Carrickmines-Shanganagh River Flood Relief Scheme

EIAR – Volume 3 Appendices

February 2025

www.jbaconsulting.ie

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Revision History

Revision Ref/Suitability Code/ Date	Amendments	Issued to
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Contract

This report relates to the Carrickmines-Shanganagh River Flood Relief Scheme commissioned by Dún Laoghaire-Rathdown County Council (DLRCC), on behalf of the Office of Public Works (OPW). Conor O'Neill and Bernadette O'Connell of JBA Consulting compiled this report, which was prepared by the competent experts listed in Table 1-1 of Volume 2, Chapter 1.

Purpose

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Abbreviations

AA	Appropriate Assessment
AEP	Annual Exceedance Probability
CFRAM	Catchment Flood Risk Assessment and Management
DLRCC	Dun Laoghaire Rathdown County Council
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FRS	Flood Relief Scheme
GHS	Geological Heritage Site
GIS	Geographic Information System
GSI	Geological Survey Ireland
MCA	Multi-Criteria Assessment
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
PCD	Public Consultation Day
PE	Population Equivalent
pNHA	Proposed Natural Heritage Area
QI	Qualifying Interest
RBMP	River Basin Management Plan
SAC	Special Areas of Conservation
SFRA	Strategic Flood Risk Assessment
SoP	Standard of Protection
SPA	Special Protection Areas
UWWTP	Urban Wastewater Treatment Plant
WFD	Water Framework Directive
WWTP	Wastewater Treatment Plant
ZoI	Zone of Influence

1 Introduction

This document includes all appendices to the Carrickmines-Shanganagh River Flood Relief Scheme (FRS) Environmental Impact Assessment Report (EIAR). The EIAR is presented over three volumes.

- Volume 1: Non-Technical Summary
- Volume 2: Main Report
- Volume 3: Appendices (this document)

Appendices are presented for the following EIAR Chapters:

- Chapter 5, Consultation
- Chapter 8, Biodiversity
- Chapter 13, Cultural Heritage
- Chapter 14, Landscape and Visual Impact Assessment.

The appendices are laid out in the following sections, numbered in the same order as the EIAR chapters in Volume 2, Main Report.

2 Examination of Alternatives Appendices

No appendices.

3 Description of Proposed Development Appendices

No appendices.

4 Legislation and Planning Policy Appendices

No appendices.

5 Consultation Appendices

5.1 Geological Survey Ireland – Scoping Response

An Roinn Comhshaoil,
Aeráide agus Cumarsáide
Department of the Environment,
Climate and Communications

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Conor O'Neill
JBA Consulting
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Rathcoole, D24 CY64

06 March 2024

Re: Carrickmines-Shanganagh Flood Relief Scheme (FRS) - EIAR Scoping
Your Ref: 20108-JBAI-XX-XX-RP-EN-00302_EIAR_Screening&Scoping_P02.01
Our Ref: 24/66

Dear Conor,

Geological Survey Ireland is the national earth science agency and is a division of the Department of the Environment, Climate and Communications. We provide independent geological information and gather various data for that purpose. Please see our website for data availability. We recommend using these various data sets, when conducting the EIAR, SEA, planning and scoping processes. Use of our data or maps should be attributed correctly to 'Geological Survey Ireland'.

The publicly available data referenced/presented here, should in no way be construed as Geological Survey Ireland support for or objection to the proposed development or plan. The data is made freely available to all and can be used as independent scientific data in assessments, plans or policies. It should be noted that in many cases this data is a baseline or starting point for further site specific assessments.

With reference to your email received on the 01 March 2024, concerning the Carrickmines-Shanganagh Flood Relief Scheme (FRS) - EIAR Scoping, Geological Survey Ireland would encourage use of and reference to our datasets. Please find attached a list of our publicly available datasets that may be useful to the environmental assessment and planning process. We recommend that you review this list and refer to any datasets you consider relevant to your assessment. The remainder of this letter and following sections provide more detail on some of these datasets.

Geoheritage

Geological Survey Ireland is in partnership with the National Parks and Wildlife Service (NPWS, Department of Housing, Local Government and Heritage), to identify and select important geological and geomorphological sites throughout the country for designation as geological NHAs (Natural Heritage Areas). This is addressed by the Geoheritage Programme of Geological Survey Ireland, under 16 different geological themes, in which the minimum number of scientifically significant sites that best represent the theme are rigorously selected by a panel of theme experts.

County Geological Sites (CGSs), as adopted under the National Heritage Plan, include additional sites that may also be of national importance, but which were not selected as the very best examples for NHA designation. All geological heritage sites identified by Geological Survey Ireland are categorised as CGS pending any further NHA designation by NPWS. CGSs are now routinely included in County Development Plans and in the GIS of planning departments, to ensure the recognition and appropriate protection of geological heritage within the planning system. CGSs can be viewed online under the Geological Heritage tab on the online Map Viewer.

The audit for Dún Laoghaire-Rathdown was carried out in 2014. The full report details can be found here. **Our records show that there is a CGS in the vicinity of the proposed Flood Relief Scheme.**

> **Killiney Bay**, Co Dublin. (Central ITM: 326272, 222516). Under IGH theme 'IGH 7 Quaternary'. Link to site report at DLR007. A 5 kilometres long coastal section exposes a succession of several units of glacial till. A particularly impressive exposure into deep till with many sedimentological characteristics exposed. The site is effectively included within the existing proposed Dalkey Coastal Zone and Killiney Hill NHA. Coastal erosion is a threat at Killiney Bay, as are the controlling measures such as erection of baffles and mesh-wire structures to stop recession of the cliffs.

With the current plan, there are no envisaged impacts on the integrity of current CGSs by the proposed development. However, if the proposed development plan is altered, please contact Clare Glanville (Clare.Glanville@gsi.ie) for further information and possible mitigation measures if applicable.

Groundwater

Geological Survey Ireland's Groundwater and Geothermal Unit, provides advice, data and maps relating to groundwater distribution, quality and use, which is especially relevant for safe and secure drinking water supplies and healthy ecosystems. Proposed developments need to consider any potential impact on specific groundwater abstractions and on groundwater resources in general. We recommend using the groundwater maps on our Map viewer which should include: wells; drinking water source protection areas; the national map suite - aquifer, groundwater vulnerability, groundwater recharge and subsoil permeability maps. For areas underlain by limestone, please refer to the karst specific data layers (karst features, tracer test database; turlough water levels (gwlevel.ie). Background information is also provided in the Groundwater Body Descriptions. Please read all disclaimers carefully when using Geological Survey Ireland data.

The Groundwater Data Viewer indicates aquifers classed as a 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones' and a 'Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones' underlie the proposed development.

The Groundwater Vulnerability map indicates the range of groundwater vulnerabilities within the area covered is variable. We would therefore recommend use of the Groundwater Viewer to identify areas of High to Extreme Vulnerability and 'Rock at or near surface' in your assessments, as any groundwater-surface water interactions that might occur would be greatest in these areas.

GWClimate is a groundwater monitoring and modelling project that aims to investigate the impact of climate change on groundwater in Ireland. This is a follow on from a previous project (GWFlood) and the data may be useful in relation to Flood Risk Assessment (FRA) and management plans. Maps and data are available on the Map viewer.

Geological Survey Ireland has completed Groundwater Protection Schemes (GWPSs) in partnership with Local Authorities, and there is now national coverage of GWPS mapping. A Groundwater Protection Scheme provides guidelines for the planning and licensing authorities in carrying out their functions, and a framework to assist in decision-making on the location, nature and control of developments and activities in order to protect groundwater. **The Groundwater Protection Response overview and link to the main reports is here: https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/projects/protecting-drinking-water/what-is-drinking-water-protection/county-groundwater-protection-schemes/Pages/default.aspx**

Geological Mapping

Geological Survey Ireland maintains online datasets of bedrock and subsoils geological mapping that are reliable and accessible. We would encourage you to use these data which can be found here, in your future assessments.

Please note we have recently launched QGIS compatible bedrock (100K) and Quaternary geology map data, with instructional manuals and videos. This makes our data more accessible to general public and external stakeholders. QGIS compatible data can be found in our downloadable bedrock 100k .zip file on the Data & Maps section of our website.

Our 3D models can help stakeholders visualize, understand and characterise geology, for deposit and resource mapping, for flooding and for urban geology applications including basement impact assessment, Sustainable Drainage Systems (SuDS), and subsurface management. Our 3D models offer a key element of geotechnical risk management by identifying areas requiring further site investigation.

Further information on the bedrock and Quaternary 3D models of Dublin is available here and here.

Geotechnical Database Resources

Geological Survey Ireland continues to populate and develop our national geotechnical database and viewer with site investigation data submitted voluntarily by industry. The current database holding is over 7500 reports with 134,000 boreholes; 31,000 of which are digitised which can be accessed through downloads from our Geotechnical Map Viewer. We would encourage the use of this database as part of any baseline geological assessment of the proposed development as it can provide invaluable baseline data for the region or vicinity of proposed development areas. This information may be beneficial and cost saving for any site-specific investigations that may be designed as part of the project.

Geohazards

Geohazards can cause widespread damage to landscapes, wildlife, human property and human life. In Ireland, landslides, flooding and coastal erosion are the most prevalent of these hazards. We recommend that geohazards be taken into consideration, especially when developing areas where these risks are prevalent, and we encourage the use of our data when doing so.

Geological Survey Ireland has information available on landslides in Ireland via the National Landslide Database and Landslide Susceptibility Map both of which are available for viewing on our dedicated Map Viewer. Associated guidance documentation relating to the National Landslide Susceptibility Map is also available.

Geological Survey Ireland also engaged in a national project on Groundwater Flooding. The data from this project may be useful in relation to Flood Risk Assessment (FRA) and management plans, and is described in more detail under 'Groundwater' above.

Coastal Vulnerability while seen as a potential geohazard, is discussed in more detail under our marine and coastal unit information below.

Natural Resources (Minerals/Aggregates)

Geological Survey Ireland provides data, maps, interpretations and advice on matters related to minerals, their use and their development in our Minerals section of the website. The Active Quarries, Mineral Localities and the Aggregate Potential maps are available on our Map Viewer.

We would recommend use of the Aggregate Potential Mapping viewer to identify areas of High to Very High source aggregate potential within the area. In keeping with a sustainable approach we would recommend use of our data and mapping viewers to identify and ensure that natural resources used in the proposed flood relief scheme are sustainably sourced from properly recognised and licensed facilities, and that consideration of future resource sterilization is considered.

Geochemistry of soils, surface waters and sediments for Dublin Region

Geological Survey Ireland provides baseline geochemistry data for Ireland as part of the Tellus programme. Data is available at https://www.gsi.ie/en-ie/data-and-maps/Pages/Geochemistry.aspx**. This page also hosts urban geochemistry mapping (Dublin SURGE project) which may be useful to the project.**

Geological Survey Ireland has completed a geochemical characterization of the subsoil beneath large parts of Dublin, known colloquially as the Dublin Boulder Clay. The report documents the analysis completed on a third-party geochemical dataset obtained from the private sector and is accompanied by an excel spreadsheet containing the database of geochemical observations. Further details can be found at: https://www.gsi.ie/en-ie/publications/Pages/Geochemical-characterization-of-the-Dublin-Boulder-Clay.aspx

Marine and Coastal Unit

Our marine environment is hugely important to our bio-economy, transport, tourism and recreational sectors. It is also an important indicator of the health of our planet. Geological Survey Ireland's Marine and Coastal Unit in partnership with the Marine Institute, jointly manages INFOMAR, Ireland's national marine mapping programme; providing key baseline data for Ireland's marine sector.

The programme delivers a wide range of benefits to multi-sectoral end-users across the national blue economy with an emphasis on enabling our stakeholders. Demonstrated applications for the use of INFOMAR's suite of mapping products include Shipping & Navigation, Fisheries Management, Aquaculture, Off-shore Renewable Energies, Marine Leisure & Tourism and Coastal Behaviour.

INFOMAR data such as bathymetry, backscatter, sediment classification, shipwrecks and survey metadata can be downloaded free of charge in a variety of formats at the INFOMAR Marine Data Download Portal: https://experience.arcgis.com/experience/9213db3d963d4f3cab3a220323d7cd4e/page/Page-1/?views=Download-Vector-Datasets

INFOMAR also produces a wide variety of seabed mapping products that enable public and stakeholders to visualize Ireland's seafloor environment https://www.infomar.ie/maps/downloadable-maps/maps. Story maps have also been developed providing a different perspective of some of the bays and harbors of the Irish coastline. We would therefore recommend use of our Marine and Coastal Unit datasets available on our website and Map Viewer.

The Marine and Coastal Unit also participate in coastal change projects and are undertaking mapping in areas such as coastal vulnerability and coastal erosion. Further information on these projects can be found here.

National Coastal Change Assessment

Geological Survey Ireland is undertaking a National Coastal Change Assessment. As part of this initiative two mapping products will be delivered for the entire Irish coastline: **coastal vulnerability mapping and shoreline change.**

Coastal vulnerability maps will provide an insight into the relative susceptibility of the Irish coast to adverse impacts of sea-level rise through the use of a **Coastal Vulnerability Index** (CVI). Currently the project is being carried out on the east coast and will be rolled out nationally over the next couple of years, detailed information and maps are available here. **Shoreline change rates** for the period 2000 to 2023 are being prioritised and will be released by county on a rolling basis over the next 12 months. Shoreline change rates database and reports will be accessible from GSI web mapping viewers. These suite of coastal mapping products are aimed at coastal managers to prioritise or concentrate efforts on adaptation.

Guidelines

The following guidelines may also be of assistance:

- Institute of Geologists of Ireland, 2013. Guidelines for the Preparation of the Soils, Geology and Hydrogeology Chapters of Geology in Environmental Impact Statements.

- EPA, 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Other Comments

Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. The data would be added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector. Data can be sent to the Geological Mapping Unit, at mailto:GeologicalMappingInfo@gsi.ie, 01-678 2795.

I hope that these comments are of assistance, and if we can be of any further help, please do not hesitate to the Geological Survey Ireland Planning Team at GSIPlanning@gsi.ie.

Yours sincerely,

Geoheritage and Planning Programme

Enc: Table - Geological Survey Ireland's Publicly Available Datasets Relevant to Planning, EIA and SEA processes.

5.2 Uisce Éireann – Scoping Response

For the attention of Conor O'Neill

By Email: Conor.oneill@jbaconsulting.ie;

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13th March 2024

Re: EIA Scoping Request – Regarding the proposed Carrickmines to Shanganagh Flood Relief Scheme

Dear Mr O'Neill,

Uisce Éireann has received notification of your Environmental Impact Assessment (EIA) scoping request relating to Dún Laoghaire Rathdown County Council's forthcoming planning application, in respect of the proposed Carrickmines to Shanganagh Flood Relief Scheme.

Please see attached, Uisce Éireann's scoping opinion in relation to Water Services. On receipt of the planning referral, Uisce Éireann will review the finalised Environmental Impact Assessment Report (EIAR) as part of the planning process.

Queries relating to the terms and the EIA scoping opinions below should be directed to planning@water.ie

PP. *Ali Robinson*

Yvonne Harris

Connections and Developer Services

Uisce Éireann's Response to EIA Scoping Requests

At present, Uisce Éireann does not have the capacity to advise on the scoping of individual projects. However, in general the following aspects of Water Services should be considered in the scope of an EIA where relevant;

a) Where the development proposal has the potential to impact an Uisce Éireann Drinking Water Source(s), the applicant shall provide details of measures to be taken to ensure that there will be no negative impact to Uisce Éireann's Drinking Water Source(s) during the construction and operational phases of the development. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified as part of the report.

b) Where the development proposes the backfilling of materials, the applicant is required to include a waste sampling strategy to ensure the material is inert.

c) Mitigations should be proposed for any potential negative impacts on any water source(s) which may be in proximity and included in the environmental management plan and incident response.

d) Any and all potential impacts on the nearby reservoir as public water supply water source(s) are assessed, including any impact on hydrogeology and any groundwater/ surface water interactions.

e) Impacts of the development on the capacity of water services (*i.e. do existing water services have the capacity to cater for the new development*). This is confirmed by Uisce Éireann in the form of a Confirmation of Feasibility (COF). If a development requires a connection to either a public water supply or sewage collection system, the developer is advised to submit a Pre-Connection Enquiry (PCE) enquiry to Uisce Éireann to determine the feasibility of connection to the Uisce Éireann network.

f) The applicant shall identify any upgrading of water services infrastructure that would be required to accommodate the proposed development.

g) In relation to a development that would discharge trade effluent – any upstream treatment or attenuation of discharges required prior to discharging to an Uisce Éireann collection network.

h) In relation to the management of surface water; the potential impact of surface water discharges to combined sewer networks and potential measures to minimise and or / stop surface waters from combined sewers.

i) Any physical impact on Uisce Éireann assets – reservoir, drinking water source, treatment works, pipes, pumping stations, discharges outfalls etc. including any relocation of assets.

j) When considering a development proposal, the applicant is advised to determine the location of public water services assets, possible connection points from the applicant's site / lands to the public network and any drinking water abstraction catchments to ensure these are included and fully assessed in any pre-planning proposals. Details, where known, can be obtained by emailing an Ordnance Survey map identifying the proposed location of the applicant's intended development to datarequests@water.ie

k) Other indicators or methodologies for identifying infrastructure located within the applicant's lands are the presence of registered wayleave agreements, visible manholes, vent stacks, valve chambers, marker posts etc. within the proposed site.

l) Any potential impacts on the assimilative capacity of receiving waters in relation to Uisce Éireann discharge outfalls including changes in dispersion / circulation characterises. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified within the report.

m) Any potential impact on the contributing catchment of water sources either in terms of water abstraction for the development (*and resultant potential impact on the capacity of the source*) or the potential of the development to influence / present a risk to the quality of the water abstracted by Uisce Éireann for public supply should be identified within the report.

n) Where a development proposes to connect to an Uisce Éireann network and that network either abstracts water from or discharges wastewater to a "protected"/ sensitive area, consideration as to whether the integrity of the site / conservation objectives of the site would be compromised should be identified within the report.

o) Uisce Éireann does not permit building over of its assets. As an applicant you are required to;

- survey the site to determine the exact location of the assets. Any trial investigations should be carried out with the agreement and in the presence of Uisce Éireann.
- Provide evidence of separation distances between the existing Uisce Éireann assets and proposed structures, other services, trees, etc. have to be in accordance with the Irish Water Codes of Practice and Standard Details.

p) Where a diversion of Public Infrastructure may be required subject to layout proposal of the development and separation distances, the applicant is required to submit a Diversions Enquiry to diversions@water.ie

q) Mitigation measures in relation to any of the above ensuring a zero risk to any Uisce Éireann drinking water sources (Surface and Ground water).

This is not an exhaustive list.

Please note;

- Where connection(s) to the public network is required as part of the development proposal, applicants are advised to complete the Pre-Connection Enquiry process and have received a Confirmation of Feasibility letter from Uisce Éireann ahead of any planning application.

- Uisce Éireann will not accept new surface water discharges to combined sewer networks.

5.3 Inland Fisheries Ireland

[via email received 15/03/2024]

Following our conversation 14/03/2024 in relation to the FRS Carrickmines-Shanganagh FRS - EIAR Scoping - Invitation to Comment, please note the following.

4.5.2.1 Surface Water- The proposed FRS scheme will require construction works in or adjacent to surface watercourses at nine separate locations, which will be either Conveyance or Containment mechanisms.

There is potential for emissions to water during the construction phase of the scheme which can impact water quality, which should be identified, and mitigation measures considered.

There is further potential for this FRS to impact on the Hydromorphology of the watercourses which will result in a potential downgrading of fish status and the ability of both rivers to achieve Good Ecological Status.

Changes in the Hydromorphology should also be considered in the EIAR and appropriate mitigation measures at both the construction and operational phase of the scheme should be proposed.

The EIAR must consider the long-term health and quality of the aquatic environment and the potential impact on fish species post construction phase.

4.5.4 Summary- Recognises potential impacts at both construction and post construction phase of the scheme.

General

The proposed works at all nine locations will be subject to site specific Method statements and instream works can only be undertaken in the open period between July and September.

Derogations in accordance with the Local Authorities (Works) Ac, 1949 may be applicable in certain specific circumstances, and will be on a case by case basis.

Both the Carrickmines and Shanganagh rivers contain migratory salmonid species and any development within these catchments, either alone or in combination with other developments cannot impact on this status.

There may be opportunities to improve and protect the hydromorphology within the rivers and IFI will co-operate fully where there is this potential.

The proposed meeting between stakeholders to look at the locations where works are proposed, is the first stage in hopefully preventing any short- or long-term damage to the aquatic environment while also providing flood protection.

Regards

Matthew Carroll

Fisheries Environmental Officer

5.4 Transport Infrastructure Ireland – Scoping Response

[via email received 21/03/2024]

Dear Mr. O'Neill,

Thank you for your correspondence of 1 March 2024 in relation to the above EIAR Scoping exercise. The position in relation to your enquiry is as follows.

Transport Infrastructure Ireland (TII) wishes to advise that it is not in a position to engage directly with planning applicants with respect to proposed developments. TII will endeavour to consider and respond to planning applications referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by TII in making such submissions or comments will seek to uphold official national road and light rail policy and guidelines including Spatial Planning and National Roads Guidelines for Planning Authorities (DoECLG, 2012). Regard should also be had to other relevant guidance available at www.TII.ie.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

The proposed scheme works as described and depicted in "Figure 2 Proposed Defence Measures for Proposed Scheme of the EIAR Scoping Request" appear to include works directly impacting the N11 and in the further general vicinity of the M50 and Luas. Interactions of the proposed scheme construction and operation with the national road and light rail networks should be identified and mitigated as appropriate as part of consideration of the material assets assessments in the EIAR.

With respect to EIAR scoping issues, the recommendations indicated below provide only general guidance for the preparation of an EIAR, which may affect the national road and light rail networks.

The developer/scheme promoter should have regard, inter alia, to the following:

- Official policy for development at or near national roads is set out in the DoECLG Spatial Planning and National Roads Guidelines for Planning Authorities (2012) available at https://www.gov.ie/en/collection/85b83-planning-guidelines-standards/,
- For general guidance for any proposed development in close proximity to an existing Luas Line; any prospective development should ensure there is no adverse impact on Luas operation and safety including its infrastructure. Observing the requirements of the following guidance will inform the type of assessments required to demonstrate no adverse impact from intended development:
    - TII's 'Code of Engineering Practice for works on, near, or adjacent to the Luas light rail system' is available at https://www.luas.ie/work-safety-permits.html.
    - Light Rail Environment - Technical Guidelines for Development, TII Publication no. PE-PDV-00001 available at https://www.tiipublications.ie/,
- In addition, as part of TII's responsibilities for managing and improving the country's national road and light rail networks, TII sets development guidance and standards for traffic and road assessments and construction that may be necessary by reason of proposed development location, scale, or typology to be prepared to accompany applications for developments or works. Technical guidance and standards are contained in TII Publications, available at https://www.tiipublications.ie/,
- There is a requirement for the protection of the national road network function that all the works proposed under, over and in the vicinity of the N11, be identified and undergo detailed design and execution in accordance with TII Publications that include TII structures technical acceptance as required under TII Publication DN-STR-03001,
- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes,

- TII would be specifically concerned with potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development,
- The developer should have regard to any Environmental Impact Statement or Assessment Report and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard for any potential cumulative impacts,
- The developer, in conducting an Environmental Impact Assessment, should have regard to TII's Guidelines, including the Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014),
- The EIAR should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and in particular how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014),
- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. TII's Traffic and Transport Assessment Guidelines (TII Publication No. PE-PDV-02045) should be referred to in relation to the proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the Guidelines which addresses requirements for sub-threshold TTA,
- The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required,
- In the interests of maintaining the safety and standard of the national road network, the EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network,
- In relation to haul route identification, the applicant/developer should clearly identify the haul routes proposed and fully assess the network to be traversed. Separate structure approvals/permits, and other licences may be required in connection with the proposed haul route, including where temporary modification to the road network may be required. Consultation with relevant local authorities, PPP Companies and MMaRC Contractors may also be required. All structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed, including abnormal weight load.

Notwithstanding any of the above, the developer should be aware that this list is non-exhaustive, thus site and development-specific issues should be addressed in accordance with best practice.

I trust that the above comments are of use in your EIAR preparation.

Yours sincerely,

Alban Mills

Senior Regulatory and Administration Executive

Transport Infrastructure Ireland

5.5 National Transport Authority – Scoping Response

Údarás Náisiúnta Iompair
National Transport Authority

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Mr Conor O'Neill,
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4th April 2024

Re. Carrickmines Shanganagh Flood Relief Scheme – EIAR Scoping

Dear Mr O'Neill,

The National Transport Authority ('the NTA') acknowledges receipt of the *Carrickmines Shanganagh Flood Relief Scheme – EIAR Scoping* report prepared by JBA Consulting on behalf of Dún Laoghaire-Rathdown County Council and welcomes the opportunity to submit the following observations.

Impact on transport and traffic

a) <u>N11 at Cherrywood Road</u>

Section 4.8.1.1 addresses Traffic in the context of Material Assets and states the following:

> 'During construction there will be an open cut excavation of the N11 dual carriageway for the culvert overflow. The impacts to traffic will include partial road closures of a primary national road for up to 2 months and diversions onto other adjoining roads. This would lead to temporary impacts for residents, workers, and emergency services.'

Section 4.8.3 on the Assessment Methodology states:

> 'Traffic assessment will be undertaken to identify roads, footpath, cycleways and public transport routes that may be affected during the construction phase of proposed scheme and alternative routes for the duration.'

NTA response:

i. General comments

The proposed closure of the N11 at its junction with Cherrywood Road for a period of up to two months is a matter of significant concern to the NTA, notwithstanding the statement that the closure would be 'partial'. The N11 at this location is used by national and regional bus services, buses in the Dublin area service network, cyclists and pedestrians, as well as by emergency vehicles and general vehicular traffic. The quoted extracts above state that traffic would be '[diverted] onto other adjoining roads', and that the traffic assessment will identify 'alternative routes for the duration' of the works to accommodate all affected modes.

The management of all modes of transport that currently travel along the N11 will be a critical consideration in the EIAR. However, it would appear that diversion of all modes during the construction phase has been assumed, and that the task for the EIAR is to identify the most suitable alternative routes. It is not clear whether the maintenance of accessibility through this location for any mode has already been considered and has been found to be unworkable, or if such an approach is not among the options under consideration. The NTA would not be of the view that the closure of the N11 is required for the purposes of this scheme.

The NTA also advises that agreement must be sought from Transport Infrastructure Ireland for works proposed to a national road, and would assume that this matter is under active consideration.

ii. Impact on buses

For national and regional bus services with no bus stops in the environs of the proposed works, alternative alignments would be acceptable in principle, subject to the routes identified being capable of accommodating the various vehicle types in use and subject to the provision of bus priority measures on the alternative routes, if required, to protect service reliability. However, the coarse grain (i.e. sparseness) of the road network in the scheme environs presents a challenge to the identification of suitable routes for buses in the Dublin area service network. Significant detours would be likely to be imposed on bus routes, which would remove buses from the areas they currently serve and, as a result, could reduce patronage. This reduced level of service might then result in an increase in private car usage for those with access to a car, exacerbating the impact of traffic on the areas through which such diverted traffic would pass. Those without access to a car could be required to walk long distances to avail themselves of the diverted services, or may be unable to make the trip by any non-car mode.

The subject location on the N11 also falls within the scheme extent of the Bray to City Centre Core Bus Corridor (CBC). This is a key infrastructural element of the overall BusConnects programme and is currently a live planning application under consideration by An Bord Pleanála. Management of the interaction between the subject scheme and the CBC scheme would be of critical importance, and there may be opportunities to coordinate the works programmes, which should be examined in the context of the EIAR preparation.

The imposition of detours to bus services would also result in additional costs to the NTA in the form of compensation to transport operators due to the increased route length.

iii. Impact on Active Travel

The road network in the scheme environs and the topography of the local area are unlikely to be conducive to walking and cycling, not only due to the significant detours arising from the coarse grain of the network, but also due to the absence of dedicated active travel infrastructure on these routes or the existence of sub-optimal facilities on roads catering for diverted traffic. As with public transport patronage, there is therefore a risk of mode shift to private car for those with access to a car, with an attendant increase in traffic volumes on the alternative routes, as outlined previously. Those without access to a car could be unable to make their intended trip if alternative modes are not available or suitable.

iv. Summary

In light of the points raised above, the NTA would strongly favour options that would maintain provision for sustainable transport modes through the subject area; in particular, for walking, cycling and Dublin area bus services.

b) <u>Other locations</u>

Section 4.8.1.1, which addresses Traffic, also states:

> 'The proposed development also includes: raising the height of existing flood defences and addition of new defence walls along Commons Road, addition of defences up and downstream of Kilgobbin Road, installation of Flood Relief Culvert at Kilgobbin Road Bridge, addition of defences around Glenamuck Rd North Roundabout and Priorsland, addition of defences upstream of N11 culvert (Brides Glen River), raising and addition of walls at Commons Road, addition of defences upstream of railway line.'

The Assessment Methodology described in Section 4.8.3, quoted above, would also be relevant to this set of locations.

NTA response:

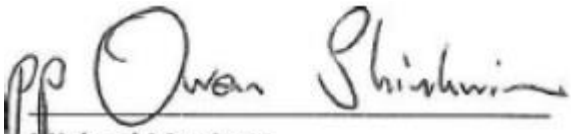
The points set out above regarding the maintenance of current routes for sustainable transport on the N11 would apply equally to the locations referenced in Section 4.8.1.1. In addition, the NTA notes that the Glenamuck Rd North Roundabout and Priorsland are areas of particular relevance to sustainable transport. The Carrickmines Park & Ride facility at Carrickmines Luas stop, which is accessed from the Glenamuck Road North Roundabout, is a critical piece of supporting infrastructure in the Luas network. Priorsland has recently been identified as the new terminus point in the Cherrywood SDZ for the extended Dublin Bus route 7 service. It is imperative, therefore, that existing access arrangements are maintained, or that adequate alternative access arrangements are put in place, to ensure continuity of service at both locations.

Conclusion

The NTA recommends that the EIAR preparation should include a broader range of options for consideration than that currently identified in Section 4.8.3 of the scoping document. In particular, the NTA strongly favours continued provision for public transport, cycling, walking and emergency vehicles through the proposed works site on the N11 at Cherrywood Road, as opposed to alternative alignments that would undermine the utility of the sustainable transport networks, reduce patronage on public transport and compromise active travel in the area. In the absence of adequate provision for non-car modes, use of private car for a range of trip purposes would be expected to increase, with consequent impacts not only on Traffic but also on other factors under examination including Human Health, Air Quality, Biodiversity and Noise.

I trust that these observations will be taken into consideration in the preparation of the EIAR. The NTA is available to discuss these matters in more detail if required, with both JBA Consulting and DLRCC.

Yours sincerely,



Michael MacAree

Head of Strategic Planning

5.6 HSE National Environmental Health Service – Scoping Response

An tOifig Náisiúnta um Sláinte Chomhshaoil
Feidhmeannacht na Seirbhíse Sláinte,
Urlár 2, Teach na Darach, Ascaill na Teile
Páirc na Mílaoise, An Nás, Co. Chill Dara.

National Office for Environmental Health Services
2nd Floor, Oak House, Lime Tree Avenue
Millennium Park, Naas, Co. Kildare
Eircode: W91KDC2

T: 045 880 442
ehnationaloffice@hse.ie

Seirbhís Sláinte Comhshaoil Náisiúnta FSS | National Environmental Health Service HSE

Conor O'Neill
Project Environmental Scientist
JBA Consultancy,
Unit 8, Greenogue Business Plaza,
Greenogue Business Park,
Rathcoole,
Dublin D24 CY64

Date: 5th April 2024

Name: Conor O'Neill, JBA Consultancy, Greenogue Business Park, Rathcoole

Re: EIA Scoping Report

Proposed development: Carickmines – Shanganagh Flood Relief Scheme

Applicant: Dun Laoghaire Rathdown County Council

EHIS Reference: EHIS 3773

Consultants Reference: N/A

Dear Sir/Madam

Please find enclosed the HSE Consultation Report in relation to the above proposal.

The following HSE departments were made aware of the consultation request for the proposed development on 4th March 2024

- Emergency Planning – Brendan Lawlor
- Estates – Helen Maher/Stephen Murphy
- Director of National Health Protection – Eamonn O'Moore/ Ina Kelly
- CHO – Martina Queally

If you have any queries regarding this report please contact Mr. Derek Bauer, PEHO, Dun Laoghaire, Environmental Health Service in the first instance at derek.bauer@hse.ie

Yours sincerely

pp
Derek Bauer,
Principal Environmental Health Officer.

HSE EIA Scoping

Environmental Health Service Submission Report

Date: 5th April 2024

Our reference: EHIS 3773

Report to: Conor O'Neill, Project Environmental Scientist, JBA consultancy, Unit 8, Greenogue Business Plaza, Greenogue Business Park, Rathcoole, Dublin D24 CY64.

Type of Consultation: EIA Scoping

Proposed development: Carrickmines Shanganagh Flood Relief Scheme

Applicant: Dun Laoghaire Rathdown County Council

Proposed Development: Dun Laoghaire Rathdown County Council aims to develop a flood relief scheme (FRS) for the Carrickmines – Shanganagh area with a standard of protection up to and including the 1% Annual Exceedance Probability.

There is a history of flooding in the catchment with flooding events stated in the Scoping Report occurring on eight occasions between 1980 and 2011.

There are two primary phases to the development, construction phase (of unknown length) and an operational phase.

The following HSE stakeholders were made aware of the development on the 4th March 2024

- Emergency Planning – Brendan Lawlor
- Estates – Helen Maher/Stephen Murphy
- Director of National Health Protection – Eamonn O'Moore/ Ina Kelly
- CHO – Martina Queally

General Introduction

The following documents should be taken into consideration when preparing the Environmental Impact Assessment Report (EIAR):

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022), EPA.

- Advice Notes on Current Practice in the preparation of EIS (2003), 435kb

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

https://www.housing.gov.ie/sites/default/files/publications/files/guidelines_for_planning_authorities_and_an_bord_pleanála_on_carrying_out_eia_-_august_2018.pdf

EU publication: Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, EU, 2017

http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

Adoption of the Directive (2014/52/EU) in April 2014 initiated a review of the above guidelines. The draft new guidelines can be seen at:

http://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes

Generally the Environmental Impact Assessment should examine all likely significant impacts and provide the following information for each:

a) Description of the receiving environment;

b) The nature and scale of the impact;

c) An assessment of the significance of the impact;

d) Proposed mitigation measures;

e) Residual impacts.

Directive 2014/52/EU has an enhanced requirement to assess likely significant impacts on Population and Human Health. It is the experience of the National Environmental Health Service (NEHS) that impacts on human health are often inadequately assessed in EIAs in Ireland. It is recommended that the wider determinants of health and wellbeing are considered in a proportionate manner when considering the EIA.

In addition to any likely significant negative impacts from the proposed development, any positive likely significant impacts should also be assessed.

The HSE will consider the final EIAR accompanying the planning application and will make comments to An Bord Pleanála/Local Planning Authority on the methodology used for assessing the likely significant impacts and the evaluation criteria used in assessing the significance of the impact.

This report only comments on Environmental Health Impacts of the proposed development. It is based on an assessment of the correspondence submitted to this office dated 1st March 2024.

The Environmental Health Service (EHS) recommends that the following matters are included and assessed in the EIAR

- Public Consultation
- Population and Human Health
- Noise & Vibration
- Air Quality
- Surface and Groundwater Quality
- Climate Change
- Material Assets (including waste)

• Ancillary facilities

• Cumulative impacts

Public Consultation

Section 3 Consultation process of the scoping report refers to a number of consultation processes followed to date including consultation with the public. Reference is made to an initial recorded presentation in October 2021 followed by a questionnaire and an in person event at a local school in December 2023 plus a Flood Relief Scheme (FRS) website that the public have access too.

The National Environmental Health Service (NEHS) recommends at a broader level that additional detail is provided in the full EIAR on the process of public consultation. Details of numbers reached, the type of feedback received and a breakdown of those reached, such as sensitive receptors, older persons, and other stakeholders etc. is included to give a detailed picture of how well the process was conducted and the level of participation from the local community.

The National Environmental Health Service recommends that the public are consulted specifically on the public health aspects of the scheme by asking questions for example, such as 'what are the potential health benefits/challenges from the scheme' and 'what opportunities can the scheme deliver for health gain'

Assessment of Consideration of Alternatives

Reference to the consideration of alternatives was not found in the scoping report. It was noted that the list of measures included for the proposed development are construction of defences orientated and apparently singular in focus.

The National Environmental Health Service (NEHS) would like to see if a more 'nature based solution' was assessed as an option for the proposed development.

The National Environmental Health Service (NEHS) recommends that the EIAR further assess the potential opportunities the proposed scheme offers to protect and promote public health. Aspects to consider include ways to enhance the sequestration of carbon, ways to better adapt to climate change for other types of severe weather events (e.g. dry spells) and ways to create opportunity for recreation and active travel.

Population and Human Health

It is noted in the scoping report that "maintaining access and the amenity value of these areas for residents is an important aspect of the FRS". The scoping report also refers to the fact that the rivers flow through lands primarily zoned for residential or open space plus other areas zoned for economic development and employment plus key public infrastructure such as schools and a hospital are at potential risk.

The potential impact on health (injuries, illness and even death) are not referred to in the context of population and human health. There is some reference to the risks to construction workers during the construction phase. The section does conclude there are likely to be potential impacts on population and human health in both construction and operational phases.

The National Environmental Health Service (EHS) wishes to highlight the importance of protecting amenity areas in the context of supporting health and well-being. Measures to minimise disruption to amenity or recreational space during the construction phase should be put in place.

The NEHS recommends that opportunities are identified to enhance potential health gain by perhaps enhancing the recreational value of the area.

Water

The scoping report identified both surface water and ground water waterbodies where potential impact is possible. The report indicates that the potential impact will be most felt during the construction phase.

The NEHS recommends that the full EIAR detail the mitigation measures to be deployed to protect both surface water and ground water waterbodies during the construction phase. Potential sources of contamination are to be detailed and should include risks associated with spills of hydrocarbons used by vehicles and machinery as well as potential contamination from a construction compound. Mitigation measures for all of the issues of relevance to population health should be contained in a Construction Environmental Management Plan or CEMP.

Air Quality

The primary air quality issue raised in the scoping report is dust during the construction phase. Some reference is also made to vehicle emissions during construction which may relate to both air quality and green-house gas emissions in the context of climate change.

The NEHS recommends that background air quality data be accessed via the EPA and that Dust Control Measures alongside other air quality mitigation measures are included in the aforementioned Construction Environmental Management Plan (CEMP)

Dust control measures to include are:

- Sweeping of hard road surfaces
- Provision of a water bowser on site, regular spraying of haul roads
- Wheel washing facilities at site exit
- Restrict speed on site
- Provide covers to all delivery trucks to minimise dust generation
- Inspect and clean public roads in the vicinity if necessary
- Material stockpiling provided with adequate protection from the wind
- Dust monitoring at the site boundary
- Truck inspection and maintenance plan
- Details of a road maintenance agreement between the developer/contractor and the Local

Roads Authority to clarify responsibility for the upkeep and repair of access roads during the construction phase of the project.

Climate Change

Climate is contained under the Air and Climate section of the scoping report but is separated out here to help ensure adequate attention is provided to the issue in the full EIAR. Very little reference could be found on the issue of climate change in the scoping report despite assuming the project is in large part a response to climate change as an adaptation measure to present and future climate risks.

The underlying rationale for the scheme in the context of climate change was not identified in the scoping report. One may have expected to find details of not only historical flooding events in this area but also projections of flooding risk into the future. One may also have expected to find an assessment of the carbon footprint generated by the scheme and how the project intends to mitigate the production of green- house gases during each phase of the development as well as ways in which carbon may be captured.

The NEHS recommends that the full EIAR devote considerable space to climate action (the greatest threat to global health this century) both in terms of how the project will contribute to delivering on Ireland's obligations under the Climate Action and Low Carbon Development Act 2015 – 2021 as well as how the project will adapt and build resilience locally to climate threats and potentially enable health gain. In brief the section should examine both Mitigation and Adaptation aspects.

Mitigation relates to how the proposed development may contribute to the generation of green-house gases, primarily during construction and how the project will aim to minimise those emissions during construction, but also look to sequester carbon during operation, as Ireland moves to being a net zero economy by 2050.

Adaptation relates to how the proposed development adapts/builds resilience to our changing climate in order to protect public health both locally and more widely. Predictive computer modelling should be included to assess vulnerability and potential exposure in the years and decades to come.

The EHS service recommends that the full EIAR assess a wider range of threats that make people and places vulnerable to climate breakdown. Floods, dry spells/heat, wind-storms should be included in the assessment. Measures to mitigate vulnerability should be included as should opportunities to deliver health gain. For example, attenuation of flood waters could be used to combat dry spells or the provision of trees could be used to provide shade in heatwave events, as well as sequester carbon.

Noise and Vibration

The scoping report recognises potential noise and vibration impacts associated with the proposed development and that those impacts will be at their most significant close to the construction works boundary. The scoping reports says noise impact is to be assessed during construction and operational phases.

The NEHS recommends the principle point of assessment for noise and vibration is to be in relation to the construction phase. All potential sensitive receptors should be identified and the potential impact on them should be assessed. As with other environmental determinants of health it is expected that Noise and Vibration including mitigation measures to be adopted will be included in the Construction Environmental Management Plan (CEMP). Particular attention should be paid to limiting the hours in which construction activities can take place.

Traffic and Waste

The section on material assets covers a number of aspects relevant to public health namely Traffic and Waste. Reference is made in the scoping report to a Construction Waste Management Plan.

Most of the potential impact is likely during the construction phase of the proposed development.

The NEHS recommends that the full EIAR assess the potential effect of the proposed development on the footpaths and cycleways, which may be disruptive to recreation and active travel.

In the context of the Construction Waste Management Plan the NEHS recommends that the proposed development start by trying to eliminate the generation of waste in the first place and follow the principles of the waste hierarchy and the Circular Economy and Miscellaneous Provisions Act of 2022.

Ancillary Facilities

The EIAR should include details of the location of all site office, construction compound, fuel storage depot, sanitary accommodation and canteen, First Aid facilities, disposal of wastewater and the provision of a potable water supply to the site canteen.

Kind regards,

Niall Roche

Niall Roche
Environmental Health Officer - Oifigeach Sláinte Comhshaoil
Environment/Climate Change, Network Support Unit (NSU)
T: +353 87 4336621 (office hours only) | E: niall.roche@hse.ie

5.7 Development Applications Unit (DAU) National Monuments Service – Scoping Response

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Planning Ref: G Pre0086/2024
(Please quote in all related correspondence)

8 April 2024

JBA Consulting
Greenogue Plaza
Greenogue Business Park
Rathcoole
Co. Dublin

Via email: Conor.oneill@jbaconsulting.ie

Proposed Development: EIAR Scoping Report for a proposed Flood Relief Scheme on the Carrickmines-Shanganagh River, Dublin

A chara

I refer to correspondence received in connection with the above. Outlined below are heritage-related observations/recommendations co-ordinated by the Development Applications Unit under the stated headings.

Underwater Archaeology

The Department of Housing, Local Government and Heritage has reviewed the 'Carrickmines Shanganagh Flood Relief Scheme – EIAR Scoping' (JBA February 2024) for the proposed Flood Relief Scheme. It is noted that Cultural Heritage is scoped into the proposed EIA process and it is noted that 'There are four national monuments in the study area, of which one (NM 216) comprises three separate monuments. Three of the national monuments are within 100m of a watercourse, comprising a cross at Kilgobbin and the portal tombs at Brenannstown and Kiltiernan Domain. Carrickmines castle is also within 100m of the study area, while it is not a designated national monument is in Local Authority ownership and is treated as such. There are 135 RMP / SMR sites within the constraints study area. Of these, 47 are within 100m of a watercourse. In particular, the large number of these sites which are close to the watercourses of the region demonstrate the importance of the river system to the people of the past and the potential to make further archaeological discoveries adjacent to the watercourses' (Section 4.9.1.1). Assessment will be based on 'a combination of desk-based research, site inspections and the results of non-invasive and invasive archaeological investigations, the strategy for which will be agreed in consultation with the Minister for Housing, Local Government & Heritage via the

National Monuments Service (Section 4.9.3). The Department are broadly in concurrence with the methodologies and approach as outlined in the scoping document and, without prejudice to further associated submissions/consultations, the following observations are offered to assist the design team.

Archaeology and Flood Relief Schemes: Guidelines (NMS 2023):

The Archaeology and Flood Relief Scheme guidelines have been developed by the National Monuments Service, in close co-ordination with the OPW Flood Relief team, to support the efficient planning and development of Flood Relief Schemes and the protection of archaeological heritage. It is vital that their methodologies for assessment and attendant mitigation proposals are closely followed in compiling the EIAR for the Carrickmines Shangannagh FRS. The Guidelines provide a framework for the effective integration of archaeological heritage into the design and construction of Flood Relief Schemes and describe the unique and broad range of terrestrial, underwater, industrial and vernacular archaeological heritage that these schemes typically encompass. Finally, they detail the critical role of advance, early-design stage, pre consent and pre construction stage archaeological assessment and mitigation of FRS projects in diminishing effects on archaeological heritage and avoiding delays to progressing projects. *Archaeology and Flood Relief Schemes: Guidelines* are available online here: https://www.archaeology.ie/publications-forms-legislation

Scope of Archaeological Heritage in Clonaslee FRS EIA:

In tandem with the methodologies for cultural heritage assessment as outlined in the scoping document and in the Archaeology and Flood Relief Schemes: Guidelines (NMS 2023), the National Monuments Services advises that the following specific investigations are undertaken prior to applying for planning permission. It is critical that these investigations are undertaken pre consent in order to inform the engineering and architectural design of the FRS, the contents of the Cultural Heritage assessment in the EIAR and its attendant mitigation proposals.

- A desk based assessment should address the cultural heritage (archaeological, built, vernacular, riverine and industrial heritage) of the proposed development area and its evirons, to include a full inventory, mapping and surveys (photographic, descriptive, photogrammetric, as appropriate) of all archaeological, underwater and cultural heritage features and structures identified by field inspections, cartographic analysis, historical and archival research and prior archaeological investigations. The field survey should include a visual inspection of any riverbanks and riverbeds and other waterbodies, where they are visible. This is best carried out following vegetation clearance (where permitted) or during winter, when vegetation cover is less dense. The desk-study, supported by comprehensive archival and historical research and detailed field inspection should inform (as appropriate), the scope and range of further archaeological investigations to be undertaken.
- Targeted non-intrusive advance geophysical survey or prospection (where practicable) of all areas where largescale ground disturbances are proposed.
- Targeted advance archaeological test excavation (where practicable) of all impacted areas of archaeological potential identified in the desk study and/or advance geophysical surveys.
- Advance Underwater Archaeological Impact Assessment (UAIA), to include dive/wade, metal detection surveys of all areas where in-stream works are proposed, in order to adequately assess the nature, depth, extent and artefact-

bearing potential of the riverine stratigraphy, to assess the potential for the remains of bridges, fording points and other riverine structures and features, and to facilitate further characterisation of underwater cultural heritage features and structures that have been identified in prior research.

- Comprehensive buildings archaeology assessments of built heritage structures and features within the proposed development area. To inform an overall appraisal of the historical, archaeological and built heritage significance of any built heritage structures proposed for removal, it is vital that detailed buildings archaeology assessment including measured survey is undertaken at the earliest opportunity.
- All intrusive advance investigations (such as, but not limited to, ground investigations for soils/geology/hydrogeology) carried out as part of the EIA or design process should be subject to advance archaeological screening (to be agreed with the Department) and a programme of archaeological monitoring and metal detection by a suitably qualified archaeologist.

Archaeological test-excavations and monitoring will be carried out under a Section 26 (National Monuments Act 1930) licence from the National Monuments Service and in accordance with an approved method statement. Licensed metal detection will be undertaken in tandem with the test excavations. A Dive/Survey Licence (Section 3 1987 National Monuments Act) and Detection Device consent (Section 2 1987 National Monuments Act) will be required for the dive/wade surveys and metal detection, respectively. Licenses should be applied for to the National Monuments Service and should be accompanied by a detailed method statement. Note a period of 3-4 weeks should be allowed to facilitate processing and approval of the licence application and method statement. All archaeological wading/diving should comply with the Health and Safety Authority's Safety, Health and Welfare at Work (Diving) Regulations 2018/2019.

The results of these investigations should form part of the EIA process and be incorporated within the EIA Report. The Department is happy to provide further advice and clarification as and if required in relation to the preparation of suitably comprehensive assessments as outlined above, with particular regard to the scope and locations for any advance non-intrusive prospection, advance test excavation, underwater archaeology dive/wade surveys or built heritage surveys that would be appropriate to inform the assessment of this proposed scheme.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at manager.dau@npws.gov.ie where used, or to the following address:

The Manager
Development Applications Unit (DAU)
Government Offices
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

.....

Simon Dolan
Development Applications Unit
Administration

6 Construction Impacts Appendices

No appendices.

7 Population and Human Health Appendices

No appendices.

8 Biodiversity

8.1 Arborist Report

Arboricultural Impact Assessment

Prepared for:

JBA Consulting

Proposed site:

Carrickmines Flood relief Scheme.

Prepared by:

Michael Garry, BSc. *Arb*. Dip *Arb* M.*ArborA,* Pgrad *Ecology* (UCC),

Arbor-Care (Ltd) Professional Consulting Tree Service,

Telephone: (086) 3082808
info@arborcare.ie
www.arborcare.ie

Arboricultural ASSOCIATION
Professional Member

Table of Contents

Executive Summary

1.0 This arboricultural report has been commissioned by JBA Consulting to provide information to assist with the planning process in relation to a proposed flood relief scheme at the above location. The adjoining areas are susceptible to flooding and therefore a flood defence scheme is required. Due to the size , location and prominence of these trees all efforts are required in order to ensure the flood defence scheme can be constructed whilst retaining the trees.

This report includes:

- an assessment of the trees, their quality and value in accordance with BS 5837:2012 - Trees in relation to design, demolition and construction;
- the site context and observations on the trees;
- local planning policies relevant to the consideration of trees on the site;
- the impact of the proposed development upon the tree population in and around the site;
- methods of reducing impacts on trees; and
- measures to be taken to protect trees during the proposed works.

2.0 Introduction

2.1 Instructions

Arbor-Care Ltd (Professional Consulting Tree Service) was retained to undertake an on-site tree survey of all trees that could be potentially be impacted by the proposed scheme and within the site extents of the areas below, the findings of the report will be used to inform design of development works and support a planning application for same.

There 10 along the route areas:

Number	Location/Site
1	Aikens Village
2	Bray Road
3	Herons ghyll/ Cherrywood road
4	Lower Brides Glen/N11 Culvert
5	Bayview
6	Brookdene-Commons Road
7	Priorsland
8	Belarmine Park

The objective of the impact assessment was to identify the areas that contained trees, groups of trees, and to ensure where possible that these areas would be retained and to identify the trees that are to be removed to facilitate the development.

The survey concentrated on the large mature trees along the river bank, within or adjacent to the proposed development area.

The below impact assessment report is based on the British standard *BS 5837:2012 Trees in relation to design, demolition and construction recommendations*, this standard gives recommendations and guidance on the principles to be applied to achieve a satisfactory juxtaposition of trees, including shrubs, hedges and hedgerows, with structures. It sets out to assist those concerned with trees in relation to construction to form balanced judgements. This impact assessment report will be accompanied by an inventory of trees and hedgerows on site and a tree protection plan.

The Arboricultural Impact Assessment and a tree protection plan was prepared for the site identifying trees that may be impacted on by the proposed development based on the proposed design.

2.2 Methodology

An initial tree survey and visual condition assessment was on the 4th of April 2024. The purpose of this report and in accordance with *BS 5837: 2012 Trees in relation to design, demolition and construction*. *Recommendations* only trees with diameters of 75mm or greater were surveyed.

Also in accordance with section 4.4.2.3 of the British standard document where trees formed obvious groups these were assessed and recorded as groups.

> *Section 4.4.2.3 of BS 5837: 2012 states:*
>
> *Trees growing as groups or woodland should be identified and assessed as such where the arboriculturist determines that this is appropriate. However, an assessment of individuals within any group should still be undertaken if there is a need to differentiate between them, e.g. in order to highlight significant variation in attributes (including physiological or structural condition).*
>
> *NOTE: The term "group" is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. parkland or wood pasture), in respect of each of the three subcategories.*

The survey concentrated primarily on the significant trees/hedgerows located within the development area and has been based on the topographical survey plan provided.

The objective of this survey was to gather information regarding the trees/hedgerows within or adjacent to the development area and the impact the proposed scheme may have on the trees. **Please refer to Appendix A for the tree inventory**.

Significant trees can be equated as those trees whose visual importance to the surrounding area are sufficient to justify special efforts to protect/preserve and whose loss would have an irremediable adverse impact on the local environment. Significance can also be placed depending on the trees age, another variable to imply significance can be the aesthetic merit of the tree based on its unusual size, intrinsic physical features or outstanding appearance or occurring in a unique location or context, and thus provides a special contribution as a landmark or landscape feature.

All above parts of the trees were visually examined. Tree diameters (DBH) were estimated at 1.5 meter above grade as per standard arboricultural practice. Tree height was measured with the use of a clinometer (Where practical). A generalised system was employed to describe the overall health of the trees. The system uses a three tier rating scale with the following descriptors:

Specimen condition 3-tier rating system

- Poor- 1-30%
- Fair- 31-60%
- Good- 61-100%

4.0 The Trees.

A breakdown of the Tree Categories on site as per BS 5837 2012 is set out in the table below:

Category	Quantity	Category %
A-Tree of high quality	4	2%
B-trees of good quality	56	28.5%
C (Low quality or trees less than 75mm diameter)	133	68%
U (remove due to poor condition)	3	1.5%
Total trees	196	100%

5.0 Dun Laoighre-Rathdown Development Plan 2022-2028

Development Plan Objectives

The site is located within the jurisdiction of *Dun Laoighre Rathdown County Council*. The Local Planning Authorities have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a Tree Preservation Order or other statutory designation) is therefore a material consideration. I have reviewed *County Council Development Plan 2022-2028 Tree Preservation Orders (TPO's).* There are no TPO's identified within the development site. However the site transverses areas where the Council have the Council have set out the below objective and any future works must be mindful of this objective.

9.3.1.3 Policy Objective OSR7: *Trees, Woodland and Forestry It is a Policy Objective to implement the objectives and policies of the Tree Policy and the forthcoming Tree Strategy for the County, to ensure that the tree cover in the County is managed, and developed to optimise the environmental, climatic and educational benefits, which derive from an 'urban forest', and include a holistic 'urban forestry' approach.*

6.0 The Proposed Development

Development Description

Permission for:

The proposed flood defence measure within certain areas as highlighted above.

Arboricultural Impact Assessment

7.0 Analysis of the Proposal in Respect of Trees

This impact assessment sets out the likely principal direct and indirect impacts of the proposed development on the trees on or immediately adjacent to the site and suitable mitigation measures to allow for the successful retention of significant trees or to compensate for trees to be removed, where appropriate.

Given the high amenity value of these trees and the specific objective (***9.3.1.3 Policy Objective OSR7:*** *)* within the plan, every effort will be given in order to retain these trees.

A brief summary of trees to be removed, related to the Proposed Scheme are detailed within the table below:

Table 1: Schedule of trees to be <u>removed</u> to accommodate the design (To be read in conjunction with Appendix 1 and the Tree Protection Plan.

Tree number	Species	Age Class	Tree category
1802	Poplar	mature	C2
1810 * 2	Lime	early mature	C2
T1	Sycamore	Mature	B2
T4	Elm	Mature	B2
T5	Ash	Mature	C2
T6	Ash	Marure	C2
T7	Sycamore	Mature	C2
1812	Sycamore	Mature	B2
1813	Sycamore	Mature	C2
T 8 * 4	Sycamore	early mature	C2
1814	cabbage palm	early mature	C2
1815 * 2	Ash	Mature	C2
1816 * 1	Laurel	Mature	C2
1817 * 2	Beech	early mature	B2
1818	Sycamore	Mature	B2
T10	Willow	Mature	C2
1821	Ash	Mature	C2
1822	Alder	Mature	C2
1830	Ash	Mature	U
1831-1832 x 2	cherry	early mature	C2
1840	Sycamore	Mature	B2
1841	Sycamore	Mature	B2
1842	Sycamore	mature	B2
1843	Ash	Mature	C2
1844	Sycamore	Mature	B2
1845	Ash	Mature	U
1846	Sycamore	Mature	B2

1847	Sycamore	Mature	B2
1848	Ash	Mature	U
1849	Sycamore	early mature	C2
1850	Willow	Mature	C2
1851 x 2	Ash Sycamore	early mature	C2
	Ash	Mature	C2
T 20 * 2	Hawthorn, Sycamore	early mature	C2
T13 x 3	Beech	Mature	B2
Tree line 1 x 5	Ash & Alder	Mature	B2
T15	Poplar	Mature	C2

A total of 56 trees will be removed which equates to 25% total tree removal to accommodate the proposed design, these consist of 0 no. category A trees, 19 no. category B and 35 no. category C trees and 3 no. category U trees. The majority of the trees to be removed are in the low quality C category.

In accordance with *BS 5837: 2012 Trees in relation to design, demolition and construction*. *Recommendations.,* Category B signifies those trees *of a "moderate value and in such a condition as to be able to make a substantial contribution (A minimum life expectancy of 20 yrs is suggested*)."Category C signifies those trees/hedgerows *of "a low quality and value that are currently in an adequate condition to remain until new planting could be established (a minimum life expectancy of 10yrs is suggested*)." *Category U*. *This category signifies those trees that are in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management.*

7.1 In the context of the overall development works the following points are also noted:

- **Arboricultural works** –No other tree pruning has been identified at this stage, however it is predicated that some lower limbs may have to be crown raised to facilitate works.
- Following the completion of the development, a **tree condition assessment** may be required on all retained trees for health and safety purposes.
- **Tree protection measures** - All retained trees can be successfully protected during the proposed development by exploring various engineering solutions.
- No materials or equipment other than those required to install tree protection will be delivered to the site until all fencing is in place.
- **Compound area** – The proposed site compound has not been designed; there is sufficient space available throughout the site to avoid any unnecessary impacts to retained trees, provided the tree protection measures as detailed within this report are carried out.
- **Site access.** unknown
- **Daylight and sunlight levels** - Shading by trees have not been assessed in relation to this proposal.
- **Drainage and services** – All new service runs should be located outside the RPAs of retained trees to avoid impacting their condition. If it is found necessary to locate services within tree RPAs, it is recommended that these works are carried out under arboricultural supervision. Methods of work should follow the recommendations in the NJUG guidance. BS5837 (2012) recommends the NJUG guidance as a normative reference to be used in these circumstances.
- **Boundary treatments** – Please refer to the landscape plan for further information
- **Landscape operations** - Landscaping operations will typically take place at the end of the construction period. These works will normally require the removal of protective

fencing to facilitate access for works. There is a risk that plant and machinery may damage soil structure where tree roots are growing. These risks can be managed by maintaining good professional standards of work and working to a method statement. The principle of avoiding soil disturbance or changes in levels within the RPAs of retained trees should be followed unless arboricultural advice has been sought

8.0 Discussion & Conclusion

General Change

8.1 My assessment is that the retention of the trees is essential and will have to be retained to avoid a negative impact on the character and appearance of the immediate surrounding landscape;

Proposal in relation to local planning policy

8.2 The proposed development complies with local planning policy as it relates to trees. A tree survey has been carried out in accordance with best practice and where possible trees have been retained and can be successfully protected during construction.

Conclusion

8.4 The proposal has been assessed in accordance with BS5837:2012 and special working methods have been recommended to minimise tree impacts.

8.5 Provided the recommendations and methods of work, as outlined within this report, are adhered to, the proposed development can be successfully carried out without having a negative impact on the character or appearance of the surrounding landscape.

9.0 Recommendations

9.1 The proposal should be carried out in accordance with the recommendations outlined within this report.

9.2 The positioning of tree protective barriers should be installed as detailed within the Tree Protection Plan.

Appendix A: Tree Survey

Key abbreviations used in the survey

Ref No	Specific identification number given to each tree or group. T=Tree/H=Hedge/G=Group/W=Woodland/S=Shrub.	
Tag No.	Tree marked with individual tree tag of this reference number on site.	
Species	Common name followed by botanical name shown in *italics*	
RPA	Root Protection Area (As defined by BS5837)	
Stem diameter	Diameter of main stem, measured in millimetres at 1.5 m above ground level. (MS = Multi-stem tree measured in accordance with BS5837 Annexe C)	Av / Average: indicates an average representative measured dimension for the group or feature
Spread	The width and breadth of the crown. Estimated on the four compass points in metres.	
Crown clearance	The estimated height (in metres) above ground level of the lowest significant branch attachments.	
#	Estimated dimensions	
*	Indicates estimated position of tree (not indicated on topographical survey).	
P	Privately owned tree (e.g. tree not located in the public highway or adjacent public land).	
Category	Categorisation of the quality and benefits of trees on Site as per Table 1 and 2 of BS5837:2012. 1=Arboricultural quality/value 2=Landscape quality/value 3=Cultural quality/value (including conservation)	
	A=High quality/value 40yrs+ (light green). B=Moderate quality/value 20yrs+ (mid blue) C=Low quality/value min 10yrs/stem diameter less than 150mm (grey). U=Unsuitable for retention (dark red).	
Life stage	**Young (Y):** Newly planted tree 0-10 years. **Semi-Mature (SM):** Tree in the first third of its normal life expectancy for the species (significant potential for future growth in size). **Early Mature (EM):** Tree in the second third of its normal life expectancy for the species (some potential for future growth in size) **Mature (M):** Tree in the final third of its normal life expectancy for the species (having typically reached its approximate ultimate size). **Over Mature (OM):** Tree beyond the normal life expectancy for the species. **Veteran (V):** Tree which is of interest biologically, aesthetically or culturally because of its condition, size or age.	
Structural condition	**Good:** No significant structural defects **Fair:** Structural defects which can be resolved via remedial works. **Poor:** Structural defects which cannot be resolved via remedial works. **Dead:** Dead.	
Physiological condition	**Good:** Normal vitality including leaf size, bud growth, density of crown and wound wood development. **Fair:** Lower than normal vitality, reduced bud development, reduced crown density, reduced response to wounds. **Poor:** Low vitality, low development and distribution of buds, discoloured leaves, low crown density, little extension growth for the species. **Dead:** Dead **Fair/Good** = Indicates an intermediate condition **Fair – Good** = Indicates a range of conditions (e.g. within a group)	
Preliminary management recommendations	Works identified during the tree survey as part of sound arboricultural management, based on the current context of the Site (where relevant reference has been made to tree management based on the potential future context of the site).	

Works to facilitate the development	Tree works identified as necessary to facilitate the Proposed Development following a desk top analysis of the proposals in relation to tree constraints.

Tree Survey Schedule-Carrikmines FRS: Location 1 Aikens Village

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp. (M)	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1801	Ash	M	900	16	N=4 S=4 E=4 W=4	4	Good	A large mature ash displaying a good overall condition. A tree of high amenity value	Minor impact to the roots less that 10%	Retain	B2	1000
1802	Poplar	M	620	14	N=2 S=2 E=2 W=2	1	Fair	A large mature Poplar displaying a fair condition it has suffered stem damage and is overhanging a car park	Remove to facilitate the wall	Remove	C2	
1803	Ash cluster	M	600	8	N=3 S=3 E=3 W=3	1	Fair	1 large ash surrounded by a cluster of smaller ash and hawthorn	Minor impact to the roots less that 10%	Retain	C2	7m
1804	Sycamore Horse chestnut Hawthorn	M	300	8	N=3 S=3 E=3 W=3	1	Good	A large sycamore surrounded by a cluster of smaller chestnut and hawthorn	No impact	Retain	B2	4m
1805	Monterey Pine	M	900	20	N=4 S=4 E=4 W=4	4	Good	A large mature pine	No impact	Retain	A2	1000
1806	Monterey cypress	M	700	16	N=1 S=3 W/E=3	4	Good	A mature cypress	No impact	Retain	B2	800

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp. (M)	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1807 x 2	Hawthorn	EM	250	4	N=2 S=2 E=2 W=2	1	Fair	Two early mature hawthorn engulfed with ivy	No impact	Retain	C2	3.5m
1808	Monterey Pine	M	750	14	N=3 S=3 E=3 W=3	3	Good	A large mature pine	No impact	Retain	A2	8.5m
1809	Ash	M	600	10	N=3 S=3 E=4 W=4	1	Fair	A large mature ash displaying signs of decline	No impact	Retain	C2	7m
1810 x 2	Lime	EM	200	4	N=2 S=2 E=2 W=2	2	Good	Two early mature Lime	Remove to facilitate the wall	Remove	C2	

Location 2: Bray Road

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
T1	Sycamore	M	500	18	N=3 S=3 E=3 W=3	3	Good	A large mature ash displaying a good overall condition located south of the river	Remove to facilitate the wall	Remove	B2	
T2	Horse chestnut	M	500	16	N=4 S=4 E=4 W=4	2	Good	A large mature horse chestnut	Potential loss of roots. Works to be undertaken under supervision	Crown raise lowest limbs by 3m to allow for access	B2	5m
T3	Ash	EM	200	8	N=2 S=2 E=2 W=2	1	Fair	An early mature ash	No impact	Crown raise lowest limbs by 3m to allow for access	C2	3m
T4	Elm	M	300	14	N=2 S=2 E=2 W=2	3	Good	A mature elm	Remove to facilitate the wall	Remove	B2	
T5	Ash	M	350	8	N=2 S=2 E=2	2	Fair	A mature ash in decline and engulfed with ivy	Remove to facilitate the wall	Remove	C2	

					W=2							
T6	Ash	M	350	8	N=2 S=2 E/w=2	2	Fair	A mature ash in decline and engulfed with ivy	Remove to facilitate the wall	Remove	C2	
Tree No	**Species**	**Age class**	**Size (mm)**	**Height (M)**	**Crown Sp.**	**Crown Cl.(M)**	**Condition**	**Structural/Physiological Observations**	**Impact of the development**	**PMR**	**Cat**	**RPA(m)**
T7	Sycamore	M	250	12	N=2 S=2 E=2 W=2	1	Fair	A mature multi-stemmed sycamore	Remove to facilitate the wall	Remove	C2	
1812	Sycamore	M	400	10	N=4 S=4 E=4 W=4	2	Good	A large mature sycamore	Remove to facilitate the wall	Remove	B2	
1813	Sycamore	EM	200	8	N=2 S=2 E=2 W=2	1	Good	An early mature sycamore	Remove to facilitate the wall	Remove	C2	
T8 x 4	Sycamore	EM	200	8	N=2 S=2 E=2 W=2	1	Good	A cluster of early mature sycamores	Remove to facilitate the wall	Remove	C2	

Location 3: Herons Ghyll-Cherrywood Road

The flood wall is proposed to be constructed on the property side of the stream, there are no trees in this location, there are various shrubs which may be impacted on. On the far side of the river there is a mature ash and beech woodland. However no trees will be impacted on

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1814	Cabbage palm	EM	120	4	N=1 S=1 E=1 W=1	2	Good	An early mature cabbage palm	Remove to facilitate the wall	Remove	C2	
1815 x 2	Ash	M	220	10	N=2 S=2 E=2 W=2	4	Fair	Two mature ash located these are in decline at the base of the river bank	Remove to facilitate the wall	Remove	C2	2.2m
1816 x 2	Laurel	M	200	10	N=3 S=3 E=3 W=3	1	Fair	Two large laurel shrubs	Remove 1facilitate the wall	Remove the laurel nearest the river	C2	3m
1817x 2	Beech	EM	200	6	N=2 S=2 E=2 W=2	1	Good	Two early mature beech	Remove to facilitate the wall	Remove	B2	
1818	Sycamore	M	350	16	N=3 S=3 E=3 W=3	2	Good	A mature sycamore located on the lower river bank	Remove to facilitate the wall	Remove	B2	

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1819 x 2	Silver birch	M	250	16	N=2 S=2 E=2 W=2	8	Good	A mature silver birch	No impact	Retain	B2	3.5m
1820	Sycamore	M	360	18	N=3 S=3 E=3 W=3	3	Good	A large mature sycamore	No impact	Retain	B2	4.6m

Location 4: Lower Brides Glen (Adjacent to Whelahan's Wine store) N11 Culvert

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
Tree line 1 x 5	Ash x 2 Alder x 3	M	250	8	N=2 S=2 E=2 W=2	2	Good	A row of mature alder and ash located on the upper bank of the river	Remove to facilitate ethe works	Remove	B2	
T9	Sycamore	M	400	18	N=4 S=4 E=4 W=4	2	Good	A large mature sycamore	No impact	Retain	A2	5m
T10	Willow Ash	M	300	12	N=2 S=2 E=2 W=2	1	Good	A cluster of ash and willow	Remove to facilitate the wall	Remove	C2	
T11	Alder cluster	M	250	8	N=2 S=2 E=2 W=2	1	Good	A mature cluster of alder	No impact	Retain	B2	3.5m

Location 5: Bayview

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1821	Ash	M	500	12	N=4 S=4 E=4 W=4	3	Fair	A mature ash adjacent a bridge, displaying signs of decline	Remove to facilitate the wall	Remove	C2	
1822	Alder	M	280	12	N=2 S=2 E=2 W=2	3	Fair	A mature alder, in decline	Remove to facilitate the wall	Remove	C2	
1823	Ash	M	550	12	N=3 S=3 E=6 W=6	1	Fair	A large mature ash in decline and engulfed with ivy, due to the presence of advanced ash dieback the retainability of the tree is low	Remove to facilitate the works	Remove	C2	
T12	Sycamore cluster	SM	75	3	N=1 S=1 E=1 W=1	1	Fair	A self seed sycamore	No impact	Retain	C2	1.5m
1824	Ash	M	350	6	N=2 S=2 E=2 W=2	2	Good	A mature ash	No impact	Retain	B2	4.5m

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1825 x 3	Alder	EM	260	6	N=2 S=2 E=2 W=2	.5	Fair	3 early mature alder	No impact	Retain	C2	3.6m
1826	Ash	M	300	8	N=3 S=3 E=3 W=3	3	Good	A mature ash	No impact	Retain	B2	4m
1827	Oak	M	320	8	N=3 S=3 E=3 W=3	1	Good	A mature oak in good condition	No impact	Retain	B2	4.2m
Group 1	Alder	M	280	14	N=2 S=2 E=2 W=2	2	Good	A group of mature alder	No impact	Retain	B2	3.8m

Location 6: Brookdene + Commons Road

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1828	Eucalyptus	EM	120	5	N=2 S=2 E=2 W=2	2	Fair	An early mature gum tree	No impact	Retain	C2	2.2m
1829	Ash	M	600	16	N=4 S=4 E=4 W=4	3	Fair	A large mature ash that is in decline	No impact	Retain	C2	7m
1830	Ash	M	650	14	N=3 S=3 E=3 W=3	4	Poor	A large mature ash in advanced decline	No impact	Remove for health & safety	U	
1831-1832 x 9	Cherry	EM	240	4	N=3 S=3 E=3 W=3	2	Good	A row of 9 early mature cherries	Remove the last 2 in the row	Remove	C2	3.4m
1833	Ash	M	650	18	N=4 S=4 E=4 W=4	2	Good	A mature ash located between the 1st and 2nd cherry	No impact	Retain	B2	7.5m

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1834	Weeping willow	EM	210	6	N=2 S=2 E=2 W=2	2	Good	An early mature willow	No impact	Retain	B2	3.1m
1835	Lime	M	350	10	N=4 S=4 E=4 W=4	1	Good	A large mature Lime	No impact	Retain	B2	4.5m
1836	Willow	M	550	8	N=3 S=3 E=3 W=3	2	Good	A large mature willow	No impact	Retain	B2	6.5m
1837	Lime	SM	90	4	N=2 S=2 E=2 W=2	2	Good	A semi-mature lime	No impact	Retain	C2	2m

To note along the commons road heading west, there is little vegetation of significance. There is an existing flood wall in this location that will be upgraded

Location 7: Priorsland

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1838 x 2	Monterey Cypress	M	360	10	N=2 S=2 E=2 W=2	2	Good	Represents two mature Monterey cypress	No impact	Retain	B2	4.6m
1839 x 5	Hornbeam cluster	SM	80	4	N=1 S=1 E=1 W=1	1	Good	A cluster of semi-mature hornbeam and cherry	Remove to facilitate the wall	Remove	C2	
1840	Sycamore	M	340	10	N=2 S=2 E=2 W=2	2	Good	A mature sycamore	Remove to facilitate the wall	Remove	B2	
1841	Sycamore	M	320	8	N=2 S=2 E=3 W=3	2	Good	A mature sycamore	Remove to facilitate the wall	Remove	B2	
1842	Sycamore	M	320	8	N=2 S=2 E=3 W=3	2	Good	A mature sycamore	Remove to facilitate the wall	Remove	B2	

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1843	Ash	M	260	8	N=2 S=2 E=1 W=1	2	Fair	A mature ash that is in decline and has been over pruned to accommodate an overhead wire	Remove to facilitate the wall	Remove	C2	
1844	Sycamore	M	600	16	N=3 S=3 E=3 W=3	1	Good	A mature co-dominant sycamore	Remove to facilitate the wall	Remove	B2	
1845	Ash	M	250	8	N=0 S=0 E=0 W=0	2	Poor	A standing stump	No impact	Remove	U	
1846	Sycamore	M	320	8	N=2 S=2 E=3 W=3	3	Good	A mature sycamore	Remove to facilitate the wall	Remove	B2	
1847	Sycamore	M	450	10	N=3 S=3 E=3 W=3	2	Good	A mature sycamore	Remove to facilitate the wall	Remove	B2	
1848	Ash	M	300	10	N=1 S=1 E=1 W=1	2	Poor	An ash tree that has suffered significant stem damage	No impact	Remove	U	

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1849	Sycamore	EM	260	6	N=2 S=2 E=2 W=2	2	Good	An early mature sycamore	Remove to facilitate the wall	Remove	C2	
1850	Willow cluster	M	280	12	N=3 S=3 E=2 W=2	1	Fair	A willow cluster	Remove to facilitate the wall	Remove	C2	
T12 x 2	Willow	M	250	8	N=3 S=3 E=3 W=3	2	Good	Represents two will in good condition	No impact	Retain	B2	3.5m
T13 x 3	Beech Sycamore Elm	M	350	14	N=2 S=2 E=3 W=3	3	Good	A cluster of mature beech, sycamore and elm	Remove to facilitate the wall	Remove	B2	
T14	Beech	M	700	20	N=4 S=4 E=4 W=4	3	Good	A large mature of high amenity value beech within a private garden	No impact	Retain	A2	8m
T15	Willow	M	200	8	N=4 S=4 E=4 W=4	1	Good	A large multi-stemmed willow	No impact	Retain	B2	3m

Location 8: Belarmine Park

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
T15	Poplar	M	500	20	N=4 S=4 E=4 W=4	3	Fair	A large mature Poplar located within a open space area	Remove to facilitate the wall	Remove	C2	
T16 x 3	Silver birch Norway maple x 2	EM	200	6	N=2 S=2 E=2 W=2	2	Good	A cluster of tree within a private garden	No impact	Retain	B2	3m
1851 x 2	Ash Sycamore	SM	140	3	N=2 S=2 E=1 W=1	1	Fair	Two self seed trees in fair condition	Remove to facilitate the wall	Remove	C2	
T17 X 2	Ash	EM	140	6	N=2 S=2 E=2 W=2	2	Good	Two early mature ash within a private garden	No impact	Retain	C2	2.4m
T18	Elm cluster	SM	70	4	N=1 S=1 E=1 W=1	1	Good	An elm cluster	No impact	Retain	C2	2m

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
1852 x 6	Ash	EM	220	6	N=2 S=2 E=2 W=2	2	Good	A row of early mature ash	No impact	Retain	B2	3.2m
T19	Willow	EM	100	4	N=2 S=2 E=2 W=2	2	Good	An early mature willow	Remove to facilitate the wall	Remove	C2	
1853	Ash	EM	210	5	N=2 S=2 E=2 W=2	1	Good	An early mature ash	Remove to facilitate the wall	Remove	C2	
1854	Ash	EM	210	5	N=2 S=2 E=2 W=2	1	Good	An early mature ash	Remove to facilitate the wall	Remove	C2	3m
1855	Hawthorn	SM	150	4	N=1 S=1 E=1 W=1	1	Fair	A hawthorn in decline	Remove to facilitate the wall	Remove	C2	
T20 x 2	Hawthorn Sycamore	EM	200	6	N=2 S=2 E=2 W=2	1	Fair	A hawthorn and sycamore in decline and engulfed in ivy	Remove to facilitate the wall	Remove	C2	

Tree No	Species	Age class	Size (mm)	Height (M)	Crown Sp.	Crown Cl.(M)	Condition	Structural/Physiological Observations	Impact of the development	PMR	Cat	RPA(m)
T21	Ash	M	300	8	N=3 S=3 E=3 W=3	2	Fair	A mature ash in decline and engulfed with ivy	Unknown	Retain	C2	4m
1856-1857 x 8	Ash	EM	200	6	N=2 S=2 E=2 W=2	2	Good	A row of early mature ash	Unknown	Retain	B2	3m
1858	Ash	EM	310	8	N=3 S=3 E=3 W=3	2	Good	An early mature ash that is in decline	Unknown	Retain	C2	4m

Appendix B: Arboricultural Method Statement

Introduction
This report has been prepared in accordance with British Standard 5837: Trees in relation to design, demolition and construction – Recommendations (2012) which provides a methodology for the assessment and protection of trees and other significant vegetation on development sites.
Sequence of Operations
• Carry out the proposed tree works. • Installation of tree protection measures. • Enabling works. • Construction of proposal and the installation of drainage and services. • Landscaping. *Alternative sequences can be discussed and agreed with the local authority and project manager if required.*

Supervision

All key / critical activities that will affect trees during construction will be inspected and monitored bythe approved arboricultural consultant *if so requested by the local authority.*

- Pre-commencement meeting with site manager and local authority to confirm location of treeprotection measures.
- Inspection of all tree works and tree protection measures prior to the commencement ofworks.
- Supervision during the excavation works within the RPAs of retained trees.
- Supervision during the installation of all services/wall within tree RPAs.
- Supervision during any other works that may affect retained trees.
- Inspection upon completion.

