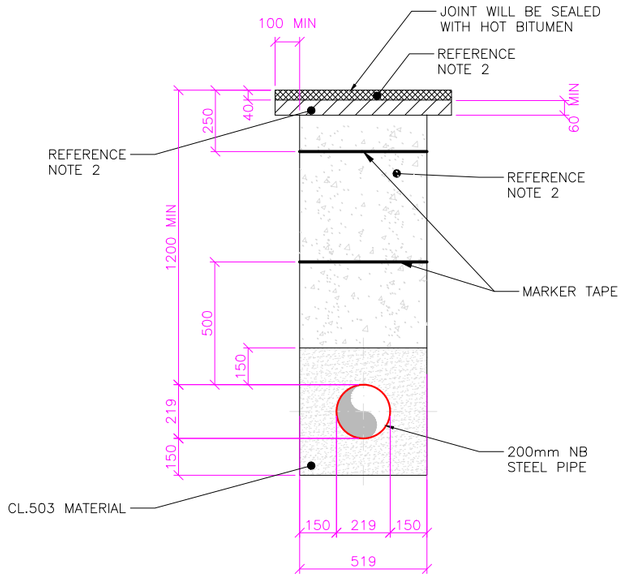

TYPICAL ROAD/FOOTPATH REINSTATEMENT DETAIL FOR 200mm NB PIPELINE

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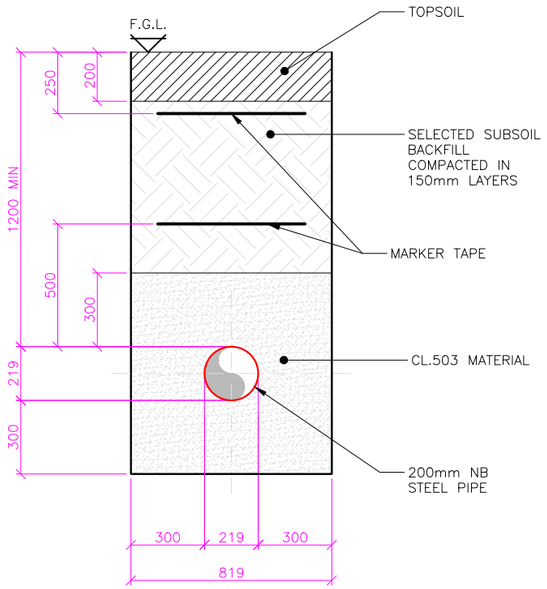

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APPROVALS

DRAWN BY: B.McMASTER

CHECKED: R.McDONNELL

APPROVAL: B.McALISTER

DATE: 10/05/2023

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PROJECT: 45924567 GAS TO MICROSOFT, GRANGECASTLE

TITLE: TYPICAL REINSTATEMENT DETAIL

DRAWING NUMBER: GNI135/01/RD/001

SCALE: AS STATED @A3

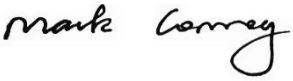
SHEET: 01 OF 01

APPENDIX C: 1587-RT-0004-R0 Griffeen River Trenchless Crossing Feasibility Report

Gas Networks Ireland

Griffeen River Trenchless Crossing Feasibility Report

CLIENT	Gas Networks Ireland		
PROJECT	GNI Grangecastle Pipelines		
CLIENT PROJECT NO.	TBC		
TITLE	Griffeen River Trenchless Crossing Feasibility Report		
DOCUMENT NO.	1587-RT-0004	**Revision**	0

REVISION NO.: 0	**PURPOSE: For Issue**		
Name	**Position**	**Signature**	**Date**
Tim Hyett Author	Consulting Engineering Geologist & Tunnel Specialist		14/08/2023
John Lennon Co Author	Design Engineer		15/08/2023
Mark Conroy FW Approver	Engineering Manager		16/08/2023

History of Issues / Approvals

REV	**DATE**	**DESCRIPTION OF CHANGES**	**FILE NO.**
0	16/08/23	First Issue	1587-RT-0004-R0

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Introduction

The purpose of this document is to present a feasibility study of trenchless construction options at the Griffeen River crossing as part of the proposed 400mm NB 85 barg GNI134 Milltown pipeline.

The proposed GNI134 Milltown pipeline shall serve as a strategic main and will allow for multiple offtakes in the Grangecastle area. The pipeline shall be an offtake form the existing 900mm NB Ballough to Brownsbarn pipeine and shall be 400 mm NB as requested by GNI. The pipeline shall terminate within Milltown AGI. Please refer to Figure 1 showing the proposed pipeline route. The pipeline must cross the Griffeen river along the route. The proposed river crossing location is also shown in Figure 1.

From initial site walks and review of the proposed crossing, the river crossing looked suitable for open cut construction methods. However, the project ecologist engaged for the pipeline Environmental Impact Assessment Report (EIAR) has advised that a trenchless crossing should be employed. The Griffeen river is noted to have a high local biodiversity value in the South Dublin Co. Co. (SDCC) area. The presence of Otter is well known by SDCC biodiversity officer, and National Parks and Wildlife Service (NPWS) would be highly concerned about any potential impacts on water quality during construction. There are also White Claw Crayfish and Trout that are stocked in the river by Anglers Association / Inland Fisheries Ireland. There is a high risk of objections being received during the pipeline Section 39A process from statutory consultees such as Inland Fisheries, SDCC etc. if open cut construction methods are proposed for the river crossing.

GNI have appointed FW to carry out the detailed design for the Milltown pipeline. Based on the above FW engaged Tim Hyett, geologist and tunnelling specialist based in the UK, to review the crossing from a trenchless perspective and determine if it is feasible to cross the river using a trenchless construction technique.

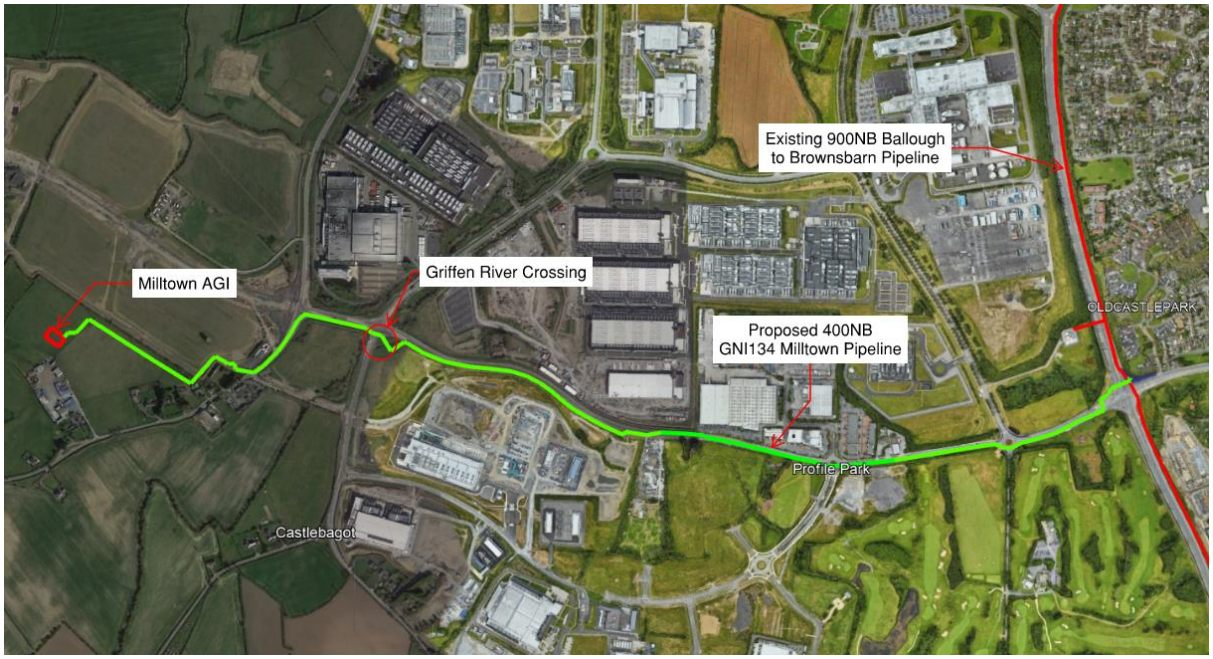


Figure 1: Overview of the Proposed GNI134 Pipeline Route with River Crossing Location. Source - Google Earth

1.1 Abbreviations

Abbreviation	Definition
AGI	Above Ground Installation
EIAR	Environmental Impact Assessment Report
FW	Fingleton White
GI	Ground Investigations
HDD	Horizontal Directional Drilling
GNI	Gas Networks Ireland
MT	Mini or Micro Tunnel
MTBM	Micro Tunnel Boring Machine
NPWS	National Parks and Wildlife Service
SDCC	South Dublin Co. Co.
RVX	River Crossing
SI	Site Investigations

Geotechnical Considerations

2.1 River Crossing Location and Topography

Figure 2 and Figure 3 give an overview of the river crossing location (approx. coordinates 53°19'13.8"N 6°27'22.0"W) and proposed pipeline route.

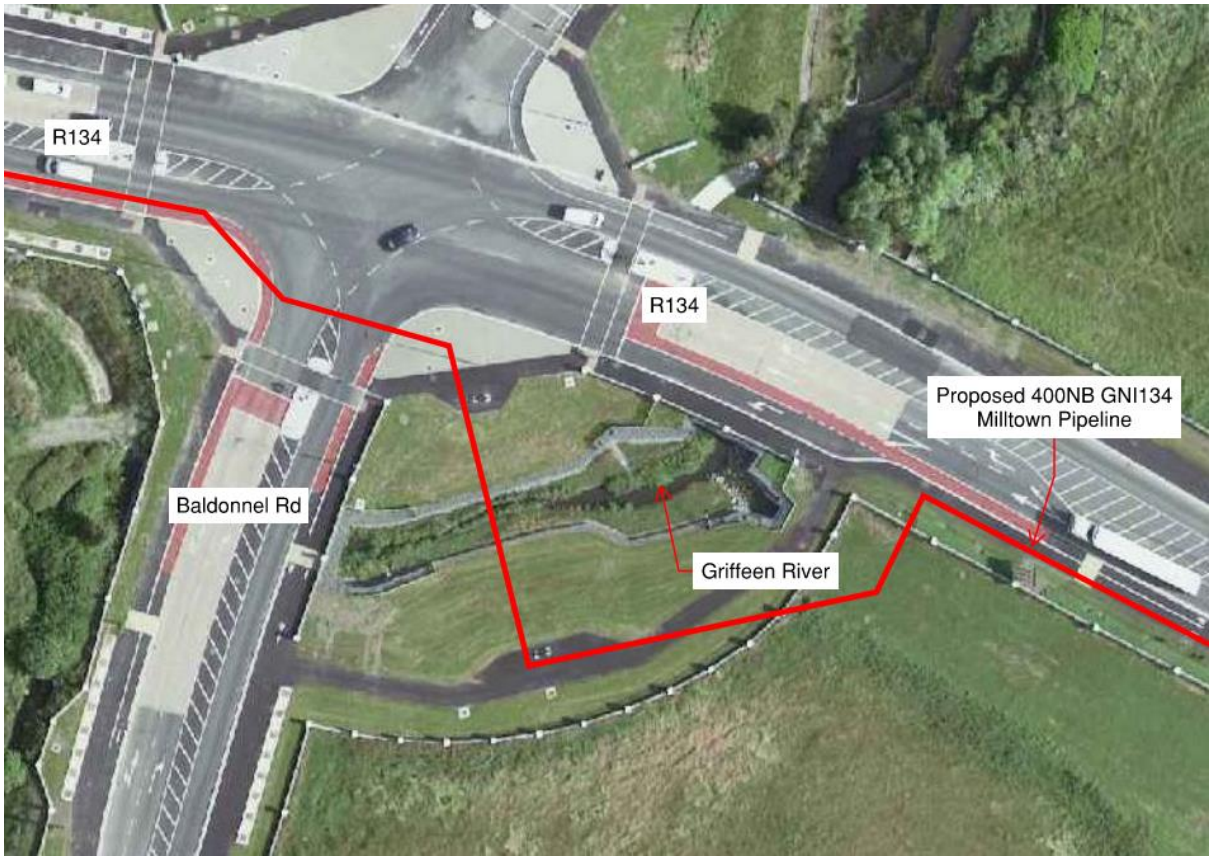


Figure 2: Plan View of Griffeen River Crossing Location

Figure 3: Site Photograph of Griffeen River Crossing Location showing Topography

Ground level at both sides of the river is steep, with an approximate 2 m change in elevation from the road / footpath level (approx. 68 m A.O.D.) to the riverbank level (approx. 66 m A.O.D.). The ground level elevations at the crossing location are shown in Figure 4 from a topographical survey conducted at the location.

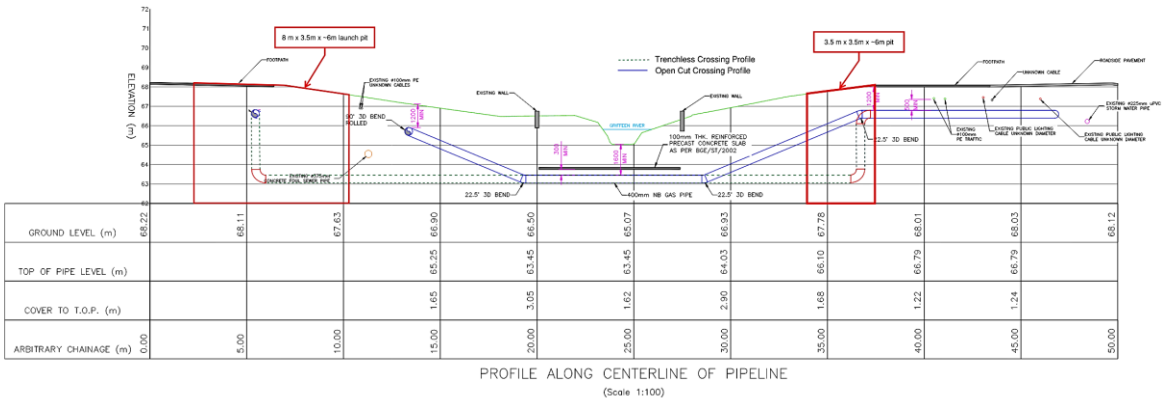


Figure 4: Ground Elevations from Topographical Survey and Crossing Profile

2.2 Background Geology

South Dublin has three main recognised geological areas – the oldest is composed of Ordovician volcanic rocks and Silurian sedimentary rocks in the south-western part of the county. These were formed as ancient sea floor sediments around 470 to 440 million years ago. They were uplifted into land as part of the Caledonian mountain building event at the end of the Silurian Period. They were on the southern side of the Iapetus Ocean which separated two 'halves' of Ireland, and which drifted northwards to combine forming mountains through the Appalachians, Ireland, Scotland and into Scandinavia.

Shortly afterwards (as a result of the collision of the continental masses) big masses of granite were created during the Devonian Period at around 405 million years ago. The chain of three main granite bodies runs down through Wicklow and Carlow. South Dublin includes the northern end of the Leinster Granite chain. As well as the granite, which was intruded to near surface levels, there was a series of dolerite dykes intruded across South Dublin, which are visible today, for example in Ballinascorney Quarry. The northern half of the county is formed of Carboniferous Limestone rocks deposited in a deep marine basin. These rocks were formed around 340 million years ago and are faulted against the older rocks along the base of the mountains.

The limestone deposited in this basin is a muddy limestone with few fossils, as it was generally a deeper water environment. This limestone underlies most of Dublin and is known as Calp limestone or 'the Calp'. It is well displayed in the Belgard Quarry. Some areas of very flat terrain such as around Newcastle conceal a buried topography from interglacial and pre-glacial periods. Drilling for minerals in the area revealed very deep channels filled with gravels, representing the route of a very large river far back in the geological past. Over the last 2 million years the Ice Age had a big effect on the landscape, eroding the mountains and depositing glacial gravels in places, especially around Brittas. Since the ice sheets melted away, rivers such as the Dodder have been active in the last 10,000 years or so, modifying the sediments at surface.

2.3 Specific Geology

Neither the riverbed depth (bathymetry) or the natural geological succession at the precise location of the crossing has been established formally at this initial stage in the design

process and the crossing location has not been subjected to a specific Ground Investigation (GI). However, some relevant indicative GI data[1] is publicly available.

Boreholes BH40 and BH41 shown in Figure 5 are located c. 150m to the south of the river crossing point and provide a general indication of the likely geology which is assumed (for the purposes of this preliminary report) to comprise Drift deposits of Alluvium and Glaciolacustrine clay soils to a depth of c. 3m over Glacial Till (boulders). Beneath this the solid geology probably consists of weathered muddy limestone and/or mudstone/siltstone (known locally as Calp).

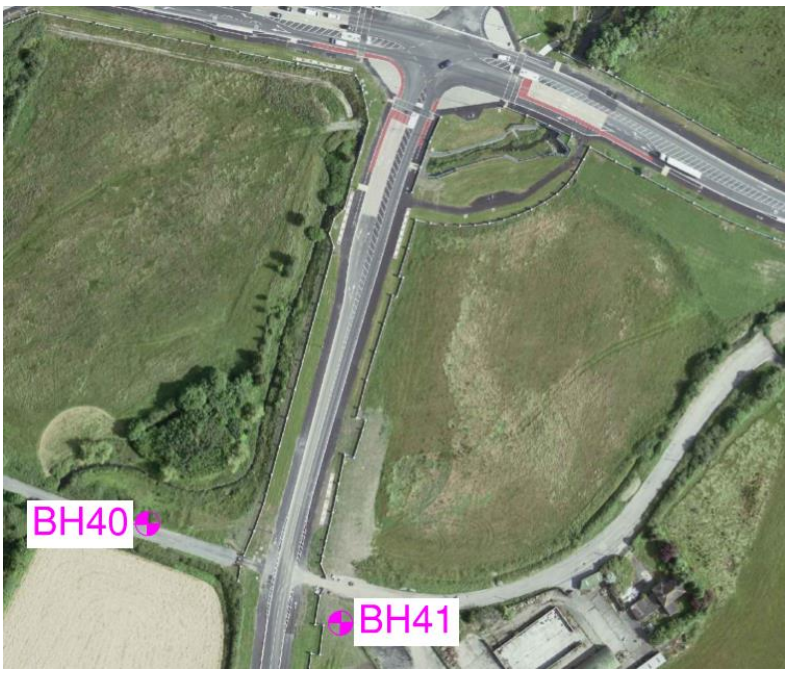


Figure 5: Borehole BH40 and BH41

2.4 Groundwater Conditions

Groundwater conditions at the site are also unknown but given the nature of the watercourse it can be assumed that water will be present in the lower horizons within the superficial soils. Bedrock is likely to be highly weathered at the soil-rock interface, but hydraulic connectivity between the river and the solid geology is unlikely.

[1] https://www.pleanala.ie/en-ie/case/309773

Trenchless Options

3.1 Horizontal Directional Drilling (HDD)

The HDD method was developed directly from the oil well drilling industry and involves the creation of a 167mm diameter horizontal borehole (pilot hole) that is fully steerable (by virtue of the geometric arrangement of the drilling assembly/bent sub/mud-motor) and the use of surface mapping technology combined with tracking of a magnetic (or gyroscopic) device located in the drill head assembly.

Spoil is excavated and removed using drilling mud (bentonite) that is pumped down the centre of the drill pipe, and flushes back up the bore hole, gradually carrying the solids to a small mud pit at the surface.

The spoil transportation system is not dissimilar to micro-tunnelling, except the system is an open-loop, and returns to the mud pit are possible only by virtue of the pump velocity of the HDD rig, pushing fluids down-hole and back up to the mud pit.

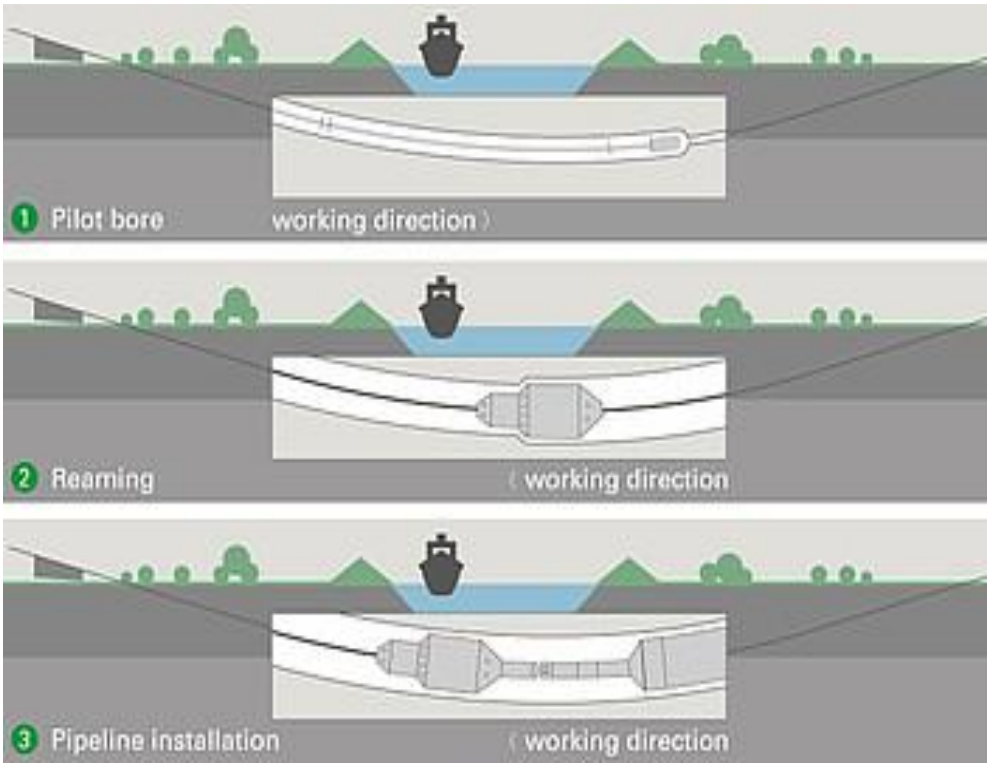


Figure 6: HDD Schematic Pilot, Reaming and Hole Opening

Once the pilot bore has been successfully installed to the correct bore profile, the hole remains full of bentonite mud (which supports the hole and prevents collapse). The hole is then increased in diameter by circulating reamers (or hole-openers) of increasing size, each cutting more of the bore diameter on each pass. Spoil is still transported by the pressure of the injected mud, pushing the arisings gradually back to the surface mud pit. Crucially, it is the engineering properties of the bentonite that, in theory, are “designed” to keep the hole supported, because with HDD no physical “sleeve” is installed to support the hole before the pipeline is inserted.

Figure 7: HDD - Hole-opening using a Barrel Type Reamer

Once the borehole is fully reamed to the required diameter (usually 1.5 times the diameter of the product pipe) the pipe is welded together and assembled in one single continuous pipe-string and is attached to the HDD drill string via a fabricated pulling head arrangement. It is then pulled into the open hole using the backward pulling force of the HDD Rig. Bentonite is displaced as the pipe is pulled into the hole, but sufficient remains within the hole to prevent ground collapse until the pipe is installed, and the mud remains in the annular space between the pipe and the excavated hole diameter, where the mud gradually gels (and sets over time), theoretically preventing further ground loss and therefore settlement due to the difference in diameter/volumes between the drilled hole and the steel pipeline.

The method is theoretically suitable for most types of geology however in reality only stable soils are appropriate, mainly due to the fact the hole must stay 'open' without the presence of a physical 'sleeve' or pipe for active ground support. Cohesion-less soils are therefore generally considered problematic, and loose sands and gravels below the water table are not generally feasible (without additional measures) because the open hole can easily collapse leading to surface settlement and the subsidence of infrastructure, foundations and underground utilities etc.

In the HDD method the excavated soil is transported in a bentonite slurry (i.e. the drilling mud). The spoil is mixed with bentonite and is carried to the surface by a slurry circuit, the efficiency of which depends on the pump capacity of the selected HDD Rig i.e. the bigger the HDD Rig, the bigger the slurry pump(s). The slurry circuit is theoretically an open-loop, but the transportation and hole supporting characteristics of the drilling mud are crucial to the operation, hence HDD also requires some form of Slurry Separation Plant (SSP) (not dissimilar to that used in micro-tunnelling) to recondition the drilling mud, and to separate the solids from suspension, sending refreshed bentonite back through the drill-string in order to transport newly excavated spoil and support the hole as the drill is progressed.

3.1.1 HDD Summary

HDD is not considered suitable for the RVX due to the very short crossing length and the physical space available within the site boundary. The geology is also not particularly suitable for small scale HDD, and it would require a Maxi HDD set up and possibly casings to bore through the solid geology in an effective way.

3.2 Micro-tunnelling (MTBM)

Micro-tunnelling is a mechanised form of pipe-jacking using a mini (or micro) tunnel boring machine (MTBM). Concrete pipes are jacked into the ground using a powerful hydraulic jacking rig situated inside a conventional shaft excavation, hence depth is not usually a restriction. The MTBM is situated at the front of the concrete jacking pipe string, and soil is excavated by the rotation of the TBM cutting wheel, equipped with cutting tools specifically tailored to suit the geology. The spoil is mixed with a bentonite slurry in the cutting chamber and is transported to the surface by pumps via inlet slurry and return slurry lines installed manually within the concrete pipe string.

Figure 8: Conventional Closed-face Micro-tunnelling Schematic

The slurry circuit is a fully closed loop. This method therefore also requires a slurry separation plant at the surface to recondition the bentonite, and to separate the solids from suspension, sending refreshed bentonite into the MTBM to transport spoil from the tunnelling machine on the next excavation cycle. Unlike HDD (or other forms of “boring”) the power element (motors) is contained within the MTBM itself, hence the diameter critically affects the overall capability in hard ground, or soft ground where cobbles and boulders have been identified i.e. larger diameter MTBM’s are more powerful because larger motors can be used in the machine design, and more cutting tools can be fitted to the cutting head.

Once complete, the MTBM is removed and the slurry lines withdrawn, leaving the installed concrete sleeve tunnel in situ. The MTBM cutting head has a nominal over-cut facility that enables the concrete pipes to be installed without picking up excessive friction from the surrounding soil. Bentonite is also used on the outside of the pipe string as a lubricant. For long drives, the concrete pipe string is interrupted with intermediate inter-jacking stations that create a “caterpillar” type tunnelling effect, enabling very long lengths of proportionally small diameter tunnel to be installed up to 900m.

The concrete pipe sleeve provides continual ground support to the excavated tunnel, and the MTBM cutting head is a fully-closed system, so surface settlement can be prevented with a

high degree of reliability. On completion, the annular space between the outside of the concrete pipe and the excavated ground is usually grouted with cement, further minimising the potential for future ground settlement in the longer term.

In all diameters, there is an array of very advanced technology that can stabilise the excavation face ahead of the MTBM, monitor external earth and water pressures, cutting wheel torques etc., and guide the pipe-jacked tunnel through potentially very long drives (900m +), and tight curves (radius > 400m), and steep positive and negative gradients.

Figure 9: Conventional Micro-tunnelling Cutting Heads – Soft Ground, Mixed Ground and Rock

The method is suitable for all types of geology, including highly variable ground beneath the water table, clays, sands and gravels, and hard rock. Boulders can usually be accommodated, but other physical obstructions may still cause the usual problems, subject to MTBM selection, size and power capacity. The technique is particularly suitable for the installation of sleeve tunnels for oil & gas pipelines, and whilst it is the critical geology that usually dictates the MTBM type and size, hence the overall tunnel diameter, it is equally possible to install more than one utility pipe into one larger tunnel, rather than necessarily trying to construct smaller diameter sleeve tunnels (where the ideal MTBM size may not be powerful enough).

3.2.1 MTBM Summary

Micro-tunnelling (MT) would be suitable for the RVX but space would present enormous challenges, and the costs would be disproportionate for such a short crossing length. The

geology (and specifically the presence of a soil-rock interface) would mean that the MT would need to be driven entirely within the rock.

3.3 Direct Pipe Micro-tunnelling (D-MTBM)

This is a recent innovation that developed from traditional micro-tunnelling - and is designed specifically to service the Pipeline and Power Distribution sectors. It involves the same form of mechanised, small diameter tunnelling but without the concrete pipe-jacking element - instead borrowing long string pipe technology from HDD.

In Direct-Pipe Micro-tunnelling a mini (or micro) tunnel boring machine (MTBM) is still used, but it is fitted directly onto the front of a long, fully assembled pipe string laid out on the surface. The MTBM + pipe string is pushed into the ground simultaneously using a Hydraulic Thruster Rig, which grips the pipe string from the sides (as opposed to pushing from the back, as with conventional pipe-jacking). The pipe string is pre-prepared and welded together on the surface (as with HDD) and the slurry lines are inserted and connected before the tunnel is started. This enables quite large diameter steel sleeves to be installed in a single process very quickly (which is why it is particularly good for oil & gas pipeline crossings). Crossings up to 1200m in length are possible (subject to geology).

Once complete, the MTBM is removed and the slurry lines withdrawn, leaving the installed pipe in situ in the ground. As with conventional micro-tunnelling, the MTBM cutting head has a nominal over-cut facility that enables the continuous pipe to be installed without picking up excessive friction from the surrounding soil. Bentonite is used on the outside of the pipe string as a lubricant, but with this method it is not possible to break the pipe string for an inter-jacking station to create the important “caterpillar” like effect, but developments with automated lubrication have enabled long lengths (>1km) of large dia. pipe to be installed.

The method is suitable for all types of geology, as with conventional micro-tunnelling, however caution is required in rock >100MPa, or in soft ground where cobbles and boulders are present, because this could mean that a larger, more powerful MTBM is required - which then requires a larger pipe diameter etc., than perhaps was wanted by the client - which can become costly, and if the smaller steel product gas pipe is installed within a larger sacrificial steel pipe (because a larger MTBM is required), further problems can manifest with respect to Cathodic Protection by virtue of the steel to steel contact etc.

Figure 10: Direct Pipe Micro-tunnelling showing Thruster Rig Installing Pipe-string (entry angle approx. 10°)

3.3.1 D-MTBM Summary

Direct-Pipe MT is not considered suitable for the RVX due to the very short crossing length and the physical space available within the site boundary. There is no space for pipe-stringing and the geology is not suitable for a small-scale D-MTBM. The set-up costs would be considerable and overall, the method is disproportionate for the work.

3.4 Traditional Auger-boring / Guided Auger-boring

Traditional auger-boring is a method where simple, short, horizontal bores can be 'drilled' through the ground on a generally straight alignment using simple equipment that consists of an external, rail mounted auger-boring rig positioned in a long, relatively shallow excavation (subject to riverbed depth). The mechanical power component is located outside of the bore and is uninfluenced and unrestricted in terms of power by the confines of the bore diameter.

The auger rig drives steel sleeves that contain an Archimedes screw (continuous flight augers), and a cutting head is attached to the lead auger. Sectional lengths are installed by pushing the sleeve into the ground using hydraulic jacks on the auger-boring rig, whilst simultaneously rotating the augers and cutting head via a hexagonal coupling.

Excavated material (in its natural untreated state) is transported back to the pit by the screw and is discharged in the pit for removal to the surface using conventional muck skips or an excavator.

Figure 11: Traditional, Long-bore Auger-boring in Stable Soils from a Battered Excavation

Once complete, the cutting head is removed and the augers withdrawn, leaving the installed pipe in situ in the ground. The cutting head has a nominal over-cut facility that enables the sleeve to be installed without picking up excessive friction from the surrounding soil. The sleeve is then left in place, and the nominal annular space between the outside of the sleeve and the excavated ground is not grouted. Sacrificial sleeves (if used) are usually steel and can be up to 12m long. They are welded together in sufficient lengths to achieve the total crossing length. Alternative methods exist for shorter pipe lengths, including facilities to use clay pipes, and whilst traditional methods are usually non-steerable, modern equipment can now include for a degree of steering, with other variations also including “guided auger-boring” using a pre-driven pilot bore and reverse auger boring method.

The auger method generally requires the geology to be stable i.e. predominantly cohesive soils in reasonably dry conditions. Boulders and physical obstructions cannot be excavated efficiently. Cohesionless soils (sands and gravels) are also problematic, particularly below the water table, as they tend to ‘run’ into the sleeve without any means of face control. This can lead to potential subsidence above. Equally, the annular space (referred to above) can

close quickly in certain types of soil, and the sleeve is liable to pick-up high friction forces as it is being pushed through the ground, limiting length capability.

Soft rock is theoretically possible by utilising a conventional hard cutter head, but in reality conventional auger heads are fairly low-tech and are generally limited to being able to deal with highly weathered rocks n/e 25MPa Unconfined Compressive Strength (UCS). For harder rocks, a special hard rock cutter head (SBU) is used - this is similar to an MTBM rock cutter head, but is still driven by the auger-boring unit.

The ROBBINS Small Boring Unit (SBU-A) is a proven solution for medium to strong rock installations up to 150m long. The SBU-A can be used with any conventional auger boring machine (ABM) from 0.6m to 1.8m in diameter and utilizes a full-face auger for spoils removal.

For excavation, the SBU-A is welded to the lead casing. An ABM provides both torque and forward thrust to the cutting head. In hard rock, the circular cutterhead is fitted with disc cutters, while in mixed ground a combination of ripper teeth, drag, bits, and disc cutters are used.

Figure 12: ROBBINS SBU Unit for Auger-boring in Hard Rock

Figure 13: ROBBINS SBU Unit in Use for a Short Hard Rock Crossing

3.4.1 Auger-bore Summary

Traditional Auger-boring is considered feasible for the RVX, but space is still required to excavate the launch pit which typically needs to be c.15m long x 3.5m wide (if full 12m long pipes are planned to be used). This requirement can be reduced if half-pipes are used. The reception pit dimensions would typically be 3.5m x 3.5m.

Trenchless Crossing Recommendation

Of the trenchless options available to GNI to construct the crossing, traditional auger-boring represents the optimum method for the short but challenging Griffeen River crossing.

Specific Ground Information obtained from boreholes either side of the river is required to determine the stratigraphy, and identify where the rockhead horizon is situated relative to the riverbed, which also needs to be surveyed for bathymetry/depth:

- If the bore horizon is situated within the superficial soils, at sufficient depth beneath the riverbed a conventional auger and cutting head may be possible.
- If the bore horizon is situated within solid geology (i.e. rock) a Robbins type SBU Unit will be required (See Appendix A for details).

In either case, further consideration should be given to whether the bored pipe should be planned to be sacrificial (i.e. oversized) to act as a sleeve for the HP Gas Pipeline (or) if it is possible to use the 400NB product HP Gas Pipe directly:

- If the bore is within rock, a larger diameter machine may be needed for 'power' reasons - which in turn is likely to drive the solution towards installing an oversize sleeve through which to install the gas pipeline.
- If a sleeve does prove to be needed (as is likely) further consideration will need to be given as to whether GNI can accommodate a steel HP Gas Pipeline situated within a steel sacrificial sleeve (which is known to have a potential to interfere with Cathodic Protection measures).
- If steel-within-steel is not acceptable to GNI, another step can be introduced into the auger-boring procedure, where the installed steel sacrificial pipe is effectively 'circulated' out, after the auger-bore is complete. Concrete jacking pipes of an equivalent outside diameter are used, and the steel sacrificial pipe is cut off in sections in the reception pit as the string is pushed forward by the jacking pipes, which effectively replaces the sacrificial steel auger-bored sleeve in entirety. The HP Gas Pipeline can then be threaded inside the concrete sleeve in the same way it would be done for a micro-tunnel crossing. This requires some effort to match the various outside diameters i.e. the boring unit, the sacrificial pipe OD and the RC Jacking pipe OD, as well as ensuring a suitable finished ID that can be threaded with a 400mm NB heavy wall Steel Gas Pipeline. From direct experience this is achievable with standard pipe sizes and standard materials.

In this report we have referred to the ROBBINS SBU-A Cutting Head, which is manufactured in the United States. Several UK Contractors have this equipment within their drilling fleets, but similar European systems exist, such as BOHRTEC (see www.bohrtec.com) which are frequently used for the same purposes in the UK gas pipeline marketplace as shown in Figure 14 below.

Figure 14: Auger-boring Launch Shaft Construction Setup

4.1 Preliminary Design Parameters

The basic design parameters for the proposed auger-bore are outlined below in Table 1. Note exact specifics of the crossing design shall be confirmed post ground investigations either side of the river.

Table 1: Basic Design Parameters for Proposed Auger-bore Crossing Technique

Parameter	Specification
Total Bored Tunnel Length	Approximately 30m
Vertical Alignment	Straight - depth TBC post GI and bathy survey.
Horizontal Alignment	Straight.
Launch Shaft	*TBC (typically 15m x 3.5m, but can be shorter, 8m x 3.5m, if half pipes are used)
Reception Shaft	*TBC (typically 3.5m x 3.5m, subject to depth)
Sacrificial Steel Sleeve OD	1100mm
Auger Machine Type	American Auger / Robbins ABM 36-630
Cutter Head	Robbins SBU-A42 (bore diameter 1120 mm to match sacrificial)
Concrete Jacking Pipe	FP McCann DN900 (1100mm OD to match sacrificial)
Jacking Pipe Type	RC jacking pipes to BS EN 1916 and BS 5911-1, steel banded
Pipe Length	2.5m
Packer Type	68mm MDF / self-lubricating joint gasket

The preliminary trenchless river crossing profile and associated shaft sizes are shown in Figure 4 in Section 2.1.

4.2 Budget Construction Costs

Estimated budget construction costs for the auger-boring trenchless technique are outlined in Table 2. Excluding design time and costs, and not factoring for pipe material costs, welding, NDT etc., the construction work for the Griffeen river crossing using auger-bore techniques shall take 6 to 8 weeks and shall cost circa €395,000 +/- 50%. Note this cost assumes a shaft depth of 6 m is required to be constructed (subject to GI).

Table 2: Budget Construction Costs for Griffeen River Auger-bore

Description	Costs	Sub-Total	Time
Mobilisation & establishment	-	€50,000	1wk
Preliminaries, site strip, enabling RAMS etc.	-	€20,000	
Launch Shaft – 15m x 3.5m x 6m deep (fully sheet piled)	€100,000		2wk
Reception Shaft 0 3.5m x 3.5m x 6m deep (fully sheet piled)	€60,000	€160,000	2wk
Auger-bore at 1100mm ϕ - 30m @ £1200/m (based on free-issue sacrificial pipe)	€70,000		1wk
Circulate pipe and replace with RC Jacking Pipe 900mm ϕ	€40,000		0.5wk
Threading & Grouting	€55,000	€165,000	1.5wk
	TOTAL	**€395k +/- 50%**	8 weeks

Further Recommendations

- Consult GNI and other stakeholders to review the content of this report. Request feedback and seek agreement that HP Gas Pipeline design be progressed on the basis that a Trenchless Solution will be carried out at the Griffeen River crossing.
- This solution will most likely be based on a sleeve installation, including a concrete replacement sleeve option. [*NOTE – although the sleeve remains in the ground, it is Temporary Works (TW). The only Permanent Works is the gas pipeline inside the sleeve. Thus, the appointed Contractor is responsible for the design of his own TW].
- Carry out basic Ground Investigation – 2 boreholes either side of the river would be satisfactory to confirm the stratigraphy. Commence using percussive initially then change to rotary to investigate the bedrock conditions.
- Carry out some form of bathymetry survey to establish the riverbed depth.
- Establish the optimum geological crossing corridor (Hz and Vz) at the earliest opportunity.
- Develop the pipeline design according to GNI's brief. Key design parameters should focus on cover depth requirements beneath the riverbed + cover depth to the soil-rock interface. This will determine shaft excavation depths etc., and also shaft sinking methodology.
- Challenge & review the design, and after any permissions and/or consents are obtained prepare the Works Information Scope.
- GNI to award a Lump Sum type contract to construct the works using suitably competent and experienced framework contractors who can demonstrate a strong auger-boring capability (or) demonstrate a supply chain that can deliver the trenchless works, retaining governance over the finished pipeline design, but embedding sufficient flexibility in terms of machine type/sleeve pipe diameters, methodology etc. (which is theoretically Temporary Works), thus enabling the party best able to shoulder the bore/tunnel design responsibility (i.e. the specialist subcontractor).
- Bind into the contract a GNI Recommended Auger-boring Specification and Sleeve Threading and Grouting Specification that will be drafted by FW and will elevate and drive quality - in effect, to steer the Contractor towards using good quality equipment and following high standards of installation.
- Supervise the crossing works accordingly and procure specialist assistance and guidance where required during the construction phase.

APPENDIX A: ROBBINS SBU Units

Robbins

SBU Division

Auger Boring Machine (ABM)

Technical Description

The Robbins Auger Boring Machine (ABM) is used to bore horizontally through soil or rock with a cutting head and auger. ABMs are used to install steel casing on road, river, and rail crossings.

A starting pit is used to launch the ABM on a predetermined length of track. The machine excavates with the cutting head, while jacking force is provided by hydraulic thrust cylinders. Steel casing pipe and auger sections are added as the machine advances. Spoil is removed from the auger through the casing to a door located on the side of the master pusher.

A Versatile Solution

The Robbins ABM can be used in a variety of ground conditions, from soil to hard rock. The machine is made for use with SBU Products in hard rock, as well as with soft and hard soil cutterheads. The ABM is capable of excavating soil, sand, clay, cobble, glacial till, soft shale, and some sandstone. Both the SBU-A and the SBU-M are the ideal attachments to be used with the Robbins ABM in hard rock and mixed ground.

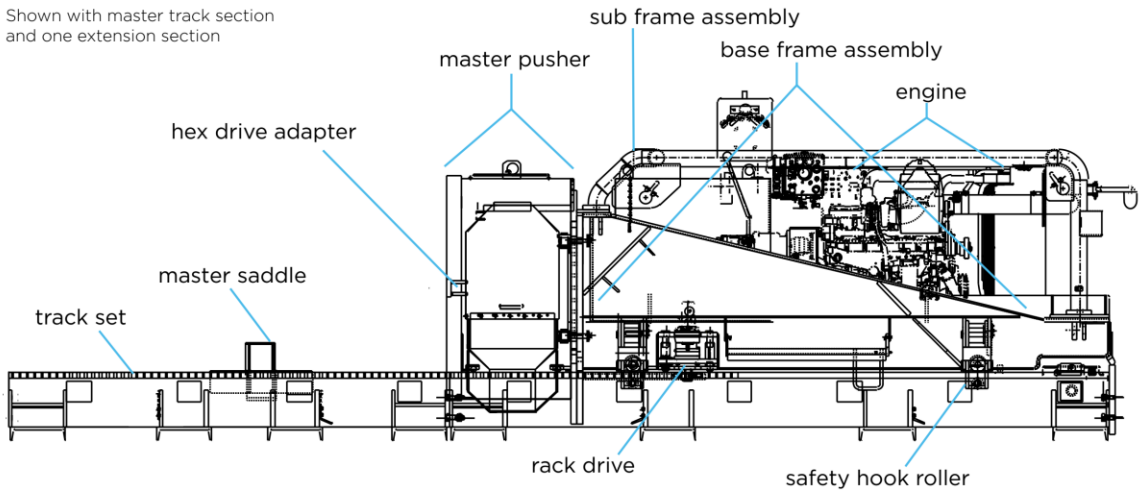
ABM APPLICATIONS:

- Soft ground utility installations
- Hard rock utility installations (with SBU products)

AVAILABLE FOR PURCHASE OR LEASE

Side View

Shown with master track section and one extension section



SPECIFICATIONS

MACHINE DIAMETERS 0.9 to 2.0 m

GROUND CONDITIONS Soil, sand, clay, cobble, glacial till, soft shale, and sandstone. ABM can also be used with SBU products to excavate hard rock and mixed ground from 25 to over 175 MPa UCS.

ABM 36-630

Bore Capacity	300 to 910 mm
Optional Lift Kit	1,070 mm
Engine	DEUTZ F6L914
Net Power	85 kW
Peak Engine Torque	400 N-m at 2300 rpm
Gearbox Ratio	54:1
Transmission	Spicer 5 speed
Hex Drive	102 mm
Cylinders	2 x 230 mm
Max. Thrust	2,800 kN
Min. Pit Size	3.7 m x 10.7 m
Total Weight	9 metric tons
Centerline	600 mm

ABM 48-950

Bore Capacity	300 to 1,220 mm
Optional Lift Kit	1,370 mm
Engine	DEUTZ BF6L914C
Net Power	130 kW
Peak Engine Torque	700 N-m at 2300 rpm
Gearbox Ratio	54:1
Transmission	Spicer 5 speed
Hex Drive	127 mm (102 mm adapter optional)
Cylinders	3 x 230 mm
Max. Thrust	4,240 kN
Min. Pit Size	3.7 m x 10.7 m
Total Weight	10 metric tons
Centerline	720 mm

ABM 60-1270

Bore Capacity	610 to 1,520 mm
Optional Lift Kit	1,680 mm
Engine	Cat C-7
Net Power	187 kW
Peak Engine Torque	800 N-m at 2300 rpm
Gearbox Ratio	40:1
Transmission	Eaton 6 speed
Hex Drive	127 mm
Cylinders	4 x 230 mm
Max. Thrust	5,650 kN
Min. Pit Size	4.9 m x 11.6 m
Total Weight	16 metric tons
Centerline	1,060 mm

ABM 72-1500

Bore Capacity	610 to 1,830 mm
Optional Lift Kit	1,980 mm
Engine	Cat C-9
Net Power	224 kW
Peak Engine Torque	1,070 N-m at 2300 rpm
Gearbox Ratio	36:1
Transmission	Eaton 9 speed
Hex Drive	127 mm (152 mm adapter optional)
Cylinders	4 x 250 mm
Max. Thrust	6,670 kN
Min. Pit Size	4.9 m x 11.6 m
Total Weight	20 metric tons
Centerline	1,060 mm

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Metric Version

Robbins

SBU Division

Small Boring Unit (SBU-A)

Technical Description

The Small Boring Unit (SBU-A) is a proven solution for medium to hard rock utility installations up to 150 m in length. The SBU-A can be used with any conventional auger boring machine (ABM) from 0.6 to 1.8 m in diameter and utilizes a full-face auger for spoils removal. For excavation, the SBU-A is welded to the lead casing. An ABM provides both torque and forward thrust to the cutting head. In hard rock, the circular cutterhead is fitted with disc cutters, while in mixed ground a combination of ripper teeth, drag, bits, and disc cutters are used.

Cutting Through Rock

Small Boring Units utilize disc cutters from 6.5" to 14" in diameter to excavate rock. Disc cutters penetrate the rock face and create a "crush zone" through which fractures propagate. Material between adjacent crush zones is then chipped from the face. Muck scrapers scoop the muck into openings on the cutterhead (called muck buckets), which transfer the material to a full-face auger for removal.

Improved Boring Efficiency

Unlike typical carbide bit or roller cone cutting heads, the SBU-A can power through rock over 175 MPa UCS. Most tungsten carbide cutting tools tend to break off in rock above 75 MPa UCS, requiring expensive replacements and machine downtime.

A Cost Effective Solution

The SBU-A has been successfully used on hundreds of projects around the world to efficiently excavate hard rock. By maximizing machine availability and minimizing labor costs, a typical SBU-A/ABM setup is economically better than carbide bit or roller cone cutting heads.

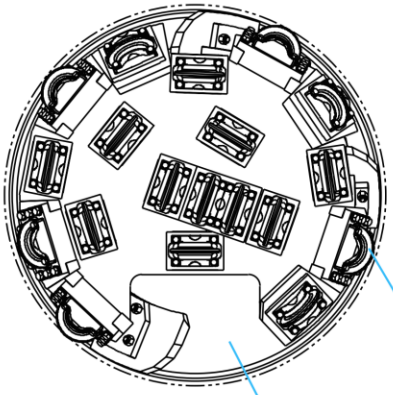
SBU-A APPLICATIONS

- Full-face auger boring
- Replacement for carbide bit and roller cone cutterheads
- Bore lengths up to 150 m (depending on geology)

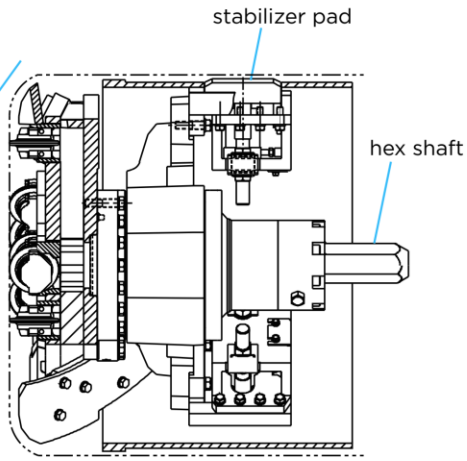
Fingleton White
NeoDyne

Gas Networks Ireland

Front View



Side View



SPECIFICATIONS

MACHINE DIAMETERS	0.6 to 1.8 m
ROCK STRENGTHS	25 to over 175 MPa UCS
GROUND CONDITIONS	Medium to hard rock, or mixed ground

SBU-A 24

Bore Diameter	660 mm
Hex Size	102 mm or 77 mm
No. Cutters	9
Cutter Size	165 mm (6.5")
ABM Torque Required	7,865 to 10,575 N-m
ABM Thrust Required	200 to 400 kN

SBU-A 30

Bore Diameter	810 mm
Hex Size	102 mm or 77 mm
No. Cutters	9
Cutter Size	165 mm (6.5")
ABM Torque Required	7,865 to 10,575 N-m
ABM Thrust Required	200 to 400 kN

SBU-A 36

Bore Diameter	970 mm
Hex Size	102 mm
No. Cutters	13
Cutter Size	165 or 241 mm (6.5" or 9.5")
ABM Torque Required	17,085 to 22,915 N-m
ABM Thrust Required	290 to 580 kN

SBU-A 42

Bore Diameter	1,120 mm
Hex Size	102 mm
No. Cutters	16
Cutter Size	165 or 241 mm (6.5" or 9.5")
ABM Torque Required	26,170 to 34,980 N-m
ABM Thrust Required	380 to 760 kN

SBU-A 48

Bore Diameter	1,270 mm
Hex Size	127 mm or 102 mm
No. Cutters	19
Cutter Size	165, 241, or 292 mm (6.5, 9.5, or 11.5")
ABM Torque Required	33,355 to 46,610 N-m
ABM Thrust Required	420 to 840 kN

SBU-A 54

Bore Diameter	1,420 mm
Hex Size	127 mm or 102 mm
No. Cutters	21
Cutter Size	165, 241, or 292 mm (6.5, 9.5, or 11.5")
ABM Torque Required	41,490 to 55,460 N-m
ABM Thrust Required	470 to 940 kN

SBU-A 60

Bore Diameter	1,570 mm
Hex Size	127 mm
No. Cutters	14
Cutter Size	165, 241, or 292 mm (6.5, 9.5, or 11.5")
ABM Torque Required	51,800 to 69,000 N-m
ABM Thrust Required	830 to 1,560 kN

SBU-A 66

Bore Diameter	1,730 mm
Hex Size	127 mm
No. Cutters	15
Cutter Size	292 mm (11.5")
ABM Torque Required	63,800 to 85,100 N-m
ABM Thrust Required	890 to 1,670 kN

SBU-A 72

Bore Diameter	1,880 mm
Hex Size	127 mm
No. Cutters	16
Cutter Size	292 mm/356 mm (14")
ABM Torque Required	86,920 to 108,200 N-m
ABM Thrust Required	1,000 to 1,780 kN

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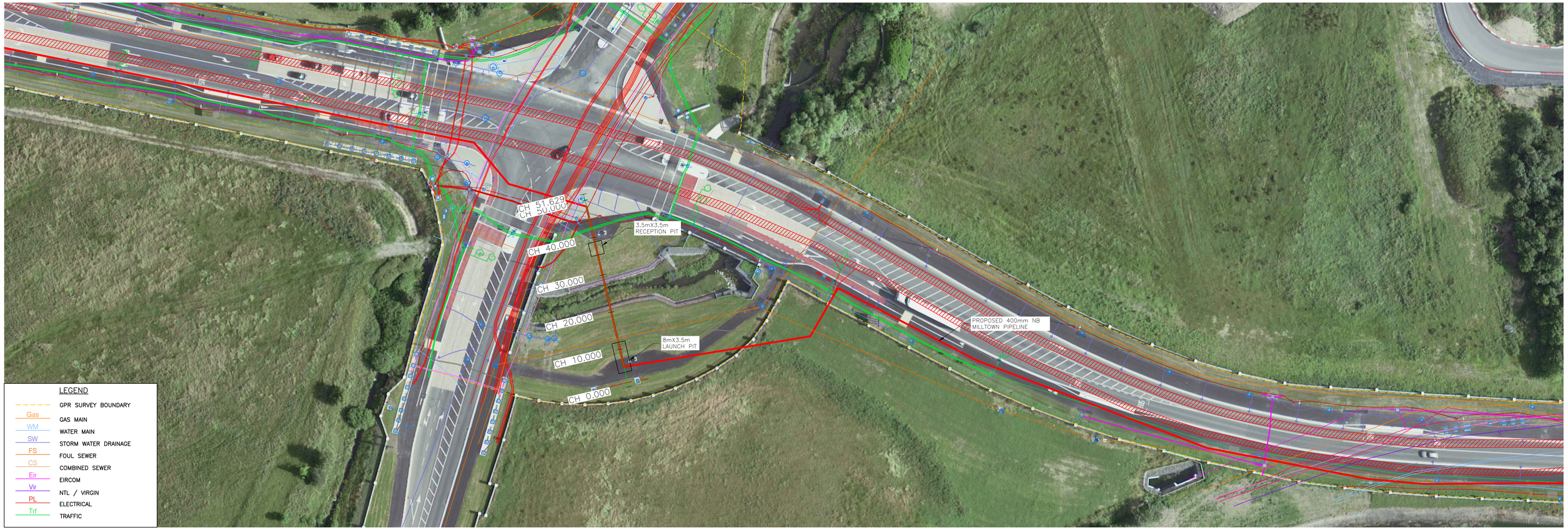
Fax: +1 440 248 1702
Email: sbusales@robbinstbm.com

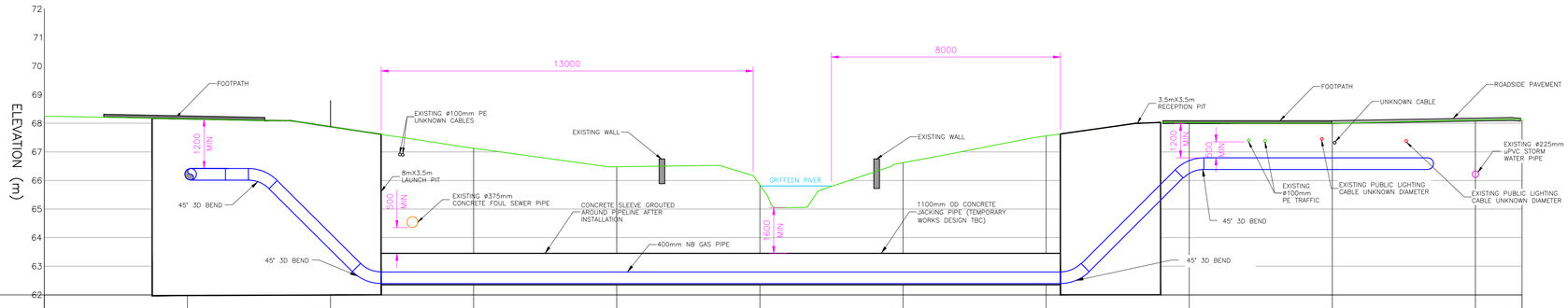
Robbins

Visit www.TheRobbinsCompany.com for more information.

Metric Version

APPENDIX D: GNI-134-06-001 Griffeen River Crossing Plan and Longitudinal Section





GROUND LEVEL (m)	68.24	68.15	67.88	67.13	66.48	65.84	66.62	67.56	68.03	68.00	68.12	68.12
TOP OF PIPE LEVEL (m)		66.43	64.14	62.80	62.80	62.80	62.80	62.80	66.79	66.79		
COVER TO T.O.P. (m)		1.72	3.74	4.33	3.68	3.04	3.82	4.76	1.24	1.21		
ARBITRARY CHAINAGE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	51.63

PROFILE ALONG CENTERLINE OF PIPELINE

(Scale 1:100)

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE FROM DRAWING.
2. EXISTING SERVICE LOCATIONS ARE INDICATIVE ONLY. CONTRACTOR SHALL CONFIRM LOCATION OF ALL SERVICES ON SITE PRIOR TO WORKS COMMENCING.
3. CONTRACTOR SHALL SITE CHECK ALL LEVELS PRIOR TO WORKS COMMENCING.
4. GRP DATA DISCLAIMER:
   (a) IN IDEAL CONDITIONS SPATIAL ACCURACIES FOR THE UNDERGROUND UTILITIES ARE +/– 5% FOR THE RD4000 AND +/– 10% OF DEPTH FOR THE GPR TO 2.5m DEEP. VARIATIONS WITHIN SUBSURFACE MAY ALTER ESTIMATED ACCURACY.
   (b) PLAN ACCURACIES OF THE ORDER OF +/– 150mm MAY BE ACHIEVED BUT THIS FIGURE WILL DEPEND ON THE DEPTH OF THE SERVICE BELOW GROUND LEVEL. WHERE SIMILAR SERVICES RUN ON CLOSE PROXIMITY, SEPARATION MAY BE IMPOSSIBLE. SUCCESSFUL TRACING OF NON–METALLIC PIPES MAY BE LIMITED.
   (C) PLEASE NOTE THAT NOT ALL BURIED PIPES, CABLES AND DUCTS CAN BE DETECTED AND MAPPED IN CONSIDERATION OF THEIR DEPTH, LOCATION, MATERIAL TYPE, GEOLOGY AND PROXIMITY TO OTHER UTILITIES.
5. DESIGN AND DEPTH OF PIPELINE CROSSING TBC PENDING RESULTS FROM SITE INVESTIGATIONS.
6. LAUNCH AND RECEPTION PITS SHOWN ARE TYPICAL ONLY. PITS ARE SUBJECT TO TEMPORARY WORKS DESIGN WHICH IS TO BE COMPLETED PRIOR TO CONSTRUCTION BY THE MAIN WORKS CONTRACTOR.

DETAILED DESIGN

ISSUE	REVISION	REV. BY	A	B	C	D	E	F	G
2	DETAILED DESIGN	MAH 21/09/23	TM 21/09/23	JL 21/09/23					
1	DETAILED DESIGN	MAH 23/08/23	TM 23/08/23	JL 23/08/23					
0	DETAILED DESIGN	MAH 27/07/23	TM 27/07/23	JL 27/07/23					

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B	DESIGN ENGINEERING	
C	STRATEGY/PLANNING	CHECKED T.MALONE
D	DESIGN MANAGEMENT	
E	OPERATONS	APPROVAL J.LENNON
F	CONSTRUCTION	
G	AM/AO ADDITIONAL	DATE 27/07/2023

PROJECT
45924538 Gas to Bulmer, Grange Castle

TITLE
RIVER CROSSING PLAN AND LONGITUDINAL SECTION

DRAWING NUMBER
GNI134/06/001

SCALE
AS SHOWN @A1

SHEET
01 OF 01

Gas Networks Ireland
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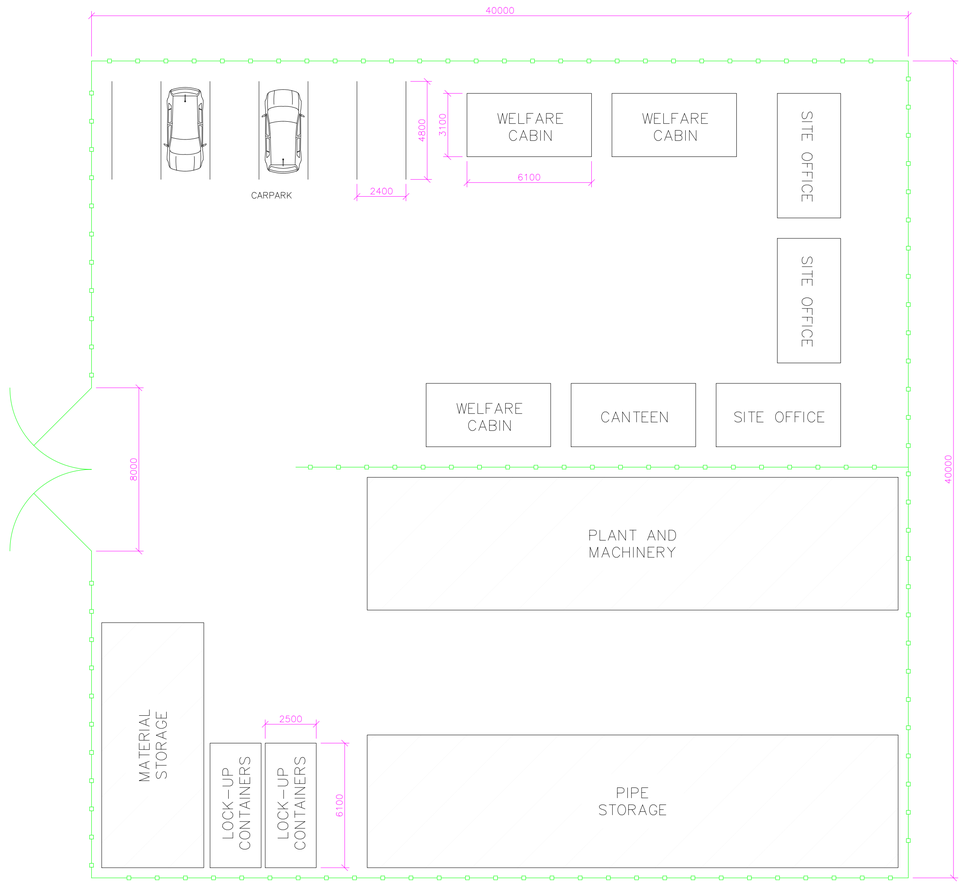
APPENDIX E: GNI-0101-DG-006-R0 Indicative Pipeline Temporary Construction Compound Layout



TEMPORARY WORKS AREA
PLAN
(SCALE: 1:150)

NOTES

1. ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE STATED.
2. DO NOT SCALE FROM THIS DRAWING.
3. SITE OFFICE, WELFARE CABIN AND LOCK-UP CONTAINER DETAILS ARE INDICATIVE ONLY, AND SUBJECT TO CHANGE.
4. CONTRACTOR TO DETERMINE TEMPORARY SITE LAYOUT. DESIGN SHOWN IS INDICATIVE ONLY.

FOR INFORMATION

REV.	DATE	REVISION	BY	CHK'D	APPR
0	23/08/23	FOR INFORMATION	DV	RMD	MC

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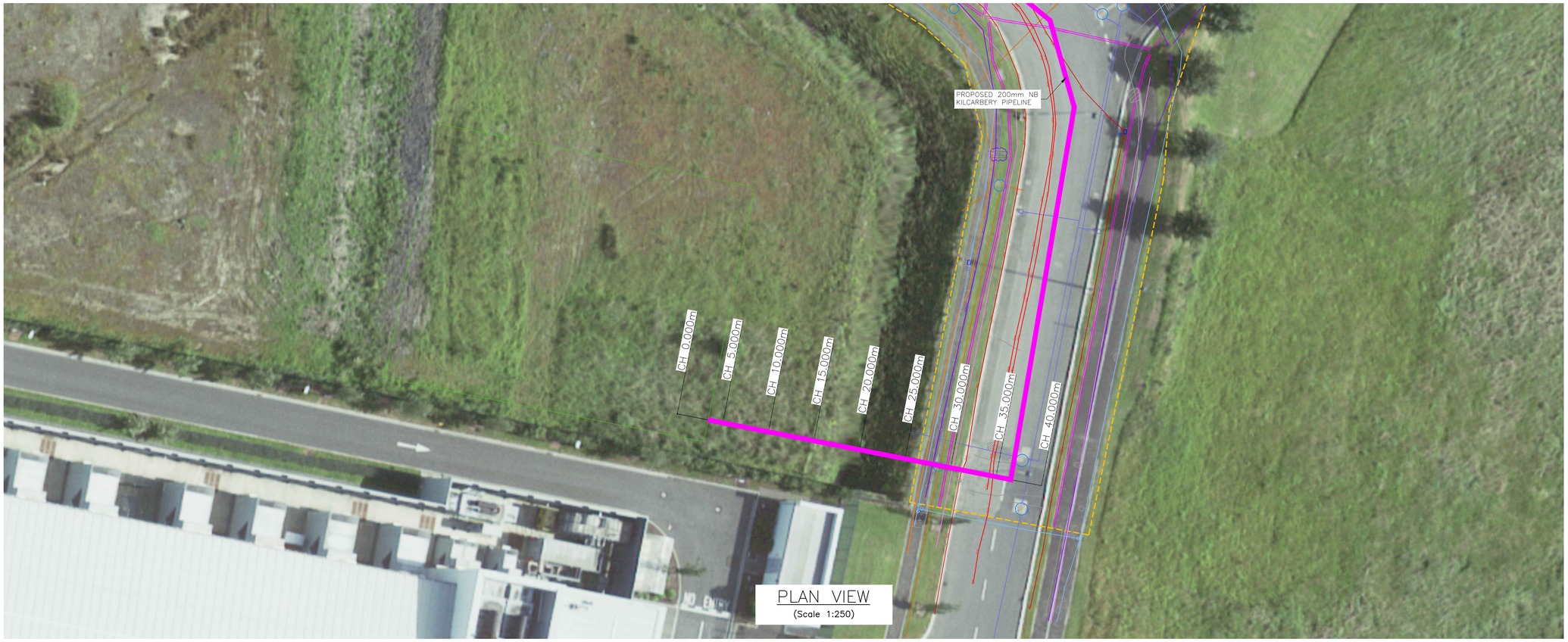
Project

GNI Reference

Indicative Pipeline Temporary Construction Compound Layout

Drawn	Scale	Drawing Number	Rev.
D.VIGMANN	1:150/A1	GNI-0101-DG-006	0
Chkd. R.McDONNELL	Date 23/08/23	sheet 1 of 1	
Apprd. M.CONROY	Status ISSUED		

APPENDIX F: Badonnel Stream Crossing Plans and Longitudinal Sections



PLAN VIEW
(Scale 1:250)

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE. USE FIGURED DIMENSIONS ONLY. DO NOT SCALE FROM DRAWING.
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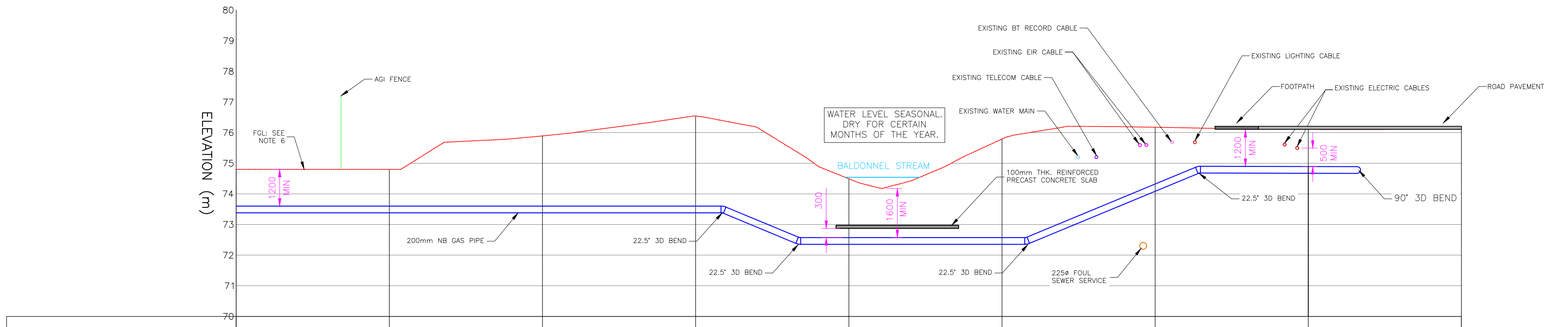
5. HEIGHT DATA RECEIVED FROM BLUE SKY. DATA ACCURACY IN X–Y DIMENSION IS +/– UP TO 1m REMSE AND Z DIMENSIONS IS +/– YP TO 1.5m REMSE.
6. FINISHED GROUND LEVEL OF 74.8m WITHIN AGI (POWER STATION SITE) HAS BEEN CONFIRMED BY CUSTOMER.

LEGEND

	GPR SURVEY BOUNDARY
Gas	GAS MAIN
WM	WATER MAIN
SW	STORM WATER DRAINAGE
FS	FOUL SEWER
CS	COMBINED SEWER
Eir	EIRCOM
Vir	NTL / VIRGIN
PL	ELECTRICAL
Trf	TRAFFIC



GROUND LEVEL (m)	74.80	74.80	75.89	76.54	74.49	75.79	76.17	76.10	76.15
TOP OF PIPE LEVEL (m)	73.60	73.60	73.60	73.60	72.57	72.57	74.32	74.89	
COVER TO T.O.P. (m)	1.20	1.20	2.29	2.94	1.92	3.22	1.85	1.21	
ARBITRARY CHAINAGE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00

PROFILE ALONG CENTERLINE OF PIPELINE
(Scale 1:100)

DETAILED DESIGN

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1	DETAILED DESIGN	MAH 21/09/23	TM 21/09/23	JL 21/09/23					
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C	STRATEGY/PLANNING	CHECKED T.MALONE
D	DESIGN MANAGEMENT	
E	OPERATONS	APPROVAL J.LENNON
F	CONSTRUCTION	
G	AM/AO ADDITIONAL	DATE 27/07/2023

PROJECT
46527670 Gas to Greener Ideas, Profile Park

TITLE
STREAM CROSSING PLAN AND LONGITUDINAL SECTION

DRAWING NUMBER
GNI137/02/001

SCALE
AS SHOWN @A1

SHEET
01 OF 01

Gas Networks Ireland

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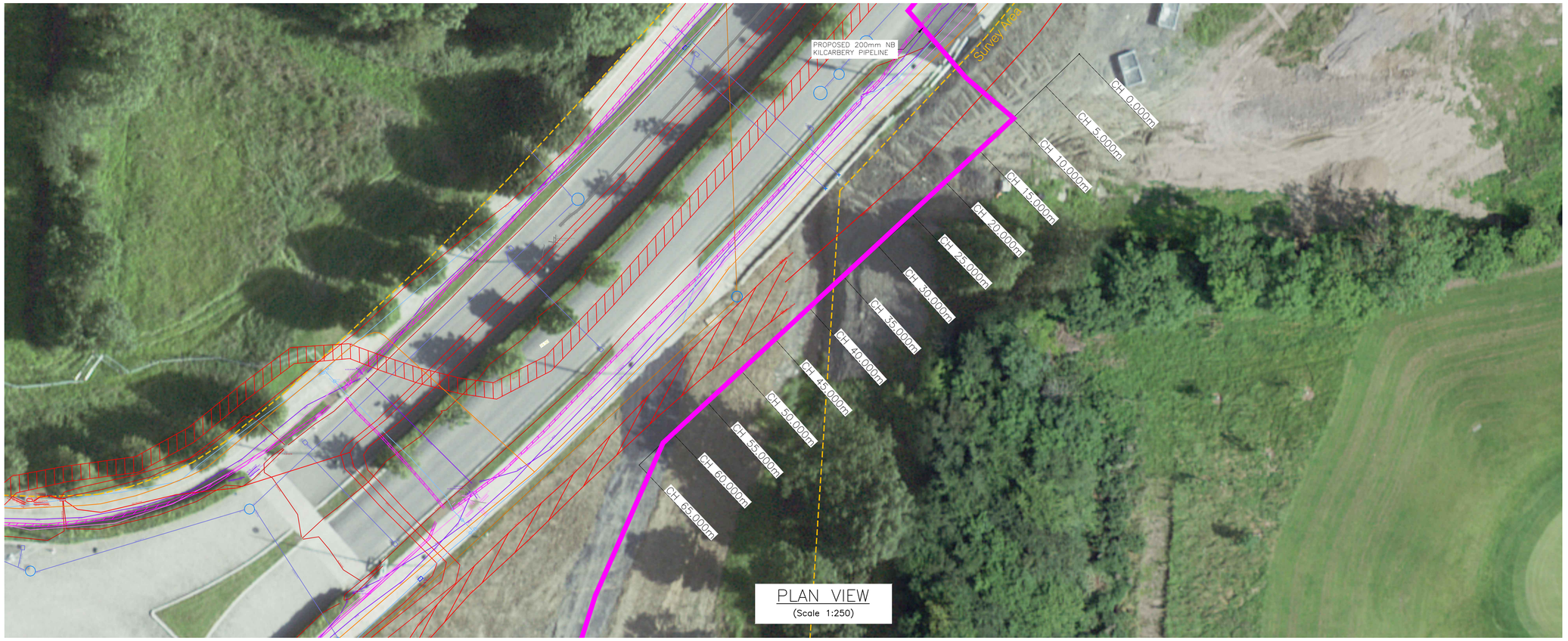

PLAN VIEW
(Scale 1:250)

NOTES:

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LEGEND

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Gas	GAS MAIN
WM	WATER MAIN
SW	STORM WATER DRAINAGE
FS	FOUL SEWER
CS	COMBINED SEWER
Eir	EIRCOM
Vir	NTL / VIRGIN
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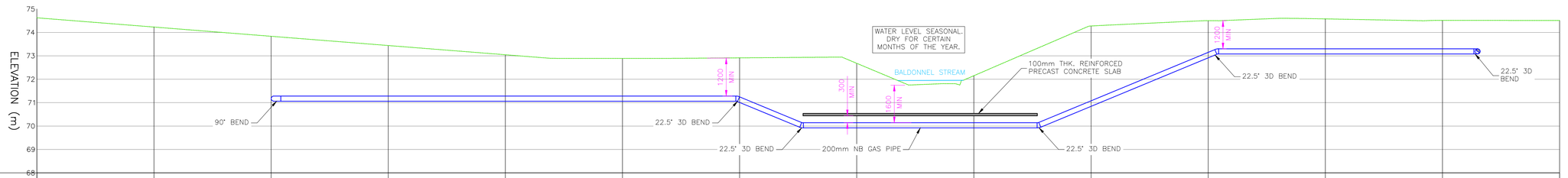

GROUND LEVEL (m)	74.62	74.23	73.84	73.44	73.05	72.89	72.91	72.68	72.15	74.27	74.50	74.58	74.52	74.51
TOP OF PIPE LEVEL (m)			71.28	71.28	71.28	71.28	70.28	70.14	70.14	72.03	73.30	73.30	73.30	
COVER TO T.O.P. (m)			2.56	2.16	1.77	1.61	1.63	2.54	2.01	2.24	1.20	1.28	1.22	
ARBITRARY CHAINAGE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00

PROFILE ALONG CENTERLINE OF PIPELINE
(Scale 1:100)

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1	DETAILED DESIGN	MAH 21/09/23	TM 21/09/23	JL 21/09/23					
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DETAILED DESIGN

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PROJECT
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TITLE
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APPENDIX 2.3

OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

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OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN GRANGE CASTLE TRANSMISSION GAS PIPELINE

Report Prepared For

Gas Networks Ireland

Report Prepared By

Jonathan Gauntlett
Principal Environmental Consultant

Our Reference

JG/237501.0275WR01-A

Date of Issue

23 November 2023

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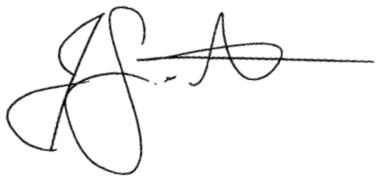
Document History

Document Reference		Original Issue Date	
JG/237501.0275WR01-A		2 October 2023	
Revision Level	Revision Date	Description	Sections Affected
A	23 November 2023		1, 2, 4

Record of Approval

Details	Written by	Approved by
Signature		
Name	Jonathan Gauntlett	Chonaill Bradley
Title	Principal Environmental Consultant	Principal Environmental Consultant
Date	23 November 2023	23 November 2023

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1.0 INTRODUCTION

This outline Construction Environmental Management Plan (oCEMP) has been prepared by AWN Consulting Ltd. (AWN) on behalf of Gas Networks Ireland for submission to the Commission for Regulation of Utilities (CRU) in relation to the proposed underground transmission gas pipelines (named GNI134, GNI135, GNI136, GNI137 and GNI142), that are designed to connect four permitted Above Ground Installations (AGIs) to the mains gas network namely, Ballybane AGI, Milltown AGI, Kilcarbery AGI, and Profile Park AGI.

The construction phase mitigation and monitoring measures set out in this oCEMP are not confined to specific S39A application(s) but are applicable across the entirety of the Overall Development, unless otherwise stated. This approach ensures that these measures will be applied to all of the individual S39A Application(s) under consideration, namely Gas to Ballybane AGI, Gas to Milltown AGI, Gas to Profile Park AGI, and Gas to Kilcarbery AGI developments.

The oCEMP provides a framework from which an updated CEMP will be developed by the appointed construction contractor to avoid, minimise or mitigate any construction effects on the environment prior to commencement on site. This plan should be viewed as a live document that will be updated as and when required. The contractor will then prepare specific method statements setting out site working requirements which manage perceived risks to the environment e.g., traffic management, work safety plans etc.

This oCEMP has been prepared to account for activities at the site during the demolition, excavation and construction phase of the project. The main issues that have been considered within this document are as follows;

- Description of the Project;
- Site Logistics;
- Environmental Consideration During Construction;
- Environmental Incidents Plan;
- Training Plan; and
- Review and finalisation of the CEMP

Additional mitigation measures may be added following consultation with relevant consultees in preparation of specific method statements prior to commencement of works.

2.0 DESCRIPTION OF THE PROJECT

The overall development relates to 5 no. proposed underground transmission pipelines (named GNI134, GNI135, GNI136, GNI137 and GNI142) that are designed to connect to 4 no. permitted Above Ground Installations (AGIs) to the mains gas network either the BGE/13 (N.E.P. 1 Abbotsown to Brownsbarn) transmission gas pipeline, that is located at the junction of Fonthill Road South (R113) and the Nangor Road (R134), or the BGE/72 (Ballough to Brownsbarn) transmission gas pipeline, that is located at the junction of Grange Castle Road (R136) and Nangor Road (R134). The Proposed Development is located within the Grange Castle Business Park and surrounding area.

The proposed overall development area that is the subject of this application comprises 5 no. linear route(s) and adjacent working areas, with a working area (‘site’) is

.approximately 20.05 hectares (ha); located in the townlands of Milltown, Clutterland, Grange, Ballybane, Aungierstown and Ballybane, Kilcarbery, Kilbride, Nangor, Deansrath, Bawnoges and Clonburris Great.

The outline CEMP is to accompany 4 no. individual applications being made to the Commission for Regulation of Utilities (CRU) under Section 39A of the Gas Act 1976[1], as amended, for each of the required transmission pipeline connections to the permitted AGI. The 4 no. applications being made are broadly summarised as follows:

1. Gas to Microsoft Grange Castle Pipelines 1 and 2 S39A Application - EIAR Project Name: Gas to Ballybane AGI
    - The Gas to Microsoft Grange Castle Pipeline 1 consists of a connection from the existing 'BGE/72' Ballough to Brownsbarn gas pipeline, to the permitted Ballybane AGI. The Gas to Microsoft Grange Castle Pipeline 2 consists of a connection from the existing 'BGE/13' NEP1 Brownsbarn to Abbotstown gas pipeline to the permitted Ballybane AGI. The Ballybane AGI is located within the Microsoft Facility.
2. Gas to Bulmer, Grange Castle Pipeline S39A Application - EIAR Project Name: Gas to Milltown AGI
    - The Gas to Bulmer, Grange Castle Pipeline consists of a connection from the existing 'BGE/72' Ballough to Brownsbarn gas pipeline to the permitted Milltown AGI. The Milltown AGI is located within the Data and Power Hub Services Facility.
3. Gas to Vantage, Profile Park Pipeline S39A Application - EIAR Project Name: Gas to Profile Park AGI
    - The Gas to Vantage, Profile Park Pipeline consists of a connection from the existing 'BGE/72' Ballough to Brownsbarn gas pipeline to the permitted Profile Park AGI. The Profile Park AGI is located in the Vantage Facility.
4. Gas to Greener Ideas, Profile Park Pipeline S39A Application - EIAR Project Name: Gas to Kilcarbery AGI
    - The Gas to Greener Ideas, Profile Park Pipeline consists of a connection from the existing 'BGE/72' Ballough to Brownsbarn gas pipeline to the permitted Kilcarbery AGI. The Kilcarbery AGI is located in the Greener Ideas (Profile Park) Facility.

The GNI136 pipeline referred to above will connect to the existing BGE/13'NEP1 Brownsbarn to Abbotstown' gas transmission pipeline, located at the junction of Fonthill Road South (R113) and the Nangor Road (R134). The GNI134, GNI135, GNI137 and GNI142 pipelines referred to above will connect either directly, or indirectly, from the BGE/72 Ballough to Brownbarn transmission gas pipeline, located at the junction of Grange Castle Road (R136) and Nangor Road (R134).

The overall underground transmission gas pipeline route is generally surrounded by residential areas and recreational open spaces in the eastern portion of the development, and Grange Castle Business Park, Profile Park, Grange Castle Golf Club and agricultural lands in the western portion of the development. The New Nangor Road, which proposed route is predominantly located along, then connects to the R110. This road links the area to Dublin City Centre, c. 10 km north east of the site. The development route also intersects with the R113, R136 and R120. Each of these

[1] Under Section 39A of the Gas Act 1976, as amended, any entity who wishes to construct such a pipeline must obtain a Section 39A Consent from the CRU. Processing a Section 39A Consent application involves assessing the applicant's financial and technical abilities to successfully and safely deliver the pipeline, as well as determining whether the pipeline project is likely to have any significant environmental impacts.

roads when followed north connects to the N4 and when followed south connects to the N7. The N4, N7 and M50 motorway provide excellent transport links to the surrounding area. Multiple bus routes also serve the area. The route can be readily accessed by the public road network.

The wider area is characterised by predominantly residential estates to the north and east and primarily agricultural lands to the west with settlements interspersed, such as Newcastle and Celbridge. In addition, to the north of the development lies the Grand Canal, a proposed Natural Heritage Area (pNHA) (Site Code: 002104). South of the development lies Casement Aerodrome, Belgard Quarry, Newlands Golf Club, Corkagh Park and further residential estates. The M50 is located c. 1.8km to the east of the site, the N4 c. 3.3km to the north and the N7 c. 1.3km to the south. There are numerous industrial estates in the vicinity, additional to those the pipeline routes through, such as Greenogue Business Park, Citywest Business Campus, Clondalkin Industrial Estate, Park West Industrial Park and Western Industrial Estate.

The area of works and construction methods are outlined further in the Fingleton White ‘GNI Grange Castle Pipelines Construction Methodology’ included as Appendix 2.2 to the EIAR. .

Figure 2.1, Figure 2.2, and Figure 2.3 illustrates the approximate red line boundary of the Proposed Overall Development Site and pipelines.

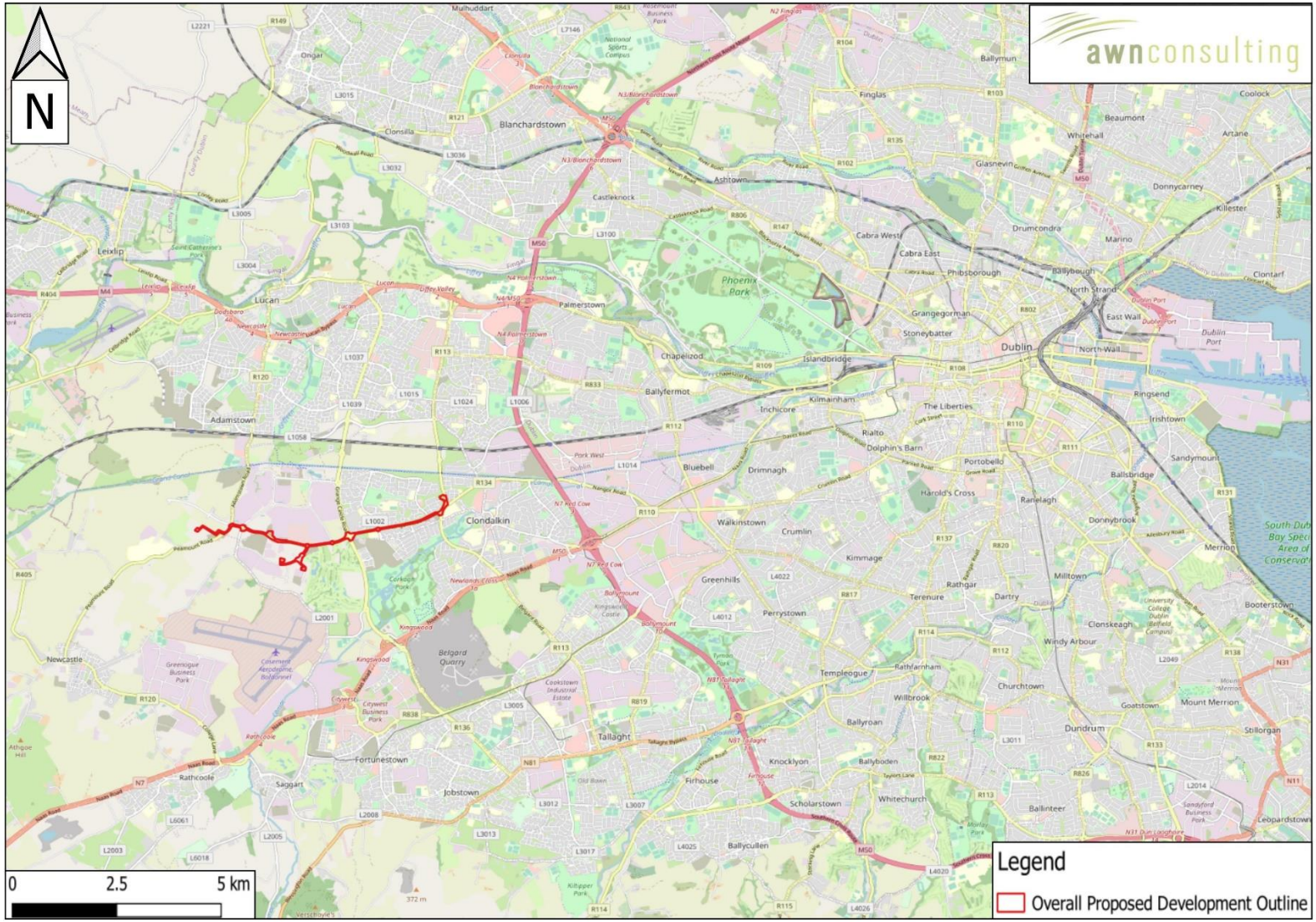

Figure 2.1 *Site Location (Baselayer Source: Google Maps).*

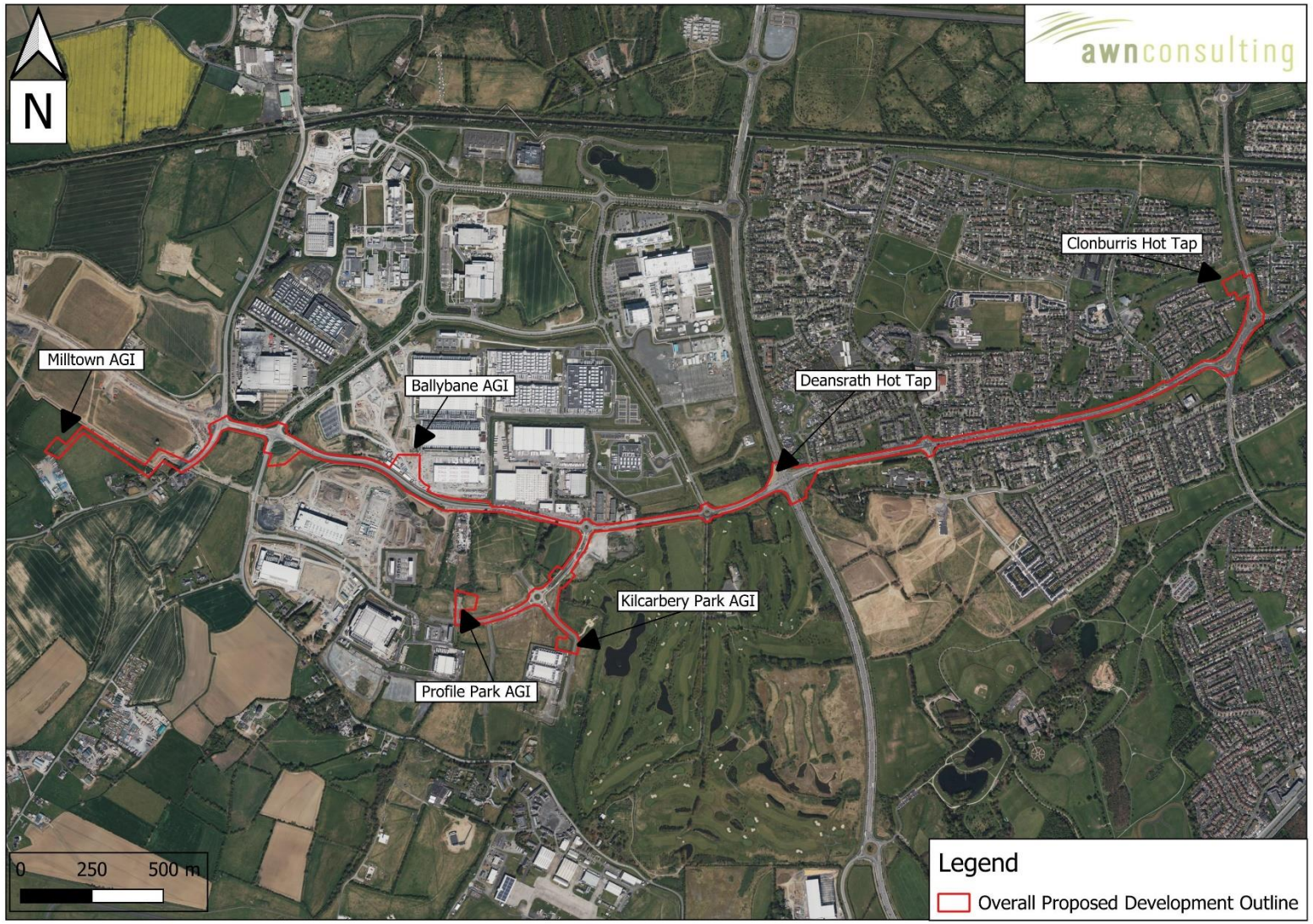

Figure 2.2 *Site Location (Baselayer Source: Open Street Maps)*

Figure 2.3 *Existing and Proposed pipelines drawing (Extract from Fingleton White Drawings 1587/D/002)*

3.0 RELEVANT LEGISLATION

All entities including parties, contractors, and consultants involved in this project must adhere to the legal regulations of Ireland as well as international and regional protocols and agreements Ireland is a part of. In cases of legislative updates, the most recent version will be followed, and all pertinent new legislation will be appropriately observed. This document presents the latest legislation as of its issuance date.

The appointed construction contractor bears the responsibility of maintaining awareness of the most current iterations of legislation relevant to the project throughout the contract's duration. The Designer is expected to recognise key environmental risks and corresponding measures outlined in this oCEMP, with the final detailed design duly incorporating these considerations.

The appointed construction contractor is also obligated to understand and comply with the Environmental Considerations' detailed in Section 4 of this oCEMP, any specific planning conditions linked to the proposed development, and additional pertinent documents as stipulated by the Employer and planning authority.

3.1 RELEVANT LEGISLATION

It's important to recognize that the appointed construction contractor will need to have a clear understanding of their responsibilities according to legal requirements. These legal obligations encompass, but are not limited to:

- Planning and Development Act and subsequent amendments, 2000-2023
- Planning and Development Regulations 2001 to 2023.
- The Birds Directive: Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC);
- The Birds Directive: Council Directive 2009/147/EC on the conservation of wild birds;
- The Habitats Directive: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
- The European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011), as amended, 2015 (S.I. No. 355 of 2015);
- Water Framework Directive (WFD): Directive 2000/60/EC of the European Parliament and Council establishing a framework for Community Action in the field of water policy, as amended;
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009, S.I. No. 272 of 2009, as amended, 2012 (S.I. No. 327 of 2012), 2015 (S.I. No. 386 of 2015), 2019 (S.I. No. 77 of 2019);
- European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I. No. 9 of 2010, as amended, 2016 (S.I. No. 366 of 2016);
- European Communities (Environmental Liability) Regulations, 2008, S.I. No. 547 of 2008, as amended, 2011 (S.I. No. 307 of 2011), 2015 (S.I. No. 293 of 2015);
- Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste, as amended 2018 (S.I. No. 851 of 2018);
- Waste Management Acts of 1996 to 2021;
- The Water Pollution Acts of 1977 & 1998;
- The Wildlife Acts 1976 to 2022;
- Water Policy Regulations 2003, S.I. No. 722 of 2003, as amended,;
- Water Conservation Regulations 2008, S.I. No. 527 of 2008;

- European Communities (Drinking Water) Regulations 2014, S.I. No. 122 of 2014, as amended 2017 (S.I No. 464 of 2017);
- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016);
- Litter Pollution Act of 1997, as amended, 2017 (Bill 58 of 2017); □ Litter Pollution Regulations 1999, S.I. No. 359 of 1999);
- European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014), as amended 2019 (S.I. No. 233 of 2019);
- Waste Management (Facility Permit and Registration) Regulations 2007, S.I. No. 821 of 2007, as amended, 2008 (S.I. No. 86 of 2008), 2015 (S.I. No. 198 of 2015), 2019 (S.I. No. 250 of 2019);
- Waste Management (Collection Permit) Regulations 2007, S.I. No. 820 of 2007), as amended, 2015 (S.I. No. 197 of 2015), 2016 (S.I. No. 24 of 2016);
- Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended 2010 (S.I. No. 350 of 2010);
- Environment (Miscellaneous Provisions) Act 2011, as amended 2015;
- Waste Management (Landfill Levy) Regulations 2008, as amended;
- Waste Management (Hazardous Waste) Regulations, 1998, as amended, 2000 (S.I. No. 73 of 2000);
- Waste Management (Shipment of Waste) Regulations 2007, S.I. No. 419 of 2007;
- Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998);
- European Communities (Shipments of Hazardous Waste Exclusively within Ireland) Regulations 2011, S.I. No 324 of 2011;
- European Communities (Transfrontier Shipment of Waste) Regulations 1994 (S.I. No. 121 of 1994);
- Waste Management (Transfrontier Shipment of Waste) Regulations 1998, as amended, 2014 (S.I. No. 861 of 2014);
- Waste Management (Tyres and Waste Tyres) Regulations 2007 (S.I. No. 664 of 2007), 2017, as amended (S.I. No. 400 of 2017) and 2018 (S.I. No. 96/2018);
- European Union Batteries and Accumulators Regulations 2014, S.I. No. 283 of 2014, as amended, 2014 (S.I. No. 349 of 2014), 2015 (S.I. No. 347 of 2015);
- Waste Management (Registration of Brokers and Dealers) Regulations 2008, SI No. 113 of 2008;
- Waste Management (Prohibition of Material Disposal by burning) Regulations 2009, S.I No. 286 of 2009, as amended 2013 (S.I. No. 504 of 2013), 2017 (S.I. No. 599 of 2017), 2019 (S.I. No. 684 of 2019);
- European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011, as amended 2016 (S.I. No. 315 of 2016);
- European Waste Catalogue (EWC) and Hazardous Waste List 2002;
- Waste Management (Food Waste) Regulations 2009, S.I. No 508 of 2009, as amended, 2015 (S.I. No. 430 of 2015);
- Protection of the Environment Act 2003;
- European Union (Properties of Waste Which Render It Hazardous) Regulations 2015, S.I. No. 233 of 2015, as amended, 2018 (S.I. No. 383 of 2018);
- Air Pollution Act, 1987 (Air Quality Standards) Regulations, 1987, as amended, 2011 (S.I. No. 180 of 2011), 2016 (S.I. No. 659 of 2016); Air Pollution Act, 1987 (Emission Limit Values for use of Asbestos) Regulations, 1990, S.I. No. 28 of 1990);
- EC (Control of Emissions of Gaseous & Particulate Pollutants from Non-Road Mobile Machinery) Regulations 2007, S.I. No.147 of 2007, as amended, 2011

(S.I. No. 263 of 2011), 2012 (S.I. No. 407 of 2012), 2013 (S.I No. 417 of 2013), 2016 (S.I. No. 2016/1628);
- The EU Regulation 2037/2000 (CFC's, HCFC's, Halons) - Ozone Depleting Substances.
- Control of Substances that Deplete the Ozone Layer Regulations 2006, S.I. No 281 of 2006, as amended, 2011 (S.I. No. 465 of 2011);
- EU F Gas Regulations 2006, as amended, 2014, S.I. No. 517 of 2014, 2019 (S.I. No. 367 or 2019);
- Environmental Protection Agency Act 1992 (Noise) Regulations, 1994 S.I. 174 of 1994;
- Environmental Noise Regulations 2006, S.I. No. 140 of 2006;
- European Communities (Environmental Noise) Regulations 2018 (S.I. No. 549 of 2018;
- European Communities (Noise Emission by Equipment for use Outdoors) Regulations, 2001, S.I No. 632 of 2001, as amended, 2006 (S.I No. 241 of 2006);
- European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Amendment Regulations 1996, S.I No. 359 of 1996 and 2001, S.I No. 632 of 2001);
- Local Government (Planning and Development) Act 1963 (S.I. No. 28 of 1963), as amended 1993 (S.I. No. 12 of 1993);
- Wildlife Act, 1976 (Protection of Wild Animals) Regulations, 1990, S.I. No. 112 of 1990 and Wildlife Amendment Act, 2000 (S.I. No. 38 of 2000);
- European Communities Conservation of Wild Bird Regulations 1985, as amended;
- Noxious Weed Act, 1936, S.I. No. 38 of 1936;
- Noxious Weed Order, 1937, S.I. No. 103 of 1937;
- Flora (Protection) Order, 2015, S.I. No 356 of 2015;
- The Forestry Act, 1946, S.I. No. 13 of 1946, as amended, 2009 (S.I. No. 40 of 2009) & Forestry Act, 2014, S.I. No. 31 of 2014;
- Forestry Regulations, S.I. No. 191 of 2017, as amended 2020 (S.I. No. 32 of 2020);
- The National Monuments Act 1930, S.I. No. 2 of 1930, as amended, 2004 (S.I. No. 22 of 2004);
- European Union (Environmental Impact Assessment and Habitats) (Section 181 of the Planning and Development Act 2000) Regulations, 2013 (S.I. No. 403 of 2013), 2015 (S.I. No. 301 of 2015), 2019 (S.I. No. 418 of 2019); and,
- European Union (Environmental Impact Assessment and Habitats) (Environmental Impact Assessment) Regulations, 2018, S.I. No. 296 of 2018, 2019 (S.I No. 191 of 2020).