Arboricultural Method Statement	
Scope	**Methodology**
Pre-commencement meeting	Prior to the commencement of works, a meeting between the arboriculturalconsultant, local authority and the site manager will be held in order to discuss the tree protection measures and proposed works required in closeproximity to trees. (if requested) Contact details of all parties will be circulated to ensure all team members are able to communicate correctly. The site manager will be responsible for the protection of all retained trees for the duration of the project. Whenever necessary, the site manager will engage the arboricultural consultant to ensure trees are adequately protected. The appointed arboricultural consultant will be available for verbal advice throughout site works.
Tree Works	Please refer to the Tree Work Schedule at Appendix A for a list of all proposed tree works. The location of trees to be removed are highlighted on the Tree Removals Plan at Appendix B. It is the responsibility of the Site Manager to ensure all tree works have been approved by the local planning authority. All tree works will be carried out by a reputable arboricultural contractor inaccordance with the recommendations given in BS 3998:2010 – Tree Work Recommendations. All tree works should be carried out in accordance with Section 40 of the Wildlife Act 1976 and Section 46 of the Wildlife (Amendment) Act 2000. It is the responsibility of the arboricultural contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works.
Tree Protection	The position of protective fencing for construction is shown on the Tree Protection Plan. Protective fencing will be constructed and installed using fencing in accordance with BS5837:2012, please refer to the attached Tree Protection Plan for the specification. Alternatives to those shown must be agreed in advance by the client approved, arboricultural consultant.

	Any machinery / site operative within tree RPAs must operate on the appropriate ground protection at all times, this will include the installation and removal of ground protection. No materials or equipment other than those required to erect protective fencing will be delivered to the site before the fencing is installed. Signs will be fixed to every third panel stating, *'Tree Protection Area Keep Out – Any incursion into the protected area must be with the agreement ofthe local authority or arboricultural consultant*'. The main contractor will inform the local authority and the arboricultural consultant that tree protection is in place before site clearance works commence. No alteration, removal or repositioning of the tree protection will take placeduring construction without the prior consent of the arboricultural consultant.
Compound Area	The proposed site compound area has not yet been designed; however, the considerations below must be followed: The site compound must be located outside the designated TPZs as highlighted on the Tree Protection Plan at Appendix B. No excavation works within tree RPAs are permitted to install temporary services for site cabins and facilities. Any temporary services within tree RPAs must be above ground and protected accordingly. No operating generators or toxic liquids will be stored within the RPAs of retained trees during construction. Overhanging tree canopies must be taken into consideration when transporting, installing and removing site cabins near tree crowns. A banksman will be present during this process to ensure that all operations are carried out in a controlled manner and no part of the cabin meets overhanging tree crowns.
Installation of fencing within RPAs	The installation of fencing within the RPAs of retained trees will be carried out using the following methodology: Post holes will be carefully positioned as far away from the stem of trees as possible (minimum 50 cm) to minimise contact with tree stems and

	significant tree roots. Holes will be manually excavated with the use of hand tools only and where roots greater than 25mm in diameter or large fibrous roots are present, theposition of the hole will be slightly altered to avoid potential root damage. If the position of the hole cannot be altered, roots greater than 25mm in diameter or large fibrous roots will be protected with flexible plastic pipes and retained within the pit. In some cases, individual roots less than 25mm in diameter may be pruned, making a clean cut with a suitable sharp sterile tool (e.g. secateurs or hand saw). Once the required depth has been excavated, the hole will be lined using 1000-gauge polythene and filled with the appropriate concrete mix.
Landscape Operations	All landscape operations within the protected area will be carried out by hand, using hand tools only, unless otherwise agreed with by the arboricultural consultant.
	No dumping of spoil or rubbish, parking of vehicles or plant, storage ofmaterials or temporary accommodation will be undertaken within the TPZs. All tree roots within the RPAs greater than 25mm diameter will be retainedand worked around. Soil levels will not be increased or reduced within the RPAs of trees without prior agreement from the arboricultural consultant.

General Principals to Avoid Damage to Trees	All tree works will be carried out in accordance with the recommendations given in BS 3998 (2010). No fires will be permitted within 20m of the crown of any tree. No materials, vehicles, plant or personnel will be permitted into the tree protection zones at any time without the prior consent of the arboriculturalconsultant. Any liquid materials spilled on site will be immediately cleared up and removed from the site. If liquid fuel or cement products are spilled within 2m of the tree protection zone, the contractor will report the incident to thearboricultural consultant immediately. The contractor will report any damage to trees or shrubs, whether caused by construction activities or from any other cause, to the arboricultural consultant immediately.

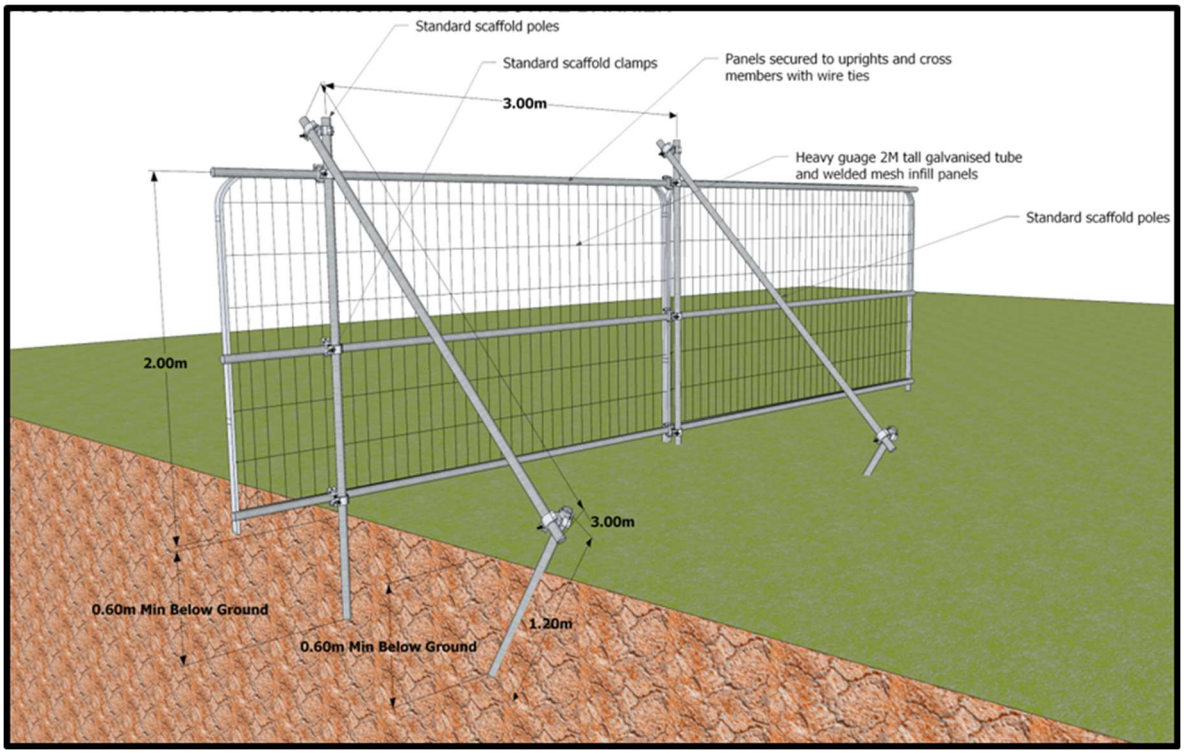


Figure 3 Default specification for tree protection barrier in accordance with BS5837:2012

PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.

TREE PROTECTION AREA

KEEP OUT !

(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION

ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

This report was prepared by:

Michael Garry, BSc. Arb. Dip Arb M.Arbor, Pgrad Ecology (UCC)
Arbor-Care Ltd, Professional Consulting Tree Service

Yours in Conservation,
Michael Garry.
www.arborcare.ie

Notes
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CHERRYWOOD ROAD

2022-CP-012

PROPOSED FLOOD GATE

BRIDES GLEN RIVER

BRAY ROAD

N11

Tree Line 1x5

PROPOSED FLOOD GATE

PROPOSED ROUGHING SCREEN

T9

Rev.	Date	Description

Legend:

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Category (U)
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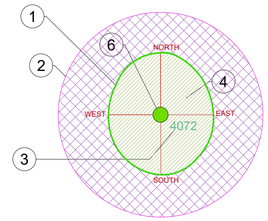

AGE GROUPINGS
Y = YOUNG
MA = MIDDLE AGE
M = MATURE
OM = OVER MATURE
V = VETERAN

1 EXISTING TREE CANOPY BASED ON DIMENSIONS GATHERED ON SITE IN 4 DIRECTIONS, NORTH, SOUTH, EAST AND WEST
2 ROOT PROTECTION ZONE BASED ON 12 TIMES THE (DBH) AT CHEST HEIGHT
3 TREE TAG NUMBER
4 TREE TO BE RETAINED
5 TREE TO BE REMOVED
6 TREE CATEGORY BASED ON BS:5837 2012 CRITERIA
7 DECIDUOUS TREE CANOPY
8 EVERGREEN TREE CANOPY

01 TABLES BS 5837-2012

Key
FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Lower Bride's Glen

Drawn By:	Checked By:	Date:	Scale:
RS	MG	11/12/2024	1:250@A1
Drg. No. CFRS-TS-004a	CAD File: CFRS_TS_004a.DWG	Issued For: Information	Rev. 1

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Dangerous Consulting Care Service

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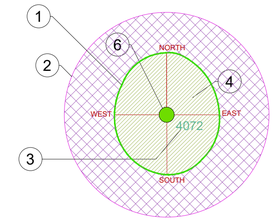

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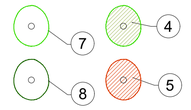

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01 TABLES BS 5837-2012

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FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Bayview

Drawn By:	Checked By:	Date:	Scale:
RS	MG	14/11/2024	1:250@A1
Drg. No. CFRS-TS-005	CAD File: CFRS_TS_005.DWG	Issued For: Information	Rev. 1

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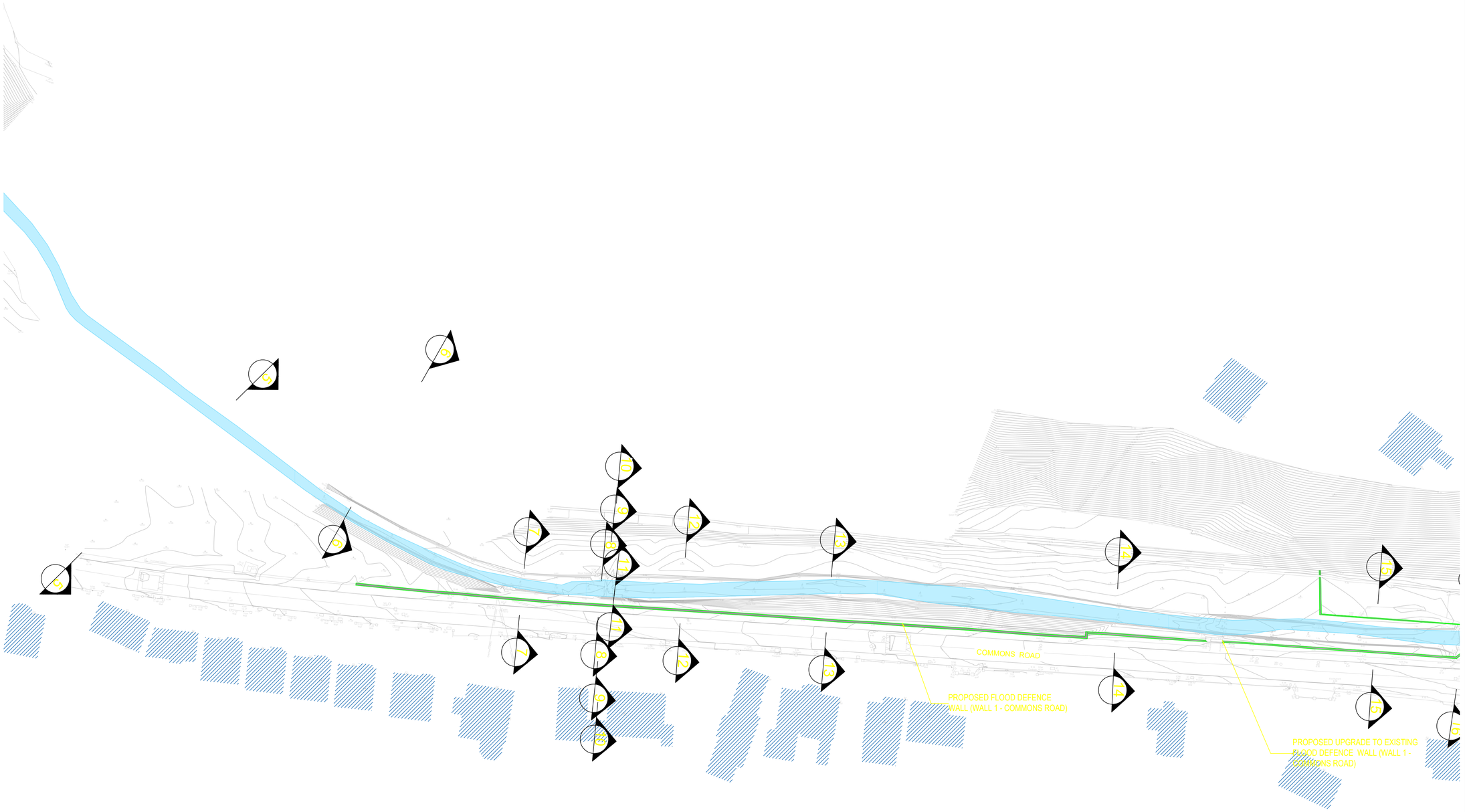

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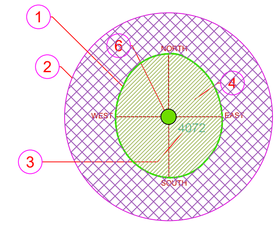

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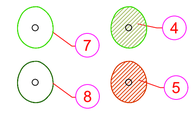

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01 TABLES BS 5837-2012

Key

FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Commons Road & Brookdene-1of2

Drawn By:	Checked By:	Date:	Scale:
RS	MG	16/04/2024	1:500@A1
Drg. No.	CAD File:	Issued For:	Rev.
CFRS-TS-006a	CFRS_TS_006.DWG	Information	-

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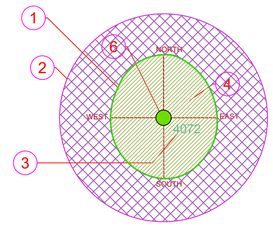

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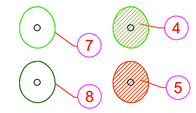

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01 TABLES BS 5837-2012

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OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Commons Road & Brookdene-2of2

Drawn By:	Checked By:	Date:	Scale:
RS	MG	16/04/2024	1:500@A1
Drg. No. CFRS-TS-006b	CAD File: CFRS_TS_006.DWG	Issued For: Information	Rev. -

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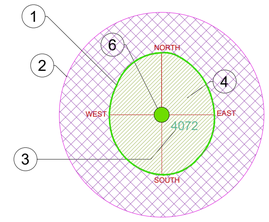

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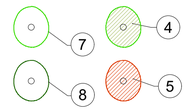

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01 TABLES BS 5837-2012

Key
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1839x5
1838x2
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
T12x2
T14
T13x3
T15
PROPOSED FLOOD DEFENCE WALL
PROPOSED ROUGHING SCREEN
SHANGANAGH RIVER
CASTLE VIEW
GLENAMUCK ROAD
GLENAMUCK ROAD

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Priorsland

Drawn By:	Checked By:	Date:	Scale:
RS	MG	14/11/2024	1:250@A1
Drg. No. CFRS-TS-007	CAD File: CFRS_TS_007.DWG	Issued For: Information	Rev. 2

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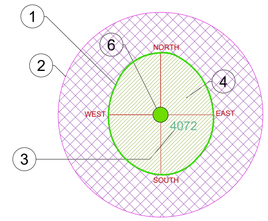

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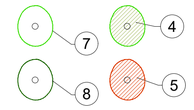

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01 TABLES BS 5837-2012

Key
FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Belarmine Park

Drawn By:	Checked By:	Date:	Scale:
RS	MG	11/12/2024	1:250@A1
Drg. No. CFRS-TS-008	CAD File: CFRS_TS_008.DWG	Issued For: Information	Rev. 2

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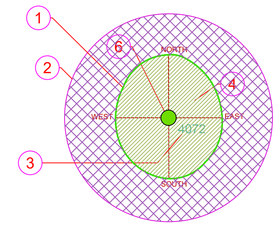

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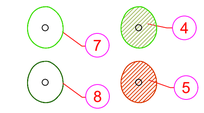

1. EXISTING TREE CANOPY BASED ON DIMENSIONS GATHERED ON SITE IN 4 DIRECTIONS, NORTH, SOUTH, EAST AND WEST
2. ROOT PROTECTION ZONE BASED ON 12 TIMES THE (DBH) AT CHEST HEIGHT
3. TREE TAG NUMBER
4. TREE TO BE RETAINED
5. TREE TO BE REMOVED
6. TREE CATEGORY BASED ON BS:5837 2012 CRITERIA
7. DECIDUOUS TREE CANOPY
8. EVERGREEN TREE CANOPY

01 TABLES BS 5837-2012

Key

FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Aikens Village

Drawn By:	Checked By:	Date:	Scale:
RS	MG	16/04/2024	1:500@A1
Drg. No.	CAD File:	Issued For:	Rev.
CFRS-TS-001	CFRS_TS_001.DWG	Information	-

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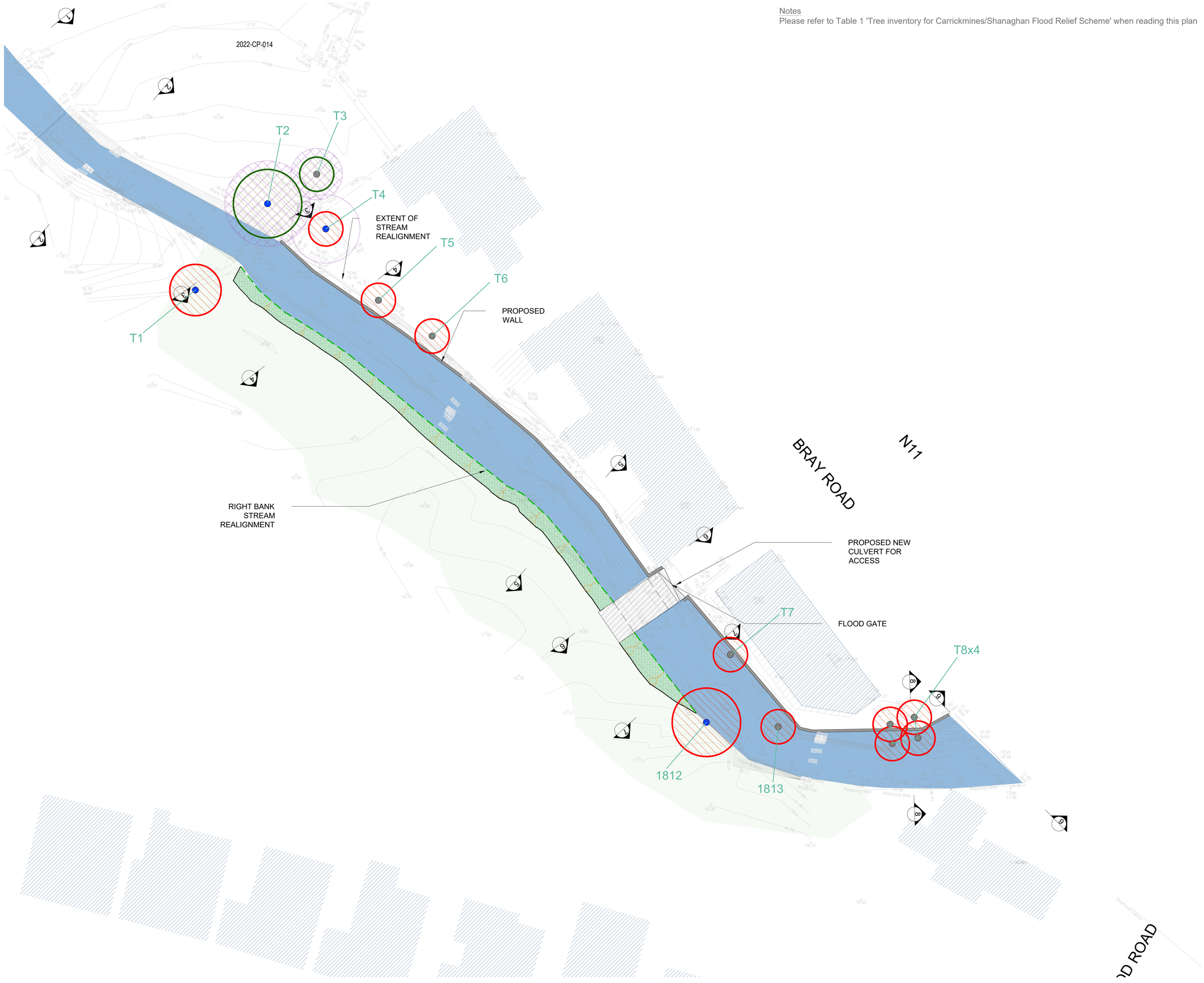
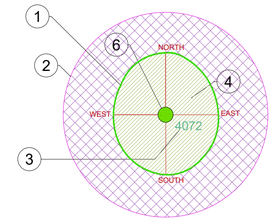
Notes
Please refer to Table 1 'Tree inventory for Carrickmines/Shanaghan Flood Relief Scheme' when reading this plan



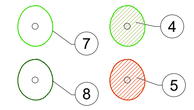
Rev.	Date	Description

Legend:

- Category (A, A1, A2, A3): Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years)
- Category (C, C1, C2, C3): Those of low quality and value: currently in adequate condition to remain untill new planting could be established (a minimum of 10 years) or young trees with a stem diameter below .150mm
- Category (B, B1, B2, B3): Those of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years)
- Category (U): Those in such condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reason of sound abroicultural management



AGE GROUPINGS
Y = YOUNG
MA = MIDDLE AGE
M = MATURE
OM = OVER MATURE
V = VETERAN



1 EXISTING TREE CANOPY BASED ON DIMENSIONS GATHERED ON SITE IN 4 DIRECTIONS, NORTH, SOUTH, EAST AND WEST
2 ROOT PROTECTION ZONE BASED ON 12 TIMES THE (DBH) AT CHEST HEIGHT
3 TREE TAG NUMBER
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7 DECIDUOUS TREE CANOPY
8 EVERGREEN TREE CANOPY

01 TABLES BS 5837-2012

Key
FENCING

Client: OPW

Project: Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title: Tree Survey Plan-Bray Road

Drawn By:	Checked By:	Date:	Scale:
RS	MG	11/12/2024	1:250@A1
Drg. No. CFRS-TS-002	CAD File: CFRS_TS_002.DWG	Issued For: Information	Rev. 1

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Notes
Please refer to Table 1 'Tree inventory for Carrickmines/Shanaghan Flood Relief Scheme' when reading this plan

Rev.	Date	Description

Legend:

Category (A, A1, A2, A3)
Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years)

Category (C, C1, C2, C3)
Those of low quality and value: currently in adequate condition to remain untill new planting could be established (a minimum of 10 years) or young trees with a stem diameter below .150mm

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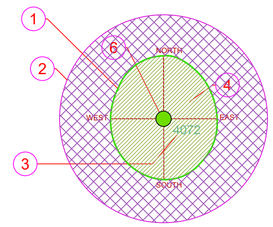

AGE GROUPINGS
Y = YOUNG
MA = MIDDLE AGE
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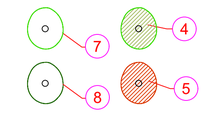
V = VETERAN



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01 TABLES BS 5837-2012

Key

FENCING

Client:
OPW

Project:
Carrickmines/Shanaghan Flood Relief Scheme

Drawing Title:
Tree Survey Plan-Herons Ghyll-Cherrywood Road

Drawn By:	Checked By:	Date:	Scale:
RS	MG	16/04/2024	1:250@A1
Drg. No. CFRS-TS-003	CAD File: CFRS_TS_003.DWG	Issued For: Information	Rev. -

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8.2 Fisheries Report

Fisheries assessment for the Carrickmines Shanganagh River Flood Relief Scheme, Co. Dublin

Prepared by Triturus Environmental Ltd. for JBA Consulting

January 2024

Please cite as:

Triturus (2024). Fisheries assessment for the Carrickmines Shanganagh River Flood Relief Scheme, Co. Dublin. Report prepared by Triturus Environmental Ltd. for JBA Consulting. January 2024.

Table of contents

1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by JBA to undertake a baseline fisheries assessment of riverine watercourses in the vicinity of the proposed Carrickmines Shanganagh River Flood Relief Scheme (FRS) located near Carrickmines in Dún Laoghaire-Rathdown, Co. Dublin (**Figure 2.1**).

The survey was undertaken to establish baseline fisheries data used in the preparation of the EIAR for the proposed scheme, which aims to alleviate the risk of flooding the 1% Annual Exceedance Probability (AEP) flood event (1 in 100-year event) within the catchments of the Carrickmines and Shanganagh Rivers. In order to gain an understanding of the fisheries value of the riverine watercourses within the vicinity of the scheme, a catchment-wide electro-fishing survey was undertaken across 7 no. riverine sites in the vicinity of proposed flood relief infrastructure (**Table 2.1; Figure 2.1**). Electro-fishing helped to identify the importance of the watercourses as nurseries, spawning and or holding areas for salmonids, European eel (*Anguilla anguilla*) and lamprey (*Lampetra* sp.). The fisheries survey also documented other fish species of lower conservation value and helped to further inform impact assessment and any subsequent mitigation for the scheme.

The fisheries survey sites were located within the Carrickmines_010 and Shanganagh_010 river sub-basins, within the Dargle_SC_010 river sub-catchment and hydrometric area 10 (Avoca-Vartry). The proposed FRS was not located within a European site. Survey sites were present in the vicinity of proposed works areas on the Barnacullia Stream (EPA code: 10B99), Carrickmines Stream (10C04) and the Shanganagh River (10S01) (**Table 2.1**). Alternate/local names for the survey watercourses are provide in **Table 2.1**.

Triturus Environmental Ltd. made an application under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake a catchment-wide electro-fishing survey in the vicinity of the proposed works for the scheme. The surveys were undertaken on the 23rd and 24th August 2023.

2. Methodology

2.1 Fisheries assessment (electro-fishing)

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on riverine watercourses in the vicinity of the proposed scheme in August 2023 following notification to Inland Fisheries Ireland and under the conditions of a Department of the Environment, Climate and Communications (DECC) licence. The catchment-wide electro-fishing (CWEF) survey was undertaken across 7 no. riverine sites (see **Table 2.1, Figure 2.1**). The nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Both river and holding tank water temperature was monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank. Salmonids, European eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. To reduce fish stress levels, anaesthesia was not applied to captured fish. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e., salmonids, lamprey, and eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology below), the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel was surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and adhered to best practice (e.g., CFB, 2008).

2.1.1 Salmonids and European eel

For salmonid species and European eel, as well as all other incidental species, electro-fishing was conducted in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson et al., 2018). A total of approx. 50-75m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European eel to the anode without harm. For the moderate conductivity waters of the sites a voltage of 250-275v, frequency of 35-40Hz and pulse duration of 3.5-4ms was used to draw fish to the anode without causing physical damage.

2.1.2 Lamprey

Electro-fishing for lamprey ammocoetes was conducted using targeted quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered. As lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) burst DC pulse setting which also allowed detection of European eel in sediment, if present. Settings for lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under

the water's surface, approximately 10-15cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to species level, where possible, with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003).

2.2 Fisheries habitat appraisal

A fisheries habitat appraisal of all 7 no. survey sites was undertaken to establish their fisheries value. The surveys focused on evaluating the spawning, nursery and or holding habitat for salmonids and lamprey species but also considered European eel and other fish species. The appraisals of salmonids and lamprey were cognisant of species-specific habitat requirements and preferences as outlined in O'Grady (2006), Hendry et al. (2003), Armstrong et al. (2003), Harvey & Cowx (2003), Maitland (2003) and Hendry & Cragg-Hine (1997). River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the riverine sites (i.e., channel profiles, substrata etc.).

2.3 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Care was given towards preventing the spread or introduction of highly virulent crayfish plague (*Aphanomyces astaci*). Furthermore, staff did not undertake any work in a known crayfish plague catchment for a period of <72hrs in advance of the survey. Where feasible, equipment was also thoroughly dried (through UV exposure) between survey areas. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

Table 2.1 Location of *n*=7 electro-fishing survey and fisheries appraisal sites in the vicinity of the proposed Carrickmines Shanganagh FRS

Site no.	Watercourse (EPA name)	Alternative name	EPA code	Location	X (ITM)	Y (ITM)
A	Barnacullia Stream	Ballyogan Stream	10B99	Belarmine Vale	718952	724926
B	Carrickmines Stream	Shanganagh River	10C04	Ballyogan Road	721875	724168
C	Carrickmines Stream	Shanganagh River	10C04	Cherrywood Valley	724050	723630
D	Carrickmines Stream	Shanganagh River	10C04	Loughlinstown	724393	723355
E	Shanganagh River	Loughlinstown Stream	10S01	Bride's Glen (N11 culvert)	724460	723195
F	Shanganagh River	Loughlinstown Stream	10S01	Cherrywood Road	724309	722692
G	Shanganagh River	Shanganagh River	10S01	Commons Road	725084	723003

Figure 2.1 Overview of the *n*=7 electro-fishing & fisheries appraisal survey site locations for the proposed Carrickmines Shanganagh River FRS

3. Desktop review

3.1 Fisheries

Works areas for the proposed Carrickmines Shanganagh River FRS are located adjacent to several watercourses, namely the Barnacullia Stream, Carrickmines Stream and Shanganagh River (**Table 2.1; Figure 2.1**).

The Barnacullia (aka Ballyogan) Stream is a heavily modified watercourse known to support three-spined stickleback (*Gasterosteus aculeatus*) (Triturus, 2021, 2020). The status of salmonids in the stream is uncertain given water quality pressures and the presence of numerous significant instream barriers along the watercourse which impede fish migration (Roisin O'Callaghan, Inland Fisheries Ireland, pers. comm.).

The Shanganagh River is recognised by Inland Fisheries Ireland (IFI) as a regionally important salmonid system, which supports both brown trout and anadromous sea trout (both *Salmo trutta*).

The Carrickmines Stream supports brown trout, European eel (*Anguilla anguilla*), lamprey (*Lampetra* sp.) and three-spined stickleback (Triturus, 2020; Dún Laoghaire-Rathdown County Development Plan 2016-2022).

4. Results

A catchment-wide fisheries survey of 7 no. sites in the vicinity of the proposed Carrickmines Shanganagh River FRS was conducted on the 23rd and 24th August 2023 following notification to Inland Fisheries Ireland. The results of the survey are discussed below in terms of fish population structure, population size and the suitability and value of the surveyed areas as nursery, spawning and or holding habitat for salmonids, European eel, lamprey and other fish species. Scientific names are provided at first mention only.

4.1 Fisheries assessment & appraisal

4.1.1 Site A – Barnacullia Stream, Belarmine Vale

Site A was located on the uppermost reaches of the Barnacullia Stream (EPA code: 10B99), adjacent to the Aikens Village attenuation pond. The small upland eroding stream (FW1) was 1m wide and 0.1-0.3m deep with banks of 1-1.5m in height. The stream had a semi-natural sinuous profile with riffle, glide and shallow pool sequences. The substrata comprised occasional compacted small boulder, cobble, bedded mixed gravels, sand and silt. The substrata had moderate to high siltation. The stream at this location was of too high an energy to support macrophyte plants. The muddy banks and splash zones supported the bryophyte species *Thamnobryum* sp., *Pellia endiviifolia* and *Fissidens crassipes*. The riparian zone provided often high shading to the channel and supported mature sycamore (*Acer psuedoplatanus*), ash (*Fraxinus excelsior*), grey willow (*Salix cinerea*), elder (*Sambucus nigra*) and holly (*Ilex aquifolium*). The understories featured dense bramble (*Rubus fruticosus* agg.) with scattered ivy (*Hedera* sp.), hogweed (*Heracleum sphondylium*), nettle (*Urtica dioica*) and pendulous sedge (*Carex pendula*) with scattered non-native skunk cabbage (*Symplocarpus foetidus*).

Three-spined stickleback (*Gasterosteus aculeatus*) (*n*=7) were the only fish species recorded via electro-fishing at site A (**Figure 4.1**). With the exception of stickleback, the site was of poor fisheries value. The stream at this location was too small, shallow and upland to support salmonid populations and none were recorded. Siltation and enrichment pressures also limited the stream's capacity to support salmonid fish. The high energy site was unsuitable for lamprey. While there was some moderate quality habitat for European eel, significant downstream barriers prevent access to the low order, upper reaches of the Carrickmines catchment.

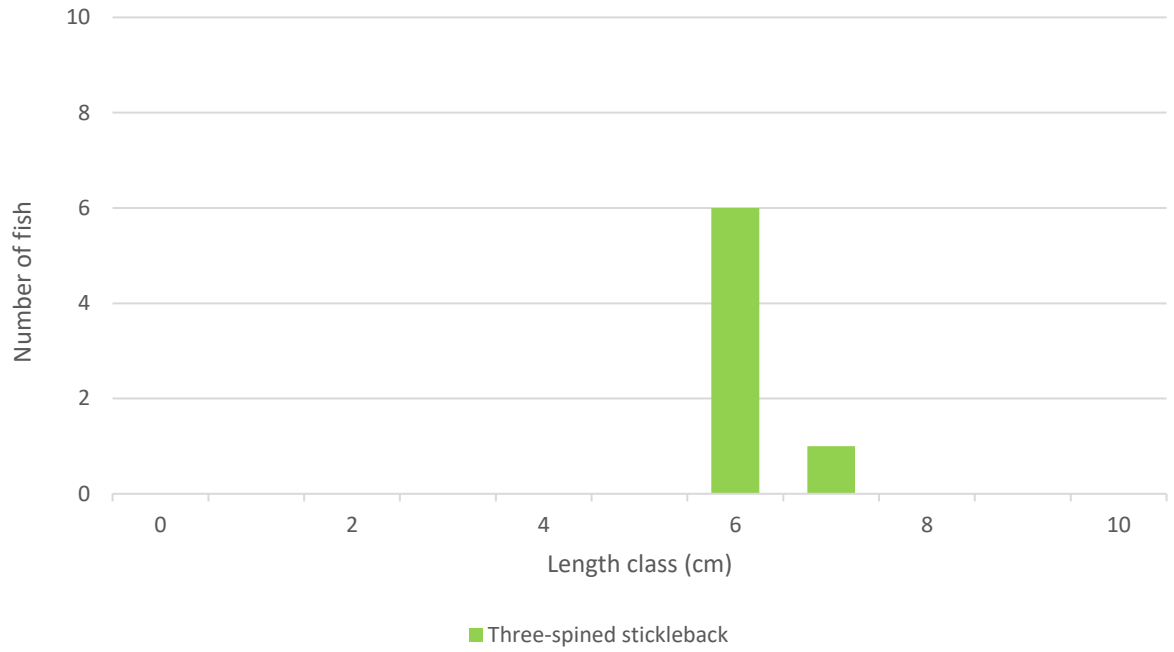

Figure 4.1 Length frequency distribution recorded via electro-fishing at A on the Barnacullia Stream, August 2023

Plate 4.1 Representative image of the Barnacullia Stream at site A, August 2023

Plate 4.2 Three-spined stickleback recorded at site A, August 2023

4.1.2 Site B – Carrickmines Stream, Ballyogan Road

Site B was located on the upper reaches of the Carrickmines Stream (10C04) upstream of the Glenamuck Road North roundabout. The small upland eroding stream (FW1) had been historically straightened and deepened locally but retained some semi-natural characteristics such as meanders. The stream flowed over a moderate gradient and was 1.5m wide and between 0.1-0.4m deep with riffle, glide and shallow pool sequences. The substrata were composed of frequent cobble with occasional compacted small boulder, mixed bedded gravels, sand and silt. Siltation was moderate to high, despite flow rates. Due to high flow rates, a compacted bed and shading, macrophytes were not present. The muddy banks and splash zones supported the bryophyte species *Conocephalum conicum*, *Pellia endiviifolia* and *Fissidens crassipes*. The riparian zone supported mature crack willow (*Salix fragilis*) and grey willow with dense bramble and hedge bindweed (*Calystegia sepium*) in the understories. The non-native snowberry (*Symphoricarpos albus*) and buddleja (*Buddleja davidii*) were also present. The site was bordered by buildings and artificial surfaces (BL3) and scrub (WS1).

Brown trout (*Salmo trutta*) (*n*=7) and European eel (*Anguilla anguilla*) (*n*=1) were the only fish species recorded via electro-fishing at site B (**Figure 4.2**). The site was considered a moderate quality salmonid nursery given strong flows with broken flow patterns and a stoney bed. Mixed gravels in deeper pool and glide provided some moderate quality salmonid spawning habitat. However, the nursery and spawning value was reduced due to evident siltation and enrichment pressures. Holding areas for adult trout were present but only juveniles were recorded. Despite significant barriers downstream, a single European eel was captured and the stream offered moderate quality eel habitat (shaded channel with deeper pool and glide with rocky refugia). The stream at this location was of too high an energy to support lamprey spawning or nursery habitats (none recorded).

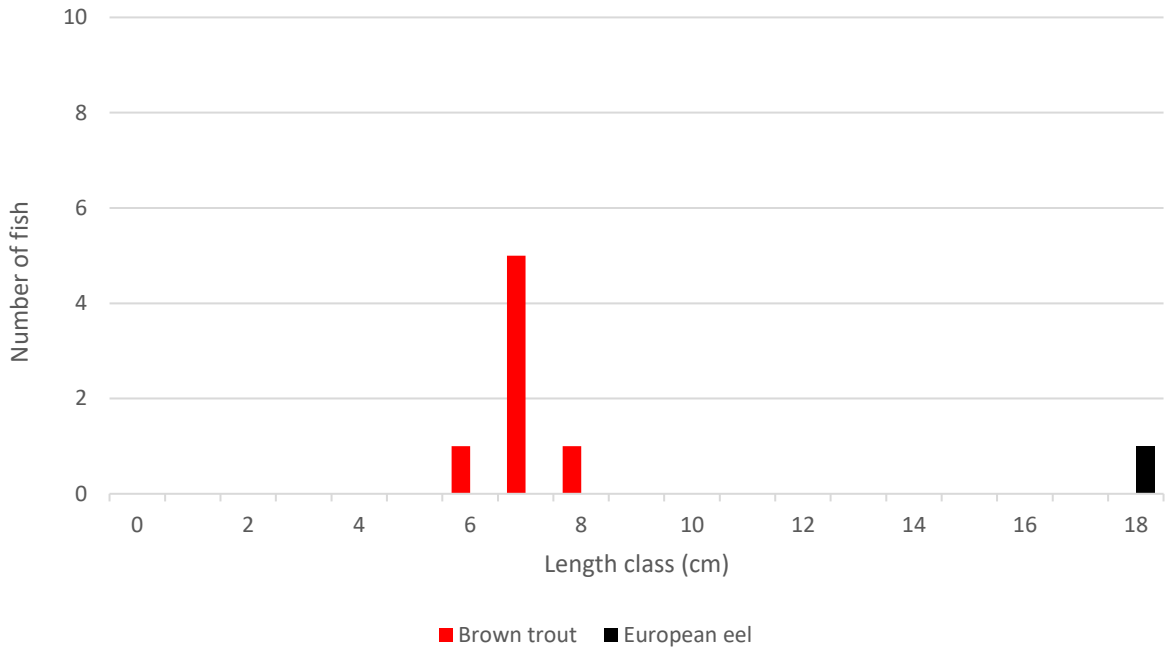

Figure 4.2 Length frequency distribution recorded via electro-fishing at B on the Carrickmines Stream, August 2023

Plate 4.3 Representative image of site B on the Carrickmines Stream, August 2023

Plate 4.4 Juvenile brown trout recorded at site B on the Carrickmines Stream, August 2023

Plate 4.5 European eel recorded at site B on the Carrickmines Stream, August 2023

4.1.3 Site C – Carrickmines Stream, Cherrywood Valley

Site C was located on the Carrickmines Stream (10C04) upstream of the R118 (Wyattville Link Road), approximately 2.5km downstream of site B. The upland eroding stream (FW1) was lower in energy compared with upstream, flowing over a low gradient. The stream was 2.5-3m wide and between 0.1-0.6m deep. The bank heights were between 1.5-2m. The stream had a semi-natural sinuous profile that was dominated by slow moving deeper glide. However, the river improved upstream of the survey

area where riffle and glide sequences and pools in undercut banks were present. The substrata were dominated by silt and sand with occasional scattered small boulder and cobble with clusters of mixed coarse gravels. These were heavily compacted with high siltation. The site was too shaded to support macrophytes and none were recorded. However, instream boulders supported *Rhynchostegium riparioides* and *Fontinalis antipyretica* (both rare). The riparian zone supported treelines of mature crack willow, grey willow, sycamore and ash with dense bramble scrub. The site was bordered by scattered trees and parkland (WD5).

Brown trout (*n*=15), lamprey (*Lampetra* sp.) (*n*=6) and three-spined stickleback (*n*=1) were recorded via electro-fishing at site B (**Figure 4.3**). The site was a moderate quality salmonid nursery given broken flow patterns and a stoney bed. The nursery value was reduced as a result of evident siltation and enrichment pressures but nonetheless the supported a moderate density of 0+ and 1+ trout. The quality of salmonid spawning habitat was moderate given the presence of mixed gravels in deeper pool and glide. However, the spawning habitat was compromised due to siltation and compaction. Good quality holding areas for adult salmonids were present locally. Despite good suitability, no European eel were recorded. The site was a moderate quality lamprey habitat with finer gravel areas that provided spawning and soft organic rich silt beds that supported a low density of ammocoetes (4 per m^2; **Table 3.2**). The compacted nature of much of the soft sediment and locally anoxic (black) silt reduced the quality of the nursery habitat accounting for the lower ammocoete density.

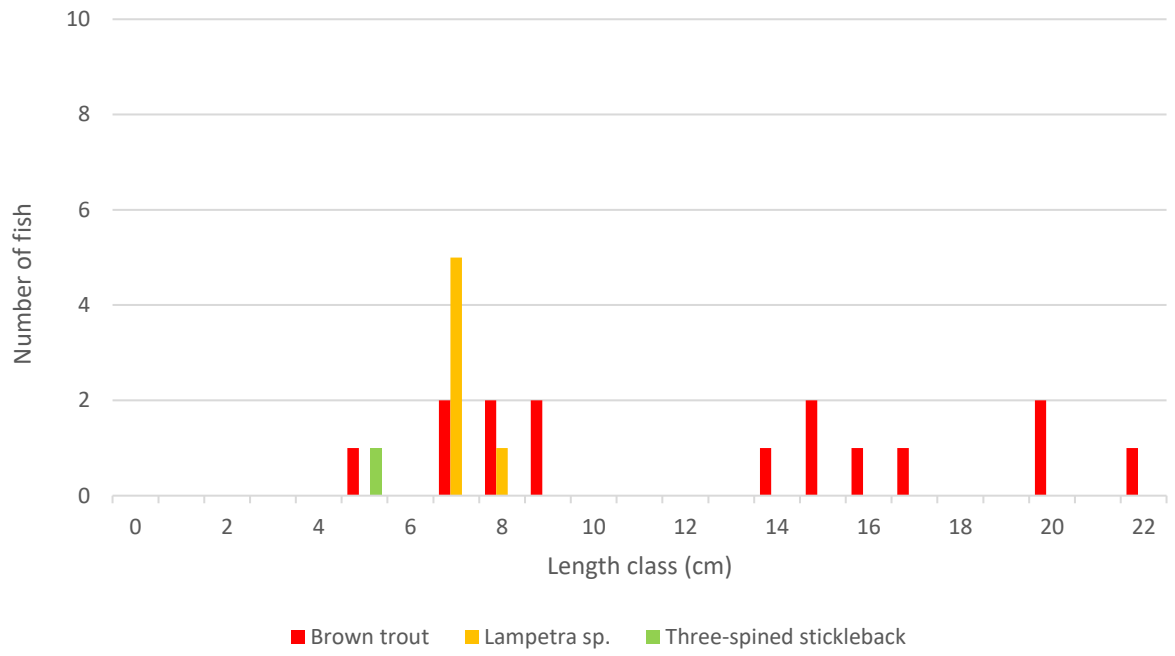

Figure 4.3 Length frequency distribution recorded via electro-fishing at C on the Carrickmines Stream, August 2023

Plate 4.6 Representative image of site C on the Carrickmines Stream, August 2023

Plate 4.7 Well conditioned brown trout recorded at site C on the Carrickmines Stream, August 2023

Plate 4.8 *Lampetra* sp. ammocoetes recorded at site C on the Carrickmines Stream, August 2023

4.1.4 Site D – Carrickmines Stream, Loughlinstown

Site D was located on the lower reaches of the Carrickmines Stream (10C04) upstream of the N11 road culverts approximately 0.5km downstream of site C. The upland eroding stream (FW1) had been extensively realigned and deepened historically with retaining walls over much of its lower length. The heavily modified channel was 3-4m wide and between 0.2-0.8m deep with 2.5-4m high banks. The profile was dominated by deep glide with localised scour pools in bank undercuts. The bed was rendered with concrete in places and heavily strewn with building rubble and old metal with pockets of small boulder, cobble, gravel and silt. The bed was very heavily compacted with high siltation. The site was too shaded to support macrophytes although large instream rubble and small boulders supported the mosses *Fontinalis antipyretica* and *Rhynchostegium riparoides* locally. Filamentous green algae (*Cladophora glomerata*) covered c. 2% of the bed despite shading, indicating enrichment pressures. The riparian zone supported mature crack willow and grey willow with dense bramble and hedge bindweed in the understories. The riparian areas also supported mature sycamore, ash, elder and hawthorn (*Crataegus monogyna*) with dense bramble and ivy in the understories. The adjoining land uses were of built land (BL3).

Brown trout (*n*=5) was the only fish species recorded via electro-fishing at site D (**Figure 4.4**). The site was a poor quality salmonid nursery given the highly modified nature of the channel, enrichment and siltation pressures and the absence of riffle areas. This was reflected by the low abundance of 0+ trout. The quality of salmonid spawning habitat was poor with no evident suitable areas given the rubble strewn bed and high siltation. Good quality holding areas for adult salmonids were however present locally although only a low number of trout were recorded. Despite some moderate suitability (i.e. deeper pool and glide with large coarse substrata refugia), no European eel were recorded. The site was a poor quality lamprey habitat due to the high energy of the channel and absence of spawning or suitable nursery areas (none recorded).

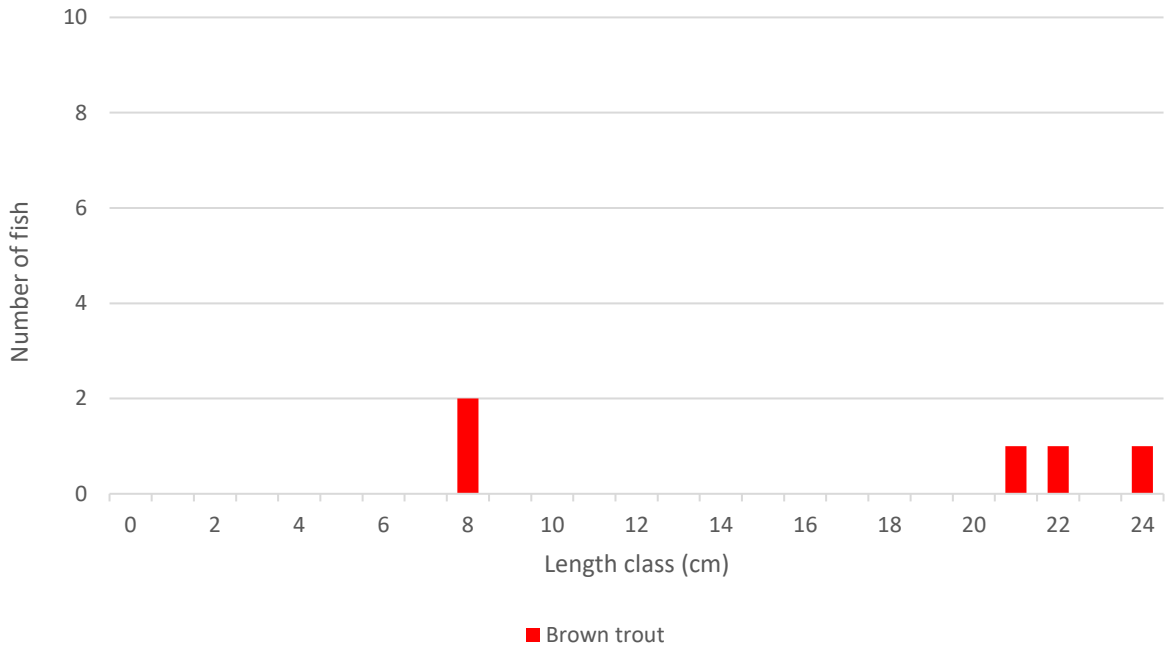

Figure 4.4 Length frequency distribution recorded via electro-fishing at D on the Carrickmines Stream, August 2023

Plate 4.9 Representative image of site D on the Carrickmines Stream, August 2023

4.1.5 Site E – Shanganagh River, Cherrywood Road

Site E was located on the Shanganagh River (10S01) immediately upstream of the N11 road culverts. The upland eroding spate channel (FW1) had been historically realigned and deepened although retained a semi-natural character. The fast-flowing river was 4m wide and between 0.2-0.3m deep with banks of 4-5m in height. The profile was dominated by riffle and glide sequences with highly localised pool. The substrata were dominated by abundant small boulder and cobble with mixed coarse gravels that were heavily bedded. Siltation was moderate but reduced only due to high flow rates. The high energy site dd not support macrophytes although small boulder supported occasional aquatic bryophytes *Riccardia chamedryfolia* and *Rhynchostegium riparioides*. The muddy banks near the waterline supported the liverwort *Conocephalum conicum* locally. The riparian zone of the south bank supported mature ash, hazel (*Corylus avellana*) and ornamental Leyland cypress (*Cupressus* × *leylandii*) and weeping willow (*Salix babylonica*). The north bank supported dense scrub vegetation including hedge bindweed, bramble, buddleia and invasive Japanese knotweed (*Reynoutria japonica*) immediately upstream of the road culvert. The site was bordered primarily by buildings and artificial surfaces (BL3).

Brown trout (*n*=17) was the only fish species recorded via electro-fishing at site E (**Figure 4.5**). The site was a moderate quality salmonid nursery given broken flow patterns and a stoney bed. The nursery value was reduced due to evident siltation and enrichment pressures but nonetheless supported by a moderate density of 0+ and 1+ trout. The quality of salmonid spawning habitat was poor to moderate given limited unbedded mixed gravels and no flow refugia. The site was of low value as a holding habitat for adult salmonids (paucity of pool) with no 2+ fish recorded. Despite some moderate suitability, no European eel were recorded. A significant barrier in the N11 culvert downstream with falls of over 2m may explain the absence of eel. The site was a poor quality lamprey habitat due to the high energy of the channel and absence of spawning or suitable nursery areas (none recorded).

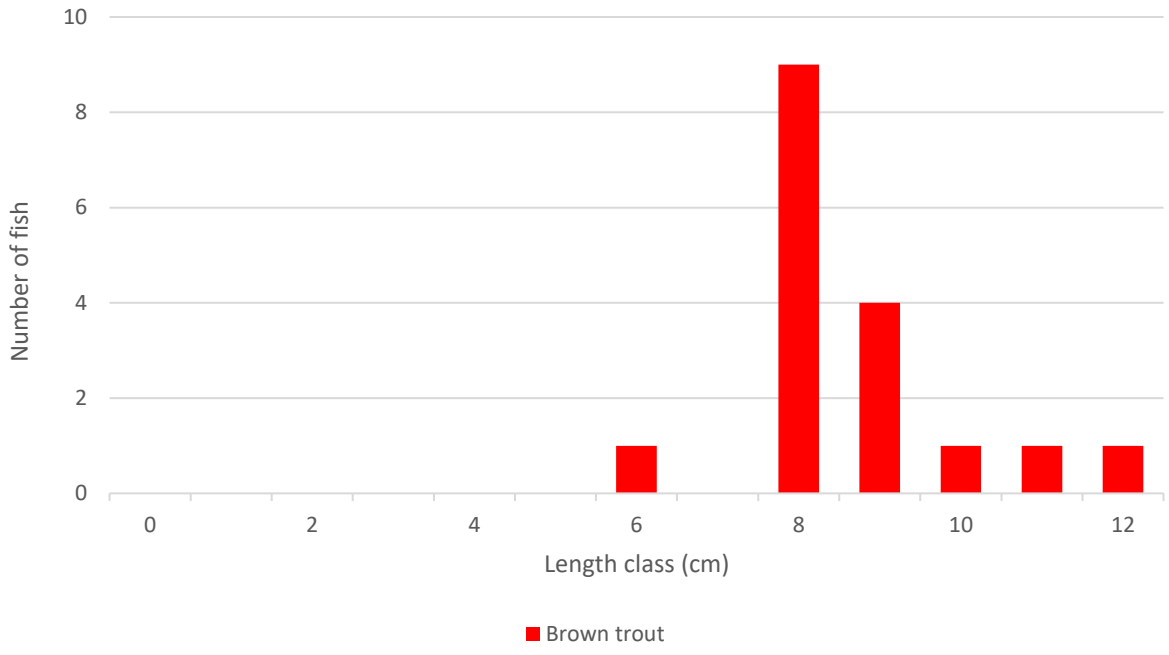

Figure 4.5 Length frequency distribution recorded via electro-fishing at E on the Shanganagh River, August 2023

Plate 4.10 Representative image of site E on the Shanganagh River, August 2023

Plate 4.11 Mixed cohort brown trout recorded at site E on the Shanganagh River, August 2023

4.1.6 Site F – Shanganagh River, Bride's Glen

Site F was located on the Shanganagh River (10S01) downstream of the Mullinastall Road crossing, approximately 0.5km upstream of site E. The fast-flowing semi-natural upland eroding spate channel (FW1) was 5-6m wide and 0.2-0.8m deep, with a naturally incised valley (up to 3m high banks) on the east bank. The profile comprised regular repeating sequences of pool, riffle and glide. The substrata were dominated by abundant cobble scattered small boulder with cobble, mixed coarse gravels and sand. The bed, while somewhat compacted given high flow rates, had light siltation. The high energy and shaded site did not support macrophytes. However small instream boulders supported frequent *Rhynchostegium riparioides* and occasional *Fontinalis antipyretica*. The muddy banks near the waterline supported *Conocephalum conicum*. The river was lined with mature treelines/woodland supporting wych elm (*Ulmus glabra*), beech (*Fagus sylvatica*) and holly with bramble and ivy. The site was bordered by mixed broadleaved woodland (WD1) and lawns (GA2) associated with detached properties.

Brown trout (*n*=24) was the only fish species recorded via electro-fishing at site E (**Figure 4.5**). The site supported the highest density of salmonids recorded during the survey. The river at this location was a good quality salmonid nursery given broken flow patterns and a stoney bed with good densities of juvenile trout present. Mixed clean gravels in deeper pool and glide provided good quality salmonid spawning habitat. Frequent deep pool were of high value as adult salmonid holding areas. While European eel habitat was considered of moderate quality, significant barriers downstream likely explain the absence of the species. The site was a poor quality lamprey habitat due to the high energy of the channel and absence of suitable nursery areas (none recorded).

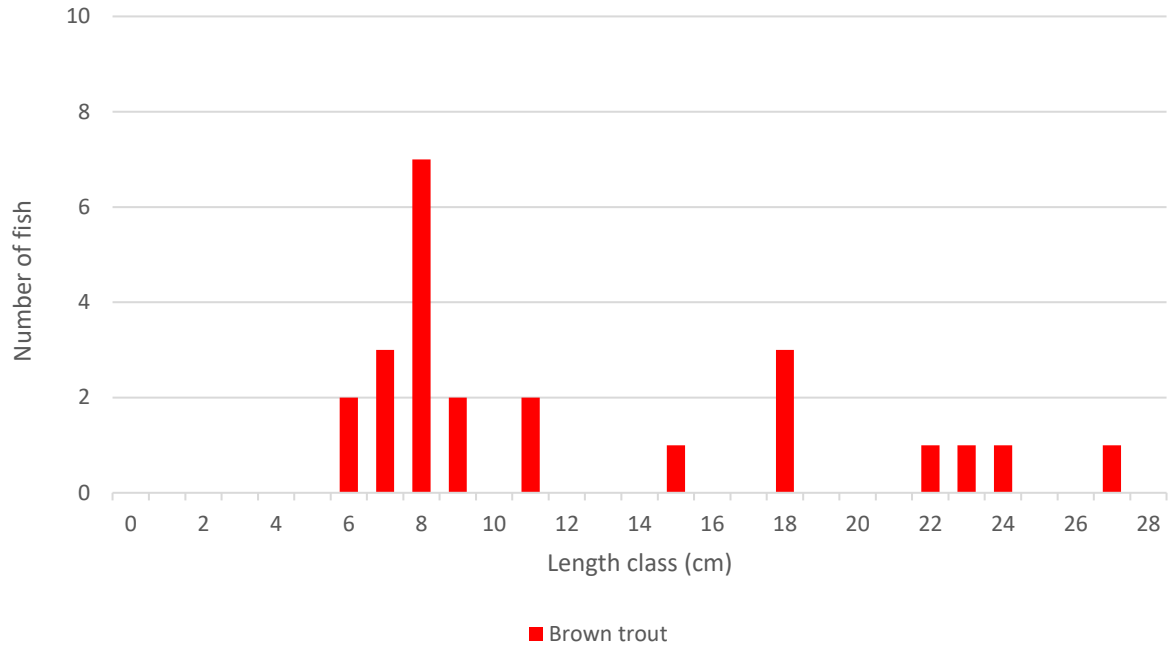

Figure 4.6 Length frequency distribution recorded via electro-fishing at F on the Shanganagh River, August 2023

Plate 4.12 Representative image of site F on the Shanganagh River, August 2023

Plate 4.13 Large adult brown trout recorded at site F on the Shanganagh River, August 2023

4.1.7 Site G – Shanganagh River, Commons Road

Site G was located on the lower reaches of the Shanganagh River (10S01), approximately 0.7km upstream of site E. The high energy lowland depositing river (FW2) had been historically realigned with retaining walls along the south bank. However, the channel retained a semi-natural profile with deep glide and pool sequences. Superior hydromorphology (i.e. repeating riffle and shallow glide sequences) was present upstream. The river was 4-5m wide and between 0.4-1.1m deep. The substrata were dominated by cobble and scattered small boulder, with scattered mixed coarse gravels that were bedded in expansive areas of sand and silt. The site was too shaded to support macrophytes and none were recorded. However, instream boulders supported occasional *Rhynchostegium riparioides* and *Fontinalis antipyretica*. The riparian zone supported mature sycamore, alder (*Alnus glutinosa*), ash and silver birch (*Betula pendula*) with bramble, ivy, nettle and hedge bindweed. Invasive giant hogweed (*Heracleum mantegazzianum*) was present locally on the north bank. The site as bordered by mixed broadleaved woodland (WD1) (i.e. Loughlinstown Woods) and buildings/artificial surfaces (BL3).

Sea trout (Salmo trutta) (*n*=1), brown trout (*n*=18), lamprey (*Lampetra* sp.) (*n*=3), European eel (*n*=1) and flounder (*Platichthys flesus*) (*n*=1) were recorded via electro-fishing at site G (**Figure 4.7**). This was the highest species diversity recorded during the survey. The site was a moderate quality salmonid nursery only given the limited broken glide in the vicinity of the survey area. Spawning habitat was of moderate quality due to the presence of more limited mixed clean gravels with high amounts of sand and silt. Superior spawning and nursery habitat existed upstream of the survey area in the reaches downstream of the N11 culverts. Frequent deeper pool provided good quality holding areas for adult salmonids, inclusive of migratory sea trout (single adult recorded; **Plate 4.15**). The site was of high suitability for European eel (deeper pool and glide with undercut banks and good prey resources) but only a single adult yellow eel was recorded. The site was of moderate value only as a lamprey nursery habitat due to the presence of compacted, sand-dominated soft sediments. These supported a low density of ammocoetes (1.5 per m^2; **Table 3.2**). Good quality lamprey spawning habitat was present locally.

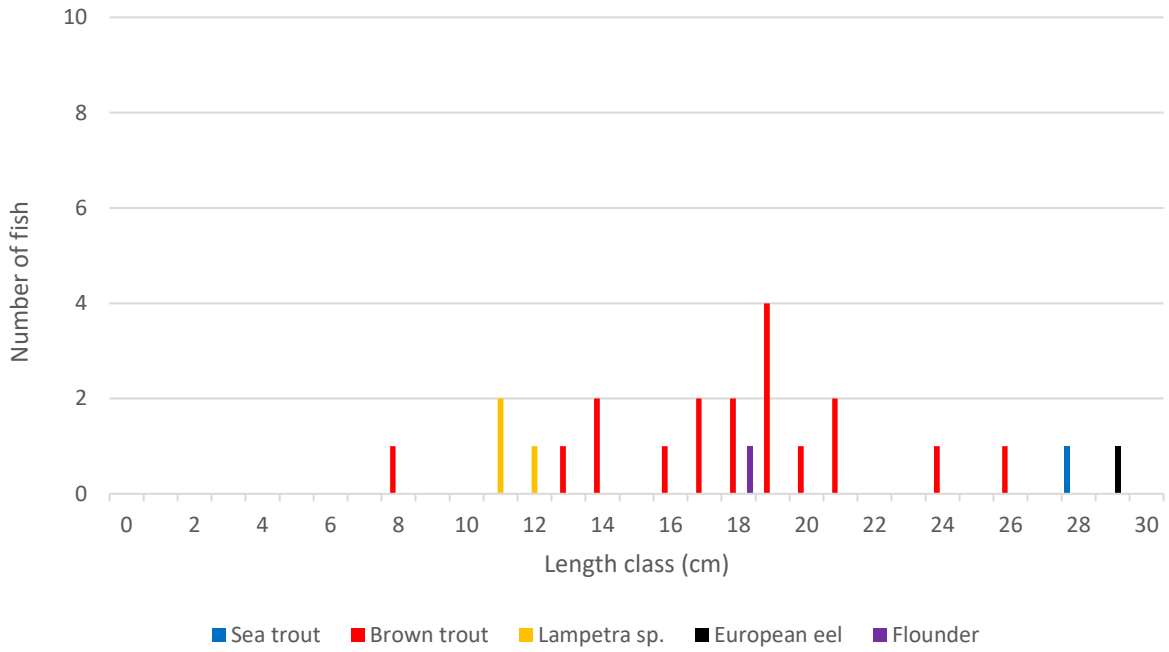

Figure 4.7 Length frequency distribution recorded via electro-fishing at G on the Shanganagh River, August 2023

Plate 4.14 Representative image of site G on the Shanganagh River, August 2023

Plate 4.15 Sea trout recorded at site G on the Shanganagh River, August 2023

Table 3.1 Relative abundance of fish species of higher conservation value recorded per survey site in the vicinity of the proposed Carrickmines Shanganagh River FRS, August 2023

Site	Watercourse	Sea trout	Brown trout	*Lampetra* sp.	European eel	Other species
A	Barnacullia Stream					Three-spined stickleback
B	Carrickmines Stream		Low		Low	
C	Carrickmines Stream		Medium	Medium		Three-spined stickleback
D	Carrickmines Stream		Low			
E	Shanganagh River		Medium			
F	Shanganagh River		High			
G	Shanganagh River	Low	High	Low	Low	Flounder

Conservation value: Brook lamprey (*Lampetra planeri*) and river lamprey (*Lampetra fluviatilis*) are listed under Annex II of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive') and are protected under the Irish Wildlife Acts 1976-2023. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). Sea trout are protected under the Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations. Apart from the Fisheries Acts 1959 to 2019, non-anadromous brown trout have no legal protection in Ireland.