3.1.1 Relevant Industry Guidelines

- BS 5837/2012. Trees in relation to design, demolition and construction;
- BS 3998; 2010. Tree Work. Recommendations;
- CIRIA (2001). C532. Control of water pollution from construction sites. Guidance for consultants and contractors;
- CIRIA (2006). C648. Control of water pollution from linear construction projects. Technical Guidance;
- CIRIA (2008). C679. Invasive species management for infrastructure managers and the construction industry.;
- CIRIA (2015). C741. Environmental Good Practice on Site;
- CIRIA (2015). C753. The SuDS Manual;

- Environmental Protection Agency (2021). 'Best Practice Guidelines for the preparation of resources & waste management plans for construction & demolition projects';
- Invasive Species Ireland (2016). Best Practice Management Guidelines. Japanese knotweed;
- NRA (2005a). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;
- NRA (2005b). Guidelines for the Treatment of Badger Prior to the Construction of National Road Schemes;
- NRA (2008). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes;
- NRA (2006). Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes; and,
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant
- Species on National Roads (Revision 1).
- Sustainability & Environmental Appraisal (March 2020) LA 120 Environmental management.

3.1.2 Consents, Permits, and Licenses

The appointed construction contractor will secure all statutory consents and licences required to commence on-site construction activities in advance of works commencing, allowing for the appropriate notice period. The inclusion of these approval processes in the project timeline is to be overseen by the appointed construction contractor. These will include, but are not limited to:

- Site notices, and construction commencement notices.
- Licence to connect to existing utilities where required.
- Road Opening Licences – Consents to carry out roadworks which including the breaking open, boring or tunnelling under any public road to place, adjust, repair, alter or renew any apparatus.
- Construction Wastewater and Trade Effluent discharges (including foul water, construction water, hydrostatic testing wastewater, or other water arising from the works) require:
    - discharge to sewer discharge licences issued by Uisce Éireann (formerly Irish Water) under Section 16 of the Local Government (Water Pollution) Acts and Regulations.
    - discharge to surface water (or storm sewer), or discharge to groundwater under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990.
- Water Supply Consents:
    - Consents for connection to water supply mains (mains water supply, local authority fire hydrants, other mains supply in private ownership); and
    - Consent for abstraction from groundwater / surface water (abstraction of > 25 m^3 of water or more per day, for any purpose must be registered with the EPA in accordance with European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018).

The specific consents and licenses required can vary based on factors such as project size, location, potential environmental impacts, and the type of construction activities

involved. The appointed construction contractor will consult with local authorities and regulatory bodies prior to commencement of works.

3.2 CONSTRUCTION PROGRAMME AND PHASING

Estimates for the duration of the construction works are included in the table below for the overall development as it is envisioned to progress under a one linear construction program. For each construction crew, the length of working area at any one time is expected to be 100 m. It is expected that there will be 2 – 3 working sections of 100 m along all the routes during construction.

The overall start-to-finish duration is estimated to be 12 months with the construction of the below development aspects overlapping. Construction is anticipated to commence in Q1 2024 and be completed by Q1 2025.

Table 3.1 *Estimated Construction Duration*

Development Aspect	Estimated Construction Duration (Months)
All pipelines	10
BGE/72 Deansrath Hot Tap	3
BGE/13 Clonburris Hot Tap	3

Each of the following EIAR chapters will, as appropriate, include an assessment of the potential impact of construction works on their individual environmental aspect and set out the relevant mitigation measures relating to those aspects.

3.3 SITE WORKING HOURS

It is anticipated that the construction of the proposed development will be completed from 10 am to 4 pm Monday to Friday, to avoid peak traffic hours on the road networks were works will be carried out. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. Sunday or evening hours during long summer days etc. Such occurrences will be agreed with the Local Authority in advance and would be kept to a minimum.

3.4 EMPLOYMENT AND MANAGEMENT WORKFORCE

It is estimated that there will initially be 40-60 site personnel on site on a typical day, however during peak construction periods this is expected to fluctuate up to a maximum of 80 site personnel and contractors on site per day. These staffing figures are for the overall development as it is envisioned to progress under one linear construction program i.e. section by section. Site personnel will include; management, engineers, construction crews, supervisors, environment health and safety personal, and transmission gas pipeline specialist contractors.

All employees working on the site will be required to have a SafePass Card (or similar approved Construction Health and Safety Card), manual handling training, Covid 19 training, and the necessary certificates to operate machinery, as required. The details of training required, records maintained, and induction procedures will be outlined in the appointed construction contractor(s) Health and Safety Plan(s).

3.5 SITE ESTABLISHMENT AND COMPOUND LOCATIONS

Initial establishment works involves setting up a protective barrier around the construction zones using fencing materials that are designed to restrict unauthorised access. Security fencing helps control who can enter the construction area and prevents theft, vandalism, and accidents. In areas adjacent to the public domain hoarding will typically be used in order to provide privacy by screening ongoing construction activities from public view.

The site construction compound (refer to Figure 3.1 for a Typical Construction Compound Layout) serves as the central hub for various activities and functions during the construction of a project. It is a temporary setup that provides essential welfare facilities and space for workers, equipment, materials, and administrative needs. The following elements will be required for the proposed development:

- **Security and Access Control:** The compound will have security measures in place to control access and ensure the safety of workers, equipment, and materials.
- **Offices and Meeting Rooms:** The compound will include office spaces for project managers, engineers, and administrative staff. Meeting rooms are providing for holding discussions, presentations, and planning sessions.
- **Welfare Facilities:** Welfare facilities are designed to provide comfort and basic amenities for workers. This will include restrooms, showers, drying rooms, changing rooms, and break areas.
- **Plant Storage and Machinery Storage:** Construction equipment and machinery are stored in designated areas within the compound.
- **Materials Storage:** Construction materials such as lumber, steel, cement, and other supplies are stored in organized areas within the compound. Proper storage helps prevent damage to materials and ensures they are readily accessible when needed.
- **Parking:** Adequate parking spaces are provided for workers' vehicles, construction vehicles, and equipment that are not in use. The parking of construction vehicles on footpaths, grass verges and double-parking will be prohibited or limited to short durations outside of peak hours.
- **Designated Waste Storage Areas:** Segregated waste storage areas will be identified within the compound to properly store different types of construction waste, such as debris, packaging materials, and hazardous substances. If hazardous materials are present they will be contained to prevent leaks or spills.

All of the sub-contractors as well as the main contractor and project managers will occupy offices in the same area. Dedicated site parking for staff, contractors, and visitors will be located within the site compound. There will be no parking permitted on the surrounding road network or estate roads by the contractor or site operatives.

Construction Compound Location(s)

The Proposed Overall Development will require the establishment of 9 site compounds in order to facilitate the proposed development works. Given the length of the gas pipeline project, having nine separate construction compounds strategically located along the route ensures that construction activities can be efficiently managed and supervised, reducing the logistical challenges associated with a single centralised compound. Each compound can operate on slightly different schedules, allowing for a phased approach to construction. By distributing construction activities across multiple

compounds, the traffic and noise impact is also distributed as compared to a single centralised compound. The proposed site construction compounds are as follows:

- 1 no. compound at the proposed Clonburris hot tap
- 1 no. compound at the proposed Deansrath hot tap.
- 1 no. compound at the proposed Griffeen River crossing.
- 1 no. compound at the permitted Ballybane AGI
- 1 no. compound at the permitted Milltown AGI
- 1 no. compound at the permitted Kilcarbery AGI
- 1 no. compound at the permitted Profile Park AGI
- 2 no. ancillary compound and material storage areas along the pipeline route.

The final site compound locations will be established in collaboration with the construction contractor, taking into account the pending landowner agreements. Despite the uncertainty surrounding the exact locations, a methodical site selection approach has been outlined through the established criteria below. The primary objective of this criteria is to ensure clear guiding principles to ensure minimal environmental impact from the construction process.

- **Existing Entrance**: The selected site preferably will already have its own entrance that does not require the creation of a new one. This helps minimise disruptions to existing infrastructure.
- **Proximity to Pipeline Construction**: The site's entrance should be located within a maximum distance of 500 meters from the pipeline works area. This ensures efficient access to the construction area.
- **Tree and Vegetation Conservation**: No trees are to be felled for the construction of the temporary working area. The site should be selected in a way that preserves the existing vegetation.
- **Surface Type**: A site with an existing hard stand or car park is preferred. However, a grassy area can also be considered, though it may require additional preparations for the construction activities.
- **Facility Requirements**: The selected site should be able to accommodate various facilities, including:
    - Site offices for administrative and management purposes.
    - Welfare facilities such as restrooms, showers, and changing rooms for workers.
    - A drying room for workers to dry wet clothing and gear.
    - A canteen or dining area for meals.
    - A pipeline storage yard for storing construction materials and equipment.
- **Distance from Surface Water Bodies**: The site should be situated a minimum distance of 20 meters away from any surface water bodies such as rivers, lakes, ponds, or streams. This helps protect water quality and ecosystems. If this separation cannot be achieved then hoarding, block barriers, or similar will be installed to eliminate hydrological connection to the surface water body.
- **Environmental Impact**: Consideration should be given to any potential environmental impact of the compound, such as soil erosion, runoff, and disturbance to local habitats. Mitigation measures should be implemented as needed.
- **Community Impact**: Consider the proximity to residents and businesses in order to minimise potential impacts on related to noise, traffic, and dust.
- **Infrastructure Compatibility**: The site should have access to necessary utilities like electricity, water, and sewage disposal. If the site is not already equipped, the feasibility of providing these utilities should be assessed.

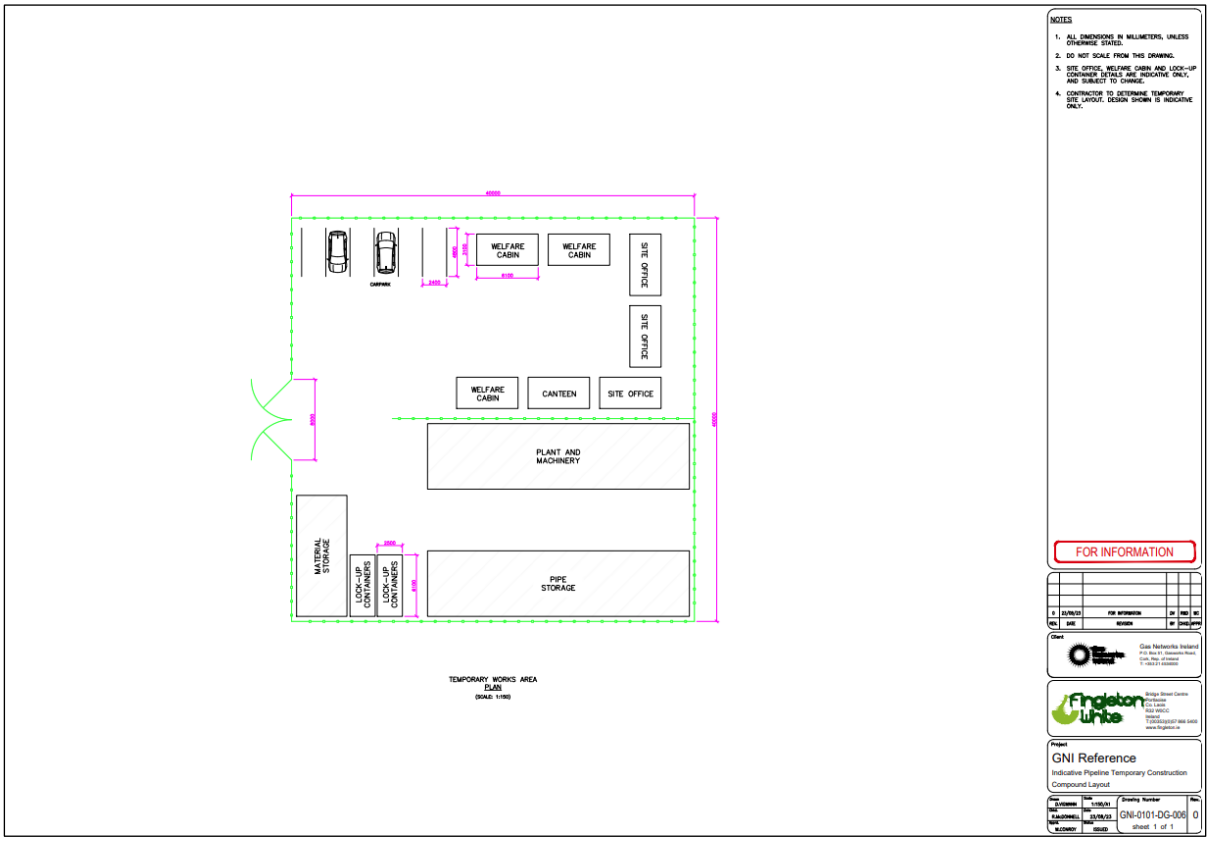

Figure 3.1 *Typical Construction Compound Layout (Fingleton White Drawing GNI-0101-DG-006)*

3.6 SERVICES AND UTILITIES

Temporary site offices and welfare facilities for construction employees will need to be established. The offices and site amenities will need to have their own power supply (generator), water deliveries and foul water collection. The appointed construction contractor will ensure that sufficient facilities are available at all times to accommodate the number of employees on site.

Electrical connections will be made by suitably qualified personnel following consultation with the relevant authorities and will be cognisant of subsequent construction works. High voltage connections will be established for heavy duty equipment and site facilities, as required.

During construction it is anticipated that a temporary supply will come from onsite Generator or via the MV network. All electrical works, including any connection to the ESB network will be carried out by a suitably qualified contractor. In later phases of the construction, the utility feed will serve the development via the applicant-owned electrical compound, including transformer and associated switchgear.

Managing surface water and rainwater at a construction site compound is essential to prevent erosion, flooding, and environmental contamination. Proper management helps maintain a safe and organized working environment while minimising the impact on the surrounding environment.

Prior to commencing any construction activities, the contractor shall conduct a comprehensive utility locating survey using advanced technologies such as ground-penetrating radar (GPR) and electromagnetic induction methods. This survey will accurately identify the location and depth of all existing underground services, including high voltage (HV) cables, water and gas pipelines, and telecommunication lines. Based on the results of the utility locating survey, exclusion zones will be demarcated around identified utilities. These zones will indicate areas where construction activities are restricted or subject to specific safety protocols.

3.7 MATERIAL HANDLING AND STORAGE

During the construction phase a significant amount of construction materials will be delivered to the site. A material storage area will be located within a secure section at each compound as shown Figure 3.1.

Waste receptacles will be stored adjacent to the construction areas as required and will move in each of the sub-phases as the construction works progress. The segregated receptacles will be maintained close to each other in a designated Waste Storage Area (WSA) insofar as possible and will be clearly signed to identify the types of waste to be placed in each in accordance with the requirements of the Resource and Waste Management Plan. Segregated skips will be located in the material storage area, as required, and wheelie bins (or other suitable waste receptacles) for the offices and welfare facilities will be provided in strategic locations around the compound.

The majority of construction waste materials generated will be soil from excavation works. Suitable topsoil will be stockpiled pending reuse across the site for backfilling and landscaping. Soil requiring removal offsite will be temporarily stockpiled away from watercourses and construction activities. Suitable locations will be determined as site clearance works and excavations progress taking into account the measures set out in Section 4 of this oCEMP. Material will be removed from site regularly to ensure only minimum stockpiling is required.

3.8 CONSTRUCTION TRAFFIC MANAGEMENT AND ACCESS

The sequence of construction will be planned to limit construction traffic movement as much as practically possible. Appropriate supervision will be provided to control the flow of traffic when large trucks / machinery needs to cross public roads. STOP/GO boards will be used during movement.

Some items of plant will require moving on low-loaders where access along the construction easement is not possible. All construction traffic shall maintain speed limits on right of way and public roads. All truck movements on site will be controlled by signal men on the ground with radios.

All Traffic Management Designs will conform to the requirements of:

- Traffic Signs Manual – Chapter 8
- Department of Transport ‘Guidance for the Control and Management of Traffic at Road-Works’
- The requirements of Westmeath County County Council’s Roads Department and TII (where applicable)

Below is a list of the proposed traffic management measures to be adopted during the construction works. Please note that this is not an exhaustive list, and that it will be the

appointed contractor's responsibility to prepare a detailed construction management plan.

- Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access locations;
- Construction and delivery vehicles will be instructed to use only the approved and agreed means of access; and movement of construction vehicles will be restricted to these designated routes;
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material;
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the site;
- A road sweeper will be employed to clean the public roads adjacent to the site of any residual debris that may be deposited on the public roads leading away from the construction works;
- All vehicles will be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol or diesel. Spill kits will be available on site. All scheduled maintenance carried out off-site will not be carried out on the public highway; and
- Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footways. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage.

The traffic management will ensure that the presence of construction traffic will not lead to any significant environmental degradation or safety concerns in the vicinity of the proposed works. Furthermore, it is in the interests of the construction programme that deliveries, particularly concrete deliveries are not unduly hampered by traffic congestion, and as a result continuous review of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.

3.9 VISITOR MANAGEMENT

Visitors will only be allowed to enter the site in vehicles via the main haul road or via designated pedestrian access gates. A dedicated, secured footpath to the main site offices will be established for registration and obtaining PPE prior to entering the site. A log will be maintained by security to control access to the site. Visitors will be required to attend a site-specific induction to allow access to the site unless being accompanied by an inducted member of the site team.

4.0 ENVIRONMENTAL CONSIDERATIONS DURING CONSTRUCTION WORKS

4.1 LAND, SOIL, GEOLOGY, HYDROGEOLOGY, AND HYDROLOGY

Management of Excavations, Stockpiled Materials, and Suspended Solids

In order to manage the potential impact associated with excavation, stockpiled materials, and reducing sediment runoff at source the following mitigation measures will be implemented during the construction phase.

- Prior to commencement of construction the main contractor will prepare and adhere to a method statement indicating the extent of the areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.
- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A stabilised entranceway consisting of an aggregate on a filter cloth base that is located at any entry or exit point of the construction site.
- Aggregate will be established at the site entrance points from the construction site boundary extending for at least 10 m.
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Construction materials, including aggregates etc. will be stored a minimum of 20 meter buffer distance from any surface water bodies, to prevent any blockage to flood water flow paths from occurring during high rainfall events.
- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.
- Silt fences will be installed around stockpiles to limit movement of entrained sediment in surface water runoff..
- Silt fencing will be installed along the working area adjacent to the watercourses, during the construction phase, to ensure no silt entry to the adjacent surface waters. This will be embedded to ensure silt retention and deposition and be positioned a minimum of 5m from the watercourse. In order to install the required silt fencing, the clearance of surrounding grasses and vegetation will not be undertaken. Monitoring of the effectiveness will be undertaken and maintenance of the fence will be undertaken if it comes into disrepair or significant amounts of silt begin to build up.
- Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site.
- Excavations will remain open for as little time as possible before placement of fill and reinstatement. This will help to minimise the potential for water ingress into excavations.
- Reinstatement will be carried out as soon as practicable after pipeline installation.

All excavated materials will be visually by suitably qualified persons assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor. Suitable soils and stones will be retained, and reused on-site as backfill where possible.

Imported CL.503 material will be required to provide a suitable bedding layer that will be placed in accordance with IS 328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book) and compacted in the trench before laying the pipeline. All imported fill and aggregate that may be required for the Proposed Development will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the Proposed Development,
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company

If any waste soil requires removal from site, it should be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery/disposal offsite.

Management and Disposal of Accumulated Rainfall/Surface water/Hydrostatic testing Water

During construction the contamination of surface waters, and run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. There will be localised pumping of surface run-off and rainfall from the excavations during and after heavy rainfall events to ensure that the excavation is kept dry. Any surface water run-off collecting in excavations that requires removal will likely contain a high sediment load. There is no significant dewatering of localised groundwater required during the construction phase which would result in the localised lowering of the water table.

During commissioning there will be discharge of water generated from hydrostatic pressure tests. This water will preferably be managed as required with temporary diversion / pumping to Intermediate Bulk Containers (IBCs) for tankering offsite. Where discharges to surface water or the local authority storm or foul water are required, the appointed construction contractor, will ensure all relevant consents are in place for the appropriate and compliant management and protection of surface water quality and quantity.

The mitigation and control measures outlined below will be implemented during the construction phase, as well as any additional measures required pursuant to discharge permit conditions which may be imposed.

Control and mitigation measures to be implemented to prevent pollution include:

- Surface water, rainfall or groundwater within excavations, or rainfall on other parts of the working area will not be pumped or discharged directly (without treatment) into watercourses or drains but will be treated prior to discharge to ensure the removal of pollutants and sediments.
- Depending on the quality of the construction water the discharge of treated water will occur to either; to surface water (via the storm water network to the Griffeen River/Carmac River); or to Ringsend WWTP (via the foul wastewater network). The discharge to surface water network is subject to agreement with South Dublin Council (SDCC); and the discharge to the foul sewer is subject to agreement with Irish Water / Uisce Éireann. In case of any exceedances of discharge permit conditions, water will be retreated on site, or disposed of to a licenced facility.
- Surface water will be allowed to settle out or filtered (using methods like straw bales, installation of lagoons or bunds, silt bags, or silt socks) before discharge.
- When discharging clean water into watercourses, measures like baffles, geotextiles, or riprap will be set up at the discharge point to avoid disturbing the watercourse bed.

- Works to stream banks and instream works to be conducted during times of settled weather and low water flows. Working during times of heavy rainfall is to be avoided.
- Excavation works will halt during continuous heavy rainfall (extreme weather events), giving the ground time to drain and excess water to dissipate.

For the avoidance of doubt, there shall not be discharge of untreated, silty, or contaminated water from the works to any watercourse or stormwater network.

Where discharges are required including foul water, construction water, hydrostatic testing wastewater, or other water arising from the works, the appointed construction contractor, will ensure all relevant consents are in place for the appropriate and compliant management and protection of surface water quality and quantity. Construction Wastewater and Trade Effluent discharges require:

- discharge to sewer discharge licences issued by Uisce Éireann (formerly Irish Water) under Section 16 of the Local Government (Water Pollution) Acts and Regulations.
- discharge to surface water (or storm sewer), or discharge to groundwater under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990.

Should any discharge of contaminated construction water be required during the construction phase discharge will be to foul sewer with agreement of the sanity services provider or tankered off site to a licenced liquid waste facility.

Management of Hydrocarbons and Other Construction Chemicals

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages of fuels and other construction chemicals and prevent any resulting discharge to surface water or groundwater systems:

- All plant and machinery will be regularly maintained and serviced to minimise the risk of release of hydrocarbons. This will only be undertaken by qualified personnel
- Designation of bunded maintenance and refuelling areas on the Site;
- Provision of spill kit facilities across the Site strategically located in high risk areas;
- Where mobile fuel bowsers are used, the following measures will be taken:
    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers to carry a spill kit and operatives must have spill response training;
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;

- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be stored within temporary bunded areas, doubled skinned tanks or bunded containers to a volume of 110% of the capacity of the largest tank/container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Refuelling and maintenance of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area or within the construction compound (or where possible off the site) which will be away from surface water drains – a minimum 25 m buffer zone will be adhered to. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors” (CIRIA 532, 2001) will be complied with.

Any ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil. Wash water from cleaning ready-mix concrete wagons and mixers will be contaminated. Wagons and mixers must be washed off-site or in a bunded, impermeable designated washout area. Washout to be removed off site and disposed of appropriately at a licenced facility or reused for concrete creation. Washout area is to be located as far away from the watercourse as is practicably possible.

Management of Domestic Wastewater

Foul wastewater discharge from the site will be managed and controlled for the duration of the construction works. Site welfare facilities will be established to provide sanitary facilities for construction workers on site. The main contractor will ensure that sufficient facilities are available at all times to accommodate the number of employees on site. Foul water from the offices and welfare facilities on the site will be contained within the portable toilets and collected by a licensed waste sewerage contractor.

Watercourse Crossings / Instream Works (Baldonnell Stream)

These mitigation measures in respect of surface water quality apply specifically to the Gas to Profile Park AGI and the Gas to Kilcarbery AGI S39A application(s) that include instream works within the Baldonnell Stream.

In combination with the measures outlined above, the specific measures below will be implemented at the proposed watercourse crossings to ensure the quality of surface water is not affected.

- The work areas must be kept to the minimum area required to carry out the proposed works and the area should be marked out and cordoned off in advance of work commencement.

- No vehicles or machinery will cross the streambed. Where required by construction, temporary culverts and/or bridges will be installed to allow vehicles to cross watercourses, thereby mitigating disruption to both flow and water quality.
- In general, no unnecessary tracking or excavating in grassland/vegetated areas will occur (to prevent sediment laden run-off).
- Silt fencing will be installed along the working area adjacent to the watercourse, during the construction phase, to ensure no silt entry to the adjacent surface waters. This will be embedded to ensure silt retention and deposition and be positioned a minimum of 5m from the watercourse. In order to install the required silt fencing, the clearance of surrounding grasses and vegetation will not be undertaken. Monitoring of the effectiveness will be undertaken and maintenance of the fence will be undertaken if it comes into disrepair or significant amounts of silt begin to build up. Once the construction phase is complete, all fencing will be removed and disposed of to a licensed waste facility.
- Works to stream banks and instream works to be conducted during times of settled weather and low water flows. Working during times of heavy rainfall is to be avoided.
- Excavation works will halt during continuous heavy rainfall (extreme weather events), giving the ground time to drain and excess water to dissipate.
- Following the dewatering process but prior to initiating the construction activities, systematically extract the exposed bed material from sections that will undergo disruption, especially in areas where machinery will be operating.
- Excavated stream bed material will be stockpiled separately from all other material, in a designated area at least 15m from any watercourse. Once crossing works are complete, this material will be used to reinstate the stream bed to its original level.
- De-watering may be required within the trench for pipeline works. Should this be required, water will be discharged into a vegetated area at least 20m from any watercourse. Water will be discharged via a silt bag and/or settlement tank. Silt fencing will surround the discharge area.
- Prior to reinstatement and removal of the flume the work area will be re-watered to avoid sudden ingress of water causing erosion of the replaced bed or bank material.
- The complete section of the watercourse will be isolated using sandbags to create a seal that that span the full width of the watercourse and watercourse to deflect all flows into the flume pipe. This keeps a stretch of the river dry and the water is transferred downstream of the works area through gravity fed flumes.
- Sandbags will be placed both upstream and downstream of the crossing point. Heavy gauge plastic may be required in order to ensure a watertight seal is obtained.
- The flume(s) are to be placed on the bed of the watercourse through the works area and outfalls at the downstream barrier, if present, or far enough downstream to prevent the water backing up into the work area.
- Flume pipes sized to ensure they are capable of accommodation flood flow water volumes are inserted into the watercourse, ensuring they extend past the area of the proposed trench.
- Measures like geotextiles, or riprap will be set up at the discharge point to avoid disturbing the watercourse bed.
- Water pumped out from the isolated stream bed will be de-watered directly into any adjacent surface water.

- Open cut water crossings are carried out as quickly as possible (typically 3-4 days) to minimise the potential environmental impact.
- Once completed, the dams and flume are removed, and the watercourse is allowed to flow normally for the remainder of construction.
- Watercourse banks will be reformed to their original profile. Geocoir will be laid and secured to the newly profiled bank to avoid any risk of erosion or run-off during high intensity rainfall events. A fast growing, deep rooting grass seed mix will be spread along these banks.
- Should riverbed material excavated be deemed unfit for reinstatement of the riverbed, stone of the same size and geology shall be sourced for reinstatement purposes.
- Upon completion of instream and riparian works, all sandbags, flume pipes and straw bales are removed. All silt fencing will be removed and disposed of to a licensed waste facility.

Regular review of the works area is crucial to ensuring effective mitigation of impacts associated with the temporary damming works. Best practice guidance will be followed for the proposed works including Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).

4.2 ECOLOGY AND BIODIVERSITY

The measures associated with the construction phase required to avoid or reduce any potential harmful effects on biodiversity are set out below. These measures are not included as mitigation to protect European Sites. The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed below.

- All trees that are to be retained, both within and adjacent to the proposed development boundary (where the root protection area of the tree extends into the proposed development boundary), will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches or root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;
- Where fencing is not feasible due to insufficient space, protection for the tree/hedgerow will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it;
- The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines;
- The construction contractor will seek to avoid removing any hedges or trees during the nesting season and where this is not possible, an ecologist will be engaged to ensure compliance with the Wildlife Act 1976, as amended. The Applicant (GNI) employ their own internal policies on Tree Cutting and Hedge Trimming that applies the applicant Biodiversity Mitigation Hierarchy on all projects to avoid and minimise any tree/hedgerow loss and to add biodiversity net gain, where practicable. The Applicant will engage with the Local Authority

to identify and agree suitable biodiversity measures and/or lands to achieve biodiversity net gain before completion of the project.

The mitigation measures outlined in Chapter 5 (Land Soils, Geology and Hydrogeology) Section 5.6.1, and Chapter 6 (Hydrology) Section 6.6.2 of the EIAR will be implemented in full during the construction. These mitigation measures will be implemented as part of the site Construction Environmental Management Plan (CEMP). The CEMP will be implemented and adhered to by the construction Contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. These measures are designed to prevent the contamination of groundwater, surface water, and downstream ecosystems. These measures are not designed for the protection of European Sites.

The retention of existing green corridors such as hedgerows and promotion of biodiversity through native species landscaping will be undertaken where feasible. All areas of hedgerow vegetation removed will be fully reinstated with an appropriate native planting mix of local provenance including the following species:

- Elder Sambucus nigra
- Hazel Corylus avellana
- Hawthorn Crataegus monogyna
- Blackthorn Prunus spinosa
- Whitebeam Sorbus aria
- Rowan Sorbus aucuparia
- Birch Betula Spp. (wetter areas)
- Guelder Rose Viburnum opulus

Griffeen River Trenchless Watercourse Crossing – GNI134 Section 3

These mitigation measures in respect of surface water quality apply specifically to the Gas to Milltown AGI S39A application(s) that include works within close proximity to the Griffeen River.

- Method statements for the proposed auger crossing will be provided to Inland Fisheries Ireland (IFI) and National Parks and Wildlife Services (NPWS) prior to works commencing.
- Launch and receptor pits for the auger bore will be located a minimum of 8m from the riverbanks of the Griffeen River.
- The mitigation measures outlined in Chapter 5 (Land Soils, Geology and Hydrogeology) Section 5.6.1, and Chapter 6 (Hydrology) Section 6.6.2 of the EIAR will be implemented in full during the construction. These measures are duplicated Section 4.1 of this oCEMP.

Baldonnell Stream Open Cut Watercourse Crossing - GNI137 Section 1 and GNI137 Section 2

These mitigation measures in respect of surface water quality apply specifically to the Gas to Profile Park AGI and the Gas to Kilcarbery AGI S39A application(s) that include instream works within the Baldonnell Stream.

- Method statements for the instream works will be agreed with Inland Fisheries Ireland (IFI) and provided to National Parks and Wildlife Services (NPWS), prior to works commencing.

- Works should be confined to the instream works season (July 1st to September 30th inclusive) unless otherwise agreed with IFI. This is due to hydrological connectivity with watercourses with potential for higher fisheries potential downstream.
- Should works be conducted prior to July (after agreement with IFI), an amphibian survey is recommended to ensure adult amphibians or spawn are not impacted by works. If translocation is required, this should only be done by an ecologist under license.
- The mitigation measures outlined in Chapter 5 (Land Soils, Geology and Hydrogeology) Section 5.6.1, and Chapter 6 (Hydrology) Section 6.6.2 of the EIAR will be implemented in full during the construction. These measures are duplicated Section 4.1 of this oCEMP.

4.3 AIR QUALITY

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' and the USA (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.

- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Bonfires and burning of waste materials is prohibited.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

4.4 CLIMATE

During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Waste materials will be re-used on site where possible and where re-use is not possible on-site they will be sent off-site for recycling, re-use or recovery.
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

4.5 NOISE AND VIBRATION

With regard to construction activities, reference has been made to BS 5228-1 and BS 5228-2, which offer detailed guidance on the control of noise and vibration from construction activities. Various mitigation measures will be considered and applied during the construction of the Proposed Development.

This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant;
- Noise control at source;
- Screening;
- Hours of work;
- Liaison with the public, and;
- Monitoring.

Further comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring, where required. The contractor will put in place the most appropriate noise and vibration control measures depending on the level of noise or vibration reduction required at individual working areas i.e. based on the construction threshold values for noise and vibration set out in Table 4.1 and Table 4.2.

Table 4.1 *Construction noise threshold (CNT) levels for proposed development*

Period over Which Criterion Applies	Location	CNT (L_{Aeq}, period)
Monday to Friday: Daytime (07:00 – 19:00hrs) Saturday: Daytime (07:00-13:00hrs)	BS 5228-1 Category A– All residential NSLs along proposed route with exception of Category B detailed below.	65 dB
	BS 5228-1 Category B Residential NSLs– Immediately located to northeast and southeast of R134 / R136 junction.	70 dB

Period over Which Criterion Applies	Location	CNT (L_{Aeq}, period)
	Sensitive commercial buildings (e.g. offices) in urban areas near main roads in heavy industrial areas.	75 dB
	Sensitive commercial buildings (e.g. offices) in rural and suburban areas away from main roads.	70 dB
Monday to Friday: Evening: (19:00 – 23:00hrs) Saturdays (13:00 – 23:00hrs)	BS 5228-1 Category A– All residential NSLs along proposed route with exception of Category B detailed below.	55 dB
	BS 5228-1 Category B Residential NSLs– Immediately located to northeast and southeast of R134 / R136 junction.	60 dB
Monday to Friday: Night-time (23:00 – 07:00hrs)	BS 5228-1 Category A– All residential NSLs along proposed route with exception of Category B detailed below.	45 dB
	BS 5228-1 Category B Residential NSLs– Immediately located to northeast and southeast of R134 / R136 junction.	50 dB

Table 4.2 *Recommended construction vibration thresholds for buildings*

Structure Type	Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:	
	Transient Vibration	Continuous Vibration
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings *Note 1	6mm/s – 15mm/s	3 mm/s – 7.5mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/s	

Note 1: The relevant threshold value to be determined on a case by case basis. Where sufficient structural information is unavailable at the time of assessment, the lower value within the range will be used.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control at source. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

The following best practice migration measures will be employed :

- Site compounds will be located away from noise sensitive boundaries within the site constraints.
- The lifting of bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- For mobile plant items such as dump trucks, excavators and loaders, utilising an acoustic canopy to replace the normal engine cover and/or ensuring the enclosure panels are closed during operation can reduce noise levels over normal operation. Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, noise control measures include fitting a more effective exhaust silencer system to reduce the noise emitted.
- For percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker tool and ensuring any leaks in the air lines are sealed.
- Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For compressors, generators and pumps, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4m in height) with a mass per unit of surface area greater than 7 kg/m^2 can provide adequate sound insulation, and has been used in the predictive noise calculations. Based on the predicted CNL, screening giving a 10 dB reduction will be required at works locations within 50m of the closest NSLs.

Hours of Work

Construction activity will mostly take place during daytime hours Monday to Friday and a half day on Saturdays. In the event of it being deemed necessary to undertake works outside these, it will be necessary to obtain prior written approval from the Local Authority. Such approval would typically only be granted on submission of details of the activity accompanied by an assessment of potential noise impact.

Consideration should be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy

event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Depending on the noise emission levels experienced and associated noise impact, the contractor should be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise.

Liaison with the Public

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise and vibration complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy or vibratory construction activity the CLO will inform the nearest sensitive locations of the time and expected duration of the works.

Noise and Vibration Monitoring

During the Construction Phase the appointed contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017). The selection of monitoring locations will be based on the nearest representative NSLs to the working area which will progress along the length of the Proposed Development.

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the Proposed Development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings. However in GNI134-Section 3 prior to works commencing site investigation will be required to identify if the outbuilding, reg. no. 11208006, is structurally sound and if it is required to support/protect the outer wall of the structure during works within this area.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the monitoring will be undertaken at a selection of sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

4.6 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

Although the potential for previously unrecorded archaeological remains to survive sub-surface along the proposed development routes is very low, due to the area being significantly developed in the past, in order to mitigate against any potential impact on archaeological, cultural or architectural heritage, the following mitigation strategy is recommended:

- A suitably qualified archaeological consultant should be retained at construction phase to advise the design and construction teams.
- An archaeological monitoring brief should be implemented, under license to the National Monuments Service, in areas where ground disturbance is into previously undisturbed ground (Figure 4.1 and Figure 4.2 below), and where appropriate, in areas where there is the potential for features to survive, such as where the routes traverse townland boundaries.
- Should any features of archaeological interest be identified within the footprint of the lands to be impacted for the construction of the proposed temporary car park, then they should be excavated under the direction of a suitably qualified

archaeologist under license to the National Monuments Service. Adequate provision should be made for excavation, post excavation analysis and reporting of the findings.

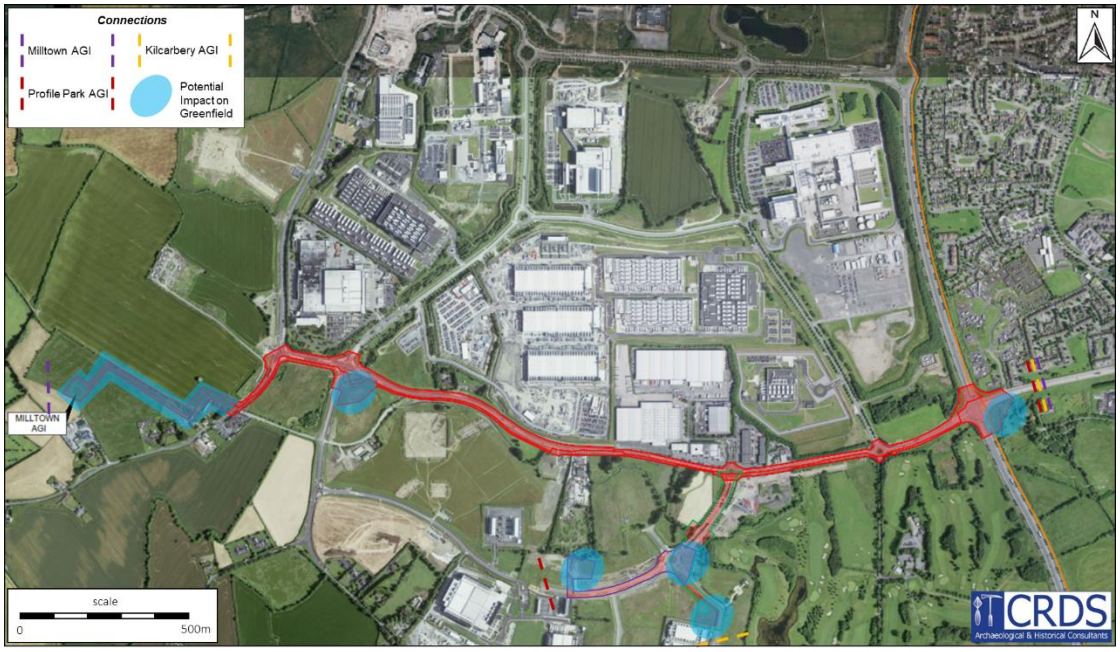

Figure 4.1 Figure 11.10 Aerial photograph of the Milltown AGI, Kilcarbery AGI and Profile Park AGI proposed routes (source www.google.ie/maps, accessed September 2023)

Figure 4.2 Aerial photograph of the Ballybane AGI proposed route (source www.google.ie/maps, accessed September 2023)

4.7 LANDSCAPE AND VISUAL

Site Management Procedures

The remedial measures proposed revolve around the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials, car parking, etc. Visual impact during

the construction phase will be mitigated somewhat through appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish.

Site hoarding and fencing will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound and scaffolding visible during the construction phase are of a temporary nature only and therefore require no remedial action other than as stated above.

Tree Protection

Existing trees and hedgerows to be retained are particularly sensitive to negative impacts during the construction phase if proper protection measures are not adhered to. With regard to the protection of the retained trees on site during proposed construction works, reference should be made to BS5837: Trees in relation Design, Demolition and Construction – Recommendations (BSI, 2012).

4.8 TRAFFIC AND TRANSPORTATION

The route of the pipelines has been designed to be predominantly within the road boundary.

A Construction Traffic Management Plan will be developed by the construction contractor to include the measures below to minimise the impacts associated with the construction phase upon the peak periods on the surrounding road network. Overall, the measures will include:

- Works will be carried out during interpeak times (10.00 to 16.00 hours) during weekdays or at weekends subject to agreement with the Local Authority.
- Carrying out road crossing works under traffic management/road closures and diversions.
- Regular cleaning of the road.
- Surface of the car park will be prepared and finished to a standard sufficient to avoid mud spillage onto adjoining roads.
- Monitoring and control of construction traffic during construction works.
- Material deliveries and collections from site will be planned, scheduled and staggered to avoid unnecessary build-up of construction work related traffic.
- All works carried out within public roadways will be carried out under Traffic Signs Manual Chapter 8 requirements.

HGV trips are anticipated to arrive and depart the site at a uniform rate throughout the day, to avoid pressure on the morning and evening peak hour periods.

All contractors' vehicles will be required to be parked in designated areas off the adjacent road. There will be no parking permitted on the surrounding road network by the contractor or site operatives.

4.9 WASTE MANAGEMENT

The following mitigation measures will be implemented during the construction phase of the proposed development.

A project specific Resource Waste Management Plan (RWMP) (Appendix 14.1 of the EIAR) has been prepared in line with the requirements of the EPA, *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)* and is included as Appendix 14.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phase of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (Appendix 14.1) in compliance with any planning conditions, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phase.

It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
    - Concrete rubble;
    - Metals;
    - Timber; and
    - Was generated by workers activities.
- Left over materials (e.g. timber off-cuts, concrete and metal) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Resource Manager (RM) will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and

- All waste leaving the site will be recorded and copies of relevant documentation maintained.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, the EMR Waste Management Plan 2015 – 2021 and the draft NWMPCE (2023). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

The mitigation measures presented in the table below have been designed to address the potential effects associated with each development element. These measures are designed to prevent, minimize, or offset the adverse impacts of the project.

Monitoring

The management of waste during the construction phase will be monitored by the Contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction works where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The mitigation measures in the RWMP specifies the need for a RM to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager will identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

4.10 UTILITIES

Ongoing consultation with Uisce Éireann, EirGrid, ESB Networks, and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community. The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to these utilities, unless this has been agreed in advance.

All applicable standards, guidelines and codes of practice will be adhered to regarding both installation of the gas transmission pipeline and working in the vicinity of existing services, in particular the Gas Networks Ireland (GNI) Guidelines for Designers and Builders – Industrial and Commercial (Non-Domestic) Sites (2018) and the Health & Safety Authority (HSA) Code of Practice for Avoiding Danger from Underground Services (2016).

Routine visual inspections of the existing services along the Nangor Road, Grange Castle Road, Fonthill Road South, Peamount Road and Profile Park internal road

network will be undertaken to ensure that these networks are kept clear of materials which could negatively impact their capacity.

Prior to commencing any construction activities, the contractor shall conduct a comprehensive utility locating survey using advanced technologies such as ground-penetrating radar (GPR) and electromagnetic induction methods. This survey will accurately identify the location and depth of all existing underground services, including high voltage (HV) cables, water and gas pipelines, and telecommunication lines. Based on the results of the utility locating survey, exclusion zones will be demarcated around identified utilities. These zones will indicate areas where construction activities are restricted or subject to specific safety protocols.

The mitigation measures set out in this EIAR will be implemented and adhered to by the construction Contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures. The construction Contractor will provide a detailed CEMP that will include any subsequent planning conditions relevant to the Proposed Development and set out further detail of the overarching vision of how the construction Contractor of the Proposed Development manage the Site in a safe and organised manner.

All plant, machinery and equipment will be stored within the temporary construction compound or within the Works Area. Oils and fuels will not be stored on site and will be stored in an appropriate bunded area within the temporary storage compound.

Mitigation via avoiding interactions with services where possible has been incorporated into the routing of the pipelines, which make use of surrounding verges and grassy areas to avoid existing services when necessary. The GNI134 pipeline will be routed through a SDCC owned field to the west of Old Nangor Road for a length of 180m to avoid a high-density area of third party services along the R120. Several sections of the GNI136 pipeline will be routed through the verge and cycling paths to ensure a sufficient separation distance between both third-party services and the proposed GNI134 pipeline. The GNI137 pipeline will initially be routed through the western lane of the Profile Park internal road network to avoid existing services in the road.

5.0 CONSTRUCTION HEALTH AND SAFETY PLAN

The appointed construction contractor will be required to prepare a Construction Health and Safety Plan which will be put in place prior to commencement of the works. A comprehensive site induction shall be conducted for all personnel prior to commencing any work on the site. The induction will cover the following topics:

- Overview of the project layout and site boundaries
- Site-specific hazards and risks
- Emergency evacuation procedures and assembly points
- Safe access and egress routes
- Location of first aid facilities and fire extinguishers
- Proper use of PPE
- Site rules and regulations
- Reporting procedures for incidents and near misses

All personnel, including subcontractors, visitors, and new workers, must complete the site induction before starting any work.

6.0 EMERGENCY PREPAREDNESS/ENVIRONMENTAL INCIDENT PLAN

Environmental incidents are events that result in harm or potential harm to the environment. These incidents include, but are not limited to, hazardous material spills, hydrocarbon spills, chemical spills, leaks, soil erosion, surface water pollution, groundwater pollution, air quality breaches, noise disturbances, and wildlife disruption.

Categories of Incidents

Incidents are categorized into three levels based on severity:

1. Major Incidents: Pose significant risk to the environment, health, and safety.
2. Moderate Incidents: Have a moderate impact and potential for environmental harm.
3. Minor Incidents: Minimal impact and easily manageable incidents.

Various types of environmental incidents that may occur on the construction site include hazardous material spills, soil erosion and sediment runoff, water contamination, air quality breaches, noise disturbances, and disruption of wildlife habitats.

Planning and Prevention

Environmental issues and potential emergencies are integral to project planning. Effective preventive and control measures are implemented, communicated to all project workers, including subcontractors, through tools like Contract Environmental Induction, Toolbox Talks, and Method Statement briefings.

Emergency contact details, Drainage Plan/Site Plan (with spill kit locations), will be posted on notice boards. Spill kits are available in the site compound's stores, strategically placed around the site, and within working vehicles. Vehicles carry sufficient spill kits matching their diesel/oil load.

Spill kits will be readily available on site. Proper placement of spill kits is crucial. They will be located as close as possible to potential spill areas and housed in clearly marked containers. These kits are mandatory at fuel storage or refuelling zones and should also be positioned near watercourses when work is being carried out nearby or within surface water drainage catchment. Mobile bowsers must always carry spill kits and drip trays/spill nappies. The choice and quantity of spill containment materials depend on the substance in use and the potential spill volume. Different absorbent types are accessible:

- Oil-Selective Absorbents: These are white or light blue and do not absorb water. They are suitable for spills on both land and water.
- Universal Absorbents: Grey in colour, these are intended for land spills. They shouldn't be used for spills in water.
- Chemical Absorbents: These could be yellow or grey and are designed for chemical or acid spills on land.

These absorbent types come in various forms:

- Granules, Sand and Shredded Fibres: These are applicable for spills on land.
- Pads: These can be used on land, particularly on hard surfaces, to contain or direct spills.
- Booms: These are designed to confine and absorb spills on water surfaces.

In addition to spill containment materials, spill kits must include appropriate Personal Protective Equipment (PPE), with gloves as a minimum requirement, and a copy of the Emergency Spill Response Plan. They should also feature disposal bags suitable for hazardous waste, including used absorbents and contaminated materials.

Regular inspections are necessary to ensure spill kits are adequately stocked and in good condition. This is especially crucial for kits located in remote areas, as they might be susceptible to vandalism or misuse. After usage, replenishing the spill kit promptly is vital to prepare for potential future spills. A detailed inventory of the kit's contents can be placed within the kit or in the site office at a minimum.

In order to prioritise safety and mitigate potential risks, as with any construction project a proactive approach will be taken towards anticipating and managing extreme weather events during the construction process. Weather forecasting will be reviewed to monitor meteorological conditions closely and identify the occurrence of storm events, lightening, heat or cold weather etc.

Emergency Response Protocols

There will be a Designated Emergency Coordinator and Responsible Personnel for Emergency Response. This individual(s) will bear primary responsibility for executing the spill response procedure. Nevertheless, other personnel present on-site, including the General Foreman, Area Supervisor, Safety Officers, Fitters, General Operatives and those in charge of refuelling, should also possess awareness of the emergency spill response procedure. It is necessary to provide training for all staff members responsible for addressing spills. These individuals must:

- Be familiar with the whereabouts of spill kits and/or materials, as well as their proper application.
- Grasp the fundamentals of spill containment and possess knowledge of site drainage systems and the locations of surrounding environments where spills might be received.
- Understand the appropriate Personal Protective Equipment (PPE) specifications for managing oils, fuels, and other hazardous substances utilized on the site.
- Possess knowledge about the proper disposal methods for contaminated materials.
- This information can be conveyed in inductions but also should be repeated in toolbox talks on a regular basis.

When an impending extreme weather event is detected through forecasting systems, as part of safety protocols the work zones, construction equipment, materials, and machinery that may be vulnerable to damage or displacement by severe weather will be ‘made safe’ by being secured or moving to safe locations. The site will be monitored and adjustments to safety measures as needed to address changing conditions.

Coordination with Emergency Services and Regulatory Authorities

An Emergency Contacts List will be developed prior to commencement of construction. The Designated Emergency Coordinator and Responsible Personnel for Emergency Response will be aware of the appropriate authorities to be notified, if necessary, as well as the emergency services to be contacted if the incident exceeds the site's capacity for containment. The emergency contact list may encompass details for:

- Emergency Services

- Local Authority
- Inland Fisheries Board
- Health & Safety Authority
- Specialized cleanup and waste disposal contractor
- EPA

Response to an Incident

All employees will be instructed to bring any environmental incidents they identify to the immediate attention of the Project / Site or Line Manager, after first taking what steps they can to contain/ remediate the incident (without putting the health and safety of themselves or others at risk).

In the event of an incident, prompt actions must be taken: the incident response team and project management should be notified without delay, and relevant emergency response protocols should be activated based on the severity of the incident. Priority shall be given to ensuring the safety of both workers and the surrounding community, with a focus on containing spills and leaks to prevent additional dispersion. Cleanup procedures will be conducted in adherence to guidelines.

Reporting and Investigation

Immediate Reporting

- Document incident details, including date, time, location, materials involved, and actions taken.
- Notify regulatory agencies and stakeholders as required by law.

Investigation and Root Cause Analysis

- Conduct a thorough investigation to determine the cause of the incident.
- Identify contributing factors and take corrective actions to prevent recurrence.

7.0 TRAINING PLAN

The following training plan outlines the training sessions and activities designed to educate construction site personnel about the Construction Environmental Management Plan, Construction Health and Safety Plan, Emergency Preparedness and Environmental Incidents Plan. The goal is to ensure that all team members are knowledgeable about the plan's protocols and can respond effectively in case of environmental incidents or emergencies.

Sample Training Objectives

- Familiarise personnel with the Construction Environmental Management Plan, Emergency Preparedness and Environmental Incidents Plan.
- Provide understanding of environmental incident categories, response protocols, and reporting procedures.
- Ensure proper usage of equipment, communication channels, and safety measures during incidents.
- Educate personnel on their roles and responsibilities within the incident response team.

Sample Training Sessions

1. Introduction to the Plan
    - Overview of the purpose and importance of the Construction Environmental Management Plan, Emergency Preparedness and Environmental Incidents Plan.
2. Evacuation and Safety Procedures
    - Overview of evacuation routes and assembly points in case of significant incidents.
    - Training on ensuring personal safety and the safety of others during an emergency.
3. Emergency Response Procedures
    - Discussion on the different categories of incidents: Major, Moderate, and Minor.
    - Description of common types of environmental incidents that may occur on the construction site. (Refuelling spillages, hydrocarbon spillage, hydraulic oil leak, alkaline wash water leak)
    - Detailed explanation of the steps to take when an environmental incident occurs.
4. Roles and Responsibilities
    - Clarification of roles within the incident response team, including Team Leader, First Aid Responders, Spill Control, Communication, etc.
    - Discussion on teamwork, communication, and coordination during incidents.
5. Reporting and Documentation
    - Guidance on properly documenting incident details, including filling out incident report forms.
    - Explanation of the importance of accurate and timely reporting.

Training Frequency, Training Material and Resources

New personnel should undergo this training upon induction to the construction site. Providing comprehensive training sessions will equip all construction site personnel with the necessary knowledge and skills to effectively respond to incidents and safeguard the environment and worker safety.

8.0 REVIEW AND FINALISATION OF THE PLAN

This oCEMP is an essential framework that guides the chosen construction contractor in implementing environmentally responsible practices throughout the construction programme.

The construction Contractor will provide a further detailed CEMP that will include any subsequent planning conditions relevant to the Proposed Development and set out further detail of the overarching vision of how the construction Contractor of the Proposed Development manage the Site in a safe and organised manner.

A systematic review and finalization process ensures the plan's adaptability and effectiveness. Regular audits and inspections serve as crucial checkpoints to assess performance and identify improvements.

Given project dynamics and potential changes, the CEMP remains dynamic, evolving alongside site activities and project alterations. Modifications will be transparently

communicated to the management team, ensuring informed decisions. This iterative process underscores commitment to environmental stewardship and sustainability.

The plan will be evaluated through routine audits, identifying areas for enhancement and ensuring alignment with project changes and regulations. As circumstances evolve, the CEMP is updated for ongoing suitability.

9.0 REFERENCES

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2. US Environment Protection Agency (USEPA), Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated) (1986).
3. The Scottish Office – Development Department, Planning Advice Note PAN50 Controlling the Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings (1996).
4. Institute of Air Quality Management (IAQM), Guidance on the Assessment of Dust from Demolition and Construction (2014).
5. UK Office of Deputy Prime Minister, Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance (2002).
6. USEPA, Fugitive Dust Technical Information Document for the Best Available Control Measures (1997).
7. Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No. 20 of 2011). Sub-ordinate and associated legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended 2011
    - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended
    - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821 of 2007) as amended
    - Waste Management (Licensing) Regulations 2000 (S.I. No. 185 of 2000) as amended
    - Waste Management (Packaging) Regulations 2014 (S.I. No. 282 of 2014)
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
    - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
    - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended 2015 (S.I. No. 190 of 2015)
    - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
    - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended
    - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007)
    - Waste Management (Movement of Hazardous Waste) Regulations 1998 (S.I. No. 147 of 1998)
    - The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988)
    - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
    - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended
8. Litter Pollution Act 1997 (No. 12 of 1997) as amended
9. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015)
10. Construction Industry Research and Information Association (CIRIA) Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532).
11. CIRIA, Environmental Good Practice on Site (3rd edition) (C692).

APPENDIX 5.1

CRITERIA FOR RATING SITE ATTRIBUTES – ESTIMATION OF IMPORTANCE OF SOIL, GEOLOGY AND HYDROGEOLOGY ATTRIBUTES

NATIONAL ROADS AUTHORITY (NRA, 2009

Table 1 Criteria for rating Site Attributes - Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality, significance or value on a regional or national scale Degree or extent of soil contamination is significant on a national or regional scale Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale*	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale Degree or extent of soil contamination is significant on a local scale Volume of peat and/or soft organic soil underlying route is significant on a local scale*	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and/or highly fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying route is moderate on a local scale*	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale Degree or extent of soil contamination is minor on a local scale Volume of peat and/or soft organic soil underlying route is small on a local scale*	Large historical and/or recent site for construction and demolition wastes Small historical and/or recent landfill site for construction and demolition wastes Poorly drained and/or low fertility soils Uneconomically extractable mineral resource

Table 2 Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

APPENDIX 6.1

CRITERIA FOR RATING SITE ATTRIBUTES – ESTIMATION OF IMPORTANCE OF HYDROLOGY ATTRIBUTES

NATIONAL ROADS AUTHORITY (NRA, 2009)

Table 1 Criteria for rating Site Attributes - Estimation of Importance of Hydrology Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2- 3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

APPENDIX 6.2

SITE SPECIFIC FLOOD RISK ASSESSMENT

SITE SPECIFIC FLOOD RISK ASSESSMENT

GNI GRANGE CASTLE PIPELINE

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1 INTRODUCTION

AWN Consulting Ltd (AWN) has been appointed by Gas Networks Ireland to undertake a Site Specific Flood Risk Assessment ("FRA") for a proposed development located in the Grangecastle area and in close proximity to the suburban town of Clondalkin, Dublin 22.

The overall proposed development comprises five underground transmission gas pipelines (named GNI134 (c. 3.045 km), GNI135 (0.077 km), GNI136 (c. 3.412km), GNI137 (c. 500m), and GNI142 (c. 455m)) facilitate the linkage between the existing gas network to four distinct customer projects. The 'Customer Projects' consist of:

- Microsoft Operations Ireland Ltd permitted Gas Generation Compound and DUB14 and DUB15 Data Centres site (the Ballybane AGI) – pipeline project name: 'Gas to Ballybane AGI';
- Data and Power Hub Services Ltd permitted ICT and Power Generation Facility site (the Milltown AGI) – pipeline project name: 'Gas to Milltown AG'I;
- Greener Ideas Ltd permitted Power Plant site (the Kilcarbery AGI) – pipeline project name: 'Gas to Profile Park AGI'; and
- Vantage Data Centers DUB11 Ltd permitted DUB11 and DUB12 Data Centers and Multifuel Generation Plant site (the Profile Park AGI) – pipeline project name: 'Gas to Kilcarbery AGI'.

A portion of the proposed development siterosses the Baldonnell Stream (twice) which flows in a northerly direction. The proposed development site also crosses the Griffeen river which flows in a northerly direction and ultimately discharges into the River Liffey at Lucan c. 4.3 km to the north of its crossing with the development. The Griffeen rivers contributary streams are the Ballymakaily, the Baldonnell and the Milltown. Other watercourses in the vicinity of the development site include the River Camac which is situated to the south and east of the development site and flows in a north-easterly direction, ultimately discharging into the River Liffey. The Grand Canal Main Line is also directly north of the Proposed Development.

It is proposed that a trenchless / auger bore crossing method is utilised for the Griffeen River. It is proposed that open cut method is utilised for installation of the rest of the pipeline route, including the Baldonnell Stream crossings (Fingleton White, 2023).

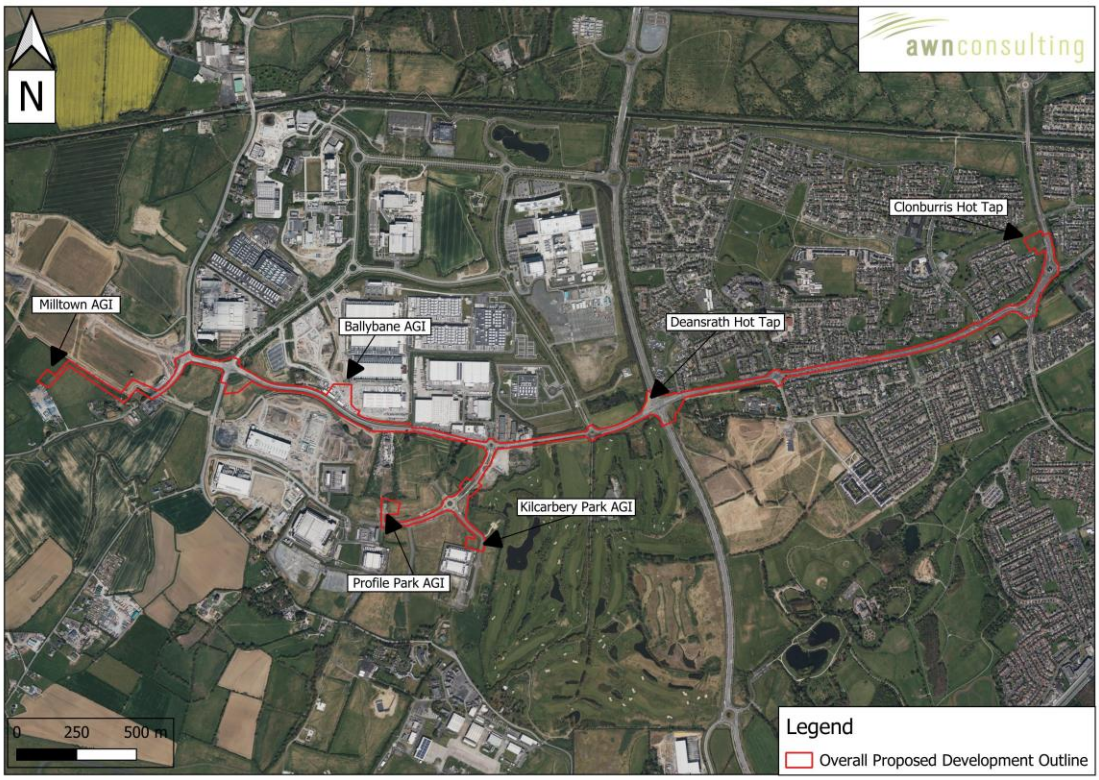


Figure 1.1 *Indicative Site Boundary (Source: AWN, 2023)*

This report was prepared by Hana Blandford (BSc), and Marcelo Allende (BSc, BEng). Hana is an Environmental Consultant with AWN Consulting holding a BSc Honours in Agri-Environmental Science working on projects involving EIA Reports, Flood Risk Assessments, Soil and Water Baseline Reports, Environmental Site Investigations and carrying out soil and groundwater monitoring on contaminated lands and a range of other developments. Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is an Senior Environmental Consultant (Hydrologist) with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI).

1.1 Planning Context

The following planning policy documents are relevant to the assessment of the proposed development:

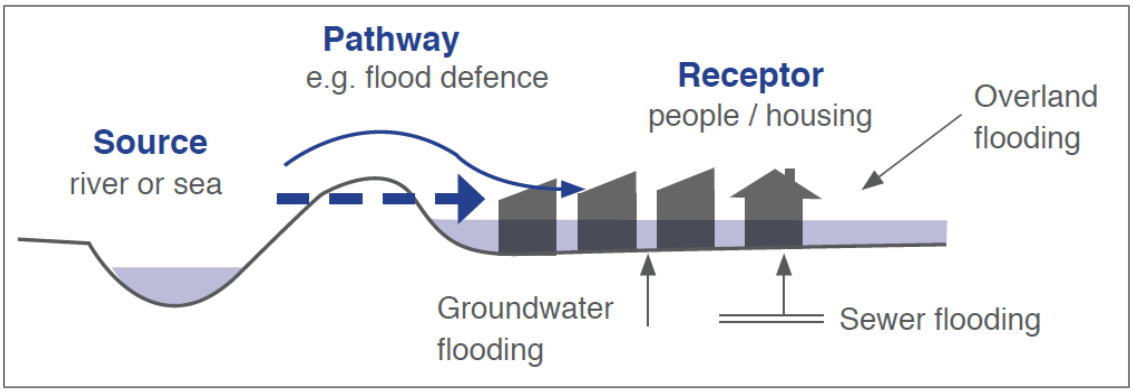
- The National Planning Guidelines published by the OPW and the Department of the Environment, Heritage and Local Government in November 2009 entitled 'The Planning System and Flood Risk Management Guidelines for Planning Authorities'
- South Dublin County Development Plan 2022-2028;
- National Development Plan 2018-2027.

1.2 The Planning System and Flood Risk Management Guidelines

This assessment was undertaken in accordance with the Department of the Environment, Heritage and Local Government (DoEHLG) Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009 (hereafter referred to as the FRM Guidelines) in order to introduce comprehensive mechanisms for the

incorporation of flood risk identification, assessment and management into the planning process.

For carrying out a Site-specific Flood Risk Assessment (SSFRA), the OPW Guidelines recommend using Source-Path-Receptor (S-P-R) concept model to identify where the flood originates from, what the floodwaters path is and the areas in which assets and people might be affected by such flooding (Section 2.18 of the OPW Guidelines, 2009). Insert 1.2 below shows a schematic representation of S-P-R model.



Insert 1.2 *Source-Pathway-Receptor Model (OPW, 2019)*

A Flood Risk Assessment (FRA) is undertaken over several stages with the need for progression to a more detailed stage dependent on the outcomes of the former stage.

As per the FRM Guidelines a tiered approach has been taken. This usually begins with a Stage 1 Assessment which aims to quantify the risk posed to the development and to the surrounding environment by this development. The main aim of this FRA is to determine the risk of flooding to the site and the impact the development will have on the floodplain, developments off site, upstream and downstream levels and any mitigation measures necessary.

This hierarchy of assessment ensures that flood risk is taken into account at all levels of the planning system but also that the right level of detail is considered. This avoids the need for detailed and costly assessments prior to making strategic decisions.

In terms of the Flood Risk Assessment and Management Study the scope of this work incorporates three stages:

- ***Stage 1: Flood Risk Identification -*** to identify whether there may be any flooding or plan issues related to a plan area or proposed development site that may warrant further investigation.

- ***Stage 2: Initial Flood Risk Assessment -*** to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed which may involve preparing indicative flood zone maps. Where existing river or coastal models exist, these should be used broadly to assess the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures; and,

- ***Stage 3: Detailed Flood Risk Assessment -*** to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impact on flood risk

elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model of the river or coastal cell across a wide enough area to appreciate the catchment wide impacts and hydrological processes involved.

However, as explained in the following sections, based off the nature of the development and the results of the flood risks identified during Stage 1 and Stage 2, it was not necessary to proceed to and 3.

As described in the FRM guidelines, flood risk is a combination of the likelihood of flooding and the potential consequences arising. This is normally expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding

The likelihood of flooding is normally expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in 100 years, i.e. it has a 1% chance of occurring in any one year. Therefore:

- 100-year flood = 1% Annual Exceedance Probability (AEP).
- 1000-year flood = 0.1% AEP.

In the FRM Guidelines, the likelihood of a flood occurring is established through the identification of Flood Zones which indicate a high, moderate, or low risk of flooding from fluvial or tidal sources, as defined as follows:

- *Flood Zone A* - Where the probability of flooding is highest (greater than 1% AEP or 1 in 100 for river flooding and 0.5% AEP or 1 in 200 for coastal flooding) and where a wide range of receptors would be vulnerable.

- *Flood Zone B* - Where the probability of flooding is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 for coastal flooding); and

- *Flood Zone C* - Where the probability of flooding is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

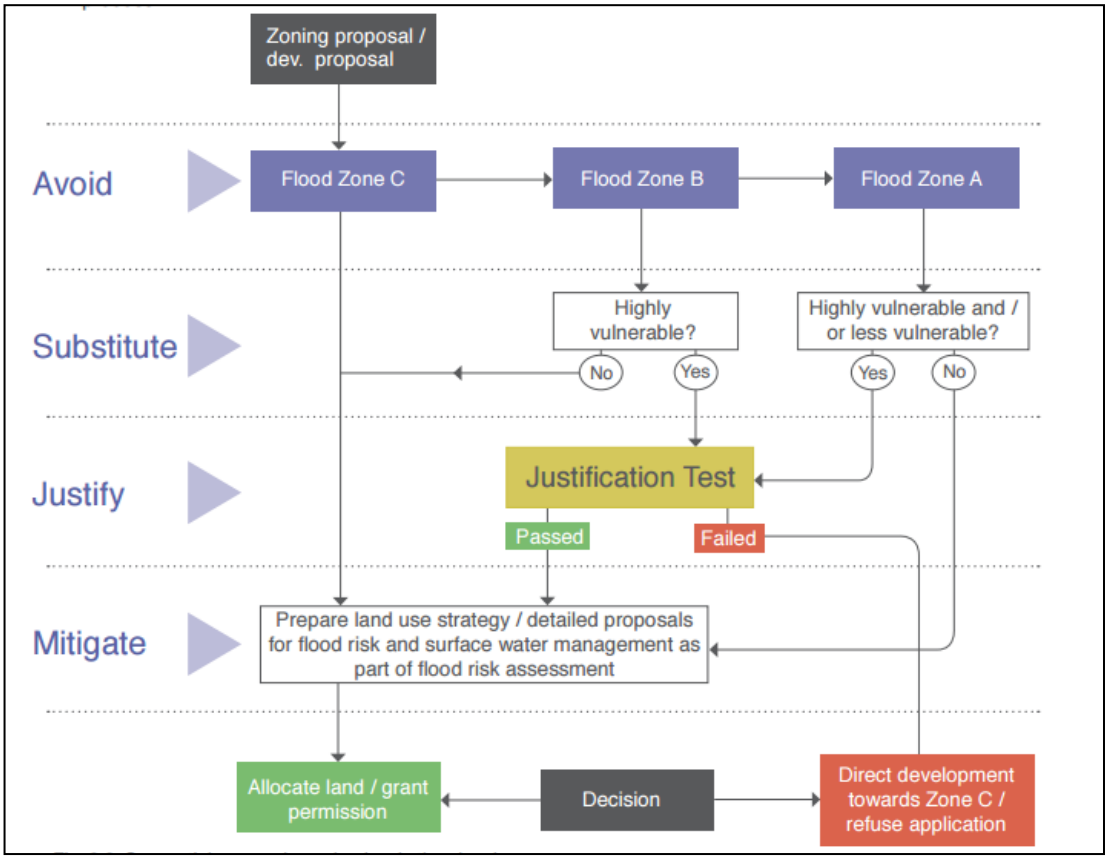
Insert 1.3 *Indicative Flood Zone Map (OPW, 2009)*

According to the OPW Guidelines, the planning implication of each of the zones mentioned above are:

- *Zone A* - High probability of flooding. Most types of development would be considered inappropriate in this zone.
- *Zone B* - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone
- *Zone C* - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

Potential impacts of the proposed development were considered within the study area. This is defined as the area within the proposed development site boundary (i.e. the proposed development site), and the wider hydrological setting of the area (refer to Insert 1.1 above and 2.1 below). A sequential plan approach was undertaken for this risk assessment under guidance from the local planning authorities (2009). Specifically, a sequential approach is first and foremost directed towards land that is at low risk of flooding. The underpinning philosophy of the sequential approach is highlighted in the illustration below. It should be noted that the above guidance is applicable in the layout and design of the specific subject site at the development management stage.

Based on the CFRAM PRFA (Preliminary Flood Risk Assessment) and South Dublin County Development Plan 2022-2028, the subject site resides in Flood Zones A and B (refer to Section 4 below). This report contains the first stage of the flood risk assessment.



Insert 1.4 Sequential approach mechanism in the planning process

1.3 Methodology

This assessment follows the FRM Guidelines; the methodology involves researching the following data sources:

- Base maps – Ordnance Survey of Ireland;
- Flood Hazard Maps and flooding information for Ireland, www.floodinfo.ie Office of Public Works (OPW);
- Geological Survey of Ireland (GSI) maps on superficial deposits;
- EPA hydrology maps;
- National River Basin Management Plan 2018-2021;
- Geological Survey of Ireland (GSI) maps on superficial deposits (current and historical);
- Circular PL2/2014 Flooding Guidelines;
- The National Development Plan 2018 – 2027;
- South Dublin County Development Plan 2022-2028.

The proposed development and its component parts have been assessed against the FRM Guidelines Classification of Vulnerability. It is considered that the proposed development would reside within the essential infrastructure category ('*utilities distribution, including power stations and substations*'); as such it is classified as '*Highly Vulnerable Development*' (see Table 1.1 below).

According to the FRM Guidance, a Highly Vulnerable Development requires a Justification test for Flood Zone A and B, and is appropriate for Flood Zone C (see Table 1.2 below).

Table 1.1 Classification of vulnerability of different types of developments.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Table 1.2 Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

1.4 Climate Change

Flood risk is anticipated to increase as a result of climate change. Projected impacts for Ireland include:

- Sea level rise of between 18cm and 59cm this century;

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding; and
- Increased storm surges.

With respect to this assessment and the development area only changes in the intensity of rainfall events and the magnitude of river flooding are of direct relevance.

In all developments, climate change should be considered when assessing flood risk and in particular residual flood risk. Consideration of climate change is particularly important where flood alleviation measures are proposed, as the design standard of the proposal may reduce significantly in future years due to increased rainfall, river flows and sea levels.

The Guidelines recommend that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects. A significant amount of research into climate change has been undertaken on both a national and international front, and updates are ongoing.

Based on these two scenarios the OPW recommended allowances for climate change are given in Table 1.3 below. These climate change allowances are particularly important at the development management stage of planning and will ensure that proposed development is designed and constructed to take into account best current knowledge.

Table 1.3 Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios for Fluvial and Tidal Sources

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+20%	+30%
Peak Flood Flows	+20%	+30%
Mean Sea Level Rise	+500 mm	+1,000 mm
Land Movement	-0.5 mm/year [1]	-0.5 mm/year [1]
Urbanisation	No General Allowance – Review on a Case by Case Basis	No General Allowance – Review on a Case by Case Basis
Forestation	-1/6 Tp [2]	-1/3 Tp [2] +10% SPR [3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)
Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land
Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For most development, including residential, nursing homes, shops and offices, the medium-range future scenario (20% increase in flows) is an appropriate consideration. This should be applied in all areas that are at risk of flooding (i.e. within Flood Zone A and B) and will be considered for sites which are in Flood Zone C but are adjacent to Flood Zone A or B. This is because land which is currently not at risk may become vulnerable to flooding when climate change is taken into account.

Where the risk associated with inundation of a development is low and the design life of the development is short (typically less than 30 years) the allowance provided for climate change may be less than the 20% / 0.5m level.

In general, climate change will be accounted for by the setting of finished floor levels to a height which includes an allowance for climate change. However, climate change may also reveal additional flow paths which need to be protected or give rise to flows

which exceed culvert capacity or overtop defences. These outcomes will need to be specifically investigated for each site, and an appropriate response provided.

2 EXISTING HYDROLOGICAL ENVIRONMENT

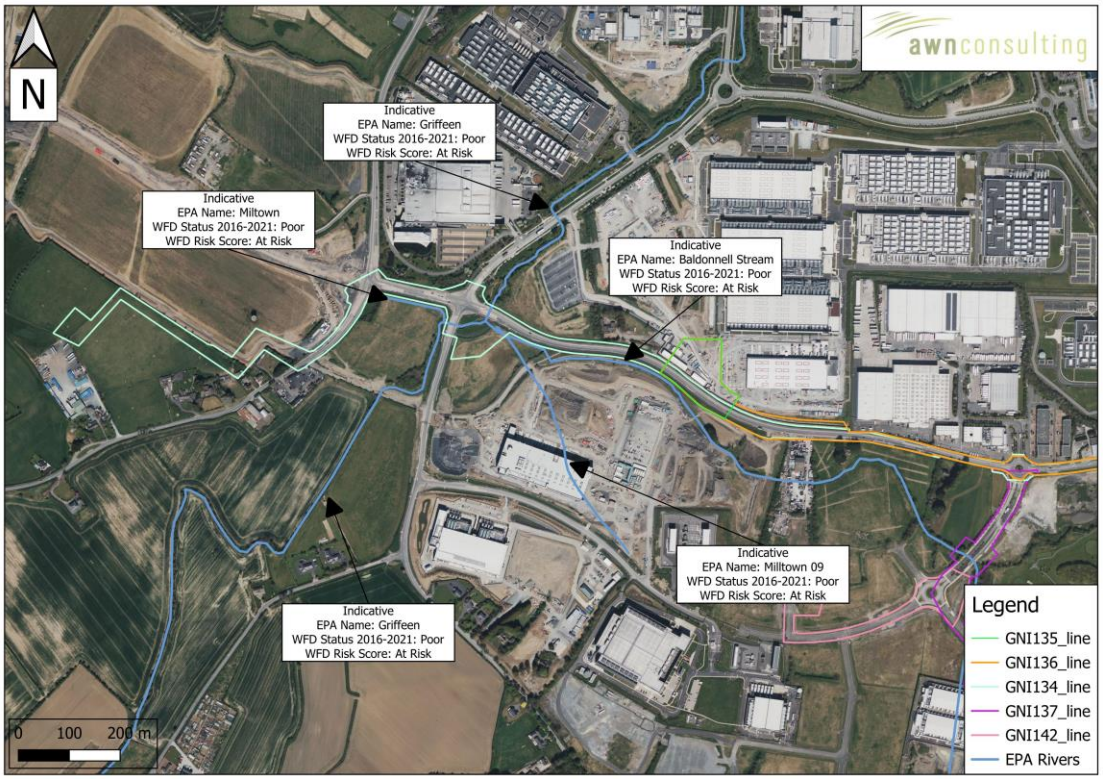
2.1 Site Location

According to EPA Maps, the proposed development site lies within the Liffey and Dublin Bay Catchment (Sub-Catchment: Liffey_SC_090).

The development is located within Hydrometric Area No. 09 of the Irish River Network. It is within Cammock (The Camac River) and Liffey Water Management Unit (WMU) which is part of the River Liffey Catchment.

The proposed development is located predominantly located along the Nangor road when followed east connects to the R110. The wider area is characterised by predominantly residential estates, as well as some agricultural land and recreational open spaces, such as Newlands Golf Club and Corkagh Park. To the west of the site the Grange Castle International Business Park. To the south lies the Roadstone Belgard Quarry and to the north lies the Grand Canal.

A portion of the site crosses the Baldonnell Stream (twice) and the Griffeen river which both flow in northerly direction. The Griffeen rivers contributary streams are the Ballymakaily, the Baldonnell and the Milltown. It flows north for approx. 4.22km where it reaches Lucan and turns in an easterly direction. It continues to flow in this direction through the areas of Palmerstown, Chapelizod and Island Bridge before discharging into the River Liffey approximately 9.55km north east of the site. Other watercourses in the vicinity of the site include the River Camac which is situated to the south and east of the site and flows in a north-easterly direction, ultimately discharging into the River Liffey. The Grand Canal Main Line is also directly north of the Proposed Development.



Insert 2.1 *Site location map with rivers.*

2.2 Existing Site Geology and Hydrogeology

The subsoil map (refer to Figure 1 in Appendix 1) presents the area to be made up of Glacial Till derived from limestones (TLs) which are typically associated with low permeability clays and Made ground (Made) associated with the Clondalkin urban area, which are generally man made. There is no indication of alluvium subsoil underlying the proposed route.The absence of Alluvium indicate that there are no historic rivers or flood plains on the site. Reference to the GSI Bedrock Geology indicates that the site is underlain by Lucan Formation (refer to Figure 2 in Appendix I).

The bedrock aquifers underlying the Proposed Development site according to the GSI National Draft Bedrock Aquifer Map is classified as a Locally Important Bedrock Aquifer (LI), which is described by the GSI as bedrock as 'moderately productive only in local zones (refer to Figure 3 in Appendix I).

Groundwater vulnerability is based on the thickness of the subsoil overlying the bedrock aquifer. Overall, the GSI groundwater vulnerability was mapped as being 'High' (H) for the majority of and vicinity of the Proposed Development site while the most westerly and easterly area of the site experiencing an 'Extreme' (E) Vulnerability rating. These indicates a general overburden depth potential of 3 – 5 m and 0 – 3 m, respectively.

3 DEVELOPMENT CHARACTERISTICS

The Proposed Development site is located predominantly on public roads and is located in the Grangecastle area and in close proximity of the suburban town of Clondalkin, Dublin 22. The site area consists of an underground transmission gas pipeline route and working areas and areas of more complex works.

The wider area is characterised by predominantly residential estates, as well as some agricultural land and recreational open spaces, such as Newlands Golf Club and Corkagh Park. To the west of the site the Grange Castle International Business Park. To the south lies the Roadstone Belgard Quarry and to the north lies the Grand Canal.

The Proposed Development Site is predominantly located along the Nangor Road which when followed east connects to the R110. This road links to the area to Dublin City Centre, c. 10km north east of the site, when followed east and to the M50 and N7 when followed west. The N7 and M50 motorway provide excellent transport links to the surrounding area. Multiple bus routes also serve this area.

A portion of the site crosses the Baldonnell Stream (twice) and the Griffeen River. It is proposed that a trenchless / auger bore crossing method is utilised for the Griffeen River. It is proposed that open cut method is utilised for installation of the rest of the pipeline route, including the Baldonnell Stream crossings (Fingleton White, 2023).

4 STAGE 1 – FLOOD RISK IDENTIFICATION

In broad terms, the potential sources of flooding at the site can be categorised as:

- Fluvial (River) Flooding: The main risk of fluvial flooding is from the local hydrological environment. Fluvial or river flooding occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying area.
- Tidal/Coastal Flooding: The risk from coastal flooding is from surge events in the Irish Sea, this would appear to be low as the site is a considerable distance inland from the coast (c. 12 km). Refer to Section 4.2 below.
- Pluvial Flooding: Pluvial flooding occurs when the capacity of the local urban drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding.
- Groundwater Flooding: Groundwater Flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding. Groundwater flood is usually associated with areas of high karstification i.e. the west of Ireland.

Each of these potential sources of flooding are considered in this FRA.

4.1 Historical Flooding Records

According to the OPW records, there are no previous flood events recorded within the proposed development site. However, a single flooding event was recorded in November 2000 at Peamount R134 R120 junction, located to the west of the Proposed Development site. As this was a single flooding event, it is not considered to represent a flood risk for the proposed development.

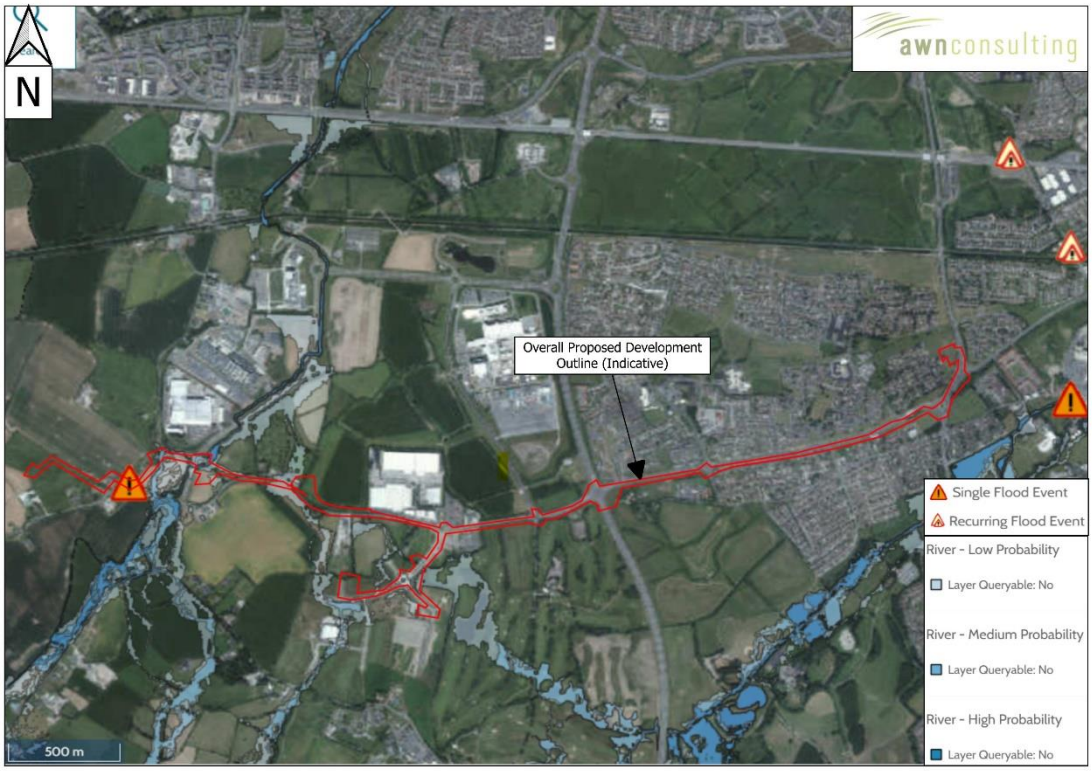
4.2 Fluvial Flooding

CFRAM Preliminary Flood Risk Assessment (PFRA)

The EU Floods Directive (2007/60/EC) required Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk exists or might be considered likely to occur. Members States were also required to prepare catchment-based Flood Risk Management Plans by 2018 that will set out flood risk management objectives, actions and measures. The OPW in co-operation with

various Local Authorities produced a number of PFRAs which aimed to map out current and possible future flood risk areas and develop risk assessment plans. These have been used to form the Draft Flood Risk Management Plans aimed at identifying possible structural and non-structural measures to improve the flood risk.

As part of the CFRAM programme provisional flood maps had been produced by the OPW which have been used in this assessment. The CFRAM River Flooding Extents shown in Insert 4.1 below demonstrates that the east of the proposed development site is located entirely within Flood Zone C i.e. the probability of flooding is low (less than 0.1% AEP or in 1 in 1000 year) for river flooding. The proposed development is also located adjacent to Flood Zone B i.e. where the probability of flooding is medium (approximately 1% AEP or 1 in 100 year) for river flooding.



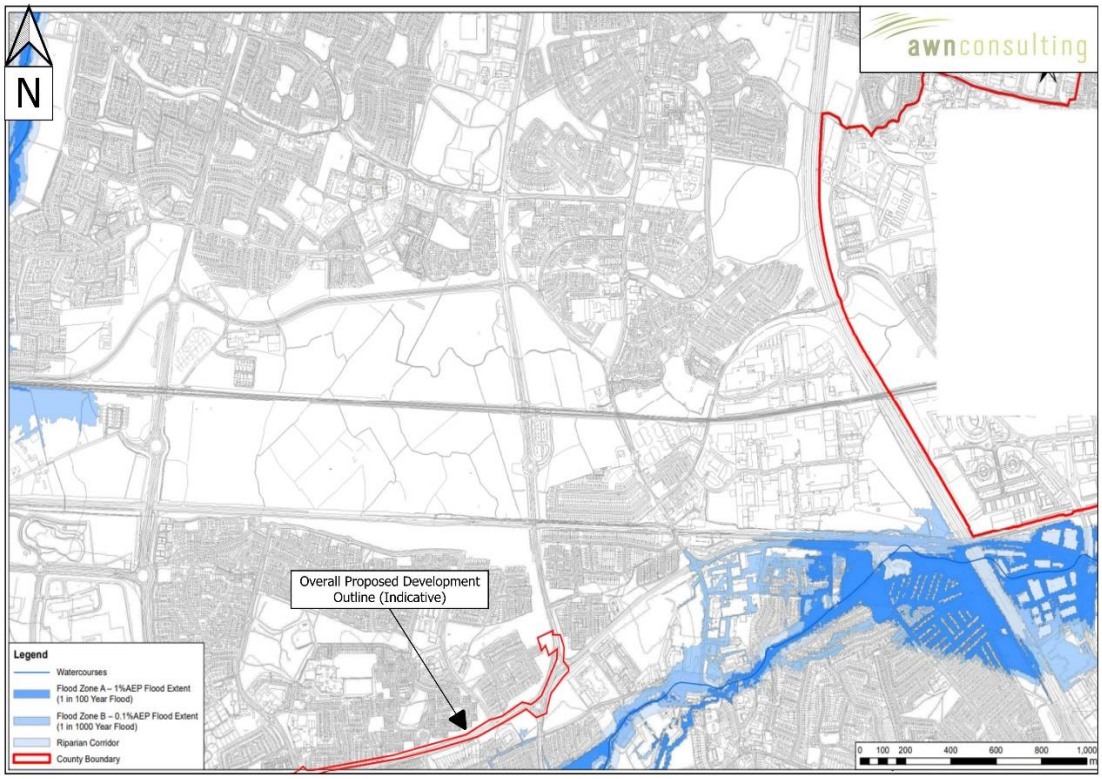
Insert 4.1 *Extract from CFRAM Pluvial Flooding Map for the Site Area (CFRAM, 2023).*

Advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW draft guidance. Two climate change scenarios are considered; these are the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a "likely" future scenario based on the wide range of future predictions available. The HEFS represents a more "extreme" future scenario at the upper boundaries of future projections. Both MRFS and HEFS model runs have been completed on all study watercourses, providing flood extent and depth maps. The OPW CFRAM Floodinfo.ie website has been reviewed for the MRFS and HEFS Mapping for medium and low probability. The maps do not show any flood extents at the site in these scenarios. However, taking into account the below section on South Dublin County Development Plans SFRA (2022-2028), it is considered the OPW Maps are out of date and not reliable.

<u>Strategic Flood Risk Assessment (SFRA) – South Dublin County Development Plan</u>

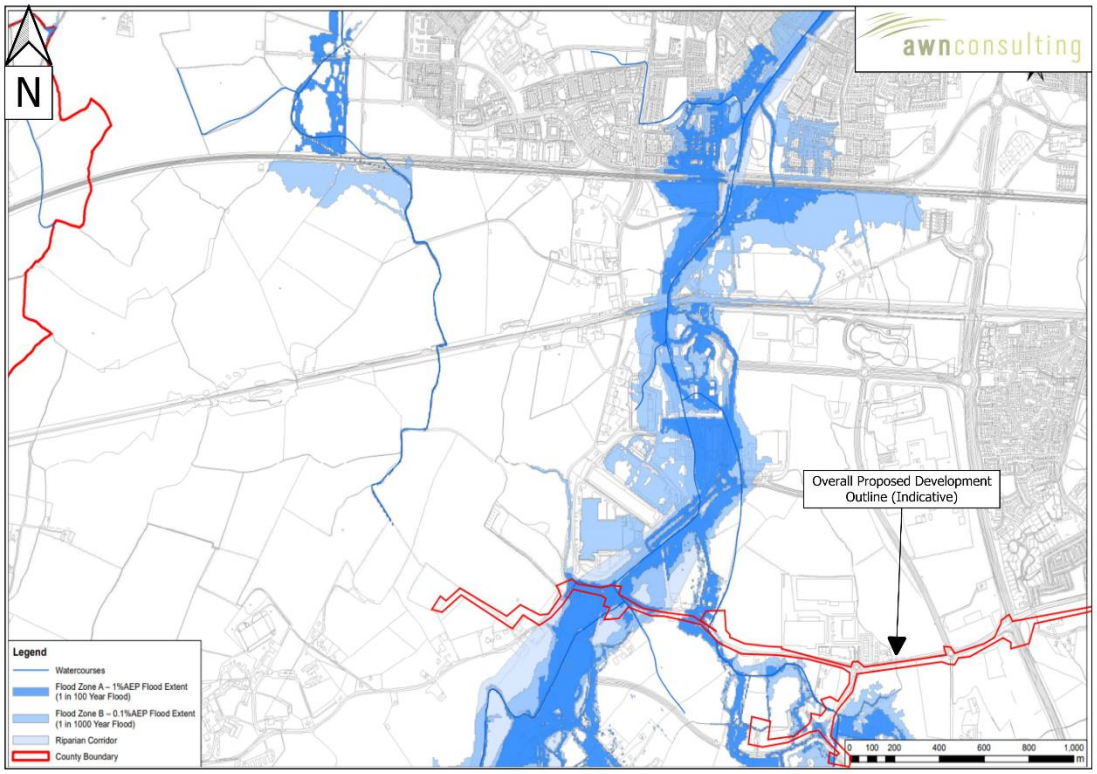
Strategic Flood Risk Assessment (SFRA) for the South Dublin County Development Plan 2022-2028 was developed by South Dublin County Council. Flood Risk Maps have been produced as part of this assessment based on desk and field studies including predictive and historical indicators of flood risk, documented Council knowledge of lands, etc.

Flood Risk Assessment mapping was developed by the Council as part of the South Dublin County Development Plan 2022-2028, an extract is shown in Insert 4.2.1 and Insert 4.2.2 below. Insert 4.2.1 shows the most eastern route of the proposed development site was outside any defined flood risk zone (source: https://www.sdcc.ie/en/devplan2022/adopted-plan/environmental-reports/sfra-south-dublin-county-development-plan-2022-2028.pdf)



Insert 4.2.1 *Flood Zones Extent. Approximated Proposed Development highlighted with the red line.*

Insert 4.2.2 shows the most western route of the proposed development site is located partially within Flood Zone A i.e. where the probability of flooding is high (approximately 10% AEP or 1 in 10 year) and Flood Zone B i.e the probability of flooding is medium (approximately 1% AEP or 1 in 100 year) for river flooding. However, after the transmission gas pipeline has been constructed, the pipeline in its entirety will be below ground ground during the contruction and operational phases, meaning if flooding were to occur, it will not have any negative impacts on the proposed development. Therefore, the proposed development site is not at risk of flood risk zones A and B (source: Strategic Flood Risk Assessment (SFRA) 2022-2028).



Insert 4.2.2 *Flood Zones Extent. Approximated Proposed Development highlighted with the red line.*

4.3 Pluvial Flooding

Flooding of land from surface water runoff is usually caused by intense rainfall that may only last a few hours. The resulting water follows along natural valley lines, creating flow paths along roads and through and around developments and ponding in low spots, which often coincide with fluvial floodplains. Any areas at risk from fluvial flooding will almost certainly be at risk from surface water flooding.

According to the South Dublin County Development Plan 2022-2028 SFRA and associated flood maps, the proposed development site is located partially within Flood Zones A and B. However, due to the nature of the proposed development being entirely below ground level there are no adverse effects of flooding on the proposed development.

4.4 Groundwater Flooding

Groundwater flooding can be due to high water tables and increased recharge following extended periods of wet weather and usually associated with the karst areas of the west of Ireland. According to the OPW records, there have been no reported instances of groundwater flooding in the area of study. An analysis of datasets available online through GSI Mapping was undertaken to determine the potential for groundwater flooding. Groundwater flooding is most common in Karst areas. The GSI Groundwater Data Viewer shows no indication of any Karst features in the area. This indicates that the proposed site has a very low risk from groundwater flooding.

4.5 Tidal/ Coastal Flooding

The risk from coastal flooding is from surge events in the Dublin Bay/ Irish Sea or in transitional waterbodies. As there is a considerable distance inland from the coast (c. 12 km) the proposed site has a very low risk from tidal or coastal flooding.

4.6 Other Sources of Flooding

There are no reservoirs orsignificant artificial sources in the vicinity of the development site except for the Grand Canal. The Grand Canal flows along the northern boundary of the Nangor Road (R134). As such flooding from this source given its distance from the Proposed Development (c. 1km) is not considered a risk to the site and therefore is not discussed further within this FRA.

4.7 CONCLUSION OF STAGE 1

The proposed development site is partially within the CFRAM Flood Zones A and B on the basis of the latest flooding maps (SDCC-SFRA, 2022-2028). According to the FRM Guidance, the development is considered to be an essential infrastructure category ('*utilities distribution, including power stations and substations*'); as such it is classified as 'Highly Vulnerable' Development which requires a Justification test for Flood Zones A and B, and is appropriate for Flood Zone C (refer Table 1.2).

As such, it is considered that a Justification Test is required and a Stage 2 should proceed for the proposed development site, since the site intersects with Flood Zones A and B associated with the Griffeen River to the west of the site.

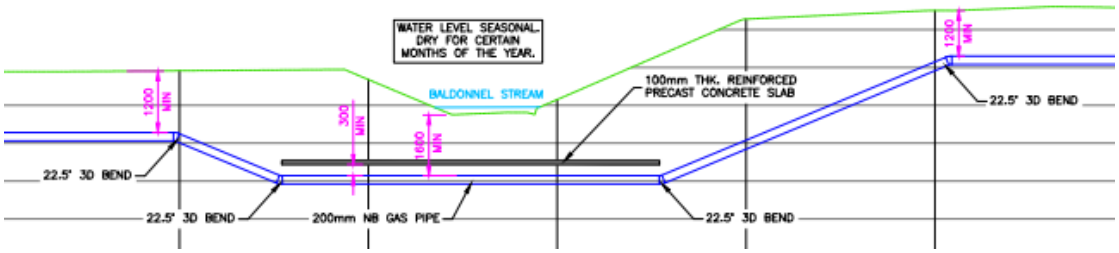
5 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

As explained in Section 1.4, a Stage 2 aims to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding and to assess the scope of possible mitigation measures.

5.1 Flood Mitigation Measures

There is no additional hardstanding provided as part of the proposed development and therefore there is no management of surface water during the operational phase. Due to the proposed sites river crossings (the Baldonnell Stream (twice) and Griffeen River) site works will comply with current best practice, notable the Inland Fisheries Ireland Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and Transport Infrastructure Ireland's Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008). It is important to note that these measures are not required for the protection of downstream Natura 2000 sites in relation to the proposed development site. The development proposed will not increase flood risk elsewhere.