Table 3.2 Fish species densities per m^2 recorded at sites in the vicinity of the proposed Carrickmines Shanganagh River FRS via electro-fishing in August 2023 (abundances in parenthesis, **bold** indicates highest density recorded per species)

Site	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Fish density per m^2					
				Sea trout	Brown trout	*Lampetra* sp.	European eel	Three-spined stickleback	Flounder
A	Barnacullia Stream	10	200	0.000	0.000	0.000	0.000	**0.035**	0.000
B	Carrickmines Stream	10	200	0.000	0.035	0.000	**0.005**	0.000	0.000
C	Carrickmines Stream	10	300	0.000	0.050	**4 per m^2**	0.000	0.003	0.000
D	Carrickmines Stream	10	250	0.000	0.020	0.000	0.000	0.000	0.000
E	Shanganagh River	10	250	0.000	0.068	0.000	0.000	0.000	0.000
F	Shanganagh River	10	220	0.000	**0.109**	0.000	0.000	0.000	0.000
G	Shanganagh River	10	250	**0.004**	0.072	1.5 per m^2	0.004	0.000	**0.004**

5. Discussion

The Barnacullia Stream, Carrickmines Stream and Shanganagh River in the vicinity of the proposed Carrickmines Shanganagh River FRS works had been modified historically, with straightening, deepening and realignment resulting in locally poor hydromorphology. Additionally, a high number of instream barriers (**Figure 5.1**) on these watercourses (both minor and major) are evidently impacting fish passage and influencing species distributions (see below). Significant siltation and water quality pressures (e.g. storm drains, point sources, urban run-off) were also observed during the surveys, further reducing the value of fisheries habitats.

However, despite hydromorphological alterations and water quality pressures typical of urban/peri-urban channels, the survey watercourses retained some good semi-natural characteristics and (with the exception of the Barnacullia Stream) supported a number of high conservation value fish species. A low diversity of fish species, namely sea trout, brown trout, *Lampetra* sp., European eel, flounder and three-spined stickleback were recorded during the electro-fishing survey (**Tables 3.1 & 3.2**).

5.1 Salmonids

Brown trout were recorded from all survey sites, except the Barnacullia Stream where a single species three-spined sticklebackwas recorded. The Shanganagh River provided the best quality salmonid habitat in the survey area and supported the highest densities of brown trout (**Table 3.2**) although hydromorphological and water quality pressures reduced the value of spawning and nursery habitat. Siltation impacts were more prevalent on the lower reaches of the Carrickmines Stream (lower flow rates compared with Shanganagh), and are likely significantly impacting salmonid spawning and recruitment, leading to the relatively small brown trout populations recorded during this survey. Anadromous sea trout were recorded on the lower reaches of the Shanganagh River (Commons Road), an unusual and notable occurrence for an urban watercourse. The semi-natural profile, strong flows, short instream distance to the sea, resident brown trout population and an absence of migratory barriers downstream of the N11 culvert facilitates the species' presence in these lower reaches (further supported by the occurrence of transitional species such as flounder). No Atlantic salmon were recorded during the survey and water quality pressures in addition to instream barriers likely preclude the species form the survey area.

Although the Barnacullia Stream had some low physical suitability for salmonids (as well as European eel and lamprey), numerous significant instream barriers (culverts and a weir) would appear to prevent upstream passage from the connecting Carrickmines Stream. Three-spined stickleback are the only fish species known from the Barnacullia Stream (Triturus data; R. O'Callaghan, IFI, pers. comm.).

5.2 Lamprey

Annex II lamprey ammocoetes (*Lampetra* sp.) were recorded from site C on the Carrickmines Stream and site G on the Shanganagh River where localised areas of sub-optimal soft sediment accumulations supported low densities (4 & 1.5 per m^2, respectively; **Table 3.1**). These sites also provided the best quality (albeit impacted) lamprey spawning habitat, areas of finer gravels with reduced silt loads. These sites aside, suitability for lamprey was typically poor in the survey area. This was a primarily a

consequence of high flow rates[1] in addition to historical modifications (e.g. instream barriers[2]) and siltation pressures which have resulted in either a paucity of suitable nursery or spawning areas (as per characteristics provided in Dawson et al., 2015; Aronsuu & Virkkala, 2014; Rooney et al., 2013; Lasne et al., 2010; Goodwin et al., 2008; Gardiner, 2003).

5.3 European eel

European eel are Red-listed in Ireland (King et al., 2011) and are classed as 'critically endangered' on a global scale (Pike et al., 2020). Despite habitat suitability at all survey sites, eel were only recorded from site B on the upper reaches of the Carrickmines Stream and site G on the lower Shanganagh River (one eel at each site). Whilst eels are known for their remarkable ability to climb and navigate structures as glass eels (Podgorniak et al., 2015), the paucity of Red-listed European eel in the survey watercourses (and wider Dargle_010 sub-catchment, pers. obs.) is evidently restricted by numerous significant instream barriers and resulting in poor ingress of this migratory fish species into the catchment.

Plate 5.1 Example of a significant barrier to fish passage on the Carrickmines Stream at the N11 road culvert (high gradients under road & >2m fall)

[1] high energy/spate nature of the watercourses provide conditions inimical to lamprey population persistence
[2] given the very poor ability of *Lampetra* sp. to climb structures such as weirs (Jubb et al., 2023; Moser et al., 2014; Lucas et al., 2009: Kelly & King, 2001)

Figure 5.1 Location of instream barriers in vicinity of the proposed Carrickmines Shanganagh River FRS (source: IFI's National Barriers Programme)

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8.3 NBDC Protected Species

Appendix 8.3 - Protected and threatened species recorded within 5km of the site within the last 10 years

Species name	Date of last record	Designation
European Otter (Lutra lutra)	12/09/2018	Protected Species: EU Habitats Directive >> Annex II & Annex IV Protected Species: Wildlife Acts
Bottle-nosed Dolphin (Tursiops truncatus)	20/05/2019	Protected Species: EU Habitats Directive >> Annex II & Annex IV Protected Species: Wildlife Acts
Common Porpoise (Phocoena phocoena)	12/12/2020	Protected Species: EU Habitats Directive >> Annex II & Annex IV Protected Species: Wildlife Acts Threatened Species: OSPAR Convention
Grey Seal (Halichoerus grypus)	19/08/2021	Protected Species: EU Habitats Directive >> Annex II & Annex V Protected Species: Wildlife Acts
Common Seal (Phoca vitulina)	06/09/2023	Protected Species: EU Habitats Directive >> Annex II & Annex V Protected Species: Wildlife Acts
Marsh Fritillary (Euphydryas aurinia)	29/03/2021	Protected Species: EU Habitats Directive >> Annex II Threatened Species: Vulnerable
Whiskered Bat (Myotis mystacinus)	01/09/2016	Protected Species: EU Habitats Directive >> Annex IV

Species name	Date of last record	Designation
		Protected Species: Wildlife Acts
Natterer's Bat (Myotis nattereri)	14/06/2018	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Daubenton's Bat (Myotis daubentonii)	06/08/2021	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Pipistrelle (Pipistrellus pipistrellus sensu lato)	08/05/2022	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Nathusius's Pipistrelle (Pipistrellus nathusii)	09/05/2023	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Brown Long-eared Bat (Plecotus auritus)	14/05/2023	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Lesser Noctule (Nyctalus leisleri)	14/05/2023	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Soprano Pipistrelle (Pipistrellus pygmaeus)	14/05/2023	Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Common Frog (Rana temporaria)	14/03/2023	Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts

Species name	Date of last record	Designation
Pine Marten (Martes martes)	26/04/2023	Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Red Deer (Cervus elaphus)	15/11/2016	Protected Species: Wildlife Acts
Eurasian Pygmy Shrew (Sorex minutus)	21/10/2018	Protected Species: Wildlife Acts
Smooth Newt (Lissotriton vulgaris)	06/10/2020	Protected Species: Wildlife Acts
Eurasian Red Squirrel (Sciurus vulgaris)	07/02/2023	Protected Species: Wildlife Acts
Eurasian Badger (Meles meles)	06/03/2023	Protected Species: Wildlife Acts
Common Lizard (Zootoca vivipara)	14/04/2023	Protected Species: Wildlife Acts
West European Hedgehog (Erinaceus europaeus)	01/10/2023	Protected Species: Wildlife Acts
Little Egret (Egretta garzetta)	27/02/2023	Protected Species: EU Birds Directive >> Annex I Bird Species
Peregrine Falcon (Falco peregrinus)	14/03/2024	Protected Species: EU Birds Directive >> Annex I Bird Species
Red-throated Diver (Gavia stellata)	14/02/2016	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Snowy Owl (Bubo scandiaca)	08/04/2016	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Common Tern (Sterna hirundo)	21/05/2016	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List

Species name	Date of last record	Designation
Arctic Tern (Sterna paradisaea)	15/11/2017	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Mediterranean Gull (Larus melanocephalus)	14/01/2023	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Common Kingfisher (Alcedo atthis)	06/03/2023	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Sandwich Tern (Sterna sandvicensis)	06/04/2023	Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern - Amber List
Rock Pigeon (Columba livia)	30/04/2023	Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
Common Pheasant (Phasianus colchicus)	09/01/2021	Protected Species: EU Birds Directive >> Annex II & Annex III
Mallard (Anas platyrhynchos)	08/04/2023	Protected Species: EU Birds Directive >> Annex II & Annex III
Common Wood Pigeon (Columba palumbus)	09/05/2023	Protected Species: EU Birds Directive >> Annex II & Annex III
Red Grouse (Lagopus lagopus)	23/01/2022	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Red List

Species name	Date of last record	Designation
Common Pochard (Aythya ferina)	22/12/2018	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Amber List
Eurasian Teal (Anas crecca)	16/01/2023	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Amber List
Common Coot (Fulica atra)	08/04/2023	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Amber List
Tufted Duck (Aythya fuligula)	08/04/2023	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Amber List
Common Snipe (Gallinago gallinago)	28/01/2017	Protected Species: EU Birds Directive >> Annex II & Annex III Birds of Conservation Concern - Amber List
Gadwall (Anas strepera)	20/04/2023	Protected Species: EU Birds Directive >> Annex II Birds of Conservation Concern - Amber List
Eurasian Curlew (Numenius arquata)	17/01/2023	Protected Species: EU Birds Directive >> Annex II Birds of Conservation Concern - Red List
Northern Lapwing (Vanellus vanellus)	20/01/2023	Protected Species: EU Birds Directive >> Annex II Birds of Conservation Concern - Red List

Species name	Date of last record	Designation
Common Grasshopper Warbler (Locustella naevia)	22/05/2016	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Black-legged Kittiwake (Rissa tridactyla)	19/06/2017	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Greenshank (Tringa nebularia)	15/10/2018	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Eurasian Tree Sparrow (Passer montanus)	24/05/2020	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Sky Lark (Alauda arvensis)	27/06/2020	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Water Rail (Rallus aquaticus)	16/01/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Mew Gull (Larus canus)	02/02/2023	P Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Little Grebe (Tachybaptus ruficollis)	10/02/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Eurasian Oystercatcher (Haematopus ostralegus)	20/02/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List

Species name	Date of last record	Designation
Black Guillemot (Cepphus grylle)	05/03/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Mute Swan (Cygnus olor)	27/03/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Northern Wheatear (Oenanthe oenanthe)	27/03/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Brent Goose (Branta bernicla)	01/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Lesser Black-backed Gull (Larus fuscus)	01/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Great Black-backed Gull (Larus marinus)	06/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Guillemot (Uria aalge)	07/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
European Shag (Phalacrocorax aristotelis)	07/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Razorbill (Alca torda)	07/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List

Species name	Date of last record	Designation
Barn Swallow (Hirundo rustica)	10/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Ringed Plover (Charadrius hiaticula)	21/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Great Cormorant (Phalacrocorax carbo)	29/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
House Martin (Delichon urbicum)	02/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Starling (Sturnus vulgaris)	07/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Kestrel (Falco tinnunculus)	24/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Red Kite (Milvus milvus)	26/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Linnet (Carduelis cannabina)	27/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
House Sparrow (Passer domesticus)	27/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List

Species name	Date of last record	Designation
Northern Gannet (Morus bassanus)	27/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Sand Martin (Riparia riparia)	27/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Spotted Flycatcher (Muscicapa striata)	31/05/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Common Swift (Apus apus)	27/08/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Amber List
Barn Owl (Tyto alba)	10/05/2021	Protected Species: Wildlife Acts Birds of Conservation Concern - Red List
Black-headed Gull (Larus ridibundus)	20/03/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Red List
Common Redshank (Tringa totanus)	27/03/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Red List
Yellowhammer (Emberiza citrinella)	02/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Red List
Herring Gull (Larus argentatus)	07/04/2023	Protected Species: Wildlife Acts Birds of Conservation Concern - Red List

Species name	Date of last record	Designation
Nebrioporus (Nebrioporus) depressus	31/12/1854	Threatened Species: Data deficient
Wall (Lasiommata megera)	05/09/2017	Threatened Species: Endangered
Gooden's Nomad Bee (Nomada goodeniana)	13/05/2021	Threatened Species: Endangered
Round-leaved Crane's-bill (Geranium rotundifolium)	26/02/2022	Threatened Species: Endangered
Nettle-leaved Bellflower (Campanula trachelium)	26/06/2023	Threatened Species: Endangered
Limnebius nitidus	31/12/1897	Threatened Species: Endangered
Crescent-cup Liverwort (Lunularia cruciata)	29/09/2016	Threatened Species: Least concern
Dilated Scalewort (Frullania dilatata)	29/09/2016	Threatened Species: Least concern
Endive Pellia (Pellia endiviifolia)	29/09/2016	Threatened Species: Least concern
Marchantia polymorpha subsp. polymorpha	29/09/2016	Threatened Species: Least concern
Marchantia polymorpha subsp. ruderalis	29/09/2016	Threatened Species: Least concern
Amblystegium serpens var. serpens	29/09/2016	Threatened Species: Least concern
Anomalous Bristle-moss (Orthotrichum anomalum)	29/09/2016	Threatened Species: Least concern
Bird's-claw Beard-moss (Barbula unguiculata)	29/09/2016	Threatened Species: Least concern
Bryum dichotomum	29/09/2016	Threatened Species: Least concern
Clustered Feather-moss (Rhynchostegium confertum)	29/09/2016	Threatened Species: Least concern
Common Feather-moss (Eurhynchium praelongum)	29/09/2016	Threatened Species: Least concern
Crimson-tuber Thread-moss (Bryum rubens)	29/09/2016	Threatened Species: Least concern
Ctenidium molluscum var. molluscum	29/09/2016	Threatened Species: Least concern
Curly Crisp-moss (Trichostomum crispulum)	29/09/2016	Threatened Species: Least concern
Fissidens taxifolius var. taxifolius	29/09/2016	Threatened Species: Least concern
Grey-cushioned Grimmia (Grimmia pulvinata)	29/09/2016	Threatened Species: Least concern

Species name	Date of last record	Designation
Hooded Bristle-moss (Orthotrichum cupulatum)	29/09/2016	Threatened Species: Least concern
Hornschuch's Beard-moss (Pseudocrossidium hornschuchianum)	29/09/2016	Threatened Species: Least concern
Kneiff's Feather-moss (Leptodictyum riparium)	29/09/2016	Threatened Species: Least concern
Pointed Spear-moss (Calliergonella cuspidata)	29/09/2016	Threatened Species: Least concern
Rough-stalked Feather-moss (Brachythecium rutabulum)	29/09/2016	Threatened Species: Least concern
Silky Forklet-moss (Dicranella heteromalla)	29/09/2016	Threatened Species: Least concern
Silver-moss (Bryum argenteum)	29/09/2016	Threatened Species: Least concern
Springy Turf-moss (Rhytidiadelphus squarrosus)	29/09/2016	Threatened Species: Least concern
Swartz's Feather-moss (Oxyrrhynchium hians)	29/09/2016	Threatened Species: Least concern
Thickpoint Grimmia (Schistidium crassipilum)	29/09/2016	Threatened Species: Least concern
Variable Forklet-moss (Dicranella varia)	29/09/2016	Threatened Species: Least concern
Wall Screw-moss (Tortula muralis)	29/09/2016	Threatened Species: Least concern
Wood Bristle-moss (Orthotrichum affine)	29/09/2016	Threatened Species: Least concern
Capillary Thread-moss (Bryum capillare)	30/09/2016	Threatened Species: Least concern
Common Cord-moss (Funaria hygrometrica)	30/09/2016	Threatened Species: Least concern
Cylindric Beard-moss (Didymodon insulanus)	30/09/2016	Threatened Species: Least concern
Fern-leaved Hook-moss (Cratoneuron filicinum)	30/09/2016	Threatened Species: Least concern
Field Forklet-moss (Dicranella staphylina)	30/09/2016	Threatened Species: Least concern
Intermediate Screw-moss (Syntrichia intermedia)	30/09/2016	Threatened Species: Least concern
Lesser Bird's-claw Beard-moss (Barbula convoluta)	30/09/2016	Threatened Species: Least concern
Red Beard-moss (Bryoerythrophyllum recurvirostrum)	30/09/2016	Threatened Species: Least concern

Species name	Date of last record	Designation
Redshank (Ceratodon purpureus)	30/09/2016	Threatened Species: Least concern
Sand Feather-moss (Brachythecium mildeanum)	30/09/2016	Threatened Species: Least concern
Schreber's Forklet-moss (Dicranella schreberiana)	30/09/2016	Threatened Species: Least concern
Slender Bristle-moss (Orthotrichum tenellum)	30/09/2016	Threatened Species: Least concern
Supine Plait-moss (Hypnum cupressiforme var. resupinatum)	30/09/2016	Threatened Species: Least concern
Variable Crisp-moss (Trichostomum brachydontium)	30/09/2016	Threatened Species: Least concern
Water Screw-moss (Syntrichia latifolia)	30/09/2016	Threatened Species: Least concern
Fragrant Crestwort (Lophocolea fragrans)	01/11/2017	Threatened Species: Least concern
Grove Earwort (Scapania nemorea)	01/11/2017	Threatened Species: Least concern
Heterocladium heteropterum var. flaccidum	01/11/2017	Threatened Species: Least concern
Crisped Pincushion (Ulota crispa)	09/08/2018	Threatened Species: Least concern
Yellow Archangel (Lamiastrum galeobdolon)	18/04/2021	Threatened Species: Least concern
Dwarf Mallow (Malva neglecta)	27/08/2015	Threatened Species: Near threatened
Upright Brome (Bromopsis erecta)	27/08/2015	Threatened Species: Near threatened
Glebionis segetum	08/06/2017	Threatened Species: Near threatened
Gipsy Cuckoo Bee (Bombus (Psithyrus) bohemicus)	21/06/2018	Threatened Species: Near threatened
Green Field-speedwell (Veronica agrestis)	07/04/2019	Threatened Species: Near threatened
Small Heath (Coenonympha pamphilus)	08/08/2019	Threatened Species: Near threatened
Greater Knapweed (Centaurea scabiosa)	20/07/2021	Threatened Species: Near threatened
Moss Carder-bee (Bombus (Thoracombus) muscorum)	07/09/2021	Threatened Species: Near threatened
Pale Flax (Linum bienne)	21/05/2022	Threatened Species: Near threatened

Species name	Date of last record	Designation
Strawberry-tree (Arbutus unedo)	16/01/2023	Threatened Species: Near threatened
Sea-kale (Crambe maritima)	11/04/2023	Threatened Species: Near threatened
Large Red Tailed Bumble Bee (Bombus (Melanobombus) lapidarius)	05/04/2024	Threatened Species: Near threatened
Nomada panzeri	31/12/1894	Threatened Species: Near threatened
Spotted Ray (Raja montagui)	20/03/2018	Threatened Species: OSPAR Convention
Thornback Ray (Raja clavata)	20/03/2018	Threatened Species: OSPAR Convention
Dog Whelk (Nucella lapillus)	25/01/2024	Threatened Species: OSPAR Convention
Dense-flowered Fumitory (Fumaria densiflora)	08/06/2017	Threatened Species: Regionally Extinct
Tawny Mining Bee (Andrena (Andrena) fulva)	04/04/2023	Threatened Species: Regionally Extinct
Field Cuckoo Bee (Bombus (Psithyrus) campestris)	17/07/2015	Threatened Species: Vulnerable
Straw Bristle-moss (Orthotrichum stramineum)	09/08/2018	Threatened Species: Vulnerable
Irish Whitebeam (Sorbus hibernica)	16/07/2020	Threatened Species: Vulnerable
Dark Green Fritillary (Argynnis aglaja)	31/07/2020	Threatened Species: Vulnerable
Andrena (Melandrena) nigroaenea	02/05/2023	Threatened Species: Vulnerable
Andrena (Cnemidandrena) denticulata	10/08/2023	Threatened Species: Vulnerable
Andrena (Micrandrena) semilaevis	30/06/1896	Threatened Species: Vulnerable
Corncockle (Agrostemma githago)	01/05/2019	Threatened Species: Waiting list
Cornflower (Centaurea cyanus)	17/10/2021	Threatened Species: Waiting list

8.4 NBDC Invasive Species

Appendix 8.4 - Invasive species recorded within 5km of the site within the last 10 years

Species name	Date of last record	Designation
House Mouse *Mus musculus*	21/05/2016	Invasive Species >> High Impact Invasive Species
Arthurdendyus triangulatus	26/04/2020	Invasive Species >> High Impact Invasive Species
Rose-ringed Parakeet *Psittacula krameri*	02/12/2023	Invasive Species >> High Impact Invasive Species
Cherry Laurel *Prunus laurocerasus*	28/02/2024	Invasive Species >> High Impact Invasive Species
Raccoon *Procyon lotor*	24/08/2014	Invasive Species >> High Impact Invasive Species Regulation No. 1143/2014
Eastern Grey Squirrel *Sciurus carolinensis*	20/03/2023	Invasive Species >> High Impact Invasive Species EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
New Zealand Pigmyweed *Crassula helmsii*	26/09/2014	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Canadian Waterweed *Elodea canadensis*	30/09/2016	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Floating Pennywort *Hydrocotyle ranunculoides*	18/01/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant-rhubarb *Gunnera tinctoria*	30/05/2020	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Rhododendron ponticum	07/06/2020	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)

Species name	Date of last record	Designation
Japanese Knotweed *Fallopia japonica*	13/05/2021	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Brown Rat *Rattus norvegicus*	21/12/2022	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant Hogweed *Heracleum mantegazzianum*	29/06/2023	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Wireweed *Sargassum muticum*	25/01/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Harlequin Ladybird *Harmonia axyridis*	25/07/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Fallow Deer (*Dama dama*	26/06/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Sika Deer *Cervus nippon*	13/10/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Black Currant *Ribes nigrum*	24/05/2015	Invasive Species >> Medium Impact
Canadian Fleabane *Conyza canadensis*	30/09/2016	Invasive Species >> Medium Impact
European Rabbit *Oryctolagus cuniculus*	27/08/2017	Invasive Species >> Medium Impact
Jenkins' Spire Snail *Potamopyrgus antipodarum*	19/06/2018	Invasive Species >> Medium Impact
Russian-vine	13/08/2020	Invasive Species >> Medium Impact

Species name	Date of last record	Designation
Fallopia baldschuanica		
Australoplana sanguinea	06/03/2021	Invasive Species >> Medium Impact
Common Broomrape *Orobanche minor*	25/06/2021	Invasive Species >> Medium Impact
Turkey Oak *Quercus cerris*	16/01/2023	Invasive Species >> Medium Impact
Sycamore *Acer pseudoplatanus*	01/11/2023	Invasive Species >> Medium Impact
Traveller's-joy *Clematis vitalba*	01/11/2023	Invasive Species >> Medium Impact
Himalayan Honeysuckle *Leycesteria formosa*	15/12/2023	Invasive Species >> Medium Impact
Butterfly-bush *Buddleja davidii*	28/02/2024	Invasive Species >> Medium Impact
American Skunk-cabbage *Lysichiton americanus*	06/01/2023	Invasive Species >> Medium Impact EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
Himalayan Knotweed *Persicaria wallichii*	25/11/2017	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Water Fern *Azolla filiculoides*	23/08/2022	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Sea-buckthorn *Hippophae rhamnoides*	22/06/2023	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Three-cornered Garlic *Allium triquetrum*	30/03/2024	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Spanish Bluebell *Hyacinthoides hispanica*	09/05/2022	Regulation S.I. 477 (Ireland)

Species name	Date of last record	Designation
House Mouse (Mus musculus)	21/05/2016	Invasive Species >> High Impact Invasive Species
Arthurdendyus triangulatus	26/04/2020	Invasive Species >> High Impact Invasive Species
Rose-ringed Parakeet (Psittacula krameri)	02/12/2023	Invasive Species >> High Impact Invasive Species
Cherry Laurel (Prunus laurocerasus)	28/02/2024	Invasive Species >> High Impact Invasive Species
Raccoon (Procyon lotor)	24/08/2014	Invasive Species >> High Impact Invasive Species Regulation No. 1143/2014
Eastern Grey Squirrel (Sciurus carolinensis)	20/03/2023	Invasive Species >> High Impact Invasive Species EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
New Zealand Pigmyweed (Crassula helmsii)	26/09/2014	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Canadian Waterweed (Elodea canadensis)	30/09/2016	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Floating Pennywort (Hydrocotyle ranunculoides)	18/01/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant-rhubarb (Gunnera tinctoria)	30/05/2020	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)

Species name	Date of last record	Designation
Rhododendron ponticum	07/06/2020	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed (Fallopia japonica)	13/05/2021	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Brown Rat (Rattus norvegicus)	21/12/2022	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant Hogweed (Heracleum mantegazzianum)	29/06/2023	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Wireweed (Sargassum muticum)	25/01/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Harlequin Ladybird (Harmonia axyridis)	25/07/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Fallow Deer (Dama dama)	26/06/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts

Species name	Date of last record	Designation
Sika Deer (Cervus nippon)	13/10/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Black Currant (Ribes nigrum)	24/05/2015	Invasive Species >> Medium Impact
Canadian Fleabane (Conyza canadensis)	30/09/2016	Invasive Species >> Medium Impact
European Rabbit (Oryctolagus cuniculus)	27/08/2017	Invasive Species >> Medium Impact
Jenkins' Spire Snail (Potamopyrgus antipodarum)	19/06/2018	Invasive Species >> Medium Impact
Russian-vine (Fallopia baldschuanica)	13/08/2020	Invasive Species >> Medium Impact
Australoplana sanguinea	06/03/2021	Invasive Species >> Medium Impact
Common Broomrape (Orobanche minor)	25/06/2021	Invasive Species >> Medium Impact
Turkey Oak (Quercus cerris)	16/01/2023	Invasive Species >> Medium Impact
Sycamore (Acer pseudoplatanus)	01/11/2023	Invasive Species >> Medium Impact
Traveller's-joy (Clematis vitalba)	01/11/2023	Invasive Species >> Medium Impact
Himalayan Honeysuckle (Leycesteria formosa)	15/12/2023	Invasive Species >> Medium Impact
Butterfly-bush (Buddleja davidii)	28/02/2024	Invasive Species >> Medium Impact
American Skunk-cabbage (Lysichiton americanus)	06/01/2023	Invasive Species >> Medium Impact EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
Himalayan Knotweed (Persicaria wallichii)	25/11/2017	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)

Species name	Date of last record	Designation
Water Fern (Azolla filiculoides)	23/08/2022	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Sea-buckthorn (Hippophae rhamnoides)	22/06/2023	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Three-cornered Garlic (Allium triquetrum)	30/03/2024	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Spanish Bluebell (Hyacinthoides hispanica)	09/05/2022	Regulation S.I. 477 (Ireland)

8.5 Invasive Species Report and Management Plan

Invasive Species Management Plan

January 2025

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Revision History

Revision Ref/Date	Amendments	Issued to
P01 26/07/2021	Draft Report	DLRCC
P02 14/11/2024	Draft Report	DLRCC
P03 10/01/2025	Final Report	DLRCC

Contract

This report relates to the Carrickmines Shanganagh Flood Relief Scheme commissioned by Dún Laoghaire Rathdown County Council (DLRCC), on behalf of the Office of Public Works.

Prepared by ..... Michael Coyle BA (Hons), MSc

Ecologist

Reviewed by ..... Patricia Byrne BSc (Hons), PhD, MCIEEM

Purpose

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Abbreviations

AEP	Annual Exceedance Probability
CIEEM	Chartered Institute of Ecology and Environmental Management
DLRCC	Dún Laoghaire Rathdown County Council
EC	European Communities
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
FRS	Flood Relief Scheme
GIS	Geographical Information Systems
ISI	Invasive Species Ireland
ISMP	Invasive Species Management Plan
INNS	Invasive Non-Native Species
NBDC	National Biodiversity Data Centre
NPWS	National Parks and Wildlife Service
pNHA	proposed Natural Heritage Area
SDZ	Strategic Development Zone
SW	Surface Water
TII	Transport Infrastructure Ireland

Executive Summary

JBA Consulting Engineers and Scientists Ltd. has been commissioned by Dún Laoghaire Rathdown County Council (DLRCC) to prepare an Invasive Species Management Report for the proposed Flood Relief Scheme (FRS) of the Carrickmines-Shanganagh Rivers. Ecological surveys, there were a total of 11 invasive species recorded along the area of the Scheme, with six of these listed as Third Schedule species.

1 Introduction

This document is the Invasive Species Management Plan (ISMP) for the Carrickmines-Shanganagh River FRS, hereafter referred to as the proposed Scheme.

The ISMP will be updated by the contractor (the Employer for the construction works) prior to the commencement of the Construction Phase, so as to ensure that any additional measures required pursuant to conditions attached to any decision to grant approval are included in the plan.

The ISMP comprises the construction mitigation measures, and will be updated to include any additional measures required pursuant to conditions attached by DLRCC.

Following appointment, the contractor(s) will be required to develop more specific Method Statements and submit an updated ISMP that is cognisant of the proposed construction activities, equipment and plant usage and environmental monitoring plan for the proposed Scheme. The appointed contractor(s) may only propose modifications to the ISMP which will not give rise to any impacts which are more significant than those already identified and assessed in the EIAR

All of the measures set out in this ISMP will be implemented in full by the appointed contractor(s) and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in the EIAR.

1.1 Legislative Context

The Third Schedule of the Birds and Natural Habitats Regulations 2011 (S.I No. 447/2011) and the First Schedule of the Invasive Alien Species Regulations 2024 (S.I. No. 374/2024) contain specific provisions that govern control of listed invasive species. It is an offence to release or allow to disperse or escape, to breed, propagate, import, transport, sell or advertise species listed on the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations without a Licence.

The two regulations that deal specifically with this scheduled list of species are:

- Regulation 49: Prohibition of introduction and dispersal of certain species; and
- Regulation 50: Prohibition on dealing in and keeping certain species.

Following on from that, the following are strictly prohibited:

- Dumping invasive species cuttings anywhere other than in facilities licensed to accept them;
- Planting or otherwise causing to grow in the wild - hence the landowner (in respect of the Proposed Scheme, this being DLRCC and the appointed contractor) should be careful not to cause further spread;
- Disposing of invasive species at a landfill site without first informing the landfill site (that is licensed under Number 10 of 1996 - Waste Management Act, 1996 (as amended) (hereafter referred to as the Waste Management Act, as amended) to take such material (plant or soil) that the waste contains invasive species material (this action requires an appropriate licence);

- Moving soil which contains First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations -specific non-native invasive species in the Republic of Ireland, unless under licence from the National Parks and Wildlife Service (NPWS) (this licence is separate from and does not discharge any person being in receipt of other necessary waste permits/ licences etc.); and
- Regulation (EU) No. 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (hereafter referred to as the IAS Regulation) lists specific Species of Union Concern, some of which overlap with the species of the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations .

The IAS Regulation conveys the rules to prevent, minimise and mitigate the adverse impacts of the introduction and spread (both with and without intention) of IAS on biodiversity and the related ecosystem services, as well as other adverse impacts on human health or the economy. Target 4.4 of Ireland's third National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017) requires that *'harmful invasive alien species are controlled and there is reduced risk of introduction and / or spread of new species'*.

1.2 Limitations

It should be noted that any decision on efficacy of chemical treatments can only be provided by a registered pesticides advisor. A suitably-qualified specialist will be engaged by the appointed contractor to monitor the treatment of non-native invasive species. This ISMP shall be updated as necessary by the specialist.

1.3 Site Location and Context

The Carrickmines-Shanganagh River catchment is approximately 36km² and encompasses a wide variety of land uses ranging from rural mountainous areas in the west, to urban residential areas in the east. The proposed development will be situated primarily in the built-up residential parts of the catchment. A description of the works areas follows, from west to east (upstream to downstream). References to the areas are as shown in

Figure 1-1.

Clon Brugh (

Figure 1-1, 1.A and 1.B, and

Figure 1-2) is a residential estate situated just east of the R117 Enniskerry Road. It comprises a mix of 3-4 storey apartment blocks and houses, with small green areas, car parking, and footpaths. The proposed works in this area will be located along an area of linear green space and footpath. The area surrounding Clon Brugh is also primarily residential, with green space to the west and south in the Dublin mountains foothills.

Belarmine Park (

Figure 1-1, 2.B and 2.D, and

Figure 1-3) is a small public park surrounded by residential areas to the north, east, west, and southwest, and a school to the southeast. The Kilgobbin Stream flows through the park from roughly west to east through a wooded area, with grassy areas to the north and south. A small pond or wetland is also within the park. The stream enters a culvert at the eastern end of the park and emerges approx. 80m upstream of Kilgobbin Road. Works will be taking place at the boundary wall between the park and houses to the north in Sandyford Hall Grove and Sandyford Hall Crescent.

Kilgobbin Road (

Figure 1-2, 2.E and 2.G, and

Figure 1-4) is a small road lined with trees and stone walls, with a narrow footpath on one side for much of its length. The works in this area will take place along the boundaries of two houses on the western side of the road, before running beneath the road and turning east down a narrow laneway, finally running across an area of open space to join back with the river approx. 220m downstream. The houses in this area are all detached, on large plots of land. Kilgobbin House is a protected structure (RPS No.1684) whose stone wall boundary will be removed and reconstructed as a flood wall. The stone walls in this area are of cultural heritage value.

The works at 3.A (

Figure 1-1, 3.A, and

Figure 1-5) are centred around the Glenamuck Road North Roundabout, Ballyogan Grove/Castle View, and Priorsland. Works will be in close proximity to Carrickmines Castle (National Monument Service (NMS) /RPS designation here) and in view of houses along Ballyogan Grove/Castle View and Priorsland. Glenamuck Road North is a busy link road between Carrickmines and the M50 Junction 15, with access also to the Carrickmines Luas Park and Ride, and Leopardstown Racecourse. The proposed works along the northern side of the roundabout are adjacent to an existing footpath and segregated two-way cycle lane, while those along Ballyogan Grove/Castle View are adjacent to the existing road surface, and will replace an existing low stone wall.

Cherrywood Road (

Figure 1-1, 4.A, and

Figure 1-6) is a tree-lined local road with detached houses on either side. It is situated between the M50 to the west and the N11 to the east, with the Cherrywood Strategic Development Zone (SDZ) to the north. Land use in this area is primarily residential, with large green spaces separating individual houses. The proposed works will take place within the property of three houses, adjacent to the river. The river has a riparian corridor here consisting of mature trees and other vegetation. Immediately downstream of this point, the river flows beneath the Cherrywood Viaduct, which is a protected structure (RPS No. 1783).

The works at 5.D (

Figure 1-1, 5.D, and

Figure 1-7) will take place on the Carrickmines River, between a green field to the west and the rear of buildings on Bray Road to the east. Bray Road is a cul-de-sac adjacent to the N11 with a mix of commercial and residential buildings. The buildings back on to the river which flows south before crossing under the N11 in a culvert. A mix of trees line the river, with an open green field on its western side.

Approximately 100m southeast of the Bray Road works, at Lower Brides Glen, works will take place within the garden of a private residence called Waterfall Cottage, and to the culvert beneath the N11. The N11 is a busy road corridor and changes to the M11 motorway approx. 500m south of the works area. The downstream end of the N11 culvert overflow works is within Loughlinstown Woods, a densely wooded area which is also designated as a proposed Natural Heritage Area (pNHA).

Works at 5.A (

Figure 1-1) will take place along the Shanganagh River as it flows from west to east along Commons Road, under the Shanganagh Road Bridge, and between Shanganagh Wood and Brookdene. Upstream of the bridge, Commons Road has residential development along its south side, with the river adjacent to the north. The northern side of the river at this point is wooded, with one house and a bridge providing access at roughly the midway point of the works. North of the wooded area is housing. Shanganagh Road Bridge is a protected structure (RPS No. 1772) and is a narrow two-lane stone arch bridge. Downstream of the bridge, Shanganagh Wood and Brookdene are both residential roads, with a footpath adjacent to the river along Shanganagh Wood, and a riparian strip and tree line on the left (north) bank at Brookdene.

Bayview (

Figure 1-1, 5.C) is a residential area bound to the east by the railway line and a green area through which the Shanganagh River flows. Bayview comprises semi-detached and detached houses with front and rear gardens. Downstream of this point, the river flows beneath the railway line and past Shanganagh Wastewater Treatment Plant to the south, before discharging into the sea at Killiney Bay.

1.4 Description of Proposed Development

The Carrickmines-Shanganagh Flood Relief Scheme aims to develop an FRS for the Carrickmines-Shanganagh area with a SoP up to and including the 1% AEP event. Potential flood relief options for all locations within the study area where required were developed using combinations of those flood risk management measures which were determined to be technically viable. The measures proposed for the preferred option are listed in the table below (Table 1-1).

Data from the GDSDS was used in hydraulic modelling for the proposed development. The purpose of this was to inform catchment delineation, and the data was included in urban areas of the model to route flows to the watercourses. The data was not connected to the 2D zone of the model to avoid issues with mapping sewer and fluvial flooding.

Level information was used to understand potential impacts on the surface water (SW) network at key locations, such as balancing ponds at Belarmine Park. However, the SW networks itself and existing control measures were not modelled in detail. Measures to mitigate potential impacts on the drainage network, e.g., flap vales, will form part of the detailed design.

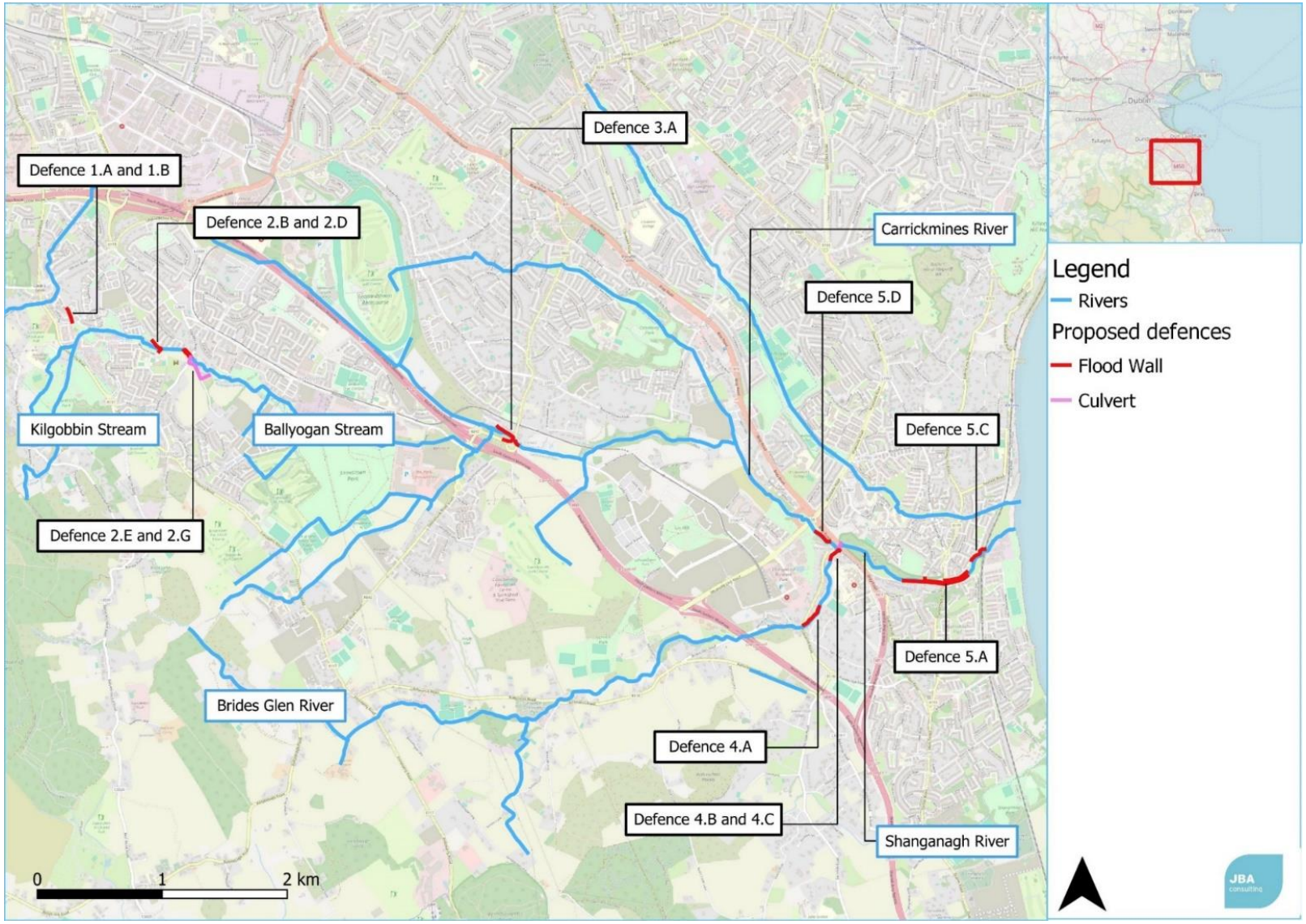

Figure 1-1: Carrickmines - Shanganagh FRS Overview

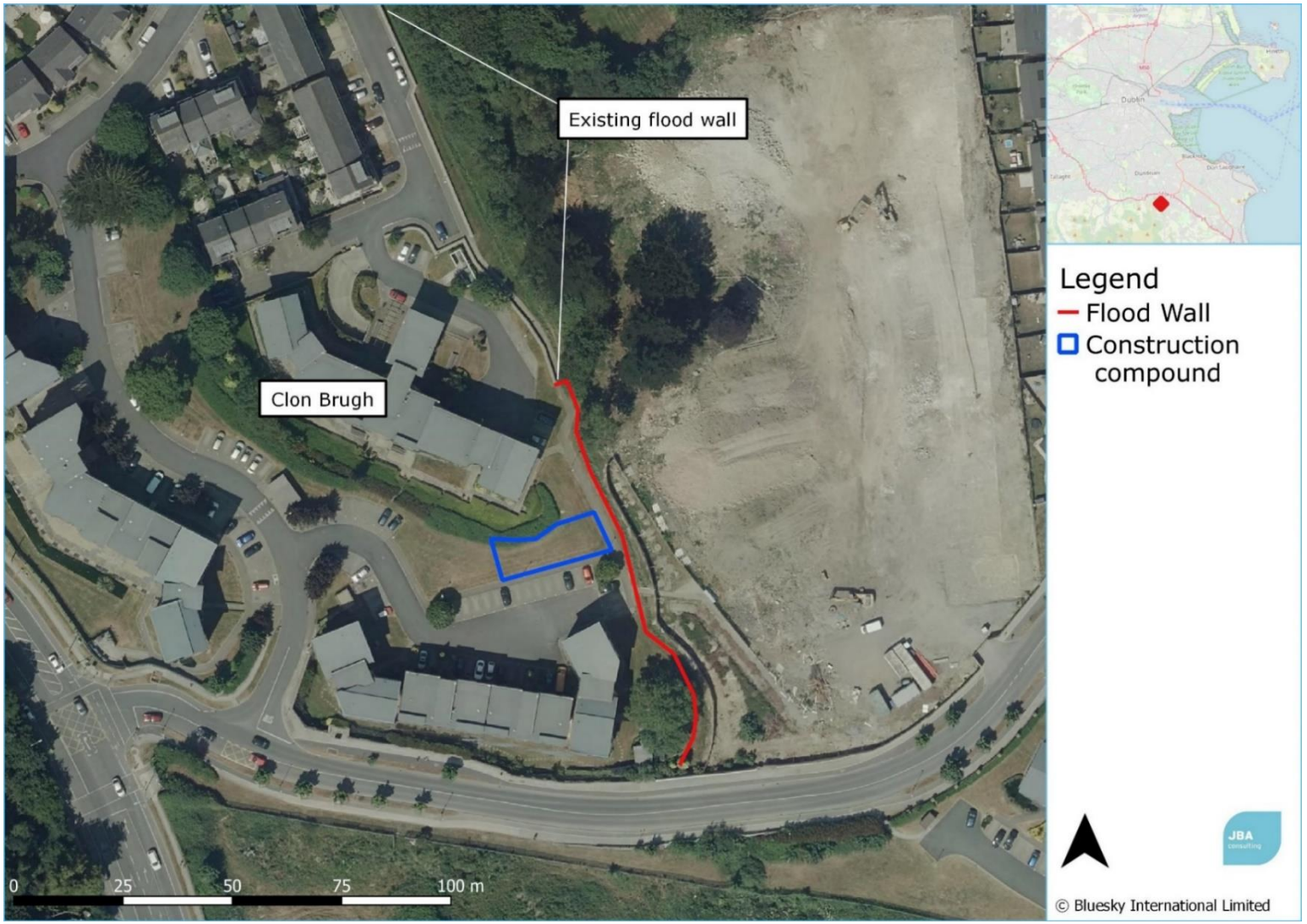

Figure 1-2: Proposed works at Clon Brugh – 1.A and 1.B

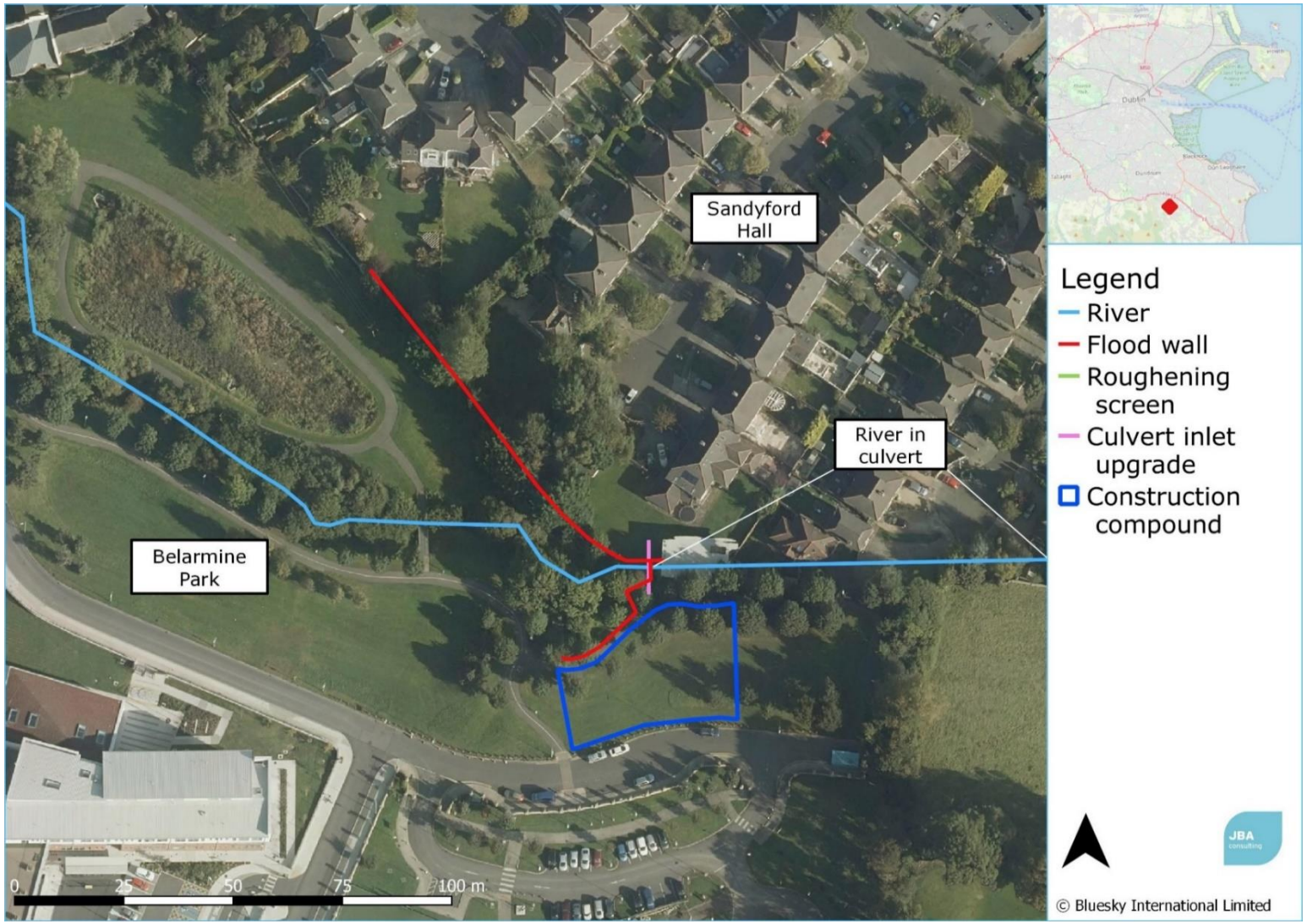

Figure 1-3: Proposed works at Belarmine Park – 2.B and 2.D

Figure 1-4: Proposed works at Kilgobbin Road – 2.E and 2.G

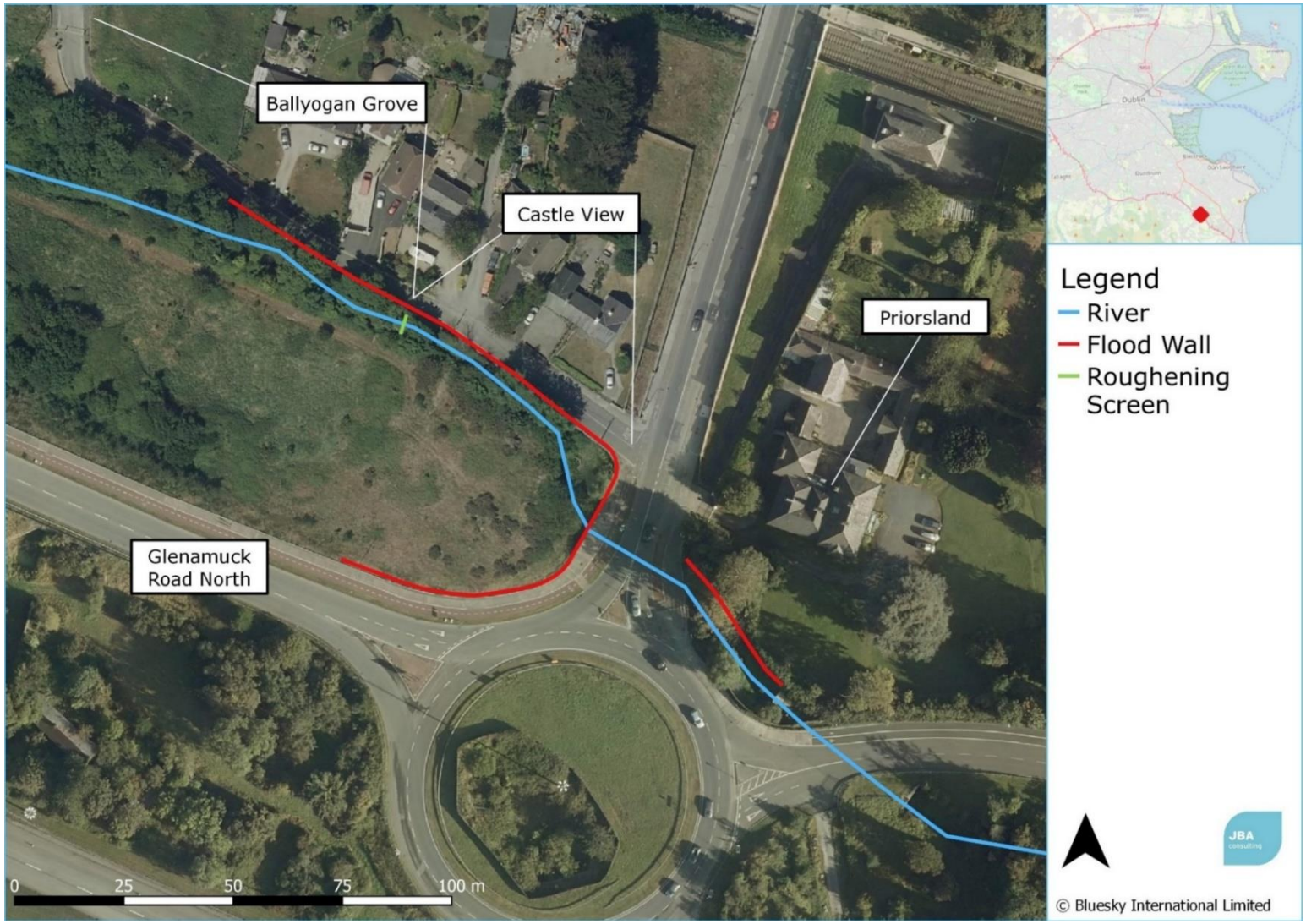

Figure 1-5: Proposed works at Glenamuck Road North - 3.A

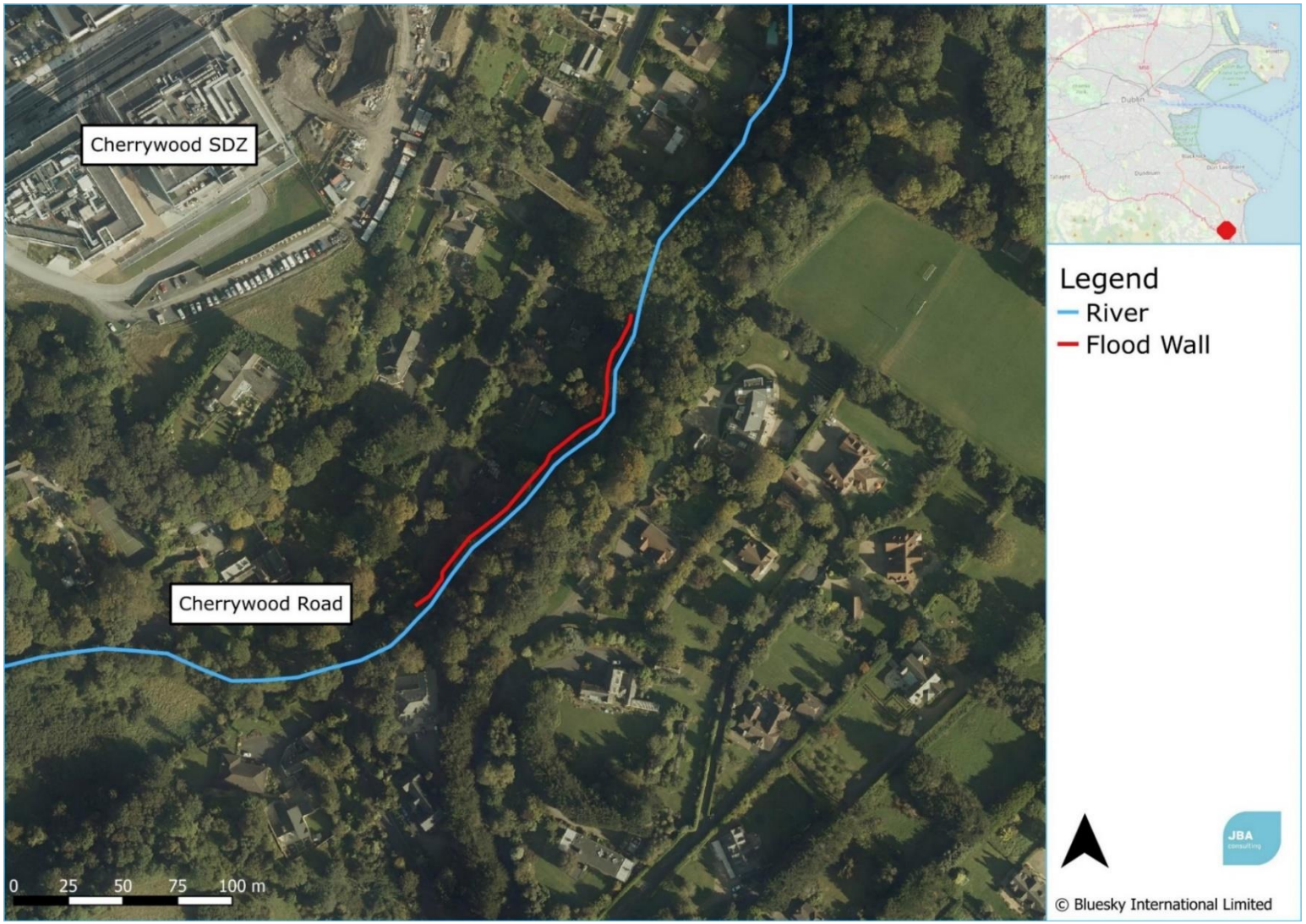

Figure 1-6: Proposed works at Cherrywood Road – 4.A

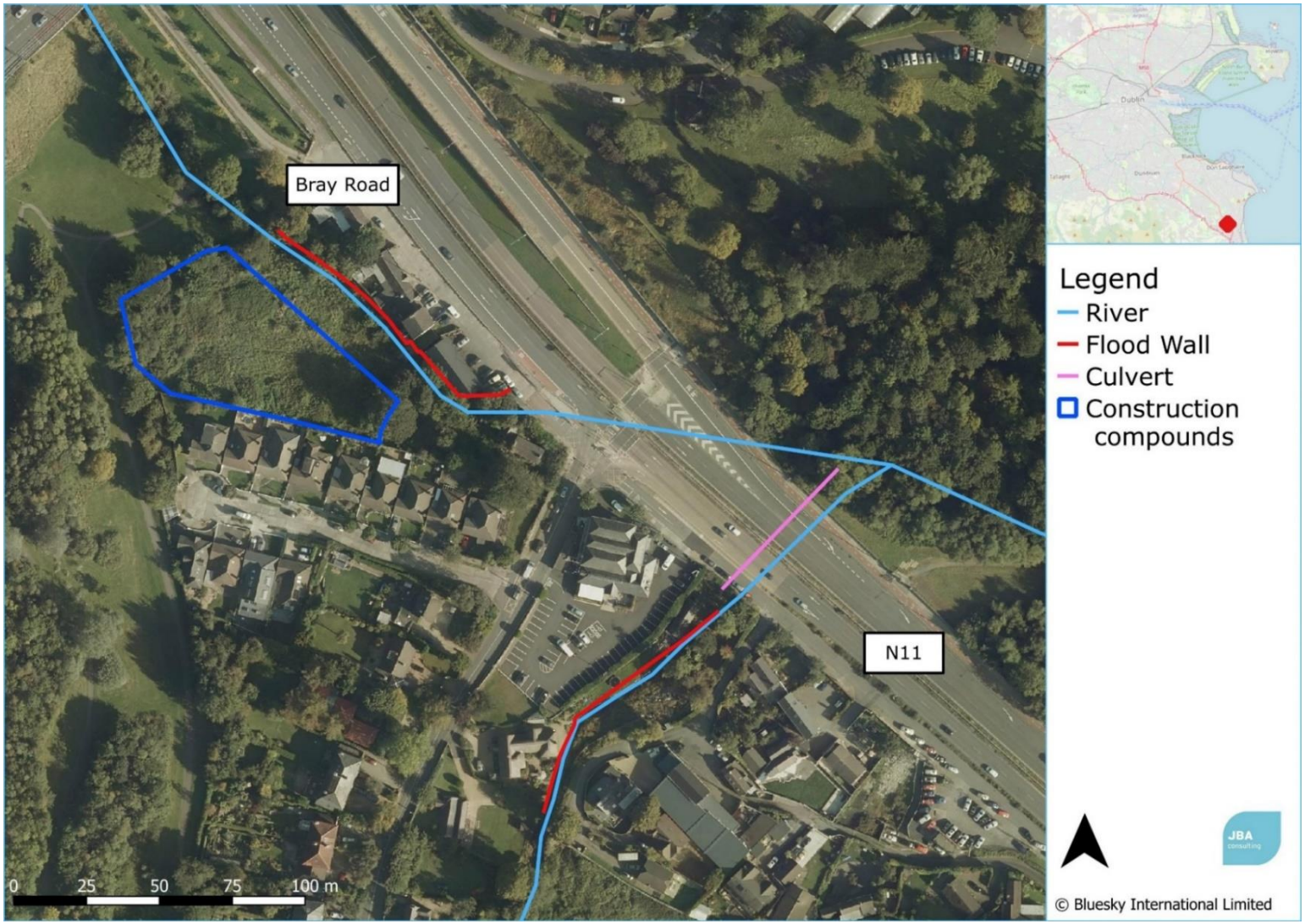

Figure 1-7: Proposed Works at Lower Brides Glen and Bray Road - 4.B, 4.C and 5.D

Table 1-1 Measures included in FRS

Measure	Mechanism	Description
1.A	Containment	Addition of defences at Clon Brugh
1.B	Containment	Closing existing openings at walls at Clon Brugh
2.B	Conveyance	Upgrade of Belarmine culvert inlet
2.D	Containment	Addition of defences at Bellarmine culvert inlet
2.E	Containment	Addition of defences upstream of Kilgobbin Road
2.G	Conveyance	Installation of Flood Relief Culvert upstream of Kilgobbin Road Bridge
3.A	Containment	Addition of defences around Glenamuck Rd North Roundabout
4.A	Containment	Addition of defences upstream of the existing Cherrywood Viaduct (Brides Glen River)
4.B	Containment	Addition of defences along upstream of N11 culvert (Brides Glen River)
4.C	Conveyance	Addition of flood relief culvert at the N11 crossing
5.A	Containment	Raising and addition of walls at Commons Road and Brookdene
5.C	Containment	Addition of defences upstream of railway line, at Bayview
5.D	Containment	Addition of defences at Bray Road

1.4.1 Clon Brugh – 1.A, 1.B

The proposed measures at Clon Brugh will protect from flood overflows from the Carysfort-Maretimo stream. This watercourse is not within the Carrickmines-Shanganagh catchment, however during flood events, flood water from this watercourse overflows into the Clon Brugh housing development. The measures as described below will be constructed along an open green space area, with a stretch of existing flood wall that will be realigned.

- Construction of c. 113m of flood defence walls up to 1.35m high adjacent to the existing overland flow path from the Carysfort Maretimo Stream.
- Demolition of c. 16m of existing masonry walls and realignment works to the existing footpath.

1.4.2 Belarmine Park – 2.B, 2.D

Belarmine Park is a small open green space with housing to the north, east, west, and southwest, and a school to the south. Mature trees are present in the area of works.

- Construction of c. 36m of flood defence walls in Belarmine Park up to 1.65m high to tie into the existing culvert inlet.
- Replacement of c. 100m of the Sandyford Hall boundary wall with a new concrete flood defence wall up to 2.6m high.
- Minor upgrade works to the existing culvert inlet structure.

1.4.3 Kilgobbin – 2.E, 2.G

Proposed measures in this area will be along the boundaries of private gardens, and underneath the public road. One of the houses, Kilgobbin House, is a protected structure.

- Replacement of c. 69m of existing stone boundary wall to Kilgobbin House with a stone-faced flood defence wall the same height on the east bank upstream of Kilgobbin Bridge.
- Construction of flood defence walls to retain and strengthen c. 13m of the existing boundary wall to Kilgobbin House and immediately adjoining Kilgobbin Bridge on the west bank.
- Construction of c. 87m of stone finish flood defence walls up to 1.7m in height on the west bank upstream of Kilgobbin Bridge.
- Installation of c. 298m of culvert from a proposed flow control weir at Kilgobbin Bridge to a discharge point adjoining Meadowbrook downstream.

1.4.4 Glenamuck Road North Roundabout – 3.A

The area of works here is a busy link road between Glenamuck Road North and the M50 Junction 15, with access also to the Carrickmines Luas Park and Ride, and residential properties at Ballyogan Grove/Castle View and east of the Glenamuck Road North roundabout. The existing walls at Ballyogan Grove/Castle View have existing vegetation along them, including mature trees.

- Demolition and removal of c. 128m of existing masonry walls.
- Construction of c.191m of stone finished flood defence walls up to 1.7m high, including flood gate, along Castle View/Ballyogan Grove and the upstream face of the bridge at Glenamuck Road roundabout.
- Construction of 37m of flood defence wall up to 1.4m high on the riverbank adjoining an existing property immediately downstream of Glenamuck Road roundabout.
- Installation of a new in-channel debris screen immediately upstream of the existing bridge.

1.4.5 Cherrywood Road – 4.A

This measure is within the gardens of 3 no. existing residential properties. Mature trees and vegetation are present along the river in this area.

- Construction of c. 178m of concrete flood defence wall ranging from 1.1m to 2.7m high, including demountable barriers and railings, on the bank of the Brides Glen River adjoining the existing properties and upstream of the Cherrywood Viaduct.

1.4.6 Bray Road – 5.D

This measure will be constructed along the rear of commercial properties at Bray Road. This area is generally not accessible to the public, but is partially visible from houses in Cherrywood Park and the open green space to the west.

- Construction of c. 133m of concrete flood defence wall ranging from 1.1m to 3.1m high, including flood gate, on the Carrickmines River to the rear of existing properties on Bray Road.
- c. 75m of river channel realignment, replacement of the existing access bridge and strengthening works to the existing masonry arch.

1.4.7 Lower Brides Glen – 4.B

This measure will be constructed within a private garden (Waterfall Cottage).

- Construction of c. 129m of flood defence walls ranging from 1.2m to 2m in height. The walls are to be located along the north bank of Brides Glen River, within the curtilage of existing properties including a protected structure Waterfall Cottage (RPS Ref: 1770) and immediately upstream of the N11 culvert. Works include demountable barriers and railings.

1.4.8 N11 Overflow Culvert – 4.C

The current proposal allows for the installation of an overflow culvert to the Loughlinstown River South under the N11 to alleviate flooding immediately upstream of the current culvert under the N11, consisting of the following elements. Several trees will require removal.

- Installation of c. 53m of new 2.4m diameter overflow pipe beneath the N11 dual carriageway including an inlet structure upstream of the N11 and an outlet structure in Loughlinstown Park.

1.4.9 Commons Road, River Lane and Brookdene – 5.A

An existing flood wall is present along part of Commons Road and Shanganagh Wood, on the right bank of the Shanganagh River. This flood wall will be upgraded to the required height, with new flood wall built to match it at the western end of the area. In Brookdene on the north side of the river, a new flood wall will be constructed in green open space, between an existing treeline/woodland and the road.

- Structural remedial works to the existing Protected Structure, Shanganagh Bridge (RPS Ref: 1773) including underpinning, scour protection and reinforcement of the masonry parapet.
- Installation of c. 209m of flood defence walls, up to 2.4m high in the environs of Commons Road adjoining the Shanganagh River. Structural works to upgrade c. 324m of existing flood defence walls upstream of Shanganagh Road Bridge to an overall height of up to c. 3.6m.
- Upgrading of c. 113m of existing flood defence wall on River Lane to an overall height of up to c. 1.8m.
- Construction of c. 185m of stone finished flood defence wall to a height of c. 1.2m in the green area in Brookdene.

1.4.10 Bayview – 5.C

This measure will be located in an existing green open space, to the rear and side of houses in Bayview. Access to the grass area will be maintained following construction.

- Construction of c. 95m stone finished flood defence walls up to c. 1.8m high in the green area adjacent to Bayview Grove/Lawns.
- Replacement of c. 17m of existing boundary wall at 20 Bayview Lawns with a new flood defence wall to match existing wall height and finishes and replacement of remaining c. 10m of wall tying into the culvert under the railway with a concrete flood defence wall.

1.5 Construction Activities

It is expected that the construction phase will take place over c. 18-24 months.

1.5.1 Construction Compounds

Several compound areas will be established during the construction phase, for use in different areas of the scheme. Establishment of these areas will include the following:

- Site offices;
- Site facilities (canteen, toilets, drying rooms, etc.);
- Secure compound for the storage of all on-site machinery and materials;
- Temporary car parking facilities;
- Temporary fencing;
- Site Security to restrict unauthorized entry;
- Bunded storage of fuels and refuelling area.

A separate container will be located in the Contractors compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled, and the contents of the container will be disposed of by a licenced waste contractor at a licenced site. Records will be maintained of material taken off site for disposal;

Drainage collection system for washing area to prevent run-off into surface water system.

It is expected that the following areas will be used as construction compounds, subject to agreement with the landowners, where located in private lands. Where located in private lands, compounds will be temporarily acquired by agreement with the landowners.

- At Clon Brugh, in the open green space adjacent to the works area.
- At Belarmine Park, lands immediately south of the works area. The public open space in use as the site compound will not be accessible to the public during the works.
- At Kilgobbin Road, in the greenfield on the left bank of the river, behind Riverside house. Access will be through an existing gate off Kilgobbin Road.

- At Glenamuck Road North, in the greenfield at the end of Ballyogan Grove. Access to the compound will be from the Leopardstown Racecourse Road.
- At Bray Road, in the greenfield on the right bank of the Loughlinstown River North, adjacent to the Bray Road channel widening works.
- At Commons Road, in the DLRCC-owned greenfield area on the left bank of the Shanganagh River, immediately upstream of Shanganagh Road Bridge and accessed from Shanganagh Road.

The compound locations described above are shown in

Figure 1-8,

Figure 1-9, and

Figure 1-10.

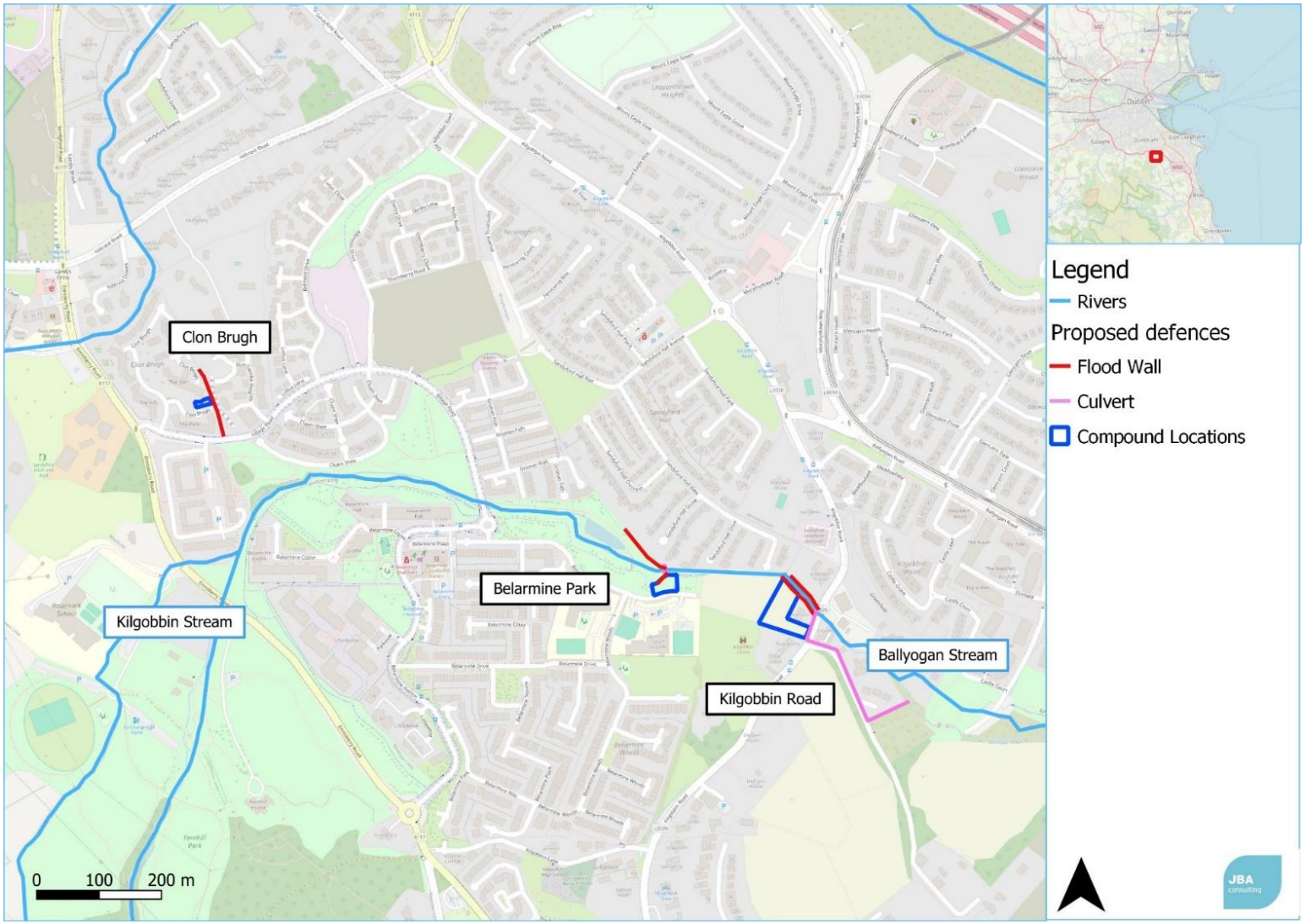

Figure 1-8: Compound locations, Clon Brugh, Belarmine Park, and Kilgobbin Road

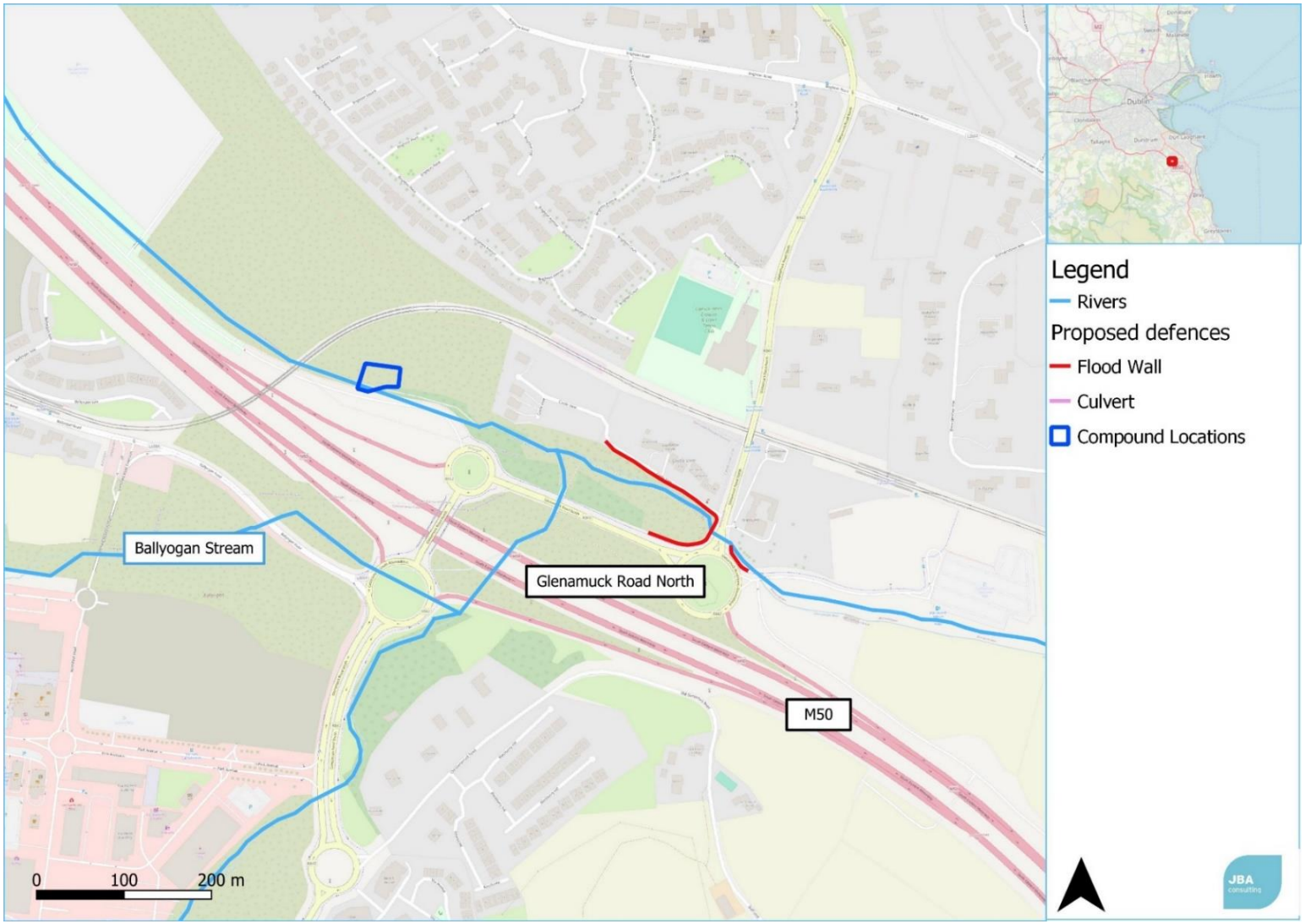

Figure 1-9: Compound location at Glenamuck Road North

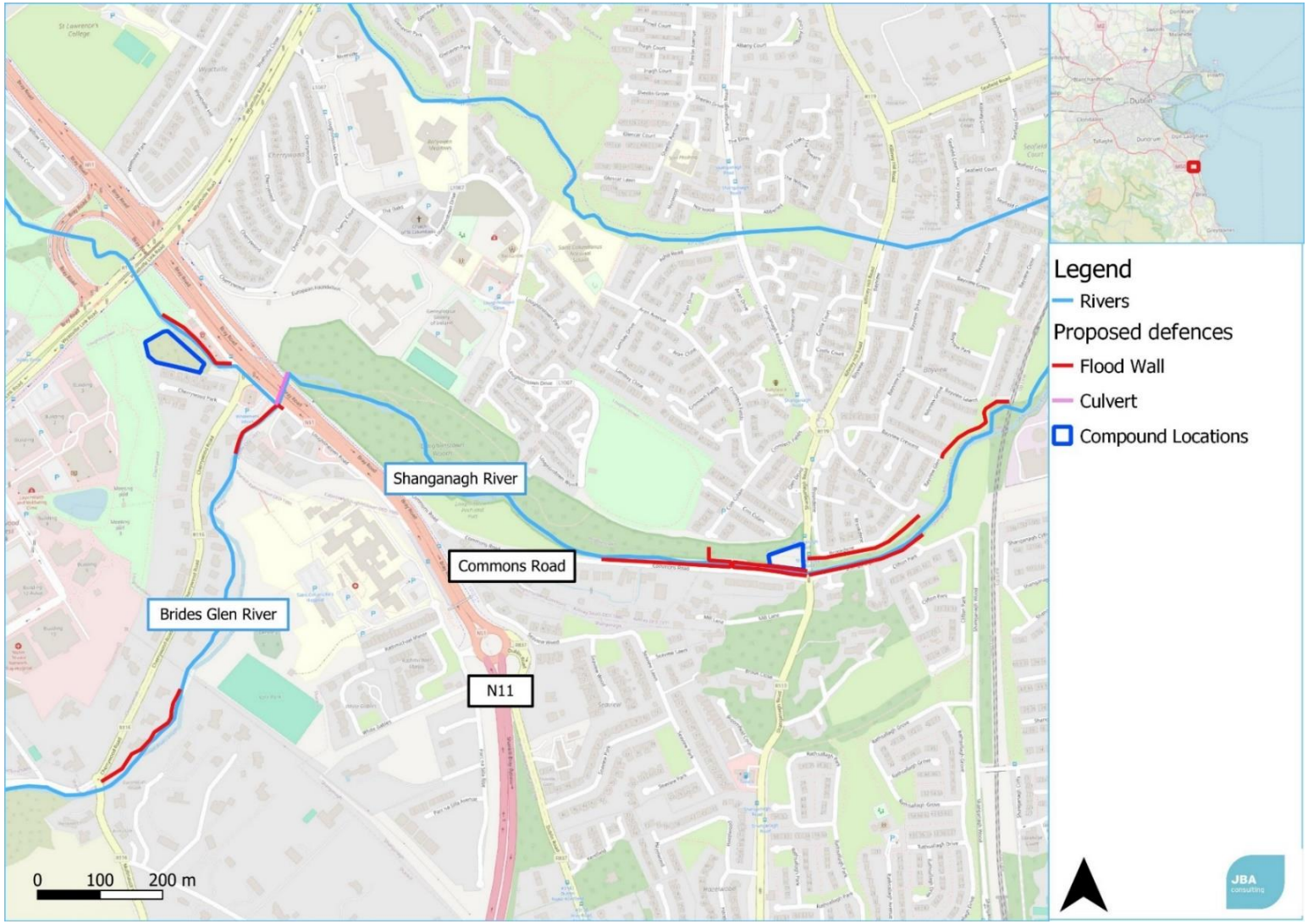

Figure 1-10: Compound locations at Bray Road and Commons Road

1.5.2 Construction Traffic Route

Construction traffic will travel to and from the site via the M50, N11, and local roads.

1.5.3 Excavation and Infilling

Excavation and import of soil and other materials will be required for construction of the walls and foundations. The Design Team has calculated that approx. 12438 m^3 of material will be excavated and removed from site. Approx. 6822 m^3 of soils will be imported for the backfill, and in addition to this, approx. 1456.5 m^3 of other construction materials will be imported to site for roadworks.

1.5.4 Instream Works and Works Near Water

There will be instream works at Belarmine Culvert, Kilgobbin, Bray Road, N11 Culvert, and Shanganagh Road Bridge. Works will take place near water throughout the scheme.

At Belarmine Park, instream works will be necessary for the installation of the culvert upgrade and wall foundations. The instream phase will consist of:

- Installing protections prior to works commencing.
- Regrading the inlet structure and upgrading the existing screen.
- Excavating and installing wall foundations.
- Removing temporary works following construction.

At Kilgobbin Road, instream works will be required for the installation of the new weir structure. The instream phase of the works will consist of:

- Installing protections prior to works commencing
- Installing a reinforced concrete weir structure, including excavation of the river bedding, foundations, superstructure, scour protection and reinstatement of the river bedding.
- Removing temporary works following construction.

At Bray Road, instream works will be required for the installation of wall foundations and for channel widening. The instream phase of the works will consist of:

- Installing protections prior to works commencing.
- Excavating the left bank upstream of the footbridge to foundation level, stabilisation works may be required.
- Installing the flood defence walls, including any joint installation and treatment between the sections.
- Reinstate the sides of the left bank to the new design level.
- Rearranging protections as may be required to allow for the channel realignment.
- Excavating the realigned section of the stream.
- Planting vegetation along the new riverbank as required.
- Removing temporary works following construction.

At the N11 culvert, instream works will be necessary for the installation of the new weir structure. The instream phase of the works will consist of:

- Installing protections prior to works commencing.
- Installing a reinforced concrete weir structure, including excavation of the river bedding, foundations, superstructure, scour protection and reinstatement of the river bedding.
- Removing temporary works following construction.

At Commons Road, instream works will be necessary for the bridge reinforcement works. The instream phase of the works will consist of:

- Installing protections prior to works commencing.
- Carry out reinforcement works to bridge foundations and masonry.
- Reinstate soil removed for instream works.
- After the concrete has reached its design strength, remove temporary supports.
- Relocate instream protection elements to the other half of the riverbed.
- Repeat steps above in the other half of the stream.

1.6 Maintenance and Operational Activities

Following construction, each proposed measure will have its own bespoke management plan.

Regular inspections of the proposed structures will take place, together with investigations of their performance after each flood event.

A routine inspection and maintenance plan will be developed whereby Dún Laoghaire Rathdown County Council and/or nominated maintenance contractors will inspect and maintain the proposed structures once per year to examine them for any defects and to ensure that staff are trained and familiar with the operational process for them. It is assumed that this will primarily be a combination of visual inspection for any damage, spot repairs to walls where needed, and removal of materials which could act as blockages, e.g., large tree branches which have fallen into the river or waste. Maintenance will not include removal of natural sediment deposition or in-channel or riparian vegetation.

1.7 Decommissioning

Decommissioning of the proposed development is not expected to occur. Regular maintenance of structures will take place to identify any damage or deterioration. The proposed development has been designed to be adaptable to changing conditions as a result of climate change. This will allow it to remain in use in the future and be adapted when necessary.

2 Methodology

A desktop study and field surveys were conducted to inform this invasive species management plan.

2.1 Desktop study

A desktop study was carried out prior to conducting the field surveys. A review of available records of invasive species was carried out. Published records of invasive species listed in the First Schedule of the Invasive Alien Species Regulations 2024 S.I. No. 374 or Third Schedule of the Birds and Natural Habitats Regulations S. I. No. 477 at the site location were researched.

The National Biodiversity Data Centre (NBDC) species records were accessed in September 2024, and records from the last 10 years were considered during this report. A customised polygon was produced to extract all the species data from an approximate 2km radius each side of the watercourse for this scheme (Appendix A).

Other species that are known to be invasive but are not included in First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations include Winter Heliotrope *Petasites pyrenaicus*, Buddleia/ Butterfly Bush *Buddleja davidii*, Himalayan Honeysuckle *Leycesteria formosa*, and *Montbretia Crocosmia* X *crocosmiflora*. These species were also searched for during the field survey.

Species are detailed in this report as either being invasive species of the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations, or simply invasive species. All instances of invasive species and their extent were recorded and mapped using QGIS.

Particular focus was placed on the search for the presence of species of both the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations: Japanese Knotweed *Reynoutria japonica* and Giant Hogweed *Heracleum mantegazzianum*. Japanese Knotweed (and its hybrids) and Giant Hogweed are considered high impact invasive species. Japanese Knotweed reproduces by vegetative means, either by fragments of rhizome or stem. Leaves are 10-15cm in length, green, shield shaped with pointed tips, a flat base, and arranged in a zig-zag formation. The stem is bamboo-like, and green with a red/purple mottled colour.

Giant Hogweed can grow up to 5-6m in height. The main stem in large, hollow, usually with purple blotches and have hairy bristles. The leaves are serrated and sharply divided and can grow to 3m in length and 1.5m wide. The flowers are white or rarely pink and umbrella shaped. They can produce up to 50 000 seeds which can be viable up to 15 years. The seeds are spread by wind, water, animal and human influence.

2.2 Field surveys

2.2.1 Site surveys

Surveying was completed by a number of experienced JBA ecologists between 2020 and 2024. Table 8-1 contains further details on survey dates and types of surveys undertaken.

The ecological walkover surveys recorded habitats, protected species, and invasive species, following the methods outlined in the documents below:

- Heritage Council (2011). Best Practice Guidance for Habitat Survey and Mapping (Smith *et a*l. 2011).
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2008).

Aerial photographs and site maps assisted the surveys. Habitats have been classified and described following Fossitt (2000). Nomenclature for higher plants follows that given in The New Flora of the British Isles 4th Edition. Identification of Irish plants generally follows Webb's An Irish Flora.

Table 2-1: Ecological surveys undertaken in the study area

Surveyors	Date of Visit	Survey Type
Malin Lundberg and Patricia Byrne	20 November 2020	Fossitt Habitat Surveys
Malin Lundberg and Patricia Byrne	10 December 2020	Fossitt Habitat Surveys
Malin Lundberg and Patricia Byrne	06 January 2021	Fossitt Habitat Surveys
Malin Lundberg and Patricia Byrne	20 January 2021	Fossitt Habitat Surveys
Malin Lundberg and Patricia Byrne	25 February 2021	Fossitt Habitat Surveys
Patricia Byrne	11 June 2021	Invasive Non-Native Species Survey
Malin Lundberg and Patricia Byrne	30 June 2021	Invasive Non-Native Species Survey, Fossitt Habitat Surveys
Patricia Byrne	14 July 2021	Invasive Non-Native Species Survey
Mark Desmond	24 October 2022	Invasive Non-Native Species Survey
Mark Desmond	05 September 2023	Fossitt Habitat Surveys and Bat Roost Potential Survey.
William Mulville, Michael Coyle, Mat Hosking and Jai Dolan	02 February 2024	Otter and Fossitt Habitat Surveys
William Mulville, Michael Coyle and Jai Dolan	10 May 2024	Fossitt Habitat Surveys
William Mulville, Michael Coyle Matt Hosking and Jai Dolan	16 May 2024	Fossitt Habitat Surveys
William Mulville, Michael Coyle and Matt Hosking	11 July 2024	Otter and Fossitt Habitat Surveys

2.2.2 Terrestrial Habitat Surveys

Initial surveys of the terrestrial habitats were conducted on: 20 November and 10 December 2020; 6 January, 20 January, 25 February and 30 June 2021. Following this initial surveying, additional sections were added to the scheme, and these were surveyed on the 05 September 2023, and the 2 February, 10 May, 16 May and 11 July 2024.

All habitats located within the survey area of the proposed Scheme were mapped to level three of the Heritage Council's Fossitt (2000) habitat codes, and in accordance with Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011). Floral species present that were either representative of a habitat, or considered to be of conservation interest, were recorded. The habitat's extent was mapped onto an aerial photograph within the QField GIS Android application, with GPS points taken where any ecological features of note were observed. Any non-native invasive plant species listed on either the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations were also recorded during the habitat and protected species surveys.

2.2.3 Limitations to the baseline data

The habitats and species present in a given area are subject to change over time. As such, the advice and assessments contained within this report is considered valid for a period of 18 months before a review or an updated survey/assessment must be made by an ecologist.

3 Baseline Data

3.1 Baseline conditions

The proposed development area is comprised of a wide range of habitats, including stone structures, earth banks, built artificial surfaces, agricultural and amenity grasslands, ponds, spoil, swamps, rivers, ditches, grassy meadows and verges, bracken, woodlands, hedgerows, treelines, scrub. Descriptions of habitats and associated species, including invasive non-native species (INNS), are provided in Appendix A.

An overview of how the measures of the scheme are split into various areas is shown in

Figure 3-1. Following that figure more detail is given on the INNS found throughout the Scheme.

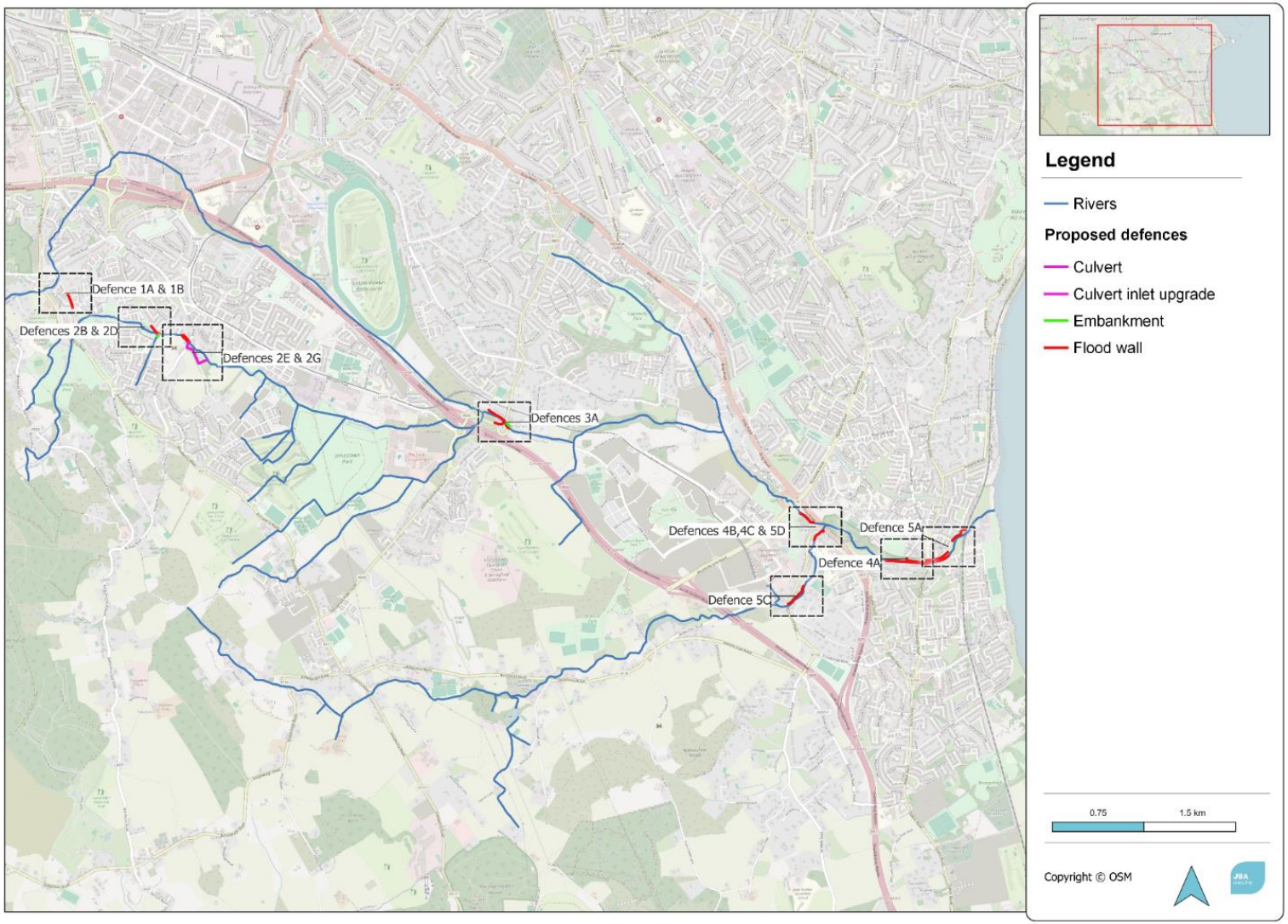

Figure 3-1: Location of the measures throughout the scheme area

3.1.1 Invasive Non-native Species (INNS)

Table 3-1 below provides a list of the 11 non-native species recorded during the ecological surveys. It includes species, their level of impact, and whether they are listed on either First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations . Five species are listed as Third Schedule species: American Skunk Cabbage, Giant Hogweed, Japanese Knotweed, Rhododendron and Three-cornered Garlic.

Table 3-1: INNS recorded within or immediately adjacent to study area

Invasive Non-Native Species	Impact	Regulation (S.I. 477/2011 and S.I. 374/2024)
American Skunk Cabbage	Medium	Yes
Butterfly Bush	Medium	No
Cherry Laurel	High	No
Giant Butterbur	-	No
Giant Hogweed	High	Yes
Japanese Knotweed	High	Yes
Rhododendron	High	Yes
Sika Deer	High	Yes
Sycamore	Medium	No
Three-cornered Garlic	Medium	Yes
Winter Heliotrope	Low	No

Figure 3-2: INNS recorded in in the vicinity of Measures 1.A and 1.B

Figure 3-3: INNS recorded in in the vicinity of Measures 2.B, 2.D, 2.E and 2.G

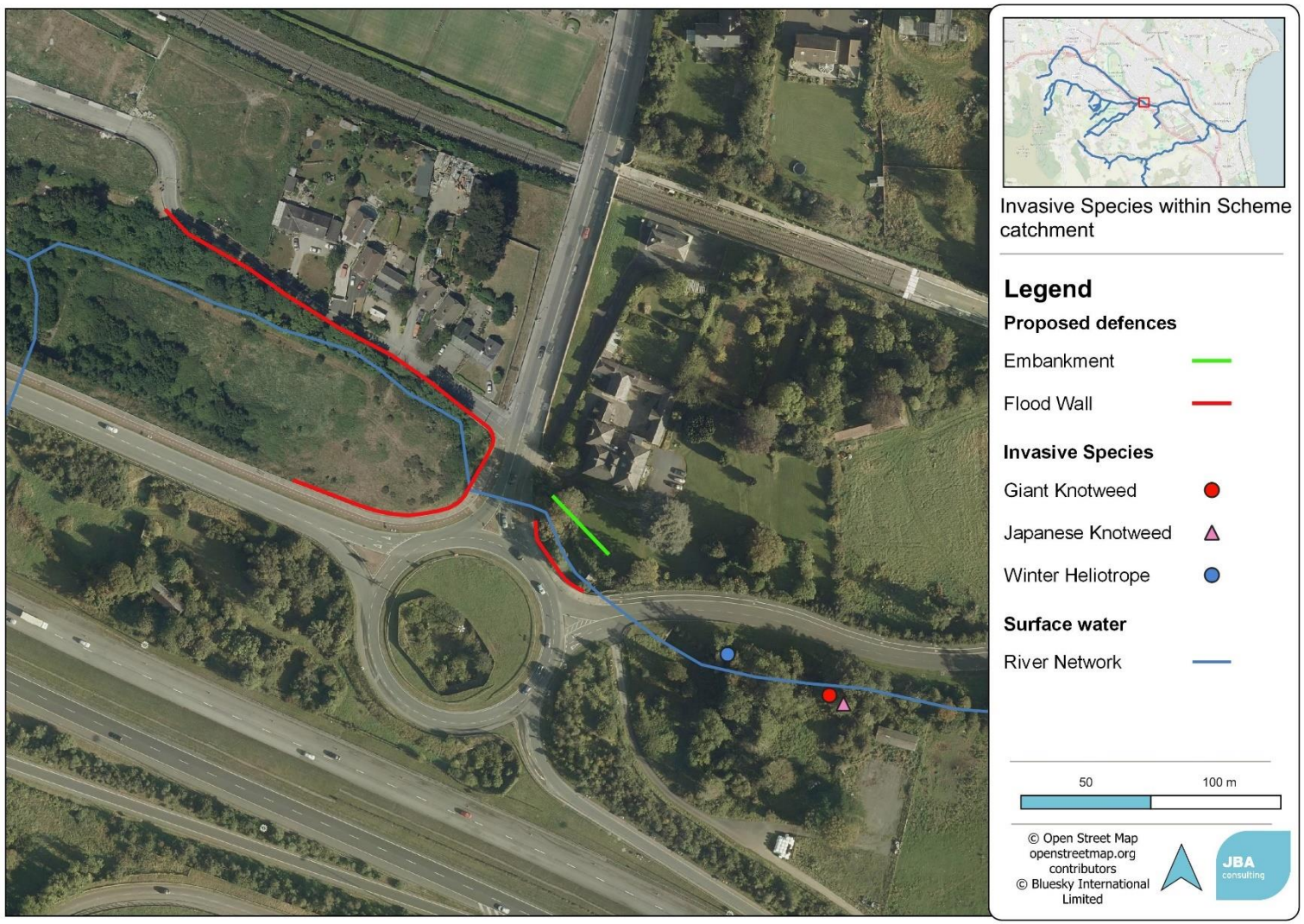

Figure 3-4: INNS recorded in in the vicinity of Measure 3.A

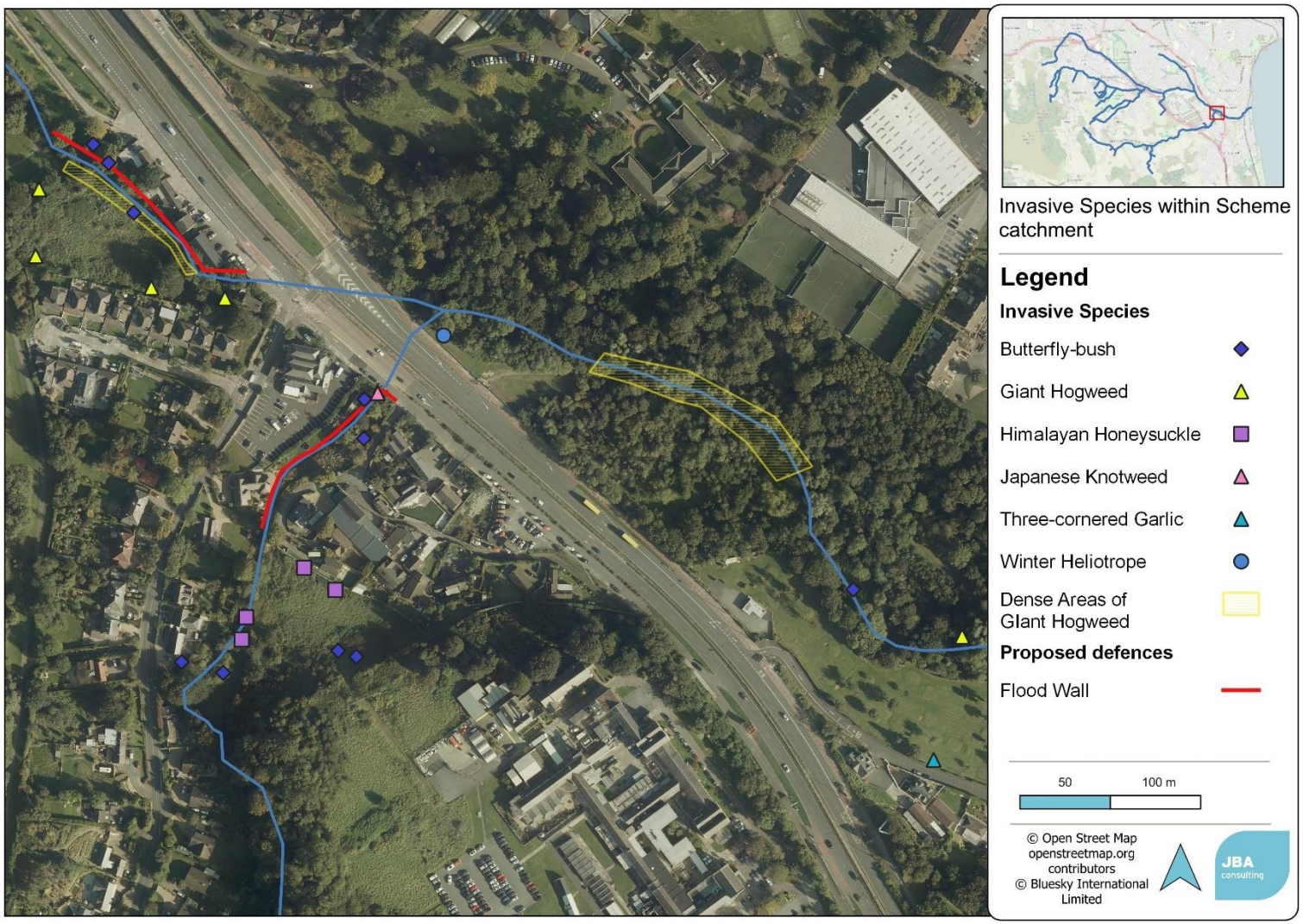

Figure 3-5: INNS recorded in in the vicinity of Measure 4.B, 4.C and 4.D

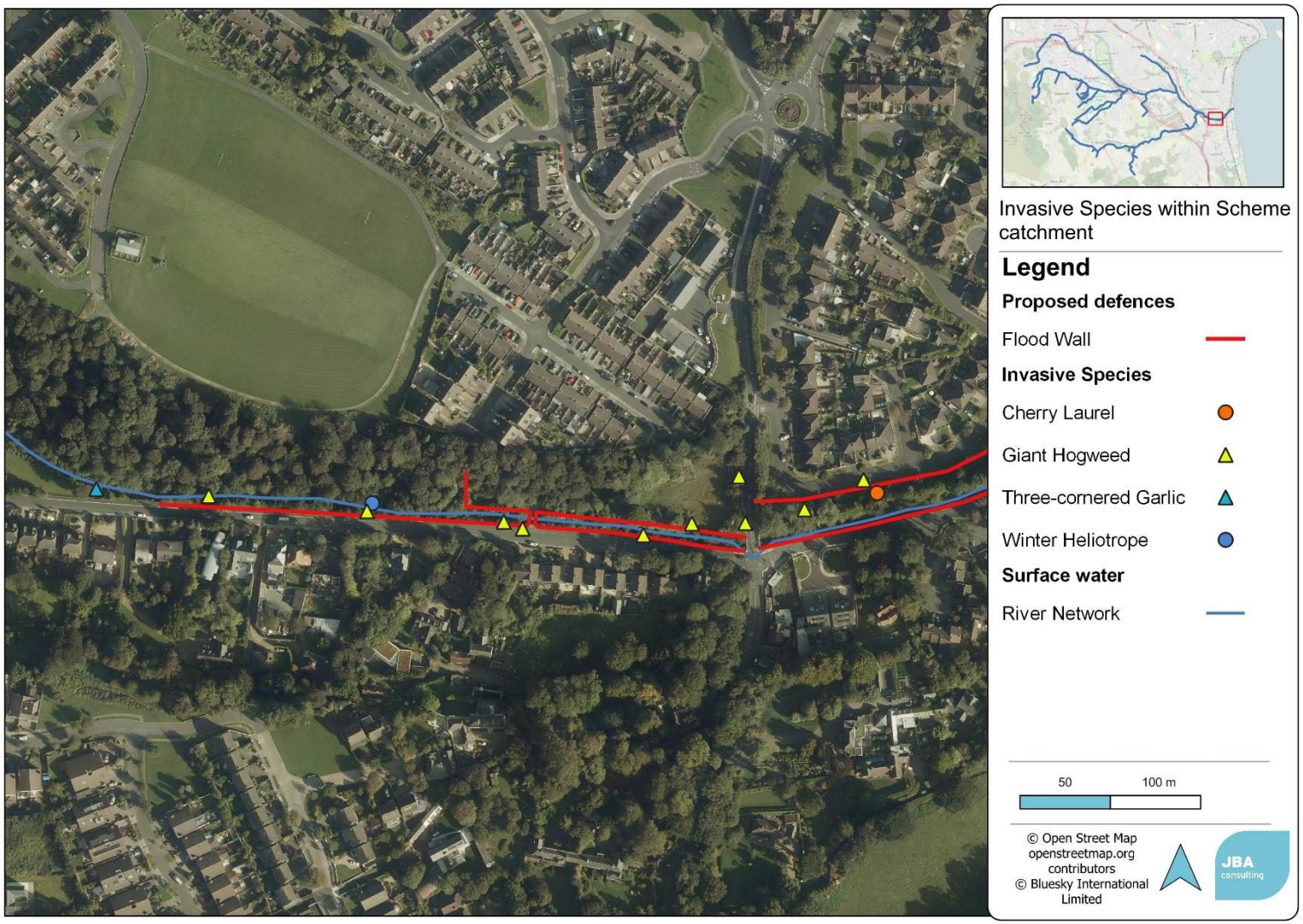

Figure 3-6: INNS recorded in in the vicinity of Measure 4.A

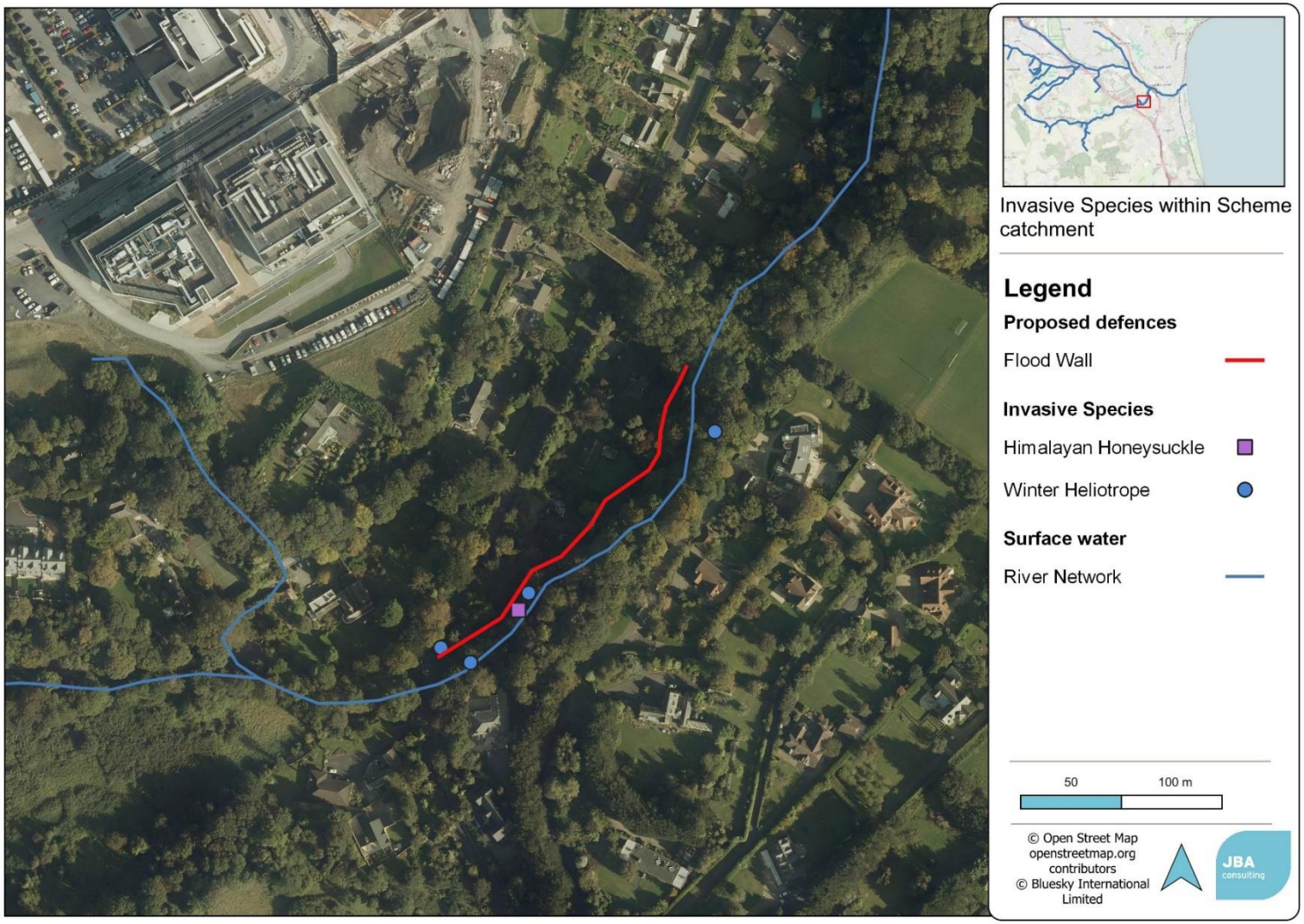

Figure 3-7: INNS recorded in in the vicinity of Measure 5.C

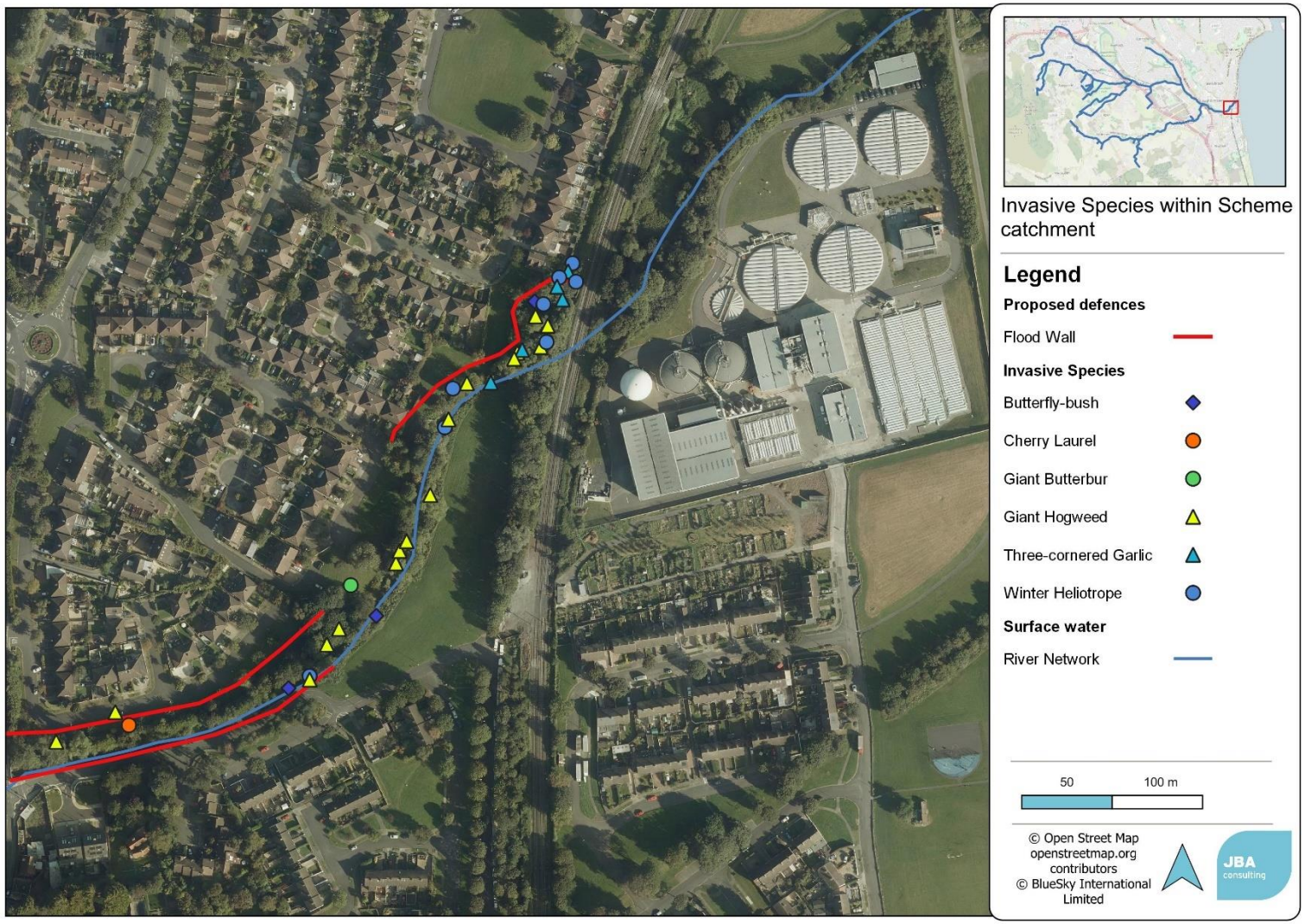

Figure 3-8: INNS recorded in in the vicinity of Measure 5.A

4 Impacts of Invasive Species Identified

4.1 Butterfly-bush

Butterfly-bush is considered a medium risk invasive species (NBDC, 2024a). It is well established in Ireland and planted as an ornamental. It is often used as a "Butterfly Bush", hence the name. It grows rapidly with extensive networks of fine roots and forms dense thickets that outcompete native vegetation (NRA, 2010). It is often found in waste ground as it is a very successful coloniser.

4.2 Cherry Laurel

Cherry Laurel is considered a high impact invasive species (NBDC, 2024b). It is well established and widespread in Ireland and is an ever-green shrub of gardens, parks and woodlands. It forms dense impenetrable thickets and is likely toxic to mammals due to the presence of cyanide and is avoided by grazing animals.

4.3 Giant Butterbur

Giant Butterbur not currently assessed on the NBDC website (NBDC, 2024c). It occurs occasionally in Ireland and is a perennial plant with thick rhizomes. The leaves are very large and either hart-shaped or kidney-shaped. Giant Butterbur is a non-native species with a risk of becoming invasive and will therefore be considered for treatment in this plan.

4.4 Giant Hogweed

Giant Hogweed is considered a high impact invasive species (NBDC, 2024d). The species is widespread and locally abundant found along riverbanks and waste grounds and produces large volumes of seeds and can rapidly spread within an area. It is highly invasive due to its vigorous early-season growth, tolerance of shade and flooding, and its efficient production and dispersal of seeds, (TII, 2020). Giant Hogweed can increase the risk of soil erosion as it dies back in winter. The plant produces a phototoxic sap that renders skin sensitive to ultraviolet light, causing blistering of the skin.

4.5 Giant Knotweed

Giant Knotweed is considered a high impact invasive species (NBDC, 2024e). The species is widespread but localised and is crowding out native plants. Riparian habitats invaded by knotweeds have lower invertebrate abundance, species richness and biomass and lower plant species richness compared to uninvaded sites, which is likely to impact on amphibians, reptiles, birds and mammals that use riparian habitats.

4.6 Himalayan Honeysuckle

Himalayan Honeysuckle is considered a medium risk invasive species (NBDC, 2024f). The species is widespread but more common in the southeast and is commonly used as a hedging plant and as cover for pheasants. There are no documented impacts recorded, however it forms dense thickets that can exclude native vegetation.

4.7 Japanese Knotweed

Japanese Knotweed is considered a high impact invasive species (NBDC, 2024g). Japanese Knotweed is a widespread and well-established garden escape or relic of cultivation in Ireland, which spreads vegetatively and forms dense stands which are difficult to eradicate successfully. It spreads very effectively by fragmentation of stem and rhizome, making it very resilient. It is widely distributed in Dublin City and throughout Ireland. It out-competes native species, contributes to soil erosion particularly along riverbanks, and may cause structural damage to buildings and infrastructure.

4.8 Rhododendron

Rhododendron is considered a high impact invasive species (NBDC, 2024h). Rhododendron is widespread and common in Ireland and is a common garden plant. It forms dense monocultures that crowds out native plants and impacts on community level processes in streams and rivers where it is present. It may produce alleopathic chemicals, preventing native species from growing in soil in which it is present. These toxins make the plant unpalatable to most herbivores and grazing animals.

4.9 Three-Cornered Garlic

Three-Cornered Garlic is considered a medium impact invasive species (NBDC, 2024i). The horticultural trade is the primary route of entry of this plant into Ireland (O'Rourke et al, 2014). It is well established in the south and southeast of Ireland. Transfer of the species in air turbulence from passing vehicles is expected to be its primary form of transfer throughout the country. It forms early season dense monocultural stands which pose a threat to biodiversity be outcompeting native species.

4.10 Winter Heliotrope

Winter Heliotrope is considered a low-risk invasive species (NBDC, 2024j). It is thought to have entered Ireland through the horticultural trade for use as a low cover ornamental plant. It is well established throughout the country and is common along roadside boundaries and on waste ground. All specimens in Ireland are male and it spreads by vegetative means. It forms dense stands and outcompetes native vegetation.

4.11 American Skunk-cabbage

American Skunk-cabbage is considered a medium risk invasive species (NBDC, 2024k). It was introduced in Ireland as an ornamental plant, and has since escaped from confinement. It is well established throughout Ireland, occurring mainly in mires, bogs, and fens. It reproduces by seeds, and also spreads by rhizomes. It outcompetes native species.

5 Management options

This section describes general guidance on management options for the different invasive species.

The following measures utilise the best practice management guidance documents listed below, where relevant:

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020a);
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020b);
- Inland Fisheries Ireland - Biosecurity Protocol for Field Survey Work (IFI, 2010);
- Managing Invasive Non-Native Plants in or near Freshwater (EA, 2010);
- Managing Invasive Alien Plants in Ireland (2016-NC-MS-7) EPA Research Report, 2022
- Invasive Species Ireland (ISI) Best Practice Management Guidelines for Japanese Knotweed (ISI, 2008a);
- Good Practice Management Guide for Japanese knotweed (*Fallopia japonica*), (Rapid Life, 2018a)
- Good Practice Management Guide for American Skunk Cabbage (*Lysichiton americanus*), (Rapid Life, 2018b)
- Best Practice Management Guidelines for Giant Hogweed (ISI, 2008b);
- Good Practice Management Guide for Giant Hogweed (Heracleum mantegazzianum), (RAPID, 2018c);
- Best Practice Management Guidelines; Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*) (Maguire et al., 2008).

5.1 Measures to Control and Prevent the Spread of Non-native Invasive Species

5.1.1 Pre-construction Survey

An updated invasive species baseline survey shall be conducted prior to the commencement of each of the proposed Scheme's enabling works. This updated baseline is required as invasive species may have continued to spread within and adjacent to the proposed Scheme since the last invasive species or habitat survey was conducted onsite.

As per TII guidance (TII, 2020a), this additional invasive species survey will include detailed maps of the precise location of each individual invasive species plant, as well as photos of these specific locations; and

During the interim between the original non-native invasive species surveys and the commencement of construction following grant of planning permission, it is possible that the existing stands of non-native invasive species on the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural

Habitats Regulations may have expanded (if unmanaged) or decreased (if there is an active management regime in place), or that newly established non-native invasive species may have become established within the footprint of the proposed Scheme. A confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist, arranged by the contractor(s), to confirm the absence, presence and / or extent of all non-native invasive species on the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations within the footprint of the proposed Scheme. Where an infestation is confirmed / identified within the footprint of the proposed Scheme, this will require the implementation of the final invasive species management plan.

5.1.2 General Measures to Avoid the Spread of INNS

The unintentional spread of INNS during construction works (within the proposed Scheme, originating from outside the proposed Scheme, such as through the importation of materials, poor biosecurity practices regarding plant and machinery or natural processes) can be a significant issue, and if not managed properly, can result in the spread of non-native invasive species to non-infested areas (within or adjacent to works areas). This will potentially increase the future cost and effort required to control the species and has the potential to pose further public health and safety risks (Japanese Knotweed can cause damage to weaknesses in built environment, whilst Giant Hogweed is an environmental public health hazard).

Listed below is a brief detailing of necessary measures to be undertaken to ensure biosecurity within the various sections of the proposed Scheme:

- The adherence to a set of biosecurity measures, including:
    - the fencing off / demarcating of the individual invasive species;
    - communicating the location, risk and hazards associated with invasive species to construction personnel (e.g. Giant Hogweed);
    - identifying dedicated access points into and out of fenced-off areas;
    - the installation of designated decontamination facilities (where appropriate);
    - protocols around the removal of contaminated soils; and
    - seed and fragment checks on boot, tyres and tracks entering and leaving the work site.
- Best practice measures for the treatment of soils contaminated with invasive species (including potential seeds and fragments of mature plants) to prevent the accidental spread of INNS;
- As required by law, licences for the disposal of contaminated materials will be obtained, as well as the utilisation of licensed facilities;
- In regard to the importation of soil and other materials, the principal contractor will only utilise traceable topsoil for landscaping that has been cleared of any invasive species material;
- Measures to be implemented during the application of herbicides – Commitment to the appointment of a suitably qualified /registered/

licensed pesticides advisor for any works requiring the use of pesticides, and safety precautions for consideration in the use of pesticides near watercourses; and

- Areas which contained invasives species, where invasives were treated on-site or removed, prior to the enabling and construction works will require an on-going post-construction monitoring programme to ensure that there is no reestablishment of any invasive species within these areas.

5.1.3 Biosecurity Mitigations

Prior to commencement of the enabling works along the Scheme, a series of biosecurity measures will have to be undertaken to prevent spread of invasive species, namely American Skunk Cabbage, Giant Hogweed, Giant Knotweed, Three-cornered Garlic and Japanese Knotweed.

American Skunk Cabbage is found in the upstream sections of the Scheme, Giant Hogweed, Giant Knotweed, Japanese Knotweed and Three-cornered Garlic are largely found in the eastern half of the scheme.

While not listed on Third Schedule list of the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations , the invasive Butterfly-bush. Cherry Laurel, Himalayan Honeysuckle, and Winter Heliotrope present in the areas of works will also be removed in the interest of the site's native floral composition.

Unwashed construction equipment, plant and vehicles, and footwear can provide a vector for the spread of non-native invasive species within the proposed Scheme and from areas outside the scheme where INNS are present or where vector material potentially containing seed / root material is attached to plant or personnel. The following hygiene measures shall be undertaken for the proposed Scheme:

- Known or potentially infested areas within the working area of the proposed Scheme shall be clearly demarcated and fenced off in advance of works and access restricted until such time that treatment has commenced and / or construction works are monitored in accordance with the ISMP in the area. In relation to Japanese Knotweed, the guidance recommends an exclusion buffer of 7m (metres) in all directions (within the works area and 3m vertically underground);
- The implementation of clear signage in accordance with TII standards will be erected at compounds, and at the boundary of the exclusion fencing. These signs will be briefed out at toolbox talks specific to each INNS to personnel on site and particular attention will be given to INNS that have the potential to cause injuries such as Giant Hogweed;
- Identify and create access points into exclusion areas for INNS. These are only to be used by specialist personnel for the removal of INNS and are not to be used by general site workers until such a time as all contaminated material has been removed from site and it is safe to enter;
- Where it is practicable, a wheel wash and footwear washing facilities will be provided to ensure biosecurity measure are preventing the further potential spread of INNS. These locations are to be provided by the contractor. Where a dedicated / bespoke wheel wash cannot be installed owing to space limitations, the appointed contractor will ensure that no excavated loose material is allowed off site from within an exclusion zone;
- Where plant that is used to excavate soils, it shall be visually checked for loose soil before movement to another part of site (where possible, the movements of tracked machinery will be restricted within the non-native invasive species exclusion zone). Loose soil shall be scraped off and disposed of, and a solution of Virkon© (or similar approved disinfectant) applied to machinery to ensure that no obscured seed / root material

remains viable. Vehicular movements within the exclusion area shall be minimised as far as is practical;

- Unless in the exceptional circumstance that direction is given from a suitably qualified ecologist, no storage of contaminated soil on site. Instead, being disposed of in a licenced soil waste facility; and
- Where there are small volumes (e.g. volumes capable of being double bagged in quarantine bags such as cut plants, bulbs or loose soil occur), it may be practical to bag the material and bring it to a clearly demarcated and dedicated quarantine area within the Construction Compounds until such time that the material is disposed of to an authorised facility, similar to the process of disposing of bulk excavated contaminated soil.

5.1.4 Soil Excavation

No excavation or removal of soil within areas demarcated as having INNS present is to be permitted unless under strict supervision by a suitably qualified ecologist or INNS specialist. Buffer zones to be installed by the contractor(s) will be advised by a suitably qualified ecologist or INNS specialist and strictly adhered to. Guidance regarding Japanese Knotweed recommends a buffer of 7m from the plant due to its expansive rhizomes while guidance for Giant Hogweed recommends a 4m buffer from the plant.

Where mechanical means of removal are required to dispose of INNS (treated or un-treated by chemicals) a suitably qualified ecologist or INNS specialist will be present to supervise and provide support to the contractor(s) for the duration of the operation;

There will be no temporary storage on-site of bulk excavated contaminated material. Where the final ISMP calls for shallow / deep burial, this material shall be removed from the excavated area and transported immediately to approved receptor area on-site. Furthermore, the temporary storage of non-contaminated material will not occur within a European or National designated site nor within 20m of any watercourse / wetland and any land within an identified flood zone;

Plant and machinery used in the control, excavation and transport of contaminated material shall also be subject to the recommendations described in the above Biosecurity Mitigations sub-section;

The installation of industry-rated non-native invasive species-proof membrane before infilling construction of road / paths surface may be required. All waste arising out of this process which has been in contact with the excavated ground shall be treated as contaminated waste and disposed of at a facility that is authorised to accept such waste; and

Where the movement of any non-native invasive species listed on the First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations is required off site, a licence will be required from NPWS in advance of any movement to a site / facility licensed to accept such waste, as per the Birds and Natural Habitats Regulation. This licence is separate to and does not negate the need for licences / permits / authorisations required under waste legislation.

5.1.5 Disposal of Material

- Where any INNS related material is collected and is required to be disposed of, it is essential to dispose of said material in a manner that does not afford it the potential to spread further either within the proposed Scheme or in the nearby vicinity of Site;
- The movement of invasive plant material, off site, requires a licence from the NPWS, as per the Birds and Natural Habitats Regulations. Invasive species (particularly roots, flower heads or seeds) must be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation (e.g. Waste Management Act, as amended, Section 4 of Number 6 of 1987 - Air Pollution Act, 1987, relevant local authority bylaws and any other relevant legislation). All disposals must be carried out in accordance with the relevant waste management legislation, as per guidance Guidelines for the Management of Waste from National Road Construction Projects (TII, 2017); and
- It is important to note that some invasive species plant material or soil (vector material) containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Act, as amended, and both categories may require special disposal procedures or permissions. Advice will be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures.

5.1.6 Measures to be Implemented During the Application of Herbicides

- If the application of herbicides is the expert advice given and then implemented during the lifespan of the proposed Scheme then a suitably qualified pesticides advisor, registered with the Department of Agriculture, Food and the Marine must be employed;
- The appointed contractor is required to refer to the appropriate guidance documents, including but not limited to those listed at the beginning of sub-section 5.1, which provide detailed recommendations for the control of invasive species and noxious weeds.
- It is important to note that where a chemical treatment is to be used, there is a risk of contaminating a watercourse. The choice of herbicide is typically limited to formulations of Glyphosate or 2,4-D amine that are approved for use near water. Full details of any chemical used, where required and as advised by a registered pesticides advisor, will be included in the final ISMP prepared in advance of construction of the proposed Scheme.

5.1.7 Post-construction Monitoring

- Following the construction of the proposed Scheme, there may be ongoing treatment programmes which extend for a number of years (length of programme is dependent on the effectiveness of treatment) into the Operational Phase. In the Operational Phase, the management of the infrastructure will be the responsibility of the local authority and the control of invasive species will be as per their plans and procedures, and responsibilities under The Birds and Natural Habitats Regulations;

- The above measures are important for all First or Third Schedule non-native invasive species, and in particular Japanese Knotweed, where it occurs, as maintenance works associated with landscaping, such as mowing and hedge cutting have the potential to spread this plant via the dispersal of very small amounts of shredded plant material;
- If invasive plants are found, then they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines; and
- The appointed INNS contractor will provide a detailed post-construction section within the Monitoring Plan and Programme within the final Invasive Species Management Plan.

5.1.8 Assessment of Management Options for Scheduled Non-native Invasive Species

The general measures included in the sections above are required to ensure good on-site practices in respect of known or potential First Schedule of the Invasive Alien Species Regulations or Third Schedule of the Birds and Natural Habitats Regulations;

The following sections further identify practical management controls. It is acknowledged that more than one potential control measure exists and that a single or combination of measures may be required;

The use of chemical treatments is recognised as a potential treatment option. However, the services of a registered herbicide advisor must be employed in the specifying of named chemicals including those rated for use adjacent to aquatic environments where required, treatment type, dosage, and timing etc., and / or use of pesticides in the management of potential Third Schedule non-native invasive species within the proposed Scheme.

5.1.9 Selected management controls

The selected management control to be defined for each non-native invasive species stand within the proposed Scheme will depend on:

- Results of the pre-construction survey;
- Construction requirements – timing of works at specific locations, level of infestation and practical considerations such as reducing disturbance to road users / homeowners; and
- Feasibility of control measure, where possible the most practicable method (with regards to the environmental impact and human health) will be used e.g.; if mechanical methods of removal are not feasible due to access. Then a step back and assess approach will be employed to remove INNS.

5.2 Japanese Knotweed

Japanese Knotweed is a high impact non-native invasive species that is particularly effective at colonising disturbed ground (e.g. construction sites) and can spread by the re-growth of cut fragments or root material, Therefore, if it is broken up during site clearance or other earthworks, it can readily re-grow in new areas to which contaminated soil is moved. Japanese Knotweed reproduces asexually (in Ireland insofar as only Female plants have been recorded) and regrowth can occur from plant material weighing as little as 0.7g (grams) of viable material. It is acknowledged to be very difficult to effectively control and even more difficult to fully eradicate.

Given the nature of Japanese Knotweed, chemical treatments are often preferred over physical methods as they can, if implemented properly, reduce the disturbance of the plant / population, thus reducing the chances of its spread. If herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective or monitored for a minimum of two years during which no regrowth is recorded. However, physical removal may be necessitated when timely interventions are required.

Table 5-1 assessed the potential management methods for Japanese Knotweed with colour coding of the potential to implement on the proposed Scheme.

Table 5-1: Assessment of Management Methods for Japanese Knotweed

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Scheme
Physical	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. In addition to waste permits / authorizations, a wildlife licence issued by NPWS is required for the transport of Scheduled non-native invasive species offsite. Depending on the nature of the excavation the proximity of services etc, the use of root barrier membrane may be required.	Likely – given the nature of the scheme, there may be a need to excavate soil and plant material to enable construction works to go ahead in timely manner.
	Dig and dispose onsite. - Shallow burial - Deep burial	Wildlife licence from NPWS is not ordinarily required if the burial of collected material is proposed for within the consented proposed Scheme. Shallow burial in a constructed pit such as a dedicated sealed cell within a constructed berm will allow for periodic monitoring and of easy chemical treatment of any regrowth. Deep burial entails a dedicated sealed cell within a constructed excavation, that is at least 2m below the surface of the ground. The landscaping regime will not specify trees or scrub to be planted above. Either shallow or deep options may require the use of root barrier membrane. The use of chemical pretreatment of deep / shallow cells may also be required	Unlikely – given the lack of suitable lands within the largely developed metropolitan area.
	Screen on site – remove fragments offsite and reuse soil.	A control option that can be used to reduce the volume of soil / sediment to be moved elsewhere for burial, this option requires suitable plant, adequate space and volumes of soil to make the operation at a location cost effective. This option often requires the use of root barrier membrane owing to reuse of screened soil. The	Possible but unlikely given the space requirements for a screener (unless a bespoke small-scale screener is available).

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Scheme
		use of chemical pre-treatment of deep / shallow cells may also be required.	
	Cutting and / or strimming	Not recommended and does not apparently diminish vigour of plants over time. Largely cosmetic and can result in considerable spread of viable vegetative material that can readily regenerate on suitable conditions.	Not Recommended
Chemical	Spot	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water will be rated for use near aquatic locations.	Chemical treatments are often a preferred option for treating Japanese knotweed, but the process can take between 3 to 5 years before eradication can be guaranteed and requires at least 2-year post implementation monitoring. However, given the nature of the proposed Scheme, the use of chemical treatment alone is unlikely to be adequate unless treatment regime begins a number of years before construction commencement.
	Spray / Stem injections	Used for isolated plants or large populations using knapsack or weep sprayers. In accessible areas including along riverbanks, lance sprayers can be used. Chemical treatments for infestations near water will be rated for use at or near aquatic locations. Can result in chemical drift. Stem Injection is considered very effective, if the injection is timed appropriately for growth phase. However, it is labour-intensive (sometimes) requiring some cutting and is usually only carried out on small / isolated populations. Chemical treatments for infestations near water will be rated for use at or near aquatic locations.	

5.2.1 Root Barrier Membrane

Following the excavation of Japanese knotweed, there may be a need to install a root barrier membrane. These are specialised products that can provide protection to structures / services etc. from regrowth from within or outside a site, if suitably rated and properly installed. Thereafter, any small adjacent infestation can be more readily treated with chemical treatment for example. This durable material can be used to line spoil pits and prevent rhizome lateral root spread or effective growth in the plant and can keep it contained to an area where suitable chemical treatment can be undertaken.

5.2.2 Reseeding Following Eradication

This is not strictly a control method. However, where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post-control management of affected sites. A grass sward established in autumn will compete with germinating Japanese knotweed seedlings in the following spring.

5.3 Giant Hogweed

This is a high-risk invasive species, that is also a biohazard in that it can pose a threat to humans. The chemistry of its sap is such that exposure to it on skin can result in prolonged photosensitizing reactions with blistering;

Thus, a clearly demarcated exclusion buffer, in excess of 4m, is recommend for any individual / populations of this species before commencing works;

It spreads via heavy seeds which can easily be transported by water. Hence, it is often found along river corridors. While the plant favours riverbanks, it is known to be found on waste / derelict ground as well as railway lines for instance. Its presence can impact local biodiversity and undermine bankside integrity. The seedling stage is the most vulnerable. Mortality of seedlings is comparable to many other plants and its seed bank is considered to be persistent for a short number of years only. Since Giant hogweed can only reproduce via seed, control measures applied before flowering and fruit set will limit subsequent generations (and even then, only with favourable conditions). The ideal time to control Giant hogweed via chemical treatment is April, with follow on monthly applications targeting regrowth, although for this treatment options, it can require up to five years before successful eradication;

Table 5-2 assessed the potential management methods for Giant Hogweed with colour coding of the potential to implement on the proposed Scheme. The potential treatment option is to be fully detailed in the contractor's ISMP for the treatment of Giant hogweed.

Table 5-2: Assessment of Management Methods for Giant hogweed

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Scheme
Physical	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. Given the phytotoxic nature of the plant, it will not be buried onsite nor disposed of with general Construction and Demolition waste. In addition to waste permits / authorisations, a wildlife licence issued by NPWS is required for the transport of Scheduled non-native invasive species offsite.	Possible and may be required.
	Above ground cutting	Not recommended. Largely cosmetic and prolongs flowering until such time that control halted. However, if digging is used, it is recommended that the removal be attempted in April / early May when the plant is	Unlikely - requires specialist equipment to enable working alongside the biohazardous plant

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Scheme
		usually less than 30cm tall. However, the root must be captured also.	
	Root cutting	Individual plants may be killed by cutting at a 45-degree angle 15cm below ground level with a spade in April or May. Can be laborious unless small/isolated stands. Can be effective if combined with chemical treatment over 4-5 years repeat treatment.	Given the nature of the proposed Scheme, root cutting may be used to remove biohazard plant and thereafter allow for chemical control against any regrowth. Requires specialist equipment to enable working alongside the biohazardous plant.
	Pulling	Hand pulling is only suitable for small / immature plants (and with suitable PPE to protect exposure of bare skin). Potential remains for tap root to remain underground and regenerate. Recommended in April - May	Unlikely for mature plants. Requires specialist equipment to enable working alongside the biohazardous small / immature plants.
	Strimming / Grazing	Not recommended owing to spread of sap.	Not recommended or practical given the nature of the river and metropolitan landscape and nature of the proposed Scheme.
Chemical	Spot	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water will be rated for use near aquatic locations.	Most widely used method, but to be wholly effective, requires total control over ~5 years of treatments within a river catchment or the isolated location. Is weather dependent

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Scheme
			and can result in chemical drift to adjacent vegetation or watercourses.
	Spray / Stem injections	More suitable for large stands, where machine-mounted blanket sprays are used. Chemical treatments for infestations near water will be rated for use near aquatic locations. Stem Injection can only be carried out on young stems. Due to difficulties with the timing of application and the potential safety risk of contact with the large leaves this method requires specialist safety equipment.	Possible in sections of the scheme, but unlikely overall owing to nature and size of population recorded on proposed Scheme recorded within sensitive features such as in the Loughlinstown pNHA.

5.3.1 Temporary Storage of Collected Material

Given the phytotoxic nature of Giant Hogweed, cut material will not be discarded. It will be disposed of immediately with similar non-native invasive species waste to a facility authorised to accept such waste. However, given the nature and relative sizes of Giant Hogweed infestations, it may be suitable to collect cut biomass (where not disposed of immediately to a facility authorised to accept such waste), and to double bag it for transport to a dedicated quarantine area (location to be approved as part of the ISMP) to decompose before disposal with similar non-native invasive species waste in a facility authorised to accept such waste. The locations of areas for which Giant Hogweed has been eradicated will be notified to the local authority, so that any future public health issue involving similar symptoms can be tracked.

5.3.2 Reseeding Following Eradication

This is not strictly a control method. However, where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post-control management of affected sites. A grass sward established in autumn will compete with germinating Giant hogweed seedlings in the following spring and retard its establishment.

5.4 American Skunk Cabbage (Rapid Life, 2018)

American Skunk Cabbage was introduced in Ireland as an ornamental plant, and has since escaped from confinement. It is well established throughout Ireland, occurring mainly in mires, bogs, and fens. It reproduces by seeds with a broad range of up 300-650 seeds per spadix, which fall to the ground next to the mother plant. Due to this, the spread of the next generation has limited distance when unaided, but this

can be accelerated through watercourses which can increase the seed spread by several kilometres. Seeds can lay dormant and remain viable for at least eight years. The plant also spreads by rhizomes, capable of regeneration from root fragments. These result in a slow establishment, but rapidly will outcompete native species.

Small plants can be controlled by hand-pulling. Digging or pulling can be carried out in early Summer to weaken any rhizomes left in the ground, as these can generate new plants if they receive light. A second digging should be carried out in late Summer or Autumn to deplete the rhizome reserves and kill the plant. This needs repeating for at least two years, and due to the seedbank's longevity, there needs to be continuous monitoring for 10 years until the seedbank is exhausted.

Manual removal is usually the preferred method. However, as most of the plants occurred along watercourses, digging could result in silt entering the streams. The plant can also be controlled by glyphosate at a rate of 6l/ha. However, access can be difficult, and glyphosate can be harmful to water habitats. Treatment during dry periods is recommended, when access to wet margins and muddy areas becomes easier.

In areas away from watercourses, digging or hand-pulling of American Skunk-cabbage should be used, with additional treatment carried out in early Summer to weaken any rhizomes left in the ground, as these can generate new plants if they receive light. A second digging should be carried out in late Summer or Autumn to deplete the rhizome reserves and kill the plant. The area should then be monitored for 10 years until the seedbank is exhausted.

5.5 Giant Knotweed

Treatment options for Giant Knotweed may include a campaign of chemical treatment or excavation, encapsulation, and burial/removal.

Chemical treatment will involve annual herbicidal application through stem injection, as opposed to a foliar spray etc. which may contaminate the adjacent watercourse. However, this may take up to five years for complete eradication. Construction activities will not be permitted until the campaign has successfully completed. The optimal time for herbicide control is May, and late September to early October (NRA, 2010). It should be noted that herbicidal treatment does not guarantee complete eradication.

If Giant Knotweed is excavated, the material must be removed and either buried deep at a suitable location on site or disposed of at a licenced facility. Strict biosecurity measures will need to be employed transporting the invasive plant material. A root barrier membrane system must be installed at the excavation boundary. The zone located within 7m of the stand must be excavated to a depth of 300 mm below the existing ground level. A horizontal root barrier membrane will be installed to contain the potential for spread of any rhizomes.

5.6 Rhododendron & Cherry Laurel (Maguire et al., 2008)

While Rhododendron is a species on the First Schedule of the Invasive Alien Species Regulations and Third Schedule of the Birds and Natural Habitats Regulations , and Cherry Laurel is not, the management of these two species follow the same best practise protocols. Treatment of these species can be divided into three main stages: initial removal, control of stems and roots, and follow-up. Stems shall be cut

and removed by hand or chainsaw, cutting as close to the ground as possible. The cut material shall be chipped or removed from the area to prevent regrowth.

After the initial cut, there are four management options. 1) dig out the stumps and remove all viable roots and place upside down to avoid regrowth. 2) Painting of spot spraying of freshly cut stumps with a herbicide (glyphosate, tryclopyr or ammonium sulphate) immediately after been cut. If vegetable dye is used it should be painted on all stumps. 3) Stem injection of glyphosate by drilling a hole into the main stem of the plant. 4) Stump regrowth and seedlings can be effectively killed by spraying with suitable herbicide, e.g., glyphosate. This is generally not as effective as stump spot treatment.

Follow-up seedling removal work may be necessary.

5.7 Three-cornered Garlic

There are no specific management guidelines in Ireland, however, there are recommendations on websites such as www.downgardenservices.org.uk. Three-cornered Garlic may be controlled by excavation or herbicidal application. It may also be controlled by continuous cutting over a number of years to exhaust the bulbs and seedbank. The excavated material may be buried on site or removed off site to a licenced facility to be destroyed.

Until the proposed development is planned for commencement, Three-cornered Garlic should be left in-situ and subjected to an ongoing chemical treatment programme where possible, during this preliminary design stage. Herbicide Treatment by an invasive species specialist contractor with demonstrated experience in treating and managing invasives as follows or subject to their advice:

Where material that contain this species needs to be excavated, this material must be removed to an EPA licenced waste facility by an invasive species specialist contractor with demonstrated experience in treating and managing invasives. Strict biosecurity procedures should be adhered to in order to minimise the risk of spread.