Additionally, after the transmission gas pipeline has been constructed, the entire pipeline route will be below ground during the construction and operational phases meaning if flooding were to occur, it will not have any negative impacts on the proposed development. As per the I.S. 328: 2021, the minimum depth of cover to top of pipe will be 1.2m for entirety of route, and 1.6m at the river / stream crossing as shown below in insert 5.1 of the Baldonnell Stream pipeline crossings cross section drawing produced by Fingleton White.



Insert 5.1 *Stream Crossing Plan and Longitudinal Section (source: Fingleton White, 2023)* (Scale 1:100)

5.2 Conclusion Of Stage 2

The Initial Flood Risk Assessment concludes that the complexity of the CFRAM pluvial hydraulic models provides the necessary level of detail to determine whether more detailed assessment is needed.

The main conclusion is that there is no significant conflict between flood risk and the proposed development site, as it will be entirely below ground. There are no potential residual risks as the proposed development site will not affect any other existing infrastructure should an extreme event occur.

It is concluded that it is not necessary to proceed to Stage 3.

Note: Construction operations relating to the proposed development will not be undertaken during adverse weather conditions i.e., extreme flooding.

6 CONCLUSIONS

This Stage 1 Flood Risk Assessment has been undertaken in accordance with the FRM guidelines. The main aim of this FRA is to determine the risk of flooding to the site and the impact the development will have on the floodplain, upstream and downstream levels and any mitigation measures necessary. The OPW CFRAM online mapping and the South Dublin County Development Plan 2022-2028 (SFRA, 2023) were used to consider the risk of flooding to the proposed development site.

A Flood Risk Assessment is undertaken over several stages with the need for progression to a more detailed stage dependent on the outcomes of the former stage. The sequential approach, as outlined in the FRM guidelines, was undertaken.

The review of the available data on fluvial, pluvial and groundwater flooding shows that the proposed development site has one single historical flood hazard identified in the vicinity (a single flooding event recorded in November 2000 at Peamount R134 R120 junction, located to the west of the Proposed Development site.); however, the proposed development site is located partially within the CFRAM Flood Zones A and B according to South Dublin County Development Plan (2022-2028) SFRA latest flooding data/imagery. According to the FRM Guidance, the development is considered to be an essential infrastructure category ('*utilities distribution, including power stations and substations*'); as such it is classified as 'Highly Vulnerable' Development which requires a Justification test for Flood Zones A and B, and is appropriate for Flood Zone C.

As such, it is considered that a Justification Test was required for the proposed development and a Stage 2 was undertaken for the proposed development site.

According to the Initial Flood Risk Assessment (Stage 2) for the proposed development site, it is concluded that there is no conflict between flood risk and the construction of the underground gas pipeline, as its entire route will be below ground in operation and construction works will not take place during extreme adverse weather conditions i.e. extreme flooding.

There are no potential residual risks as the proposed development will not affect any other existing infrastructure should an extreme event occur.

7 REFERENCES

1. The Planning System and Flood Risk Management Guidelines for Planning Authorities, DoEHLG, 2009.
2. Base maps, Ordnance Survey Ireland.
3. Flood Hazard Maps and flooding information for Ireland, www.floodinfo.ie
4. GSI Bedrock Geology, Subsoils, Aquifers, Groundwater vulnerability online mapping, www.gsi.ie .
5. South Dublin County Council Development Plan (Source: sfra-south-dublin-county-development-plan-2022-2028.pdf (sdcc.ie))
6. The National Development Plan 2018 – 2027.
7. GNI Grangecastle Pipelines Construction Methodology, Fingleton White, 2023

APPENDIX I

Figures

(AWN, 2023)

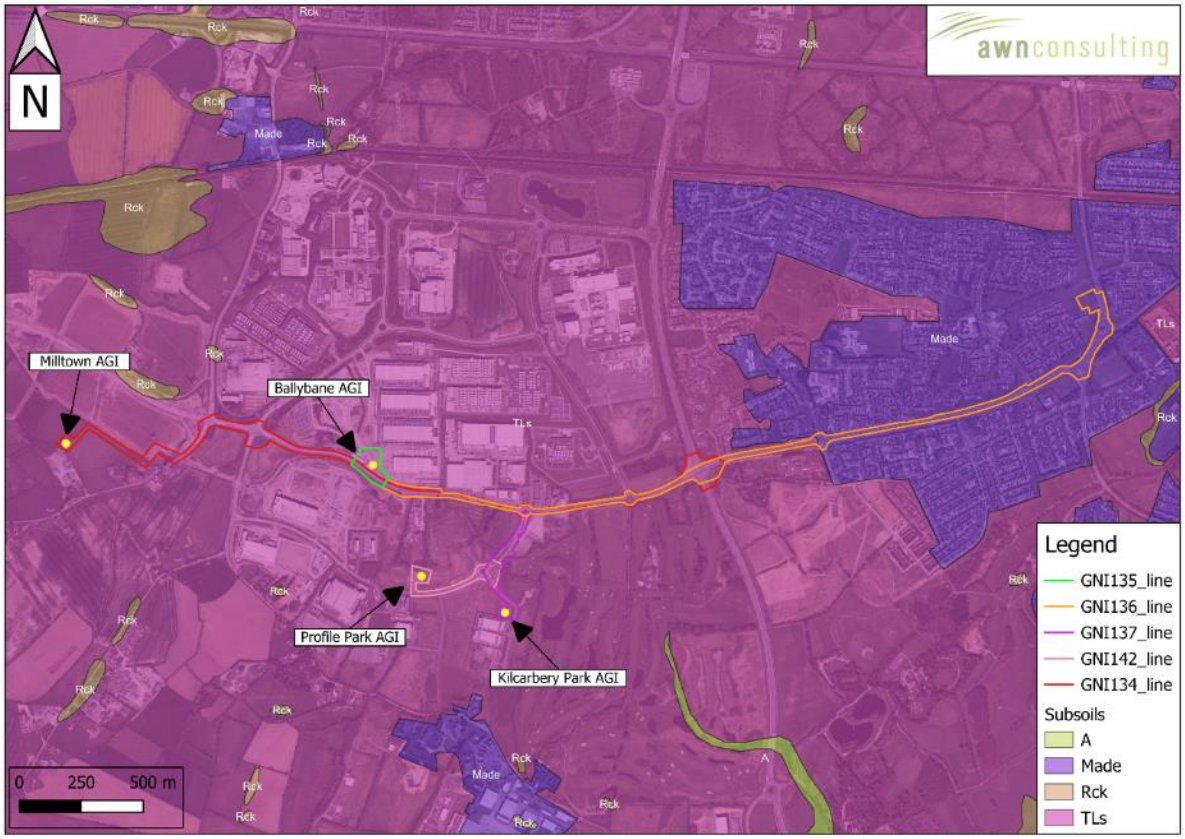


Figure 1 *Subsoils Map (GSI, 2023)*

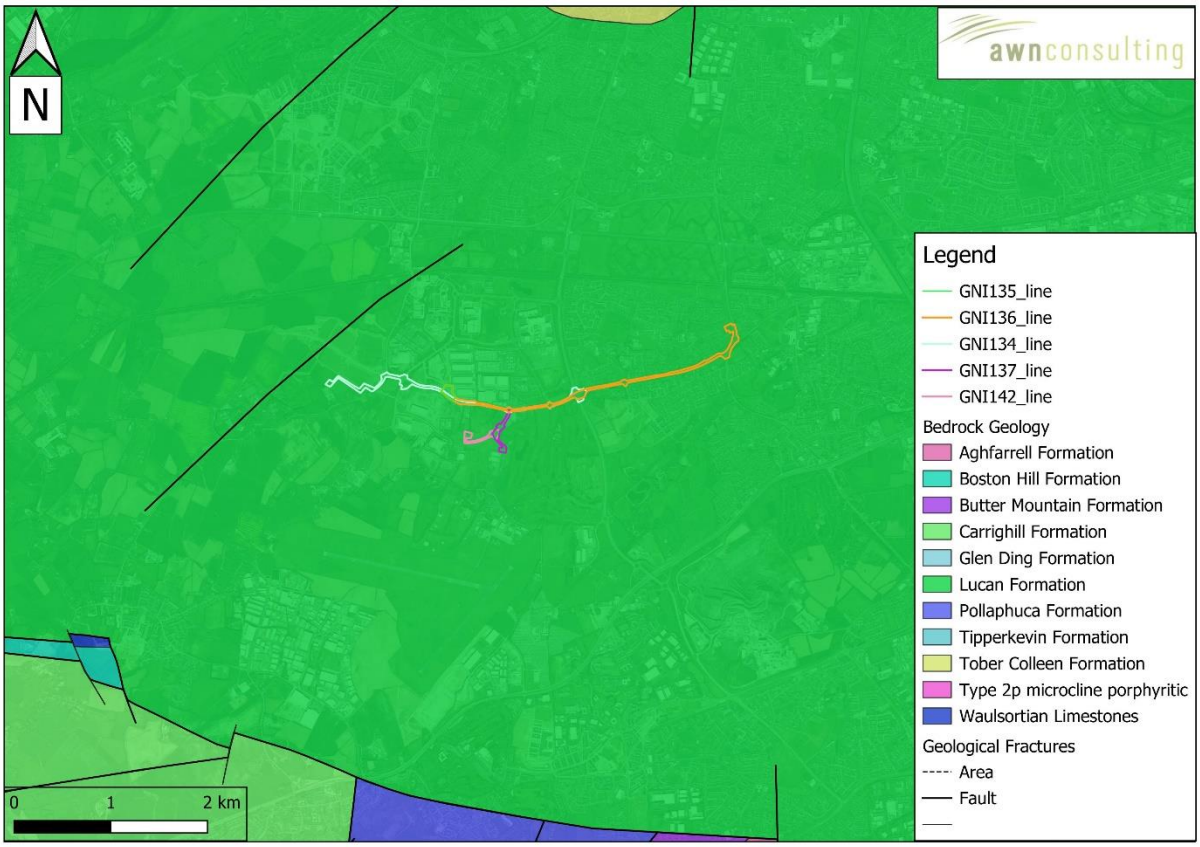


Figure 2 *Bedrock Geology Map (GSI, 2023)*

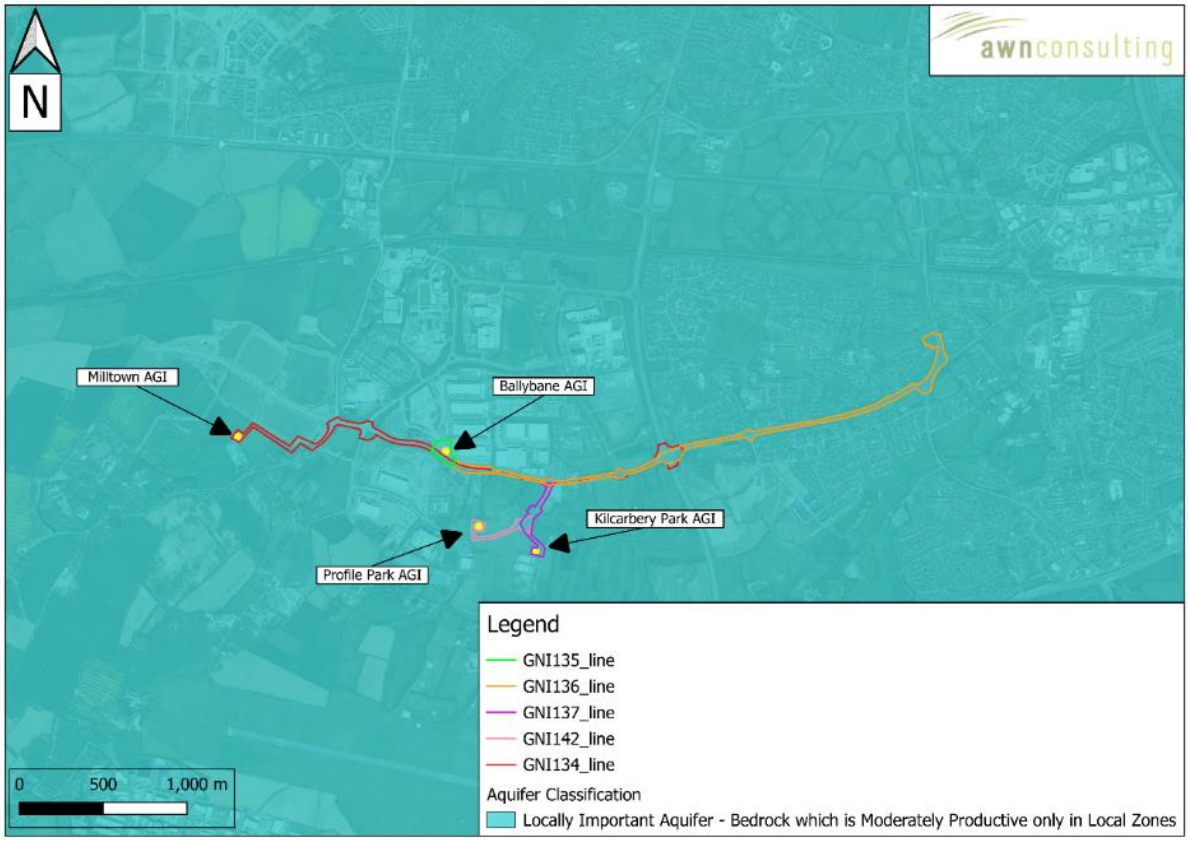


Figure 3 *Aquifer Classification Map (GSI, 2023)*

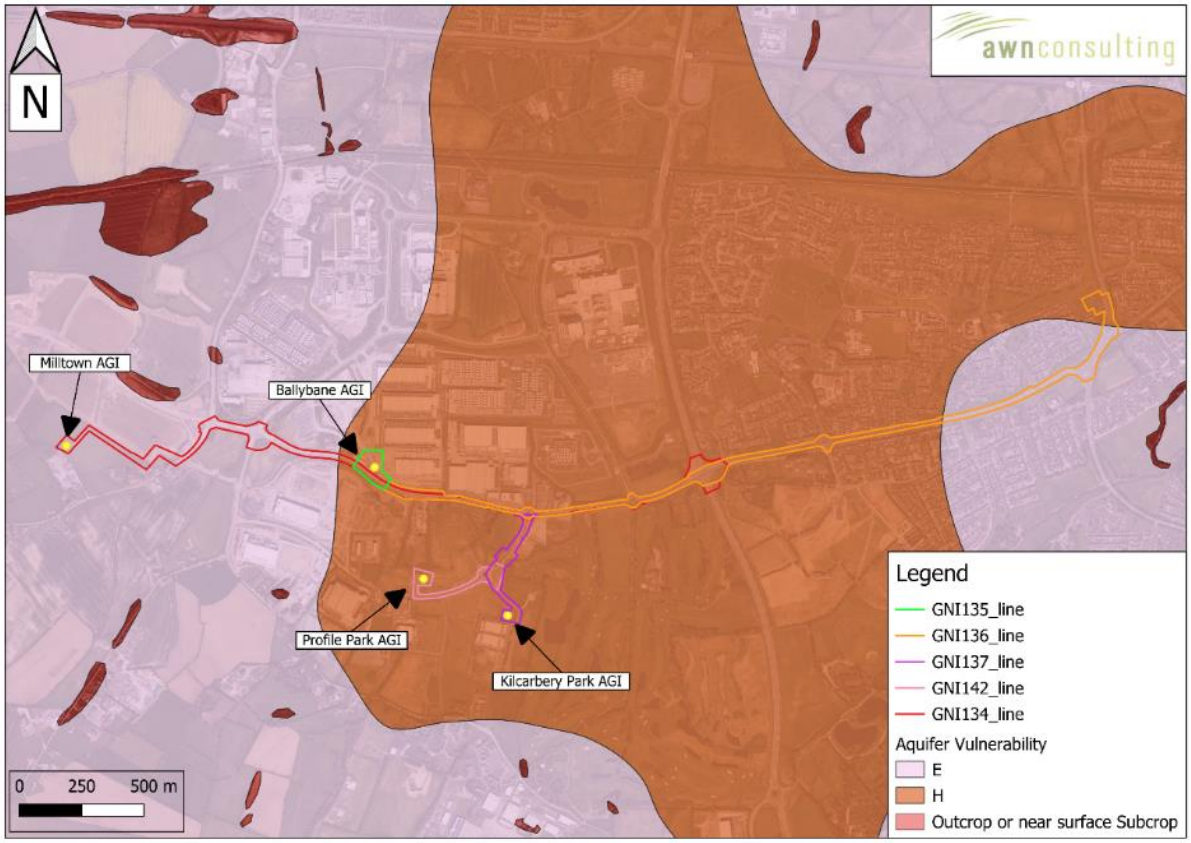


Figure 4 *Aquifer Vulnerability Map (GSI, 2023)*

APPENDIX 10.1

GLOSSARY OF ACOUSTIC TERMINOLOGY

APPENDIX 10.1
GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise — The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

background noise — The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

broadband — Sounds that contain energy distributed across a wide range of frequencies.

dB — Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).

dB L_{pA} — An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with the A-frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

Hertz (Hz) — The unit of sound frequency in cycles per second.

impulsive noise — A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

$L_{Aeq,T}$ — This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} — The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

L_{AFmax} — is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).

$L_{Ar,T}$ — The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.

L_{AF90} — Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the

intermittent features of traffic and is used to estimate a background level. Measured using the “Fast” time weighting.

L_{AT}(DW) equivalent continuous downwind sound pressure level.

L_{ft}(DW) equivalent continuous downwind octave-band sound pressure level.

L_{day} L_{day} is the average noise level during the daytime period of 07:00hrs to 19:00hrs

L_{night} L_{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.

low frequency noise LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.

noise Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

noise sensitive location NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000 Hz octave band contains acoustical energy between 707 Hz and 1,414 Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

rating level See $L_{Ar,T}$.

sound power level The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where:

$$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$

Where: p is the rms value of sound power in pascals; and
P_0 is 1 pW.

sound pressure level The sound pressure level at a point is defined as:

$$Lp = 20Log\frac{P}{P_0}\ \text{dB}$$

specific noise level A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: ‘the equivalent continuous A-weighted sound pressure

	level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq, T}$)'.
tonal	Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.
$^1/_3$ octave analysis	Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one-third of an octave each.

APPENDIX 11.1

RECORD OF MONUMENTS AND PLACES

PREPARED BY CRDS LTD

Recorded Archaeological Monuments located within c. 500m of the proposed development routes are listed below (source Record of Monuments and Places; www.archaeology.ie).

SMR No.	RPS No.	Ballybane	Miltown	Profile Park	Kilcarbery
DU017-037----		√	√	√	√
DU017-039----	142	√			
DU017-040----		√			
DU017-082----		√	√	√	√
DU017-084----			√		
DU017-109----			√		
DU017-110----			√		
DU021-004----				√	
DU021-108----		√	√		
DU021-109----		√	√		√

SMR No.: **DU017-037----**
Townland: NANGOR
Class: Castle - unclassified
ITM: 704527, 731166
Description: Located in flat terrain. Named 'Nangor castle' on the 1837 edition OS 6-inch map and 'Nangor castle on site of castle' in the later edition. This indicates that the castle had been incorporated into an 19th-century mansion. All buildings on the site have been recently demolished leaving no surface trace of the earlier building. In 1532 Ffinian Bassenett was residing at Nangor (Ball 1906, 112; Healy 1974, 22; D'Alton 1976, 345 (2nd ed.). There are earthworks in the field to the south of the castle. Pre-development testing in the vicinity of the castle in 1996 produced evidence for a substantial ditch and an associated shallower linear feature of uncertain date. Trial-trenching in the field bounding the castle site to its south uncovered several lignite cores and slivers, early medieval pottery and metal slag suggesting a date in at least the early medieval period- twelfth/thirteenth century. Several trenches cut through a large ditch located on both the east and west of the field. Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features (McConway 1997, 17). Compiled by: Geraldine Stout Date of upload: 26 August 2011

SMR No.: **DU017-039----**
Townland: DEANSRATH
Class: Castle - tower house
ITM: 705105, 731486
Description: Situated in flat ground near the roadside. All that survives of Deansrath Castle is portion of a stair tower, which rises to two storeys with a partially vaulted over ground floor. This is built of mortared ashlar blocks of limestone. This appears to be part of a gatehouse shown in a drawing by Beranger in 1773 (Harbison 1998, 166-167). It was part of a larger castle complex described by Austin Cooper in the eighteenth century which was entered through and defended by a deep enclosing fosse (Price 1942, 38-39). The Dean of St. Patrick was proprietor in 1641 (Simington 1945, 307). By 1656 it is described as the 'stumpe of a castle' (op cit, 292, see Mc Dix, 1897, XXI, 179; Healy 1974, 22; Ball 1906, 112, 117). Compiled by: Geraldine Stout Date of upload: 26 August 2011

SMR No.: **DU017-040----**
Townland: BAWNOGES
Class: Enclosure
ITM: 705775, 731479
Description: An aerial photograph taken in 1971 (FSI 224/5/6) shows traces of an enclosure which appears to be defined by a low bank (dims. L 30m; Wth 18m). Not visible at ground level. Compiled by: Geraldine Stout Date of upload: 26 August 2011

SMR No.: **DU017-082----**
Townland: NANGOR
Class: Field system
ITM: 704328, 731197
Description: Excavations in 2001 revealed a medieval ditch complex. This appeared to represent the remains of medieval field boundaries with associated water management gullies. Some 1600 sherds of local medieval pottery were recovered and two sherds of imported ware (Doyle 2003, 135-136).Compiled by: Geraldine StoutDate of upload: 26 August 2011

SMR No.: **DU017-084----**
Townland: NANGOR
Class: Fulacht fia
ITM: 704410, 731473
Description: Monitoring of topsoil-stripping in 2000 revealed the remains of a small fulacht fiadh. This consisted of a small pit or trough, a spread of heat-cracked stone and a linear feature to the south-west of the trough. The pit/trough consisted of a subcircular cut into natural, 0.56m by 1.25m. This spread measured 1.92m north-south x 1.18m with a maximum depth of 0.05m. Approximately 6m to the west of the spread a linear gully feature was revealed. This gully consisted of a cut into natural boulder clay measuring 2.57m north-south x 0.28-0.54m. This had a depth of 0.16m with sharply sloping sides and a flat base. The cut was filled with a moderately compact, mid-brown clay containing frequent pieces of oxidised clay and occasional flecks of charcoal. Infrequent fragments of burnt bone were noted in the fill (Doyle, 2001) Compiled by: Geraldine Stout Date of upload: 26 August 2011

SMR No.: **DU017-109----**
Townland: MILLTOWN (Newcastle By.)
Class: Earthwork
ITM: 702236, 731328
Description: In tillage field with cropmark of ring-ditch (DU017-110----) 120m to WSW. Cropmark of circular-shaped area (diam. c. 30m) defined by the cropmark of a ditch visible on Google Earth orthoimage taken 24/06/2018. See attached Google Earth orthoimage taken 24/06/2018Compiled by: Caimin O'Brien based on details provided by Jean-Charles Caillère Date of upload: 29 May 2023

SMR No.: **DU017-110----**
Townland: MILLTOWN (Newcastle By.)
Class: Ring-ditch
ITM: 702099, 731307
Description: In tillage field with cropmark site (DU017-109----) 120m to ENE. Small circular-shaped area (diam. c. 8m) defined by the cropmark of a ditch visible on Google Earth orthoimage taken 24/06/2018. See attached Google Earth orthoimage taken 24/06/2018Compiled by: Caimin O'Brien based on details provided by Jean-Charles Caillère Date of upload: 29 May 2023

SMR No.: **DU021-004----**
Townland: KILBRIDE
Class: Castle - unclassified
ITM: 703754, 730071
Description: Situated in a narrow valley. There are farm buildings on the site. There is no visible trace above ground (Ball 1906, 66). Compiled by Geraldine Stout

SMR No.: **DU021-108----**
Townland: BALLYBANE
Class: Concentric enclosure
ITM: 703060, 730985
Description: Not indicated on any OS map a large concentric enclosure is visible as a crop-mark on an aerial photo. A second enclosure (DU021-109----) is visible to the SW. DU021-108----_01.jpg Aerial image (derived from Bing Maps) showing the enclosures. Compiled by: Paul Walsh Date of upload: 11 March 2015

SMR No.: **DU021-109----**
Townland: BALLYBANE
Class: Enclosure
ITM: 702937, 730716
Description: Not indicated on any OS map this enclosure is as a crop-mark on an aerial photo. A second larger enclosure (DU021-108----) is visible to the NE. DU021-109----_01.jpg Aerial image (derived from Bing Maps) showing the enclosures. Compiled by: Paul Walsh Date of upload: 11 March 2015

APPENDIX 11.2

ARCHAEOLOGICAL FINDS

PREPARED BY CRDS LTD

The recorded archaeological finds in the vicinity of the proposed routes are listed below, all noted in the National Museum of Ireland files, Kildare Street, Dublin 2, or in other published catalogues of prehistoric material: Raftery (1983 - iron age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) and the Irish Stone Axe Project Database.

Museum Reg. No.	**NMI 1972:92**
Townland	Grange
Object type	Pottery sherd Fine ware sherd with thick pale blue glaze. 8.5cm x 8 cm x 0.6cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:93**
Townland	Grange
Object type	Pottery Sherd 18th/19th century Pottery sherd, wheel turned coarse brick red ware with blackish glaze. 5.5cm x 3cm x 1.1cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:94**
Townland	Grange
Object type	Pottery Sherd Rim sherd of reddish ware, no glaze. 3.7cm x 2.5cm x 0.5cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:95**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:96**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:97**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:98**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison
Museum Reg. No.	**NMI 1972:99**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

Museum Reg. No.	**NMI 1972:100**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

Museum Reg. No.	**NMI 1972:101**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

Museum Reg. No.	**NMI 1972:102**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

Museum Reg. No.	**NMI 1972:103**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

Museum Reg. No.	**NMI 1972:104**
Townland	Grange
Object type	Fragment of bottle glass, ranging from 0.3cm x 5cm x 0.4cm to 18.3cm x 5cm x 1.2cm Handed into the NMI by Peter Harbison

APPENDIX 11.3

ARCHAEOLOGICAL EXCAVATIONS

PREPARED BY CRDS LTD

The excavation bulletin website (www.excavations.ie) was consulted to identify previous excavations that have been carried out within the study area. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2023.

Excavation	Ballybane	Miltown	Profile Park	Kilcarbery
96E0273	√	√	√	√
97E0116	√	√	√	√
00E0718	√	√	√	√
00E0754	√	√	√	√
00E0931	√			
01E0743	√			
03E1833	√			
06E1161		√		
07E0588	√	√	√	√
09E0537	√			
12E0067		√		√
13E0471	√	√		
14E0453	√	√	√	√
15E0551a	√	√	√	
15E0551b	√	√	√	
16E0529ext		√		
16E0531	√	√		
17E0293		√		
17E0367	√			
17E0394	√	√	√	
17E0590		√		
17E0591	√	√		
18E0292	√	√		
18E0484	√	√		
18E0600	√			
19E0170	√	√	√	√
19E0682		√		
20E0008	√	√		
21E0061a			√	√
21E0061b	√	√	√	√
21E0692			√	√
22E0306		√		
22E0760	√	√	√	√

Survey	Ballybane	Miltown	Profile Park	Kilcarbery
15R0116	√	√	√	
15R0147	√	√		
17R0016	√			
19R0190		√		

Licence No.: **96E0273**
Excavation No.: 1996:068
Site name: Nangor Castle, Clondalkin
SMR No.: N/A
Author: Cia McConway, Archaeological Development Services Ltd. Power House, Pigeon House Harbour, Dublin 4.
Site type: Medieval
Period/Dating: —
ITM: E 704428m, N 731227m
Description: Trial-trenching in the vicinity of the now-demolished castle and eighteenth-century house produced evidence for a substantial ditch and an associated shallower linear feature. Neither feature produced any datable artefacts but had silted up with a series of organic-rich clays with animal bone, shell and matted grass-possibly bedding material.

Trial-trenching continued in the field bounding the castle site to its south, after an extensive geophysical survey had been carried out. Results from these cuttings suggest widespread archaeology surviving below the ploughsoil. Several lignite cores and slivers, early medieval pottery and metal slag were all retrieved both from the trenches and from field-walking, suggesting a date in at least the early medieval period- twelfth/thirteenth century. Several trenches cut through a large ditch located on both the east and west of the field, which apparently substantiated the impression, given from the overall lie of the land, that the field had contained a ploughed-our rath or ring-ditch. Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features. Other than some cutting into the ditch, the trench went no deeper once in situ archaeology was reached.

Licence No.: **97E0116**
Excavation No.: 1997:086
Site name: NANGOR CASTLE/GRANGE CASTLE, KILMAHUDDRICK, CLONDALKIN
SMR No.: SMR 17:34 and 17:37
Author: Cia Mc Conway, Archaeological Development Services Ltd.
Site type: Excavation - miscellaneous
Period/Dating: Medieval (AD 400-AD 1600)
ITM: E 704428m, N 731226m
Description: Test-trenching was carried out along the line of a proposed road leading northwards from the vicinity of the now-demolished Nangor Castle to Grange Castle, within the area of a proposed industrial park. This was the second phase of testing, the first phase having concentrated on the field to the immediate south of Nangor Castle and its general vicinity.

An intensive geophysical survey had been carried out along the line of the proposed road and several anomalies were identified. This testing specifically examined the areas of anomalies, as agreed on with the relevant authorities within the National Monuments Service. Trenching was carried out by machine, and halted once in situ archaeological deposits were encountered. However, as experienced before, only subsoil-cut features survived-years of ploughing the fairly shallow ploughsoil had completely removed any potential archaeological stratigraphy.

Seven trenches were opened. Of these, only three, all located in Grange Field 3, to the east of Grange Castle, produced any significant archaeology. Two linear features 0.5–0.8m wide, of unknown date and function, ran in a north-south direction. However, their proximity both to the 15th-century castle and to one another could suggest substantial archaeological potential. Some spreads of brown soil had 20th-century pottery inclusions in their upper surface, while other areas, a mix of brown soil and broken slate subsoil, were probably the result of the dragging action of the plough.

This licence was taken over by Richard O'Brien to carry out monitoring and excavation along the line of the road (No. 87, Excavations 1997).

Windsor House, 11 Fairview Strand, Fairview, Dublin 3

Licence No.: **00E0718**
Excavation No.: 2000:0224
Site name: GRANGE/KILMAHUDDRICK/NANGOR (GRANGE CASTLE INTERNATIONAL BUSINESS PARK), CLONDALKIN
SMR No.: N/A
Author: Ian W. Doyle, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.
Site type: Monitoring
Period/Dating: —
ITM: E 704228m, N 731827m

Description: Monitoring of topsoil-stripping commenced in early September 2000. In Nangor townland, in the northern part of Field 111, the remains of a small fulacht fiadh were revealed. This consisted of a small pit or trough, a spread of heat-cracked stone and a linear feature to the south-west of the trough.

The pit/trough consisted of a subcircular cut into natural, 0.56m by 1.25m. The cut was steep-sided, leading to a flat base. It was filled with a mix of silt and compact, stony clays.

A spread of heat-shattered sandstone was located some 0.9m to the west of the trough. This spread consisted of a moderately compact, dark grey, sandy clay with frequent inclusions of heat-shattered sandstone fragments, pieces of burnt clay and charcoal. This spread measured 1.92m north–south x 1.18m with a maximum depth of 0.05m.

Approximately 6m to the west of the spread a linear gully feature was revealed. This gully consisted of a cut into natural boulder clay measuring 2.57m north–south x 0.28–0.54m. This had a depth of 0.16m with sharply sloping sides and a flat base. The cut was filled with a moderately compact, mid-brown clay containing frequent pieces of oxidised clay and occasional flecks of charcoal. Infrequent fragments of burnt bone were noted in the fill. Some 4m to the south of the heat-shattered sandstone spread, a small linear gully feature was excavated. This measured c. 1m north-east/south-west x 0.12m with a depth of 0.14m. The fill of this comprised a mid-brown, sandy clay with frequent charcoal flecking. No archaeological objects were recovered.

To the south of the fulacht fiadh, a backfilled field boundary was revealed by topsoil-stripping. The alignment of this boundary possibly corresponds with a similar ditch encountered in Field 113 (see above No. 223).

Topsoil-stripping is set to continue in 2001.

Licence No.: **00E0754**
Excavation No.: 2000:0226
Site name: NANGOR (GRANGE CASTLE INTERNATIONAL BUSINESS PARK), CLONDALKIN
SMR No.: N/A
Author: Ian W. Doyle, Margaret Gowen & Co. Ltd, 2 Killiney View, Albert Road Lower, Glenageary, Co. Dublin.
Site type: Medieval field complex
Period/Dating: —
ITM: E 703397m, N 731729m
Description: Excavations commenced in this area of the Grange Castle International Business Park in October 2000 and are continuing at the time of writing (January 2001). The site of Nangor Castle (SMR 17:37) is located immediately outside the southern boundary of the Wyeth Medica Ireland biotechnology campus. There are no upstanding remains of Nangor Castle—demolition appears to have happened in the 1970s. Cartographic evidence and test-trenching carried out close to this area (see above No. 223) indicate that a complex of agricultural buildings and concrete surfaces existed in the area. To the west of the Nangor Castle site, mid-19th-century OS maps depict a well-designed garden. The unkempt remains of this garden exist today to the south of the biotechnology campus.

The placename Nangor appears to be of old French origin. In 1307 there is a reference to the tenements of 'Kilbryde and the Naungre', which were held by Walter de Kenley from William, son of John de Galbarry, for a rent of 20 pounds (Mills 1914, 356). Test-trenching carried out by Cia McConway in 1996 at Nangor Castle revealed at least one substantial ditch and a shallow linear feature to the west of the castle site (Excavations 1996, 17, 96E0273).

The present phase of excavation was designed to resolve any archaeological material in Fields 112 and 113 within the southern boundary of the biotechnology campus. In addition to this, excavation is ongoing to the south of the boundary in a corridor through the Nangor Castle gardens (South Dublin County Council land) to enable a gas pipeline and access road to serve the Wyeth Medica Ireland site.

To date, a complex of intercutting medieval ditches and gullies has been excavated. Some 1500 sherds of locally manufactured medieval pottery (Dublin-type wares, Leinster cooking ware) have been recovered. A complete iron sickle was found in a ditch associated with sherds of medieval pottery. Further details will be provided for Excavations 2001.

Reference: Mills, J. (ed.) 1914 Calendar of the Justiciary Rolls or Proceedings in the Court of the Justiciar of Ireland, Edward I. Part 2. Dublin.

Licence No.: **00E0931**
Excavation No 2000:0222
Site name: FAIRVIEW, Clondalkin
SMR No.: N/A
Author: Ruth Elliott, for Judith Carroll & Co. Ltd.
Site type: Enclosure
Period/Dating: Post Medieval (AD 1600-AD 1750)
ITM: E 705938m, N 731037m
Description An excavation was conducted in Fairview, Clondalkin, between 16 December 2000 and 2 February 2001. The site was uncovered during monitoring along the Saggart, Rathcoole and Newcastle drainage pipeline (see Excavations 2000 No. 339).

A north-west/south-east-running hand-cut ditch was uncovered. It expanded in width from 2.4m in the south-east to 4.3m in the north-west. The sides sloped sharply to an irregular flat base at depths of 0.48m to 0.65m, being deeper to the north-west. The primary fill was a light yellowish-grey, silty clay reaching depths up to 0.38m, suggesting that the ditch remained open and contained standing water for a considerable length of time. Post-medieval pottery found within this silt dated it to the 17th or 18th century. Overlying this was a mid-brownish/grey, gritty, silty clay with frequent stone inclusions, which was used to backfill the ditch.

The ditch represented the archaeological remains of part of a pseudo-circular boundary, visible on the first edition OS map. An SMR site, the 'Two Sisters Wells' (SMR 21:9), was central to this boundary, and it had therefore been suggested that it had potential ecclesiastical significance. Excavation showed that the ditch did not have ecclesiastical significance, however, and is more likely to have formed one of the boundaries to lands of the Fairview oil mills (SMR 21:8), also central to the boundary, which were active in the 17th century.

Top Mews, 23 Upper Leeson Street, Dublin 4

Licence No.: **01E0743**
Excavation No 2001:342
Site name: CLONDALKIN, Lealand Road
SMR No.: N/A
Author: Shane Delaney, IAC Ltd.
Site type: No archaeology found
Period/Dating: N/A
ITM: E 705607m, N 731708m
Description Monitoring of the proposed housing development at Lealand Road took place on 13–15 August and from 27 November to 7 December 2001. The development site is located to the east of Lealand Road. The site comprised three former green areas within a mature housing estate.

The exposed material proved to be buried builders' rubble that had been used as backfill on an area of uneven and disturbed ground associated with the construction of the surrounding mature (c. 25 years) housing estate.

Monitoring of the topsoil-stripping and the excavation of the foundation trenches failed to produce anything of archaeological significance.

8 Dungar Terrace, Dun Laoghaire, Co. Dublin

Licence No.: **03E1833**
Excavation No 2003:472
Site name: Tower Road and Old Nangor Road, Clondalkin
SMR No.: SMR 41:1, 41:5
Author: Hilary Opie, for V.J. Keeley Ltd, Brehon House, Kilkenny road, Castlecomer, Co. Kilkenny.
Site type: Medieval
Period/Dating: —
ITM: E 706179m, N 731372m
Description Monitoring of engineering/geological trial-pits took place at a proposed development site between the Tower Road and Old Nangor Road in Clondalkin village on 25 November 2003. The entire proposed 'Tower Centre' development lies within the zone of archaeological potential and was identified by the Urban Archaeological Survey as the area occupied by a medieval settlement. The development site surrounds the round tower, a designated National Monument, and impacts directly upon its environs.

Five trial-pits were excavated to probable rock and one trial-pit was abandoned before rock was encountered. In general the pits measured 3.2–4m in length and were 0.85m wide. They varied between 2 and 3m in depth. Trial-pits 3, 4 and 6 were all located in back gardens and produced distinctive, rich, humic garden soils (i.e. topsoil) overlying

undisturbed natural, which was encountered between 0.35 and 0.5m below the ground surface.

Trial-pits 1, 2 and 5 were located in a yard area adjacent to the round tower. This consisted of a levelled, modern surface of hardcore and concrete with disturbed made-up ground beneath. Trial-pit 2 produced the only find of archaeological significance (one sherd of medieval cooking ware pottery), but the depth of disturbed stratigraphy in these three trenches was considerable, varying between 1 and 1.4m, before undisturbed natural was encountered. These were very mixed layers, containing the medieval potsherd, post-medieval pottery and more modern finds, such as red brick and plastic bags. These may represent very disturbed archaeological layers.

Licence No	**06E1161**
Excavation No	2006:581
Site name	NEW IAWS HQ, GRANGE CASTLE BUSINESS PARK, CLONDALKIN
Site type	No archaeological significance.
SMR No.	n/a
ITM	E 706999m, N 731291m
Description	The Grange Castle Business Park has witnessed several archaeological investigations since 2000 (O'Donovan 2004; Doyle 2005). These investigations resulted in the discovery and excavation of several prehistoric sites in the area of the Grange Castle Business Park. The Record of Monuments and Places records two castles located within the grounds of Grange Castle Business Park, namely Grange Castle DU(017–134) and Nangor Castle DU(017–037). The new IAWS HQ has an area of 9.3ha and is located at the south-west corner of Grange Castle Business Park, being bordered on the west by the R120 (Lucan road). The site was part of an extensive geophysical survey carried out by Margaret Gowen & Co. Ltd in October 2005, which revealed that the south-west corner of the site had a distinct magnetic disturbance indicative of a spread of material, possibly rubble. All groundworks associated with the development were monitored during December 2006. The excavation of the site access road resulted in the discovery of a modern pit, a modern linear spread of angular stone, a small spread of red brick mixed with shells and several modern land drains. No features of archaeological significance were encountered during the stripping of topsoil. The programme for the monitored stripping of topsoil at the eastern portion of the site will resume in January 2007.
References	Doyle, I. 2005 Excavation of a prehistoric ring barrow at Kilmahuddrick, Clondalkin, Dublin 22. The Journal of Irish Archaeology 14, 43–75. O'Donovan, E. 2004 A Neolithic house at Kishoge, Co. Dublin. The Journal of Irish Archaeology 12 and 13, 1–27. Eoin Sullivan, for Margaret Gowen & Co. Ltd, 27 Merrion Square, Dublin 2.

Licence No.:	**07E0588**
Excavation No.:	2007:530
Site name:	NANGOR
SMR No.:	DU017–037
Author:	Sylvia Desmond, Margaret Gowen & Co. Ltd, 27 Merrion Square, Dublin 2.
Site type:	Medieval, post-medieval
Period/Dating:	—
ITM:	E 704169m, N 731329m
Description:	Monitoring and testing took place between August and October 2007 within and adjacent to the Nangor Castle, Clondalkin, Co. Dublin. The monitoring of a service trench, 400m in length, 1m in depth and 0.5–0.55m in width, revealed several archaeological features that have been tentatively identified as part of the landscaped gardens, located to the west of the RMP site and associated with the now demolished 18th-century Queen Anne house that was built on the site of the earlier Nangor Castle. The initial stage of the service trench, which was parallel to an existing access road to a gas pumping station, ran through heavily disturbed ground that contained redeposited topsoil, subsoil and road-making materials. As the monitoring trench approached the gas pumping station, a series of small stone walls, averaging 0.5m in width, separated in some instances by low banks of stone-free soil, were revealed. The walls, six in all, were located at a depth of 0.5m below the present ground surface. They consisted of stones, c. 0.2m by 0.15m or smaller, bonded together in some instances with creamy gritty mortar with fragments of red brick. One wall, F9, lay at a depth of 1m; it was 0.5m in width and appeared to be bordered by narrow pieces of wood on each side. All the walls ran in a north-west to south-east direction across the monitoring trench. As the service trench ran to the south of the pumping station it cut through concrete floors, possibly associated with farm and cattle yards. The foundation for the floors

consisted of loose stone, stone blocks and mortar and lay directly on the subsoil. Two further stone walls were revealed at the extreme eastern portion of the service trench in this area. Both ran north–south across the service trench. The walls were just under 1m in width and were revealed 0.6m beneath disturbed topsoil and fill.

As the service trench turned southwards and ran parallel with the site boundary for 120m, there was a marked difference in the ground conditions. The ground here was undisturbed. However, nothing of any significance was revealed in this area.

It should be noted that, while the monitoring did reveal landscape features possibly associated with the Queen Anne house, the rubble foundation that underlay the concrete floors in the northern portion of the site contained a considerable amount of stonework, which may be related to the 18th-century house and possibly to Nangor Castle itself. The incidence of red brick and large blocks of stone may indicate this to be the case. Areas with the constraint zone for Nangor Castle are strewn with large rough-hewn limestone blocks, possibly relating to the castle structure, although the dumping of construction waste and other waste within the area masks this to quite a degree. There was no evidence for in situ remains of the Queen Anne house or Nangor Castle revealed during monitoring.

Two phases of testing took place on the site. The initial phase took place within the RMP site and one test-trench was located across the possible remains of the Queen Anne house and the castle. It had been hoped to insert a series of test-trenches over possible subsurface remains of the Queen Anne house and castle site, but, due to a very large and unstable overburden and the desire not to impact unnecessarily on the RMP site, only one test-trench was completed.

This test-trench, located across possible structural remains in the western portion of the site, was cut through a very large deposit of construction debris, general dumping and waste, averaging between 3m and 4m in places. This overburden was extremely loose and unsound. Consequently a test-trench 6m in width was cut through this overburden and battered back for safety. Within this a slightly narrower test-trench revealed the remains of a modern concrete building at the western end of the test-trench, 3m below the original overburden. The modern structural remains were abutted by a portion of a large stone structure, over 1m in height and 1.75m in width, with a rubble core, suggesting it may be associated with or be part of Nangor Castle. The true depth of the wall was not ascertained. It appeared to run in a southwards direction from the test-trench. Further to the east, possible remains associated with the Queen Anne house were revealed. These consisted of stone walls plastered on one side, walls of red brick and painted walls. They were revealed to be up to 1m or more in depth. Red brick from this area was identified as being very early in date. No further work was done in the area due to the instability of the overburden.

A second phase of testing took place to the south, south-east and south-west of the RMP site. A series of three test-trenches were excavated. This testing took place within a possible Early Christian 90m diameter enclosure previously identified. An area to the south-east of the RMP site and the Early Christian enclosure was also tested. The two test-trenches to the south-east revealed a redeposit of disturbed modern fill, within which lay garden features such as low banks of stone-free soil, for trees or shrubs, which may have been associated with the avenue which led up to the Queen Anne house, which was located to the immediate west. The third test-trench, which was 150m in length, ran across the previously identified Early Christian enclosure to the south-west of the RMP.

This long test-trench cut across the entire width of the enclosure, at the northern extremity, and confirmed the previous investigations and geophysical survey. The presence of a large enclosure with ditches up to 2.7m in width and over 0.7m in depth, with the possible remains of a second ditch in the western portion of the enclosure, were revealed. Previous investigations had revealed a cemetery and possible structures within the enclosure. There was considerable evidence for occupation levels, areas of burning within the test-trench and features such as pits and linear features. Finds from the original investigations by Cia McConway (Excavations 1996, No. 68, 96E0273; Excavations 1997, No. 86, 97E0116) included lignite slivers and cores, metal slag, animal bone, medieval pottery and human remains. Additional medieval pottery, green-glazed, was recovered from this second phase of testing, together with large quantities of animal bone.

The monitoring of the service trench and the two phases of testing has confirmed that this is an area of considerable archaeological activity. The location of such a large enclosure, Early Christian in date, with evidence for a cemetery and interior occupation, may have given the site considerable importance, marking it out as a significant place in the landscape. The second phase of activity, to the north and north-east of the enclosure, that of the medieval Nangor Castle, also attests to the importance of this site, as does the erection of the later Queen Anne house. The layout

of the Queen Anne gardens is still clearly visible on the ground, although heavily overgrown, and the testing has shown that subsurface features associated with the gardens still exist. Possible substantial remains of Nangor Castle itself and the Queen Anne house, under a deep overburden of unstable construction fill, were also revealed, although further investigations would be necessitated to confirm this.

Licence No.:	**09E0537**
Excavation No	2009:279
Site name:	METRO NORTH
SMR No.:	N/A
Author:	Aisling Collins, CRDS, Unit 4A, Dundrum Business Park, Dublin 14.
Site type:	Urban, post-medieval
Period/Dating:	—
ITM:	E 715514m, N 734824m
Description	A team of archaeological directors from CRDS Ltd carried out a programme of monitoring of geotechnical trial-pits and boreholes in advance of development of Metro North. Only trial-pits and boreholes identified by the RPA archaeologist as being of archaeological potential were monitored. The trial-pits were located within four principal areas, all of which are in Dublin city and county: Metro North enabling works: O'Connell Street substation Metro West: advanced contamination testing Luas BXD: preliminary ground investigation Metro North enabling works: Ballymun sewer Three areas of archaeological potential were identified at Dominick Street (BXD BH 002), at Broadstone Station (BXD BH 006) and the Mater Hospital (MN TP 004). An underground basement was identified at Dominick Street. BXD BH 002 was dug under the footpath close to the kerb line. At 0.95m a mortared brick structure was encountered with a hole revealing a void underneath measuring 1.7m. The structure appears to be an intact (barrel?) vault from one of the original Georgian (18th-century) houses that lined the street. The presence of the vault would suggest that construction of the Dominick Street flats left the basements under the footpath sealed and intact. The prospect therefore exists for further basements to survive under the street (c. 1m below street level) from Dominick Lane to Parnell Street. A piece of post-medieval (17th-century) pottery was identified at the site of the proposed Broadstone station. It was recommended that prior, to any further works at this location, archaeological testing be carried out. A possible underground basement was also identified at the Mater Hospital. No other archaeological features were identified and no new areas of archaeological potential were identified.

Licence No.:	**12E0067**
Excavation No.:	2012:188
Site name:	Profile Park, Nangor Road, Clondalkin
SMR No.:	N/A
Author:	Neil O'Flanagan
Site type:	No archaeological significance
Period/Dating:	—
ITM:	E 704448m, N 731067m
Description:	Monitoring was carried out in advance of a Digital Data Centre on behalf of Digital Netherland VIII BV Ltd. The site was situated close to Kilbride church and cemetery (DU021-005), and Kilbride castle DU021-004). There were no archaeological features observed. O'Flanagan Consultants, Botanic Court, 30-32 Botanic Road, Glasnevin, Dublin 9

Licence No.:	**13E0471**
Excavation No.:	2016:083
Site name:	Dub06 Data Centre, Grange Castle Business Park, Ballybane, Dublin 22
SMR No.:	N/A
Author:	Neil O'Flanagan
Site type:	Bronze Age - Early Medieval
Period/Dating:	—
ITM:	E 703709m, N 731334m
Description:	The initial excavation comprised extensive test trenches over a large area within Grange Castle Business Park, County Dublin, on behalf of Microsoft Operations (Ireland) Ltd, in advance of a Data Centre complex. Test trenching began in January 2014, confirming the results of a geophysical survey carried out in 2004, identifying a circular enclosure in one portion of the site, known as Area 11, and two burnt mounds

in another portion, known as Area 9. The excavation of Area 11 began in May 2014 and additional, associated, enclosures came to light leading to a prolonged excavation continuing on an intermittent basis until January 2016. The excavations in Area 9 took place in July 2014. Monitoring continued elsewhere in lands impacted by the construction works, with the subsequent recovery of more isolated features.