The infestation and an area of up to ca. 2m around and to a depth of 0.5m may contain Tree-cornered Garlic seeds and/or bulbs. Soils that are to be removed for the proposed development must be disposed of at an EPA licenced waste facility and not mixed with general spoil.

5.8 Non-First-or-Third-Schedule Species

5.8.1 Butterfly-bush

For physical control, hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedlings (NRA, 2010). For larger stands, mechanical excavation/ cutting may be employed. Deadhead specimens should be handled with great care as seeds can rapidly germinate and grow in different habitats.

5.8.2 Himalayan Honeysuckle

There are no specific management guidelines in Ireland, however, there are recommendations on websites such as https://www.weedbusters.org.nz/what-are-weeds/weed-list/himalayan-honeysuckle/. Himalayan Honeysuckle can be dug out and left on site to rot down.

It can also be cut down and treated with stump paint or herbicidal application (e.g., glyphosate-based). Herbicidal treatment by spraying can be carried out during spring/summer.

5.8.3 Winter Heliotrope

As with other plants that have the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Winter Heliotrope can be treated using a Glyphosate-based weedkiller or may be excavated and buried on site. Herbicide is best applied in mid to late summer (NRA, 2010) before foliage dies back. Methods of foliar spray, wiper applicator, or spot treatment may be employed. The treated area should be monitored for regrowth in subsequent years.

6 Monitoring

DLRCC shall engage a qualified specialist to verify if the invasive species recorded in this report are still present following construction works. This will be carried out for a number of years post–construction and a copy of any records of the plant shall be lodged with the National Biodiversity Data Centre (www.biodiversityireland.ie). If invasive species are found, they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

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7 Conclusion

Eleven different invasive species were identified during the field survey, located in numerous separate stands in the scheme area. Seven of these species are listed on the First Schedule of the Invasive Alien Species Regulations and Third Schedule of the Birds and Natural Habitats Regulations including Japanese Knotweed, Giant Knotweed, and Giant Hogweed. Several of the species not listed on the Schedules are still considered invasive/problematic including Winter Heliotrope and Butterfly-bush.

Overall, given the presence of invasive alien species within the subsites, specific Invasive Species Management Plans for the various invasive alien species are required and must be completed by a suitably qualified Invasive Species specialist/s with suitable experience in the treatment of the various invasive alien species. Implementation of the plan/s will be carried out under the supervision of a suitably qualified Invasive Species specialist/s.

Chemical treatment should be carried out on Japanese Knotweed, Giant Knotweed, Winter Heliotrope and Giant Butterbur. The general treatment time for all three is approximately May to September or October.

Physical treatment involving excavation, hand-pulling, and digging should be used to remove Three-cornered Garlic.

A combination of physical and chemical control should be carried out on Butterfly-bush, Giant Hogweed, American Skunk-cabbage, Cherry Laurel, Rhododendron, and Himalayan Honeysuckle.

A number of biosecurity measures have been prescribed herein. These measures should strictly be adhered to and further mitigation measures should be outlined by a suitably qualified invasive species specialist prior to commencement of any treatment.

A Invasive species recorded within 2km of the site within the last 10 years

Species name	Date of last record	Designation
House Mouse *Mus musculus*	21/05/2016	Invasive Species >> High Impact Invasive Species
Arthurdendyus triangulatus	26/04/2020	Invasive Species >> High Impact Invasive Species
Rose-ringed Parakeet *Psittacula krameri*	02/12/2023	Invasive Species >> High Impact Invasive Species
Cherry Laurel *Prunus laurocerasus*	28/02/2024	Invasive Species >> High Impact Invasive Species
Raccoon *Procyon lotor*	24/08/2014	Invasive Species >> High Impact Invasive Species Regulation No. 1143/2014
Eastern Grey Squirrel *Sciurus carolinensis*	20/03/2023	Invasive Species >> High Impact Invasive Species EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
New Zealand Pigmyweed *Crassula helmsii*	26/09/2014	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Canadian Waterweed *Elodea canadensis*	30/09/2016	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Floating Pennywort *Hydrocotyle ranunculoides*	18/01/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant-rhubarb *Gunnera tinctoria*	30/05/2020	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Rhododendron ponticum	07/06/2020	Invasive Species >> High Impact

Species name	Date of last record	Designation
		Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed *Fallopia japonica*	13/05/2021	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Brown Rat *Rattus norvegicus*	21/12/2022	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Giant Hogweed *Heracleum mantegazzianum*	29/06/2023	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Wireweed *Sargassum muticum*	25/01/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Harlequin Ladybird *Harmonia axyridis*	25/07/2024	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland)
Fallow Deer *Dama dama*	26/06/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Sika Deer *Cervus nippon*	13/10/2018	Invasive Species >> High Impact Invasive Species Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
Black Currant *Ribes nigrum*	24/05/2015	Invasive Species >> Medium Impact

Species name	Date of last record	Designation
Canadian Fleabane *Conyza canadensis*	30/09/2016	Invasive Species >> Medium Impact
European Rabbit *Oryctolagus cuniculus*	27/08/2017	Invasive Species >> Medium Impact
Jenkins' Spire Snail *Potamopyrgus antipodarum*	19/06/2018	Invasive Species >> Medium Impact
Russian-vine *Fallopia baldschuanica*	13/08/2020	Invasive Species >> Medium Impact
Australoplana sanguinea	06/03/2021	Invasive Species >> Medium Impact
Common Broomrape *Orobanche minor*	25/06/2021	Invasive Species >> Medium Impact
Turkey Oak *Quercus cerris*	16/01/2023	Invasive Species >> Medium Impact
Sycamore *Acer pseudoplatanus*	01/11/2023	Invasive Species >> Medium Impact
Traveller's-joy *Clematis vitalba*	01/11/2023	Invasive Species >> Medium Impact
Himalayan Honeysuckle *Leycesteria formosa*	15/12/2023	Invasive Species >> Medium Impact
Butterfly-bush *Buddleja davidii*	28/02/2024	Invasive Species >> Medium Impact
American Skunk-cabbage *Lysichiton americanus*	06/01/2023	Invasive Species >> Medium Impact EU Regulation No. 1143/2014 Regulation S.I. 477 (Ireland)
Himalayan Knotweed *Persicaria wallichii*	25/11/2017	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Water Fern *Azolla filiculoides*	23/08/2022	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Sea-buckthorn *Hippophae rhamnoides*	22/06/2023	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)

Species name	Date of last record	Designation
Three-cornered Garlic *Allium triquetrum*	30/03/2024	Invasive Species >> Medium Impact Regulation S.I. 477 (Ireland)
Spanish Bluebell *Hyacinthoides hispanica*	09/05/2022	Regulation S.I. 477 (Ireland)

B Ecology Baseline Data

B.1 Baseline conditions

The proposed development area is comprised of a wide range of habitats, including stone structures, earth banks, built artificial surfaces, agricultural and amenity grasslands, ponds, spoil, swamps, rivers, ditches, grassy meadows and verges, bracken, woodlands, hedgerows, treelines, scrub.

B.2 Habitats

A list of habitats recorded during the ecological habitat survey is listed in Table 3-1 below and are presented in detail in the following sub-sections. These sections include text on where INNS occurs within the various habitats. Individual habitat maps of the sections are found at the beginning of each sub-section. The sub sections include the following:

- Area A: Measures 1.A and 1.B (Clon Brugh)
- Area B: Measures 2.B and 2.D (Belarmine Park)
- Area C: Measures 2.E and 2.G (Kilgobbin Road)
- Area D: Measure 3.A (Glenamuck Road)
- Area E: Measures 4.A, 4.B, 4.C and 5.D (Bride's Glen River and Bray Road)
- Area F: Measures 5.A and 5.C (Commons Road, Brookdene and Bayview)

Table B-1: Habitats recorded during the site visits

Habitat	Fossitt Code
Stone walls and other stonework	BL1
Earth banks	BL2
Mosaic: Earth banks / Scrub	BL2 / WS1
Buildings and artificial surfaces	BL3
Recolonising Bare Ground	ED3
Other artificial lakes and ponds	FL8
Eroding/upland rivers	FW1
Mosaic: Eroding/upland rivers / Depositing/lowland rivers	FW1 / FW2
Drainage ditches	FW4
Improved agricultural grassland	GA1
Amenity grassland (improved)	GA2
Dry meadows and grassy verges	GS2
Wet grassland	GS4
Marsh	GM1
Dense Bracken	HD1
Mosaic: Dense Bracken / Scrub	HD1 / WS1
(Mixed) broadleaved woodland	WD1
Mosaic: (Mixed) broadleaved woodland / Scrub	WD1 / WS1
Mixed broadleaved/conifer woodland	WD2
Mosaic: Mixed broadleaved/conifer / Scrub	WD2 / WS1
Scattered trees and parkland	WD5
Hedgerow	WL1
Treelines	WL2
Scrub	WS1
Mosaic: Scrub / Dry meadows and grassy verges	WS1 / GS2

Figure B-1: Clon Brugh habitats

The habitats for Area A are described below:

Stone walls and other stonework (BL1)

There are stone walls present within the housing estate at Clon Brugh. There were neither floral nor faunal species present on this stone wall.

Buildings and artificial surfaces (BL3)

A large portion of the site is dedicated to roadways, houses, footpaths or adjacent housing. These areas that have few species present or associated with them.

Drainage ditches / Dry meadows and grassy verges (FW4, GS2)

Located through Clon Brugh is a ditch that has a distinct grassy verge located along its course. At the time of the survey on the 16th of May 2024. This ditch was wet at the very northern tip of this section, and dry for the remainder. The flora located along the ditch's course include: Willowherb *Epilobium* sp; Hogweed *Heracleum sphondylium*; Perennial Rye-grass *Lolium perenne*; Cuckooflower *Cardamine pratensis*; Dandelion *Taraxacum* spp.; Red Clover *Trifolium pratense*; Bramble *Rubus fruticosus* agg.; Hedge Crane's-bill *Geranium pyrenaicum*; Ragwort *Jacobeae vulgaris*; Lesser Stitchwort *Stellaria graminea* ; Creeping Cinquefoil *Potentilla reptans*; Ribwort Plantain *Plantago lanceolata*; Black Medick *Medicago lupulina*; Wild Carrot *Daucus carota*; Red Fescue *Festuca rubra*; Cock's-foot *Dactylis glomerata*; Oxeye Daisy *Leucanthemum vulgare*; Herb Robert *Geranium robertianum*; Smooth Sow-thistle *Sonchus oleraceus*; Common Vetch *Vicia sativa*; Meadow Buttercup *Ranunculus acris*; Creeping Buttercup *Ranunculus repens*; and Broad-leaved Dock *Rumex obtusifolius*. Some garden Marigolds were also located within this area.

Amenity grassland (improved) (GA2)

On either side of the ditch in this area, is a section of amenity grass. While some of the plants from the ditch and its verges have spread into these amenity areas, it is managed moderately, and so it consists mainly of Ragwort, Perennial Rye-grass, Dandelion and Daisy *Bella perennis*.

(Mixed) broadleaved woodland (WD1)

East of Defences 1A and 1B is a woodland which consists of a mixture of trees, native and non-native. This woodland is dominated by Sycamore *Acer pseudoplatanus*, while also containing other tree species such as: Ash *Fraxinus excelsior*; Silver Birch *Betula pendula*; Scots Pine *Pinus sylvestris*; Hawthorn *Crataegus monogyna*; Blackthorn *Prunus spinosa*; Elder *Sambucus nigra*; Holly *Ilex aquifolium*; Alder *Alnus glutinosa*; Pedunculate Oak *Quercus robu*r; Horse Chestnut *Aesculus hippocastanum*; and Barberry *Barberis* sp., while also having a light layer of English Ivy *Hedera helix* on some of the trees.

The understory of this woodland section includes Cleavers *Gallium aparine*, Bramble, Lords-and-ladies *Arum maculatum*; Burdock *Arctium minus*; Hedge Mustard *Sisymbrium officinale*; Dandelion; Creeping Buttercup; Perennial Rye-grass; Cleavers; Ragwort; Sunspurge *Euphorbia peplus*; Scaly Male Fern *Dryopteris affinis*, Shepherd's-purse *Capsella bursa-pastoris*, Creeping Thistle *Cirsium vulgare*; Broad-leaved Dock; Garlic Mustard *Alliaria petiolata*, Green Alkanet *Pentaglottis sempervirens*; Common Vetch; Nettle *Urtica dioica*; Wood Sorrel *Oxalis acetosella*; White Clover *Trifolium repens* and Common Fumitory *Fumaria officinalis*.

This woodland was also inspected for bat roosting features, and was deemed to have low potential for roosting, given the lack of dense Ivy growth of cracks within trees and limbs.

Hedgerows WL1

There is a small hedgerow located to the north of this location, made entirely of Cherry Laurel *Prunus laurocerasus*, before beginning to merge with the woodland section.

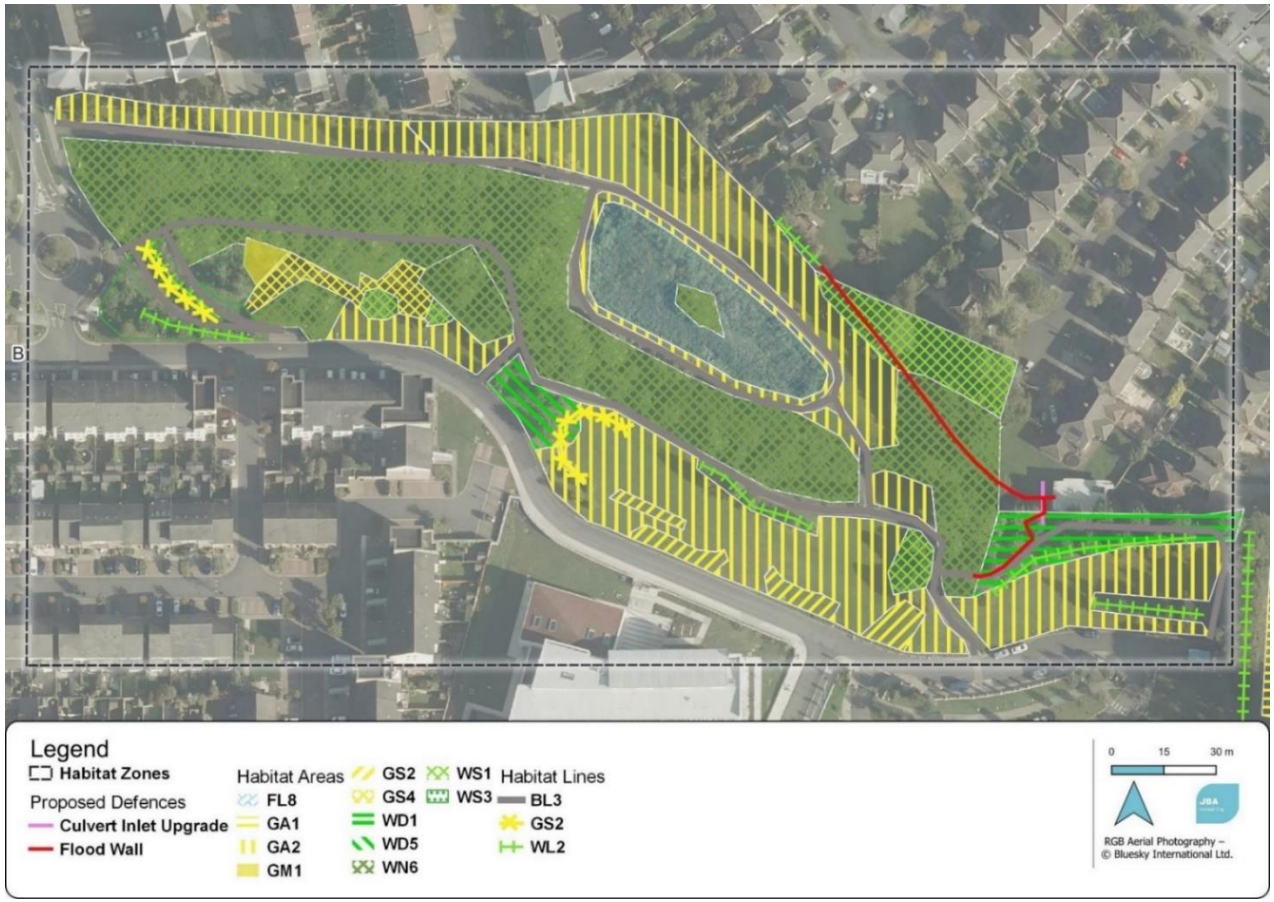

Figure B-2: Belarmine habitats

Habitats for Area B are described below

Other artificial lakes and ponds (FL8)

West of the Belarmine culvert inlet, lies an acting water storage and flood relief pond with an island. In the area of this pond and along the bank are, both mature and immature Willow *Salix* spp., Willowherb, Broadleaved Dock, Creeping Buttercup; Bulrush *Typha latifolia*, Pendulous Sedge *Carex pendula*, Soft Rush *Juncus effusus*; Hard Rush *Juncus inflexus*; Common Vetch; Creeping Buttercup; Meadow Buttercup; Lesser Stitchwort; Dandelion; Broad-leaved Dock; Yorkshire Fog *Holcus lanatus*; Bent *Agrostis* sp., Yarrow *Achillea millefolium*; White Clover; Hogweed; Sweet Vernal-grass *Anthoxanthum odoratum*; Ragwort; Creeping Thistle; Red Clover and Common Daisy.

Amenity grassland (improved) (GA2)

There are large areas of amenity grassland located within the vicinity of Defences 2 A-E. These areas are predominantly Perennial Rye-grass with some small sections of Ragwort, Dandelion and Daisy.

Marsh (GM1)

There is a small section of marshland within the Belarmine Park. This area exhibits little management and this has allowed for stands of Yellow Iris, Bramble, Willowherb and some singular stands of Grey Willow *Salix cinerea* and Alder to develop.

Dry meadows and grassy verges (GS2)

There are patches of unmown grassy verges and small meadow patches in the south of Belarmine Park. These verges include Annual Meadow-grass Poa annua; Yorkshire Fog; Bent *Agrostis* sp.; Dandelion; Perennial Rye-grass; Cuckooflower; Dandelion; Red Clover; Ragwort; Lesser Stitchwort; Creeping Cinquefoil; Cock's-foot; Herb Robert; Meadow Buttercup and Creeping Buttercup.

In the south-east of this section, near to the bridge on Kilgobbin Road, is a small patch of grassy verge that contains the species: Red Valerian *Centranthus ruber*; Curled Dock *Rumex crispus*; Meadow Buttercup; Ivy; Creeping Buttercup; Nettle; Creeping Thistle; Tutsan *Hypericum androsaemum*; Willowherb; Cow Parsley *Anthriscus sylvestris*; Dandelion; Mouse-ear *Cerastium fontanum* ; Yorkshire Fog, Hart's-tongue Fern *Asplenium scolopendrum*; Pendulous Sedge and Cleavers.

Wet grassland (GS4)

A section of wet grassland is present in the center of the Belarmine Park, in a clearing of the Wet willow-alder-ash woodland and grading from the Marsh. Within this wet grassland are varied management sections. While there were sections of lower growth height that contained lots of Cuckooflower, along with Creeping Buttercup; Daisy; Dandelion; Chickweed *Stellaria media*; Soft Rush *Juncus effusus* and Willowherb there were additional sections in this area that had undergone some mowing, while still retaining the soft and waterlogged ground.

(Mixed) broadleaved woodland (WD1)

There is a small stretch of Mixed Broadleaved woodland in the east of Belarmine Park, which consists of two interlocking treelines. These treelines contain Beech *Fagus sylvatica* and Ash *Fraxinus excelsior* with a minimal ground layer of Perennial Rye-grass and some Ground Ivy *Glechoma hederacea*.

Scattered trees and parkland (WD5)

In the west of Belarmine Park is a small section of scattered trees in an amenity grass area. These trees consisted of Pedunculate Oak *Quercus robur*.

Treelines (WL2)

In and the west and east of this section, are rows of trees bordering the roadways or the grassland areas, which contain the species Ash, Hawthorn *Crataegus monogyna*, Beech, Sycamore, Elder *Sambucus nigra* and Holly with a low cover of Bramble.

Wet willow-alder-ash woodland (WN6)

Throughout Belarmine Park is a woodland that consists of high content of Ash and White Willow, while also containing other tree species Elder *Sambucus nigra*, Sycamore, Dogwood *Cornus sanguinea*, Silver Birch, Hazel *Corylus avellana* and Beech. The understory of this woodland consisted of a variation of Bramble; Cleavers; Cow Parsley; Creeping Buttercup; Ivy; Gorse *Ulex europaeus*; Ribwort Plantain *Plantago lanceolata*; Nettle; Hogweed; Bush Vetch *Vicia sepium*; Annual Meadow-grass; Lords-and-ladies; Male Fern *Dryopteris filix-mas*; Tutsan; Harts-tongue Fern; Pendulous Sedge; Hedge Bindweed *Calystegia sepium*; Field Horsetail *Equisetum arvense*; Greater Stitchwort *Stellaria holostea*; Brooklime *Veronica beccabunga*, Lesser Celandine *Ficaria verna*; Herb Robert; Nipplewort *Lapsana communis*, Gorse, and Ground Ivy.

The Carrickmines Stream ran directly through this woodland, whilst there were sections of the woodland that were off from the main water body, but still had pools of standing water present.

Scrub (WS1)

West of the Belarmine culvert, and north-east of the attenuation pond, is an area that widens into a dense scrub. This scrub section was largely a section of Bramble at the time of surveying. Additional species present include Beech; Ash; Broad-leaved Dock; Cow Parsley; Creeping Buttercup; Nettle; Sycamore; Ash; Crab Apple *Malus sylvestris* and Cleavers.

Invasive Species

There is widespread Skunk Cabbage *Lysichiton americanus* and Three-cornered Garlic (also known as Three-cornered Leek) *Allium triquetrum* present along the stretch of the Carrickmines Stream.

Figure B-3: Kilgobbin Road habitats

Habitats for Area C are described below:

Stone walls and other stonework (BL1)

There is a stone wall that lines either side of Kilgobbin Road This wall was species poor, including Ivy-leaved Toadflax Cymbalaria muralis; Ivy; Herb Robert; Stonecrop Sedum sp and Dandelion.

Buildings and artificial surfaces (BL3)

There are houses, roads and driveways located within the area of this section of the Scheme. These areas do not have any species associated with them.

Improved agricultural grassland (GA1)

There is a field to the west of Kilgobbin Road, that at the time of surveying had a horse present in it. Due to the grazing of the horse, the field was not entered, however, from the roadside it was apparent that the grassland was species-poor, likely due to over-grazing.

Amenity grassland (improved) (GA2)

Areas of amenity grass within this section of the Scheme include the gardens of local residents that were not surveyed due to their maintenance and low ecological value.

Dry meadows and grassy verges (GS2)

There are two large field areas that are located within this section of the Scheme, which had previously been utilised as agricultural land. At the time of the survey, these areas have been allowed to diversify and develop into meadow areas with species including Cow Parsley; Meadow Buttercup; Cock's-foot; Yorkshire Fog; Cuckooflower; Cleavers; Nettle and have begun to be encroached by Bramble, in particular along the edges of the field boundary.

Scattered trees and parkland (WD5)

In the east of this section of the Scheme is a housing estate that has a planted woodland present. Trees in this area include Sycamore; Ash; Horse Chestnut and Scots Pine. The ground flora in this area is amenity grassland that is tightly mown and managed.

Hedgerows (WL1)

There is one hedgerow within this section of the scheme that is located within the centre of the grazed field. As with the rest of this field, the area was not surveyed due to the presence of the horse, however, from a distance it was apparent that the hedge was heavily fragmented.

Treelines (WL2)

There are treelines located throughout this section of the Scheme, with one treeline consisting of Horse Chestnut; Bramble; Ivy, Sycamore and Hawthorn with Nettles and Creeping Buttercup present at its base.

The treelines that are present within the rest of this section include Ash; Sycamore and Beech.

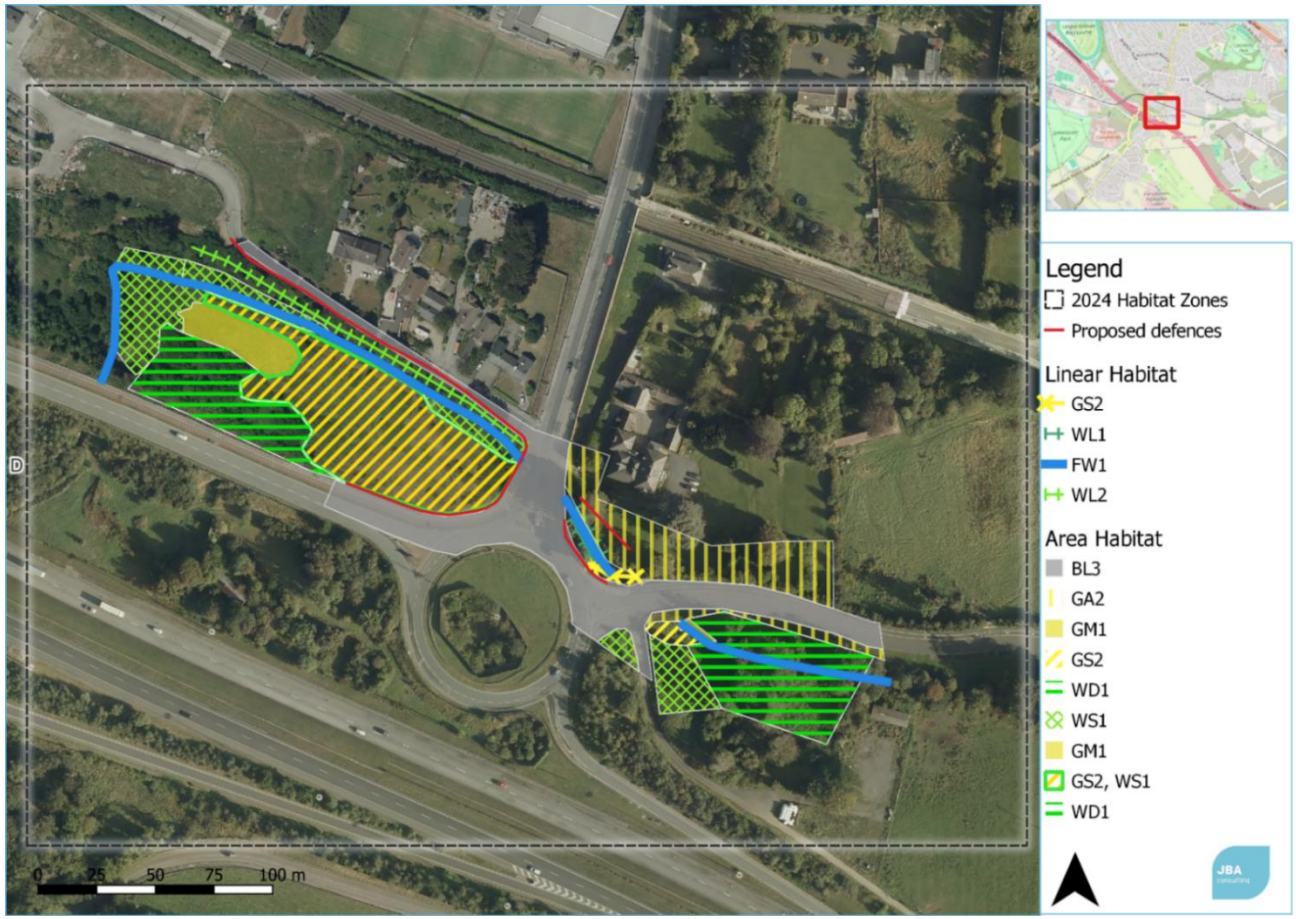

Figure B-4: Glenamuck Road habitats

Habitats for Area D are described below

Recolonising Bare Ground (ED3)

There is a narrow, linear section of recolonising bare ground in the north-east of the roundabout section. This linear feature includes Field Mustard *Brassica rapa*; Ragwort; Field Speedwell *Veronica persica*; Wavy Bittercress *Cardamine impatiens*; American Willowherb *Epilobium Ciliatum*; Groundsel *Senecio vulgaris*; Alder; Ivy; Nettle and Bilbao Fleabane *Conyza floribunda*. This habitat was less than 0.5m in width so not mapped, due to its small scale.

Marsh (GM1)

There is a section of marsh located in the patch east of the roundabout. This marshland contains Green Alkanet, Nettle, Pendulous Sedge; Cleavers; Water Figwort *Scrophularia nodosa*; Cow Parsley, Great Willowherb *Epilobium hirsutum*; Hogweed, Curled Dock; Bramble and Marsh Marigold *Caltha palustris*.

A patch of marsh also exists north-west of the roundabout section. This marsh area also contains Cleavers; Hogweed; Bramble; Great Willowherb; Pendulous Sedge, Nettle; while it contained the additional species Yellow Iris, Field Scabious *Knautia arvensis*, False Oat-grass; Meadowsweet *Filipendula ulmaria*; Meadow Buttercup; Greater Stitchwort; Red Clover; White Clover; Yarrow and Cock's-foot with occasional sapling Alder and Goat Willow, and the invasive non-native species Butterfly Bush *Buddleja davidii*.

Dry meadows and grassy verges (GS2)

A small section of meadow is located to the east of the roundabout which contains Cow parsley; Dandelion; Bramble; Common Vetch; Meadow Buttercup; Bush Vetch; Cleavers; Downy Oat-grass *Avenula pubescens*; Hedge Bindweed; Cock's Foot; Creeping Buttercup; Creeping Thistle; Yorkshire Fog; Ragwort; Curled Dock; Broad-leaved Dock; Meadow Foxtail *Alopecurus geniculatus*; Hogweed; English Cinquefoil *Potentilla anglica*; Horsetail; Dandelion; Ragwort; Rough Hawk's-beard *Crepis biennis*; Red Fescue; Butterfly Bush; Yorkshire Fog; Wood Avens *Geum urbanum*; Ribwort Plantain; Spear Thistle *Cirsium vulgare*; Fleabane spp.; Herb Robert; Yarrow; Cock's-foot; Smooth Sow-thistle and American Willowherb.

(**Mixed) broadleaved woodland (WD1)**

A stretch of woodland is located east of this roundabout section. This woodland contains Sycamore; Ash; Hawthorn; Cypress Cupressus sp; Nettle; Alexanders *Smyrnium olusatrum*; Bramble; Ivy; Hogweed; Cleavers; Lords-and-ladies; Pendulous Sedge; Soft Shield-fern *Polystichum setiferum*; Harts-tongue Fern; Giant Knotweed *Reynoutria sachalinensis*; Wych Elm *Ulmus glabra*; Winter Heliotrope *Petasites pyrenaicus*; Palm Tree, Holly; Irish Yew, Cherry Laurel and Beech.

Treelines (WL1)

There are two small treelines located north of the roundabout. These treelines contain a mixture of tree species Alder; Ash; Wych Elm; Sycamore and Beech, with an understory of Bramble; Alexanders, Nettle; Water Figwort and Pendulous Sedge.

Scrub (WS1)

A patch of scrub exists to the east of the roundabout, adjacent to the local woodland. This scrub consists mainly of Bramble, while also containing occasional

Cow Parsley; Tutsan; Hawthorn; Sycamore; Alder; Elder, Butterfly Bush; Pendulous Sedge; Dogwood and Rowan *Sorbus aucuparia*.

An additional patch of scrub is located in the west of this section, containing the same species as in the east.

Scrub / Dry meadows and grassy verges (WS1 / GS2)

There is one small section of meadow grassland, east of the roundabout, that is transitioning into a patch of scrub. The species in this area include False Oat-grass, a dense growth of Bramble, Hogweed, Meadow Buttercup, ferns, Great Wood-rush *Luzula sylvatica*, Ivy, Ribwort Plantain, Hedge Bindweed *Calystegia* spp., Fairy Flax *Linum catharticum*, Tufted Vetch *Vicia cracca*, Hawthorn, Creeping Thistle, Meadow Foxtail and Creeping Cinquefoil.

In the western part of this section, is a larger patch of meadow grassland / scrub. This western section also contains Bramble; Hogweed; Hawthorn; False Oat-grass; Meadow Buttercup; Creeping Cinquefoil; Creeping Thistle; Ribwort Plantain and Ivy.

In the east of this area of scrub/grassland, were the invasive non-native species Japanese Knotweed *Reynoutria japonica*, Winter Heliotrope and Giant Knotweed *Heracleum mantegazzianum*.

This western section also included additional species Yorkshire Fog; Meadowsweet; Cock's-foot; Common Vetch; Bush Vetch; Gorse; Ash; Nettle; Herb Robert; Silverweed; Great Willowherb; Sweet Vernal-grass; Pedunculate Oak; Ragwort; Alder; Smooth Sow-thistle; Smooth Meadow-grass *Poa pratensis sens lat*; Curled Dock; Dandelion; Cleavers; Perennial Rye-grass; Soft Rush; Hedge Woundwort; Common Couch *Elymus repens*; Perforate St John's Wort *Hypericum perforatum*; Pendulous Sedge; Colt's-foot *Tussilago farfara*; Smooth Hawkbit; Elm; Italian Alder *Alnus cordata*; Cow Parsley; Cluster Dock; Soft Rush; Sycamore; Horsetail; Meadow Vetchling *Lathyrus pratensis*; Black Medick; Common Bent *Agrostis capillaris*; Creeping Bent *Agrostis stolonifera* and Oxeye Daisy.

B.2.1 Habitat Map Area E: Measures 4.A, 4.B, 4.C and 5.D (Bride's Glen River and Bray Road)

Given the widespread nature of measures 4 and 5, these areas are addressed east and west of the pitch and putt.

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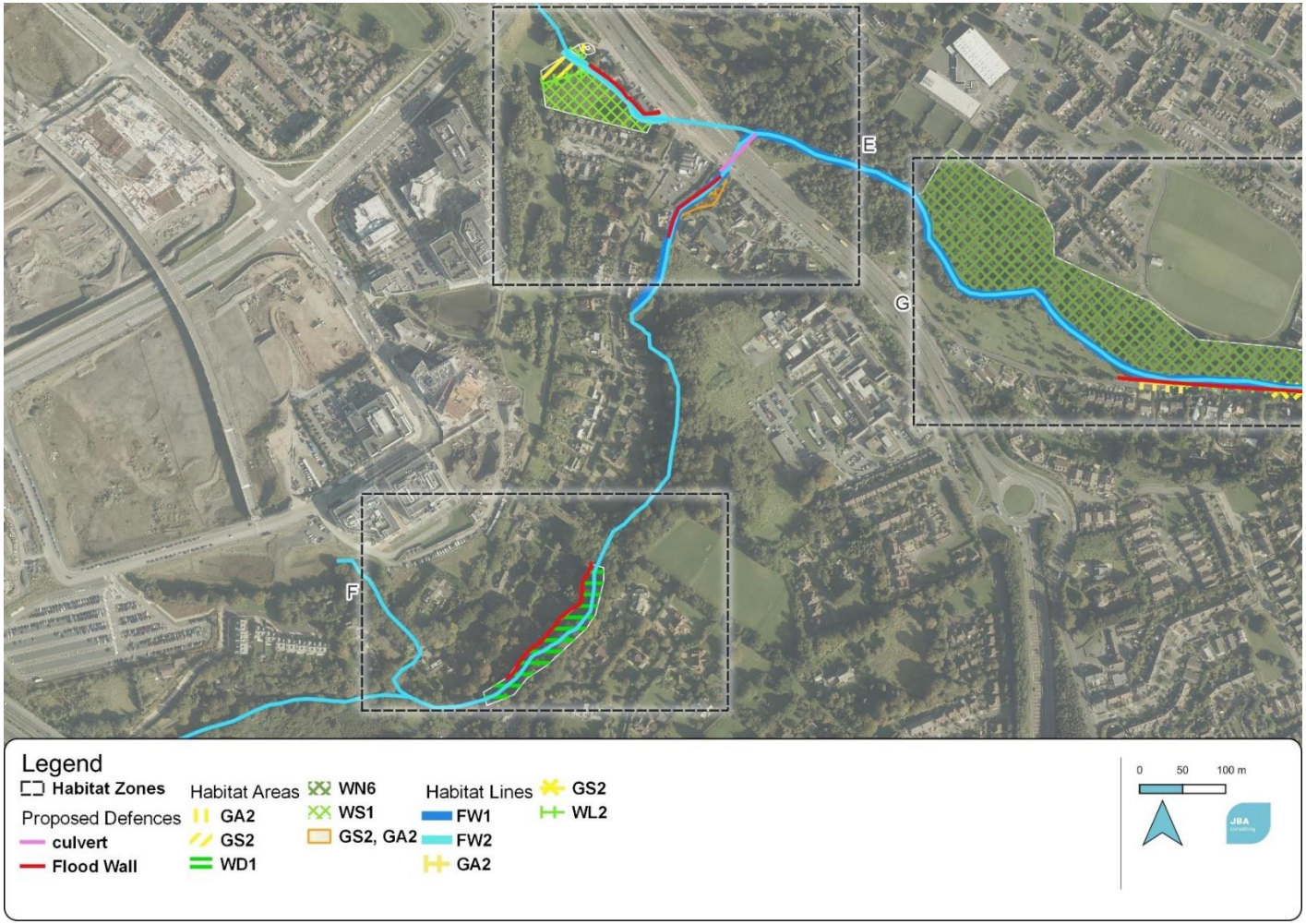


Figure B-5: Brides Glen River and Bray Road habitats

Habitats for Area E are described below:

Eroding/upland rivers (FW1)

Throughout this section of the scheme is a continuation of the Shanganagh River. Where it flows under the railway line, there is no access to the north between houses and railway line. In this area, the watercourse is approximately 5.5 m wide, containing boulders cobbles, gravel. At the time of the survey it was approximately 0.5m deep and fast flowing. The channel banks are vegetated with Bramble, Alexanders, Hart's Tongue Fern, Pendulous Sedge and Reed Canary-grass *Phalaris arundinacea*. The banks also support the non-native species Winter Heliotrope and Butterfly Bush.

Mosaic: Eroding/upland rivers / Depositing/lowland rivers (FW1 / FW2)

There is a section where the river transitions between an eroding and a depositing river. The river varies in depth from 10cm to 50cm deep, and is fast flowing, having a cobble base with sections of a sandy gravel substrate and stone walled edges. The banks of the river include Pendulous Sedge, Bramble, Ferns, Alder and Ash Saplings.

Dry meadows and grassy verges (GS2)

There are sections of meadow located throughout the northern parts of this section of the site which include unmown grassy areas within the local parkland and in the vicinity of some local businesses. These areas include Dandelion, White Clover, Red Clover, Hogweed, Creeping Buttercup, Ragwort, Common Bird's-foot-trefoil, Cuckooflower, Ribwort Plantain, Common Bent, Mouse-ear, Common Sorrel *Rumex acetosa* and Meadow Buttercup.

Dry meadows and grassy verges / Amenity grassland (improved (GS2 / GA2)

This habitat comprises Perennial Rye-grass, Dandelion, White Clover, Creeping Buttercup, Ribwort Plantain, Colts-foot, Cow Parsley, Hogweed, Broad-leaved Dock, Winter Heliotrope, Bush Vetch, Curled Dock, Rough Hawk's-beard, Common Vetch, Cleavers, False Oat-grass, Herb Robert, Common Bent, Nettle, *Brome Bromus* spp. and Three corner garlic. Common Carder Bee was also recorded in this area.

(**Mixed) broadleaved woodland (WD1)**

There are stretches of mixed broadleaved woodland along the banks of the river in the west of this section, one at the back of the local Pitch and Putt, which includes Alder, Sycamore and Ash, with an understory of Bramble and the invasive species Butterfly Bush and Fuchsia *Fuchsia magellanica*.

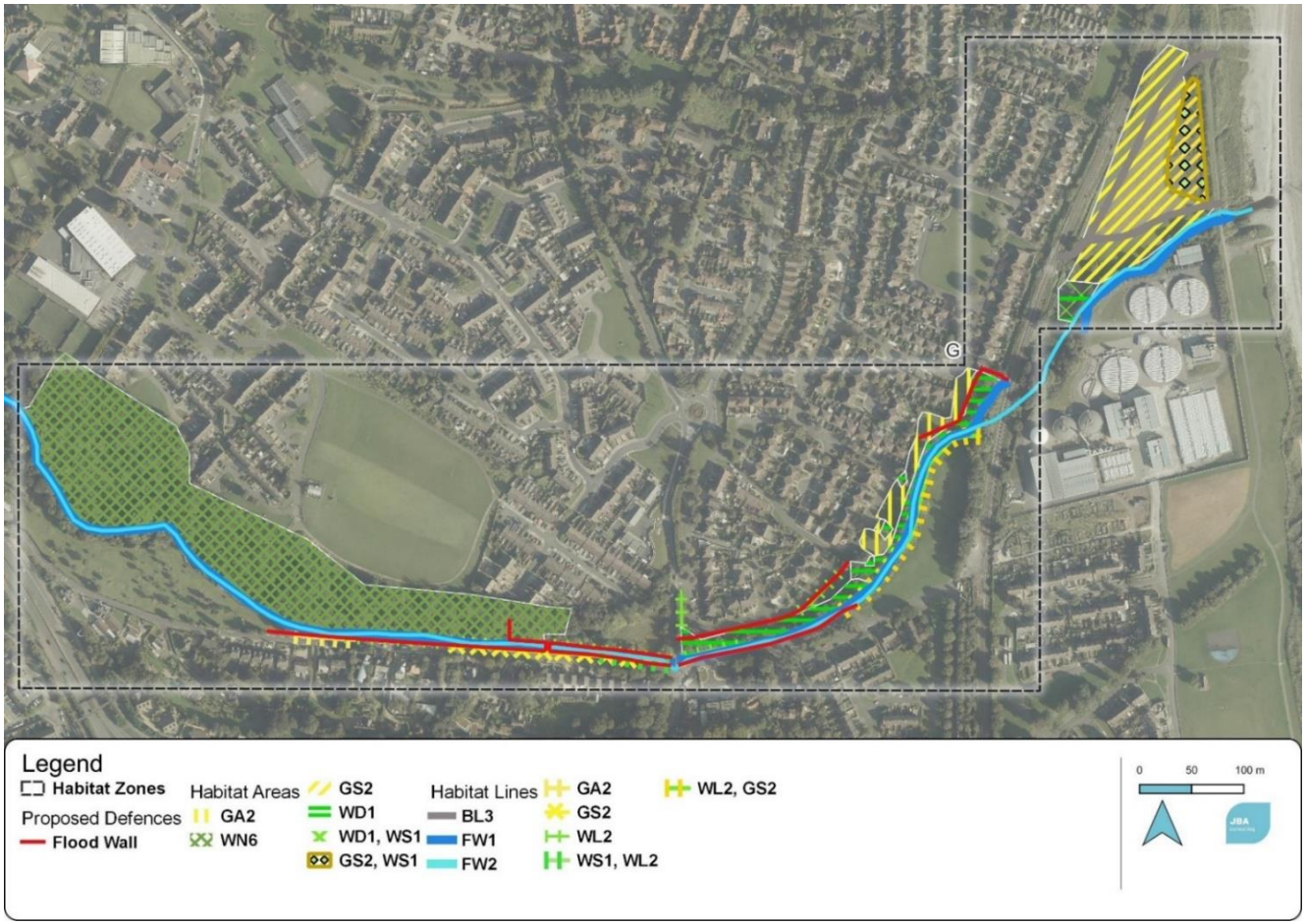
In the south of this section is another stretch of woodland, which contains the species Elm, Beech, Willow, Ash, Alder, Pine, Holly and an understory of Bramble and Fern (Soft Shield-fern *Polystichum setiferum* and Male-fern *Dryopteris filix-mas*, while continuing further south there are areas of Elder and Elm, with an understory of Nettle, Ivy, Lords-and-Ladies, Ramsons *Allium ursinum,* Sweet Violet *Viola odorata*, Speedwell Veronica spp., Lesser Celandine and Primrose *Primula vulgaris*.

There is a small section of broadleaved woodland in the west of the site adjacent to the river, which comprises Willow, Alder, Ash and a ground flora of Ivy, Pendulous Sedge, Cow Parsley and Lesser Celandine.

Scrub (WS1)

There is an area of scrub which comprises: Elder; Bramble; Rowan, Wych Elm; Dog rose; Willow; and Hawthorn. This area has a ground flora of Cow Parlsey, Cleavers, Colt's-foot, Spurge, Broad-leaved Dock, Common Vetch, Germander speedwell, Teasel *Dipsacus fullonum*, Water Figwort, Pendulous Sedge and Hedge Bindweed. There are a number of non-native species including Leillandii, Buddleja, an ornamental Holly and Giant Hogweed.

Giant Hogweed was recorded within the scrubland located behind the local businesses.



B.2.2

Figure B-6: Commons Road, Brookdene and Bayview habitats

Habitats for Area F are described below:

Stone walls and other stonework (BL1)

There are stone walls in the east and the west of this section, these walls have no notable ecological characteristics, and no species present. The stone wall along the back of the houses had Bramble, Ivy and Willowherb.

Amenity grassland (Improved) – GA2

A small stretch of mown amenity grassland occurs along the footpath of Commons Road. This grassland patch contains Ragwort, Daisy, Perennial Rye-grass, Dandelion, Meadow Buttercup, Yarrow, Red Clover, Meadow Vetchling and Ribwort Plantain. Giant Hogweed was also present.

Dry meadows and grassy verges – GS2

Linear sections of grassy verge occur near to the banks of the River Shanganagh along Commons Road. These verges include Curled Dock, Nettle, Cleavers, Dandelion, Smooth Sow-thistle, Creeping Buttercup, Cut-leaved Crane's-bill *Geranium dissectum*, Wood Avens *Geum urbanum*, White Clover, Hogweed, Common Bent, Daisy, Tufted Hair-grass *Deschampsia cespitosa*, Herb Robert, Ribwort Plantain, False Oat-grass, Roughs Hawk's-beard, Black Medick, Nightshade, Bramble, Cow Parsley, French Crane's-bill *Geranium endressii*, Field bindweed, Ash, Cock's-foot, Lesser Trefoil *Trifolium dubium*, Perennial Rye-grass, Hedgerow Crane's-bill *Geranium pyrenaicum*, Field forget-me-not Myosotis arvensis, Field Marigold Calendula arvensis, Common Vetch, Field Mustard and the non-native species *Montbretia Crocosmia* x *crocosmiiflora*, Winter Heliotrope, Giant Hogweed, *Cotoneaster* spp. and Sycamore.

There is a large meadow section in the east of this stretch of the project, near to the coastline. This meadow is divided by a footpath and contains Creeping Buttercup; Meadow Buttercup; Ribwort Plantain; Cuckooflower; Brome; Meadow -grass; Dandelion; Cock's-foot; Red Clover; Curled Dock; Hedge Mustard; Hogweed; Cow Parsley, Alexanders; Daisy; Red Fescue; Lesser Trefoil; Ragwort, Common Couch; Yorkshire Fog, Meadow Foxtail; Sweet Vernal-grass; Cleavers; Lesser Celandine; Rough Hawk's-beard and False Oat-grass.

Dry meadows and grassy verges / Scrub – GS2/WS1

The meadow near to the coastline begins to grade into an area of showing characteristics of scrub, gradually transitioning into a section more dominated by Common Reed *Phragmites australis* while also containing Horsetail; False Oat-grass; Creeping Thistle; Bramble; Bush Vetch; willowherb; Hogweed; Brome.; Ribwort Plantain; Alexanders and a single standing Hawthorn.

(Mixed) broadleaved woodland - WD1

There are stretches of broadleaved woodland located throughout the Hacket Island housing estate. These include a main woodland stretch along the river bank, and a series of isolated woodland pockets among the housing estate's amenity grass areas.

The woodland stretches include a ground layer of Fumitory; Alexanders; Broad-leaved Dock; Cow Parsley; Dandelion; Creeping Buttercup; Nettle; Ivy; Hedge Bindweed; Bramble; Cleavers; dock; Creeping Thistle; Daisy; Shepherd's Purse; Germander Speedwell *Veronica chamaedrys*; Green Alkanet; Wood Speedwell *Veronica montana*, Spear Thistle; Herb Robert; Hogweed; Pendulous Sedge; Ribwort

Plantain; Field Forget-me-not; Yarrow; Garlic Mustard; Wood Sorrell; Nettle; Wood Dock *Rumex sanguineus*; Wood Avens; Meadow Buttercup; Creeping Buttercup; Lords-and-ladies; willowherb; Cuckooflower; Ribwort Plantain; Cowslip *Primula veris*; and Cock's-foot.

The tree cover of this woodland stretch includes Sycamore; Alder; Pedunculate Oak; Ash; Crack Willow *Salix fragilis*; Turkey Oak Quercus cerris; Field Maple Acer campestre; Elm; Cherry; Crab Apple; Leaf Little Box Wood, Leylandi; Chestnut Saplings; Hawthorn, Cypress, White Willow, Japan Chestnut; Silver Birch; Linden; Privet; Sessile Oak, Cherry Laurel; Eucalyptus. This woodland stretch also contains some Three-cornered Garlic, Winter Heliotrope, Giant Hogweed; and Snowberry *Symphoricarpos albus*.

The pockets of woodland within these areas include Italian Alder; Yarrow; Beech; Wood Avens; Herb Robert; Nettle; Dandelion; Meadow Buttercup; *Fringecups Tellima grandiflora*; Common Vetch; Field Maple; Cottonwood; Ivy; Nipplewort, Firethorn *Pyracantha coccinea*, Hedge Periwinkle Vinca sp., Common Vetch, Ragwort, Creeping Thistle, Bent, Nettle, Burdock *Arctium minus*, Cleavers, Dock, Creeping Buttercup, Hogweed; Spear Thistle; Bramble; Field Maple; and Elm.

(Mixed) broadleaved woodland / Scrub – WD1 / WS1

There is a patch in the far east of the site, near to the grassy meadows and the coastline, that contains a mixture of mature trees and a scrub layer. This area contains Holly, Sycamore, Elm, Hart's-tongue Fern; Bramble; Cow Parsley; Soft Shield-fern *Polystichum setiferum*; Buckler Fern Dryopteris sp.; Hedge Bindweed; Nettle; Cleavers; Alder; Butterly Bush; Bluebell *Hyacinthoides non-scripta*; Green Alkanet; and Bush Vetch. There was also widespread Three-cornered Garlic and Giant Hogweed in this area.

Treeline – WL2

There is a small treeline at the entrance to the estate at Hacket Island. This treeline contained Elder; Beech; Bramble; Cleavers; Cherry Laurel; Creeping Buttercup; Dandelion; Nettle; Wild Cherry Sycamore; Hedge Bindweed; Broadleaf Dock, Alexanders, Daisy and Herb Robert.

Additional treelines include those along the Shanganagh Stream parallel to Commons Road. These treelines contain Wavy Bitter-cress *Cardamine flexuosa*; Lesser Celandine; Bush Vetch; Red Clover; Wood Spurge *Euphorbia amygdaloides*; Daffodil *Narcissus pseudonarcissus*; Dog Rose *Rosa canina*; willow; Alder; Pendulous Sedge; Butterfly Bush; Ivy; Tutsan, Water Figwort; Elder; Sycamore; Herb Robert; Birch; Horsetail; buttercup; *Vetch Vicia* spp.; White Willow and Gorse. These treelines also contained the garden escapee Cyclamen spp. and the invasive non-native Giant Hogweed. These treelines connect to the grassy verge located within this area.

Wet willow-alder-ash woodland – WN6

There is a section of the Loughlinstown Wood pNHA that is classified as a Wet willow-alder-ash woodland and runs along the Shanganagh River that is in close proximity to some of the works. This downstream section of the pNHA includes Ash; Willow; Alder; Sycamore; Tutsan; Nettle; Herb Robert; Ivy; Bramble; Creeping Buttercup; Pendulous Sedge; Common Vetch; Cow Parsley; Soft Shield-fern; Hart's-tongue Fern; Elder; and Hawthorn. This woodland also had widespread Giant

Hogweed along the woodland both through the main body of the woods, and along the river bank.

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9 Land and Soil Appendices

No appendices.

10 Water – Surface and Groundwater Appendices

No appendices.

11 Material Assets – Traffic and Transport Appendices

No appendices.

12 Material Assets – Utilities and Waste Appendices

No appendices.

13 Cultural Heritage Appendices

13.1 Legislation, Standards and Guidelines

13.1.1 List of Legislation, Standards and Guidelines

The following legislation, standards and guidelines were consulted to inform the ongoing archaeological assessment for the project

Conventions, Charters, Treaties and Declarations

- International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter1964);
- European Convention on the Protection of the Archaeological Heritage (London Convention1969);
- UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (The World Heritage Convention 1972);
- ICOMOS Florence Charter on Historic Gardens (Florence Charter 1982);
- European Convention for the Protection of the Architectural Heritage (Granada Convention, 1985);
- ICOMOS Charter for the Conservation of Historic Towns and Urban Areas (Washington Charter, 1987);
- European Convention on the Protection of the Archaeological Heritage (Valetta Convention, 1992);
- ICOMOS Charter on the Built Vernacular Heritage,1999;
- European Landscape Convention (Florence Convention, 2000);
- Framework Convention on the Value of Cultural Heritage for Society (Faro Convention, 2005);
- UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001);
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (Paris Convention, 2003);
- ICOMOS Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas (Xi'an Declaration, 2005);
- The Australia ICOMOS Charter for Places of Cultural Significance (Burra Charter, 2013);
- Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes (The Dublin Principles 2011).

Legislation, Government Policies, Regulations, Guidelines and Codes of Practice

- Roads Act 1993 and EIA Regulations (as amended);
- Planning and Development Act 2000 (as amended);
- The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was enacted in October 2023
- National Monuments Acts 1930 to 2014;
- National Cultural Institutions Act 1997;
- Heritage Act 1995;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 2000;
- Framework and Principles for the Protection of the Archaeological Heritage (1999);
- National Policy on Town Defences (2008);
- National Policy on Architecture (2022);
- Code of Practice between the National Roads Authority (NRA) and the Minister for Arts, Heritage and the Gaeltacht, (2000);
- EPA, Guidelines on the information to be contained in Environmental Impact Statements (2002);
- EPA, Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (2003);
- NRA, Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes (2006);
- NRA, Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes (2006);
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- ICOMOS, Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (2011);

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- Historic England, Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets (2015);
- Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland (2017);
- Historic England, Land Contamination and Archaeology Good Practice Guidance, (2017);
- EPA, Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022);
- TII, Cultural Heritage Impact Assessment (CHIA) of TII Projects – Overarching Technical Document (Draft 2022);
- TII Cultural Heritage Impact Assessment (CHIA) of Proposed TII Projects – Standard (Draft 2022)

Other Key Plans and Policies

- National Development Plan 2018–27;
- Project Ireland 2040;
- National Landscape Strategy for Ireland 2015–25;
- Heritage Ireland 2030 – A Framework for Heritage (2022);
- Action Plan for Rural Development – Realising our Rural Potential (2017);
- Built & Archaeological Heritage Climate Change Sectoral Adaptation Plan (2019)

13.1.2 National Monuments (Amendment) Act (1930-2014)

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was enacted in October 2023 and this this Act is now law. The Minister for Housing, Local Government and Heritage commenced certain provisions in May 2024 (S.I. No. 252/2024); however, until the Act is fully commenced, the National Monuments Acts have therefore not yet been repealed and remain in force.

All archaeological sites have the full protection of the national monuments legislation (Principal Act 1930; Amendments 1954, 1987, 1994, 2004 and 2014). In the 1987 Amendment of Section 2 of the Principal Act (1930), the definition of a national monument is specified as:

> *any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections;*
>
> *any artificial cave, stone or natural product, whether forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position;*
>
> *any, or any part of any, prehistoric or ancient tomb, grave or burial deposit, or*
>
> *(ii) ritual, industrial or habitation site*
>
> *and*
>
> *any place comprising the remains or traces of any such building, structure or erection, any cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...*

Under Section 14 of the Principal Act (1930):

It shall be unlawful...

> *to demolish or remove wholly or in part or to disfigure, deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned (a licence issued by the Office of Public Works National Monuments Branch),*

or

> *to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance...*

Under Amendment to Section 23 of the Principal Act (1930),

> *A person who finds an archaeological object shall, within four days after the finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum...*

The latter is of relevance to any finds made during a watching brief.

In the 1994 Amendment of Section 12 of the Principal Act (1930), all the sites and 'places' recorded by the Sites and Monuments Record of the Office of Public Works are provided with a new status in law. This new status provides a level of protection to the listed sites that is equivalent to that accorded to 'registered' sites [Section 8(1), National Monuments Amendment Act 1954] as follows.

The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the State.

The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of the county drawn up and publish in a prescribed manner information about when and where the lists and maps may be consulted.

In addition, when the owner or occupier (not being the Commissioners) of a monument or place which has been recorded, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having given the notice.

Under the National Monuments Amendment Act (2004), the Minister of Environment, Heritage and Local Government will issue directions relating to archaeological works and will be advised by the National Monuments Section and the National Museum of Ireland. The Act sets out the circumstances whereby the Minister of Environment, Heritage and Local Government may grant consent (i.e. In respect of a national monument of which the Minister or a local authority are the owners or the guardians or in respect of which a preservation order is in force) or issue directions (i.e. in relation to approved road developments—being road development approved under either or both sections 49 and 51 of the Roads Act 1993).

14A. (1) The consent of the Minister under section 14 of this Act and any further consent or licence under any other provision of the National Monuments Acts 1930 to 2004 shall not be required where the works involved are connected with an approved road development.

14A. (2) Any works of an archaeological nature that are carried out in respect of an approved road development shall be carried out in accordance with the directions of the Minister, which directions shall be issued following consultation by the minister with the Director of the National Museum of Ireland.

14A (4) Where a national monument has been discovered to which subsection (3) of this section relates, then the road authority carrying out the road development shall report the discovery to the Minister subject to subsection (7) of this section, and pending any directions by the minister under paragraph (d) of this subsection, no works which would interfere with the monument shall be carried out, except works urgently required to secure its preservation carried out in accordance with such measures as may be specified by the Minister

The Minister will consult with the Director of the National Museum of Ireland for a period not longer than 14 days before issuing further directions in relation to the national monument.

The Minister will not be restricted to archaeological considerations alone, but will also consider the wider public interest.

13.2 Local Authority Policies in Relation to Cultural Heritage

13.2.1 Laoghaire Rathdown Policies in The County Development Plan in Relation To Cultural Heritage (2022-2028)

Policy Objective HER1: Protection of Archaeological Heritage

It is a Policy Objective to protect archaeological sites, National Monuments (and their settings), which have been identified in the Record of Monuments and Places and, where feasible, appropriate and applicable to promote access to and signposting of such sites and monuments.

Policy Objective HER2: Protection of Archaeological Material in Situ

It is a Policy Objective to seek the preservation in situ (or where this is not possible or appropriate, as a minimum, preservation by record) of all archaeological monuments included in the Record of Monuments and Places, and of previously unknown sites, features and objects of archaeological interest that become revealed through development activity. In respect of decision making on development proposals affecting sites listed in the Record of Monuments and Places, the Council will have regard to the advice and/ or recommendations of the Department of Culture, Heritage and the Gaeltacht (DCHG).

Policy Objective HER3: Protection of Historic Towns

It is a Policy Objective to promote and protect the Historic Town of Dalkey as identified by the Department of Culture, Heritage and the Gaeltacht (DCHG) (consistent with RPO 9.27 of the RSES).

Policy Objective HER4: Carrickmines Castle Site

It is a Policy Objective to support the implementation of the (Archaeological) Conservation Plan for the Carrickmines Castle Site.

Policy Objective HER5: Historic Burial Grounds

It is a Policy Objective to protect historical and/or closed burial grounds within the County and encourage their maintenance in accordance with good conservation practice and to promote access to such sites where possible.

Policy Objective HER6: Underwater Archaeology

It is a Policy Objective for all developments, which have potential to impact on riverine, intertidal and sub-tidal environments to require an archaeological assessment prior to works being carried out.

Policy Objective HER7: Record of Protected Structures

It is a Policy Objective to include those structures that are considered in the opinion of the Planning Authority to be of special architectural, historical, archaeological, artistic, cultural, scientific, technical or social interest in the Record of Protected Structures.

Policy Objective HER8: Work to Protected Structures

It is a Policy Objective to:

i. Protect structures included on the RPS from any works that would negatively impact their special character and appearance.

ii. Ensure that any development proposals to Protected Structures, their curtilage and setting shall have regard to the 'Architectural Heritage Protection Guidelines for Planning Authorities' published by the Department of the Arts, Heritage and the Gaeltacht.

iii. Ensure that all works are carried out under supervision of a qualified professional with specialised conservation expertise.

iv. Ensure that any development, modification, alteration, or extension affecting a Protected Structure and/or its setting is sensitively sited and designed, and is appropriate in terms of the proposed scale, mass, height, density, layout, and materials.

v. Ensure that the form and structural integrity of the Protected Structure is retained in any redevelopment and that the relationship between the Protected Structure and any complex of adjoining buildings, designed landscape features, or views and vistas from within the grounds of the structure are respected.

vi. Respect the special interest of the interior, including its plan form, hierarchy of spaces, architectural detail, fixtures and fittings and materials.

vii. Ensure that new and adapted uses are compatible with the character and special interest of the Protected Structure.

viii. Protect the curtilage of protected structures and to refuse planning permission for inappropriate development within the curtilage and attendant grounds that would adversely impact on the special character of the Protected Structure.

ix. Protect and retain important elements of built heritage including historic gardens, stone walls, entrance gates and piers and any other associated curtilage features.

x. Ensure historic landscapes and gardens associated with Protected Structures are protected from inappropriate development (consistent with NPO 17 of the NPF and RPO 9.30 of the RSES).

Policy Objective HER9: Protected Structures Applications and Documentation

It is a Policy Objective to require all planning applications relating to Protected Structures to contain the appropriate level of documentation in accordance with Article 23 (2) of the Planning Regulations and Chapter 6 and Appendix B of the 'Architectural Heritage Protection Guidelines for Planning Authorities', or any variation thereof.

Policy Objective HER10: Protected Structures and Building Regulations

It is a Policy Objective to protect the character and special interest of Protected Structures when considering or carrying out interventions to comply with the requirements of the Building Regulations - with particular reference to Part B and Part M.

Policy Objective HER11: Energy Efficiency of Protected Structures

It is a Policy Objective to have regard to the Department of Environment, Heritage and Local Government's publication on 'Energy Efficiency in Traditional Buildings' (2010) and the Irish Standard IS EN 16883:2017 'Conservation of Cultural Heritage - Guidelines for Improving the Energy Performance of Historic Buildings' (2017) and any future advisory documents in assessing proposed works on Protected Structures.

Policy Objective HER12: National Inventory of Architectural Heritage (NIAH)

It is a Policy Objective to review and update the RPS on foot of any Ministerial recommendations. The 'Ministerial Recommendations', made under Section 53 of the Planning Acts, will be taken into account when the Planning Authority is considering proposals for development that would affect the historic or architectural interest of these structures.

Policy Objective HER13: Architectural Conservation Areas

It is a Policy Objective to:

i. Protect the character and special interest of an area which has been designated as an Architectural Conservation Area (ACA).

ii. Ensure that all development proposals within an ACA be appropriate to the character of the area having regard to the Character Appraisals for each area.

iii. Ensure that any new development or alteration of a building within an ACA or immediately adjoining an ACA is appropriate in terms of the proposed design, including scale, height, mass, density, building lines and materials.

iv. Seek a high quality, sensitive design for any new development(s) that are complementary and/or sympathetic to their context and scale whilst simultaneously encouraging contemporary design which is in harmony with the area. Direction can also be taken from using traditional forms that are then expressed in a contemporary manner rather than a replica of a historic building style.

v. Ensure street furniture is kept to a minimum, is of good design and any redundant street furniture removed.

vi. Seek the retention of all features that contribute to the character of an ACA including boundary walls, railings, soft landscaping, traditional paving and street furniture.

Policy Objective HER14: Demolition within an ACA

It is a Policy Objective to prohibit the demolition of a structure(s) that positively contributes to the character of the ACA.

Policy Objective HER15: Shopfronts within an ACA

It is a Policy Objective to:

i. Ensure that all original and traditional shopfronts which contribute positively to the appearance and character of a streetscape within an ACA are retained and restored.

ii. Ensure that new shopfronts are well-designed, through the sympathetic use of scale, proportion and materials.

Policy Objective HER16: Public Realm and Public Utility works within an ACA

It is a Policy Objective to:

i. Retain or sensitively reintegrate any surviving items of historic street furniture and finishes such as granite kerbing and paving that contribute to the character of an ACA.

ii. Ensure that works to the public realm - such as the provision of traffic control measures, street furniture, materials and finishes - have regard to the distinctive character of the area.

iii. Encourage the undergrounding of overhead services and the removal of redundant wiring/cables within an ACA.

Policy Objective HER17: Candidate Architectural Conservation Areas

It is a Policy Objective to assess candidate Architectural Conservation Areas to determine if they meet the requirements and criteria for re-designation as Architectural Conservation Areas.

Policy Objective HER18: Development within a Candidate Architectural Conservation Area

It is a Policy Objective that development proposals within a candidate Architectural Conservation Area will be assessed having regard to the impact on the character of the area in which it is to be placed.

Policy Objective HER19: Protection of Buildings in Council Ownership

It is a Policy Objective to:

i. Continue to demonstrate best practice with regard to Protected Structures, Recorded Monuments and other elements of architectural heritage in the ownership and care of the Council.

ii. Ensure any works are undertaken having regard to the Department of Culture, Heritage and the Gaeltacht 'Advice Series' publications on how best to carry out repairs and maintain historic buildings and ensure the use of specialist practitioners in the field of conservation.

Policy Objective HER20: Buildings of Vernacular and Heritage Interest

It is a Policy Objective to:

i. Retain, where appropriate, and encourage the rehabilitation and suitable reuse of existing older buildings/structures/features which make a positive contribution to the character and appearance of the area and streetscape in preference to their demolition and redevelopment and to preserve surviving shop and pub fronts of special historical or architectural interest including signage and associated features.

ii. Encourage the retention and/or reinstatement of original fabric of our historic building stock such as windows, doors, roof coverings, shopfronts, pub fronts and other significant features. iii. Ensure that appropriate materials be used to carry out any repairs to the historic fabric.

Policy Objective HER21: Nineteenth and Twentieth Century Buildings, Estates and Features

It is a Policy Objective to:

i. Encourage the appropriate development of exemplar nineteenth and twentieth century buildings, and estates to ensure their character is not compromised.

ii. Encourage the retention and reinstatement of features that contribute to the character of exemplar nineteenth and twentieth century buildings, and estates such as roofscapes, boundary treatments and other features considered worthy of retention.

iii. Ensure the design of developments on lands located immediately adjacent to such groupings of buildings addresses the visual impact on any established setting.

Policy Objective HER22: Protection of Historic Street Furniture and Public Realm

It is a Policy Objective to:

i. Preserve the retention of historic items of street furniture where these contribute to the character of the area, including items of a vernacular or local significance.

ii. Promote high standards for design, materials and workmanship in public realm improvements within areas of historic character.

Policy Objective HER23: Industrial Heritage

It is a Policy Objective to:

i. Have regard to those items identified in the Industrial Heritage Survey when assessing any development proposals.

ii. Identify further sites of industrial heritage significance with a view to assessing them for inclusion in the Record of Protected Structures.

Policy Objective HER24: Protection of Coastline Heritage

It is a Policy Objective to:

i. Encourage and promote the retention of features of the County's coastal heritage where these contribute to the character of the area.

ii. Have regard to those items identified in the Coastal Architecture Heritage Survey when assessing any development proposals.

Policy Objective HER25: Heritage Plan

It is a Policy Objective to support the preparation and implementation of the third DLR County Heritage Plan 2021 – 2025.

Policy Objective HER26: Historic Demesnes and Gardens

It is a Policy Objective that historic demesnes and gardens should be identified and protected to reflect and acknowledge their significance as part of our National Heritage. The following houses and gardens are listed: Cabinteely House, Marlay House, Fernhill and Old Conna.

Policy Objective HER27: Civic Memorials

It is a Policy Objective that the Council will, at appropriate times and having due regard to resources and suitable subject matter, erect civic memorials in accordance with Part 1 of the Council's Memorials Policy adopted in 2011 in order to raise awareness of the County's history and heritage.

Policy Objective HER28: The Metals

It is a Policy Objective to manage and enhance The Metals from the Peoples Park to Dalkey giving due regard to its historic importance while continuing to facilitate and encourage its use as a walking and cycling route between Dún Laoghaire and Dalkey.

13.3 Glossary of Effects and Assessment Methodology

13.3.1 Glossary of Impacts

Types of Impacts

Potential effects on the receiving cultural heritage[1] environment can be described as direct physical impacts, indirect physical impacts, and effects on setting (i.e., the surroundings in which a cultural heritage asset can be experienced; Historic England 2017).

Direct physical effects are those development activities that directly cause damage to the fabric of a cultural heritage asset. Typically, these activities are related to construction works (e.g., they could include excavation of foundations, earthmoving / site preparation creation of access roads, cycle paths, and the excavation of service trenches).

Indirect physical effects are those processes, triggered by development activity, that lead to the degradation of cultural heritage assets.

Effects on the setting of cultural heritage assets describe how the presence of a development changes the surroundings of an asset in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual effects are most commonly encountered. Such effects may be encountered at all stages in the life cycle of a development, but they are only likely to be considered significant during the prolonged operational life of the development.

Types of impact (now referred to as effects), as defined by the EPA Guidelines on Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022):

- *Cumulative Effects*– The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant, effects.
- *Do Nothing Effects* – The environment as it would be in the future should the subject project not be carried out.
- *Indeterminable Effects* – When the full consequences of a change in the environment cannot be described.
- *Irreversible Effects* – When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
- *Residual Effects* – The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
- '*Worst case' Effects* – The effects arising from a project in the case where mitigation measures substantially fail; and
- *Indirect or Secondary Effects* – Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.

Quality of Effects

Effects on the cultural heritage environment are assessed in terms of their quality, i.e., positive, negative, neutral:

- Negative Effects A change that will detract from or permanently remove a cultural heritage asset from the landscape;
- Neutral Effects: A change that does not affect cultural heritage; and

[1] Cultural Heritage includes archaeology, architectural heritage, and folklore and history

- Positive Effects: A change that improves or enhances the setting of a cultural heritage asset.

Duration of Effects

The duration of an effects can be as follows:

- Temporary effects: effects lasting for one year or less;
- Short-term effects: effects lasting one to seven years;
- Medium-term effects: effects lasting seven to fifteen years;
- Long-term effects: effects lasting fifteen to sixty years; and
- Permanent effects: effects lasting over sixty years.

13.3.2 Assessment Methodology

This assessment methodology has regard to the EPA assessment criteria (EPA 2022) and to the National Roads Authority (NRA) Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes (hereafter referred to as the NRA Guidelines) (NRA 2005).

Cultural heritage sites are a non-renewable resource and such assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites.

Significance / Sensitivity Criteria

In accordance with EPA Guidelines (EPA 2022), the context, character, significance and sensitivity of each cultural heritage asset requires evaluation and the significance of the impact is then determined by considering the significance / sensitivity of the asset and the predicted magnitude of the impact.

The significance / sensitivity can be ascertained by looking at the following criteria: the existing status (level of protection), condition or preservation, documentation or historical significance, group value, rarity, visibility in the landscape, fragility or vulnerability, and amenity value (Table 13.1). While these criteria contribute to the significance of a feature they should not be treated as definitive. These criteria are indicators which contribute to a wider judgement based on the individual circumstances of these cultural heritage assets.

Table 13.1: Explanation of Cultural Heritage Asset Assessment Criteria

Criteria	Explanation
Existing Status	The level of protection associated with a cultural heritage asset is an important consideration.
Condition / Preservation / Integrity	The survival of a cultural heritage asset's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highlighted, this assessment can only be based on a field inspection.
Documentation / Data	The significance of a cultural heritage asset may be enhanced by the existence of records of previous investigations or contemporary documentation supported by written evidence or historic maps. Sites with a definite historical association or an example of a notable event or person should be highlighted.
Group Value / Character	The value of a single a cultural heritage asset may be greatly enhanced by its association with related contemporary monuments or with monuments from different periods indicating an extended time presence in any specific area. In some cases it may be preferable to protect the complete group, including associated and adjacent land, rather than to protect isolated monuments within that group.

Rarity / Character	The rarity of some a cultural heritage asset types can be a central factor affecting response strategies for development, whatever the condition of the individual feature. It is important to recognise sites that have a limited distribution.
Visibility in the landscape/ Character / Integrity	Cultural heritage assets that are highly visible in the landscape have a heightened physical presence. The inter-visibility between monuments may also be explored in this category.
Fragility / Vulnerability / Integrity	It is important to assess the level of threat to a cultural heritage asset from erosion, natural degradation, agricultural activity, land clearance, neglect, careless treatment or development.
Amenity Value / Character	Regard should be taken of the existing and potential amenity value of a cultural heritage asset.
Existing Status	The level of protection associated with a cultural heritage asset is an important consideration.
Condition / Preservation / Integrity	The survival of a cultural heritage asset's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highlighted, this assessment can only be based on a field inspection.

An evaluation of the significance / sensitivity of cultural heritage assets is based on their designation and on the extent to which these assets contribute to the cultural heritage environment, though their individual or group qualities, either directly or potentially. Table 13.2 presents the scale of significance / sensitivity together with criteria. It has been compiled by Courtney Deery Heritage Consultancy Ltd, based on standard authorities and guidelines as listed at the end of this appendix. Undesignated cultural heritage sites can be assigned a low, medium or high sensitivity value, taking into consideration the criteria cited in Table 13.1 (e.g., condition, character, integrity or preservation, data, group value, rarity, visibility in the landscape, fragility or vulnerability, and amenity value).

Table 13.2: Significance / Sensitivity Criteria

Sensitivity / Significance	**Criteria**
Very high	Sites of international significance: World Heritage Sites and sites on the UNESCO World Heritage Tentative List. NIAH sites (assessed by the NIAH to be of international importance).
High	National Monuments. Recorded Monuments (RMP sites & SMR sites), where these are considered to be of national importance. Protected Structures (assessed by the NIAH to be of national importance. Undesignated cultural heritage sites considered to be of national importance.
Medium	Recorded Monuments (RMP sites & SMR sites), not considered to be of national importance. Protected Structures / NIAH sites (assessed by the NIAH to be of regional importance). Newly identified archaeological sites, confirmed through archaeological investigation, to be added to the SMR.

	Undesignated cultural heritage sites considered to be of regional importance.
Low	Sites listed in the County or City Industrial Heritage Records, Record of Protected Structures (RPS) and National Inventory of Architectural Heritage (NIAH) Building Survey for which there are no upstanding remains. NIAH sites (assessed by the NIAH to be of local importance) Undisturbed greenfield areas and riverine environs, which have an inherent archaeological potential. Undesignated cultural heritage sites considered to be of local importance.
Negligible	Assets with very little or no surviving cultural heritage interest.
Unknown	The importance of the asset has not yet been ascertained (e.g., a LiDAR feature that may or may not be archaeological). In such cases, the significance of effect will be 'Indeterminable'.

Table 13.3: Description of Criteria

Criteria	Description
World Heritage Properties	World Heritage Properties as designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and properties on the Tentative List.
National Monuments	The National Monuments Act (1930, Section 2) defines a 'National Monument' as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto'. The National Monuments legislation legally protects access to and the visual amenity associated with National Monuments and requires consent from the Minister for invasive works in their vicinity.
Recorded Monuments	The primary source of information for archaeology is the Record of Monuments and Places (RMP) maintained by the Department of Housing, Local Government and Heritage (DHLGH). The RMP documents known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites in rural areas identified as cropmarks on vertical aerial photographs dating to before 1700 AD (with some later ones also being included). It is based on a comprehensive range of published and publicly available documentary and cartographic sources. For the purpose of the assessment, the Sites and Monument Record (SMR) data and mapping as updated by the Archaeological Survey of Ireland (www.archaeology.ie) was also examined.
Protected Structures	A 'Protected Structure' is a structure that a planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, or technical point of view and is included in its Record of Protected Structures (RPS). It may be a building or part of a building which is of significance because of its architectural or artistic quality, or its setting, or because of its association with commercial, cultural, economic, industrial, military, political, social, or religious history.
Architectural Conservation Areas	An Architectural Conservation Area (ACA) is a place, area, group of structures or townscapes that is of special interest and that has been afforded statutory protection by the planning authority in accordance with Section 81 of the Planning & Development Act.
NIAH	The National Inventory of Architectural Heritage (NIAH) is a state initiative established on a statutory basis, to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Housing, Local Government and Heritage to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

Undesignated Sites	Newly identified archaeological sites that have been confirmed through archaeological investigation (monitoring, testing, excavation, geophysical survey) are considered to be of medium importance. Such sites are undesignated as they have yet to be added to the SMR.
	Potential or undesignated cultural heritage sites identified through aerial photography, historic mapping, stray finds are considered to be of low sensitivity, as they have yet to be ground-truthed through archaeological investigation. Similarly, undisturbed greenfield areas and riverine environs, which have an inherent but as yet unproven archaeological potential are considered to be of low sensitivity.
	Zones of archaeological potential (ZAP) can be defined as areas within the urban and rural landscape that possess the potential to contain archaeological remains due to the settlement history of a place and or to the presence of topographical features such as rivers, lakes and high, defendable ground
	Sites / features recorded in county / city industrial heritage surveys, where these are not designated assets.

Magnitude of effect

When assessing the impact magnitude, the following criteria need to be considered:

- Extent – size, scale and spatial distributions of the effects
- Duration – period of time over which the effects will occur;
- Frequency – how often the effects will occur; and
- Context – how will the extent, duration and frequency contrast with the accepted baseline conditions.

Table 13.4: Magnitude of Effects Criteria

Impact Magnitude	Criteria
High	These effects arise where a cultural heritage asset is completely and irreversibly destroyed by a proposed development. A change such that the value of the asset is totally altered or destroyed, leading to a complete loss of character, integrity and data about the site.
Medium	An effect which, by its magnitude, duration or intensity alters an important / significant aspect of the environment. An impact like this would be where a cultural heritage asset would be impacted upon leading to a significant loss of character, integrity and data about the site. Or an effect which by its magnitude results in the partial loss of a historic structure (including fabric loss or alteration) or grounds including the part removal of buildings or features or part removal of demesne land (e.g., severance, visual intrusion or degradation of setting and amenity). A permanent positive effect that enhances or restores the character and / or setting of an upstanding cultural heritage site in a clearly noticeable manner.
Low	A low effect arises where a change to the site is proposed which though noticeable is not such that the cultural heritage character / integrity of the site is significantly compromised, and where there is no significant loss of data about the site. A positive impact that results in partial enhancement of the character and / or setting of an upstanding cultural heritage site in the medium to long-term.
Negligible	An effect which causes very minor changes in the character of the environment and does not directly impact a cultural heritage asset, or affect the appreciation or significance of the asset. There would be very minor changes to the character and integrity of the asset and no loss of data about the site.

Significance of Effect

The EPA Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EIS) (EPA 2017) contained two additional levels of significance of effect: Very Significant and Not Significant. These levels have been retained in the current EPA Guidelines (2022).

Table 13.5: Significance of Effects (EPA 2022)

Significance of Impact	Description
Very Significant	An effect which by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment, for example in this case a monument
Not Significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.

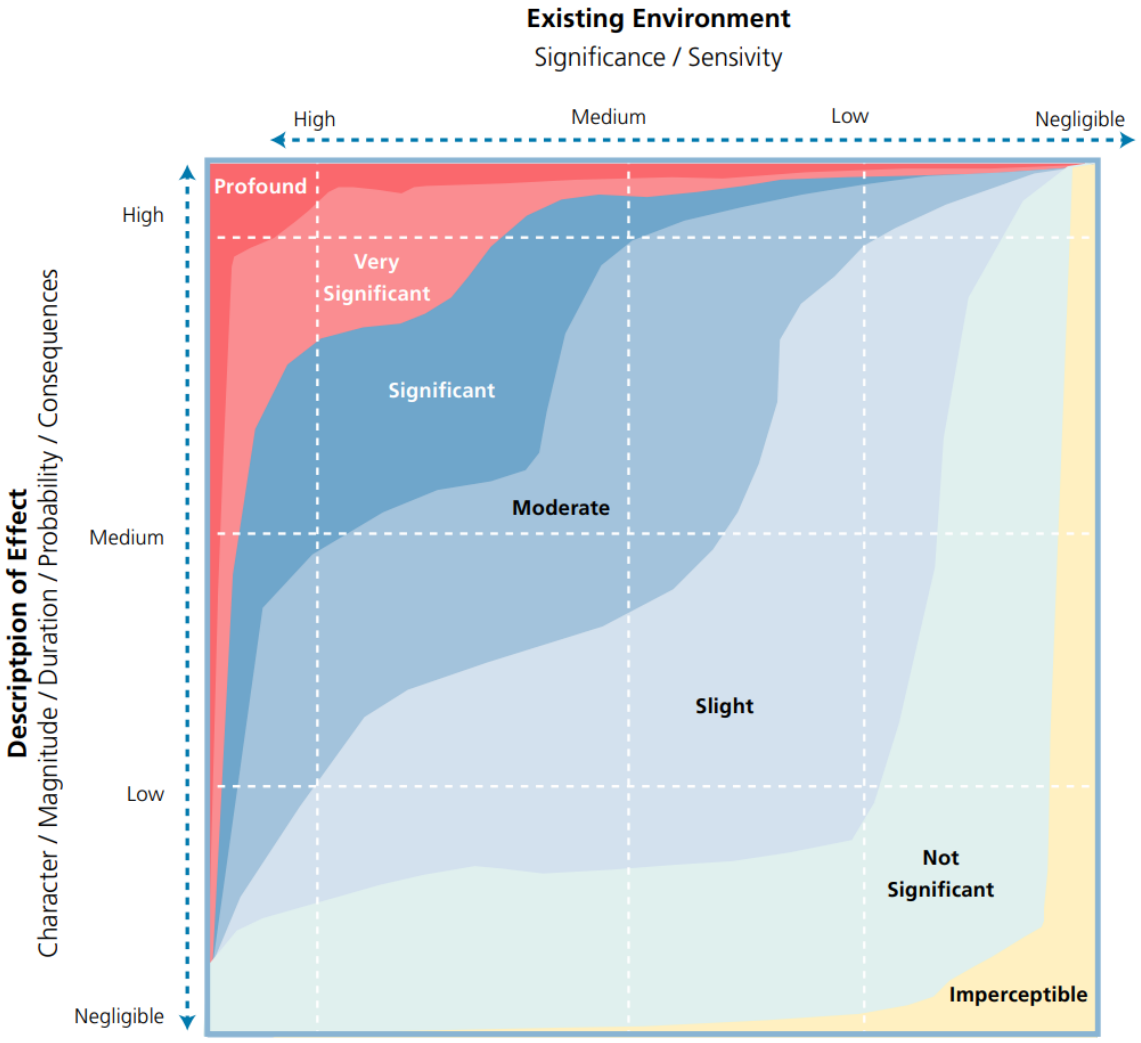


Figure 13.1: Chart showing typical classifications of the Significance of Effect, from the EPA Guidelines on Information to be Contained in EIAR (EPA 2022, Figure 3.4)

The likely significance of effects is determined by considering the baseline rating or sensitivity value of the asset upon which the impact has an impact and the magnitude of the impact. The impact significance is defined as Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, or Profound.

Table 13.6: Defining Significance of Effects

Impact	Definition
Imperceptible	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes minor changes in the character of the environment and does not affect a cultural heritage asset in a moderate or significant manner.
Moderate	A moderate effect arises where a change to the site is proposed which though noticeable, does not lead to a significant loss of character, integrity and data about the cultural heritage asset.
Significant	An effect which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part or all of a site would be permanently impacted upon, leading to a significant loss of character, integrity and data about the cultural heritage asset.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where a cultural heritage asset is completely and irreversibly destroyed by a proposed development.

13.4 Inventory of Cultural Heritage Sites within 100m of the Proposed FRS

13.4.1 Introduction

The following is an inventory of Cultural Heritage Sites located within an FRS Measure:

- Archaeological Heritage Sites (RMP sites)
- Architectural Heritage Sites (RPS sites)
- Areas of Archaeological Potential (AP)
- Undesignated Built and Cultural Heritage Features (CH)

13.4.2 Archaeological Heritage Sites (Record of Monuments and Places - RMP Sites)

Reference no.	**DU026-161----**
Legal Status	SMR
Other Designations	N/A
Location	Kilgobbin
Site Type	Burnt mound
ITM	718936, 724926
Description	A burnt mound located under the south slopes of Three Rock Mountain was archaeologically excavated in 2003. It was located at in a marshy area at a kink in the stream. This horse-shoe shaped mound (L 7.6m, Wth 6.4m, D 0.15m) consisted of fire-cracked granite and charcoal. A sub-rectangular shallow cut or depression (L 1m, Wth 0.8m) was located 1m north of the burnt material. This was filled with fire-cracked stones and charcoal. No trough was present. A fire bowl and a hearth were located 8m to the south. A hearth was uncovered in the vicinity of the fire bowl. Associated with the hearth was a v-shaped structure composed of post-and stake-holes. A disturbed pit containing Early-mid-Bronze age pottery lay nearby.
Sources	www.archaeology.ie
Images	-
Approx Distance from FRS Measure	c.47m to the west of the Belarmine Park measure

Reference no.	**DU025-017001-**
Legal Status	RMP, within the ZoN of the settlement of Kilgobbin.
Other Designations	N/A
Location	Kilgobbin
Site Type	Castle - tower house
ITM	719218, 724746
Description	This impressive tower house stands in private ground at the foot of the Dublin Mountains. It was associated with the Walsh family (Goodbody 1993, 19-22). It rises to three storeys with stepped battlements marked by a string course and a southeast corner tower which projects above parapet level. It is built of randomly coursed granite blocks with small packing stones. The entrance is in the south wall through a pointed segmental arched opening. It is rectangular

	in plan (int. dims. L 8.2m; Wth 4.8m) with a vaulted ground floor on a N-S axis and a stair turret in the southeast. The interior is lit by a slit ope in the south wall. The north end collapsed in the 19th-century but the north and east walls survive to foundation level. The base of the walls are considerably undercut in the interior. There are beam holes visible at the top of the walls where the vault starts over the ground floor. The former existence of a loft at this level is indicated by the presence of a slit ope in the south wall. There are remains of a fireplace on the west wall of the upper floor and a square-headed rectangular window, with chamfered granite jambs. A lookout platform is carried on a squinch arch (Anon 1900, 190-91, Anon 1914, 227-8; 1983, 79-81). In the field to the north of the tower house a medieval ditch (L 14m, Wth 4m, d 1.2-1.3m) was excavated in 2003. The ditch deposits yielded unburnt bone and four sherds of medieval pottery (Hagen, I. 2004, 163).
Sources	www.archaeology.ie; Goodbody 1993; Anon. 1900; Anon. 1983; Hagen 2004
Images	 ***View of Kilgobbin Castle from the south from Kilgobbin Road***
Approx Distance from FRS Measure	The ZoN of the castle site includes the corner of the proposed compound area for the Kilgobbin Road measure. The castle structure is c.50m to the southeast, in lands associated with Kilgobbin Castle House (RPS1698). It lies to the rear of Thornberry House and Castle Lodge properties and in a separate field. It cannot be seen from the proposed compound area as it is behind a dense field boundary of mature hedgerow and trees. .

Reference no.	**DU025-017002-**
Legal Status	RMP, within the ZoN of the settlement of Kilgobbin.
Other Designations	N/A
Location	Kilgobbin
Site Type	Inn
ITM	719230, 724587
Description	Situated to the northeast of Kilgobbin Road. An Inn which according to Goodbody (1993, 72-75) was on the site of Oldtown House. It was built in the 1690's and was known as the White House.
Sources	www.archaeology.ie; Goodbody 1993

Images	 ***View of the site of the Inn – now Oldtown House which incorporates the former inn from the Kilgobbin Road***
Approx Distance from FRS Measure	The inn site is c.140m southwest of the proposed compound for the Kilgobbin Road measure

Reference no.	**DU025-017003-**
Legal Status	SMR, within the ZoN of the settlement of Kilgobbin.
Other Designations	N/A
Location	Kilgobbin
Site Type	Cist
ITM	719265, 724689
Description	Situated to the north of Kilgobbin Road. A cist was noted by Rev. George Goring Cuthbert in 1835. A human skeleton enclosed in a cist was unearthed in the immediate vicinity of Kilgobbin castle (Leslie 1934). A cist near Kilgobbin castle contained a human skeleton enclosed in a subterranean dungeon formed of several large masses of stone on end and covered up by another. Unfortunately, there's nothing more given as to the direction or distance from the castle or whether the cist was destroyed or simply covered again (Goodbody referring to an account of this discovery from Rev. T. O Murchoe's `A history of Kilternan & Kilgobbin'.
Sources	www.archaeology.ie; Leslie, J. B. 1934 A History of Kilternan and Kilgobbin
Images	-
Approx Distance from FRS Measure	The site of the cist is c.52m southeast of the proposed compound for the Kilgobbin Road measure.

Reference no.	**DU026-087----**
Legal Status	RMP, within the ZoN of the settlement of Kilgobbin.
Other Designations	N/A
Location	Kilgobbin

Site Type	Linear earthwork
ITM	719658, 724606
Description	Along the southern boundary of Greenfield House Goodbody (1993, 30) has identified a possible section of Pale Ditch. This runs on a roughly E-W axis along a northeast facing slope that falls away to a river c. 8m below surrounding ground level. It comprises a roughly continuous linear bank of earth and stone (H 1m, Wth at top 0.9m, Wth at base 1.4m) with a ditch on the southern or upper slope side (Wth 1.8m). This ditch is more apparent at the western end of the earthwork. Heavy vegetation obstructs the present views. This section of the boundary may continue along the Kilgobbin Stream, or as suggested by Goodbody crosses the field in the vicinity of the pipeline and ran along the line of a private access laneway to connect with the linear earthwork at Kilgobbin Castle (DU025-121002). RMP site DU026-121002, is recorded in the Heritage Map Viewer as being located immediately north of the entrance gate of Oldtown House further south of the laneway. However, it is described in the RMP as follows: *Goodbody (1993, 25-32) suggests that the Pale Ditch may have run through Kilgobbin. He indicates that a lane which runs off Kilgobbin road to Kilgobbin cottage was a bank in the early eighteenth century, which followed the line of a Pale ditch which it replaced.* The RMP location shown does not match the description; it was confirmed by the writer that the site described by Goodbody is located further north at the entrance to Kilgobbin Cottage (Goodbody, Pers. Comm. 2023). This section would have connected with a linear earthwork DU026-087.
Sources	www.archaeology.ie; Goodbody, R. 1993 On the borders of the Pale. A history of Kilgobbin, Stepaside and the Sandyford area. Bray. Pale Publishing
Images	 ***The tree lined boundary to the middle left of the photo is RMP DU026-087, the boundary is likely to cross the greenfield onto the local laneway, the proposed pipeline runs inside the fence associated with a recent housing development.***
Approx Distance from FRS Measure	The linear earthwork, associated with the pale boundary (RMP DU026-087), is just c.5m from the eastern end of the proposed overflow pipeline for the Kilgobbin flood measure. The linear earthwork may have run across the greenspace associated with the new Meadowbrook Estate towards the private access laneway, however in Meadowbrook the proposed pipeline runs along the same line as a waterpipe, so the area has been previously disturbed.

	There is a potential that subsurface remains should they survive will interact with the line of the overflow pipeline at some point along its route, there are existing manholes on the laneway which suggest that works have occurred here previously.

Reference no.	**DU026-121002-**
Legal Status	RMP, within the ZoN of the settlement of Kilgobbin.
Other Designations	N/A
Location	Kilgobbin
Site Type	Linear earthwork
ITM	719281, 724676
Description	Goodbody (1993, 25-32) suggests that the Pale Ditch may have run through Kilgobbin. He indicates that a lane which runs off Kilgobbin road to Kilgobbin cottage was a bank in the early eighteenth century, which followed the line of a Pale ditch which it replaced.
Sources	www.archaeology.ie; Goodbody, R. 1993 On the borders of the Pale. A history of Kilgobbin, Stepaside and the Sandyford area. Bray. Pale Publishing.
Images	 ***Private laneway in Kilgobbin to Kilgobbin Cottage and Meadowbrook Estate***
Approx Distance from FRS Measure	The RMP location for this site is 70m from the Kilgobbin Road measure, however, appears to be in the wrong location (as described in the inventory entry above), it is likely that the site is at the entrance to the private laneway (to Meadowbrook and Kilgobbin Cottage) where the proposed overflow pipe will run. There is a potential that that the subsurface remains should they survive will interact with the line of the overflow pipeline at some point along the route, there are existing manholes on the laneway which suggest that works have occurred here previously.

Reference no.	**DU026-005001-**
Legal Status	RMP Within the ZoN of the settlement of Carrickmines
Other Designations	N/A.

Location	Carrickmines Great
Site Type	Castle - unclassified
ITM	721785, 724107
Description	Only the gatehouse and a section of a revetted stone fosse and curtain wall with mural tower remains standing of Carrickmines Castle and bawn (DU026-005002-) which is located in the townland of Carrickmines Great (Carraig Mhaighin Mhór), in the parish of Tully in the barony of Rathdown. This gatehouse has been been incorporated into post-1700 farm outbuildings. The castle stands on low-lying terrain off the Golden Ball-Carrickmines Road, on the south side of a stream which marks the townland boundary with Carrickmines Little to the north and Brenanstown to the northeast. A U-Shaped building with large enclosure attached to north side is depicted in the area of the medieval castle on Rocque's 1760 map of County Dublin where it is shown standing immediately west of a road which traverses the stream to northeast. The castle appears to have been built to control this road and crossing point over the stream to the northeast where Carrickmines Bridge is depicted on the 1st. ed. OSi 6-inch map. On this map the castle appears to the have stood to the north of a cluster of dwellings with a larger dwelling to the south-southeast. According to D'Alton (1838, 836) in 1178 Archbishop O'Toole confirmed the church of 'Carrickmayne', with all it tithes to Christ Church. In 1295 the Roll of Service of Dublin, recorded a payment of 3s. from 'Roger fitz David, for Karrkmayn [Carrickmines]' (Cal. doc. Ire., Vol. 4, 108, no. 259). Two years earlier in 1293 there was a royal grant of 'English laws and customs to persons purporting to be Irishmen' which included 'Roger Fitz David' (Cal. doc. Ire., Vol. 4, 6, no. 19). In 1297/8 there is a payment of 5s. in the Roll of service of Tristledermot [Castledermot] from 'Roger David de Carmayn [Carrickmines]' (Cal. doc. Ire., Vol. 4, 222, no. 473). In 1301/02 the Pipe Roll of Edward I recorded a payment from 'Roger Dauy [David] for Aunger de Lisbon, 5s. for the service of one foot serjeant from Carrickmayn [Carrickmines]' (38th Report of the Deputy Keeper of Ireland, 61). In 1314/15 in the Pipe Roll of 9 Edward II recorded payment into the treasury from the 'Lands of Adam de Cromelyn, co. Dublin' which included the following payment from Carrikmayn [Carrickmines]; 'He accounts for 13s. 4d. rent of 40 acres, 6 cottars and issues from pasturage of the demesnes which belonged to Roger son of David at Carrikmayn near Senekyl [Shankill], in the King's hand by the death of said Roger from 16 Mar. a.r. v., to 15 May same year, before the premises were delivered to John his son and heir. Sum 13s. 4d.—deduct 6s. 8d. rent of 40 acres sown before death of said Roger. Sum 6s. 8d.'(Appendix to 39th Report of the Deputy Keeper of Ireland, 61). Around 1326 there is a reference to Carrickmines [Carricmayn] in the rental account of the Prior of the Cathedral Church of the Holy Trinity (Christchurch DU018-020270-) which received payment of 40s. for 40 acres in Carrickmines [Carricmayn] and Ballybrennan from Maurice Howell. The Irish Exchequer Payments recorded that in 1335-6 a sum of £13 6s. 8d. in compensation for expenses incurred by John de Troye, baron of the exchequer who had been 'lately appointed by various letters patent under the great seal to supervise wards placed by the king and the communities of those parts at Killoghtre, Kylmartre, Newcastle McKinegan, Kylrothery, Bree, Carrigmayn [Carrickmines], Dundrom, Tauelaght and Saggart in Leinster in Co. Dublin and at Kylhele, Rathmore, Balymore and Grane in Cos. Kildare and Carlow, in defence of the marches of those counties and the king's faithful people there against the hostile attacks of Obryn, Otothill, Onolan and their accomplices, then enemies of the king, who were daily invading the marches and people and committing homicides, depredations, burnings and other crimes, and he stayed with many armed men and archers not without heavy labours and expenses for no small time in supervising these wards and the persons nominated for those wards, to see whether they, the nominated persons or others in the place of those who were unfit stayed there continuously and if any did not come or send others in their place, and who left the wards without licence, and when each arrived and left, and if those coming to the wards were suitably arrayed and furnished with horses and arms, and to punish tor their contempt and rebellion those who did not come or did not stay in the wards' (Connolly 1997, 472). In 1359, John Scrop, the clerk of the wages of men at arms in Leinster was ordered by Edward III to pay 'John Bermingham kt, who was in the parts of Carrigmayn with men-at-arms [etc.] to resist Obryn and Otothill' (Close Roll 33 Edward III, Calendar of Irish Chancery Letters). In

	1372 the Prior and Convent of the Holy Trinity Church [Christchurch DU018-020270-] leased to 'Sir Thomas Walsch, chaplain, the town of Balybrenan [adjoining to Carrickmines], (the tithes both great and small thereto belonging, being reserved); for 20 years; rent, 4 marks. Lessee is bound to do suit of court at Clonken twice a year, to build and maintain a stone house on the premises within four years, and to surrender it in good condition at the end of term, under a penalty of double the rent. Should lessee die during the term, lessors to be entitled to heriot, or half a mark, at their pleasure; and should the rent be in arrear for 15 days, lessors may re-enter the premises and recover the rent in arrear as a simple debt' (Appendix to 23rd Report of the Deputy Keeper of Ireland, 120, Deed No. 717). In 1374 a letter to the Treasurer and chamberlains of the exchequer, stated that, John Colton, Treasurer of Ireland, 'stayed at Carrykmayn for eight days, and later for one month, with a great company of defensible men beyond his own retinue to resist them [the Irish] in salvation of the neighbouring marches, where every day he rode from morning to evening with others of the said marches undertaking various excessive labours at his own costs' (Close Roll 48 Edward III, Calendar of Irish Chancery Letters). In 1395 there is a reference to the manor of 'Carrykmayne' and other manors which 'belonged to John fitz James Archbold and Hugh Lawless kt (which have come into the K.'s hand both by forfeiture and acquisition)' (Close Roll 18 Richard II A Calendar of Irish Chancery Letters). On the 11th of March 1400 the Crown recorded that; 'Thorncastelle co. Dublin in Ireland. Order of the issues and rents of that manor to pay to Henry Adamesone of Cairykmayn [Carrickmines] 100s. a year, which for good service the king has granted him' (Calendar of the Close Rolls Henry IV, Vol. 1, 69). In 1415 the English crown recorded a royal pardon to 'William Walsh of Carrykmayn of debts and accounts' (Patent Roll 2 Henry V, A Calendar of Irish Chancery Letters). The terrier of the Down Survey of the Parish of Tully recorded that the lands of Carrickmines and Glenamuck amounting to 844 acres, in 1640 belonged to the Irish Papist, Theobald Welsh [Walsh] where 'there stands only the Walls of a ffayre Stone House' (NLI, Ms. 714). On the 22nd of April, 1529 before the Barons of the Exchequer an Inquisition recorded that 'Theobald Walshe was seised of the manor of Carrykmayn. held in chief at 6s. royal service. James his s[on]. & h[eir]., inherited & d[ied]. without lineal heir. James nearest heir, his brother Robert, intruded himself & held the manor from James' death, i.e. from 15 Dec 1512' (Griffith 1991, 22). The 1654-56 Civil Survey of County Dublin recorded that there was on the lands of 'Theobald Walsh of Carrickmayne', Captain of a Foot Company in the Irish Army, 'the Walles of a Castle, an Orchard, and garden plott, a Bawne; the Buildings are Valued by the Jury at Tenn poundes' (Simington 1945, 270). According to this jury the Castle of Carrickmines was 'a Mannor & kept Court Leet, the Tithes belong to Christ-Church' (ibid.).
Sources	www.archaeology.ie; D'Alton 1838; Cal. Doc. Ire 1875-86; Connolly 1997; Griffith 1991; Simington 1945; Berry, H. F. (ed.) 1910
Images	

	Ruins associated with Carrickmines castle in 1983 (Patrick Healy collection https://hdl.handle.net/10599/3418)  ***Ruins of Carrickmines castle at Junction 15 of the M50 motorway***
Approx Distance from FRS Measure	c.70m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-005002-**
Legal Status	RMP
Other Designations	N/A
Location	Carrickmines Great
Site Type	Bawn
ITM	721769, 724109
Description	Only the gatehouse and a section of curtain wall with external stone-revetted fosse and mural tower remains standing of the bawn that defended Carrickmines Castle (DU026-005001-) which was described in the 1654-56 Civil Survey of County Dublin as, *'the Walles of a Castle, an Orchard, and garden plott, a Bawne; the buildings are Valued by the Jury at Tenn poundes'* (Simington 1945, 270). According to this jury the Castle of Carrickmines which in 1640 belonged to 'Theobald Walsh', a Captain of a Foot Company in the Irish Army was 'a Mannor & kept Court Leet, the Tithes belong[ed] to Christ-Church [DU018-020270-]' (ibid.). Only the gatehouse remains standing of Carrickmines Castle and bawn which is located in the townland of Carrickmines Great (Carraig Mhaighin Mhór), in the parish of Tully in the barony of Rathdown. This gatehouse has been been incorporated into post-1700 farm outbuildings. The castle stands on low-lying terrain off the Golden Ball-Carrickmines Road, on the south side of a stream which marks the townland boundary with Carrickmines Little to the north and Brenanstown to the northeast. A U-Shaped building with large enclosure attached to north side is depicted in the area of the medieval castle on Rocque's 1760 map of County Dublin where it is shown standing immediately west of a road which traverses the stream to northeast. The castle appears to have been built to control this road and crossing point over the stream to the northeast where Carrickmines Bridge is depicted on the 1st. ed. OSi 6-inch map. On this map the castle appears to the have stood to the north of a cluster of dwellings with a larger dwelling to the south-southeast. Excavations at Carrickmines castle have revealed a double fosse/double bank along the northwest flank of the site. To the southeast of the inner castle area is a stone-revetted fosse interpreted as part of the southern curtain wall. This enclosed an area of angular form and was connected to an earlier enclosure by a causeway. Two linear fosses identified c 60m to the south of the castle may represent some form of outer defence line. These contained

	Saintonge pottery which was made in the Saintonge region of France in the 13th and 14th centuries (Clinton 2002, 72). A Draft Conservation Plan of Carrickmines Castle 2015-2025, commissioned by Dún Laoghaire-Rathdown County Council, recorded the following details about Carrickmines Castle; 'The site today consists of three areas, connected by modern half-round tunnels, effectively rendering it an island within a motorway. The site consists of post-medieval farm buildings and the fragmentary remains of part of a medieval gatehouse positioned between the M50 motorway and Glenamuck Road North. A post-medieval masonry bridge is located within a timber-walled enclosure in the roundabout at the bottom of Glenamuck Road North. Both areas are connected by halfround concrete tunnels which house the remains of the looping defences of Carrickmines including the surviving revetted stone fosse. The south-eastern enclosure was added last, and this re-used the eastern causeway of the south-western enclosure to allow passage between both areas. The south-eastern enclosure had three sets of defences (i.e. trivallate) with the innermost and central ditch cut into bedrock, and sections of the defences extending 217m in length revetted in granite. The south-eastern enclosure had the foundations of a rectangular structure which has been suggested as a gate tower controlling access into the site. This was the strongest of the three enclosures, and probably the 'bawn' later recorded by the Civil Survey in the seventeenth century. The defensive triple-ditched enclosures at Carrickmines had three entrances: a revetted causeway in the north-west corner which may have had a drawbridge between the inner and middle fosse; the gate house which formed part of the revetted stone fosse, a segment of which is still visible to the north of the farm buildings; and a staggered entrance at the south side of the rectangular enclosure crossing all three fosses, possibly with a wooden gate tower. A stretch of fosse survives to the north of the farm buildings, and extends beneath the Glenamuck Road overpass. The remains consist of a stone-revetted fosse wall with the remains of the foundations of a possible square mural tower beneath the overpass tunnel. The masonry is heavily overgrown. The eastern fosse consists of a stone-revetted fosse, extending from the south-east corner of the site and beneath the roundabout on Glenamuck Road. The fosse is heavily overgrown with most of its length obscured by mature vegetation. The exposed granite masonry below the overpass tunnel is loose and requires consolidation' (Bolton 2015, 27, 30, 49-50).
Sources	www.archaeology.ie; Simington 1945; Clinton 2002; Bolton 2015
Images	-
Approx Distance from FRS Measure	c.84m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-005003-**
Legal Status	RMP
Other Designations	N/A
Location	Carrickmines Great
Site Type	Fortification
ITM	721770, 724105
Description	Excavations revealed the remains of a northern enclosure of possible moated site which was described in the Draft Conservation Plan of Carrickmines Castle as follows; 'The northern defences of Carrickmines Castle (DU026-005001-) consist of three earth and stone ditches. The earliest is the northern enclosure, possibly a moated site defended by a broad ditch and containing at least one substantial stone building. Another enclosure was later added to the south-west which had two probable entrances - a causeway or bridge on the south side, and

	a causeway on the east side. The south-east enclosure [DU026-005002-] was added last and was defended by three sets of defences (i.e. trivallate) with the innermost and central ditch cut into bedrock, and sections of the defences revetted in granite. The south-eastern enclosure had the foundations of a rectangular structure which has been suggested as a gate tower' (Bolton 2015, 27-8).
Sources	www.archaeology.ie; Bolton 2015
Images	-
Approx Distance from FRS Measure	c.83m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-005004-**
Legal Status	RMP
Other Designations	N/A
Location	Carrickmines Great
Site Type	Mill - unclassified
ITM	721772, 724103
Description	This site is located in low-lying terrain off the Golden Ball-Carrickmines Road. A millrace runs from the site identified on the OS 1st edition map as 'site of an ancient mill' to the north of Carrickmines castle.
Sources	www.archaeology.ie
Images	-
Approx Distance from FRS Measure	c.81m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

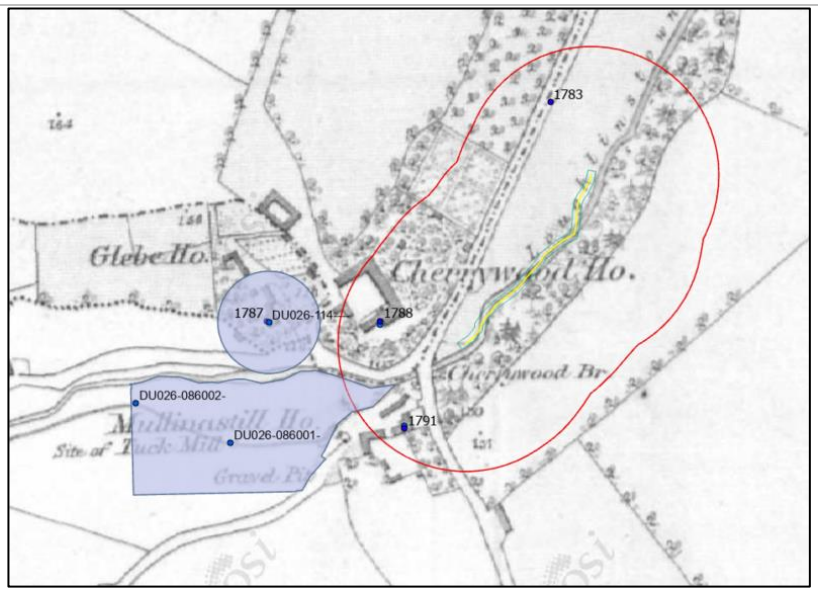
Reference no.	**DU026-005005-**
Legal Status	SMR
Other Designations	N/A
Location	Carrickmines Great
Site Type	Enclosure
ITM	721777, 724103
Description	Excavations revealed the remains of a south-west enclosure which was described in the Draft Conservation Plan of Carrickmines Castle (DU026-005001-) as follows; 'The northern defences of Carrickmines Castle (DU026-005001-) consist of three earth and stone ditches. The earliest is the northern enclosure [DU026-005003-], possibly a moated site defended by a broad ditch and containing at least one substantial stone building. Another enclosure was later added to the south-west which had two probable entrances - a causeway or bridge on the south side, and a causeway on the east side. The south-east enclosure [DU026-005002] was added last and was defended by three sets of defences (i.e. trivallate) with the innermost

	and central ditch cut into bedrock, and sections of the defences revetted in granite. The south-eastern enclosure had the foundations of a rectangular structure which has been suggested as a gate tower. The excavation report considered that the three conjoined defensive enclosures (north, south-west and southeast enclosures) were built within the space of a few generations by the Lissebon family. These three enclosures extend north, east and west of the farmhouse and barn buildings at Carrickmines' (Bolton 2015, 27-8).
Sources	www.archaeology.ie; Bolton 2015
Images	-
Approx Distance from FRS Measure	c.77m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-145----**
Legal Status	SMR
Other Designations	N/A
Location	Carrickmines Great
Site Type	Rock art
ITM	721783, 724068
Description	This is one of three small boulders (DU026-146/147----) containing cup-marks which were discovered during archaeological investigations on the route of the South-Eastern Motorway (Clinton 2002). Rock A. described by Dr Muiris O'Sullivan as a; 'Slightly rounded granite boulder (00E0525:3:104). The surface into which the cupmarks are carved is convex in form with at least 24 cupmarks to be seen on a face measuring 0.61m x 0.38m. The largest of the cupmarks measure approximately 4 cm across while the smallest examples are about half that diameter. The field of cupmarks extends more or less over the entire area of the face. In spite of the variations in size the cupmarks appear to form a coherent group in general disposition on the stone, individual form and carving technique' (Breen 2012, 397).
Sources	www.archaeology.ie; Clinton 2002; Breen 2012
Images	-
Approx Distance from FRS Measure	c.83m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-146----**
Legal Status	SMR
Other Designations	N/A
Location	Carrickmines Great
Site Type	Rock art

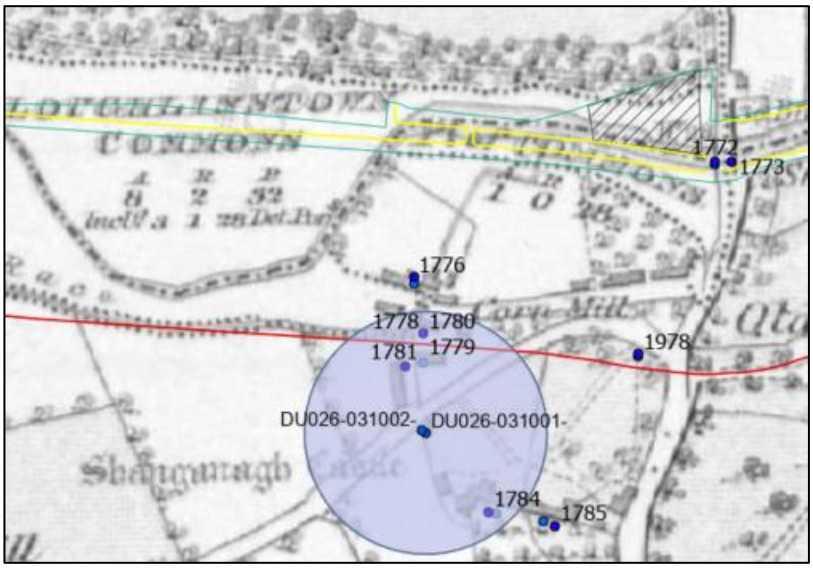
ITM	721783, 724068
Description	This is one of three small boulders (DU026-145/147----) containing cup-marks which were discovered during archaeological investigations on the route of the South-Eastern Motorway (Clinton 2002, 87). Rock B described by Dr Muriris O'Sullivan as a; 'Slightly rounded granite boulder (00E0525:1:6094). The surface into which the cupmarks are carved is convex in form with a fault line running along the centre of the face for approximately half its length. This face measures 0.60m x 0.48m. There are at least nine cupmarks to be seen on the face, generally clustered near the centre and arranged in two loose arcs, with an outlier. Three of them are formed along the fault line and these might conceivably be natural' (Breen 2012, 397).
Sources	www.archaeology.ie; Clinton 2002; Breen 2012
Images	-
Approx Distance from FRS Measure	c.83m southwest of the Glenamuck Road North Measure and south of the Glenamuck Road North

Reference no.	**DU026-086001-**
Legal Status	RMP
Other Designations	N/A
Location	Cherrywood, Shankill
Site Type	Mill - fulling
ITM	724083, 722581
Description	The site was located south of the Brides Glen Road, on the south bank of the stream and east of the M50. The 1837 OS 6-inch map indicates the 'site of tuckmill'. It is not shown on the 1937 OS 6-inch map but the house name Mullinastill House at a distance to the east indicates the former presence of a mill.
Sources	www.archaeology.ie
Images	

	First edition OS Map of 1837, the flood measure is further upstream on the Loughlinstown River
Approx Distance from FRS Measure	c.30m southwest of the Cherrywood Road Measure. There will be no impact on the site, the works are being carried out further downstream of the mill site.

Reference no.	**DU026-031001-**
Legal Status	RMP
Other Designations	N/A
Location	Shanganagh
Site Type	Castle - tower house
ITM	725226, 722846
Description	The fragmentary remains of this tower house are located in private grounds at Beechlands. It is situated in a prominent position above Bride's Glen. It was built in 1408 by a member of the Lawless family and it was destroyed by fire in 1763 (Turner 1983, 85-6). The ivy-covered west wall and northwest corner are all that survive. The later rises to three storeys. There is a chimney stack present. The tower house is built of roughly coursed granite masonry. There is a high base batter on the section of north wall. The ground floor is vaulted on a N-S axis. There are two deep recesses with wicker-centring in the ground floor west wall (int dims. L 8.4m; Wth 2.15; Wall T 0.9m), (Ball 1902, 117-18, Mc Dix 1897, 39, 6).
Sources	www.archaeology.ie; Turner 1983; Ball 1902; Mc Dix 1897
Images	 ***Down survey Map 1654 highlighting Shanganagh Castle***
Approx Distance from FRS Measure	c. 84m south of the Commons Road and Brookdene Measure there will be no impact on this site. The castle site is located in private grounds surrounded by a wall and shelter belt of trees

Reference no.	**DU026-031002-**
Legal Status	RMP
Other Designations	N/A
Location	Shanganagh
Site Type	Water mill - unclassified

ITM	725224, 722847
Description	A mill is listed in the Civil survey (1654-6) and is shown on the Down Survey (1655-6) map . A mill race led from Loughlinstown to Shanganagh and there are the ruins of a mill dating from 1847 probably on the site of the medieval mill (pers. comm. Rob Goodbody).
Sources	www.archaeology.ie
Images	 ***Down survey Map 1654 highlighting the mill***  ***First edition OS Map of 1837***
Approx Distance from FRS Measure	c. 84m south of the Commons Road and Brookdene Measure

13.4.3 Architectural Heritage Sites – Record of Protected Structures (RPS Sites) and National Inventory of Architectural Heritage Sites (NIAH)

Reference no.	**RPS 1684 (See CH1)**
Legal Status	Protected Structure
Other Designations	NIAH 60260003
Location	Glenamuck Road
Site Type	Kilgobbin House
ITM	719351, 724844
Description	Detached three-bay two-storey house, extant 1837, on a T-shaped plan with single-bay (single- or two-bay deep) full-height central return (west). Renovated, 2009. Pitched slate roof on a T-shaped plan centred on pitched slate roof (west) with clay ridge tiles, cut-granite coping to gables with roughcast chimney stacks to apexes having rendered rounded capping supporting terracotta or yellow terracotta tapered pots, and cast-iron rainwater goods on roughcast eaves retaining cast-iron hoppers and downpipes. Roughcast walls. Round-headed central door opening with cut-granite threshold supporting cast-iron bootscrapers, cut-granite doorcase with panelled pilasters supporting archivolt centred on keystone, and concealed dressings framing replacement glazed timber panelled door having fanlight. Square-headed window openings with cut-granite sills, and concealed dressings framing eight-over-eight (ground floor) or six-over-six (first floor) timber sash windows with six-over-six timber sash windows to rear (west) elevation. Interior including (ground floor): central hall retaining carved timber surrounds to door openings framing timber panelled doors; and carved timber surrounds to door openings to remainder framing timber panelled doors with timber panelled shutters to window openings. Set back from line of road in landscaped grounds with cut-granite tapered piers to perimeter having pyramidal capping supporting cast-iron gate. A house representing an important component of the domestic built heritage of south County Dublin with the architectural value of the composition, 'a charming late Georgian house [which] may incorporate an earlier structure' (Pearson 1998, 319), suggested by such attributes as the compact plan form centred on a Classically-detailed doorcase not only demonstrating good quality workmanship in a silver-grey granite, but also showing a pretty fanlight; the somewhat disproportionate bias of solid to void in the massing compounded by the diminishing in scale of the centralised openings on each floor producing a graduated tiered visual effect; and the high pitched roofline. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original or sympathetically replicated fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house having historic connections with Daniel O'Connell FitzSimon (1872-1948) of Glencullen House (see 60250027). The property fronts onto the Kilgobbin Road behind a rubble stone wall, there is a pedestrian gate to the house and a vehicular gate further north along the road. To the west and rear of the building there are modern extensions, these additions do not detract from the main structure due to their positioning and scale. The house and its roadside boundary treatment are an important part of the 18th/19th century ‘country road’ character of Kilgobbin road. The western boundary wall of the property runs directly along the east bank of the river, it is 1.80–2m high (inside the property, and at least 3m+ high on the river side) comprising a roughly coursed pink granite rubble stone
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie

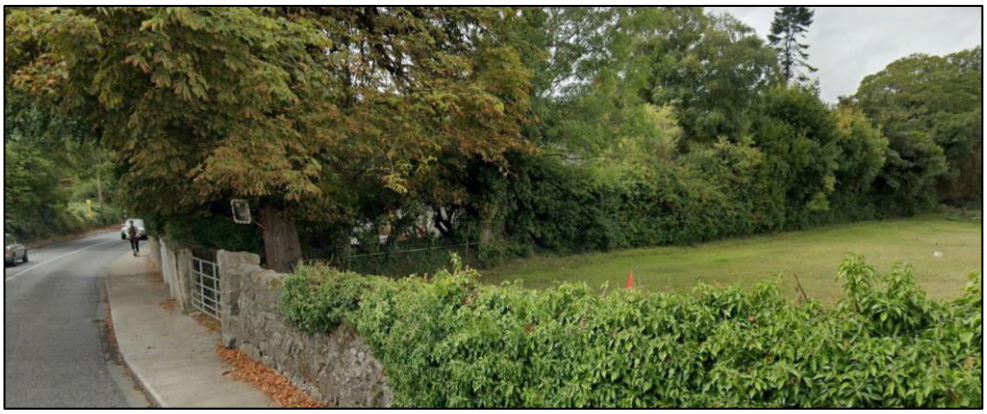
Images	 ***Kilgobbin House front elevation***  ***Boundary wall and Kilgobbin Bridge on the right-hand side of the photo, view looking west***  ***Curving boundary wall at Kilgobbin Bridge***
Approx Distance from FRS Measure	The southwestern boundary wall of Kilgobbin House is part of the Kilgobbin flood measure

Reference no.	**60260004**
Legal Status	NIAH Site

Other Designations	NIAH
Location	Kilgobbin Road, north of the entrance to Kilgobbin House
Site Type	Milestone/milepost
ITM	719375, 724863
Description	Freestanding inscribed cut-granite milestone, extant 1909. Road fronted on concrete footpath. A weathered milestone making a pleasing, if largely inconspicuous visual statement in a sylvan street scene.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	 ***Milestone on Kilgobbin Road***
Approx Distance from FRS Measure	c.71m north of the Kilgobbin flood measure. There will be no impact to this structure.

Reference no.	**RPS 1688**
Legal Status	Protected Structure
Other Designations	NIAH 60260008
Location	Kilgobbin Villa, Kilgobbin Road
Site Type	House
ITM	719340, 724748
Description	Detached three-bay two-storey house, extant 1837, on a rectangular plan centred on single-bay single-storey gabled projecting glazed porch to ground floor; three-bay two-storey rear (east) elevation. Pitched slate roof with terracotta ridge tiles, cut-granite coping to gables with red brick Running bond chimney stacks to apexes having stepped capping supporting terracotta or yellow terracotta tapered pots, and replacement uPVC rainwater goods on rendered cut-granite eaves retaining cast-iron octagonal or ogee hoppers and downpipes. Rendered, ruled and lined wall (ground floor); roughcast surface finish (first floor); rendered, ruled and lined surface finish to side elevations with roughcast surface finish to rear (east) elevation. Segmental-headed central door opening into house with glazed terracotta tiled threshold, timber doorcase with panelled pilasters on padstones supporting "Cyma Recta"- or "Cyma Reversa"-detailed cornice, and concealed dressings framing timber panelled door having fanlight. Square-headed window openings with cut-granite sills, and concealed dressings framing eight-over-eight timber sash windows. Set back from line of road in landscaped grounds with cut-granite octagonal piers to perimeter having pyramidal capping supporting flat-iron gate.

	A house representing an integral component of the early nineteenth-century domestic built heritage of south County Dublin with the architectural value of the composition, one rooted firmly in the contemporary late Georgian fashion, suggested by such attributes as the compact rectilinear plan form centred on a Classically-detailed doorcase not only demonstrating good quality workmanship, but also showing a simplified "peacock tail" fanlight; and the diminishing in scale of the openings on each floor producing a graduated visual impression. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original or sympathetically replicated fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house making a pleasing visual statement in a sylvan street scene. Kilgobbin Villa fronts onto Kilgobbin Road and is situated behind rubble stone roadside walls. The Kilgobbin Stream runs beneath the Kilgobbin road bridge in an open culvert through the property. There is a pedestrian gate to the house and a vehicular entrance to the north of the property A tall rubble stone wall also bounds the property to the south where there is access to the rear farm buildings from a private lane way.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	 ***Kilgobbin Villa façade and pedestrian entrance***  ***The boundary wall surrounding Kilgobbin Villa and the private lane way, view northeast. Note the painted white jostle sone at the rounded edge of the boundary/road junction***
Approx Distance from FRS Measure	The proposed overflow pipe route associated with the Kilgobbin flood measure runs immediately outside the property boundary walls to the east and also south along a private laneway. The measure will have no impact on the enclosing boundary walls associated with the property.

Reference no.	**RPS 1689**
Legal Status	Protected Structure
Other Designations	NIAH 60260002
Location	Thornberry House
Site Type	House
ITM	719292, 724739
Description	Detached three-bay (two-bay deep) two-storey house, extant 1837, on a square plan. Renovated. Hipped slate roof on a U-shaped plan with terracotta ridge tiles, paired rendered chimney stacks on axis with ridge having stringcourses below capping supporting yellow terracotta pots, and cast-iron rainwater goods on rendered cut-granite eaves retaining cast-iron octagonal hoppers and downpipes. Roughcast walls bellcast over rendered plinth. Segmental-headed central door opening with cut-granite step threshold, timber doorcase with engaged fluted columns supporting lead-covered "Cyma Recta" or "Cyma Reversa" cornice on flush beaded or panelled frieze, and concealed dressings framing timber panelled door having fanlight. Square-headed window openings with cut-granite sills, and concealed dressings framing replacement six-over-six timber sash windows. Set back from line of road in landscaped grounds with rendered piers to perimeter having cut-granite shallow pyramidal capping supporting wrought iron double gates. A house representing an integral component of the early nineteenth-century domestic built heritage of south County Dublin with the architectural value of the composition, one rooted firmly in the contemporary late Georgian fashion, suggested by such attributes as the compact plan form centred on a Classically-detailed doorcase not only demonstrating good quality workmanship, but also showing a simple radial fanlight; and the diminishing in scale of the openings on each floor producing a graduated visual impression. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original or sympathetically replicated fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house forming part of a self-contained group alongside the adjacent Castle Lodge (see 60260001) with the resulting ensemble making a pleasing visual statement in sylvan street scene.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	 ***Thornberry House is located behind a mature treelined hedgerow, view southwest towards the property. The field in the foreground is proposed for a site compound***
Approx Distance from FRS Measure	The property is located immediately to the south of the Kilgobbin flood measure compound and is c 12m from the proposed overflow waterpipe which runs through the Kilgobbin Road. There will be no impact on this property it is behind a mature tree boundary and a wall and hedgerow with limited views into or out of the property.

Reference no.	RPS 1690
Legal Status	Protected Structure
Other Designations	NIAH 60260001
Location	Castle Lodge
Site Type	House
ITM	719270, 724714
Description	Detached three-bay (two-bay deep) two-storey house, extant 1837, on a T-shaped plan with single-bay (single-bay deep) two-storey central return (west). Renovated. Replacement hipped slate roof on a T-shaped plan centred on hipped slate roof (west) with clay ridge tiles, rendered chimney stack on axis with ridge having shallow capping supporting yellow terracotta pots, and uPVC rainwater goods on timber eaves boards on box eaves. Roughcast walls bellcast over rendered plinth. Segmental-headed central door opening with cut-granite step threshold, timber doorcase with panelled pilasters supporting lead-covered "Cyma Recta" or "Cyma Reversa" cornice on "Acanthus"-detailed consoles, and concealed dressings framing timber panelled door having fanlight. Square-headed window openings with cut-granite sills, and concealed dressings framing replacement two-over-two timber sash windows. Set back from line of road in landscaped grounds with rendered, ruled and lined piers to perimeter having cut-granite shallow pyramidal capping supporting cast-iron double gates. A house representing an integral component of the early nineteenth-century domestic built heritage of south County Dublin with the architectural value of the composition, one rooted firmly in the contemporary late Georgian fashion, suggested by such attributes as the compact plan form centred on a Classically-detailed doorcase not only demonstrating good quality workmanship, but also showing a simple radial fanlight; and the diminishing in scale of the openings on each floor producing a graduated visual impression. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original or sympathetically replicated fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house forming part of a self-contained group alongside the adjacent Thornberry (see 60260002) with the resulting ensemble making a pleasing visual statement in a sylvan street scene.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.46m northeast of the Kilgobbin flood measure proposed water overflow pipe on the Kilgobbin Road. No effect.

Reference no.	**RPS 2061**
Legal Status	Protected Structure
Other Designations	NIAH 60260006
Location	Greenfield House
Site Type	House
ITM	719509, 724723
Description	Detached three-bay two-storey over basement house, extant 1901, on a T-shaped plan with single-bay (single-bay deep) full-height central return (south). Pitched slate roof on a T-shaped plan centred on pitched (gabled) slate roof with terracotta ridge tiles, rendered chimney stacks having "Cyma Recta"- or "Cyma Reversa"-detailed cornice capping supporting terracotta tapered pots, timber bargeboards to gables on timber purlins, and replacement uPVC rainwater goods on timber eaves boards on exposed timber rafters retaining cast-iron downpipes. Roughcast walls on cut-granite chamfered cushion course on rendered plinth with "timber frame" surface finish to gables; slate hung surface finish (south). Square-headed off-central door opening with timber mullions supporting timber transom, and concealed dressings framing glazed timber panelled double doors having sidelights on panelled risers below overlight. Square-headed window openings (first floor) with cut-granite sills, and red brick block-and-start surrounds framing timber casement windows. Square-headed window openings (remainder) with cut-granite sills, and concealed dressings framing six-over-six or one-over-one (first floor) timber sash windows. Set in landscaped grounds with cut-granite piers to perimeter having stringcourses below pyramidal capping supporting replacement cast-iron double gates. A house representing an important component of the nineteenth-century domestic built heritage of south County Dublin with the architectural value of the composition, one potentially repurposing portions of an earlier house (extant 1837) marked on the first edition of the Ordnance Survey (published 1843), suggested by such attributes as the compact plan form centred on a pillared veranda; the diminishing in scale of the openings on each floor producing a graduated tiered visual effect with the principal "apartments" or reception rooms defined by bay windows; and the "faux" medieval timber work embellishing the roofline. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, including a partial slate hung surface finish, thus upholding the character or integrity of the composition. Furthermore, an adjacent coach house (extant 1909); and a nearby gate lodge (see 60260007), all continue to contribute positively to the group and setting values of a diminished estate having historic connections with the Phenix family including James Edward Phenix (1837-1910) 'of Greenfield Sandyford Kilgobbin' (Calendars of Wills and Administrations 1876, 621; cf. 60260011); and the Manly family including Arthur Reginald John Dalrymple Manly (1866-1941), 'Member of Dublin Stock Exchange' (NA 1901); and his sons Lieutenant Eric Cecil John Manly (1896-1917) and Lieutenant-Colonel Lawrence Arthur Manly (1899-1942), casualties of the First World War and the Second World War respectively.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	C. 83m northeast of the Kilgobbin flood measure proposed water overflow pipe on the Kilgobbin Road. No effect.

Reference no.	**RPS 1743**
Legal Status	Protected Structure
Other Designations	NIAH 60260232
Location	Glenamuck Road
Site Type	Station House (Former Carrickmines Railway Station)
ITM	721987, 724221
Description	Detached three-bay two-storey railway station, opened 1854, on a rectangular plan; four-bay two-storey platform (north) elevation. Occupied, 1911. Closed, 1958. Restored, 2009. Now disused. Hipped slate roof with lichen-spotted clay ridge tiles, rendered chimney stacks on rendered chamfered bases having concrete capping supporting terracotta pots, and cast-iron rainwater goods on timber eaves boards on slightly overhanging exposed timber rafters retaining cast-iron downpipes. Rendered, ruled and lined walls on rendered plinth with rusticated cut-granite quoins to corners. Round-headed central door opening with threshold, concealed dressings having bull nose-detailed reveals with open bed segmental pediment hood moulding on consoles framing replacement glazed timber door having overlight. Square-headed flanking window openings with cut-granite sills, and concealed dressings framing replacement uPVC casement windows replacing two-over-two timber sash windows. Square-headed window openings (ground floor) with cut-granite sills, and concealed dressings framing replacement uPVC casement windows replacing six-over-six timber sash windows. Square-headed window openings (first floor) with concealed dressings framing two-over-two timber sash windows centred on six-over-six timber sash window. Square-headed window openings to platform (north) elevation with lugged surrounds framing boarded-up replacement three-over-three timber sash windows. Set in unkempt grounds. A railway station erected to a design attributed to William Dargan (1799-1867) identified as an important component of the mid nineteenth-century domestic built heritage of south County Dublin on account of the connections with the development of the Dublin and South Eastern Railway (DSER) line opened (1854) by the Dublin and Wicklow Railway (DWR) Company with the architectural value of the composition, one recalling the contemporary Stillorgan Railway Station (see 6023----), suggested by such attributes as the compact rectilinear plan form centred on a pedimented doorcase; the dramatic diminishing in scale of the openings on each floor producing a graduated visual impression; and the slightly oversailing roofline.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	 *Station House (www.buildingsofireland.ie)*
Approx Distance from FRS Measure	c.98m north of the Glenamuck Road North Roundabout Measure. No effect.

Reference no.	RPS 1746
Legal Status	Protected Structure
Other Designations	NIAH 60260234
Location	Priorsland
Site Type	House, Out Offices and Gates
ITM	721969, 724152
Description	Detached three-bay two-storey house, extant 1884, on a cruciform plan centred on single-bay single-storey flat-roofed projecting porch to ground floor; three-bay (three-bay deep) two-storey lower block (west) with two-bay two-storey rear (west) elevation. Occupied, 1911. For sale, 1983. Hipped slate roof abutting hipped slate roof on a U-shaped plan (west), clay ridge tiles, paired rendered central chimney stacks on rendered bases having stringcourses below capping supporting terracotta or yellow terracotta tapered pots, rendered central chimney stacks (west) having stringcourses below capping supporting yellow terracotta tapered pots, and cast-iron rainwater goods on dentilated cornice retaining cast-iron downpipes. Part creeper- or ivy-covered fine roughcast walls on overgrown plinth with rendered piers to corners; part creeper- or ivy-covered fine roughcast surface finish (west). Central door opening into house. Square-headed window openings with cut-granite sills, and concealed dressings framing six-over-six timber sash windows. Square-headed window openings (west) with cut-granite sills, and concealed dressings framing six-over-six timber sash windows. Set in landscaped grounds with rendered tapered piers to perimeter having pyramidal capping supporting wrought iron double gates. A house representing an integral component of the nineteenth-century domestic built heritage of south County Dublin with the architectural value of the composition, one refronting an earlier house occupied by Reverend Lyndon Henry Bolton (d. 1869; Lewis 1837 II, 656), suggested by such attributes as the deliberate alignment maximising on scenic vistas overlooking landscaped grounds 'which enjoy a backdrop of semi-rural parkland'; the symmetrical frontage centred on a Classically-detailed porch; the diminishing in scale of the openings on each floor producing a graduated visual impression; and the monolithic timber work embellishing the roofline (Shaffrey 2010, n.p.). Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior where contemporary joinery including 'a fine staircase built in an anachronistic mid eighteenth-century style'; restrained chimneypieces; and decorative plasterwork enrichments, all highlight the artistic potential of the composition (ibid.). Furthermore, adjacent outbuildings (extant 1837); and a wedge-shaped walled garden (extant 1909), all continue to contribute positively to the group and setting values of a self-contained estate having historic connections with George Sutherland '[of] Priorsland Carrickmines County Dublin' (Journal of the Royal Historical and Archaeological Association of Ireland 1873, 204); Dr. Thomas Wrigley Grimshaw MD CB (1839-1900), 'Registrar General of Ireland late of Priorsland Carrickmines County Dublin' (Calendars of Wills and Administrations 1900, 196); Alexander Porter (1876-1946) and the Honourable Frances Maud Porter (née Gibson) (1880-1957); Alfred Dover Delap (1871-1943; Proceedings of the Society for Physical Research Volume XXXI 1921, 431; cf. 60260180); and Thomas Vincent Murphy (1902-88) 'of Priorsland Carrickmines'.
Sources	Dun Laoghaire Rathdown County Council; www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	The southern property of boundary of Priorsland House is part of the Glenamuck Road North Roundabout Measure.

Reference no.	60260228
Legal Status	NIAH Site
Other Designations	N/a of Regional Rating
Location	Glenamuck Road
Site Type	Water pump
ITM	721907, 724165
Description	Freestanding cast-iron “lion mask” water hydrant, extant 1937. Now disused. Road fronted. A “lion mask” water hydrant supplied by Glenfield and Kennedy (established 1852) of Kilmarnock representing an interesting example of mass-produced cast-iron work making a pleasing, if largely inconspicuous visual statement in a suburban street scene.
Sources	www.buildingsofireland.ie
Images	 ***Water hydrant on Castle View***
Approx Distance from FRS Measure	c. 5m north of the Glenamuck Road North Roundabout Measure on the opposite (northern) side of Castle View Road. No effect, however contractors should be made aware of its location.

Reference no.	RPS 1770
Legal Status	Protected Structure
Other Designations	N/A
Location	Waterfall Cottage
Site Type	Thatched Dwelling
ITM	724444, 723194
Description	Waterfall Cottage (RPS Ref: 1770) is a thatched structure located immediately adjacent to the flood measure, it is extant on the first edition OS map (1847) as an isolated L- shaped structure. The dwelling is located on an irregular shaped property plot and is bound by the river on its west side, which is contained on by rubble stone revetment wall. There are steps providing access to the river and instream boulders, gardens associated with the house

	continue upstream along the bank. On the opposite side of the river is a sloping grassy bank. Waterfall House is an important surviving example of traditional thatched roof workmanship. The structure has a visual and physical link to the river.
Sources	Dun Laoghaire Rathdown County Council
Images	 ***View upstream of Waterfall thatched Cottage, in the foreground a derelict mid-19th century dwelling***  ***View downstream of the riverbank garden of Waterfall house***  ***View looking upstream, showing the granite-built retaining wall on the left bank with the recessed steps***
Approx Distance from FRS Measure	The eastern riverside boundary of the property is part of the Lower Brides Glen flood measure.

Reference no.	RPS 1783
Legal Status	Protected Structure
Other Designations	NIAH 60260097
Location	Cherrywood Road
Site Type	Viaduct
ITM	724333, 722847
Description	Five-arch viaduct over road, built 1852-3; opened 1854. Closed, 1958. Now disused. Part creeper- or ivy-covered rock faced granite ashlar walls centred on benchmark-inscribed margined rock faced granite ashlar tapered piers with rock faced cut-granite coping to parapets. Series of five round arches with margined rock faced granite ashlar voussoirs. Sited spanning road. A viaduct erected to a design attributed to William Dargan (1799-1867) of Dublin identified as an important component of the mid nineteenth-century civil engineering heritage of south County Dublin on account of the connections with the development of the Dublin and South Eastern Railway (DSER) line opened (1854) by the Dublin and Wicklow Railway (DWR) Company with the architectural value of the composition, one recalling the so-called “Nine Arches Viaduct” (1854) at Milltown (see 6022----), confirmed not only by the robust rock faced surface finish demonstrating good quality workmanship, but also by the lofty “sweep” of the arches making a dramatic visual statement in a sylvan street scene: meanwhile, a discreet benchmark remains of additional interest for the connections with cartography and the preparation of maps by the Ordnance Survey (established 1824).
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.57m from the Cherrywood Road flood measure. No effects.

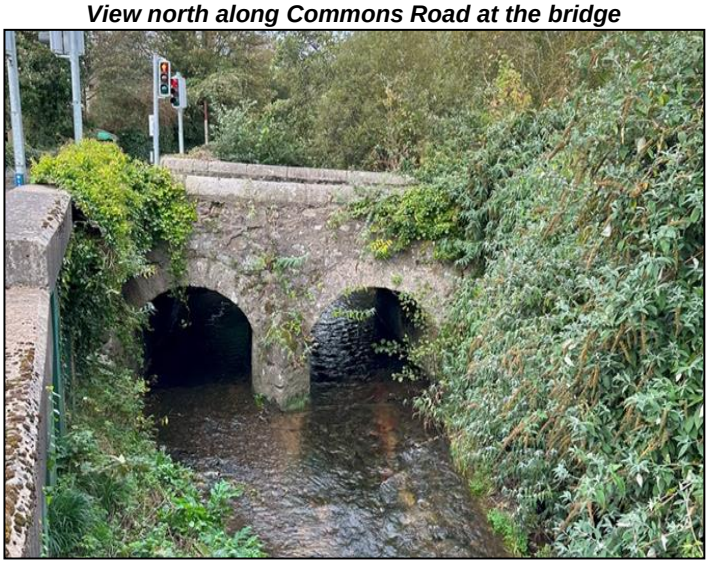
Reference no.	RPS 1788
Legal Status	Protected Structure
Other Designations	NIAH 60260096
Location	Cherrywood House
Site Type	House
ITM	724200, 722676
Description	Detached five-bay two-storey Church of Ireland glebe house, built 1751; extant 1760, on a rectangular plan with pair of single-bay (two- or three-bay deep) two-storey returns centred on single-bay (single-bay deep) two-storey return (north). Sold, 1860. Occupied, 1911. Pitched slate roof on an E-shaped plan behind parapet with clay ridge tiles, rendered coping to gables with rendered chimney stacks to apexes having chamfered capping supporting terracotta or yellow terracotta tapered pots, and concealed rainwater goods retaining cast-iron ogee hoppers and downpipes. Part creeper- or ivy-covered lime rendered or roughcast walls bellcast over rendered plinth with cut-granite coping to parapets. Square-headed window

	openings with cut-granite sills, and concealed dressings framing six-over-six timber sash windows without horns with six-over-six (ground floor) or six-over-three (first floor) timber sash windows without horns to side elevations. Square-headed window openings to rear (north) elevation centred on round-headed window opening (half-landing) with cut-granite sills, and concealed dressings framing six-over-six (ground floor) or six-over-three (first floor) timber sash windows centred on six-over-nine timber sash window without horns having fanlight. Set in landscaped grounds with rendered piers to perimeter having stepped capping supporting spear head-detailed wrought iron double gates. A glebe house erected for Dr. John Lyon (d. 1790), Prebendary of Rathmichael (appointed 1751; resigned 1764), representing an important component of the mid eighteenth-century built heritage of south County Dublin with the architectural value of the composition, '[a house which] was for several years the favourite retirement of Dr. Thomas Leland [1725-85], author of the "History of Ireland" [1773] and…the shrubbery of which was planted by the hand of that historian' (Brewer 1825, 171), confirmed by such attributes as the deliberate alignment maximising on scenic vistas overlooking rolling grounds; the rectilinear plan form; the diminishing in scale of the openings on each floor producing a graduated visual impression; and the parapeted high pitched roofline. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, including crown or cylinder glazing panels in hornless sash frames: meanwhile, contemporary joinery; and plasterwork refinements, all highlight the artistic potential of a glebe house having historic connections with the Rathmichael parish Church of Ireland clergy including Reverend William Beresford (1743-1819), later Archbishop of Tuam (fl. 1794-1819); and Reverend John P. Hunt (1786-1866), 'Clerk late of Cherrywood in the County of Dublin' (Calendars of Wills and Administrations 1866, 162).
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.58m from the Cherrywood Road flood measure. No effect

Reference no.	**RPS 1791**
Legal Status	Protected Structure
Other Designations	NIAH 60260094
Location	Mullinastill House
Site Type	House
ITM	724219, 722592
Description	Detached three-bay two-storey farmhouse, extant 1837, on a T-shaped plan with single-bay (two-bay deep) two-storey lower central return (west). Occupied, 1982. Now disused. Pitched slate roof centred on hipped and pitched slate roof (west) with terracotta ridge tiles, part creeper- or ivy-covered rendered chimney stacks having corbelled stepped chamfered stringcourses below capping supporting yellow terracotta tapered pots with yellow brick Running bond chimney stack (west) having corbelled stepped capping supporting terracotta pot, and cast-iron rainwater goods on cut-granite eaves retaining cast-iron octagonal or ogee hoppers and downpipes. Creeper- or ivy-covered roughcast wall to front (east) elevation; limewashed surface finish (remainder). Segmental-headed central door opening with overgrown cut-granite threshold, doorcase with panelled pilasters supporting archivolt centred on fluted keystone framing timber panelled door having fanlight. Square-headed flanking window openings in bipartite arrangement with cut-granite sills, carved timber mullions, and concealed dressings framing six-over-six timber sash windows. Paired square-headed window openings (first floor) centred on square-headed window opening with cut-granite sills,

	and concealed dressings framing six-over-six timber sash windows. Interior including (ground floor): central hall retaining carved timber surrounds to door openings framing timber panelled doors. Set in overgrown grounds with roughcast cylindrical piers to perimeter having overgrown capping supporting flat iron gate. A farmhouse representing an integral component of the domestic built heritage of south County Dublin with the architectural value of the composition suggested by such attributes as the compact plan form centred on a Classically-detailed doorcase not only demonstrating good quality workmanship, but also showing a simplified "peacock tail" fanlight; and the diminishing in scale of the openings on each floor producing a graduated visual impression with the principal "apartments" defined by elegant bipartite glazing patterns. A prolonged period of unoccupancy notwithstanding, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, thus upholding the character or integrity of a farmhouse having historic connections with the Grehan family including Thomas Grehan (1830-1918), 'Farmer [late of] Mullinastill Shankill County Dublin' (Calendars of Wills and Administrations 1918, n.p.).
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.76m from the Cherrywood Road flood measure. No Effects.