Area 11

The excavation of Area 11 revealed a series of associated enclosures aligned north-south. The earliest enclosure, Site 3, comprised a circular penannular ditch, with a maximum diameter of 48m, and maximum depth of 1m. Finds within the ditch included iron knives, a pair of mismatched quernstones, and a cluster of cow skulls. An upended cow skull, with human femur, provided an AMS date 656-727 and 737-768 CAL AD.

The ditch was encircled by the penannular Site 4 ditch, maximum diameter 86m, which also contained cow skulls. Both Site 3 & 4 enclosures shared a south-western entrance way. The Site 4 ditch was preceded by a linear, and more shallow, east-west ditch running across the north end of the site for a distance of 86m. The large D-shaped Site 2 enclosure, 40m x 32m, attached itself to the southern arc of the Site 4 ditch. Much reworked and augmented, the ditch cut through the underlying limestone bedrock to a maximum of 0.9m.

A portion of the old ground surface was recovered within this enclosure as well as the burial of a male and female, within a shallow grave, aligned north-south. Other finds included an articulated sheep or goat within a shallow pit, and a complete horse pelvis and femur.

The smaller Site 1 enclosure comprises two concentric ditches, 14.7m diameter maximum. An occupation surface of redeposited clay set it apart from the larger ritual enclosures, as did the numerous stake-holes, post-holes, and kiln, within the interior. A wattle fence survived in what appears to be a later recut ditch within the enclosure. Much of the clay deposits were characterised by large amounts of charcoal, both in the fills of internal pits, and the ditches. Cremated bone was also recovered, raising the possibility of ritual feasting and / or a funeral pyre being situated here.

A significant feature of the enclosures is the deliberate linking of each ditch to one another. In the case of Sites 3 & 4, a shallow ditch provides the connection. Site 2 was then physically attached to the Site 4 ditch. In the case of Site 1, a ditch emanates from its outer enclosure almost to the lip of the Site 2 ditch.

The burial of two individuals within a shallow grave, the cluster of cow skulls, the deposition of a cow skull with human femur, as well as the insertion of mismatched quernstones, all indicate substantial ritual and ceremonial uses, probably including animal sacrifice. The continuation of pre-Christian rituals is not unprecedented but is stark in view of the nearby presence of Clondalkin monastic settlement.

Several post-1169 medieval ditches ran up to, aligned themselves to the enclosures.

Area 9

Two fulacht fiadh were situated in a waterlogged field. The remains to the west comprised a shallow unlined trough, a well and several pits, including a recut pit indicating a second phase of use, as well as a spread of heat-shattered stones. Finds included fragments of human bone in a deep pit.

Thirty metres to the east, another fulacht fiadh comprised troughs, pits, numerous stake-holes and an elongated gully. The stake-holes, and an associated deep trough, appear to belong to a second phase of use. The findings tend to support the hypothesis of intermittent communal feasting.

Other archaeological sites have since been excavated within the Data Centre complex, although none to the same scale as those described above. They include a Bronze Age structure, and a possible Neolithic structure. A summary will be submitted in due course.

Excavations were also carried out in an adjacent associated site under licence 14E0453 in the townland of Nangor revealing a corn-drying kiln, medieval field boundaries as well as two clusters of cremations pits.

Botanic Court, 30-32 Botanic Road, Glasnevin

Licence No.:	**14E0453**
Excavation No.:	2016:084
Site name:	DSF, Grange Castle Business Park, Dublin 22
SMR No.:	N/A
Author:	Neil O'Flanagan
Site type:	Bronze Age cremation pits & medieval corn-drying kiln
Period/Dating:	—
ITM:	E 704096m, N 731046m

Description:	Excavations were carried out on behalf of Sisk & Sons Ltd during the course of 2015-16, yielding a corn-drying kiln, medieval field boundaries, and two clusters of cremation pits. The kiln was dumbbell shaped, 6.06m in length, 1.4m wide across its flue, and cut to a depth of 0.48m. The fill included clays that appear to have originally formed part of the roofing of the kiln, indicating that the roof collapsed after its use, to be followed by a gradual natural accumulation. The kiln lay adjacent to a pair of parallel ditches, one of which extended to 38m within the monitored area, with a depth of 0.25m maximum. Some distance to the south, a cluster of 5 cremation pits came to light, with burnt bone within the pits evident from the surface. The pits were cut to a depth of 0.32m maximum, and a diameter of 0.37m maximum. Further to the south, another cluster of 4 cremation pits, including a shallow oval-shaped pit, measuring 0.57m in length, and 0.07 in depth, and another circular pit 0.48m in diameter, and 0.14m in depth. Some of the pits appear to have been 'capped', or sealed. Botanic Court, 30-32 Botanic Road, Glasnevin, Dublin 9

Licence No	**15E0551a**
Excavation No	2016:094
Site name:	Ballybane and Aungierstown, Dublin (South County)
SMR No.:	250m from 'the zones of notification' for RMP's DU021-108 & DU021-109 a concentric enclosure and an enclosure
Author:	Billy Quinn
Site type:	No archaeology found
Period/Dating:	—
ITM:	E 703357m, N 730445m
Description	Archaeological testing at the site of a proposed substation site at Ballybane and an interface compound at Kishoge, Co. Dublin was undertaken between the 22nd and 24th of February 2016. The test trenches were purposely sited on both sites to provide coverage for the new development and to investigate geophysical anomalies identified in an earlier survey. The trenches exposed a number of modern drainage channels across the site and a natural sterile stratigraphy elsewhere. The anomalies can be accounted for by modern disturbance, drains and geology. There was no evidence for any features of archaeological potential. Moore Archaeological and Environmental Services, 3 Gort na Ri, Athenry, Co. Galway

Licence No	**15E0551b**
Excavation No	2016:049
Site name	GOLLIERSTOWN, AUNGIERSTOWN, BALLYBANE
Site type	No archaeology found
SMR No.	n/a
ITM	E 763222m, N 730681m
Description	MOORE GROUP undertook a programme of archaeological testing at two sites in West Dublin as part of the development of a 220/110 kV Substation in a green field site at Ballybane/Aungierstown and the development of an interface compound at nearby Kishoge, South County Dublin. Earthsound Archaeological Geophysics carried out surveys of the proposed development works at both sites in October 2015 (detection Device no. 15R0116). At the interface site in Kishoge dipolar anomalies detected suggested that the land has been used for the deposition of debris or imported soils, causing the magnetic interference. This interference appeared to be truncated by a number of possible ditches which, it was suggested, relate to underlying features or may be an artefact of the deposition of the debris or imported soils. At Ballybane, the proposed sub-station site, a series of circular and sub-circular trends were detected across the northern survey area. These were interpreted as representing archaeological ditches or geological trends. Testing involving the mechanical excavation of twelve trenches was carried out from 22-24 February 2016 in bright and dry conditions. Ballybane Site The proposed substation site was accessed via a new business park access road south of the New Nangor Road (R134). The site consists of an improved tillage field to the north, cut by a ditch to the south. The field was originally subdivided into a smaller sub-triangular plot, the boundary of which has in recent years been cleared away. Due to regular ploughing the site was relatively even underfoot. The test trenches were excavated by a 15-tonne backhoe excavator using a 1.2m-wide ditching bucket. All the test trenches were deliberately sited to target sub-surface anomalies identified during the geo-physical survey. These anomalies were variously interpreted

as possible pits, ditches or relict boundaries. Trench 1 was located in the north-west corner of the site in relativity even ground. The trench measured 24m in length and was dug to an average depth of 0.5m. The topsoil was a rich humic material and the subsoil contained a high inclusion of angular stones. The only notable feature was a drainage channel at the west of the trench and was orientated north to south.

Kishoge Site

The proposed interface compound at Kishoge is located to the south-east of a roundabout at the junction of the R136 and the Ninth Lock Road. The field contains a high voltage tower with power lines overhead; the ground is of rough pasture with evidence of previous infill. This infilling was confirmed by the geophysical results, frequent 'iron spikes' were interpreted as relating to the importation of soils/debris. Three trenches were excavated across this area. Groundworks exposed a disturbed stratigraphy of imported builders' rubble and topsoil that had been dumped on the site. Subsoil, a boulder clay, was exposed at 1m in depth. There were no finds or features of archaeological potential.

Moore Archaeological and Environmental Services Ltd. Corporate House, Ballybrit, Business Park, Ballybrit, Galway.

Licence No	**16E0520 Extension**
Excavation No	2017:042
Site name:	Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme, Ballybane and Milltown townlands
SMR No.:	N/A
Author:	Dermot Nelis
Site type:	No archaeology found
Period/Dating:	—
ITM:	E 702620m, N 731140m
Description	The development is intended to improve the standard of the existing carriageway on both the Adamstown Road and Nangor Road, and will provide footpaths, cycle tracks, pedestrian crossing facilities, public lighting and two new signalised junctions. The overall length of the scheme is 2.45km. Test trenching in Milltown townland, immediately west of Adamstown Road, in 2016 (Licence No. 16E0520) revealed two associated mortar-bonded stone walls. The walls appeared parallel and were 25m apart, forming the gables of a structure that was orientated north-east/south-west. A concrete floor was continuous throughout the structure at a depth of 0.4m below the existing ground level. A structure is depicted in this location on the First Edition Ordnance Survey map. Additional test trenching in April 2017 confirmed the structure to be built directly on geologically deposited strata, and no associated or earlier phases of activity were noted. A test trench was also excavated in Ballybane townland in April 2017, and no archaeological features or artefacts were noted. 36 Fingal Street, Dublin 8

Licence No	**16E0531**
Excavation No	2016:464
Site name	GRANGE CASTLE SOUTH BUSINESS PARK, BALLYBANE
Site type	Early medieval/medieval enclosures
SMR No.	DU 21:108 & 109
ITM	E 703029m, N 730829m
Description	The areas tested were identified initially from studies of aerial photography and geophysical survey results and a very close correlation between the test trenching results and the results of the geophysical survey was noted. AH1 represented a recorded concentric enclosure (DU021-108) with an internal ditched enclosure measuring c.50m east to west and 60m north to south and an outer ditched enclosure measuring c.90m in diameter. The test trenching confirmed the presence of extensive and well preserved internal and external ditches measuring 4m wide and 1.80m in depth below the current ground level. Numerous internal features were identified which comprised a group of linear type features and pits all of which are suggestive of domestic activity within the enclosure. The enclosure is likely to represent an early medieval settlement site. AH2 was located 100m to the south of AH1 and represented a probable circular enclosure measuring 25m in diameter. The test trenching clearly identified the presence of a single – ditched circular enclosure measuring between 20m to 25m in diameter, with the ditch averaging 3m in width. The ditch was present within three test trenches and probably represents a ringfort or similar enclosure. AH3 was described in the geophysical survey as a negative band of data oriented southwest-northeast and extending into the adjacent field which may represent a

former track-way. The test trenching of this feature recorded two linear parallel ditches both measuring 3m wide by 1.60m deep that appear to form an old abandoned road or track. Both ditches contained old terracotta land drainage pipes suggestive of a relatively modern date for these two features.

AH4 was located in the east of the northern most field and was identified in the geophysical survey as a cluster of isolated responses which may represent a spread of burnt material or cluster of small pits and larger, isolated pit-type features. Archaeological test trenching in this area failed to identify any features of an archaeological nature. The ground was quite disturbed in this part of the site and it would appear to have been subject to test trenching previously.

AH5 represented an enclosure (DU021-109) located in the southern field, measuring c.44m with a probable entranceway in the east. The archaeological test trenching confirmed the presence of a single-ditched circular enclosure, 44m in diameter with the ditch measuring 3m wide and 1.60m deep. The general appearance of this feature is suggestive of a possible ringfort type enclosure. No internal features were recorded.

AH6 represented a circular internal ditched enclosure measuring c. 37m in diameter encompassed by a larger oval-shaped enclosure measuring c.75m x 42m. The test trenching confirmed the presence of the large elongated oval enclosure measuring approximately 75m north-south by 42m east-west with a smaller associated internal enclosure c. 37m in width containing features suggestive of occupation. The external ditch of this enclosure measured on average 2.60m wide and 1.60m deep. The site is likely to represent a multi-phased early medieval settlement site.

AH7 was identified in the geophysical survey as a series of circular and sub-circular trends and five possible pits which may be archaeological or agricultural in origin. The test trenching failed to identify any features of an archaeological nature. A field boundary was recorded containing old terracotta land drainage pipes suggestive of a relatively modern date.

AH8 was identified in the geophysical survey as a series of linear negative magnetic trends which were suggestive of archaeology. The test trenching of this area failed to identify any features of an archaeological nature. A field boundary was recorded containing old terracotta land drainage pipes suggestive of a relatively modern date.

Within Field 1, two sections of a possible linear double ditched type feature were recorded with curving u-shaped termini (AH 9-10). These two parallel ditches may form a linear boundary and one of the ditches was clearly identified by the geophysical survey. An archaeological section excavated through one of these ditches recorded its width as 2.5m and depth as 1.45m in depth. The deposits recorded within this section appear similar to that recorded within area AH1 and contain no modern materials suggestive of modern field boundaries.

The geophysical survey and the results of archaeological test trenching clearly indicate that the site contains significant archaeological remains including four separate enclosure sites, two of which are scheduled for inclusion in the next revision of the Record of Monuments & Places. Although preservation in situ of archaeological remains should always be the preferred option, where such can be accommodated within any proposed development, the present site is located with a partly developed business park and any future development here is likely to extend to the entirety of the two fields resulting in an inevitable impact on all identified archaeological features. Any proposed development of this site should take into account the surviving archaeological remains and where possible the development should be designed to avoid the archaeology.

Jon Stirland Will O'Siorain Robert Breen, Archaeological Consultancy Services Unit, Unit 21 Boyne Business Park, Greenhills, Drogheda, Co Louth

Licence No	**17E0293**
Excavation No	2017:367
Site name:	St Cuthbert's Park, Clondalkin
SMR No.:	DU017-038001-3
Author:	Fintan Walsh
Site type:	Nothing of archaeological significance
Period/Dating:	—
ITM:	E 705218m, N 731724m
Description	Testing was undertaken at the site of a proposed development of social housing, at St Cuthbert's Park, Clondalkin, Co. Dublin. The assessment followed on from a geophysical survey of the development area, which was carried out by Joanna Leigh under licence 17R0080. There are no recorded monuments located within the development area, however three recorded monuments are located within the park. These consist of a church, graveyard and moated site (DU017-038001-3).

Nothing of archaeological significance was uncovered during the testing. Large portions of the area tested were found to comprise of 'made-ground' and were heavily disturbed by services and former groundworks presumably undertaken during the construction of the adjacent housing estates.

C/O IAC, Unit G1, Network Enterprise Park, Kilcoole, Co. Wicklow.

Licence No.:	**17E0367**
Excavation No	2017:343
Site name:	Corkagh Demesne, Deansrath, Kilcarbery and Nangor, Clondalkin
SMR No.:	N/A
Author:	Dermot Nelis
Site type:	Nine undated features
Period/Dating:	—
ITM:	E 705100m, N 730800m
Description	South Dublin County Council proposes to build approximately 1,000 dwellings over a 5–7 year period on a site measuring 87.37 acres. Test trenching carried out in 2017 revealed a number of previously unrecorded discrete archaeological features within the development area. These features were excavated in 2018. A pit/hearth and a possible screen were identified towards the southern end of the development area. These features contained no diagnostic artefacts or suitable dating material. A hearth and post-hole were identified towards the eastern end of the development area. These features contained no diagnostic artefacts or suitable dating material. A shallow post-medieval pit was also identified in this area. A group of three pits with heat-fractured stone were revealed towards the middle of the development area. A radiocarbon determination from a charcoal sample from one of the pits returned a Middle/Late Bronze Age date. A separate location contained an articulated sheep burial of unknown date. All known archaeological features within the development were fully excavated. No additional archaeological features or artefacts were revealed. 36 Fingal Street, Dublin 8

Licence No.:	**17E0367 Extension**
Excavation No	2017:343
Site name:	Corkagh Demesne, Deansrath, Kilcarbery and Nangor, Clondalkin
SMR No.:	N/A
Author:	Dermot Nelis
Site type:	Nine undated features
Period/Dating:	—
ITM:	E 705100m, N 730800m
Description	South Dublin County Council proposes to build approximately 1,000 dwellings over a 5–7 year period on a site measuring 87.37 acres. Test trenching carried out in 2017 revealed a number of previously unrecorded discrete archaeological features within the development area. These features were excavated in 2018. A pit/hearth and a possible screen were identified towards the southern end of the development area. These features contained no diagnostic artefacts or suitable dating material. A hearth and post-hole were identified towards the eastern end of the development area. These features contained no diagnostic artefacts or suitable dating material. A shallow post-medieval pit was also identified in this area. A group of three pits with heat-fractured stone were revealed towards the middle of the development area. A radiocarbon determination from a charcoal sample from one of the pits returned a Middle/Late Bronze Age date. A separate location contained an articulated sheep burial of unknown date. All known archaeological features within the development were fully excavated. No additional archaeological features or artefacts were revealed. 36 Fingal Street, Dublin 8

Licence No.:	**17E0394**
Excavation No	2020:440
Site name:	Castlebaggot Sub-Station
SMR No.:	N/A
Author:	Neil O'Flanagan & Chiara Mazzanti
Site type:	Prehistoric
Period/Dating:	—

ITM: E 703309m, N 730725m

Description: Excavations were carried out in November – December 2017 in advance of Castlebaggot 220/110 kV sub-station. Three sites were identified during monitoring of topsoil stripping in September – October 2017.

Site 1 consisted of a series of pits, post- and stake-holes in a 9 m x 7 m area. No convincing evidence for a structure was revealed or any in situ artefacts.

Site 2 consisted of a slightly curvilinear ditch running north/south and a smaller ditch just beside it, running north-west/south-east. The larger measured 9.1 m in length and the width varied from 1 m to 1,8 m, while the depth at the base varied from a minimum of 0,15 m to a maximum of 0,74 m. The smaller ditch had a total length of 5.8 m, its depth varied from 0.10 m to 0.26 m, and had a maximum width of 1.40 m. Some animal bone, and two pieces of worked flint, one possible a scraper, were recovered.

Area 3 consisted of the remains of a heavily disturbed spread of burnt stone and clay. The material was situated in a very slight hollow and the materials seems to reflect a dry cooking oven.

The archaeological material in the Castlebaggot site reflects the continued settlement of the Ballybane area, from at least the Bronze Age, and possibly earlier in the case of the ditch remains in Area 2.

Reliqua, Dublin Business Centre, 33 Slaney Road, Glasnevin, Dublin 11

Licence No.: 17E0590

Excavation No: *NO SUMMARY SUBMITTED TO EXCAVATIONS.IE*

Site name: Grange Castle South, Area 1

SMR No.: N/A

Author: Shane Delaney

Site type: Medieval

Period/Dating: —

ITM: E 703059m, N 730985m

Description: The following report describes the preliminary results of an archaeological excavation at Grange Castle Business Park South (Licence Ref.: 17E0590), which was located at the site of a proposed business park development. The excavations were undertaken on behalf of South Dublin County Council.

The site comprised a double ditched enclosure with a number of features on the interior of the enclosure. The site had suffered from modern disturbance, with large parts of the enclosure being reused as drainage ditches. A modern field boundary/drainage ditch extended in a northwest-southeast direction through the middle of the area enclosed by the ditches and truncated a number of archaeological features.

On the interior of the enclosure, agricultural furrows in the north-northeast of the area indicated that this part of the enclosure was used for agricultural activities. The remainder of the features on the interior seemed to indicate predominantly domestic activity. The most interesting of the features was a large pit, possibly a well, that was re-used at a later stage as a possible fire waste pit. Three linear slot trenches located around this pit may have held windbreak-type structures that provided shelter around the pit and adjacent features in an area significantly disturbed by a modern drainage ditch. An isolated pit in the southwest of the interior, with evidence of in-situ burning may indicate a small amount of industrial activity took place on the site. Finds recovered from the site, including medieval pottery recovered from the fills of the enclosure ditches, indicate that the site was occupied during the medieval period.

The initial findings from the excavation on site indicate that the use of the site dates to the medieval period and it was of a domestic nature. It is hoped that further analysis during post excavation works will provide more information on the use and date of usage for the site.

Licence No.: 17E0591

Excavation No: *NO SUMMARY SUBMITTED TO EXCAVATIONS.IE*

Site name: Grange Castle South, Area 2

SMR No.: N/A

Author: Shane Delaney

Site type: Ring Ditch

Period/Dating: —

ITM: E 703109.40m, N 730827.42m

Description: The following report describes the preliminary results of an archaeological excavation at Grange Castle South Business Park (Area 2), Ballybane, Co. Dublin (Licence Ref.: 17E0591), which was located at the site of a proposed business park development. The excavations were undertaken on behalf of South Dublin County Council.

Excavation commenced on site on the 20th June 2019 and was completed by the 23rd July 2019.

The site at Grange Castle south, Area 2, comprised a ring-ditch with three features in the area enclosed by the ditch and an external figure-of-eight shaped kiln. The function of the ditch could not be determined during the excavation. It is possible that it was used as a simple livestock enclosure. Similarly, no immediately diagnostic material to indicate a date for the use of the ditch was recovered during the course of the excavation. The sparse number of archaeological features on the interior of the enclosed area didn't provide any useful information to further our understanding of the function of the ringditch.

It should be noted that large scale land improvement works took place in the general area in the recent past and this may have a negative impact on some archaeological features.

It was not possible to determine if the kiln located to the west of the ring-ditch was contemporary with the use of the ring-ditch, or from a separate period. Kilns of this type most commonly date to the early medieval period.

All post excavation works will be carried out in accordance with the relevant approvals and in consultation and agreement with the National Monuments Section of the Department of Culture, Heritage and the Gaeltacht and the National Museum of Ireland. Where necessary licences to alter and export archaeological objects will be sought from the National Museum of Ireland.

Licence No.:	**18E0292**
Excavation No	2018:458
Site name:	Ballybane/Aungierstown and Ballybane/Clondalkin
SMR No.:	DU021-109
Author:	Jean O'Dowd
Site type:	No archaeological significance
Period/Dating:	—
ITM:	E 703105m, N 730807m
Description	A total of 38 test trenches were excavated, across three areas (Area A, B and C). Trenches 1-7 were located in Area A, the north-east section of the proposed development site, Trenches 8-27 were located in Area B to the west, north-west and sout-hwest of the excavated enclosure site Area 3 (AH5; RMP DU021-109; Licence No. 17E0577) and Trenches 28-35 were located in Area C to the south of Trenches 1-7 within the property boundaries of Erganagh, Kent Cottage, and Weston Lodge. No significant sub-surface archaeological remains are present within the areas tested. There were no indications that there were any outlying archaeological features relating to either of the two enclosure sites (Area 4–AH5 and Area 4–AH6). The features that were encountered were generally drainage and cultivation features relating to the post-medieval agricultural usage of the lands. The geophysical anomalies identified in March 2018 that could be directly investigated proved to have no archaeological significance. However, due to constraints on access, it was not possible to excavate all the trenches originally planned in the south-west quadrant of the site, so a number of the geophysical anomalies have not been assessed. There is still a potential that these anomalies could reflect the presence of subsurface archaeological features. The only feature of potential interest encountered was the wide linear ditch (027) encountered at the south-west end of Trench 29 running parallel to the townland boundary between Ballybane and Aungierstown and Ballybane. This ditch appears to represent the sub-surface remains of the earlier (pre-1900) configuration of this townland boundary. It appears on historic mapping as a double field boundary and possibly an earlier trackway or laneway. Rubicon Heritage Services Ltd, Office 8, Dominick Court, No. 41 Dominick Street Lower, Dublin 1

Licence No.:	**18E0484**
Excavation No	2018:538
Site name:	Aungierstown, Ballybane and Milltown, Clondalkin
SMR No.:	N/A
Author:	Dermot Nelis
Site type:	Medieval linear features
Period/Dating:	—
ITM:	E 703050m, N 730780m
Description	Development involved installation of 110kv ducts to facilitate operation of a 220kv substation under construction in the Grange Castle Business Park South site. The scheme measured approximately 550m in length north-west/south-east x 15m in width

north/south (maximum), and was located immediately north of an existing north-west/south-east orientated road (Grange Castle South Access Road).

Fieldwork previously carried out on site by Rubicon Heritage revealed two roughly parallel ditches, on average 5m apart, running north-east/south-west within the development area. A small sub-circular deposit of greyish-brown stony silty clay was also revealed within the area of land take. A rough piece of granite measuring 0.25m x 0.2m x 0.1m was recovered from the surface of this deposit; it contained a single evenly-pecked face suggestive of a grinding surface. A shallow arc on the opposite surface is suggestive of part of a broken central perforation. Pending specialist examination, it was suggested that this is a fragment of a rotary quernstone of uncertain type.

A Method Statement was submitted to facilitate excavation of these known archaeological features, and for test trenching of the remainder of the area of land take.

Excavation of these features has now been completed. A report on the pottery prepared by Clare McCutcheon confirmed that of the 60 sherds recovered from the site, 41 are medieval in date. In addition to the household pottery, three sherds of post-medieval unglazed red earthenware roof tile were recovered, one of which is a fragment of pantile. The fabrics and vessel forms are consistent with other sites in the wider Dublin city area. The medieval glazed ware in particular was very worn with all surfaces reduced by post-depositional wear.

No additional archaeological features or artefacts were revealed as a result of carrying out the monitoring.

36 Fingal Street, Dublin 8

Licence No.:	**18E0600**
Excavation No	2019:061
Site name:	Clonburris Great, Deansrath and Kilmahuddrick, Clondalkin
SMR No.:	DU017-038001
Author:	Dermot Nelis
Site type:	No archaeology found
Period/Dating:	—
ITM:	E 705375m, N 731720m
Description	Development involved construction of a 63-unit infill housing project on undeveloped land at St Cuthbert's Park, Clondalkin, Dublin 22. Extensive test trenching, carried out by Irish Archaeological Consultancy Ltd. prior to groundworks commencing on site, revealed up to 0.7m of made ground across most of the development area, with the exception of the western end close to the ruins of St Cuthbert's church (DU017-038001), graveyard (DU017-038002) and moated site (DU017-038003). No archaeological features or artefacts were identified as a result of carrying out the test trenching. The monitoring programme confirmed the findings of the test trenching exercise, and uncovered no features or artefacts of archaeological interest. 36 Fingal Street, Dublin 8

Licence No.:	**19E0170**
Excavation No	2019:076
Site name:	Nangor Road, Clondalkin
SMR No.:	DU017-037
Author:	Muireann Ní Cheallacháin
Site type:	Post-medieval surfaces and possible wall footings
Period/Dating:	—
ITM:	E 704513m, N 731182m
Description	Testing was undertaken on 1 April 2019, on behalf of Gas Networks Ireland, to study the impact, if any, on the archaeological and historical resource of a proposed extension to the Gas Networks Ireland compound, which is located in the townland of Nangor, Clondalkin, Dublin 22. The trenches targeted the zone of notification for DU017-037 (castle-unclassified), to fully investigate the archaeological potential of the site. Testing revealed up to 1.55m of overburden overlying post-medieval features consisting of three cobbled surfaces located on either side of two north-east/south-west running walls and a stone-lined drain. These features may represent the northern yard area associated with an 18th-century house that was built on the site of the original Nangor Castle as depicted on the 25-inch map (1906–09). Monitoring of ground disturbances associated with works is ongoing. c/o IAC Ltd, Unit G1 Network Enterprise Park, Kilcoole, Co. Wicklow

Licence No.:	**19E0682**
Excavation No	2019:756
Site name:	Milltown 2, Grange Castle West
SMR No.:	N/A
Author:	David Bayley & Tim Coughlan
Site type:	Field boundaries and agricultural furrows
Period/Dating:	—
ITM:	E 702477m, N 731092m
Description	The following describes the preliminary results of an archaeological excavation at Milltown 2, Grange Castle West, Clondalkin Dublin 22, located at the site of the proposed Grange Castle West Access Road development. The site at Milltown 2 was located to the north-east and north-west of an extant farmyard with upstanding stone-built barns and wall. The site area to the north-west of the farmyard had a gentle slope from north-east to south-west, while the site area to the north-east of the farmyard sloped more steeply from north-west to south-east. In the north-eastern part of the site, two probable field boundaries and four agricultural furrows were recorded. The preliminary interpretation of these features is that they were part of a broader medieval field system. Sherds of medieval pottery recovered from one of the field boundaries and one of the furrows have helped in the formation of this interpretation. Another medieval field boundary extended across the entire length of the north-western part of the site. Two pits and the shallow remnants of a fire were recorded in the south-west of this area, along with an agricultural furrow and a field boundary that post-date this activity. A modern field boundary was also recorded in the north-western part of the site. The current interpretation of the phasing and dating of the activity on site is based on artefacts recovered, stratigraphic relationships between features and typological similarities. It is hoped that ongoing post-excavation analysis will further inform the preliminary interpretation of the activity on site. c/o IAC Ltd, Unit G1 Network Enterprise Park, Kilcoole, Co. Wicklow

Licence No.:	**20E0008**
Excavation No	2020:280
Site name:	Presentation College, Clondalkin
SMR No.:	N/A
Author:	Aisling Collins
Site type:	Urban, no archaeology found
Period/Dating:	—
ITM:	E 703035m, N 730919m
Description	An archaeological impact assessment report was requested as part of a planning condition in order to assess the impact of the proposed development on the archaeological heritage. Planning ref: SD18A/0328, Board Order APB304708-19, condition no. 22. The client is Bartra Property (NH), architects are Conroy Crowe Kelly Architects, conservation architects are Sheehan & Barry Architects, and the Engineers are Cronin Sutton Consulting Group at this site. Geological site investigations were carried out by IGSL and these test trenches also doubled up as archaeological test trenches. Monitoring of the geological site investigation trial trenches in Areas A and B did not identify any features of archaeological significance. In general, the deposits identified in the trenches consisted of dark brown clays with inclusions of modern building rubble throughout. In some trenches the inclusions identified comprised of large lumps of concrete, steel rods, plastic and fragments of cardboard. Old service routes including water and sewage pipes were also identified. ACAS 45 Richmond Park, Monkstown, Co Dublin

Licence No.:	**21E0061a**
Excavation No	2021:110
Site name:	Profile Park, Kilbride
SMR No.:	N/A
Author:	Donald Murphy, Archaeological Consultancy Services Unit
Site type:	Enclosure
Period/Dating:	—
ITM:	E 703650m, N 730500m
Description	Archaeological assessment, in the form of targeted archaeological test trenching of an enclosure and associated features, was carried out at the site at Profile Park, Kilbride,

Dublin in June 2021 using a 14-tonne track excavator. The site is located within Profile Park, adjacent to and south of Profile Park Road.

A total of ten test trenches were excavated, targeting anomalies identified during the geophysical survey 20R0080 (Anomalies D, E, F, G). Each test trench measured 1.8m in width. In total, 232 linear meters were excavated. In general, the average thickness of topsoil measured between c. 0.14-0.3m and consisted of dark brown sandy clay exposing a stony grey boulder clay natural that was in places represented by yellow/grey stoney marl.

Testing confirmed the results of the geophysical survey and succeeded in identifying the remains of an oval/circular enclosure (Anomaly D) measuring c. 40m in diameter. Enclosure ditch C3 measures 2.4m in width and 0.33m in depth. It appears that the upper part of the ditch was likely truncated during groundworks in 2009. Furthermore, two linear features (corresponding with Anomalies F and G) were recorded. These were represented by two roughly east-west aligned linear ditches (C5 and C7) measuring 1.7m and 1.45m in width and 0.32m and 0.3m in depth, respectively. In addition, a feature visible as a positive anomaly, representing a modern bank C9 (visible on a 2017 aerial photograph), that appears to be in alignment with anomaly G, was noted. Anomaly E was of geological nature.

Unit 21, Boyne Business Park, Greenhills, Drogheda, Co Louth

Licence No.:	**21E0061b**
Excavation No	2021:111
Site name:	Profile Park, Ballybane and Kilbride
SMR No.:	N/A
Author:	Donald Murphy, Archaeological Consultancy Services Unit
Site type:	No archaeological significance
Period/Dating:	—
ITM:	E 703636m, N 730780m
Description	Archaeological assessment (Test Trenching) was carried out at the site at Profile Park, Ballybane and Kilbride, Dublin. The site is located within Profile Park, north of Baldonnell Casement Aerodrome, on lands adjacent to and south of New Nangor Road (R134) and north of the internal Profile Park Road. Test trenching was carried out in March 2021. A total of 32 test trenches were excavated across the site using a 14-tonne track excavator fitted with a 1.8m wide toothless bucket. In total, 1,928m of linear test trenches were excavated. Anomalies identified during the geophysical survey (20R0080) were targeted. In general, the average thickness of topsoil measured c. 0.3-0.45m and consisted of dark brown sandy clay exposing a greyish-yellow boulder clay natural. No features or deposits of archaeological significance were exposed or identified, and no finds were recovered. The work is now complete. No further archaeological mitigation is required. Unit 21, Boyne Business Park, Greenhills, Drogheda, Co Louth

Licence No.:	**21E0692**
Excavation No	2021:567
Site name:	Profile Park, Kilbride
SMR No.:	N/A
Author:	Marc Piera
Site type:	Pit
Period/Dating:	—
ITM:	E 703681m, N 730561m
Description	Archaeological testing was carried out on 4 November 2021. Six trenches and six trail pits were excavated across the site measuring in total 382 linear meters. The trenches targeted open green space to fully investigate the archaeological potential of the site. Testing revealed one area of archaeological significance, which has been designated as Archaeological Area 1. It consists of an oval pit filled by a light grey plastic silty clay-marl with frequent inclusions of charcoal and animal bone. It may represent a waterlogged pit, possibly a well or cistern. Spoil from a third party covered the north and north-western area of the site which prevented test trenches from being excavated in this area. The eastern area of the site had around 2.5m of modern backfill consisting of different layers of gravel and concrete blocks and with 0.2m of topsoil, which lead to the scaling back of test trenches. A total of three stone drains were recorded across the site. Some of them may represent the same drainage features running across several trenches. A stone drain was recorded in two trenches.

One ditch was observed along the site, at the southern end of Trench 7. This ditch is interpreted as being made for agricultural purpose, and may represent old field boundaries or drainage ditches.

c/o IAC Archaeology Ltd, Unit G1 Network Enterprise Park, Kilcoole, Co. Wicklow

Licence No.:	**22E0306**
Excavation No	2022:523
Site name:	Milltown
SMR No.:	N/A
Author:	Niall O'Hora
Site type:	Pits and post-holes
Period/Dating:	Undetermined
ITM:	E 702183m, N 731077m
Description	This summary outlines results of archaeological testing, monitoring of Geotechnical Site Investigations (GSI) and an archaeological excavation carried out within the footprint of a proposed development site located in the townland of Milltown, Peamount Road, Newcastle, Co. Dublin. The testing was carried out by Colum Hardy between 23 May and 03 June 2022. The license was then transferred to Niall O'Hora in July 2022 and the archaeological excavation was carried out by him between 28 July and 10 August 2022. A geophysical survey was undertaken at the proposed development site by Target Archaeological Geophysics in 2019 (Nicholls 2019; Licence Number 19R0190). The investigations, comprising high resolution magnetic gradiometry, identified a series of potential archaeological features within four different areas of the site. On testing, the majority of these anomalies turned out to be of geological or modern origin. However, three Archaeological Areas (AA1, AA2 & AA3) were identified. Testing consisted of a combination of targeted and random trenching comprising a minimum of 10% of the total site area. This consisted of 105 test trenches totalling 4,097 linear metres. Following the archaeological testing it was recommended that these three Archaeological Areas be excavated prior to any commencement of construction on site. The original Method Statement was amended (and approved by NMS) to extend the testing licence to allow for the excavation of these three areas and the excavation was carried out between 28 July and 10 August 2022. Archaeological Area 1 (AA1) The feature identified in testing in AA1 transpired to be modern a dump of burnt material including some fragments of rubber and iron nails. Archaeological Area 2 (AA2) The excavation of AA2 revealed six archaeological pits and three post-holes. The pits ranged in size from small to medium with dimensions varying from 0.68m x 0.4m x 0.12m to 1.41m x 0.56m x 0.15m to 2.48m x 0.53m x 0.42m. Several of the pits contained similar fills comprising mixed deposits of ash, charcoal and occasional burnt material and would appear to represent refuse pits to dump burnt material. Only one of the pits (C.21) produced finds which included two pieces of worked chert and a fragment of flint debitage, possibly giving a prehistoric date to the pit. Three post-holes (C.12, C.17, and C.38) were also excavated in AA2. The post-holes ranged in size from 0.22m x 0.2m x 0.12m to 0.32m x 0.28m x 0.36m. Post-hole C.17 contained frequent burnt clay and occasional charcoal while post-hole C.38 contained occasional charcoal and a fragment of burnt stone. The post-holes were relatively spaced out and do not appear to represent an obvious structure although they were possibly originally part of a structure . The pits in AA2 appear to be refuse pits used to dump material and may represent peripheral activity from a nearby settlement. Although the post-holes do not indicate a substantial structure they may be the remains of a light temporary structure used over a short period of time. Archaeological Area 3 (AA3) The excavation of AA3 revealed two shallow pits, one (C.9) of which was slag-rich and yielded a fragment of tuyere pipe, indicating a possible Iron Age/early medieval date. The pit measured 1.55m x 0.56m x 0.32m and contained two fills. The second pit (C.41) measured 0.92m x 0.88m x 0.1m and also contained two fills, the upper of which included frequent charcoal flecks. Both pits would appear to be refuse pits with the slag material in pit C.9 possibly relating to smelting activity. In the absence of absolute dating, given the nature of the site types and the finds, it would not be unreasonable to suggest a prehistoric date for AA2 and a prehistoric or possible early medieval date for AA3.

Preliminary post-excavation analysis has commenced, and it is anticipated that this analysis, including radiocarbon dating and comparative research, will further enhance our understanding of the sites.

A programme of archaeological monitoring was also undertaken in respect to advance GSI works, where nothing of archaeological significance was recorded. A further phase of archaeological monitoring will take place across the rest of the site when construction works begin at a later date that is yet to be confirmed.

Archaeological Management Solutions (AMS), Fahy's Road, Kilrush, Co. Clare

Licence No.:	**22E0760**
Excavation No	2022:267
Site name:	Profile Park, New Nangor Road, Ballybane
SMR No.:	N/A
Author:	Deirdre Murphy, Archaeological Consultancy Services Unit Ltd
Site type:	Prehistoric/early historic ditch (possible)
Period/Dating:	—
ITM:	E 703833m, N 730822m
Description	Archaeological test trenching was carried out at Profile Park, New Nangor Road, Ballybane, Co. Dublin on 6–7 October 2022. This was undertaken following an Archaeological Impact Assessment in August 2022 and a geophysical survey carried out by Donald Murphy under licence number 22R0316 in September 2022. A total of 11 test trenches were excavated within the site. In general, the sod and topsoil measured 0.34–0.5m in thickness and lay above a mid-grey natural clay and stone. Only one potential archaeological feature was identified within Trenches 5, 6 and 11. It consisted of a linear feature or ditch (C3), aligned north-west/south-east and measuring c.25m in length, 1.7m in width and 0.32m in depth. It was filled with a mid-brown silty clay containing occasional inclusions of decayed stone and a few small fragments of animal bone (C4). Unit 21 Boyne Business Park, Greenhills, Drogheda, Co. Louth. A92 DH99.

Geophysical Surveys

Licence No.:	**15R0116**
Excavation No	*n/a*
Site name:	West Dublin interface compound T5 and 220/110 kV Substation, Kishoge and Ballybane,
SMR No.:	N/A
Author:	Heather Gimson
Site type:	Potential features
Period/Dating:	—
ITM:	E 703261m, N 730717m
Description	On the 1st and 2nd October 2015, a series of geophysical surveys commissioned by Tobin Consulting Engineers were conducted over two sites associated with Eirgrids West Dublin 220/110 kV Substation works. Three sites represent possible locations for the interface compound while the larger is the site of the substation. A magnetic gradiometer survey was undertaken at a sample resolution of 1m x 0.25m. The survey was conducted upon a bedrock geology consisting of Calp, beneath Tills. The majority of the survey area was covered in short grass however an area at the substation was not surveyable due to vegetation. The surveys undertaken at interface compound T5 revealed a site which has been subjected to the deposition of debris or imported soils. Within this a series of possible ditches were detected which may represent underlying archaeological remains or be associated with the deposition of material on site. At the substation survey area a series of potential archaeological remains were detected in the form of sub-circular trends and possible pits. Previous agricultural processes were also identified with the detection of linear walls or stone-filled ditches and some associated ditches which form a relict field boundary.

Licence No.:	**15R0147**
Excavation No	*n/a*
Site name:	Grange Castle Business Park South
SMR No.:	DU021:108 and DU021:109
Author:	J. M. Leigh
Site type:	Concentric Enclosure & Enclosure
Period/Dating:	—
ITM:	E 703077m, N 730846m

Description	The gradiometer survey has successfully identified the two recorded enclosure sites (DU021:108 and DU021:109). In addition, two further potential sites have been recorded. The recorded concentric enclosure (DU021:108) is represented by curvilinear responses forming an oval shape measuring c.50m east to west and 60m north to south. Responses within this are suggestive of habitation activity. The outer ditch is poorly defined in the data due to magnetic interference resulting from drainage features and a large spread of magnetic disturbance. Nevertheless, the outer ditched enclosure is approximated to be c.90m in diameter. Approximately 100m to the south there is a probable circular enclosure measuring 25m in diameter, identified by a faint circular response. The enclosure DU021:109 is represented by a circular response measuring c.44m and has a probable entranceway in the east. The enclosure is less well defined in the west, perhaps suggesting some plough damage. Approximately 26m to the east of the enclosure (DU021:109) there are a series of responses indicative of another archaeological site. The responses suggest a circular internal ditched enclosure measuring c. 37m in diameter. Numerous responses within this area indicative of habitation activity. This circular enclosure is encompassed by a larger bean-shaped response indicative of a ditched feature..

Licence No.:	**17R0016**
Excavation No	*n/a*
Site name:	Kilcarbery Grange Project
SMR No.:	N/A
Author:	J. M. Leigh
Site type:	No archaeological significance
Period/Dating:	—
ITM:	E 705164m, N 730797m
Description	The site was littered with modern ferrous debris, including areas of burnt out cars, prams and mattresses etc. The modern litter has resulted in a data set comprising of mostly modern ferrous responses. Although modern disturbance dominates the data, some responses of interest were recorded. Linear responses and trends are indicative of former boundary features. In the south of the application area (Areas I & J), responses suggestive of former boundaries were also identified and it is possible that a former field system is represented here.

Licence No.:	**19R0190**
Excavation No	n/a
Site name:	Milltown
SMR No.:	N/A
Author:	John Nichols
Site type:	Pits and post-holes
Period/Dating:	—
ITM:	E 702183m, N 731077m
Description	A geophysical survey was undertaken at the proposed development site by Target Archaeological Geophysics in 2019 (Nicholls 2019; Licence Number 19R0190). The investigations, comprising high resolution magnetic gradiometry, identified a series of potential archaeological features within four different areas of the site. On testing, the majority of these anomalies turned out to be of geological or modern origin. However, three Archaeological Areas (AA1, AA2 & AA3) were identified.

APPENDIX 11.4

DOWN SURVEY

PREPARED BY CRDS LTD

Taken in the years 1656-1658, the Down Survey of Ireland is the first ever detailed land survey on a national scale anywhere in the world. The survey sought to measure all the land to be forfeited by the Catholic Irish, in order to facilitate its redistribution to Merchant Adventurers and English soldiers. The confiscation and redistribution of lands through which the proposed route traverses are shown below (source www.downsurvey.tcd.ie/down-survey-maps.php).

Townlands (west to east)	Ballybane	Miltown	Profile Park	Kilcarbery
Milltown		√		
Clutterland		√		
Grange		√		
Aungierstown & Ballybane			√	
Ballybane	√	√	√	√
Kilbride			√	√
Kilcarbery		√	√	√
Nangor	√	√	√	√
Deansrath	√			
Bawngoes	√			
Clonburris Great	√			

Townland of MILLTOWN
No townland information available.

Townland of CLUTTERLAND

Down Survey Name:	Clondalkin
1641 Owner(s):	Dublin, Lord Archbishop of (Protestant)
1670 Owner(s):	Dublin, Lord Archbishop of (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin
1659 Census	
Total:	4
English:	4

Townland of GRANGE

Down Survey Name:	Grange
1641 Owner(s):	Fagan of Feltrim, Christopher (Catholic)
1670 Owner(s):	Sedgrave, John (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Killmatallway
Profitable land:	87 plantation acres
Forfeited:	87 plantation acres

Townland of AUNGIERSTOWN and BALLYBANE
No townland information available.

Townland of BALLYBANE

Down Survey Name:	Ballybaune
1641 Owner(s):	Patricks, Dean of St (Protestant)
1670 Owner(s):	Patricks, Dean of St (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin
Profitable land:	101 plantation acres
1659 Census	
Total:	21
English:	18
Irish:	3

Townland of KILBRIDE
No townland information available.

Townland of KILCARBERY
No townland information available.Kilcarbery

Townland of NANGOR

Down Survey Name:	Manger
1641 Owner(s):	Nottingham, Limerick (Protestant)
1670 Owner(s):	Nottingham, Limerick (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin
Profitable land:	80 plantation acres
1659 Census	
Total:	7
English:	5
Irish:	2
Titulado:	William Greene

Townland of DEANSRATH

Down Survey Name:	Drumnagh
1641 Owner(s):	Barnewell of Tirenure, Peter (Catholic)
1670 Owner(s):	Barnewell of Tirenure, Peter (Catholic)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin
Profitable land:	314 plantation acres
1659 Census	
Total:	56
English:	53
Irish:	3

Townland of BAWNOGES

Down Survey Name:	Clondalkin
1641 Owner(s):	Dublin, Lord Archbishop of (Protestant)
1670 Owner(s):	Dublin, Lord Archbishop of (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin

Townland of CLONBURRIS GREAT

Down Survey Name:	Clanborrowes
1641 Owner(s):	Dublin, Lord Archbishop of (Protestant)
1670 Owner(s):	Dublin, Lord Archbishop of (Protestant)
County:	Dublin
Barony:	Newcastle and Uppercross
Parish:	Clondalkin

APPENDIX 11.5

NATIONAL INVENTORY OF ARCHITECTURAL HERITAGE

PREPARED BY CRDS LTD

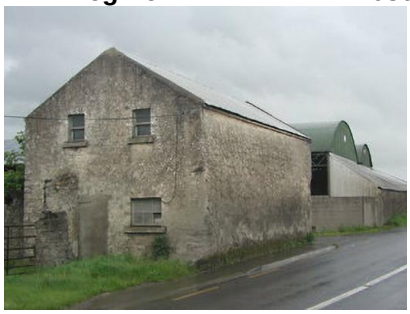
The recorded architectural heritage sites within c. 500m of the proposed development routes are listed below, all noted in the National Inventory of Architectural Heritage (NIAH) (www.archaeology.ie; www.buildingsofireland.ie).

Reg. No.	RPS No.	Ballybane	Miltown	Profile Park	Kilcarbery
11208005			√		
11208006	160		√		
11208008			√		
11208015	155		√		
11208016			√		
11209001	173	√	√	√	√
11209002		√	√	√	√
11209003		√	√	√	√
11209004		√	√	√	√
11209005		√	√	√	√
11209006		√			
11209007		√			
11209008		√			
11209009		√			

NIAH reg no.: **11208005**

Site name: **MILLTOWN (NE. BY.), Milltown, DUBLIN**
Townland: Milltown (Ne. By.)
Original use: gates/railings/walls
Current use: gates/railings/walls
Rating: Regional
Cat of spec int.: Artistic, Social, Technical
Date: 1850, 1900
ITM: 702113, 730898
Description: Pair of cylindrical rendered gate piers, c.1870, of squared limestone with conical cement capping. Five-bar wrought-iron gate with arched bar. Former entrance to farm house beyond, now demolished.
Appraisal: A fine intact example of a type of vernacular gateway peculiar to this area of County Dublin. Preserves the old road line and is now set back from the re-aligned section.

NIAH reg no.: **11208006**



Site name:	**MILLTOWN (NE. BY.), Milltown, DUBLIN**
Townland:	Grange
Original use:	farm house
Current use:	farm house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1840, 1870
ITM:	702680, 731575
Description:	Detached four-bay two-storey farm house, c.1850. Roughcast rendered walls. uPVC door and casement windows. Replacement pitched slate roof with terracotta ridge tiles and gable coping. Two central brick chimney stacks. Later drip moulding over northern front window. Lean-to extension to the rere, and shed to side.
Appraisal:	A tidy detached farm house which retains its original form and an unusually formal front garden, still serving the farm to the rere.