Reference no.	**RPS 1772**
Legal Status	Protected Structure
Other Designations	NIAH 60260118
Location	Bridge over Loughlinstown River
Site Type	Shanganagh Bridge (Over River)
ITM	725369, 722980
Description	Shanganagh bridge dated to 1829 is a protected structure (RPS Ref: 1773, NIAH 60260118). It was formerly a three-arched road bridge over the Loughlinstown river. It has two visible segmented arches and granite ashlar voussoirs centred on pointed cutwaters with pyramidal capping. The parapets comprise a cut-granite rounded coping, a style that is reminiscent of all the walls and bridges in south County Dublin (including the river walls at Carrickmines and bridge at Kilgobbin). There is an inscribed cut-granite date stone the face of which is illegible but is recorded as '*Built 1829 - Robert Day Thomas Bourchier Esq's – Overseers Myles Bready – Mason*', it also has a benchmark inscribed on it. On the upstream side of the bridge there are concrete floodwalls on both sides. The flood walls continue along the downstream side of the bridge on the southern bank, the northern bank however comprises a sloping embankment where there is a treelined sloping area runs down to the river where there are some rock armour /boulders revetting the bank. The bridge is on a historic routeway that connects to Bray and there is a significant potential that an earlier bridge structure was located here. Any in-stream works associated with the bridge repair works may reveal archaeological features including the potential of an earlier structure. The bridge reinforcement measure will however have the positive effect of protecting the bridge from future flood damage.
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie

Images	-  ***Plaque on the bridge***  ***View north along Commons Road at the bridge***  ***View upstream of the east facing side view of the bridge***
Approx Distance from FRS Measure	The bridge is within the Commons Road and Brookdene flood measure. The UAIA of Shanganagh river completed a detailed measured survey of Shanganagh bridge A written description of the bridge and a laser survey providing a full record of the bridge is provided in Appendix 12.5 and forms a baseline record for the structure.

Reference no.	RPS 1773
Legal Status	Protected Structure
Other Designations	N/a
Location	Shanganagh River
Site Type	Ford
ITM	725377, 722980
Description	Site of a ford in Shanganagh River. No further details are available.
Sources	Dun Laoghaire Rathdown County Council
Images	-
Approx Distance from FRS Measure	Within the Commons Road and Brookdene flood measure. No effect.

Reference no.	RPS 1776
Legal Status	Protected Structure
Other Designations	NIAH 60260127
Location	Mill House
Site Type	House
ITM	725220, 722923
Description	Detached three-bay two-storey house, extant 1837, on a T-shaped plan with single-bay (single-bay deep) two-storey lower central return (north). Pitched slate roof on a T-shaped plan centred on pitched slate roof (north), terracotta ridge tiles, lichen-covered concrete or rendered coping to gables with rendered chimney stacks to apexes having stepped capping supporting terracotta pots, and cast-iron rainwater goods on rendered eaves retaining cast-iron downpipes. Rendered, ruled and lined walls. Camber-headed central door opening with cut-granite threshold, and concealed dressings having bull nose-detailed reveals framing timber panelled door having overlight. Square-headed window openings with cut-granite sills, and concealed dressings framing two-over-two timber sash windows. Interior including (ground floor): central hall retaining carved timber surrounds to door openings framing timber panelled doors; and carved timber surrounds to door openings to remainder framing timber panelled doors with timber panelled shutters to window openings. Set back from lane in landscaped grounds with roughcast boundary wall to perimeter having lichen-covered rendered rounded coping centred on flat iron gate. A house representing an integral component of the domestic built heritage of south County Dublin with the architectural value of the composition suggested by such attributes as the compact plan form centred on a restrained doorcase showing a simple "mouth organ" overlight; and the diminishing in scale of the openings on each floor producing a graduated visual impression. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, both to the exterior and to the interior, thus upholding the character or integrity of a house making a pleasing visual statement in Mill Lane.

Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c. 66m to the south of the Commons Road and Brookdene flood measure. No effect.

Reference no.	**RPS 1788**
Legal Status	Protected Structure
Other Designations	N/a
Location	At the western end of Mill Lane, Shanganagh
Site Type	Mill
ITM	725225, 722895
Description	Mill lane has the site of the mill of Shanganagh which is shown on the downs survey map. The remains of the mill still stand and was built in 1847 to replace an earlier version. No further details are available.
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.94m south of the Commons Road and Brookdene flood measure. No effect.

Reference no.	**RPS 1779**
Legal Status	Protected Structure
Other Designations	N/a
Location	At the western end of Mill Lane, Shanganagh
Site Type	Millpond
ITM	725225, 722895
Description	A millpond associated with the 1847 mill (RPS 1788). No further details are available.
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.94m south of the Commons Road and Brookdene flood measure. No effect.

Reference no.	**RPS 1780**

Legal Status	Protected Structure
Other Designations	N/a
Location	At the western end of Mill Lane, Shanganagh
Site Type	Corn Kiln
ITM	725225, 722895
Description	The remains of a corn kiln. No further details are available.
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie
Images	-
Approx Distance from FRS Measure	c.94m south of the Commons Road and Brookdene flood measure. No effect.

Reference no.	**RPS 1978**
Legal Status	Protected Structure
Other Designations	NIAH 60260125
Location	Beechlands
Site Type	Gate lodge
ITM	725331, 722885
Description	Detached three-bay single-storey gate lodge, extant 1908, on a T-shaped plan centred on single-bay single-storey gabled advanced open porch. Extended, 1986, producing present composition. For sale, 2012. Chamfered slate-detailed hipped slate roof on a T-shaped plan centred on chamfered slate-detailed pitched (gabled) slate roof on chamfered timber posts, perforated crested terracotta ridge tiles extending into terracotta ridge tiles, red brick Common bond central chimney stack on chamfered cushion course on red brick Common bond base having "Cavetto" stringcourse below capping supporting terracotta pots, timber bargeboards to gable on timber purlins, and replacement uPVC rainwater goods on timber eaves boards on exposed timber rafters. Red brick Common bond walls on red brick header bond chamfered cushion course on red brick Common bond base. Round- or segmental-headed central door opening with cut-granite step threshold, and red brick voussoirs framing timber boarded door having overlight. Camber- or segmental-headed flanking window openings with red brick voussoirs framing two-over-two timber sash windows. Set back from line of road at entrance to grounds of Beechlands. A gate lodge not only contributing positively to the group and setting values of the Beechlands estate, but also illustrating the continued development or "improvement" of the estate by Sir Edward O'Farrell (d. 1926) with the architectural value of the composition, one eliciting strong comparisons with a contemporary gate lodge (1895) at Padua [Desmond] (see 6026----), suggested by such attributes as the compact plan form centred on an expressed porch; the construction in a vibrant red brick; the gentle "sweep" of the openings; and the high pitched roof showing a polygonal "fish scale" slate finish. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, thus upholding the character or integrity of a gate lodge making a pleasing, if largely inconspicuous visual statement in a sylvan street scene.
Sources	Dun Laoghaire Rathdown County Council www.buildingsofireland.ie

Images	-
Approx Distance from FRS Measure	. c.90m south of the Commons Road and Brookdene flood measure. No effect.

13.4.4 Areas of Archaeological Potential (AP)

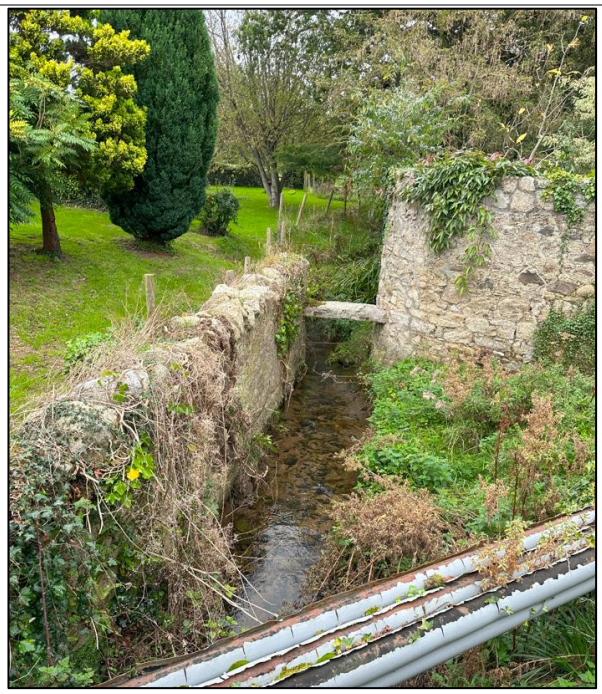
Rivers have been the focal point for settlement, transport, resources, and trade since the earliest of times. Riverscapes in areas of historic settlement in particular possess a significant potential to uncover a diverse range of archaeological heritage in a variety of contexts, including terrestrial, underwater, reclaimed ground, floodplains, industrial, vernacular, estuarine, and maritime environments (e.g. at Kilgobbin and Carrickmines). The dredged soil from a river, particularly in these areas, can be rich in archaeological materials and objects, including organic materials. Any instream activity in a river should consider the potential to reveal archaeological sites or industrial heritage features in their vicinity, such as sites from early prehistoric fish traps to medieval mills or remnants of bridges, etc. Riverine environments and the adjacent undisturbed green field urban environment are therefore considered to be of archaeological potential.

Each of the proposed flood relief measures is within a riverine environment, and for the aforementioned reasons, there exists an inherent archaeological potential to uncover previously unknown subsurface archaeological sites, soils, features, or artefacts during any earthmoving activities.

AP ref.	FRS Measure	Potential
AP1	Belarmine Park Measure	General riverine and greenfield archaeological potential
AP2	Kilgobbin Compound and FRS Measure	In-situ archaeological features within the compound and archaeological potential of the river and its banks
AP3	Kilgobbin FRS Measure and overflow pipeline.	Riverine archaeological potential. The measure is in the ZoN of Kilgobbin DU025-017001-003 and possible continuation of the Pale ditch between DU026-087 and DU025-121002.
AP4	Glenamuck Road North Roundabout FRS Measure	ZoN of Carrickmines Castle RMP DU0026-005001-005
AP5	Lower Bridges Glen and N11 Culvert FRS Measure	General riverine and greenfield archaeological potential
AP6	Cherrywood Road FRS Measure	General riverine and greenfield archaeological potential
AP7	Bray Link Road North FRS Measure	General riverine and greenfield archaeological potential
AP8	Commons Road and Brookdene FRS Measure	General riverine and greenfield archaeological potential
AP9	Bay view FRS Measure	General riverine and greenfield archaeological potential

13.4.5 Undesignated Cultural Heritage Features

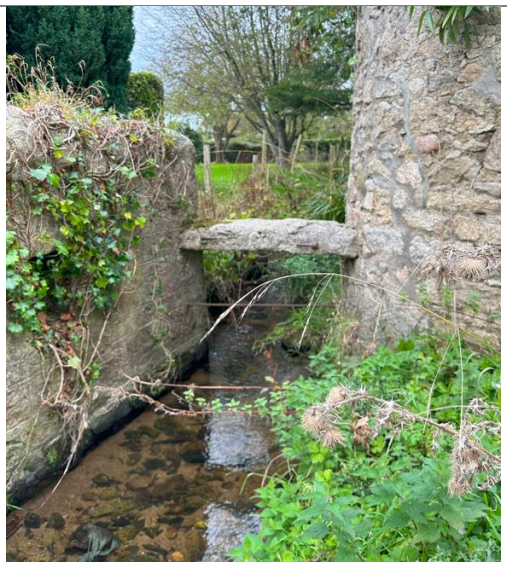
Reference no.	CH1
Legal Status	Protected Structure RPS 1684
Other Designations	NIAH 60260003
Location	Kilgobbin Road
Site Type	Kilgobbin House Boundary Wall
ITM	719331; 724796
Description	The southwestern boundary wall associated with Kilgobbin House, a protected structure (DLR Ref: 1684). Kilgobbin House is a detached three-bay two-storey house, that dates to the 1790's (Pearson 2007). The house and its roadside boundary treatment are an important part of the 18th/19th century 'country road' character of Kilgobbin road. The western boundary wall of the property runs directly along the east bank of the river, it is 1.80–2m high (inside the property, and at least 3m+ high on the river side) comprising a roughly coursed pink granite rubble stone. Within Kilgobbin House the east facing section of wall is very well maintained and kept free of climbing vegetation, vegetation however vegetation is growing over the wall from the riverbank. There has been repair work carried out on the walls due to previous flooding events (Pers. Comm. property owner). The river wall forms part of the curtilage of the property, and it is likely to be contemporary the house i.e., dating to the 1790's.Outside the property, the wall is overgrown with vegetation, it curves easterly to form the southern boundary of Kilgobbin House and runs north immediately adjacent to the river. This wall, and the walls aligning the Kilgobbin Road forms part of the collective rural cultural heritage character of Kilgobbin Road.
Sources	www.osi.ie, Fieldwork
Images	 ***Kilgobbin House boundary wall viewed from within the property***

	 ***View of upstream of the curving boundary wall at Kilgobbin House on the left bank of the river***
Approx Distance from FRS Measure	0m, the Kilgobbin Flood Measure will have a direct impact on this boundary wall

Reference no.	CH2
Legal Status	N/A
Other Designations	This site is also described as ADCO 10 in the UAIA report (Appendix 12.5)
Location	On the left bank of the Kilgobbin River
Site Type	Retaining wall
ITM	719337, 724787
Description	A low rubble stone retaining river wall on the opposite bank (right bank) to Kilgobbin House boundary wall (CH1). It is approximately 2m high on the river side and 1m high on the river bank with cow and calf granite coping. It connects to the Kilgobbin road bridge This wall, and the walls aligning the Kilgobbin Road forms part of the collective rural cultural heritage character of Kilgobbin Road.
Sources	www.osi.ie, Fieldwork

Images	 ***View of upstream of the low retaining wall on the right bank of the river***
Approx Distance from FRS Measure	0m, the Kilgobbin Flood Measure will have a direct impact on this boundary wall

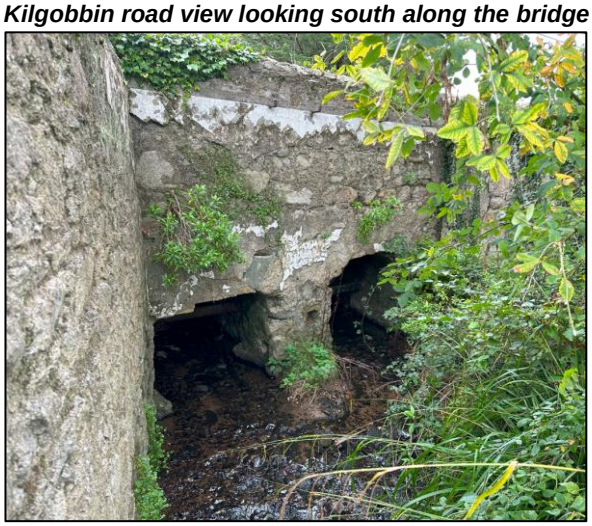
Reference no.	CH3
Legal Status	N/A
Other Designations	This site is also described as site ref. ADCO 10 in the UAIA report (Appendix 12.5)
Location	Kilgobbin Stream
Site Type	Granite slab
ITM	719331, 724794
Description	A granite slab spanning the Kilgobbin stream, connected to the retaining river wall and Kilgobbin House boundary wall (CH1 and CH2) river. It has metal pins which may have acted as former sluice/ gate water management feature.
Sources	www.osi.ie, Fieldwork

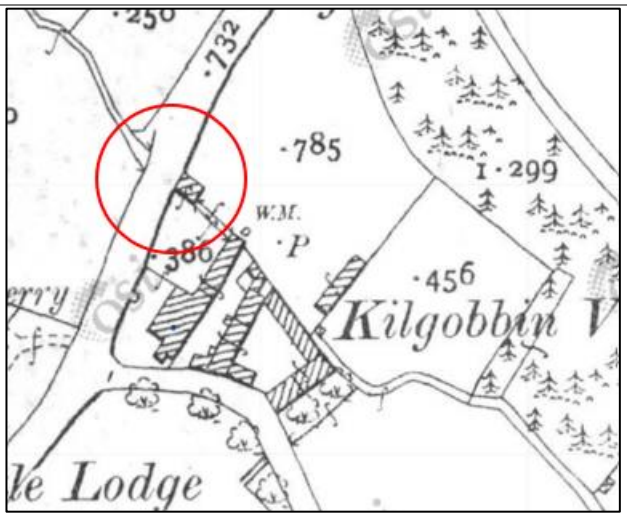
Images	 ***View of upstream of the low retaining wall on the right bank of the river***
Approx Distance from FRS Measure	0m, the Kilgobbin Flood Measure will have a direct impact on this boundary wall

Reference no.	CH4
Legal Status	N/A
Other Designations	N/a
Location	Kilgobbin Road.
Site Type	Access ramp to Kilgobbin Stream
ITM	719334, 724793
Description	A ramp access to Kilgobbin Stream between Kilgobbin Bridge and Kilgobbin House boundary wall measuring at least 3m wide. The ramp is over grown and access is not used. It is likely that the access was provided to control the potential sluice gate (CH4) in the river.
Sources	www.osi.ie, Fieldwork
Images	 ***View of the access between Kilgobbin Bridge upstream parapet wall and boundary wall to Kilgobbin House***

	 ***Detail of the access ramp***
Approx Distance from FRS Measure	0m, the Kilgobbin Flood Measure will have a direct impact on this boundary wall

Reference no.	CH5
Legal Status	N/A
Other Designations	This site is also described as site ref. U44 in the UAIA report (Appendix 12.5)
Location	Kilgobbin Road.
Site Type	Kilgobbin Road Bridge over the Kilgobbin Stream
ITM	719337, 724787
Description	The upstream and downstream sides of the bridge are very different. On the upstream facing side there is a double arched granite rubble stone structure, cut stone used in the arches and rounded coping stones on the parapet wall with a central triangular cutwater. Modern piped services cross the river in front of the bridge. The downstream arches are squared off. There are remnants of plaster on the parapet wall and metal drainage pipe brackets. On the revised 25-inch map (1910) there was a small structure across the river attached to the southern side of the bridge, it is no longer present but might have had a function associated with water management or given the possible gates/sluices suggested by the granite slabs crossing the river, some sort of milling. The abbreviations 'W.M' and 'P' are indicated on the map within the north farmyard, they may represent 'watermill' and 'pump', but this is conjecture as there are no corresponding explanations for these on the map source characteristic sheet. The parapet wall is on the upstream side is c.0.80m and there are additional courses on the downstream side c.1.2m high.
Sources	www.osi.ie

Images	 ***Upstream facing façade of the bridge.***  ***Kilgobbin road view looking south along the bridge***  ***View of the downstream façade of the bridge***

	 ***25- inch OS Map 1910, showing the bridge and the structure downstream of it and the detail of the ramped access (CH4)***
Approx Distance from FRS Measure	0m, the Kilgobbin Flood Measure will have a direct impact on this boundary wall

Reference no.	CH6
Legal Status	N/a
Other Designations	N/a
Location	Kilgobbin Road.
Site Type	Field boundary wall and stile
ITM	719320, 224755
Description	An approximately 17m stretch of field boundary rubble stone wall a square gate pier, stone stile and a granite gate post. This wall, and the walls aligning the Kilgobbin Road forms part of the collective rural cultural heritage character of Kilgobbin Road.
Sources	www.osi.ie, Fieldwork
Images	  ***CH6 field boundary wall and detail of stile.***
Approx Distance from FRS Measure	The entrance to the proposed Kilgobbin Compound will use this field access for the Kilgobbin FRS measure works.

Reference no.	CH7
Legal Status	N/A
Other Designations	RPS 1688
Location	Kilgobbin Road.
Site Type	Kilgobbin Villa Boundary Wall and Jostle Stone
ITM	719326, 724737
Description	A rubble stone boundary wall defining Kilgobbin Villa that runs along the eastern side of Kilgobbin road and along the northern side of the laneway that runs to the south of it. Ther is a painted hexagonal jostle stone on the corner. The wall runs to the gables of farm buildings and entrance to the farmyard to the rear of Kilgobbin Villa and then continues along the private laneway. This wall, and the walls aligning the Kilgobbin Road forms part of the collective rural cultural heritage character of Kilgobbin Road.
Sources	www.osi.ie, Fieldwork
Images	 ***Kilgobbin villa curving boundary wall***  ***Continuation of the boundary wall beyond the farm buildings.***
Approx Distance from FRS Measure	The overflow pipe proposed for the Kilgobbin flood relief measure will run within the road adjacent to the rubble stone boundary wall.

Reference no.	CH8
Legal Status	N/A
Other Designations	N/a
Location	Kilgobbin Road
Site Type	Field boundary wall
ITM	719354,724726
Description	Rubble stone field boundary wall on the Kilgobbin road and southern wall defining the private laneway south of Kilgobbin Villa which runs to Kilgobbin Cottage to the south.
Sources	www.osi.ie, Fieldwork
Images	
Approx Distance from FRS Measure	The overflow pipe proposed for the flood measure will run within the road adjacent to the rubble stone boundary wall.

Reference no.	CH9
Legal Status	N/A
Other Designations	N/A
Location	Castle View, Carrickmines Little
Site Type	Rubble stone wall
ITM	721878,724174
Description	On Castle Street, which runs parallel to the river, there is a low randomly coursed limestone rubble wall c. 1m high running along the bank of the river. It has a mix of rounded granite cap stones (like that in Shanganagh and Kilgobbin bridges), concrete rounded coping and cow and calf coping. The wall in in various states of repair along its length, it is bulging in parts and has been rebuilt/ repaired in places. It is approximately 114m long.
Sources	www.osi.ie, Fieldwork

Images	 ***View east along the existing rubble stone river wall along its eastern end***  ***View east along the western end of the river wall***
Approx Distance from FRS Measure	The Glenamuck North Roundabout measure incorporates the river wall

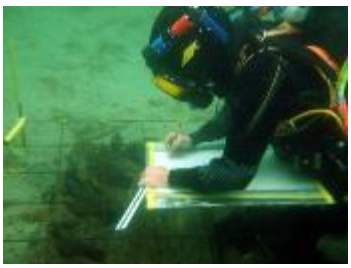
Reference no.	CH10
Legal Status	N/A
Other Designations	This site is also described as site ref. ADCO 6 in the UAIA report (Appendix 12.5)
Location	Beechwood, Loughlinstown
Site Type	Arched boundary wall and gate
ITM	724358, 723372
Description	As described in the UAIA the feature comprises a granite-built arch that crosses above the Loughlinstown River North River channel is part of a boundary wall that is recorded on historic OS maps. (See ADCO 6 in Appendix 12.5 for a full description).
Sources	www.osi.ie, Fieldwork

Images	 ***Arched boundary wall CH10***
Approx Distance from FRS Measure	Part of the Bray Link Road North Measure

Reference no.	CH11
Legal Status	N/A
Other Designations	Waterfall Cottage RPS Ref: 1770 This site is also described in detail in in the UAIA report under reference: RPS 1770(Appendix 12.5)
Location	Beechwood, Loughlinstown
Site Type	River retaining wall
ITM	724358, 723372
Description	A retaining wall associated with Waterfall Cottage comprising of large granite stone blocks with granite steps providing access to the river (See in Appendix 12.5 for a full description).
Sources	www.osi.ie, Fieldwork
Images	 ***River boundary wall CH10***
Approx Distance from FRS Measure	The river wall is part of the Lower Brides Glen Measure

13.5 Underwater Archaeological Impact Assessment

Underwater Archaeological Impact Assessment
Carrickmines FRS, Co. Dublin
24D0214, 24R0337

Underwater Archaeological Impact Assessment
Carrickmines FRS, Co. Dublin
24D0214, 24R0337

Issued 06 November 2024

Project Director **Niall Brady**
Report Author **Niall Brady**

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CONTENTS

Abbreviations

ADCO -	Archaeological Diving Company Ltd
AIA -	Archaeological Impact Assessment
AMP -	Archaeology Management Plan
CEMP -	Construction Environmental Management Plan
DHLGH -	Department of Housing, Local Government and Heritage
E -	Easting
ITM -	Irish Transverse Mercator
N -	Northing
NIAH -	National Inventory of Architectural Heritage
NMS -	National Monuments Service
OD -	Ordnance Datum
RMP -	Record of Monuments and Places
SMR -	Sites and Monuments Record
UAIA -	Underwater Archaeological Impact Assessment

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Executive Summary

Introduction

The Archaeological Diving Company Ltd (ADCO) presents an Underwater Archaeological Impact Assessment of four locations to inform the Carrickmines Flood Relief Scheme (FRS) for JBA Consulting on behalf of Dun Laoghaire Rathdown County Council and the Office of Public Works.

The assessment is based on in-water waded non-disturbance assessment and metal-detection, completed under licensed consent granted by the Department of Housing, Heritage and Local Government, 24D0214, 24R0337 in August 2024.

Proposed works

The works associated with the proposed FRS will include the addition of flood defences along river banks to complement and/or upgrade existing flood defences and to provide new flood defence measures where none currently exist.

Receiving environment

The receiving environment is informed by a desktop study and walkover inspection completed for the project in 2023 by Courtney Deery Heritage Consultancy Ltd.

Observations

Area 1 – Commons Road to Shanganagh Bridge

The channel of the Shanganagh River has been dredged in the historic past, presenting a constructed straight course along the subject length. The riverbed is a rocky cobble, and the main flow has created localised channels that meander along its length.

The key cultural heritage asset in Area 1 is Shanganagh Bridge, a three-arched stone-built bridge recorded in the National Inventory of Architectural Heritage, reference NIAH 60260118 and a protected structure (RPS 1772). The UAIA completed a detailed measured survey of the bridge, adding a new layer of baseline information.

The river banks are constructed. Larsen piles exist along the right bank (south bank) downstream of the bridge, while a low earthen bank that has dense overgrowth established forms the left bank.

Upstream of the bridge, both banks retain series of concrete retaining slab serving as existing flood defences, and only give way to earthen banks some 100m upstream of the bridge. A floodplain extends 10-20m wide on the left bank, from where the ground rises and meets a stone boundary wall that appears to serve as the townland boundary between Loughlinstown Commons (in the valley bottom) and Loughlinstown. The floodplain is overgrown with dense tree cover. The Commons Road runs along the right bank.

A footbridge crossing the river recorded on the 1910 historic OS maps has been replaced in recent times.

Metal-detection within the river channel encountered modern debris, much of which is exposed on the riverbed surface.

Apart from Shanganagh Bridge, no archaeological features were observed.

Area 2 – Bray Road and N11 overflow culvert

There are two stream channels in Area 2. The Loughlinstown River, also known as Bride's Glen River, flows in from the south and is referred to as Loughlinstown River South, while a stream

flowing in from the north is referred to as the Loughlinstown River North. Both streams converge to the east of the N11 Dual Carriageway and continue as the Shangan River to the sea.

Loughlinstown River South is a narrow channel with a flat stoney bed. To the west of the N11 Dual Carriageway, the upstream limit of the UAIA study area included a thatched house, Waterfall Cottage, which is a protected structure (RPS 1770). Several features on the riverbank may be included within the curtilage of the protected structure.

A footbridge crosses the river downstream of Waterfall Cottage and is recorded on historic OS mapping since the First Edition 6-inch series *c.* 1840. The footbridge gives access to a stone cottage that still stands (ADCO 1).

The Loughlinstown River South flows east under the N11. In doing so, the old masonry bridge that supported the pre-existing road survives as a well-built construction. Construction of the Dual Carriageway added a reinforced concrete element to the east.

Metal-detection within the river channel encountered a small amount of modern debris that gathers close to the bridge.

Loughlinstown River North is a narrow channel with a flat stoney bed. It runs alongside the site of Beechgrove House (DU026-028), which no longer stands. Historic mapping records two weir features and a footbridge in the channel. The river is canalised in this location until it passes behind the row of former houses that now serve as commercial premises. At this point, the riverbanks have a granite-built stone retaining wall that extends up- and downstream of a stone arch constructed across the channel (ADCO 4–7). The arch is part of the northmost boundary wall that formerly enclosed the complex of buildings and the land area to the west of the channel. The channel is much overgrown. The left bank (east bank) is furnished with ad hoc retaining walls associated with each premises. The right bank continues to show a granite-built retaining wall that reaches downstream and includes the riverbank element of the former Smithy recorded on the historic Ordnance Survey 25-inch map series (ADCO 8).

The Loughlinstown River North flows east under the N11. In doing so, the old masonry bridge, 'Loughlinstown Bridge' that supported the pre-existing road survives as a well-built construction (ADCO 9). Construction of the Dual Carriageway added a reinforced concrete element to the east.

Metal-detection within the river channel encountered modern debris throughout and high concentrations of debris is noted behind the commercial premises.

Both river channels emerge on the east side of the Dual Carriageway under concrete culverts that extend the former exit points of the river channels by some 30m east of the older road. The historic OS 25-inch map records a weir on Loughlinstown River South, but there is no indication of the weir today as it would have been removed or lies under the modern culvert. The two streams converge in open woodland some 50m further east, where they become the Shanganagh River.

Metal-detection within the river channels east of the Dual Carriageway did not register material other than modern bottle caps and drinks cans.

Area 3 – Glenamuck Road North Roundabout

Assessment of a short stretch of the Carrickmines River that runs along the north end of the Zone of Archaeological Potential associated with the site of Carrickmines Castle did not reveal any features of archaeological interest.

Area 4 – Kilgobbin Road and Belarmine Park

Assessment of a short stretch of Kilgobbin Stream that runs north of Kilgobbin Castle confirms the presence of a stone-built bridge recorded on historic OS maps that carries the Kilgobbin Road across the stream channel. The bridge is not recorded on cultural heritage registers and warrants consideration in this regard. The bridge forms part of the boundary wall of Kilgobbin Villa, a protected structure.

Impact assessment

The Flood Relief Scheme proposes to construct flood defence measures in each of the areas inspected.

The measures proposed are for bankside works for the most part, where flood walls will be constructed on existing riverbanks/stream banks to protect against inundation from flooding.

At Kilgobbin, a culvert channel is also proposed, to deflect flood waters to the south of Kilgobbin House.

Recommendations

The proposed works should avoid impacts with known cultural heritage sites, including the previously unregistered sites identified in this report.

Where impact avoidance is not possible, sufficient rationale for the impacts must be provided, and the features will be archaeologically recorded in full prior to construction works commencing at those locations.

Archaeological monitoring by a licence-eligible archaeologist experienced in riverine archaeology will be conducted of all bankside and in-channel ground disturbance activities, with the proviso to resolve fully any archaeological features exposed.

A series of project management mitigations is included to ensure the successful delivery of the project.

The project must comply with the National Monuments Service, *Archaeology and Flood relief Scheme: Guidelines* (Government of Ireland, two volumes, 2023).

Recommendations are subject to the approval of the National Monuments Service at the Department of Housing, Local Government and Heritage.

1.0 Introduction

The Archaeological Diving Company Ltd (ADCO) presents an Underwater Archaeological Impact Assessment of four locations to inform the Carrickmines Flood Relief Scheme (FRS) for JBA Consulting on behalf of Dun Laoghaire Rathdown County Council and the Office of Public Works.

Area 1 (Commons Road and Brookdene, and Bayview flood measure) is located on the Shanganagh River, and the focus point is Shanganagh Bridge, which is recorded on the National Inventory of Architectural Heritage (NIAH), reference 60260118, and is a protected structure (Recorded Protected Structure (RPS), reference 1772). Commons Road runs alongside the right bank (south bank) upstream of Shanganagh Bridge, and River Lane runs along the right bank downstream of the bridge. The bridge carries the R119 road from Shankhill north to Ballybrack/Killiney.

Area 2 (Bray Road North, Lower Brides Glen and N11 overflow culvert flood measure) is located further upstream and includes the lower sections of the Loughlinstown River, referred to here as Loughlinstown River South and Loughlinstown River North, before they converge to become the Shanganagh River. The N11 Dual Carriageway lies to the east of the streams and crosses above both channels. Loughlinstown River North passes alongside the site of Beechgrove House, a former registered archaeological monument (Register of Monuments and Places, reference RMP DU026-028).

Area 3 (Carrickmines River–Glenamuck Road North measure) is a short stretch of the Carrickmines River that forms the north end of the Zone of Archaeological Potential associated with the complex and extensive site of Carrickmines Castle (DU026-005---), where archaeological excavation in advance of the Southeastern Motorway in the early 2000s revealed a significant medieval and early modern sequence of settlement and defensive activity.

Area 4 (Kilgobbin Road and Belarmine Park flood measure) is two short stretches of the Kilgobbin Stream that lie north and east of Kilgobbin Castle (DU023-017---) and immediately west of Kilgobbin House (NIAH 60260008). The potential exists to encounter the Pale Ditch defensive boundary in this location.

The assessment is based on in-water waded non-disturbance assessment and metal-detection, completed under licensed consent granted by the Department of Housing, Heritage and Local Government, 24D0214, 24R0337 in August 2024.

2.0 Proposed works

The proposed FRS works will include the addition of flood defences along river banks to complement and/or upgrade existing flood defences, as indicated on Figure 1, and the provision of new flood defence measures where none currently exist. The proposals are for flood defence

walls and a culvert, as described in chapter 3 of the project Environmental Impact Assessment Report.

3.0 Receiving environment

The receiving environment is informed by a cultural heritage desktop study and walkover inspection completed for the project in 2023 by Courtney Deery Heritage Consultancy Ltd.[1]

4.0 Observations

4.1 Methodology

A team of three personnel carried out the waded inspections: Niall Brady, archaeologist and licence-holder; Dominick Gallagher, archaeologist; and Derek Copeland, topographic surveyor.

Observations in Area 1 were recorded with the assistance of a Trimble DPGS Rover and a Laser-scanner. Observations in Areas 2–4 were recorded with the assistance of hand-held GPS receivers.

A Fisher Aquanaut 1280X hand-held metal-detector was employed to assess the potential for metallic debris.

Observations were also recorded using an underwater camera.

All locations were inspected. The river channels were not in flood when inspected. Vegetation overgrowth was particularly dense in Area 2 and the upstream location in Area 4 in Bellarmine Park, where access proved to be not possible.

Features observed are referenced according to their recorded heritage register where noted. Features recorded by Courtney Deery based on examination of historic Ordnance Survey maps are referred to as Undesignated sites. This report follows the undesignated status and provides a U# that is in keeping with the table line numbering presented by Courtney Deery. New features observed in the course of the present survey are provided a project-specific reference, commencing ADCO 1.

The archaeological waded inspection confirmed the presence of the known cultural heritage sites and provided the opportunity to chart a series of in-channel features that are associated with the various developments recorded on the historic Ordnance Survey maps. In addition to the SMR, RPS and NIAH sites, there are eight undesignated sites recorded by Courtney Deery's examination of historic OS maps, and ten additional sites recorded in ADCO's UAIA inspections. The sites are presented in Table 1 and on Figures 2, 4–6, and introduced in section 4.2. They are described in more detail in section 5, Catalogue of sites.

[1] Y. O' Brien, 'Cultural Heritage Constraints Study, Shanganagh–Carrickmines Flood Relief Scheme, Dublin'. Unpublished report: Courtney Deery Heritage Consultancy Ltd, 2023. For JBA Consulting on behalf of Dun Laoghaire Rathdown County Council.
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Location	Reference	Site type	Status	Easting	Northing
Area 1	NIAH 60260118, RPS 1772	Bridge	Upstanding	725369	722980
	U185	Footbridge	Not evident	725285	722989
Area 2	RPS 1770	Cottage	Upstanding	724444	723194
	U182	Footbridge	Upstanding	724511	723237
	ADCO 1	Cottage	Upstanding	724506	723245
	U189	Bridge	Upstanding	724523	723247
	ADCO 2	Weir	Not evident	724534	723263
	ADCO 3	Road	Not evident	724584	723243
	U114	Weir	Not evident	724293	723413
	U115	Footbridge	Replaced	724320	723398
	U119	Weir	Not evident	724342	723382
	ADCO 4	River wall	Upstanding	724347	723382
	ADCO 5	River wall	Upstanding	724349	723376
	ADCO 6	Arch/boundary wall	Upstanding	724358	723372
	U121	Footbridge	Replaced	724405	723332
	ADCO 7	River wall	Upstanding	724361	723368
	ADCO 8	Smithy	Upstanding	724442	723304
	ADCO 9	Bridge	Upstanding	724449	723313
Area 3	DU026-005---	Castle complex	Site of and buried	721785	724107
	NIAH 60260228	Water pump	Upstanding	721907	724165
Area 4	U44	Bridge	Upstanding	719337	724787
	NIAH 60260008 RPS 1688	House	Upstanding	719338	724749
	NIAH 60260003 RPS 1684	House	Upstanding	719348	724843
	ADCO 10	Wall	Upstanding	719330	724793

Table 1: RMP/SMR, RPS, NIAH, Undesignated and ADCO sites in the UAIA Areas1–4.

Note that coordinates are derived from the online Historic Environment Viewer portal and should not be taken as absolute because the historic map projections must allow for discrepancy in GIS application.

4.2 Area 1 (Commons Road and Brookdene, and Bayview flood measure) – Commons Road to Shanganagh Bridge

4.2.1 Context

The channel of the Shanganagh River, which is also known as the Loughlinstown River, runs east to Shanganagh Bridge, below which the channel serves as the townland boundary between

Hackettsland to the north and Shanganagh to the south, and continues in this vein to the sea (Figure 2). To the south of the river by some 80m, and outside the UAIA study area, the line of a former mill race associated with Shanganagh Castle (DU026-031---) and mill site is recorded on the Ordnance Survey (OS) historic 6-inch map series (*c.* 1840).

4.2.2 River channel and banks

The river channel pursues a relatively straight-line course that has all the appearance of being a dredged channel within the area inspected.

The riverbed comprises a rocky cobble along its narrow course, and the main flow has created localised channels that meander along its length. Some 250m upstream of Shanganagh Bridge, the character of the channel changes, where the channel is somewhat wider and a soft clay has accumulated on the bed.

A slight dip in the river profile exists downstream of Shanganagh Bridge, where a series of boulders lying across the channel form the feature (Plate 1). This is likely to be a modern embellishment inserted when the riverbanks were developed and may serve to facilitate fish movement.

The river banks have been subject to significant impact from flood relief works completed within the last 10-15 years. Downstream of Shanganagh Bridge, the right bank has a low reinforced concrete parapet wall that caps a line of steel Larsen piles inserted into the river channel. Rock armour is added to the base of the piles (Plate 2), while the left bank (north bank) is formed by a low earthen bank approximately 1m high over a line of rock armour at its base (Plate 3). Dense undergrowth has developed on the bank beneath a tree canopy that reaches north where it borders landscaped grassland of a residential estate.

Upstream of the bridge, a 5m-length of stone-built wall is retained that forms a low parapet wall on the right bank. However the channel side of both banks has a series of concrete retaining slab walls that serve as existing flood defences, with rock armour added to the base of the walls (Plates 4–5). The retaining slab is built on the line of a stone wall on the right bank, which re-emerges for a length further upstream. Commons Road runs along the right bank.

The retaining wall on the left bank serves as the rear boundary to a string of residential properties, and gives way to earthen banks some 220m upstream of the bridge, at which point a floodplain extends 10–20m wide on the left bank (Plate 6). The edge of the floodplain is defined by rising ground, where a stone boundary wall is built on top of the slope associated with Glen Druid, and appears to serve as the townland boundary between Loughlinstown Commons (in the valley bottom) and Loughlinstown. The floodplain is overgrown with dense tree cover.

At the upstream limit of the survey area, a flood gauge has been installed next to a concrete-built weir, and the road surface of Commons Road serves as a flood defence embankment for a series of lower lying residential properties to the south (Plates 7–8).

4.2.3 Shanganagh Bridge, NIAH 60260118, RPS 1772

The key cultural heritage asset in Area 1 is Shanganagh Bridge, a three-arched stone-built bridge recorded in the NIAH (60260118) and a protected structure (RPS 1772).

The channel-side aspect of the bridge is overgrown today, with the downstream eye of the northern arch concealed by shrubs. The bridge was surveyed using a laser-scanner to capture metrically accurate data and provide a new baseline layer of available information on the historic structure (Figures 3+).

The bridge arches are semi-circular in shape, with long barrel vaults constructed on vertical stone-built piers that appear to stand on a narrow foundation plinth of stone. The barrel vaults include a variety of stone types in addition to granite, and lime mortar is evident throughout. The arch rings are cut granite ashlar blocks, and the keystones remain *in situ*. The cutwaters, which are integrated into the piers, survive on both the upstream and the downstream sides of the bridge, except for the upstream cutwater of the northern pier, which is not evident. Rebuilt stonework has been added above the cutwaters on the right bank (south bank) to merge with the Larsen piles downstream and the concrete panels upstream of the bridge. The bridge spandrels are formed with roughly shaped granite and no formal coursing is evident. The spandrels merge with the bridge parapets that are built in a similar manner and are capped with large cut granite saddle-block coping stones that are hemispherical in shape. To facilitate the parapet wall curving onto Commons Road and River Lane, a series of lintel stones were built into the bridge above the arch ring at an angle and survive as original features, on top of which the parapet walls were constructed. The way in which the northern pier is integrated into the left bank could not be addressed due to dense overgrowth restricting access.

Concrete repointing is evident on the spandrels and parapet walls. A narrow (*c.* 200mm wide) sloping band of concrete evident at the base of the piers appears to have been added above stonework that juts out from the piers, perhaps serving as an original foundation plinth. There is an indication of an apron beneath the southern arch but not under the central arch. It was not possible to determine the situation under the northern arch due to gravel overburden.

4.2.4 Undesignated site, U185 Footbridge, ITM 725285E 722989N

As noted in the Courtney Deery report, the historic OS map 25-inch series (*c*. 1910) map records a footbridge *c.* 80m upstream of Shanganagh Bridge. The footbridge is also recorded on the 3rd Edition 6-inch map series Sheet 26 (*c.* 1930). There is no indication of the bridge today. The riverbank at this location has been altered on both sides with the addition of panels of concrete retaining walls.

4.2.5 Modern features

Three modern features were noted upstream of Shanganagh Bridge. A vehicular entrance to a private residence has been inserted as a new bridge feature across the channel *c.* 120m upstream of Shanganagh Bridge. The bridge measures *c.* 4m wide and is constructed of

reinforced concrete. The riverbanks up- and downstream of the bridge have been altered to accommodate vertical retaining wall panels (Plate 9).

A debris trap is located *c.* 220m upstream of Shanganagh Bridge. The feature comprises a series of seven steel H-frame girders set vertically into the channel and located next to a flood access gate (Plate 10).

The flood gauge and concrete weir feature mentioned above are located at the upstream limit of the UAIA survey area (Plate 7).

The modern features do not retain archaeological interest.

4.2.6 Metal-detection

Metal-detection within the river channel encountered modern debris throughout the course, much of which is exposed on the riverbed surface. No archaeological targets were observed.

4.3 Area 2 (Bray Road North, Lower Brides Glen and N11 overflow culvert flood measure) – Bray Road and N11 overflow culvert

4.3.1 Context

The two river channels in Area 2 have been impacted by the construction of the N11 Dual Carriageway. Loughlinstown River South, also known as Bride's Glen River, maintains the course recorded on the historic OS maps except for where the Dual Carriageway crosses over the channel and constrained it within a culvert.

Historic OS mapping record a series of undesignated features within the course of Loughlinstown River North, comprising two weirs and footbridge (U114, U115, U119 outside of the flood measure, and U121 within the flood measure) (Figure 4). Construction of the exit/entry ramp that connects the R118 flyover with the N11 resulted in new landscaping and the removal of Beechgrove House, DU026-028. The N11 constrained the channel into a culvert where the new road crossed over the river channel.

4.3.2 Loughlinstown River South, River channel, banks and features

Loughlinstown River South is a narrow channel with a flat stoney bed. The UAIA study area upstream started at Waterfall Cottage, a protected structure (RPS 1770). The river passes through the garden of the cottage, where the left bank is retained by a well-built granite wall, and may be considered to be within the curtilage of RPS 1770 and consequently part of the protected site. The retaining wall has a flight of four extruded granite steps giving access the river bed at the upstream end of the property. A flight of recessed steps occurs further downstream directly in front of the cottage. The right bank is less formal and essentially of clay but includes some granite boulders at its base serving as rock armour. The right bank is accessed from the left bank by two closely-spaced tree-trunks or former telegraph poles that serve as footbridges.

A footbridge crosses the river downstream of Waterfall Cottage and is recorded on historic OS mapping since the First Edition 6-inch series *c.* 1840. The footbridge is noted by Courtney Deery

as an undesignated site (U182 ITM 724511E 723237N). The footbridge is a simple affair today in poor repair, comprising a light timber parapet supported on two steel girders.

The footbridge gives access to a stone cottage that still stands. The cottage is recorded on historic OS maps, which indicated it may have been constructed as two buildings. The cottage is not recorded on any heritage register and should be regarded as retaining heritage value. It is identified in this report as ADCO 1.

Loughlinstown River South flows east under the N11. In doing so, the old masonry bridge that supported the pre-existing road survives as a well-built construction and is reported as an undesignated site in Courtney Deery (U189 ITM 724523E 723247N). The bridge comprises a single arch, which is elliptical in shape supporting a long barrel vault constructed on stone piers that retain a slightly bevelled or step profile. The façade stone of the arch, piers, spandrel and parapet are all well-cut granite ashlar blocks. A central line of granite stone appears to continue through the length of the barrel vault, while the stones that form the vault either side of the centreline employ a variety of stone including slate. There is no upstream cutwater, and the downstream element is masked by the addition of the modern culverted channel, which was built over the original east-facing side of the bridge. A stone apron exists across the riverbed under the arch. The parapet is capped with a line of rounded coping stones that were originally tied together with iron staples.

The OS historic 25-inch map (*c.* 1910) recorded a weir some 10m east of the bridge, and the OS First edition 6-inch map (*c.* 1840) recorded an ‘Old Road’ 15m east of the bridge. Neither feature has been designated previously and consequently are presented in this report as ADCO 2 and ADCO 3 respectively. The ‘Old Road’ would have preceded that which served as a road in 1840 and which continues in use today as the old ‘Bray Road’, providing local access to the premises at the foot of Cherrywood Road. Neither the ‘Old Road’ nor the weir are evident today. Construction of the N11 significantly widened the road area, extending it eastwards and effectively burying both of these historically mapped features. The opening of the Loughlinstown River South on the east side of the N11 today is by means of a modern concrete culvert (Plates 11–12).

Metal-detection within the river channel encountered a small amount of modern debris that gathers close to the bridge, U189.

4.3.3 Loughlinstown River North, River channel, banks and features

Loughlinstown River North is a narrow channel with a flat stoney bed. It runs alongside the site of Beechgrove House (DU026-028), which no longer stands. Historic mapping records two weir features and a footbridge in the historic route of the channel, which was aligned northwest//southeast and appears to have served as a millrace (U114, U119 and U115 respectively). The channel was impacted on during the construction to the N11 and R118 flyover.

The current channel alongside the N11 and under the flyover is straight-sided with constructed, presenting as steep-sided earthen banks and a clear gravel bed. A number of water drainage pipes empty into the channel, which is heavily overgrown with overhanging briars and shrubs (Plates 13–15). There is no indication of the former weir features U114 and U119 and footbridge (U115) recorded on the historic OS maps and noted by Courtney Deery, but a new bridge is located on the site of the former footbridge (ITM 724320E 723398N) (Plate 16). The new bridge is wide enough to carry a path across the landscaped parkland for light vehicular traffic. The current construction is a simple reinforced concrete slab supported by abutments that are formed by two stacks of stone-filled gabion nests on both banks. A concrete slab separates the gabion stacks, and the river channel is deeper under the bridge on the right side (west side).

Rock armour revetting reaches downstream of the new bridge on both banks. A large outfall pipe, 2-feet in diameter, with a metal grill enters the channel from the right bank (west bank (Plate 17). The feature is set within two concrete walls on either side of the right bank, reaching 3.3m wide and 1.8m high. It is located in the vicinity of where the former weir U119 was recorded (ITM 724342E 723382N). There is no indication of a weir today but there is building rubble on the channel bed, creating a localised shallows, which may indicate the presence of buried structure underneath.

The corresponding left bank retains a granite-built stone wall, with clay slippage falling into the channel (Plate 17). Once downstream of the large outfall, a similar stone retaining wall survives on the right bank. The stone walls are not recorded on cultural heritage registers and warrant consideration. Accordingly, they are referred to in this report as ADCO 4 and ADCO 5. The walls are vertical in profile and survive to a height of approximately 800mm. They are made from roughly shaped granite blocks cut into rectangular shape and measuring approximating 350mm wide by 25mm high in size.

The walls ADCO 4 and ADCO 5 continue 10-15m downstream to a granite-built arch, ADCO 6, which crosses above the channel, and are integrated into it. The arch itself is part of a boundary wall that is recorded on historic OS maps and encloses the group of buildings that are today represented by commercial premises on the old Bray Road. The boundary wall wraps around this cluster to meet towards the junction of Cherrywood Road and the old Bray Road. The western element of the boundary is aligned northeast/southwest and includes the arch. That part of the western element lying north of the river channel is a stone granite-built wall that includes a gateway measuring 1.65m wide. The ground surface has obvious build-up and the current height to the wall top is 1.85m. The wall base is 1.2m wide but this narrows to 750mm wide. The northwest-facing façade of the boundary wall is straight-sided, while the internal side retains a slight batter. Where the wall transforms into the arch that crosses the channel, the wall is 600mm wide. The arch springs from a granite battered buttress of three courses of granite ashlar blocks. The arch ring is made from yellow brick, with average brick size being 230mm long 70mm high and 90mm deep, bonded by white-coloured lime mortar. The spandrel above the arch is constructed in granite. Dense overgrowth inhibited inspection of the boundary wall as it proceeds southwest from the river channel.

Downstream of the arch, the river channel is a flat gravel bed that is littered with debris mostly associated with the premises on the old Bray Road, and the level of debris in the channel increases as one proceeds downstream.

The left bank (north bank) downstream of the arch ADCO 6 does not have an upstanding retaining wall. In its place is a series of walls that serve as the rear wall to the premises that front on to the old Bray Road. One of the walls lacks any render and reveals a poured concrete construction with beach pebbles or greenstone in the mix (Plate 19). The wall was raised in a series of concrete pours, and is typical of how buildings were constructed in the wider area in the early 20th century. As one proceeds downstream, the *ad hoc* nature of the left bank is evident. The historic OS records another footbridge (U121 at ITM 724405E 723332N). As with U115 upstream, there is no indication of an historic bridge here as a more recent construction replaces it. The current bridge is supported on steel girders and is a simple concrete slab surface. The river channel turns sharply to the northeast on approach to the old Bray Road, and roughly laid rock armouring is pitched at the base of the left bank to act in some capacity to prevent scour, along with discarded lengths of concrete slab and general construction debris. On the approach to the old Bray Road, elements of a stone-built retaining wall survive on the left bank (Plate 20). The wall is approximately 1.2m high and includes a culverted stone drain outlet. The wall is considered to be associated with Loughlinstown Bridge, ADCO 9.

In contrast, the right bank downstream of the arch ADCO 6 continues the retaining wall seen upstream (ADCO 5) and is 500mm in height, ADCO 7. It is fractured in places, and obscured by vegetation in other places. Downstream of U121, a stretch of stone wall is replaced with breeze-blocks (Plate 21). The breeze-block section is built directly against the original wall, which is 2m high at this point. An area of collapse reveals the construction of ADCO 7, showing the natural clay bank that was cut into to permit the building of a battered wall with a stone rubble core measuring 600mm in depth. The battered façade stands on a stone plinth that extends a further 100mm out from the façade and stands 800m high above the riverbed. A *c.* 15m-long section of the stone wall has collapsed as the wall follows the bend of the river channel. The historic OS maps indicate that this land was used as a Smithy (ADCO 8). A line of quoin stones are revealed above the retaining wall. The stones represented one corner of the Smithy complex recorded on the OS mapping. A poured concrete-and-pebble wall with window opening is also exposed and would have been another element of the former Smithy.

At this point, approaching the old Bray Road, the riverbed has a stone-built apron set across it. The upstream element of the apron has a thin concrete skin added later but the main part is fully of stone work, comprising large cut granite blocks set in line with along the water flow. The stones in general measure 430mm long by 170mm wide and are set in profile to follow a shallow shelving dip with the lowest part in the central channel (Plate 20). The apron serves as a protective anti-scour device to the bridge that carries the old Bray Road and should be regarded as an integral part of the bridge. Named ‘Loughlinstown Bridge’ on the OS First Edition map (*c.* 1840), it is not previously recorded as a cultural heritage asset and is recorded here as ADCO 9.

The bridge retains elements are comparable to the bridge U189 that crosses Loughlinstown River South. The bridge comprises a single arch, which is elliptical in shape supporting a long barrel vault constructed using granite blocks and resting on stone piers that are made of four courses of cut ashlar granite set at alternating distances to give a slightly alternating bevelled or step profile. The stone apron observed upstream of the bridge continues right along its interior where the stone blocks are perhaps somewhat smaller in size on occasion (500mm by 400mm). The façade stone of the arch, spandrel and parapet are all well-cut granite ashlar blocks, with the keystone protruding several centimetres proud of the façade. There is no clearly defined upstream cutwater due to later works built against the bridge obscuring this detail, while the downstream element is masked by the addition of the modern dual-culverted channel, which was built over the original east-facing side of the bridge. A steel/iron girder crosses through the arch and supports a skin wall of red brick measuring 900mm high that conceals/protects a steel service pipe. The parapet is capped with a line of rounded coping stones that were originally tied together with iron staples. A memorial plaque refers to the Carrickmines-Shanganagh Main Drainage Scheme of 1996. This may suggest the date for the steel service pipe inserted through the bridge arch.

Construction of the N11 significantly widened the road area, extending it eastwards. The opening of the Loughlinstown River North on the east side of the N11 today is by means of a modern concrete culvert (Plate 22).

Metal-detection within the river channel encountered modern debris throughout, with especially large volumes upstream of bridge ADCO 9 behind the premises on the old Bray Road. No archaeological targets were observed.

4.4 Area 3 (Carrickmines River–Glenamuck Road North measure) – Glenamuck Road North Roundabout

4.4.1 Context

The Carrickmines River as it runs north of the Carrickmines Castle site forms the boundary of the Zone of Notification for this important archaeological complex.

4.4.2 Carrickmines River, River channel, banks and features

A water pump is recorded in the NIAH on the north side of the road that runs alongside the river (NIAH 60260228). The NIAH record records the pump as a cast-iron ‘lion mask’ that was extant in 1937 and made by Glenfield and Kennedy (established 1852) of Kilmarnock.

The opposite side of the road next to the river channel has a low stone wall (Plate 23). The river bank is earthen and overgrown. The other bank is constructed. Both banks are heavily overgrown.

The riverbed is flat and narrow, measuring some 2m in width and with a gravel bed. Rock armour protection has been added along its length (Plate 24). The channel widens slightly approaching the roadbridge at Glenamuck Roundabout. While historic OS maps record a pre-existing bridge in this location, as ‘Carrickmines Bridge’, there is no record of the structure available. The current

bridge is a modern replacement and it was not possible to access under the bridge to see if any elements of the historic structure survive *in situ*.

No features of archaeological interest or potential were observed in the river channel or on the banks.

Metal-detection within the river channel encountered modern debris and a discarded hammer. No archaeological targets were observed.

4.5 Area 4 (Kilgobbin Road and Belarmine Park flood measure) – Kilgobbin Road and Belarmine Park

4.5.1 Context

The Kilgobbin Stream is a narrow channel measuring approximately 1m in width that runs east and then southeast across the UAIA area (Figure 6). The stream banks are a simple clay (Plate 25), and the bed is gravel with cobbles (Plate 26). The stream runs north of the Kilgobbin Castle archaeological complex (DU025-017---) and lies some 50m outside the Zone of Notification. It flows alongside the boundary wall of Kilgobbin House (NIAH 60660003) and through the curtilage of Kilgobbin Villa (NIAH 60260008), both of which are protected structures (RPS 1683 Kilgobbin House and RPS 1688 Kilgobbin Villa respectively).

There are two sections of the stream identified for the UAIA study. The first section runs upstream from Kilgobbin Road to the western boundary wall of Kilgobbin House. The second section lies approximately further 200m upstream, in Belarmine Park.

4.5.2 Kilgobbin Stream channel, banks and features

A stone-built bridge recorded on historic OS maps and recorded as an undesignated site (U44) carries the Kilgobbin Road across the stream channel. The bridge is registered in DLRCC as DL-LP2024-001.00. Access to the bridge is provided on the left bank (east bank) by means of a wayleave that may have served previously to provide access to the stream for livestock. The bridge is built of granite and comprises two small arches and a central pier with a cutwater on its upstream side. The arches are semi-circular stilted forms with repairs giving a slightly pointed perspective to the vaults. The piers are made using large rounded granite boulders. The south arch contains two stone-built culverts for water draining on to the stream bed. The culvert openings are approximately 800mm high and 500m wide. Modern service pipes truncate the arches. The arch rings are cut and roughly finished blocks. The buttresses are flat and have no distinguishing features. The cutwater is made with three courses of large cut granite blocks that stands 1m above the stream bed, on top of which is a pyramidal capping made with granite. The spandrel and parapet are coursed layers of stone work, rising to two layers above the arch ring. Long rounded coping stones complete the upstream parapet. The downstream parapet has been praised by additional granite to over 1m in height, affording privacy to the garden of Kilgobbin Villa.

The right bank (south bank) upstream of the bridge has a stone-built retaining wall (ADCO 10) that includes two drainage opes and a saddle slab that connects to the boundary wall of

Kilgobbin House on the left bank. An iron bar located below the saddle slab suggests it may have served as part of a sluice.

The boundary wall of Kilgobbin House continues northwards to be built alongside the left bank of the stream. Where the boundary turns northeast and leaves the stream, at the upstream limit of the UAIA for this section of Kilgobbin Stream, there is a modern reinforced concrete slab crossing the stream that appears to provide access from the adjoining field into the rear of the House. The presence of stonework below the concrete slab on the right bank may suggest that this replaced an earlier access bridge, but the location is quite densely covered in overgrowth to make this judgement with certainty.

The section of Kilgobbin Stream in Belarmine Park is a location where the stream channel meanders. An outfall pipe is located here, and the stream has been culverted as it flows downstream from there (Plates 27–28). A small extent of stonework is evident beneath a concrete slab feature, and is the only indication of earlier activity at this location (Plate 29). It has not been recorded as a heritage feature in this report.

Metal-detection within the stream channel encountered modern debris. No archaeological targets were observed.

5.0 Catalogue of sites

Refer to Table 1 and Figures 2, 4-6 for the distribution of the catalogue entries.

Coordinates are derived from the online Historic Environment Viewer portal and should not be taken as absolute because the historic map projections must allow for discrepancy in GIS application.

Site are presented according to UAIA survey area, and follow the sequence of presentation in Section 4.

Area 1 (Commons Road and Brookdene, and Bayview flood measure) – Commons Road to Shanganagh Bridge

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260118, RPS 1772	Bridge	Upstanding	725369	722980

The NIAH describes Shanganagh Bridge as:

> *Three-arch road bridge over river, dated 1829. Part creeper- or ivy-covered walls centred on triangular cutwaters to piers having pyramidal capping with cut-granite rounded coping to parapets centred on benchmark-inscribed cut-granite date stone ("1829"). Series of three segmental arches with lichen-spotted granite ashlar voussoirs. Sited spanning Loughlinstown River with gravel-covered banks to river.*

The channel-side aspect of the bridge is overgrown today, with the downstream eye of the northern arch concealed by shrubs. The bridge was surveyed using a laser-scanner to capture metrically accurate data and provide a new baseline layer of available information on the historic structure (Figures 3+).

The bridge arches are semi-circular stilted in shape, with long barrel vaults constructed on vertical stone-built piers that appear to stand on a narrow foundation plinth of stone (Plate 1). The barrel vaults include a variety of stone types in addition to granite, and lime mortar is evident throughout. The arch rings are cut granite ashlar blocks, and the keystones remain *in situ*. The cutwaters survive on both the upstream and the downstream sides of the bridge, except for the upstream cutwater of the northern pier, which is not evident (Plates 2–3). The cutwaters are integrated into the piers. Rebuilt stonework has been added above the cutwaters on the right bank (south bank) to merge with the Larsen piles inserted on the right bank downstream, and the concrete panels inserted as retaining walls upstream of the bridge (Plate 4).

The bridge spandrels are formed with roughly shaped granite and no formal coursing is evident (Plate 5). The spandrels merge with the bridge parapets that are built in a similar manner and are capped with large cut granite saddle-block coping stones that are hemispherical in shape (Plate 6). To facilitate the parapet wall curving onto Commons Road and River Lane, a series of lintel stones were built into the bridge above the arch ring at an angle and survive as original features, on top of which the parapet walls were constructed (Plates 4, 7). The way in which the northern pier is integrated into the left bank could not be addressed due to dense overgrowth restricting access.

Concrete repointing is evident on the spandrels and parapet walls. A narrow (*c.* 200mm wide) sloping band of concrete evident at the base of the piers appears to have been added above stonework that juts out from the piers, perhaps serving as an original foundation plinth (Plate 1, 8). There is an indication of an apron beneath the southern arch but not under the central arch. It was not possible to determine the situation under the northern arch due to gravel overburden

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260118, RPS 1772	Bridge	Upstanding	725369	722980

Plate 1: View looking through bridge arch

Plate 2: View looking upstream at central arch and cutwater

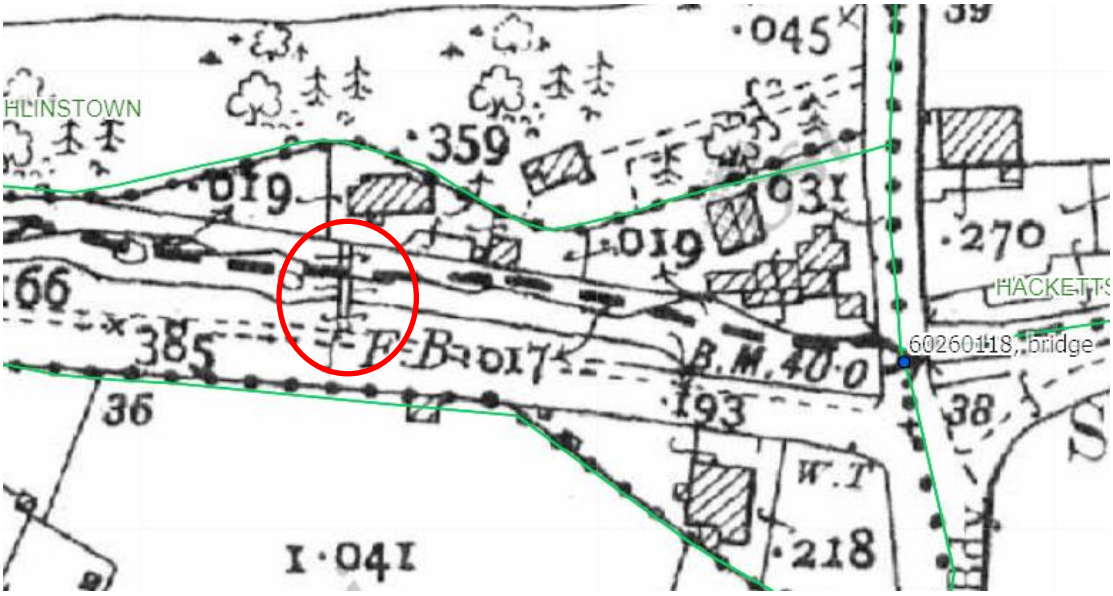
Plate 3: Upstream side of northern arch showing no evidence for cutwater

Plate 4: Downstream side of southern arch showing cutwater and rebuilt stonework above cutwater

Plate 5: View looking upstream at so

Plate 6: Parapet wall with coping stones

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260118, RPS 1772	Bridge	Upstanding	725369	722980
 *Plate 7: View of lintel stones built into the spandrel above the arch ring to support the parapet wall to as it curves into the retaining wall of Commons Road*		 *Plate 8: View of base on arch pier showing narrow skim of concrete added above the pier's stone plinth as an ant-scour measure*		
Impact from development	Direct. The proposal is to strengthen and repair the bridge.			
Mitigation	Conservation Engineer inputs. Archaeological monitoring.			

Reference	Site type	Status	ITM Easting	ITM Northing
U185	Footbridge	Not evident	725285	722989
The historic OS map 25-inch series (*c*. 1910) map records a footbridge *c.* 80m upstream of Shanganagh Bridge. The footbridge is also recorded on the 3rd Edition 6-inch map series Sheet 26 (*c.* 1930). There is no indication of the bridge today. The riverbank at this location has been altered on both sides with the addition of panels of concrete retaining walls				
 *Detail from OS 25-inch map showing location of Footbridge highlighted in red*				
Impact from development	None.			
Mitigation	None.			

Area 2 (Bray Road North, Lower Brides Glen and N11 overflow culvert flood measure) – Bray Road and N11 overflow culvert

Loughlinstown River South

Reference	Site type	Status	ITM Easting	ITM Northing
RPS 1770	Cottage	Upstanding	724444	723194

Waterfall Cottage is a protected structure. The river passes through the garden of the cottage, where the left bank is retained by a well-built granite wall, and may be considered to be within the curtilage of RPS 1770 and consequently part of the protected site.

The retaining wall has a flight of four extruded granite steps giving access the river bed at the upstream end of the property (Plates 1–2). A flight of recessed steps occurs further downstream directly in front of the cottage (Plate 3). The right bank is less formal and essentially of clay but includes some granite boulders at its base serving as rock armour. The right bank is accessed from the left bank by two closely-spaced tree-trunks or former telegraph poles that serve as footbridges (Plate 4).

Plate 1: View looking downstream from above Waterfall Cottage, showing the granite-built retaining wall on the left bank with the four extruded steps

Plate 2: View looking upstream, showing the granite-built retaining wall on the left bank with the four extruded steps

Plate 3: View looking upstream, showing the granite-built retaining wall on the left bank with the recessed steps

Plate 4: View looking downstream, showing the two footbridges using former telegraph poles as support

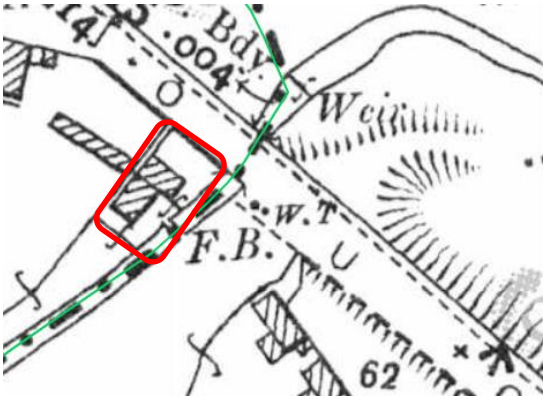
Impact from development	Direct impact on the riverine wall.
Mitigation	Detailed archaeological recording ahead of impact. Archaeological monitoring

Reference	Site type	Status	ITM Easting	ITM Northing
U182	Footbridge	Upstanding	724511	723237

A footbridge crosses the river downstream of Waterfall Cottage and is recorded on historic OS mapping since the First Edition 6-inch series *c.* 1840. The footbridge is a simple affair today in poor repair, comprising a light timber parapet supported on two steel girders (Plate 1). The right bank has a poured concrete render that retains the corrugated sheet profile of the formwork used to retain the concrete.

Plate 1: Footbridge is constructed on steel girders and has a light open timberwork parapet. The right bank underneath the bridge has been strengthened by the addition of a concrete pour

Impact from development	Direct. The bridge will be replaced.
Mitigation	Detailed archaeological recording ahead of impact. Archaeological monitoring

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 1	Cottage	Upstanding	724506	723245
A cottage is recorded on historic OS maps with indications that it may have been constructed as two buildings. The cottage survives as a rendered stone structure (Plates 1–2). It is not recorded on any heritage register and should be regarded as retaining heritage value.				
 *Detail from OS 25inch showing cottage*		 *Detail from OS 3rd Edition showing cottage*		
 *Plate 1: view looking west at north end of cottage*		 *Plate 2: View looking west at south end of cottage*		
Impact from development	None.			
Mitigation	None.			

Reference	Site type	Status	ITM Easting	ITM Northing
U189	Bridge	Upstanding	724523	723247

The bridge comprises a single arch, which is elliptical in shape supporting a long barrel vault constructed on stone piers that retain a slightly bevelled or step profile (Plates 1–4).

The façade stone of the arch, piers, spandrel and parapet are all well-cut granite ashlar blocks. A central line of granite stone appears to continue through the length of the barrel vault, while the stones that form the vault either side of the centreline employ a variety of stone including slate.

There is no upstream cutwater, and the downstream element is masked by the addition of the modern culverted channel, which was built over the original east-facing side of the bridge (Plate 5). The arch measures 3.7m wide and stands 2.2m above the riverbed.

A stone apron exists across the riverbed under the arch. The apron is constructed using rectangular-shaped cut stone blocks that are aligned east/west on the long axis of the bridge.

The parapet is capped with a line of rounded coping stones that were originally tied together with iron staples (Plate 6).

Plate 1: View looking at arch ring, spandrel and parapet from upstream

Plate 2: View of upstream right hand buttress

Plate 3: View looking upstream showing bridge pier from within the arch

Plate 4: View looking upstream showing bridge arch

Reference	Site type	Status	ITM Easting	ITM Northing
U189	Bridge	Upstanding	724523	723247

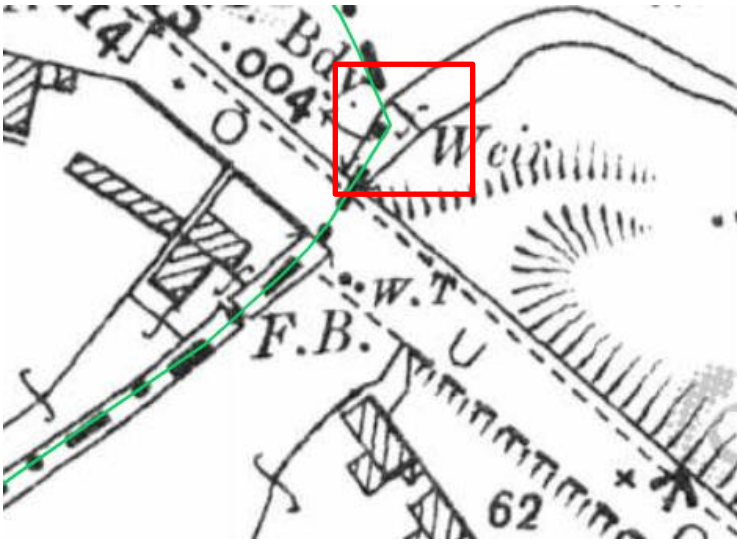
Plate 5: View showing where the N11 culvert is built on to the old bridge stonework

Plate 6: View looking south along parapet wall

Impact from development	Indirect.
Mitigation	Impact avoidance Archaeological monitoring of impacts in the vicinity.