NIAH reg no.: **11208008**

Site name:	**GRANGE (BA. W BY.), Milltown, DUBLIN**
Townland:	Milltown (Ne. By.)
Original use:	outbuilding
Current use:	outbuilding
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1840, 1860
ITM:	702447, 730985
Description:	Detached two-storey farm outbuilding, c.1850, with two-bay gable ends. Rendered walls. Blind wall to street with chamfered corners. Timber sash and casement windows. Corrugated aluminium pitched roof. Adjoining rubble stone walls of demolished outbuildings to south-east and ruinous cottages to north-east.
Appraisal:	The chamfered corners of this outbuilding indicate the volume of horse-drawn traffic originally passing into the farm complex. Such buildings following the road line sheltered the farm yard and were a characteristic feature of Irish agriculture. This farm was associated with the now-demolished Milltown House.

NIAH reg no.: **11208015**

Site name:	**MILLTOWN (NE. BY.), Milltown, DUBLIN**
Townland:	Milltown (Ne. By.)
Original use:	farm house
Current use:	farm house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1750, 1770
ITM:	702449, 731068
Description:	Detached four-bay two-storey farm house, c.1760, with attached outbuildings. Rendered rubble stone walls. Glazed timber door in gabled porch. Timber sash windows. Some openings blocked. Possible traces of carriage arch to central bay. Pitched slate roof with two rendered chimney stacks. House possibly originally single-storey. Adjoining outbuildings to north with hayloft, and enlarged openings inserted recently. Partial tubular iron sunburst gate. Original fir tree stand to south.
Appraisal:	A fine example of an eighteenth-century farm cottage and barn, demonstrating a classic sequence of vernacular evolution. Retains many period features.

NIAH reg no.: **11208016**

Site name:	**Polly Hop's, MILLTOWN (NE. BY.), Milltown, DUBLIN**
Townland:	Milltown (Ne. By.)
Original use:	house
Current use:	public house
Rating:	Regional
Cat of spec int.:	Architectural, Social
Date:	1780, 1810
ITM:	702520, 731039
Description:	Formerly detached four-bay two-storey former house, c.1790, in use as public house. Roughcast rendered walls with parallel render quoins. Timber casement windows. Timber door with iron fittings. Pitched slate roof with single rendered chimney stack. Series of nineteenth- and twentieth-century extensions to south and west.
Appraisal:	This site has long been in use as a public house as shown by the extensions surrounding the original modest rural house. Its presence gives a focus to this important and formerly more developed junction.

NIAH reg no.: **11209001**

Site name:	**Kilcarberry House, off Nangor Road, KILCARBERY, DUBLIN**
Townland:	Kilcarbery
Original use:	country house
Current use:	country house
Rating:	Regional
Cat of spec int.:	Architectural, Artistic, Technical
Date:	1800, 1820
ITM:	704437, 730616
Description:	Detached three-bay two-storey house, c.1810, with projecting diagonally-set single-storey porch. Roughcast rendered walls. Single-pane timber sash windows. Timber panelled door with Ionic doorcase having radial elliptical fanlight. Hipped slate roof with brick chimney stacks. Lower two-storey rere section with lean-to slate roof forming catslide. Stone rubble outbuildings to rere in various states of dilapidation with pitched timber-framed slate roofs.
Appraisal:	This attractive Georgian house is beautifully set in the rural landscape. It has been well-maintained and its unusual porch design makes it a unique and interesting building retaining its original proportions and styles of fenestration.

NIAH reg no.: **11209002**

Site name:	**1 off Nangor Road, NANGOR, DUBLIN**
Townland:	Nangor
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural, Technical
Date:	1925, 1945
ITM:	704830, 730980
Description:	Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Tripartite timber sash windows to front, door to side. Hipped slate roof with red brick chimney stack.
Appraisal:	One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road, the unobtrusive siting of which adds visual interest to this rural road. This house is substantially intact, retaining original window, roofing and wall materials.

NIAH reg no.: **11209003**

Site name:	**2 Off Nangor Road, NANGOR, DUBLIN**
Townland:	Nangor
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1925, 1945
ITM:	704837, 730979
Description:	Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Replacement uPVC windows. Hipped slate roof with red brick chimney stack.
Appraisal:	One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road. Despite some alterations, this house retains its original proportions and remains an important element of this group, the unobtrusive siting of which adds visual interest to this rural road.

NIAH reg no.: **11209004**

Site name:	**3 Off Nangor Road, DEANSRATH, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural, Technical
Date:	1925, 1945
ITM:	704883, 730992
Description:	Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Tripartite timber sash window to front, door to side. Hipped slate roof with red brick chimney stack.
Appraisal:	One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road, the unobtrusive siting of which adds visual interest to this rural road. This house is substantially intact, retaining original window, roofing and wall materials.

NIAH reg no.: **11209005**

Site name:	**Sky Lawn, 4 Off Nangor Road, DEANSRATH, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1925, 1945
ITM:	704891, 730995
Description:	Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Replacement uPVC windows. Hipped slate roof with red brick chimney stack. Later flat-roofed porch to east with timber panelled door.
Appraisal:	One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road. Despite some alterations, this house retains its original proportions and remains an important element of this group, the unobtrusive siting of which adds visual interest to this rural road.

NIAH reg no.: **11209006**

Site name:	**1 Nangor Road, DEANSRATH, Clondalkin, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1870, 1890
ITM:	705616, 731134
Description:	Semi-detached three-bay single-storey house, c.1880, with gabled projecting porch. Rendered, ruled and lined walls with brick quoins. Replacement segmental-arched timber casement windows. Replacement timber panelled door with plain fanlight. Brick dressings to openings. Pitched slate roof with brick chimney stack.
Appraisal:	Part of a group of four semi-detached houses, which substantially retains its original proportions. As a group they convey a pleasing character to the modern streetscape.

NIAH reg no.: **11209007**

Site name:	**2 Nangor Road, DEANSRATH, Clondalkin, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1870, 1890
ITM:	705608, 731129
Description:	Semi-detached three-bay single-storey house, c.1880, with gabled projecting porch. Rendered, ruled and lined walls with brick quoins. Replacement uPVC casement windows, one segmental-arched, and replacement timber panelled door. Brick dressings to openings. Pitched slate roof with brick chimney stack.
Appraisal:	Part of a group of four semi-detached houses, which substantially retains its original proportions. As a group they convey a pleasing character to the modern streetscape.

NIAH reg no.: **11209008**

Site name:	**3 Nangor Road, DEANSRATH, Clondalkin, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural
Date:	1870, 1890
ITM:	705583, 731116
Description:	Semi-detached two-bay single-storey house, c.1880. Rendered, ruled and lined walls with brick quoins and later random rubble-clad infill sections around altered openings. Replacement aluminium bow windows. Original doorway now blocked. Pitched artificial slate roof with brick chimney stack. Modern extension to east side of house containing glazed aluminium door.
Appraisal:	Part of a group of four semi-detached houses, which retains some original proportions. As a group they convey a pleasing character to the modern streetscape.

NIAH reg no.: **11209009**

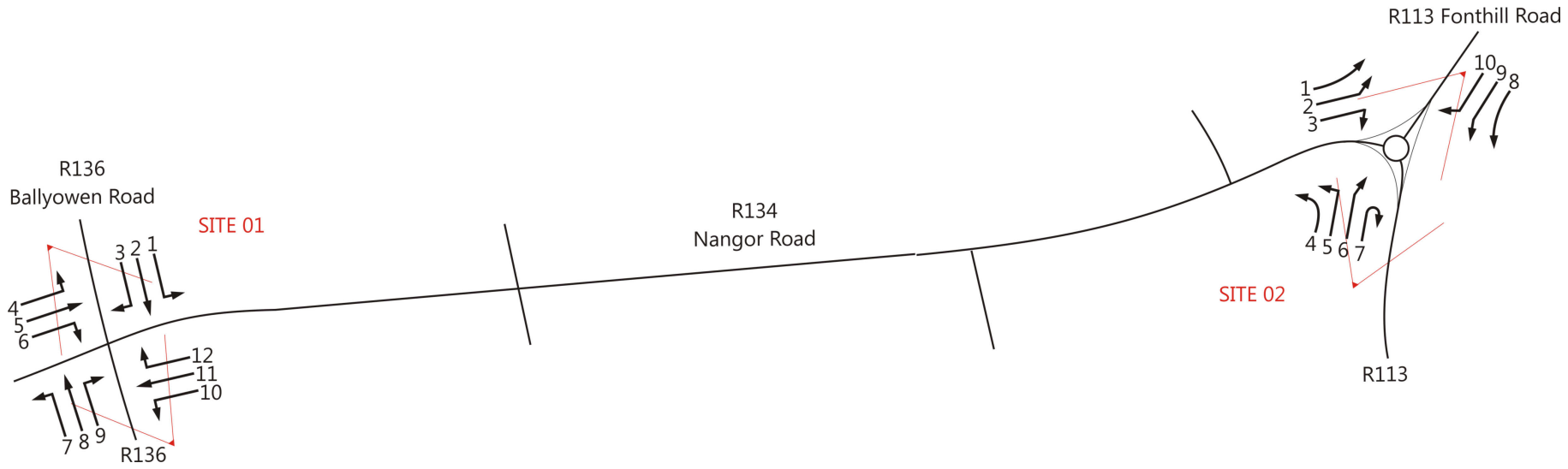
Site name:	**4 Nangor Road, DEANSRATH, Clondalkin, DUBLIN**
Townland:	Deansrath
Original use:	house
Current use:	house
Rating:	Regional
Cat of spec int.:	Architectural, Technical
Date:	1870, 1890
ITM:	705574, 731109
Description:	Semi-detached three-bay single-storey house, c.1880, with projecting gabled entrance porch having hinged overlight. Pitched slate roof with red brick chimney stack.
Appraisal:	Part of a group of four semi-detached houses, which substantially retains its original proportions. As a group they convey a pleasing character to the modern streetscape.

APPENDIX 13.1

TRAFFINOMICS SURVEY INFORMATION

Site/Movement Numbering

Appendix 13.1



Job number: TRA/23/152	Job Date: 13th June 2023	Drawing No: TRA/23/152-01	traffinomics.ie
Client: CST Group Consulting Engineers	Job Day: Tuesday	Author: SPW	

SITE: 01 DATE: 13th June 2023

LOCATION: R136 Ballyowen Road/R134 Nangor Road DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	13	5	0	0	0	18	18	144	32	2	0	0	178	179	15	3	0	0	0	18	18	07:00	1	1	1	1	0	4	6	28	6	1	1	2	38	42
07:15	12	3	1	0	0	16	17	109	28	3	2	0	142	146	8	4	2	1	0	15	17	07:15	7	1	0	0	0	8	8	42	20	3	1	4	70	77
07:30	11	4	0	0	1	16	17	148	35	4	4	0	191	198	11	2	2	1	0	16	18	07:30	5	0	1	0	0	6	7	50	4	5	0	1	60	64
07:45	17	5	0	0	2	24	26	179	26	3	2	1	211	216	15	6	4	1	0	26	29	07:45	7	4	1	1	2	15	19	37	12	3	0	3	55	60
H/TOT	53	17	1	0	3	74	78	580	121	12	8	1	722	739	49	15	8	3	0	75	83	**H/TOT**	20	6	3	2	2	33	39	157	42	12	2	10	223	242
08:00	18	2	0	0	0	20	20	146	24	6	0	1	177	181	9	3	0	0	0	12	12	08:00	6	1	3	1	0	11	14	65	7	7	3	4	86	97
08:15	19	0	1	0	0	20	21	157	22	3	3	1	186	192	11	2	0	1	0	14	15	08:15	11	6	1	0	1	19	21	49	14	2	1	2	68	72
08:30	29	5	3	0	2	39	43	149	13	1	4	1	168	175	14	3	2	0	0	19	20	08:30	9	3	0	0	0	12	12	75	9	2	1	3	90	95
08:45	35	4	0	0	0	39	39	162	17	4	0	2	185	189	15	1	0	1	0	17	18	08:45	9	1	4	1	0	15	18	50	7	2	1	5	65	72
H/TOT	101	11	4	0	2	118	122	614	76	14	7	5	716	737	49	9	2	2	0	62	66	**H/TOT**	35	11	8	2	1	57	65	239	37	13	6	14	309	337
09:00	16	3	0	0	1	20	21	122	17	1	2	3	145	151	11	1	2	1	0	15	17	09:00	8	1	2	1	0	12	14	43	15	6	1	3	68	75
09:15	10	4	1	0	0	15	16	127	8	2	6	2	145	156	11	2	1	0	0	14	15	09:15	11	1	0	0	0	12	12	27	14	4	3	3	51	60
09:30	5	1	1	0	0	7	8	121	12	5	4	5	147	160	3	1	0	0	0	4	4	09:30	7	10	0	0	0	17	17	38	4	2	1	1	46	49
09:45	6	2	2	0	0	10	11	87	12	3	7	2	111	124	12	1	0	0	0	13	13	09:45	8	4	2	2	0	16	20	35	11	4	0	2	52	56
H/TOT	37	10	4	0	1	52	55	457	49	11	19	12	548	590	37	5	3	1	0	46	49	**H/TOT**	34	16	4	3	0	57	63	143	44	16	5	9	217	241
10:00	9	8	0	0	1	18	19	61	17	6	1	0	85	89	6	4	0	0	0	10	10	10:00	7	3	0	0	0	10	10	27	6	1	0	2	36	39
10:15	12	2	1	0	0	15	16	66	12	2	2	0	82	86	4	0	0	3	0	7	11	10:15	4	2	1	1	0	8	10	24	5	1	0	2	32	35
10:30	4	2	1	0	0	7	8	72	18	8	5	0	103	114	8	4	0	1	0	13	14	10:30	6	2	3	0	0	11	13	16	6	1	2	2	27	32
10:45	13	2	1	0	1	17	19	82	10	1	3	0	96	100	5	0	0	2	0	7	10	10:45	4	0	0	0	0	4	4	16	8	2	1	2	29	33
H/TOT	38	14	3	0	2	57	61	281	57	17	11	0	366	389	23	8	0	6	0	37	45	**H/TOT**	21	7	4	1	0	33	36	83	25	5	3	8	124	138
11:00	13	0	1	0	0	14	15	76	9	2	2	0	89	93	7	0	1	1	0	9	11	11:00	4	3	1	1	0	9	11	23	5	5	1	2	36	42
11:15	11	2	0	0	0	13	13	56	15	5	5	0	81	90	9	2	1	0	0	12	13	11:15	6	2	2	0	0	10	11	25	6	3	1	4	39	46
11:30	9	1	0	0	0	10	10	70	9	2	3	0	84	89	8	2	1	0	0	11	12	11:30	5	2	2	0	0	9	10	23	7	4	0	0	34	36
11:45	15	2	1	0	0	18	19	63	14	4	7	1	89	101	5	2	0	0	0	7	7	11:45	12	1	0	0	0	13	13	21	6	5	3	3	38	47
H/TOT	48	5	2	0	0	55	56	265	47	13	17	1	343	373	29	6	3	1	0	39	42	**H/TOT**	27	8	5	1	0	41	45	92	24	17	5	9	147	171
12:00	9	3	1	0	0	13	14	55	9	4	3	1	72	79	9	1	0	1	0	11	12	12:00	12	1	0	0	0	13	13	27	4	1	0	3	35	39
12:15	10	4	2	0	0	16	17	61	18	3	4	2	88	97	7	1	0	1	0	9	10	12:15	6	1	0	0	0	7	7	31	12	4	1	3	51	57
12:30	10	2	0	0	0	12	12	61	5	4	3	0	73	79	3	4	1	0	0	8	9	12:30	2	3	1	0	0	6	7	28	7	3	0	1	39	42
12:45	17	6	0	0	0	23	23	68	13	3	4	1	89	97	5	0	0	0	0	5	5	12:45	10	1	1	0	0	12	13	28	7	3	0	3	41	46
H/TOT	46	15	3	0	0	64	66	245	45	14	14	4	322	351	24	6	1	2	0	33	36	**H/TOT**	30	6	2	0	0	38	39	114	30	11	1	10	166	183

TRAFFINOMICS LIMITED

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 01 DATE: 13th June 2023

LOCATION: R136 Ballyowen Road/R134 Nangor Road DAY: Tuesday

TRAFFINOMICS LIMITED

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 01 DATE: 13th June 2023 SITE: 01

LOCATION: R136 Ballyowen Road/R134 Nangor Road DAY: Tuesday LOCATION: R136 Ballyowen Road/R134 Nangor Road

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**TIME**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
13:00	14	1	1	0	0	16	17	67	12	1	3	0	83	87	3	2	0	0	0	5	5	13:00	16	1	0	1	0	18	19	45	5	0	2	0	52	55
13:15	19	0	0	0	0	19	19	61	8	6	1	0	76	80	6	2	0	0	0	8	8	13:15	11	5	2	0	0	18	19	31	10	2	1	3	47	52
13:30	18	3	2	0	0	23	24	61	12	2	5	0	80	88	14	2	0	2	0	18	21	13:30	12	0	0	1	0	13	14	26	10	1	0	1	38	40
13:45	18	3	0	0	0	21	21	61	13	4	3	1	82	89	14	2	0	0	0	16	16	13:45	16	3	0	0	0	19	19	24	8	2	0	2	36	39
H/TOT	69	7	3	0	0	79	81	250	45	13	12	1	321	344	37	8	0	2	0	47	50	**H/TOT**	55	9	2	2	0	68	72	126	33	5	3	6	173	185
14:00	20	2	0	0	2	24	26	77	13	6	7	0	103	115	15	0	1	0	0	16	17	14:00	9	2	0	0	0	11	11	54	11	3	1	3	72	78
14:15	20	4	1	0	2	27	30	72	16	4	1	0	93	96	5	0	0	1	0	6	7	14:15	10	2	0	0	0	12	12	42	7	0	0	2	51	53
14:30	30	2	1	0	0	33	34	95	10	5	1	2	113	119	11	0	3	0	0	14	16	14:30	10	1	1	0	0	12	13	33	5	4	1	2	45	50
14:45	14	1	2	0	2	19	22	89	13	10	1	2	115	123	8	2	0	0	0	10	10	14:45	14	0	1	0	0	15	16	29	9	1	1	2	42	46
H/TOT	84	9	4	0	6	103	111	333	52	25	10	4	424	454	39	2	4	1	0	46	49	**H/TOT**	43	5	2	0	0	50	51	158	32	8	3	9	210	227
15:00	20	4	0	0	1	25	26	97	14	2	4	4	121	131	8	3	0	0	0	11	11	15:00	19	1	0	0	0	20	20	30	4	2	1	5	42	49
15:15	16	3	0	0	1	20	21	109	17	2	3	5	136	146	8	0	1	0	0	9	10	15:15	11	1	2	1	0	15	17	41	7	3	0	4	55	61
15:30	22	5	0	0	1	28	29	129	38	3	2	6	178	188	8	2	1	0	0	11	12	15:30	10	5	0	0	0	15	15	38	4	0	1	1	44	46
15:45	18	3	1	0	0	22	23	112	25	2	2	4	145	153	12	1	0	0	0	13	13	15:45	14	1	0	1	0	16	17	45	6	1	1	2	55	59
H/TOT	76	15	1	0	3	95	99	447	94	9	11	19	580	618	36	6	2	0	0	44	45	**H/TOT**	54	8	2	2	0	66	70	154	21	6	3	12	196	215
16:00	22	3	1	0	0	26	27	138	33	1	2	1	175	179	5	1	0	0	0	6	6	16:00	12	2	1	0	1	16	18	54	10	1	0	3	68	72
16:15	18	5	0	0	0	23	23	135	22	2	1	1	161	164	10	3	0	1	0	14	15	16:15	7	2	0	1	0	10	11	61	4	0	0	2	67	69
16:30	29	3	0	0	0	32	32	133	28	4	3	0	168	174	5	3	1	0	0	9	10	16:30	18	4	0	2	0	24	27	48	4	1	1	1	55	58
16:45	35	8	1	0	0	44	45	178	32	5	1	1	217	222	7	1	0	0	0	8	8	16:45	19	4	1	0	0	24	25	50	3	3	0	2	58	62
H/TOT	104	19	2	0	0	125	126	584	115	12	7	3	721	739	27	8	1	1	0	37	39	**H/TOT**	56	12	2	3	1	74	80	213	21	5	1	8	248	260
17:00	18	3	0	0	0	21	21	137	17	3	3	1	161	167	7	0	0	4	1	12	18	17:00	27	5	1	0	0	33	34	66	5	1	1	3	76	81
17:15	21	8	0	0	0	29	29	162	16	2	1	2	183	187	10	2	0	0	0	12	12	17:15	14	4	0	0	0	18	18	49	10	0	0	0	59	59
17:30	22	5	0	0	0	27	27	129	13	3	0	1	146	149	14	2	0	0	0	16	16	17:30	16	2	1	0	0	19	20	66	6	0	0	4	76	80
17:45	36	5	0	0	0	41	41	167	30	1	5	0	203	210	17	0	0	0	0	17	17	17:45	19	1	1	0	0	21	22	49	4	0	0	1	54	55
H/TOT	97	21	0	0	0	118	118	595	76	9	9	4	693	713	48	4	0	4	1	57	63	**H/TOT**	76	12	3	0	0	91	93	230	25	1	1	8	265	275
18:00	19	2	0	0	0	21	21	119	18	0	3	2	142	148	11	3	1	0	0	15	16	18:00	16	1	0	0	0	17	17	26	3	1	1	1	32	35
18:15	20	5	0	0	1	26	27	144	10	3	0	1	158	161	12	0	0	2	0	14	17	18:15	12	3	0	0	0	15	15	29	3	0	0	1	33	34
18:30	12	3	0	0	2	17	19	130	14	0	4	2	150	157	8	4	0	0	0	12	12	18:30	12	1	0	0	0	13	13	20	5	1	0	2	28	31
18:45	21	2	0	0	0	23	23	110	13	0	0	0	123	123	8	2	0	0	0	10	10	18:45	12	2	0	0	0	14	14	37	3	1	0	2	43	46
H/TOT	72	12	0	0	3	87	90	503	55	3	7	5	573	589	39	9	1	2	0	51	54	**H/TOT**	52	7	0	0	0	59	59	112	14	3	1	6	136	145
P/TOT	825	155	27	0	20	1027	1061	5154	832	152	132	59	6329	6636	437	86	25	25	1	574	620	**P/TOT**	503	107	37	16	4	667	710	1821	348	102	34	109	2414	2618

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

DATE: 13th June 2023 SITE: 01

DAY: Tuesday LOCATION: R136 Ballyowen Road/R134 Nangor Road

MOVEMENT 6								MOVEMENT 7								MOVEMENT 8						
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
39	6	2	7	0	54	64	07:00	64	11	3	6	0	84	93	102	20	2	2	1	127	132
35	7	2	8	0	52	63	07:15	69	9	0	12	0	90	106	90	19	4	3	4	120	130
35	3	1	12	0	51	67	07:30	72	16	3	6	0	97	106	106	19	4	1	2	132	137
41	7	1	12	1	62	79	07:45	69	7	2	8	0	86	97	98	23	5	2	1	129	135
150	23	6	39	1	219	274	**H/TOT**	274	43	8	32	0	357	403	396	81	15	8	8	508	534
36	11	3	6	1	57	67	08:00	66	9	2	10	0	87	101	138	15	3	3	1	160	166
54	7	2	14	1	78	98	08:15	74	8	2	3	0	87	92	123	28	3	2	3	159	166
59	6	9	3	1	78	87	08:30	61	8	2	5	0	76	84	122	25	4	3	5	159	170
52	9	1	7	1	70	81	08:45	54	11	0	10	0	75	88	105	20	2	2	3	132	139
201	33	15	30	4	283	334	**H/TOT**	255	36	6	28	0	325	364	488	88	12	10	12	610	641
38	3	2	9	0	52	65	09:00	41	12	8	11	0	72	90	101	21	1	5	2	130	139
37	7	2	7	0	53	63	09:15	40	6	4	14	0	64	84	99	22	6	3	2	132	141
24	7	3	7	1	42	54	09:30	36	7	2	10	0	55	69	139	30	7	9	4	189	208
18	10	1	12	0	41	57	09:45	39	6	5	13	1	64	84	128	25	7	6	5	171	187
117	27	8	35	1	188	239	**H/TOT**	156	31	19	48	1	255	328	467	98	21	23	13	622	675
19	10	6	8	0	43	56	10:00	26	6	4	11	1	48	65	79	23	2	4	1	109	116
19	6	2	10	1	38	53	10:15	19	4	3	5	1	32	41	58	10	4	4	1	77	85
16	6	5	8	0	35	48	10:30	18	6	1	10	0	35	49	58	10	2	2	0	72	76
24	10	4	10	0	48	63	10:45	16	7	6	5	0	34	44	57	11	3	7	1	79	91
78	32	17	36	1	164	220	**H/TOT**	79	23	14	31	2	149	198	252	54	11	17	3	337	368
14	6	2	6	0	28	37	11:00	21	8	1	15	1	46	67	43	12	3	3	2	63	70
22	9	4	10	0	45	60	11:15	16	1	3	7	1	28	40	55	11	5	3	1	75	82
19	10	2	8	0	39	50	11:30	23	4	5	10	0	42	58	63	14	5	6	0	88	98
22	5	2	8	1	38	50	11:45	23	7	1	6	0	37	45	65	16	1	4	0	86	92
77	30	10	32	1	150	198	**H/TOT**	83	20	10	38	2	153	209	226	53	14	16	3	312	343
21	8	5	4	2	40	50	12:00	23	9	3	4	1	40	48	69	15	2	2	1	89	94
31	8	3	6	0	48	57	12:15	15	10	0	5	0	30	37	64	5	4	2	0	75	80
27	8	3	3	0	41	46	12:30	26	10	4	8	1	49	62	73	20	4	2	1	100	106
22	5	7	5	0	39	49	12:45	25	6	6	6	0	43	54	72	10	1	2	0	85	88
101	29	18	18	2	168	202	**H/TOT**	89	35	13	23	2	162	200	278	50	11	8	2	349	367

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

DATE: 13th June 2023 SITE: 01

DAY: Tuesday LOCATION: R136 Ballyowen Road/R134 Nangor Road

MOVEMENT 6								MOVEMENT 7							MOVEMENT 8						
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
44	9	1	9	1	64	77	13:00	19	9	2	12	0	42	59	61	12	6	2	1	82	89
23	10	3	6	1	43	53	13:15	28	7	1	4	0	40	46	76	12	1	5	0	94	101
22	6	1	6	0	35	43	13:30	36	7	3	10	0	56	71	67	11	4	0	2	84	88
35	7	7	3	0	52	59	13:45	26	7	2	8	3	46	60	57	16	2	2	0	77	81
124	32	12	24	2	194	233	**H/TOT**	109	30	8	34	3	184	235	261	51	13	9	3	337	358
58	4	3	6	0	71	80	14:00	24	6	3	11	0	44	60	60	10	6	1	1	78	83
27	6	2	5	0	40	48	14:15	23	10	9	6	0	48	60	62	21	3	2	1	89	94
35	10	1	9	1	56	69	14:30	20	3	3	10	0	36	51	68	13	3	2	3	89	96
35	11	2	8	1	57	69	14:45	27	9	4	6	0	46	56	86	15	3	3	4	111	120
155	31	8	28	2	224	266	**H/TOT**	94	28	19	33	0	174	226	276	59	15	8	9	367	394
51	11	3	8	0	73	85	15:00	29	8	1	3	0	41	45	101	15	1	2	1	120	124
42	15	2	5	0	64	72	15:15	30	8	5	4	1	48	57	92	16	5	5	1	119	129
59	14	4	2	1	80	86	15:30	24	3	4	14	0	45	65	99	17	2	3	3	124	132
53	17	1	8	0	79	90	15:45	21	16	3	5	2	47	57	81	13	4	2	1	101	107
205	57	10	23	1	296	332	**H/TOT**	104	35	13	26	3	181	224	373	61	12	12	6	464	492
77	12	2	6	0	97	106	16:00	40	9	5	6	1	61	72	108	21	3	2	2	136	142
86	9	5	3	0	103	109	16:15	32	8	3	3	0	46	51	118	23	2	2	3	148	155
77	17	1	0	0	95	96	16:30	46	3	2	9	0	60	73	164	21	5	4	1	195	204
55	10	1	3	0	69	73	16:45	47	6	2	2	1	58	63	160	23	5	2	3	193	201
295	48	9	12	0	364	384	**H/TOT**	165	26	12	20	2	225	259	550	88	15	10	9	672	702
75	10	1	2	0	88	91	17:00	45	14	1	1	1	62	65	148	21	2	1	0	172	174
75	11	0	3	0	89	93	17:15	54	8	2	2	0	66	70	194	36	2	2	1	235	240
69	8	1	3	0	81	85	17:30	59	9	2	1	1	72	75	184	25	3	2	1	215	220
69	8	1	1	0	79	81	17:45	68	7	1	2	0	78	81	169	16	0	0	2	187	189
288	37	3	9	0	337	350	**H/TOT**	226	38	6	6	2	278	291	695	98	7	5	4	809	823
53	6	1	4	1	65	72	18:00	63	5	1	5	0	74	81	1271	26	3	2	1	1303	1308
39	7	1	0	0	47	48	18:15	57	7	1	0	0	65	66	147	15	1	1	1	165	168
43	3	1	1	0	48	50	18:30	37	9	1	1	0	48	50	138	11	1	0	1	151	153
47	5	0	2	0	54	57	18:45	39	5	1	5	0	50	57	100	10	3	2	0	115	119
182	21	3	7	1	214	226	**H/TOT**	196	26	4	11	0	237	253	1656	62	8	5	3	1734	1748
1973	400	119	293	16	2801	3257	**P/TOT**	1830	371	132	330	17	2680	3192	5918	843	154	131	75	7121	7443

TRAFFINOMICS LIMITED

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS **JUNE 2023**
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/23/152**

DATE: 13th June 2023 SITE: 01 DATE: 13th June 2023

DAY: Tuesday LOCATION: R136 Ballyowen Road/R134 Nangor Road DAY: Tuesday

MOVEMENT 9								MOVEMENT 10								MOVEMENT 11								MOVEMENT 12								PCU's Through Junction
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
43	19	1	3	0	66	70	07:00	23	9	4	5	0	41	50	20	6	4	1	3	34	40	14	4	0	0	0	18	18	730
55	14	3	3	1	76	82	07:15	39	10	2	1	0	52	54	28	7	3	0	2	40	44	20	3	1	0	0	24	25	768
31	15	3	2	1	52	57	07:30	41	16	1	0	0	58	59	46	5	4	1	1	57	61	19	4	1	0	1	25	27	818
28	9	4	5	1	47	57	07:45	50	8	3	2	1	64	69	62	11	3	1	1	78	82	28	1	1	0	0	30	31	899
157	57	11	13	3	241	266	**H/TOT**	153	43	10	8	1	215	231	156	29	14	3	7	209	227	81	12	3	0	1	97	100	3215
41	6	4	3	1	55	62	08:00	56	9	3	3	2	73	80	53	13	5	1	1	73	78	25	4	1	0	1	31	33	912
33	7	1	4	2	47	55	08:15	64	15	2	3	1	85	91	36	10	5	1	2	54	60	20	2	0	0	0	22	22	905
42	10	4	3	5	64	75	08:30	61	12	0	3	1	77	82	44	7	3	2	3	59	66	22	6	1	0	0	29	30	938
40	7	5	3	6	61	73	08:45	66	9	0	3	0	78	82	42	7	1	1	2	53	57	18	2	0	0	0	20	20	876
156	30	14	13	14	227	265	**H/TOT**	247	45	5	12	4	313	335	175	37	14	5	8	239	261	85	14	2	0	1	102	104	3630
36	8	8	4	0	56	65	09:00	51	10	6	3	6	76	89	54	8	2	2	2	68	74	30	7	1	0	2	40	43	843
24	7	2	2	0	35	39	09:15	39	8	4	6	1	58	69	30	8	2	1	4	45	51	13	6	0	0	1	20	21	726
36	9	10	3	0	58	67	09:30	31	9	3	3	0	46	51	22	8	5	0	5	40	48	16	7	1	0	0	24	25	759
28	18	3	1	0	50	53	09:45	30	10	2	1	0	43	45	27	3	2	0	1	33	35	7	3	0	0	0	10	10	695
124	42	23	10	0	199	224	**H/TOT**	151	37	15	13	7	223	254	133	27	11	3	12	186	207	66	23	2	0	3	94	98	3023
23	14	3	0	0	40	42	10:00	25	8	5	2	0	40	45	32	7	2	0	1	42	44	7	2	0	0	0	9	9	544
25	9	2	1	0	37	39	10:15	27	11	4	4	0	46	53	18	7	4	2	4	35	44	15	5	1	0	0	21	22	493
33	7	3	4	0	47	54	10:30	34	7	3	2	0	46	50	20	8	5	1	5	39	48	6	3	1	0	0	10	11	514
18	8	2	2	0	30	34	10:45	34	4	2	3	0	43	48	25	8	3	0	2	38	42	4	2	1	0	0	7	8	493
99	38	10	7	0	154	168	**H/TOT**	120	30	14	11	0	175	196	95	30	14	3	12	154	177	32	12	3	0	0	47	49	2045
22	8	5	4	0	39	47	11:00	20	11	3	3	0	37	42	25	8	1	0	2	36	39	12	1	0	0	0	13	13	485
22	9	2	0	1	34	36	11:15	32	7	2	7	1	49	60	20	4	3	0	2	29	33	14	2	0	0	0	16	16	499
25	4	0	4	0	33	38	11:30	43	9	4	0	1	57	60	36	7	3	1	4	51	58	6	4	1	0	0	11	12	530
31	5	3	1	1	41	45	11:45	17	11	1	1	0	30	32	19	10	4	1	2	36	41	16	3	0	0	0	19	19	511
100	26	10	9	2	147	166	**H/TOT**	112	38	10	11	2	173	194	100	29	11	2	10	152	170	48	10	1	0	0	59	60	2026
25	9	2	3	0	39	44	12:00	37	8	2	3	0	50	55	29	7	2	1	4	43	49	17	3	0	0	1	21	22	517
34	7	1	3	0	45	49	12:15	38	9	3	1	0	51	54	25	4	5	0	4	38	45	15	0	1	0	0	16	17	526
28	4	2	3	0	37	42	12:30	29	11	4	6	0	50	60	22	9	4	1	0	36	39	27	1	1	0	0	29	30	532
29	2	3	2	0	36	40	12:45	45	8	4	2	0	59	64	30	15	3	2	2	52	58	17	3	1	0	0	21	22	557
116	22	8	11	0	157	175	**H/TOT**	149	36	13	12	0	210	232	106	35	14	4	10	169	191	76	7	3	0	1	87	90	2132

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS **JUNE 2023**
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/23/152**

DATE: 13th June 2023 SITE: 01 DATE: 13th June 2023

DAY: Tuesday LOCATION: R136 Ballyowen Road/R134 Nangor Road DAY: Tuesday

MOVEMENT 9								MOVEMENT 10								MOVEMENT 11								MOVEMENT 12								PCU's Through Junction
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
36	7	1	2	0	46	49	13:00	25	10	3	6	1	45	55	14	7	1	1	4	27	33	18	5	0	0	0	23	23	567
24	6	4	3	0	37	43	13:15	31	12	6	3	0	52	59	25	6	3	1	2	37	42	17	2	0	0	0	19	19	541
35	6	3	2	0	46	50	13:30	40	6	1	3	1	51	56	24	4	1	0	4	33	38	15	2	1	0	0	18	19	550
15	6	3	4	0	28	35	13:45	37	8	2	3	0	50	55	31	8	2	0	1	42	44	13	2	3	0	0	18	20	537
110	25	11	11	0	157	177	**H/TOT**	133	36	12	15	2	198	226	94	25	7	2	11	139	156	63	11	4	0	0	78	80	2196
34	15	4	4	1	58	66	14:00	32	6	5	1	0	44	48	24	7	2	2	1	36	41	14	1	1	0	1	17	19	643
33	3	2	2	3	43	50	14:15	32	10	0	2	0	44	47	27	10	3	0	1	41	44	11	2	1	0	0	14	15	554
28	9	3	3	0	43	48	14:30	46	14	0	9	7	76	95	23	6	2	1	8	40	50	14	2	0	0	2	18	20	660
27	5	4	4	1	41	49	14:45	48	14	2	1	2	67	71	41	7	0	1	3	52	56	34	1	0	1	1	37	39	678
122	32	13	13	5	185	213	**H/TOT**	158	44	7	13	9	231	260	115	30	7	4	13	169	191	73	6	2	1	4	86	92	2535
42	5	2	3	2	54	61	15:00	47	13	6	4	1	71	80	30	12	2	0	2	46	49	24	0	2	0	0	26	27	709
28	9	2	2	1	42	47	15:15	38	14	4	5	4	65	78	34	8	2	2	1	47	52	20	7	1	0	2	30	33	720
33	7	4	2	0	46	51	15:30	53	20	5	2	0	80	85	27	3	2	0	3	35	39	16	5	0	1	1	23	25	773
44	10	2	4	1	61	68	15:45	45	13	4	4	0	66	73	27	9	0	1	1	38	40	23	3	1	0	0	27	28	727
147	31	10	11	4	203	226	**H/TOT**	183	60	19	15	5	282	316	118	32	6	3	7	166	180	83	15	4	1	3	106	112	2928
35	12	2	3	2	54	61	16:00	62	25	2	4	0	93	99	50	6	2	2	2	62	68	20	4	0	0	0	24	24	873
49	6	3	2	0	60	64	16:15	65	12	3	4	1	85	93	43	6	2	1	0	52	54	23	5	0	0	0	28	28	837
59	8	0	1	1	69	71	16:30	50	21	1	4	0	76	82	42	4	0	1	4	51	56	16	5	0	0	0	21	21	902
43	10	2	1	0	56	58	16:45	60	13	4	1	0	78	81	53	8	1	1	2	65	69	15	2	0	0	0	17	17	923
186	36	7	7	3	239	255	**H/TOT**	237	71	10	13	1	332	355	188	24	5	5	8	230	247	74	16	0	0	0	90	90	3535
62	7	1	1	0	71	73	17:00	49	17	0	1	0	67	68	46	5	0	0	2	53	55	17	3	0	0	0	20	20	867
47	12	2	0	0	61	62	17:15	57	17	2	0	0	76	77	49	4	0	2	2	57	62	16	2	0	0	0	18	18	926
52	13	2	0	0	67	68	17:30	60	12	2	2	0	76	80	31	6	0	1	2	40	43	15	3	0	0	0	18	18	881
54	6	1	1	0	62	64	17:45	39	10	2	1	0	52	54	47	4	0	0	3	54	57	23	2	0	0	0	25	25	896
215	38	6	2	0	261	267	**H/TOT**	205	56	6	4	0	271	279	173	19	0	3	9	204	217	71	10	0	0	0	81	81	3569
57	4	0	0	0	61	61	18:00	55	9	1	1	1	67	70	40	4	1	0	1	46	48	11	1	0	0	0	12	12	1887
33	5	1	0	0	39	40	18:15	61	3	0	0	1	65	66	34	3	1	0	0	38	39	18	4	0	0	2	24	26	704
37	4	3	0	0	44	46	18:30	50	8	0	0	0	58	58	50	2	1	0	2	55	58	16	1	0	1	2	20	23	668
28	6	1	0	1	36	38	18:45	45	8	1	1	0	55	57	40	3	0	1	0	44	45	16	3	0	0	3	22	25	613
155	19	5	0	1	180	184	**H/TOT**	211	28	2	2	2	245	251	164	12	3	1	3	183	189	61	9	0	1	7	78	86	3872
1687	396	128	107	32	2350	2585	**P/TOT**	2059	524	123	129	33	2868	3130	1617	329	106	38	110	2200	2412	813	145	24	3	20	1005	1041	34706

SITE: 02 DATE: 13th June 2023

LOCATION: R113 Fonthill Road/R134 Nangor Road DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3								MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**TIME**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	3	1	0	0	1	5	6	80	18	3	5	0	106	114	46	8	0	0	1	55	56	07:00	1	0	0	0	0	1	1	17	4	0	0	0	21	21	46	18	3	2	0	69	73
07:15	1	0	0	0	2	3	5	115	28	3	4	2	152	161	54	14	1	0	1	70	72	07:15	2	0	0	0	1	3	4	17	5	0	0	0	22	22	69	18	1	6	2	96	106
07:30	7	0	0	0	4	11	15	123	27	4	1	0	155	158	38	17	1	0	2	58	61	07:30	1	0	0	0	0	1	1	31	3	0	0	1	35	36	81	13	3	3	3	103	111
07:45	5	0	0	0	4	9	13	114	31	8	4	1	158	168	47	3	2	3	3	58	66	07:45	0	1	0	0	4	5	9	34	3	3	0	0	40	42	80	21	8	4	2	115	126
H/TOT	16	1	0	0	11	28	39	432	104	18	14	3	571	601	185	42	4	3	7	241	254	**H/TOT**	4	1	0	0	5	10	15	99	15	3	0	1	118	121	276	70	15	15	7	383	417
08:00	7	0	0	0	4	11	15	130	14	8	6	0	158	170	71	13	1	1	3	89	94	08:00	4	2	0	0	3	9	12	35	3	1	0	0	39	40	86	12	6	6	0	110	121
08:15	3	0	0	0	7	10	17	130	23	5	6	1	165	176	74	7	2	0	2	85	88	08:15	1	0	0	0	3	4	7	19	4	1	0	0	24	25	106	7	4	2	0	119	124
08:30	16	2	0	0	2	20	22	108	19	3	5	0	135	143	85	10	1	0	2	98	101	08:30	5	0	0	0	3	8	11	32	5	0	0	0	37	37	153	11	4	5	1	174	184
08:45	9	1	0	0	3	13	16	106	19	5	4	0	134	142	72	10	3	0	4	89	95	08:45	5	0	0	0	0	5	5	48	2	2	1	0	53	55	124	13	2	5	0	144	152
H/TOT	35	3	0	0	16	54	70	474	75	21	21	1	592	631	302	40	7	1	11	361	377	**H/TOT**	15	2	0	0	9	26	35	134	14	4	1	0	153	156	469	43	16	18	1	547	579
09:00	9	2	0	0	4	15	19	98	18	9	7	0	132	146	73	6	1	1	1	82	85	09:00	3	1	0	0	3	7	10	49	2	0	0	0	51	51	113	15	1	8	1	138	150
09:15	6	0	0	0	0	6	6	73	18	4	10	0	105	120	69	14	2	0	1	86	88	09:15	1	0	0	0	1	2	3	39	3	1	1	1	45	48	80	16	7	7	1	111	125
09:30	4	2	0	0	2	8	10	62	14	8	6	0	90	102	49	6	4	0	5	64	71	09:30	2	1	0	0	1	4	5	30	2	1	0	0	33	34	89	17	4	9	1	120	135
09:45	8	1	0	0	3	12	15	69	19	10	4	1	103	114	57	7	7	0	2	73	79	09:45	2	0	1	0	0	3	4	29	3	2	0	1	35	37	78	13	4	10	2	107	124
H/TOT	27	5	0	0	9	41	50	302	69	31	27	1	430	482	248	33	14	1	9	305	322	**H/TOT**	8	2	1	0	5	16	22	147	10	4	1	2	164	169	360	61	16	34	5	476	533
10:00	3	0	0	0	2	5	7	61	25	5	1	0	92	96	44	2	0	0	1	47	48	10:00	2	0	0	0	1	3	4	31	7	2	0	0	40	41	64	12	3	9	0	88	101
10:15	0	0	0	0	0	0	0	61	19	4	2	0	86	91	36	7	3	0	0	46	48	10:15	1	0	0	0	4	5	9	29	4	0	0	0	33	33	70	16	4	5	1	96	106
10:30	3	0	0	0	1	4	5	71	19	4	1	0	95	98	37	7	2	0	2	48	51	10:30	1	0	0	0	0	1	1	36	5	1	1	0	43	45	64	13	7	7	0	91	104
10:45	3	1	0	0	2	6	8	52	16	5	5	1	79	89	51	4	1	0	1	57	59	10:45	2	0	1	0	2	5	8	37	2	1	0	1	41	43	63	7	8	6	2	86	100
H/TOT	9	1	0	0	5	15	20	245	79	18	9	1	352	374	168	20	6	0	4	198	205	**H/TOT**	6	0	1	0	7	14	22	133	18	4	1	1	157	161	261	48	22	27	3	361	410
11:00	6	0	0	0	1	7	8	65	13	10	3	0	91	100	46	5	2	1	2	56	60	11:00	2	0	0	0	0	2	2	37	7	0	2	0	46	49	93	13	6	10	0	122	138
11:15	2	0	0	0	1	3	4	47	18	5	2	1	73	79	34	5	3	0	1	43	46	11:15	1	0	0	0	2	3	5	36	0	2	0	0	38	39	66	7	5	8	1	87	101
11:30	2	0	0	0	0	2	2	71	25	4	3	0	103	109	38	6	1	1	1	47	50	11:30	5	1	0	0	2	8	10	35	7	0	0	0	42	42	75	10	4	4	1	94	102
11:45	2	0	0	0	2	4	6	48	11	5	4	0	68	76	73	10	2	1	0	86	88	11:45	2	2	0	0	1	5	6	40	1	0	0	0	41	41	66	11	3	2	0	82	86
H/TOT	12	0	0	0	4	16	20	231	67	24	12	1	335	364	191	26	8	3	4	232	244	**H/TOT**	10	3	0	0	5	18	23	148	15	2	2	0	167	171	300	41	18	24	2	385	427
12:00	2	1	0	0	2	5	7	79	17	5	2	0	103	108	58	6	0	0	3	67	70	12:00	3	1	0	0	0	4	4	47	5	1	0	0	53	54	81	10	1	2	1	95	99
12:15	4	0	0	0	0	4	4	88	21	4	5	0	118	127	46	5	1	0	3	55	59	12:15	4	0	0	0	1	5	6	53	6	2	0	0	61	62	75	16	5	8	2	106	121
12:30	3	1	0	0	2	6	8	53	16	5	2	0	76	81	68	11	1	0	1	81	83	12:30	7	2	0	0	2	11	13	50	4	1	0	0	55	56	76	12	4	6	1	99	110
12:45	1	0	1	0	2	4	7	57	8	6	4	1	76	85	71	10	0	0	0	81	81	12:45	1	1	0	0	1	3	4	46	3	1	1	0	51	53	60	9	4	5	1	79	89
H/TOT	10	2	1	0	6	19	26	277	62	20	13	1	373	401	243	32	2	0	7	284	292	**H/TOT**	15	4	0	0	4	23	27	196	18	5	1	0	220	224	292	47	14	21	5	379	418

TRAFFINOMICS LIMITED

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02

LOCATION: R113 Fonthill Road/R134 Nangor Road

SITE: 02 DATE: 13th June 2023

LOCATION: R113 Fonthill Road/R134 Nangor Road DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3								MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**TIME**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
13:00	2	0	0	0	0	2	2	67	10	3	2	0	82	86	50	5	2	1	1	59	62	13:00	3	0	0	0	2	5	7	38	9	0	0	0	47	47	66	9	2	8	1	86	98
13:15	3	0	0	0	1	4	5	46	13	7	5	0	71	81	75	8	0	0	1	84	85	13:15	6	3	0	0	1	10	11	49	1	1	0	0	51	52	78	9	6	6	1	100	112
13:30	5	0	0	0	1	6	7	54	14	4	3	1	76	83	57	4	2	1	1	65	68	13:30	3	0	0	0	2	5	7	47	4	2	1	0	54	56	81	8	3	13	1	106	125
13:45	1	1	0	0	1	3	4	84	14	1	3	0	102	106	48	4	3	0	1	56	59	13:45	5	2	0	0	0	7	7	45	2	1	0	0	48	49	69	15	6	5	1	96	107
H/TOT	11	1	0	0	3	15	18	251	51	15	13	1	331	356	230	21	7	2	4	264	274	**H/TOT**	17	5	0	0	5	27	32	179	16	4	1	0	200	203	294	41	17	32	4	388	442
14:00	3	1	0	0	1	5	6	70	19	5	3	0	97	103	74	1	0	1	1	77	79	14:00	3	1	0	0	1	5	6	44	7	2	0	0	53	54	64	11	1	4	2	82	90
14:15	7	1	0	0	0	8	8	85	20	3	2	1	111	116	63	5	3	0	2	73	77	14:15	4	1	0	0	2	7	9	36	6	0	1	0	43	44	80	9	4	6	2	101	113
14:30	3	0	0	0	1	4	5	71	14	9	1	0	95	101	66	6	0	0	2	74	76	14:30	1	0	0	0	1	2	3	39	4	1	1	0	45	47	72	7	2	2	3	86	93
14:45	3	0	0	0	2	5	7	76	12	8	3	1	100	109	76	7	0	1	1	85	87	14:45	4	0	0	0	0	4	4	71	8	0	1	0	80	81	98	7	2	6	3	116	128
H/TOT	16	2	0	0	4	22	26	302	65	25	9	2	403	429	279	19	3	2	6	309	319	**H/TOT**	12	2	0	0	4	18	22	190	25	3	3	0	221	226	314	34	9	18	10	385	423
15:00	5	0	0	0	1	6	7	81	8	3	2	2	96	102	58	3	3	0	3	67	72	15:00	2	1	0	0	4	7	11	64	9	2	0	0	75	76	72	14	3	2	2	93	99
15:15	6	1	0	0	4	11	15	72	9	2	3	3	89	97	54	3	4	0	4	65	71	15:15	10	0	0	1	1	12	14	45	2	1	0	0	48	49	69	11	4	5	1	90	100
15:30	5	1	0	0	1	7	8	65	10	3	2	1	81	86	51	8	1	0	2	62	65	15:30	7	0	0	0	1	8	9	51	5	1	0	0	57	58	62	12	1	4	1	80	87
15:45	4	0	0	0	1	5	6	87	8	3	0	0	98	100	31	12	1	1	2	47	51	15:45	6	0	0	0	0	6	6	57	8	1	0	0	66	67	87	13	5	3	3	111	120
H/TOT	20	2	0	0	7	29	36	305	35	11	7	6	364	385	194	26	9	1	11	241	258	**H/TOT**	25	1	0	1	6	33	40	217	24	5	0	0	246	249	290	50	13	14	7	374	406
16:00	3	1	0	0	4	8	12	90	15	4	3	0	112	118	52	9	2	0	1	64	66	16:00	2	0	0	0	0	2	2	45	4	0	1	0	50	51	71	11	2	2	1	87	92
16:15	6	1	0	0	0	7	7	77	15	3	1	0	96	99	70	2	0	0	1	73	74	16:15	4	0	0	0	3	7	10	52	6	0	0	0	58	58	73	8	1	1	1	84	87
16:30	5	0	0	0	1	6	7	90	13	2	2	0	107	111	61	7	0	0	1	69	70	16:30	2	0	0	0	1	3	4	54	9	0	0	0	63	63	65	8	3	1	0	77	80
16:45	3	0	0	0	1	4	5	78	12	3	1	0	94	97	74	14	1	0	1	90	92	16:45	1	1	0	0	3	5	8	50	8	0	0	0	58	58	92	15	2	1	0	110	112
H/TOT	17	2	0	0	6	25	31	335	55	12	7	0	409	424	257	32	3	0	4	296	302	**H/TOT**	9	1	0	0	7	17	24	201	27	0	1	0	229	230	301	42	8	5	2	358	371
17:00	3	0	0	0	1	4	5	99	15	2	2	0	118	122	71	9	1	0	2	83	86	17:00	2	1	1	0	0	4	5	49	7	0	0	0	56	56	78	15	2	1	0	96	98
17:15	4	0	0	0	1	5	6	92	18	2	0	0	112	113	55	3	0	0	0	58	58	17:15	1	0	0	0	2	3	5	68	10	1	0	0	79	80	78	7	2	0	0	87	88
17:30	3	2	0	0	1	6	7	87	10	0	0	0	97	97	61	10	1	0	1	73	75	17:30	1	0	0	0	1	2	3	52	5	1	0	0	58	59	85	10	1	2	0	98	101
17:45	3	0	0	0	1	4	5	69	13	0	1	0	83	84	89	6	0	0	1	96	97	17:45	2	0	0	0	0	2	2	63	6	1	0	0	70	71	93	15	3	0	2	113	117
H/TOT	13	2	0	0	4	19	23	347	56	4	3	0	410	416	276	28	2	0	4	310	315	**H/TOT**	6	1	1	0	3	11	15	232	28	3	0	0	263	265	334	47	8	3	2	394	404
18:00	4	0	1	0	0	5	6	83	7	1	1	0	92	94	59	5	1	0	0	65	66	18:00	2	0	0	0	1	3	4	62	7	0	0	1	70	71	106	8	0	1	1	116	118
18:15	3	0	0	0	0	3	3	72	6	1	0	0	79	80	63	7	1	0	2	73	76	18:15	1	0	0	0	2	3	5	65	6	0	0	0	71	71	111	12	1	0	0	124	125
18:30	2	0	0	0	2	4	6	75	12	2	0	1	90	92	74	6	0	0	0	80	80	18:30	4	0	0	0	0	4	4	47	3	2	0	0	52	53	82	6	1	0	1	90	92
18:45	3	0	0	0	1	4	5	71	8	4	0	0	83	85	81	3	0	0	3	87	90	18:45	1	1	0	0	2	4	6	47	2	0	0	0	49	49	82	3	0	0	0	85	85
H/TOT	12	0	1	0	3	16	20	301	33	8	1	1	344	350	277	21	2	0	5	305	311	**H/TOT**	8	1	0	0	5	14	19	221	18	2	0	1	242	244	381	29	2	1	2	415	419
P/TOT	198	21	2	0	78	299	378	3802	751	207	136	18	4914	5212	2850	340	67	13	76	3346	3472	**P/TOT**	135	23	3	1	65	227	295	2097	228	39	11	5	2380	2419	3872	553	158	212	50	4845	5250

TRAFFINOMICS LIMITED

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02 DATE: 13th June 2023

LOCATION: R113 Fonthill Road/R134 Nangor Road DAY: Tuesday

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS **JUNE 2023**
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/23/152**

DATE: 13th June 2023 SITE: 02 DATE: 13th June 2023

DAY: Tuesday LOCATION: R113 Fonthill Road/R134 Nangor Road DAY: Tuesday

MOVEMENT 7								MOVEMENT 8							MOVEMENT 9							MOVEMENT 10							PCU's Through Junction
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
13	3	1	0	0	17	18	07:00	1	0	0	0	1	2	3	35	10	2	7	1	55	66	29	9	5	3	3	49	58	416
16	2	0	0	0	18	18	07:15	4	0	0	0	1	5	6	39	15	5	5	0	64	73	52	12	7	2	2	75	83	550
22	5	0	0	0	27	27	07:30	2	0	0	0	0	2	2	50	7	2	7	2	68	80	52	10	7	2	1	72	79	570
21	5	1	0	2	29	32	07:45	2	1	0	0	4	7	11	60	11	5	3	0	79	85	60	19	6	4	4	93	105	657
72	15	2	0	2	91	94	**H/TOT**	9	1	0	0	6	16	22	184	43	14	22	3	266	305	193	50	25	11	10	289	326	2193
26	4	1	0	2	33	36	08:00	1	1	0	0	0	2	2	74	12	2	6	0	94	103	55	14	5	3	2	79	87	679
48	4	0	1	0	53	54	08:15	1	1	0	0	5	7	12	75	3	5	4	0	87	95	78	19	7	3	3	110	120	718
53	2	0	1	0	56	57	08:30	2	0	0	0	0	2	2	96	11	4	4	0	115	122	67	22	5	9	3	106	123	802
54	3	0	0	1	58	59	08:45	10	2	0	0	0	12	12	107	8	0	9	0	124	136	107	16	5	2	2	132	139	810
181	13	1	2	3	200	206	**H/TOT**	14	4	0	0	5	23	28	352	34	11	23	0	420	455	307	71	22	17	10	427	470	3008
36	5	0	0	2	43	45	09:00	8	0	0	0	1	9	10	81	11	7	6	0	105	116	90	17	5	4	0	116	124	755
22	0	0	0	1	23	24	09:15	3	0	0	0	1	4	5	70	5	3	8	1	87	100	47	20	9	4	2	82	94	612
25	4	0	0	0	29	29	09:30	2	0	1	0	3	6	10	56	5	6	4	0	71	79	37	15	4	4	4	64	75	549
19	2	0	0	0	21	21	09:45	8	0	0	0	0	8	8	51	16	5	8	0	80	93	51	13	7	3	1	75	83	578
102	11	0	0	3	116	119	**H/TOT**	21	0	1	0	5	27	33	258	37	21	26	1	343	388	225	65	25	15	7	337	376	2494
23	1	0	0	0	24	24	10:00	2	0	0	0	1	3	4	52	13	3	8	0	76	88	52	17	5	4	4	82	94	507
24	2	0	0	0	26	26	10:15	1	0	0	0	2	3	5	57	9	5	9	0	80	94	52	15	7	6	5	85	101	512
23	1	2	0	0	26	27	10:30	4	1	0	0	0	5	5	59	6	5	5	0	75	84	62	20	4	2	1	89	95	514
30	5	0	0	0	35	35	10:45	1	0	0	0	1	2	3	73	10	2	7	0	92	102	64	8	9	2	2	85	94	540
100	9	2	0	0	111	112	**H/TOT**	8	1	0	0	4	13	17	241	38	15	29	0	323	368	230	60	25	14	12	341	384	2073
23	0	0	0	0	23	23	11:00	3	0	0	0	1	4	5	71	12	2	9	0	94	107	55	29	7	1	1	93	99	590
19	1	0	0	0	20	20	11:15	1	1	0	0	0	2	2	63	12	4	10	0	89	104	73	25	6	5	2	111	123	522
27	5	0	0	0	32	32	11:30	4	1	0	0	2	7	9	64	12	6	6	0	88	99	73	19	6	1	3	102	109	564
33	1	0	0	2	36	38	11:45	4	0	0	0	3	7	10	71	11	2	3	0	87	92	86	13	9	1	0	109	115	558
102	7	0	0	2	111	113	**H/TOT**	12	2	0	0	6	20	26	269	47	14	28	0	358	401	287	86	28	8	6	415	445	2234
15	1	0	0	0	16	16	12:00	1	0	0	0	1	2	3	80	9	4	8	0	101	113	75	19	6	3	2	105	114	588
16	0	1	0	0	17	18	12:15	6	0	0	0	2	8	10	50	9	2	5	0	66	74	73	17	10	3	3	106	118	597
17	2	0	0	1	20	21	12:30	2	1	0	0	1	4	5	78	10	8	9	0	105	121	77	19	6	6	0	108	119	615
26	2	0	0	0	28	28	12:45	4	0	0	0	0	4	4	72	2	3	10	0	87	102	75	21	10	4	2	112	124	576
74	5	1	0	1	81	83	**H/TOT**	13	1	0	0	4	18	22	280	30	17	32	0	359	409	300	76	32	16	7	431	475	2376

JUNE 2023 GRANGE CASTLE GNI TRAFFIC COUNTS **JUNE 2023**
TRA/23/152 MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/23/152**

DATE: 13th June 2023 SITE: 02 DATE: 13th June 2023

DAY: Tuesday LOCATION: R113 Fonthill Road/R134 Nangor Road DAY: Tuesday

MOVEMENT 7								MOVEMENT 8							MOVEMENT 9							MOVEMENT 10							PCU's Through Junction
CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
25	2	0	0	0	27	27	13:00	2	1	0	0	0	3	3	63	13	4	3	1	84	91	70	19	7	4	0	100	109	532
28	4	0	0	0	32	32	13:15	1	0	0	0	3	4	7	84	14	4	6	0	108	118	90	22	5	3	2	122	130	633
21	1	0	0	0	22	22	13:30	1	0	0	0	0	1	1	58	4	1	7	0	70	80	97	18	7	2	3	127	136	586
28	3	2	1	1	35	38	13:45	2	0	0	0	2	4	6	71	6	0	9	0	86	98	83	21	5	4	1	114	123	596
102	10	2	1	1	116	119	**H/TOT**	6	1	0	0	5	12	17	276	37	9	25	1	348	386	340	80	24	13	6	463	498	2346
25	2	0	0	0	27	27	14:00	4	0	0	0	1	5	6	60	5	1	3	0	69	73	81	14	6	2	3	106	115	559
29	3	0	0	1	33	34	14:15	7	2	0	0	0	9	9	85	8	3	10	1	107	123	76	29	5	3	2	115	123	656
27	1	0	0	0	28	28	14:30	5	0	0	0	0	5	5	78	13	2	8	0	101	112	98	24	4	6	1	133	144	613
30	3	0	0	0	33	33	14:45	5	0	0	0	1	6	7	100	9	2	4	1	116	123	101	24	4	0	0	129	131	711
111	9	0	0	1	121	122	**H/TOT**	21	2	0	0	2	25	27	323	35	8	25	2	393	432	356	91	19	11	6	483	513	2539
23	4	0	0	0	27	27	15:00	2	1	0	1	0	4	5	69	5	3	5	0	82	90	112	19	7	3	6	147	160	649
32	5	0	0	0	37	37	15:15	4	1	0	0	0	5	5	78	13	3	4	1	99	107	93	18	5	5	4	125	138	632
21	3	0	0	0	24	24	15:30	2	1	0	0	3	6	9	72	16	5	6	0	99	109	97	16	5	0	3	121	127	581
29	3	1	0	0	33	34	15:45	1	1	0	0	1	3	4	67	11	3	3	0	84	89	104	17	10	3	5	139	153	629
105	15	1	0	0	121	122	**H/TOT**	9	4	0	1	4	18	23	286	45	14	18	1	364	395	406	70	27	11	18	532	578	2491
25	7	0	0	0	32	32	16:00	3	0	0	0	2	5	7	82	12	5	1	0	100	104	131	27	1	6	2	167	177	661
22	2	0	0	0	24	24	16:15	2	0	0	0	2	4	6	95	12	3	0	0	110	112	124	27	4	3	2	160	168	644
27	0	0	0	0	27	27	16:30	4	1	0	0	0	5	5	85	16	2	0	0	103	104	120	36	2	4	1	163	170	641
18	2	0	0	0	20	20	16:45	2	1	0	0	0	3	3	97	9	0	1	1	108	110	137	28	4	1	1	171	175	680
92	11	0	0	0	103	103	**H/TOT**	11	2	0	0	4	17	21	359	49	10	2	1	421	430	512	118	11	14	6	661	691	2626
19	2	0	0	0	21	21	17:00	3	0	0	0	0	3	3	94	22	2	1	0	119	121	143	21	2	1	1	168	171	688
19	2	0	0	0	21	21	17:15	4	0	0	0	0	4	4	97	7	0	0	0	104	104	130	23	2	3	0	158	163	641
22	0	0	0	0	22	22	17:30	3	2	0	0	0	5	5	84	8	1	1	0	94	96	137	15	2	3	3	160	168	632
26	2	0	0	0	28	28	17:45	0	1	0	0	0	1	1	85	14	2	0	1	102	104	122	16	3	0	1	142	145	653
86	6	0	0	0	92	92	**H/TOT**	10	3	0	0	0	13	13	360	51	5	2	1	419	425	532	75	9	7	5	628	647	2614
21	1	0	0	1	23	24	18:00	3	0	0	0	0	3	3	85	8	0	1	0	94	95	117	21	1	2	0	141	144	625
17	1	0	0	0	18	18	18:15	3	1	0	0	0	4	4	88	9	0	1	1	99	101	127	15	10	1	1	154	161	643
24	2	0	0	0	26	26	18:30	3	0	0	0	0	3	3	90	12	2	1	0	105	107	110	8	0	1	4	123	128	591
34	1	0	0	0	35	35	18:45	0	1	0	0	0	1	1	81	14	0	0	0	95	95	103	17	3	2	1	126	131	582
96	5	0	0	1	102	103	**H/TOT**	9	2	0	0	0	11	11	344	43	2	3	1	393	399	457	61	14	6	6	544	565	2441
1223	116	9	3	14	1365	1387	**P/TOT**	143	23	1	1	45	213	260	3532	489	140	235	11	4407	4794	4145	903	261	143	99	5551	5966	29433

APPENDIX 14.1

RESOURCE AND WASTE MANAGEMENT PLAN

RESOURCE & WASTE MANAGEMENT PLAN FOR PROPOSED GAS TRANSMISSION PIPELINES WITHIN THE GRANGE CASTLE BUSINESS PARK AREA

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Report Prepared For

Gas Networks Ireland

Report Prepared By

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Our Reference

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Date of Issue

18 August 2023

AWN Consulting Limited
Registered in Ireland No. 319812

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Details	Written by	Approved by
Signature		
Name	David Doran	Chonaill Bradley
Title	Senior Environmental Consultant	Principal Environmental Consultant
Date	18 August 2023	18 August 2023

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource Waste Management Plan (RWMP) on behalf of Gas Networks Ireland. The Proposed Development relates to 5 no. proposed underground transmission pipelines (named GNI134, GNI135, GNI136, GNI137 and GNI142) that are designed to connect to 4 no. permitted Above Ground Installations (AGIs) to the mains gas network either the BGE/13 NEP1 Abbotstown to Brownsbarn transmission gas pipeline, located at the junction of Fonthill Road South (R113) and the Nangor Road (R134) and the BGE/72 Ballough to Brownbarn transmission gas pipeline, located at the junction of Grange Castle Road (R136) and Nangor Road (R134).

This plan provides information necessary to ensure that the management of Construction & Demolition (C&D) waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3], the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4] and the draft *National Waste Management Plan for a Circular Economy* (2023) [5]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also provides appropriate measures in relation to the collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and prescribes measures for the management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout the project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible.

2.0 RESOURCE & WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998*, Changing Our Ways* [6], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2018).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [7] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [8] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) [9] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Circular Economy and Miscellaneous Provisions Act 2022 [10] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will work to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021* [11]. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [12]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and
- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 2 development as it is above following criterion:

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [13] , published by FÁS and the Construction Industry Federation in 2002 and the previous guildines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of South Dublin County Council (SDCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the SDCC area published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices have issued a new draft NWMPCE in June 2023

The current EMR Waste Management Plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste"* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The draft NWMPCE does not dissolve the three regional waste areas. The draft NWCPCE sets the ambition of the plan to have a 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector.

Proposed National Target

1b. (Construction Materials) 2% Reduction / year – Construction & Demolition Waste Generated

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes an €85 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015* (as amended).

The *South Dublin County Council Development Plan 2022– 2028* [14] sets out a number of objectives and actions for the South Dublin area in line with the objectives of the waste management plan.

Policy and Objectives

Policy IE7: Waste Management

Implement European Union, National and Regional waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes.

- **IE7 Objective 1**
  To encourage a just transition from a waste management economy to a green circular economy to enhance employment and increase the value, recovery and recirculation of resources through compliance with the provisions of the Waste Action Plan for a Circular Economy 2020 – 2025 and to promote the use of, but not limited to, reverse vending machines and deposit return schemes or similar to ensure a wider and varying ways of recycling.
- **IE7 Objective 2**
  To support the implementation of the Eastern Midlands Region Waste Management Plan 2015-2021 or as amended by adhering to overarching performance targets, policies and policy actions.
- **IE7 Objective 4**
  To provide for and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the County to facilitate the recycling and recovery of hazardous and non-hazardous municipal wastes.
- **IE7 Objective 7**
  To require the appropriate provision for the sustainable management of waste within all developments, ensuring it is suitably designed into the development, including the provision of facilities for the storage, separation and collection of such waste.
- **IE7 Objective 8**
  To adhere to the recommendations of the National Hazardous Waste Management Plan 2014-2020 and any subsequent plan, and to co-operate with other agencies including the EPA in the planning, organisation and supervision of the disposal of hazardous waste streams, including hazardous waste identified during construction and demolition projects.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 as amended [15]; and
- Circular Economy and Miscellaneous Provisions Act 2022.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is

responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the developer ensures that the waste contractors engaged by construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a waste licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 Design Approach

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials within the design constraints of transmission gas pipeline National Standard I.S. 328: 2021. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

As noted in the EPA guidelines, the approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;
- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (structures, equipment, materials, soils, etc.); and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They should also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
    - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring to reduce the residual volumes of concrete/formwork and wood/packaging, respectively; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

Gas Networks Ireland has set a long-term target to send zero waste to landfill by 2025. Its two main project construction contractors report monthly on their waste KPIs and are also striving to meet Gas Networks Ireland's target of zero waste to landfill by 2025.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be

recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE PROJECT

4.1 Location, Size and Scale of the Development

The overall development encompasses the establishment of five underground transmission gas pipelines (GNI136, GNI134, GNI136, GNI137 and GNI142), collectively catering to four distinct customer developments. These pipelines are intrinsically interconnected and share a new section of pipeline before splitting off towards the respective customer connection, and facilitate the linkage between the existing gas network and four permitted above-ground installations: namely, the Ballybane AGI, Milltown AGI, Kilcarbery AGI, and Profile Park AGI. The underground transmission gas pipelines once constructed will be owned and operated by the Applicant, Gas Networks Ireland (GNI).

This section of the development description separates the geographical segments of these pipelines into eight divisible parts. A summary representation of these eight divisible route sections, encompassing their starting points, endpoints, and lengths, is provided in Table 2.3.

Table 4.1 Summary of Proposed Transmission Gas Pipeline sections

Route Section	Commences	Terminates	Total Length (m)
GNI136 (Clonburris Pipeline)	Existing BGE13 NEP1 Brownsbarn to Abbotstown 450NB	Ballybane AGI.	3412 m
GNI134 Section 1 (Milltown Pipeline	Existing BGE72 Ballough to Brownsbarn 900NB	Kilcarbery Offtake Junction (located at Nangor Rd / Kilcarbery Rd junction)	805 m of the 3045 m total
GNI134 Section 2 (Milltown Pipeline	Kilcarbery Offtake Junction	Ballybane Offtake Junction	641 m of the 3045 m total
GNI134 Section 3 (Milltown Pipeline)	Ballybane AGI Offtake	Milltown AGI	1599 m of the 3045 m total
GNI 135 (Ballybane pipeline)	Ballybane Offtake Junction	Ballybane AGI	77 m
GNI 137 Section 1 (Kilcarbery pipeline)	Kilcarbery Offtake Junction	Profile Park Offtake Junction	291 m of 500m total
GNI 137 Section 2 (Kilcarbery pipeline)	Profile Park Offtake Junction	Kilcarbery AGI	209 m of 500m total
GNI142 (Profile Park pipeline)	Profile Park Offtake Junction	Profile Park AGI	455 m

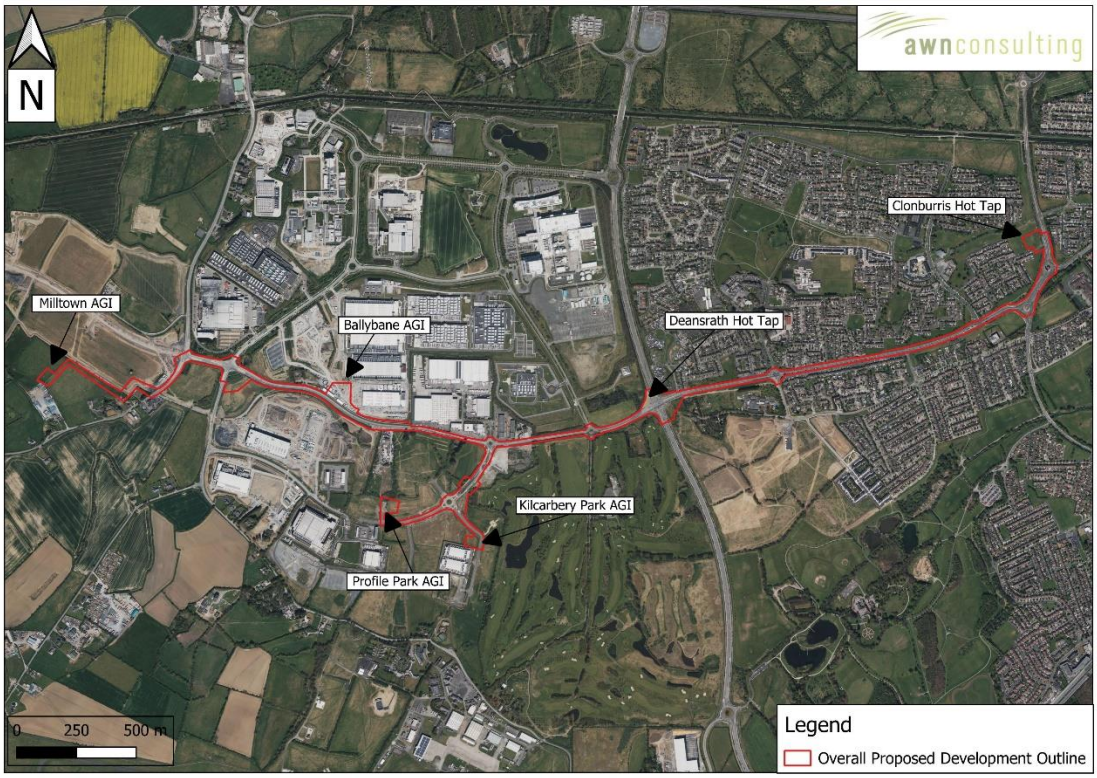

Figure 4.1 Proposed site location of the overall development (illustrated by redline boundary)

Gas to Ballybane AGI

The Applicant is applying to the CRU for consent to install 2 no. underground transmission gas pipeline routes, (1) a primary connection from the existing BGE/72 to the permitted Ballybane AGI at the Microsoft Facility; and (2) a secondary connection from the existing NEP1 to the permitted Ballybane AGI at the Microsoft Facility. The Proposed Underground Transmission Gas Pipeline Connections to Ballybane AGI requires the following geographical sections: GNI134 Section 1, GNI134 Section 2, GNI135, and GNI136.

The first underground transmission gas pipeline route (GNI134 Section 1, GNI134 Section 2) connects the existing BGE/72 Ballough to Brownsbarn to the permitted Ballybane AGI and is a linear route of c. 1.523km, of which 1.446km has a 400mm NB (Nominal Bore) and 0.077km has a 200mm NB. This route will be largely within public roads, and will be entirely installed by open cut method. The c. 1.446km route can be summarised as approximately:

- Commencing from the existing 900mm NB transmission gas pipeline via a hot tap connection ('Deansrath') in the grassy area directly to the east of the Grange Castle Road at a depth of 3.7m and crossing the Grange Castle Road west;
- Following the northern footpath/cycle path of the Nangor Road south west to cross the Nangor Road south;
- Extending west along the road lanes, foot paths and cycle paths of the Nangor Road, to the Kilcarbery Offtake junction, located at the Nangor Road/Profile Park Road junction;
- Continuing from the Kilcarbery Offtake junction, extending for c. 641m along the road lanes, verges, foot paths and cycle paths of the Nangor Road to the Ballybane Offtake junction;
- Continuing from the Ballybane Offtake junction and crossing the Nangor Road north for c. 26m; and
- Extending north through the Microsoft campus for c. 51m and terminating at the permitted Ballybane AGI.

The second redundancy underground transmission gas pipeline (the GNI136) connects the existing BGE/13 NEP1 Brownsbarn to Abbottstown pipeline to the permitted Ballybane AGI, and is a linear route of c. 3.21 km and has proposed a 200mm NB. The 3.21 km pipeline will be largely within public roads, and will be installed using an open cut method and is summarised as:

- Connection will be made to tie-in to the existing BGE/13 NEP1 Brownsbarn to Abbottstown pipeline utilising a hot tap offtake valve arrangement (to be named 'Clonburris') located to the west of Fonthill Road South,
- Following the curve of the Nangor Road/Fonthill Road South roundabout to the south along the Fonthill Road South for c. 350m; and
- Turning west to run for c. 2.9k m along the verge, combined footpath and cycling path or road lanes of the Nangor Road; and
- Extending to the north c. 30m from verge of the Nangor Road (R134) and terminating at the permitted Ballybane AGI.

These two proposed transmission pipelines provide the necessary connection to the permitted Microsoft Facility. The Microsoft Facility data centres and gas generation plant are permitted by SDCC Reg. Ref.: SD20A/0283 and SD21A/0203.

Figure 4.2 Proposed site location for the Gas to Ballybane AGI development

Gas to Milltown AGI

The Applicant is applying to the CRU for consent to install 1 no. underground transmission gas pipeline route to connect the existing BGE/72 gas transmission pipeline to the Milltown AGI. The Proposed Underground Transmission Gas Pipeline Connection to Milltown AGI requires the following geographical sections: GNI134 Section 1, GNI134 Section 2, and GNI134 Section 3.

The underground transmission gas pipeline (GNI134 Section 1, 2 and 3) connects the existing BGE/72 Ballough to Brownsbarn pipeline to the permitted Milltown AGI, and is a linear route of c. 3.045km and has proposed a 400mm NB. The 3.045km pipeline will be largely within public roads, and will predominantly be installed using an open cut

method. The route involves 1 no. crossing of the Griffeen River which will be undertaken using trenchless method. The route is summarised as:

- Commencing from the existing 900mm NB transmission gas pipeline via a hot tap connection ('Deansrath') in the grassy area directly to the east of the Grange Castle Road at a depth of 3.7m and crossing the Grange Castle Road west;
- Following the northern footpath/cycle path of the Nangor Road south west to cross the Nangor Road south;
- Extending west along the road lanes, foot paths and cycle paths of the Nangor Road, to the Kilcarbery Offtake junction, located at the Nangor Road/Profile Park Road junction;
- Continuing from the Kilcarbery Offtake junction, extending for c. 641m along the road lanes, verges, foot paths and cycle paths of the Nangor Road to the Ballybane Offtake junction;
- Continuing from the Ballybane Offtake junction at the verge of the Nangor Road and extending for c. 746m north west along the verge, cycle path and foot path of the Nangor Road. This portion of the route also includes a crossing of the River Griffeen which will be undertaken via an underground auger bore in the grassy verge south east of the Nangor Road/Baldonnel Road junction;
- Turning south at the Nangor Road/Peamount Road junction and extending south west for c. 594m within the lanes of the Peamount Road; and
- Turning west off the Peamount Road to extend for c. 259m through the Data & Power Hub Services campus and terminating at the permitted Milltown AGI.

The proposed transmission pipeline provides the necessary connection to the permitted Data & Power Hub Services Facility. The Data & Power Hub Services Facility ICT facilities are permitted by SDCC Reg. Ref.: SD20A/0324 and the power plant is permitted by SDCC Reg. Ref.: SD20A/0058.

Figure 4.3 Proposed site location for the Gas to Milltown AGI development

Gas to Profile Park AGI

The Applicant is applying to the CRU for consent to install 1 no. underground transmission gas pipeline route to connect the existing BGE/72 gas transmission pipeline to the Profile Park AGI. The Proposed Underground Transmission Gas Pipeline Connection to Profile Park AGI requires the following geographical sections: GNI134 Section 1, GNI137 Section 1, and GNI142.

The underground transmission gas pipeline route (GNI134 Section 1, GNI137 Section 1 and GNI142) connects the existing BGE/72 Ballough to Brownsbarn to the permitted Profile Park AGI and is a linear route of c. 1.551km, of which 0.805km has a 400mm NB (Nominal Bore) and 0.746km has a 200mm NB. This route will be largely within public roads, and will be entirely installed by open cut method. The c. 1.551km route can be summarised as approximately:

- Commencing from the existing 900mm NB transmission gas pipeline via a hot tap connection ('Deansrath') in the grassy area directly to the east of the Grange Castle Road at a depth of 3.7m and crossing the Grange Castle Road west;
- Following the northern footpath/cycle path of the Nangor Road south west to cross the Nangor Road south;
- Extending west along the road lanes, foot paths and cycle paths of the Nangor Road, to the Kilcarbery Offtake junction, located at the Nangor Road/Profile Park Road junction;
- Continuing from the Kilcarbery Offtake junction and extending south along the Nangor Road/Profile Park Road junction for c. 20m;
- Continuing south for c. 176m within the lanes of the Profile Park Road;
- Continuing south through the adjacent verge to the east of the Profile Park Road for c. 95m to the Profile Park Offtake junction, located in the verge directly east of the Profile Park roundabout;
- Continuing from the Profile Park Offtake junction and extending west for c. 405m within the lanes of the Profile Park Road; and
- Turning north and following the offroad into the Vantage campus for c. 50m to terminate at the Profile Park AGI.

The proposed transmission pipeline provides the necessary connection to the permitted Vantage Facility. The Vantage Facility data centres and multifuel generation plant are permitted by SDCC Reg. Ref.: SD21A/0241 and subsequent amendment SDCC Reg. Ref.: SD23A/0035.

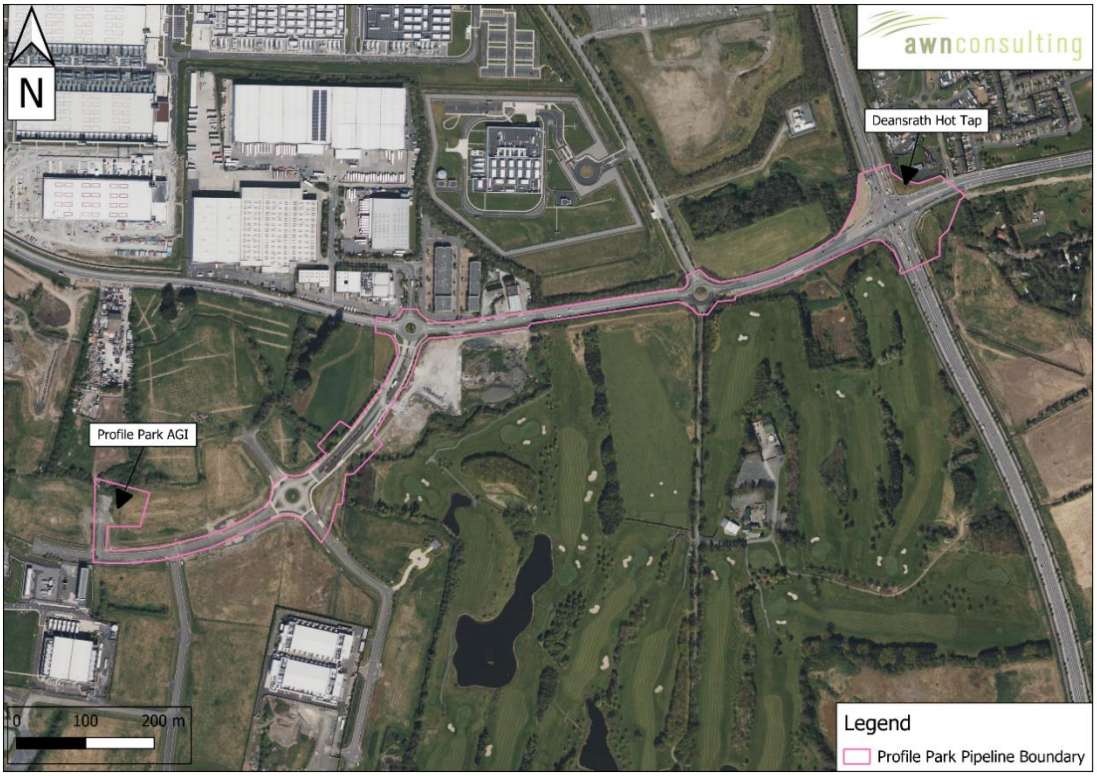

Figure 4.4 Proposed site location for the Gas to Profile Park AGI development

Gas to Kilcarbery AGI

The Applicant is applying to the CRU for consent to install 1 no. underground transmission gas pipeline route to connect the existing BGE/72 gas transmission pipeline to the Kilcarbery AGI. The Proposed Underground Transmission Gas Pipeline Connection to Kilcarbery AGI requires the following geographical sections: GNI134 Section 1, GNI137 Section 1, and GNI137 Section 2.

The underground transmission gas pipeline (GNI134 Section 1, and GNI137 Section 1 and 2) connects the existing BGE/72 Ballough to Brownsbarn pipeline to the permitted Kilcarbery AGI, and is a linear route of c. 1.305km, of which 0.805km has a 400mm NB (Nominal Bore) and 0.5km has a 200mm NB. The 1.305km pipeline will be largely within public roads, and will be entirely installed using an open cut method. The route involves 2 no. crossings of the Baldonnel Stream which will be undertaken using an open cut method. The route is summarised as:

- Commencing from the existing 900mm NB transmission gas pipeline via a hot tap connection ('Deansrath') in the grassy area directly to the east of the Grange Castle Road at a depth of 3.7m and crossing the Grange Castle Road west;
- Following the northern footpath/cycle path of the Nangor Road south west to cross the Nangor Road south;
- Extending west along the road lanes, foot paths and cycle paths of the Nangor Road, to the Kilcarbery Offtake junction, located at the Nangor Road/Profile Park Road junction;
- Continuing from the Kilcarbery Offtake junction and extending south along the Nangor Road/Profile Park Road junction for c. 20m;
- Continuing south for c. 176m within the lanes of the Profile Park Road;
- Continuing south through the adjacent verge to the east of the Profile Park Road for c. 95m to the Profile Park Offtake junction, located in the verge directly east of the Profile Park roundabout;
- Continuing from the Profile Park Offtake junction and extending south through the adjacent verge to the east of the Profile Park Road for c. 53m;

- Following the Profile Park Road south east for c. 156m within the lanes of the road. This portion of the route also includes a crossing of the culverted Baldonnel Stream which will be undertaken via open cut method.; and
- Turning west into the Greener Ideas campus and terminating at the Kilcarbery AGI. This portion of the route also includes a crossing of the open Baldonnel Stream which will be undertaken via open cut method.

The proposed transmission pipeline provides the necessary connection to the permitted Greener Ideas Facility. The Greener Ideas Facility power plant is permitted by SDCC Reg. Ref.: SD21A/0167.

Figure 4.5 Proposed site location for the Gas to Kilcarbery AGI development

4.2 Details of the Non-Hazardous Wastes to be produced

There will be soil, tarmac and hardcore excavated to facilitate the installation of the underground transmission gas pipelines.

Excavations of soil, tarmac and hardcore will be required for the Proposed Development site to facilitate the installation of the underground transmission gas pipeline in the form of an open cut trench. There will be soil, tarmac and hardcore excavated to facilitate the installation of the transmission gas pipeline The estimated quantities of material to be excavated for Gas to Ballybane AGI, Gas to Milltown AGI, Gas to Profile Park and Gas to Kilcarbery AGI can be seen in Table 4.2 below.. It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

Table 4.2 *Excavation Quantities*

Development element	Estimated excavation volumes (m^3)
Gas to Ballybane AGI	6810
Gas to Milltown AGI	4415

Gas to Profile Park AGI	2151
Gas to Kilcarbery AGI	2367

4.3 Potential Hazardous Wastes to be produced

4.3.1 Contaminated Soil

Site investigations and environmental soil testing will be undertaken prior to any excavated material being removed from the development site.

In the event that any potentially contaminated material is encountered, it will need to be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* (2018) [17] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC*, which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify SDCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded (or stored in double-skinned tanks) and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil wastage at the site.

4.3.3 Invasive Plant Species

A site survey was undertaken by Moore Group on 3rd August 2023. No invasive species, such as Japanese Knotweed *Fallopia japonica,* listed on the Third Schedule of the Birds and Habitats Regulations were recorded at the development site.

If any invasive species, such as Japanese Knotweed Fallopia japonica, which is listed on the Third Schedule of the Birds and Habitats Regulations, are recorded on the site, a species-specific management plan will be created and submitted to SDCC and the necessary remediation measures will be undertaken.

4.3.4 Asbestos

If ACMs are detected on site, the removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*. All material will be taken to a suitably licensed or permitted facility.

4.3.5 Other known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or light bulbs and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes (if encountered) will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 Roles and Responsibilities

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of this RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is submitted to the local authority, and their agreement obtained, prior to commencement of works on site;
- The Client will request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This will also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;

- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the RWMP throughout the construction phase (including the management of all suppliers and sub-contractors) as per the requirements of the EPA guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) will be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information will be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that will be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;
- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main C&D Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 6.1. The List of Waste (LoW) code (effective from 5th July 2018) for each waste stream is also shown.

Table 6.1 Typical waste types generated and LoW codes (*individual waste types may contain hazardous substances)

Waste Material	LoW Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

7.0 WASTE MANAGEMENT

7.1 Demolition Waste Generation

There will be no demolition required as part of this proposed developmen. It is envisaged the trench width of concrete and asphalt/bitmac will be temporary reinstatement after every day and permanent reinstatement of all concrete and asphalt/bitmac sections will be done at a later date as agreed with local authority / business park, Permanent reinstatement will be carried out in accordance with the design drawings and IS 328:2021, GNI/AO/SP/007, Guidelines for Managing Openings in Public Roads 2017 (The Purple Book) and to the approval of the local authority and/or private landowners, unless otherwise agreed with local authorities.

7.2 Construction Waste Generation

Table 7.1 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [18], the joint EPA and Galway-Mayo Institute of Technology (GMIT) *EPA Research Report 146* [19] and other research reports.

Table 7.1 Waste materials generated on a typical Irish construction site.

Waste Types	%
Mixed C&D	33
Timber	28

Waste Types	%
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Tables 7.2 – 7.5 show the predicted construction waste generation for four (4 no.) pipelines routes associated with the proposed development, based on the information available to date along with the targets for management of the waste streams. The predicted waste amounts are based on an average largescale development waste generation rate per m^2, using the waste breakdown rates shown in Table 7.1 and the proposed length of each pipeline.

Any waste which is generated during the construction phase will be stored at a construction compound prior to collection. Space will be allocated at the designated construction compound(s) for this purpose.

The Proposed Development will require the establishment of 9 site compounds in order to facilitate the proposed development works. The proposed site construction compounds are as follows:

- 1 no. compound at the proposed Clonburris hot tap
- 1 no. compound at the proposed Deansrath hot tap.
- 1 no. compound at the proposed Griffeen River crossing.
- 4 no. typical compound at the permitted AGIs.
- 2 no. ancillary compound and material storage areas along the pipeline route

The final site compound locations will be established in collaboration with the construction contractor, taking into account the pending landowner agreements. Despite the uncertainty surrounding the exact locations, a methodical site selection approach has been outlined through the established criteria in Section 2.5.4 of Chapter 2 of the accompanying EIAR.

Gas to Ballybane AGI

Table 7.2 Estimated off-site reuse, recycle and disposal rates for construction waste.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	9.7	10	1.0	80	7.8	10	1.0
Timber	8.2	40	3.3	55	4.5	5	0.4
Metals	2.3	5	0.1	90	2.1	5	0.1
Concrete	1.8	30	0.5	65	1.1	5	0.1
Other	4.4	20	0.9	60	2.6	20	0.9
Total	**26.4**		**5.8**		**18.2**		**2.5**

In addition to the information in Table 7.2, excavations of soil, tarmac and hardcore will be required for the Proposed Development site to facilitate the installation of the underground transmission gas pipeline in the form of an open cut trench. There will be soil, tarmac and hardcore excavated to facilitate the installation of the transmission gas pipeline. It is estimated that c. 6,810 m^3 of material will be excavated to facilitate this pipeline area of the Proposed Development. It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due

to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

Gas to Milltown AGI

Table 7.3 Estimated off-site reuse, recycle and disposal rates for construction waste.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	6.0	10	0.6	80	4.8	10	0.6
Timber	5.1	40	2.0	55	2.8	5	0.3
Metals	1.4	5	0.1	90	1.3	5	0.1
Concrete	1.1	30	0.3	65	0.7	5	0.1
Other	2.7	20	0.5	60	1.6	20	0.5
Total	**16.3**		**3.6**		**11.2**		**1.5**

In addition to the information in Table 7.3, excavations of soil, tarmac and hardcore will be required for the Proposed Development site to facilitate the installation of the underground transmission gas pipeline in the form of an open cut trench. There will be soil, tarmac and hardcore excavated to facilitate the installation of the transmission gas pipeline. It is estimated that c. 4,415 m^3 of material will be excavated to facilitate this pipeline area of the Proposed Development. It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

Gas to Profile Park AGI

Table 7.4 Estimated off-site reuse, recycle and disposal rates for construction waste.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	2.6	10	0.3	80	2.0	10	0.3
Timber	2.2	40	0.9	55	1.2	5	0.1
Metals	0.6	5	0.0	90	0.6	5	0.0
Concrete	0.5	30	0.1	65	0.3	5	0.0
Other	1.2	20	0.2	60	0.7	20	0.2
Total	**7.0**		**1.5**		**4.8**		**0.7**

In addition to the information in Table 7.4, excavations of soil, tarmac and hardcore will be required for the Proposed Development site to facilitate the installation of the underground transmission gas pipeline in the form of an open cut trench. There will be soil, tarmac and hardcore excavated to facilitate the installation of the transmission gas pipeline. It is estimated that c. 2,151 m^3 of material will be excavated to facilitate this pipeline area of the Proposed Development. It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

Gas to Kilcarbery AGI

Table 7.5 Estimated off-site reuse, recycle and disposal rates for construction waste.

Waste Type	Tonnes	Reuse	Recycle/Recovery	Disposal

		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	3.0	10	0.3	80	2.4	10	0.3
Timber	2.6	40	1.0	55	1.4	5	0.1
Metals	0.7	5	0.0	90	0.7	5	0.0
Concrete	0.6	30	0.2	65	0.4	5	0.0
Other	1.4	20	0.3	60	0.8	20	0.3
Total	**8.3**		**1.8**		**5.7**		**0.8**

In addition to the information in Table 7.5, excavations of soil, tarmac and hardcore will be required for the Proposed Development site to facilitate the installation of the underground transmission gas pipeline in the form of an open cut trench. There will be soil, tarmac and hardcore excavated to facilitate the installation of the transmission gas pipeline. It is estimated that c. 2,367 m^3 of material will be excavated to facilitate this pipeline area of the Proposed Development. It is envisaged that excavated material will need to be removed offsite due to the limited opportunities for reuse on site, due to the excavation of tarmac and hardcore. This material will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

7.3 Proposed Resource and Waste Management Options

Waste materials generated will be segregated on site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided at designated temporary construction compounds. These compounds will facilitate segregation at source where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the SDCC Region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arising's requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

Written records will be maintained by the contractor(s) detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and Certificate of Registration (COR)/ waste permit or licence for the receiving waste facility for all waste removed off site for appropriate reuse, recycling, recovery and/or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc, if required.

The management of the main waste streams is outlined as follows:

<u>Soil, Tarmac and Hardcore</u>
The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

It is envisaged that there will be limited opportunity for reuse on site due to the excavation of tarmac and hardcore. As such, it is envisaged that the majority of excavated material will be removed off site for appropriate reuse, recycling, recovery and/or disposal. When material is removed off-site it could be reused as a by-product

(and not as a waste). If this is done, it will be done in accordance with Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2018) publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Regulation 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Regulation 27. Regulation 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

It is likely that bedrock will be encountered on site during the excavations required to auger bore under the Griffeen River. it is not envisaged that bedrock will be encountered elsewhere. Where bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from SDCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception should be carried out on runoff and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed offsite.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate waste facility permit will be obtained from SDCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber
Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be disposed of in a separate skip and recycled off-site.

Metal
Metals will be segregated where practical and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard
There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phase will be stored in a separate skip, pending collection for recycling. The site manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass
Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment (WEEE)
Any WEEE will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling.

Other Recyclables
Where any other recyclable wastes such as cardboard and soft plastic are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste
C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 9.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Other Hazardous Wastes
On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing
If the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from SDCC and the destination of the accepting waste facility will be supplied to the SDCC waste unit.

It should be noted that until a construction contractor is appointed it is not possible to provide information on the specific destinations of each construction waste stream. Prior to commencement of construction and removal of any waste offsite, details of the proposed destination of each waste stream will be provided to SDCC by the project team.

7.4 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RM (see Section 9.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Act 1996 as amended*, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 9.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR/permit or EPA Waste Licence for that site will be provided to the nominated project RM (see Section 9.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on site.

8.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below.

The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

8.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle/recovery/disposal costs associated with the requirement for a waste contractor to take the material off-site.

Clean and inert soils, gravel, stones etc. which cannot be reused on site may be used as access roads or capping material for landfill sites etc. This material is often taken free of charge or a reduced fee for such purposes, reducing final waste disposal costs.

8.2 Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips.

Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes such as timber from a site than mixed waste.

8.3 Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes an €85 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc. is also used as fill/capping material, wherever possible.

9.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

9.1 Resource Waste Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

9.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

10.0 TRACKING AND TRACING / RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver should stop at the site office and

sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Quantity
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- LoW

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the SDCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically checked by the RM. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

11.0 OUTLINE WASTE AUDIT PROCEDURE

11.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the construction phase of the proposed development. Contact details for the nominated RM will be provided to the SDCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

11.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest

percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

12.0 C&D ENVIRONMENTAL MITIGATION MEASURES

During the construction phase the project Construction Environmental Management Plan (CEMP) will be followed in regard to implementing and managing all environmental management requirements.

This CEMP explains the construction techniques and methodologies which will be implemented during the construction of the proposed development.

The CEMP mitigation measures will be implemented to ensure that pollution and nuisances arising from site clearance and construction activities is prevented where possible and managed in accordance with best practice environmental protection.

The CEMP will be implemented and adhered to by the construction contractors and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, RM and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures.

13.0 CONSULTATION WITH RELEVANT BODIES

13.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the SDCC Waste Regulation Unit.

SDCC will also be consulted, as required, throughout the excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

13.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

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14.0 REFERENCES

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