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 2	Weir	Not evident	724534	723263

The OS historic 25-inch map (*c.* 1910) recorded a weir some 10m east of the bridge U189.

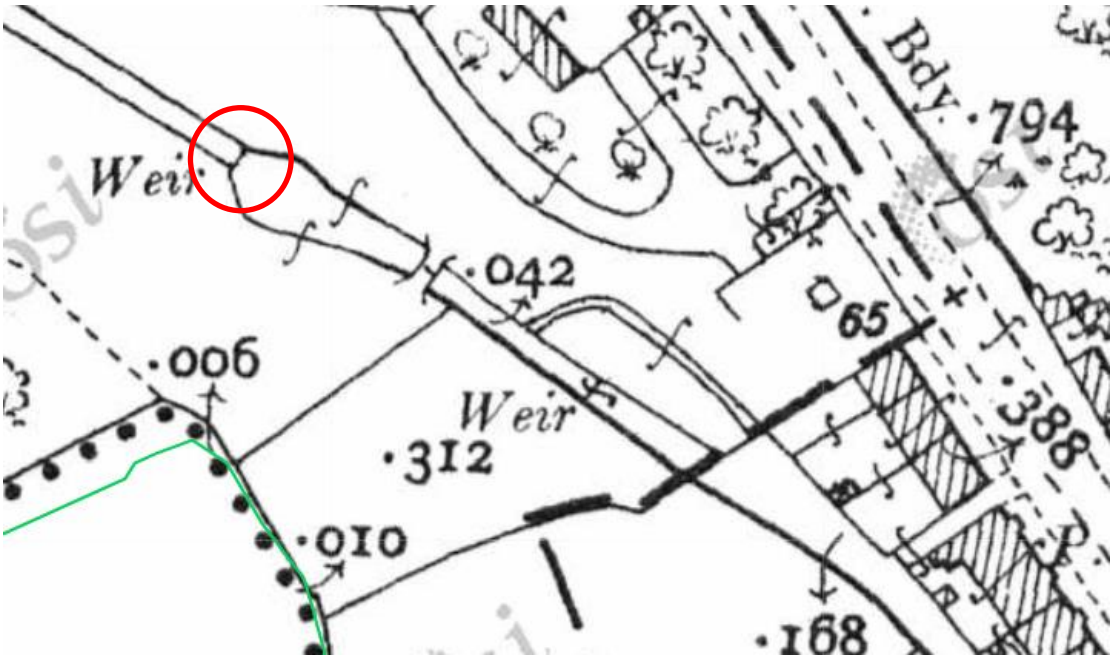


Detail from OS 25-inch map showing location of weir

Impact from development	None.
Mitigation	None.

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 3	Road	Not evident	724584	723243
The OS First edition 6-inch map (*c.* 1840) recorded an 'Old Road' 15m east of the bridge U189. The 'Old Road' would have preceded that which served as a road in 1840 and which continues in use today as the old 'Bray Road', providing local access to the premises at the foot of Cherrywood Road				
 *Detail from OS First Edition, highlighting in red that length of the 'Old Road' recorded to the east of the Bray Road at that time*				
Impact from development	None.			
Mitigation	None.			

Loughlinstown River North

Reference	Site type	Status	ITM Easting	ITM Northing
U114	Weir	Not evident	724293	723413
There is no indication of the former weir features U114 recorded on the historic OS maps				
 *Detail from OS 25-inch map series*				

Reference	Site type	Status	ITM Easting	ITM Northing
U114	Weir	Not evident	724293	723413
Impact from development	None.			
Mitigation	None.			

Reference	Site type	Status	ITM Easting	ITM Northing
U115	Footbridge	Replaced	724320	723398

There is no historic bridge at the recorded location. However, a new bridge is located on the site. The new bridge is wide enough to carry a path across the landscaped parkland for light vehicular traffic. The current construction is a simple reinforced concrete slab supported by abutments that are formed by two stacks of stone-filled gabion nests on both banks. A concrete slab separates the gabion stacks, and the river channel is deeper under the bridge on the right side (west side).

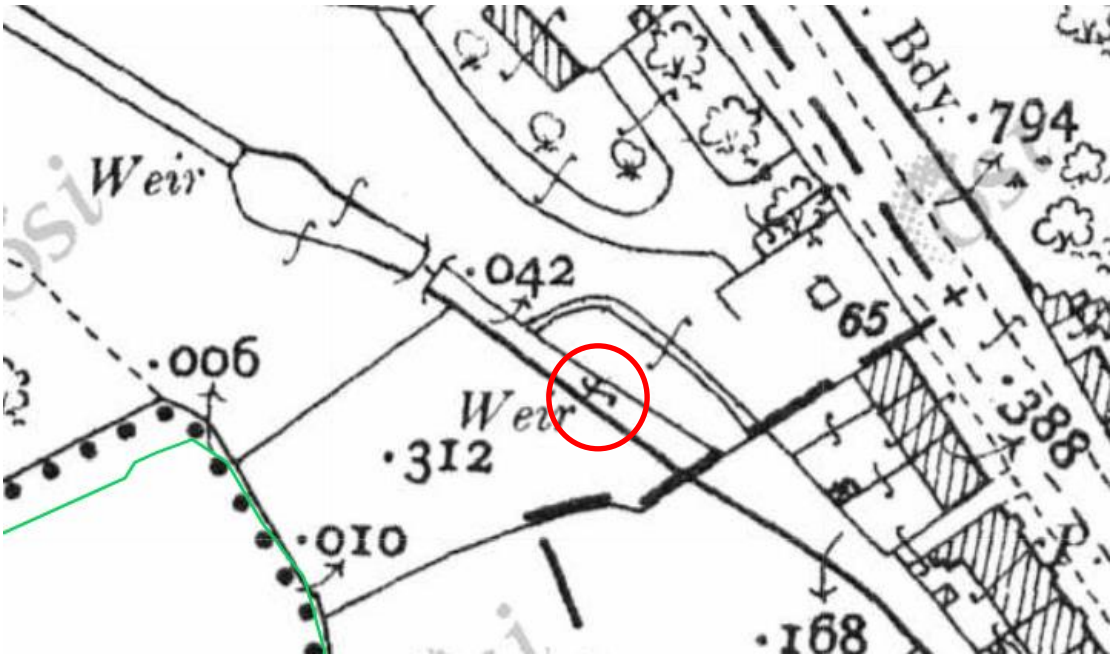
Detail from OS 25-inch map series

U115, site of, showing base of modern bridge, left bank

U115, site of, showing base of modern bridge, right bank

Reference	Site type	Status	ITM Easting	ITM Northing
U115	Footbridge	Replaced	724320	723398
Impact from development	None.			
Mitigation	None.			

Reference	Site type	Status	ITM Easting	ITM Northing
U119	Weir	Not evident	724342	723382
There is no indication of the former weir feature U119 recorded on the historic OS maps				



Detail from OS 25-inch map series

Impact from development	None.
Mitigation	None.

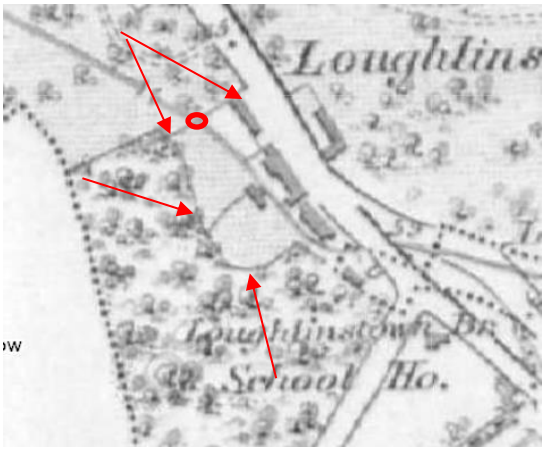
Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 4	River wall	Upstanding	724347	723382
A granite-built stone wall, vertical in profile, survives from approximately the former location of U119 to ADCO 6; a distance of 10-15m. The wall is made from roughly shaped granite blocks cut into rectangular shape and measuring approximating 350mm wide by 25mm high. The wall survives to approximately 800mm in height and has clay slippage falling into the channel at its upstream point (main report Plate 18)				
 *View looking downstream at retaining wall, ADCO 4*				
Impact from development	Direct.			
Mitigation	Detailed archaeological recording ahead of impact. Archaeological monitoring.			

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 5	River wall	Upstanding	724349	723376
A granite-built stone wall, vertical in profile, survives from approximately the modern outfall pipe inserted into the right bank, to ADCO 6; a distance of 10-15m. The wall is made from roughly shaped granite blocks cut into rectangular shape and measuring approximating 350mm wide by 25mm high. The wall survives to approximately 800mm in height				
 *View looking on to the retaining wall, ADCO 5, at a point immediately downstream of the recently insert outfall pipe (main report Plate 17)*				
Impact from development	Indirect.			
Mitigation	Detailed archaeological recording in advance of impacts. Archaeological monitoring.			

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 6	Arch/boundary wall	Upstanding	724358	723372

A granite-built arch crosses above the river channel is part of a boundary wall that is recorded on historic OS maps and encloses the group of buildings that are today represented by commercial premises on the old Bray Road.

The boundary wall wraps around this cluster towards the junction of Cherrywood Road and the old Bray Road. The western element of the boundary is aligned northeast/southwest and includes the arch. That part of the western element lying north of the river channel is a stone granite-built wall that includes a gateway measuring 1.65m wide. The ground surface has obvious build-up and the current height to the wall top is 1.85m. The wall base is 1.2m wide but this narrows to 750mm wide. The northwest-facing façade of the boundary wall is straight-sided, while the internal side retains a slight batter. Where the wall transforms into the arch that crosses the channel, the wall is 600mm wide. The arch springs from a granite battered buttress of three courses of granite ashlar blocks. The arch ring is made from yellow brick, with average brick size being 230mm long 70mm high and 90mm deep, bonded by white-coloured lime mortar. The spandrel above the arch is constructed in granite. Dense overgrowth inhibited inspection of the boundary wall as it proceeds southwest from the river channel.



Detail from OS First Edition 6-inch map series with red arrows highlighting route of boundary wall that the arch is part of. Red oval highlight location of the arch

View looking from upstream and arch landing on left bank, with pedestrian entrance to far left

View looking from the north at pedestrian entrance feature, with arch to right

View looking pedestrian entrance from the south

Impact from development	Direct. The feature will be strengthened and reinforced.
Mitigation	Detailed archaeological recording in advance of impacts. Archaeological monitoring.

Reference	Site type	Status	ITM Easting	ITM Northing
U121	Footbridge	Replaced	724405	723332
The site of U121 footbridge recorded on the historic OS maps is populated today by a more recent construction, comprising a simple concrete slab surface supported on a series of steel girders				
				
Impact from development	Direct. The feature will be replaced with a modern culvert.			
Mitigation	Detailed archaeological recording ahead of impacts. Archaeological monitoring.			

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 7	River wall	Upstanding	724361	723368

The right bank downstream of the arch ADCO 6 continues the retaining wall seen upstream (ADCO 5) and is 500mm in height, ADCO 7. It is fractured in places, and obscured by vegetation in other places. Downstream of U121, a stretch of stone wall is replaced with breeze-blocks (Main report Plate 21). The breeze-block section is built directly against the original wall, which is 2m high at this point. An area of collapse reveals the construction of ADCO 7, showing the natural clay bank that was cut into to permit the building of a battered wall with a stone rubble core measuring 600mm in depth. The battered façade stands on a stone plinth that extends a further 100mm out from the façade and stands 800m high above the riverbed. A *c.* 15m-long section of the stone wall has collapsed as the wall follows the bend of the river channel.

The historic OS maps indicate that this land was used as a Smithy (ADCO 8). A line of quoin stones are revealed above the retaining wall. The stones represented one corner of the Smithy complex recorded on the OS mapping. A poured concrete-and-pebble wall with window opening is also exposed and would have been another element of the former Smithy

Section through ADCO 7 reveals the clay bank that was cut into to accommodate the wall, and the construction core of the wall

As one proceeds downstream, the retaining wall is built on by the former Smithy (ADCO 8), and a line of jambstones are retained that served as a rear corner to one of the smithy buildings

Impact from development	Indirect. The proposed flood wall is located on the northern side of the river, and as such the retaining wall will not be subject to impact. However, the realignment of a *c.* 75m-long section of the right bank of the stream is required and sections of ADCO 7 retaining wall will be subject to impact.
Mitigation	Detailed archaeological recording ahead of impacts. Archaeological monitoring.

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 8	Smithy	Upstanding	724442	723304

The historic OS maps indicate that the land abutting the right bank retained by ADCO 7 was used as a Smithy (ADCO 8). Several structural elements of the smithy are retained in the current river wall, including a line of quoin stones that served as one corner of the smithy complex recorded on the OS mapping, and a poured concrete-and-pebble wall with window opening, which would have been another element of the former smithy

Detail from OS 25-inch map series showing former Smithy with wall-ends running close to the river. That highlighted by the red arrow is likely to be that which survives today in the pictures below

Line of jambstones are retained that served as a rear corner to one of the smithy buildings, along with later wall and window ope

Close-up view of jambstones retained and forming top of river wall

Impact from development	Indirect. Works will occur on the opposite bank. No impacts are proposed on ADCO 8.
Mitigation	Impact avoidance. Detailed archaeological recording. Archaeological monitoring.

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 9	Bridge	Upstanding	724449	723313

The upstream approach to Loughlinstown Bridge includes a retaining wall on the left bank and a stone-built apron set across the channel bed that continues in under the bridge (main report Plate 20). These two elements are considered as features directly associated with the bridge. The wall is approximately 1.2m high and includes a culverted stone drain outlet. The upstream element of the apron has a thin concrete skin added later but the main part is fully of stone work, comprising large cut granite blocks set in line with along the water flow. The stones in general measure 430mm long by 170mm wide and are set in profile to follow a shallow shelving dip with the lowest part in the central channel. The apron serves as a protective anti-scour device to the bridge that carries the old Bray Road.

Named 'Loughlinstown Bridge' on the OS First Edition map (*c.* 1840), the bridge retains elements are comparable to the bridge U189 that crosses Loughlinstown River South. The bridge comprises a single arch, which is elliptical in shape supporting a long barrel vault constructed using granite blocks and resting on stone piers that are made of four courses of cut ashlar granite set at alternating distances to give a slightly alternating bevelled or step profile. The stone apron observed upstream of the bridge continues right along its interior where the stone blocks are perhaps somewhat smaller in size on occasion (500mm by 400mm). The façade stone of the arch, spandrel and parapet are all well-cut granite ashlar blocks, with the keystone protruding several centimetres proud of the façade. There is no clearly defined upstream cutwater due to later works built against the bridge obscuring this detail, while the downstream element is masked by the addition of the modern dual-culverted channel, which was built over the original east-facing side of the bridge. A steel/iron girder crosses through the arch and supports a skin wall of red brick measuring 900mm high that conceals/protects a steel service pipe. The parapet is capped with a line of rounded coping stones that were originally tied together with iron staples. A memorial plaque refers to the Carrickmines-Shanganagh Main Drainage Scheme of 1996. This may suggest the date for the steel service pipe inserted through the bridge arch.

Construction of the N11 significantly widened the road area, extending it eastwards. The opening of the Loughlinstown River North on the east side of the N11 today is by means of a modern concrete culvert (main report Plate 22).

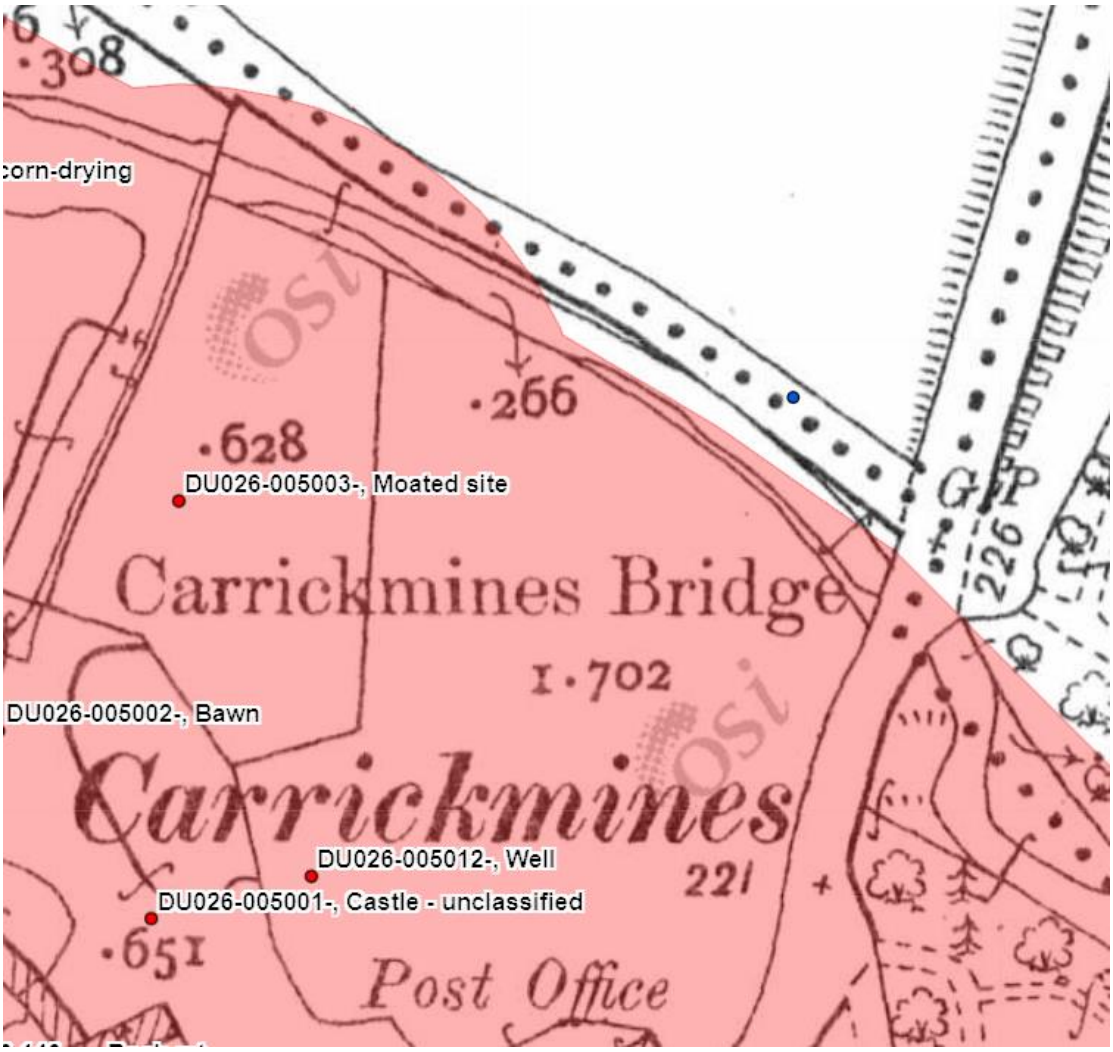
View from upstream looking at bridge arch ring and stone apron below. The bridge infill is sheathing to protect a later service pipe, supported on a steel girder

View from upstream looking at bridge arch ring and stone apron below

Reference	Site type	Status	ITM Easting	ITM Northing
ADCO 9	Bridge	Upstanding	724449	723313
 *View of western abutment from upstream*		 *View of barrel vault and northern point where the N11 culvert is added to the former edge of the bridge. The stone apron remains* in situ		
		*View of the southern parapet wall with memorial plaque*		
Impact from development	Direct. The new flood wall will not impact on this structure but will abut the end wall at the northern end of the bridge parapet.			
Mitigation	Detailed archaeological recording ahead of impacts. Archaeological monitoring.			

Area 3 (Carrickmines River–Glenamuck Road North measure) – Glenamuck Road North Roundabout

Reference	Site type	Status	ITM Easting	ITM Northing
DU026-005---	Castle complex	Site of and buried	721785	724107
Carrickmines Castle site forms the boundary of the Zone of Notification for this important archaeological complex				



Detail from OS 25-inch map series showing the extent of the Carrickmines Castle complex Zone of Archaeological Potential (red) extending north to include UAIA Area 3

Impact from development	Direct.
Mitigation	Archaeological monitoring.

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260228	Water pump	Upstanding	721907	724165
A water pump is recorded in the NIAH on the north side of the road that runs alongside the river (NIAH 60260228. The NIAH record records the pump as a cast-iron 'lion mask' that was extant in 1937 and made by Glenfield and Kennedy (established 1852) of Kilmarnock.				

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260228	Water pump	Upstanding	721907	724165
				
Impact from development	None.			
Mitigation	None.			

Area 4 (Kilgobbin Road and Belarmine Park flood measure) – Kilgobbin Road and Belarmine Park

Reference	Site type	Status	ITM Easting	ITM Northing
U44	Bridge	Upstanding	719337	724787

A stone-built bridge recorded on historic OS maps and recorded as an undesignated site (U44) carries the Kilgobbin Road across the stream channel. The bridge is registered in DLRCC as DL-LP2024-001.00. Access to the bridge is provided on the left bank (east bank) by means of a wayleave that may have served previously to provide access to the stream for livestock. The bridge is built of granite and comprises two small arches and a central pier with a cutwater on its upstream side. The arches are semi-circular stilted forms with repairs giving a slightly pointed perspective to the vaults. The piers are made using large rounded granite boulders. The south arch contains two stone-built culverts for water draining on to the stream bed. The culvert openings are approximately 800mm high and 500mwide. Modern service pipes truncate the arches. The arch rings are cut and roughly finished blocks. The buttresses are flat and have no distinguishing features. The cutwater is made with three courses of large cut granite blocks that stands 1m above the stream bed, on top of which is a pyramidal capping made with granite. The spandrel and parapet are coursed layers of stone work, rising to two layers above the arch ring. Long rounded coping stones complete the upstream parapet. The downstream parapet has been praised by additional granite to over 1m in height, affording privacy to the garden of Kilgobbin Villa.

The boundary wall of Kilgobbin Villa includes the bridge U44. As a protected structure, it is likely that the boundary wall of Kilgobbin Villa is within the curtilage of the protected site and, as such protected status should extend to include U44.

View looking north from Kilgobbin Stream as entrance area to bridge from the road

View from upstream at bridge arches and cutwater. Modern service pipes cross in front of the bridge

View along the northern barrel vaulted arch, showing the large boulder used to construct the bridge piers, and the later repairs to the vault

View of western culvert that empties into the southern arch from the south

Reference	Site type	Status	ITM Easting	ITM Northing
U44	Bridge	Upstanding	719337	724787
 *View looking south into stone drainage culvert*		 *West-facing view of bridge parapet wall and coping stones*		
		*East-facing view of bridge parapet, showing where the coping stones have been removed and the wall raised in height*		
Impact from development	Direct. Except for minor works to the parapet of Kilgobbin Bridge there will be no impact on the bridge structure.			
Mitigation	Detailed archaeological recording ahead of impacts. Archaeological monitoring.			

Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260008 RPS 1688	House	Upstanding	719338	724749
Kilgobbin Villa is believed to date from 1837 and the NIAH entry focuses its description on the architecture of the house, and comments on the landscaped grounds. While the NIAH entry does not refer to the boundary wall *per se*, the wall would fall within the curtilage of the protected structure and should be considered within this context. The boundary wall of Kilgobbin Villa includes the bridge U44 as it carries Kilgobbin Road across Kilgobbin Stream. As a protected structure, it is likely that the boundary wall is within the curtilage of the protected site and, as such, protected status should extend to include U44.				
Impact from development	Indirect, curtilage location. Kilgobbin Villa will not be impacted and the side of the bridge parapet that forms the boundary will not be impacted by the development.			
Mitigation	Impact avoidance. Archaeological monitoring.			

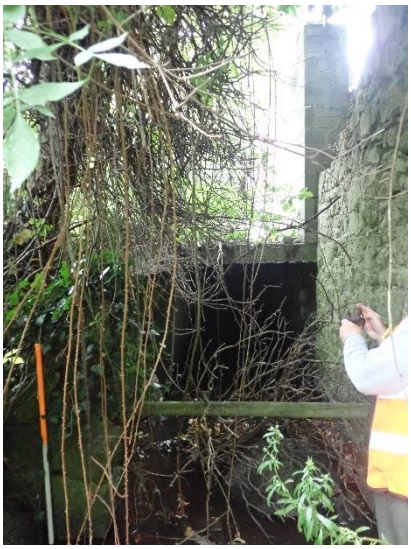
Reference	Site type	Status	ITM Easting	ITM Northing
NIAH 60260003 RPS 1684	House	Upstanding	719348	724843

Kilgobbin House is believed to date from 1837 and the NIAH entry focuses its description on the late Georgian architecture of the house, and comments on the landscaped grounds. While the NIAH entry does not refer to the boundary wall *per se*, the wall would fall within the curtilage of the protected structure and should be considered within this context.

The southern boundary wall of Kilgobbin House is built alongside the left bank of the Kilgobbin Stream. Where the boundary turns to become the western wall of the House, there is a modern reinforced concrete slab crossing the stream that appears to provide access from the adjoining field into the rear of the House. The presence of stonework below the concrete slab on the right bank may suggest that this replaced an earlier access bridge, but the location is quite densely covered in overgrowth to make this judgement with certainty.

As a protected structure, it is likely that the boundary wall is of Kilgobbin House is within the curtilage of the protected site and, as such protected status should extend along the left bank of Kilgobbin Stream.

View looking downstream along the stream channel, with the south boundary wall of Kilgobbin House to the left



View looking upstream to the modern concrete slab crossing the channel to provide a rear access into Kilgobbin House. The presence of stonework on the right bank may indicate a pre-existing entrance bridge, but the dense vegetation at this location meant that is not yet possible to clarify

Impact from development	Direct, curtilage location. Retain 10m-length of boundary wall where the wall meets Kilgobbin Bridge, and construct flood wall behind the boundary wall. The upstream remainder of the boundary wall will be removed and replaced with a flood wall that re-uses the stone from the demolished wall under direction of the project's conservation engineer.
Mitigation	Detailed archaeological recording in advance of impacts. Archaeological monitoring.

<table>
<tr><th>Reference</th><th>Site type</th><th>Status</th><th>ITM Easting</th><th>ITM Northing</th></tr>
<tr><td>ADCO 10</td><td>Wall</td><td>Upstanding</td><td>719330</td><td>724793</td></tr>
<tr><td colspan="5">The right bank (south bank) upstream bridge U44 has a stone-built retaining wall (ADCO 10) that includes two drainage opes and a saddle slab that connects to the boundary wall of Kilgobbin House on the left bank. An iron bar located below the saddle slab suggests it may have served as part of a sluice. As a protected structure, it is likely that the boundary wall is of Kilgobbin House is within the curtilage of the protected site and, as such protected status may extend to the saddle slab and, by extension to the stone retaining wall that is ADCO 10.</td></tr>
<tr><td colspan="3"> 
View looking upstream at retaining wall on right bank (left side of picture) and boundary wall of Kilgobbin House on left bank (right side of picture)</td><td colspan="2"> 
Close-view looking upstream at retaining wall on right bank (left side of picture) with drain ope; saddle block crossing river, and boundary wall of Kilgobbin House on left bank (right side of picture)</td></tr>
<tr><td colspan="3">  </td><td colspan="2">Close-view looking downstream at retaining wall on right bank (right side of picture); saddle block crossing river, and boundary wall of Kilgobbin House on left bank (left side of picture)</td></tr>
<tr><td>Impact from development</td><td colspan="4">Direct, curtilage location. A 10m-length of the boundary wall of Kilgobbin House as it runs up to Kilgobbin Bridge will remain in situ, and new flood wall built behind/inside the boundary wall</td></tr>
<tr><td>Mitigation</td><td colspan="4">Detailed archaeological recording ahead of impacts.
Archaeological monitoring.</td></tr>
</table>

6.0 Impact assessment

The Flood Relief Scheme proposes to construct flood defence measures in each of the areas inspected.

The measures proposed are for bankside works for the most part, where flood walls will be constructed on existing riverbanks/stream banks to protect against inundation from flooding.

At Kilgobbin, a culvert channel is also proposed, to deflect flood waters to the south of Kilgobbin House. A short length of flood wall is proposed to complement the proposed flood wall upstream at Belarmine Park.

The details of the proposed works are still at an early stage of design and particular impacts can be considered on a site by site basis in due course. One can expect indirect impacts on cultural heritage assets in Area 1, and potentially direct impacts in Areas 2 and 4. The impacts in Area 3 will take place within the Zone of Notification associated with the Carrickmines Castle complex and must take account of the protected status attached to working within such a location.

Table 2 summarises potential impacts at the recorded locations in Areas 1–4, and also summarises recommended mitigation measures.

Location	Reference	Site type	Status	Assessed impact	Mitigation strategy
Area 1	NIAH 60260118, RPS 1772	Bridge	Upstanding	Direct	• Conservation Engineer inputs • Archaeological monitoring
	U185	Footbridge	Not evident	None	• None
Area 2	RPS 1770	Cottage	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
	U182	Footbridge	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
	ADCO 1	Cottage	Upstanding	None	• None
	U189	Bridge	Upstanding	Indirect	• Impact avoidance • Archaeological monitoring
	ADCO 2	Weir	Not evident	None	• None
	ADCO 3	Road	Not evident	None	• None

Location	Reference	Site type	Status	Assessed impact	Mitigation strategy
	U114	Weir	Not evident	None	• None
	U115	Footbridge	Replaced	None	• None
	U119	Weir	Not evident	None	• None
	ADCO 4	River wall	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
	ADCO 5	River wall	Upstanding	Indirect	• Detailed archaeological recording • Archaeological monitoring
	ADCO 6	Arch/boundary wall	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
	U121	Footbridge	Replaced	Direct	• Detailed archaeological recording • Archaeological monitoring
	ADCO 7	River wall	Upstanding	Indirect	• Detailed archaeological recording • Archaeological monitoring
	ADCO 8	Smithy	Upstanding	Indirect	• Impact avoidance • Detailed archaeological recording • Archaeological monitoring
	ADCO 9	Bridge	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
Area 3	DU026-005---	Castle complex	Site of and buried	Direct	• Archaeological monitoring
	NIAH 60260228	Water pump	Upstanding	None	• None
Area 4	U44	Bridge	Upstanding	Direct	• Detailed archaeological recording

Location	Reference	Site type	Status	Assessed impact	Mitigation strategy
					• Archaeological monitoring
	NIAH 60260008 RPS 1688	House, curtilage	Upstanding	Direct	• Impact avoidance • Archaeological monitoring
	NIAH 60260003 RPS 1684	House, curtilage	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring
	ADCO 10	Wall	Upstanding	Direct	• Detailed archaeological recording • Archaeological monitoring

Table 2: Potential impacts and recommended mitigation measures at RMP/SMR, RPS, NIAH, Undesignated and ADCO sites in the UAIA Areas1–4.

7.0 Recommendations

The proposed works must seek to avoid impacts with protected sites (RMP/SMR sites and RPS sites) and should avoid impacts with other known cultural heritage sites, including the previously unregistered sites identified in this report.

Where impact avoidance is not possible, sufficient rationale for the impacts must be provided, and the features will be archaeologically recorded in full prior to construction works commencing at those locations. The recording standard must be of the highest level and must be capable of providing metrically accurate plan, elevation and section drawings at 1:20 scale where needed, supported by detailed descriptions and a comprehensive photographic record. A laser-scanner and Total Station EDM would be the expected devices used by the archaeologists to do the recording work.

Archaeological monitoring by a licence-eligible archaeologist experienced in riverine archaeology will be conducted of all bankside and in-channel ground disturbance activities, with the proviso to resolve fully any archaeological features exposed.

7.1 Pre-construction recommendations

Carry out close review of detailed flood defence proposals and contribute to design team discussions relating to impact avoidance; impact rationale, and impact avoidance where possible.

An Archaeology Management Plan will be prepared by the archaeologist to support the protocols to be included in the Construction Environmental Management Plan (CEMP) to ensure proper management and response to archaeological monitoring, recording and resolution that will be required in the course of the project.

Carry out pre-construction phase detailed archaeological survey of the features identified to be impacted and summarised on Table 2, to create a detailed record of the features before they are impacted upon.

7.2 Construction phase recommendations

Archaeological monitoring is required of the ground disturbance works associated with the scheme, with the proviso to resolve fully any material observed at that point

7.3 Management matters

DLRCC will appoint an experienced underwater / riverine archaeologist to manage and resolve the underwater archaeological requirement, which relates to in-channel and bankside works associated with the FRS.

The archaeological appointment will be in addition to an independent Office of Public Works/DLRCC-appointed project archaeologist whose remit is to serve in a supporting role in terms of archaeological licensing and mitigation.

Archaeological interventions (pre-construction and construction phase) are licensed by the DHLGH. The Licence applications take four working weeks to be processed and must be granted before archaeology-related site-work can commence. An excavation licence will be required for investigative work ahead of construction, and for the monitoring element of the construction phase. A ministerial consent will be required for works within the ZoN of Carrickmines Castle. Since 2017, excavation licence applications must be accompanied by a letter from the client 'confirming that sufficient funds and other facilities are available to [the archaeologist] to complete the archaeological excavation, post-excavation, and preliminary and final reports (including specialist reports)'.

THE TIME SCALE for the pre-construction and construction phases will be made available to the archaeologist, with information on where and when the various elements and ground disturbances and dredging will take place.

SUFFICIENT NOTICE. DLRCC will provide sufficient notice to the archaeologist/s in advance of the pre-construction and construction works commencing. This will allow for prompt arrival on site to undertake additional surveys and to monitor ground disturbances. As often happens, intervals may occur during the construction phase. In this case, it will also be necessary to inform the archaeologist/s as to when ground disturbance works will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, any machine work will cease in the immediate area to allow the archaeologist/s to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once the presence of archaeologically significant material is established, full archaeological recording of such material will be facilitated. If it is not possible for the construction works to avoid the material, full excavation is recommended. The extent and duration of excavation will be a matter for discussion between DLRC/OPW and the licensing authorities.

ARCHAEOLOGICAL FINDS RETRIEVAL. It is required that the works has an archaeological finds retrieval protocol in place to ensure the safe recovery of objects from spoils, risings and excavations exposed in the course of the FRS works, and that facility is provided to the archaeologist to scan risings for objects before risings are disposed of, in accordance with the expectations of the National Museum of Ireland.

ARCHAEOLOGICAL TEAM. It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This will be complimented in the event of a full excavation.

SECURE TEMPORARY SITE OFFICES and facilities will be provided on or near those sites where excavation is required within the site boundary

SECURE WET AND DRY STORAGE for artefacts recovered during the course of the investigations and monitoring work should be provided on or near those sites within the site boundary where excavation is required.

FENCING of cultural heritage assets immediately beside the works areas may be necessary during construction to avoid any accidental and indirect impacts on these environs.

MACHINERY TRAFFIC during construction will be restricted as to avoid any of the selected sites and their environs.

SPOIL will not be dumped on any of the selected sites or their environs.

POST-CONSTRUCTION PROJECT REPORT AND ARCHIVE. It is a condition of archaeological licensing that a detailed project report is lodged with the DCHG within 12 months of completion of site works. The report will be to publication standard and will include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy, along with a discussion and specialist reports. Artefacts recovered during the works will meet the requirements of the National Museum of Ireland

The project must comply with the National Monuments Service, *Archaeology and Flood relief Scheme: Guidelines* (Government of Ireland, two volumes, 2023).

Recommendations are subject to the approval of the National Monuments Service at the Department of Housing, Local Government and Heritage.

The use of the same laser-scanner and Total Station EDM as that deployed during pre-construction will facilitate the ready addition of new information layers that will ultimately represent a very comprehensive archaeological record of the bridge and its context.

The extent of monitoring needed will be qualified by the works contractor's method statement and schedule when known.

8.0 Bibliography

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Online

National Monuments Service, online portal : https://heritagedata.maps.arcgis.com/

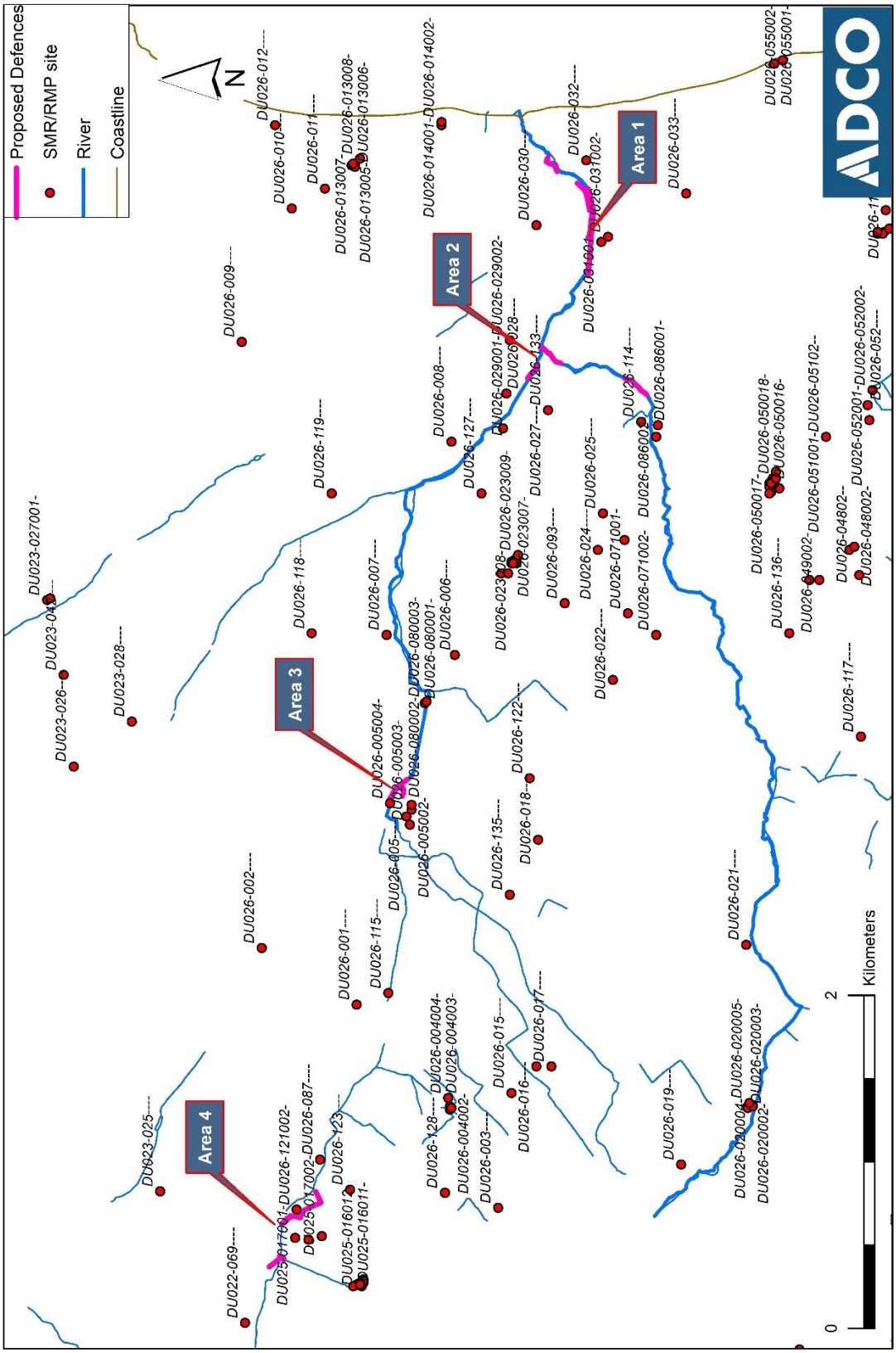

Figure 1: Project location showing UAIA Areas 1–4.

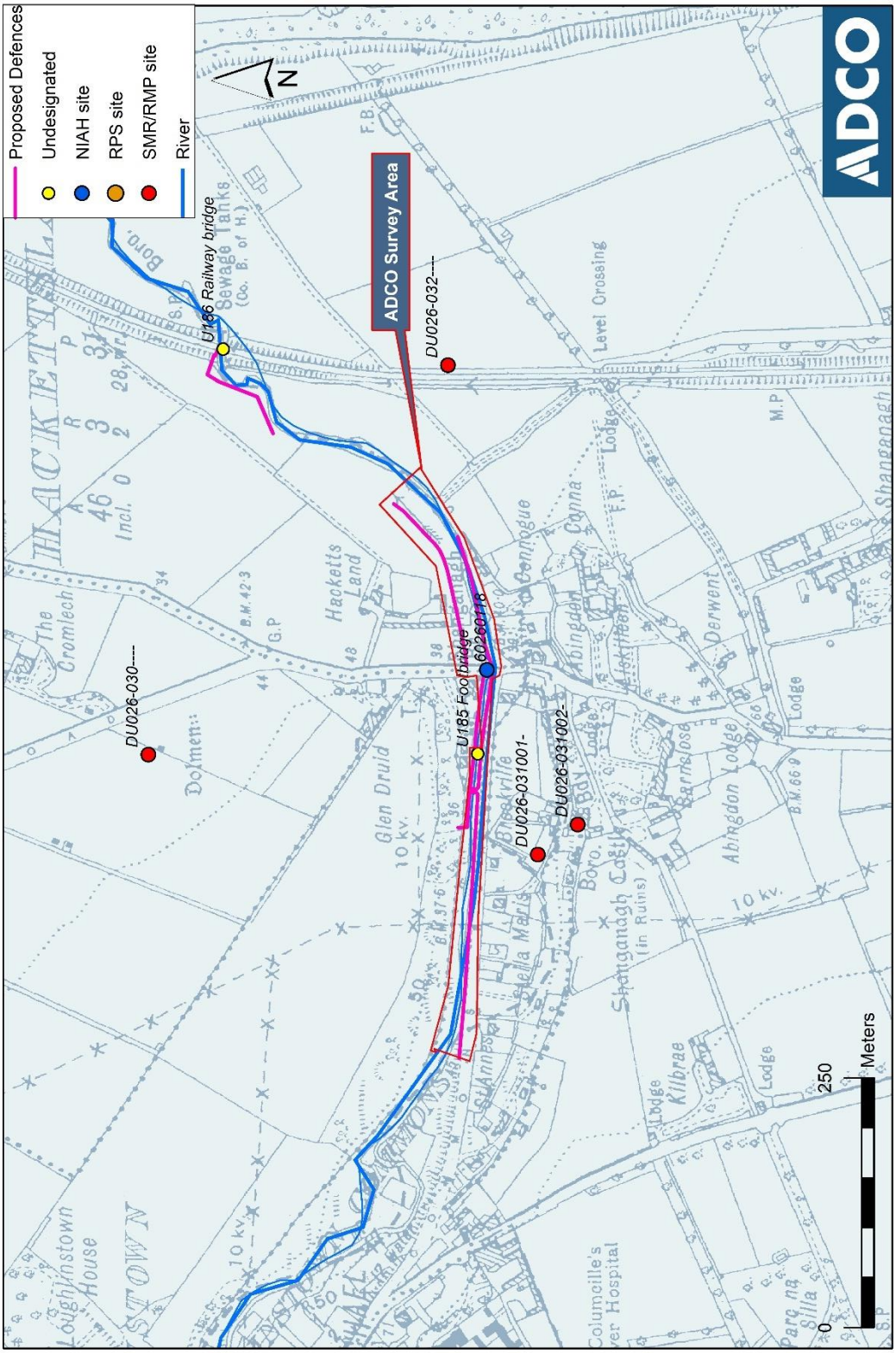

Figure 2: Area 1, showing ADCO survey area and observed cultural heritage assets.

Figure 3: Point Cloud image derived from laser scan survey of Shanganagh Bridge. View looking upstream towards bridge.

Figure 4: Point Cloud image derived from laser scan survey of Shanganagh Bridge. View looking downstream towards bridge.

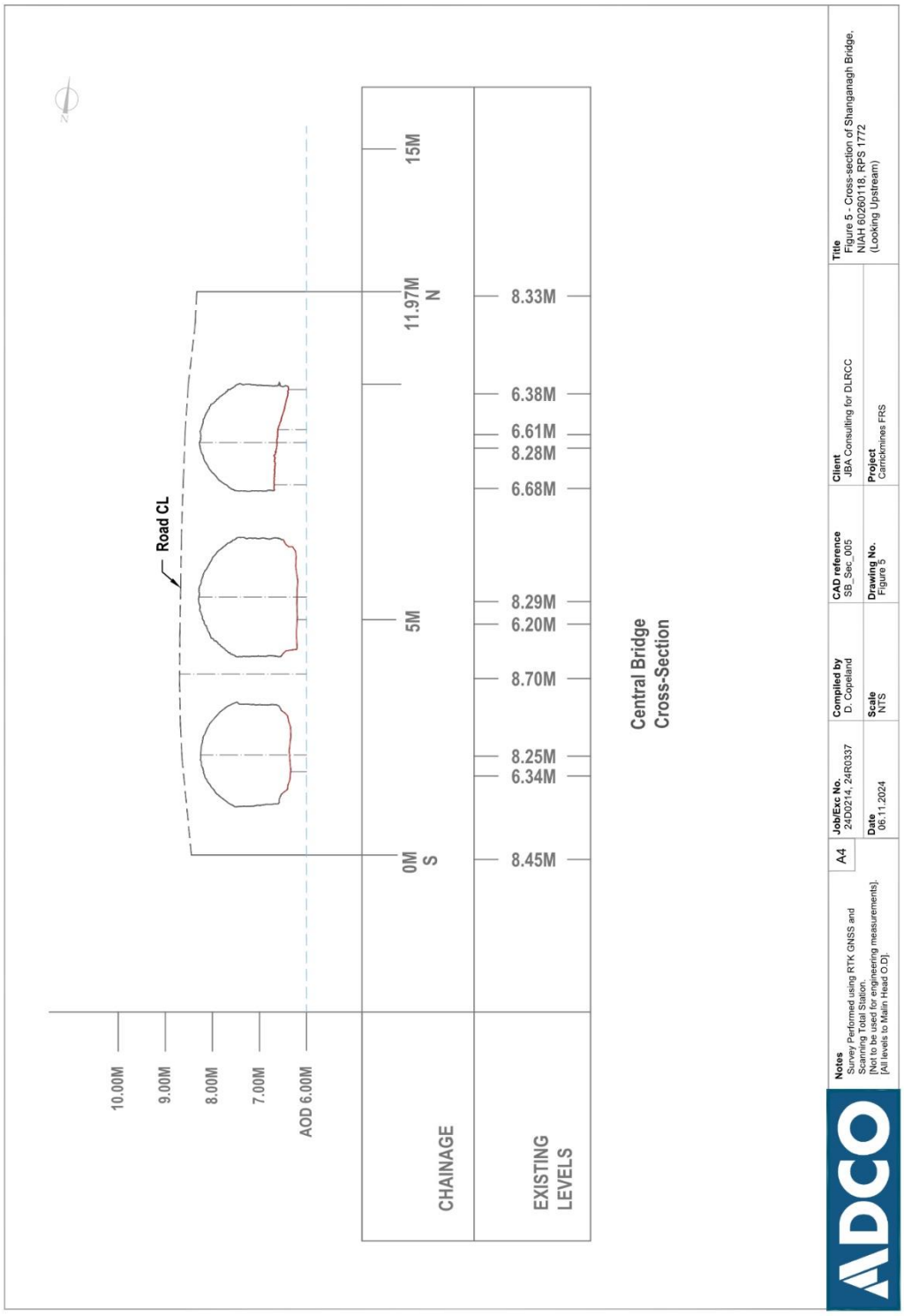

Figure 5: Cross section through Shanganagh Bridge.

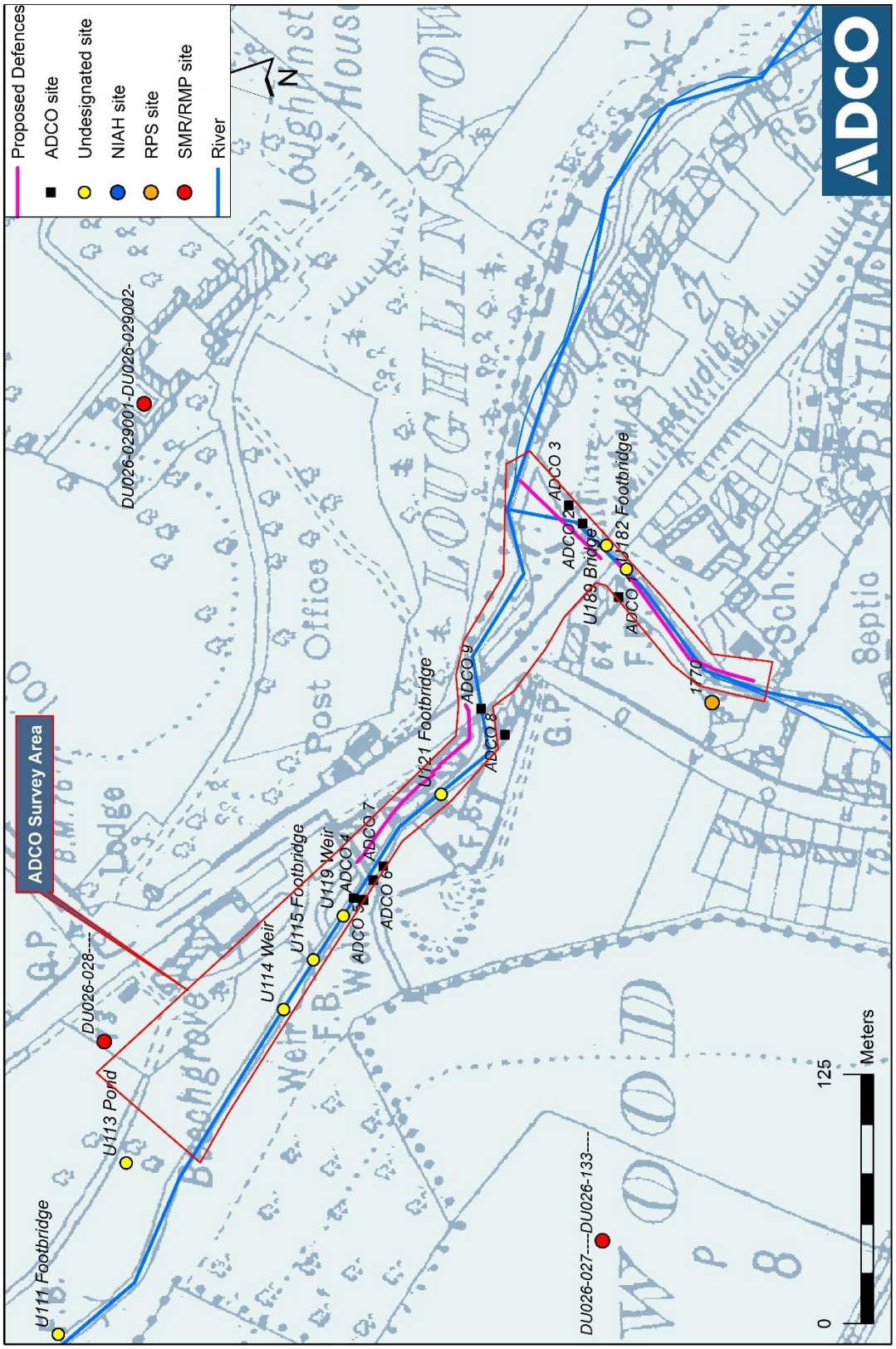

Figure 6: Area 2, showing ADCO survey area and observed cultural heritage assets.

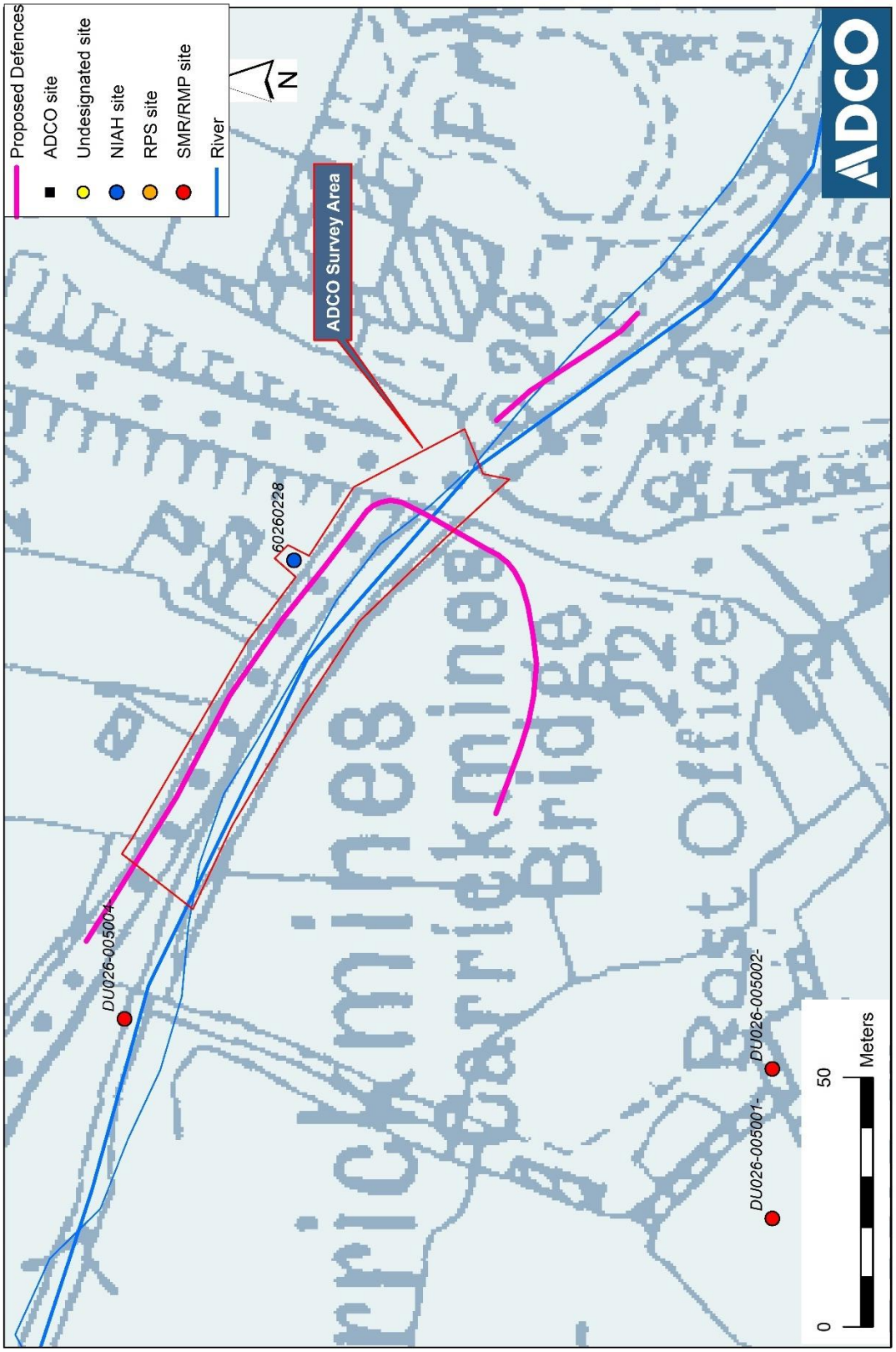

Figure 7: Area 3, showing ADCO survey area and observed cultural heritage assets.

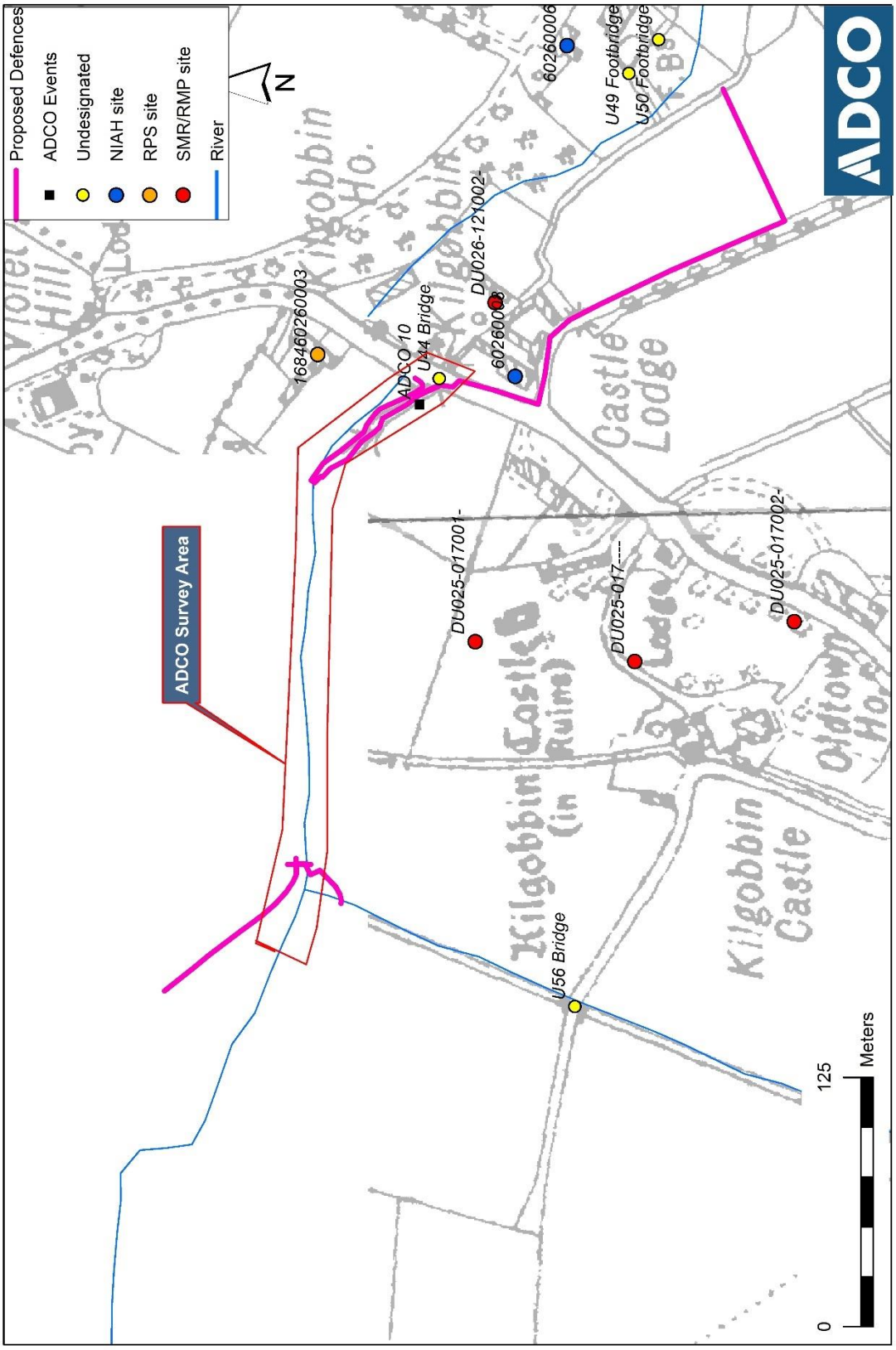

Figure 8: Area 4, showing ADCO survey area and observed cultural heritage assets.

Plate 1: View looking upstream at slight dip in channel bed, perhaps constructed as a fish pass.

Plate 2: View looking upstream showing Larsen piling and rock armour protection that defines the right bank downstream of Shanganagh Bridge.

Plate 3: View of left bank showing rock armour protection added to base, downstream of Shanganagh Bridge.

Plate 4: View of right bank above Shanganagh Bridge, showing concrete slab retaining wall and rock armour protection along riverbank.

Plate 5: View of concrete slab retaining wall on left bank upstream of Shanganagh Bridge.

Plate 6: View across floodplain at base of Glen Druid.

Plate 7: View of concrete weir and flood gauge at upstream limit of UAIA area.

Plate 8: View east along Commons Road, where the top of the stone retaining wall is flush with the road surface that, in turn, serves as an embankment to the lower-lying properties on the other side of the road.

Plate 9: Modern vehicular bridge providing access across the Shanganagh River to a private residence off Commons Road.

Plate 10: Debris trap inserted into the Shanganagh River in the recent past.

Plate 11: Current exit of the Loughlinstown River South on the east side of the N11 is through a reinforced concrete culvert.

Plate 12: View looking upstream at channel of Loughlinstown River South as it flows under the N11 culvert.

Plate 13: View looking south along Loughlinstown River North from the upstream limit of the UAIA area.

Plate 14: View of gravel riverbed, Loughlinstown River North.

Plate 15: Example of pipe entering Loughlinstown River North from the left bank.

Plate 16: Modern bridge replacing U115, Loughlinstown River North.

Plate 17: outfall pipe and attendant impacts on right bank, Loughlinstown River North.

Plate 18: Clay slippage into river channel off left bank with stone retaining wall, ADCO 4, behind the slippage and extending downstream.

Plate 19: View looking north at rear wall of outhouse that occupies one of the now-commercial premises on the old Bray Road. The poured concrete-and-pebble temper mix is typical of early 20th-century dwellings in the wider area.

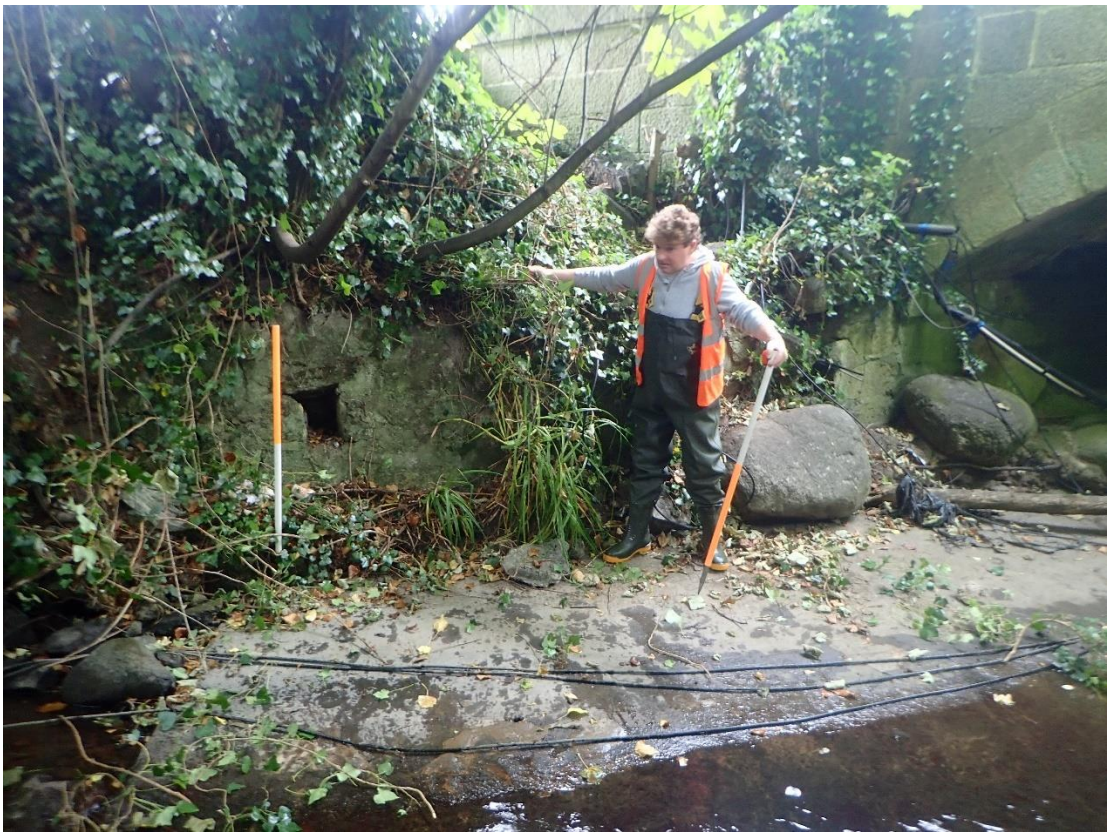

Plate 20: View of retaining wall upstream of and associated with Loughlinstown Bridge, ADCO 9. The riverbed at this point is covered in the stone apron that is also associated with the bridge.

Plate 21: Expanse of breeze blocks to the right that replace stone wall to the left (ADCO 7), where the stone wall has collapsed or been removed.

Plate 22: Current exit of the Loughlinstown River North on the east side of the N11 is through a reinforced concrete culvert.

Plate 23: View looking west along road at parapet wall that ovrlooks Carrickmines River.

Plate 24: View looking downstream (east) along Carrickmines River, with rock armour boulder inserted at base of riverbank.

Plate 25: View of Kilgobbin Stream as it passes alongside the boundary wall of Kilgobbin House.

Plate 26: View of Kilgobbin Stream upstream of Kilgobbin Bridge.

Plate 27: View of outfall pipe that flushes into Kilgobbin Stream in Belarmine Park.

Plate 28: View of Kilgobbin Stream in Belarmine Park where it is culverted.

Plate 29: View of stone setting at base of streambank in Belarmine Park, where a modern reinforced concrete feature has been placed above it.

13.6 Geophysical Survey Report

GEOPHYSICAL SURVEY

REPORT

Carrickmines Flood Relief Scheme,

County Dublin

Licence Number: **24R0431**

Date:
06/09/2024

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CARRICKMINES FLOOD RELIEF SCHEME, COUNTY DUBLIN

Site Name	Carrickmines Flood Relief Scheme	**JML Ref No.**	24040
Townland	Loughlinstown	**Licence No.**	24R0431
County	County Dublin	**Licence Holder**	Joanna Leigh
ITM (centre)	E625610, N719780	**Purpose**	Site Investigation
Client	Dun Laoghaire-Rathdown County Council	**Reference No.**	NA

Ground Conditions	The application area had been cut and cleared to facilitate this survey.
Survey Type	Detailed gradiometer survey totalling c.0.2 hectares.

Summary of Results

The survey data is dominated by modern magnetic disturbance and ferrous responses. This results from modern ground disturbance and material within the topsoil. No responses of archaeological interest can be discerned within the dataset.

Fieldwork Date	28th August 2024

Report Date	06/09/2024	**Report Author**	Joanna Leigh

Contents

Carrickmines Flood Relief Scheme,
County Dublin

1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys Ltd. at a site in the townland of Loughlinstown, County Dublin. This survey forms part of a wider investigation for the proposed Carrickmines Flood Relief Scheme, on behalf of Dun Laoghaire-Rathdown County Council.

1.2 The survey application area is located within a small irregular shaped piece of land to the west of the N11 road, south of the R118 and north of Cherrywood Road. A site location diagram is presented in Figure 1 at a scale of 1:3,000.

1.3 There are no recorded monuments within the application area. However, to the west there are a cluster of monuments. These include an enclosure (DU026-027), a prehistoric house (DU026-155), a barrow (DU026-133) and two fulacht fia (DU026-142 and DU026-141), and to the east a castle (DU026-029). The locations of the monuments are presented in Figure 1.

1.4 The main aim of the survey was to identify any geophysical responses that may represent the remains of unknown archaeology within the application area. A detailed gradiometer survey was conducted under licence 24R0431, issued by the Department of Housing, Local Government and Heritage. Figure 2, at a scale of 1:750, presents the location of the detailed survey.

2 Survey Ground Conditions and Further Information

2.1 The application area had been cut and cleared to facilitate this survey. Previous to this the ground was disused and overgrown. Modern material was still evident, with modern litter noted throughout.

3 Survey Methodology

3.1 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.

3.2 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.

3.3 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

3.4 All data was collected in ‘zigzag’ traverses. Grid orientation was positioned to facilitate data collection and remained constant throughout the survey areas. Data was collected with a sample interval of 0.25m and a traverse interval of 0.5m. The survey grid was set out using a GPS VRS unit. Survey tie-in information is available upon request.

4 Data Display

4.1 A summary greyscale image of the survey results is presented in Figure 3, at a scale of 1:750. An accompanying interpretation diagram is presented in Figure 4, also at a scale of 1:750.

4.2 Isolated ferrous responses in the gradiometer data highlighted in the interpretation diagram most likely represent modern ferrous litter and debris and are not of archaeological interest. These are not discussed in the text unless considered relevant.

4.3 The raw gradiometer data is presented in archive format in Appendix A1.01. The raw data is displayed as a greyscale image and xy-trace plot, both at a scale of 1:500. The archive plots are used to aid interpretation of the results and are for reference only. These are available as PDF images upon request.

4.4 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

5 Survey Results & Conclusion

5.1 The data is dominated by modern magnetic disturbance and ferrous responses. This results from ground disturbance and modern ferrous debris. The magnetic disturbance is significant and may mask any subtle responses resulting from archaeological features.

5.2 No responses of archaeological potential can be discerned within the magnetic disturbance and, as such, no archaeological interpretation can be provided.

5.3 Consultation with a licensed archaeologist and with the Department of Housing, Local Government and Heritage is recommended to establish if any additional archaeological works are required.

6 Technical Information Section

Instrumentation & Methodology

Detailed Gradiometer Survey

Detailed gradiometer survey can either be targeted across a specific area of interest or conducted as a blanket survey across an entire application area, often as a standalone methodology.

Sampling methodologies can vary but a typical survey is conducted with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids measuring 40m x 40m, with the data displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. This can sometimes produce results with a more detailed resolution. A survey with a grid size of 20m x 20m and a traverse interval of 0.5m will provide a data set with high resolution.

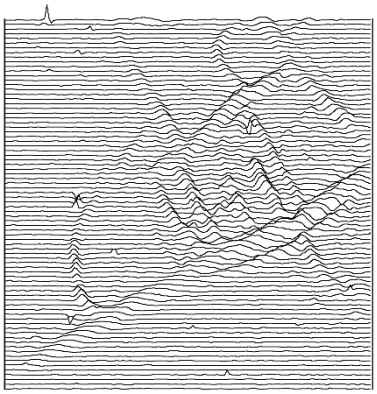
Bartington GRAD 601-2

The Bartington Grad 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

Frequent realignment of the instruments and zero drift correction ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

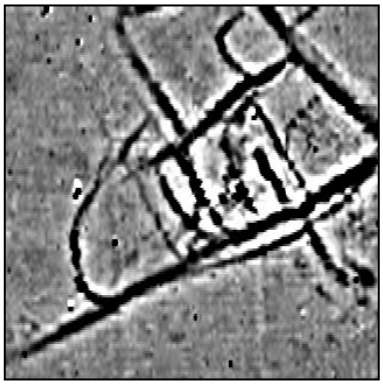
Gradiometer Data Display & Presentation

XY Trace



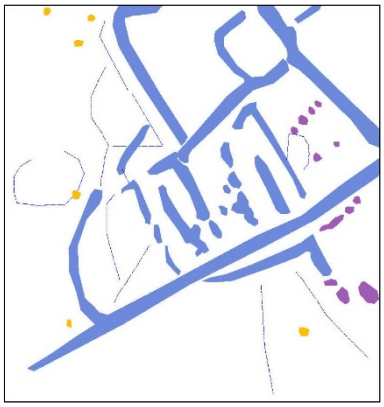
The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.

*Greyscale**



As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.

Interpretation



An interpretation of the data is made using the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allow a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation. The archive plots are provided as PDF images upon request.*

Glossary of Interpretation Terms

Categories of responses may vary for different data sets. The list below are the most used categories for describing geophysical responses, as presented in the summary interpretation diagrams.

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, pits, and associated features.

? Archaeology

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

Area of Increased Magnetic Response

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

Trend

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

? Natural

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

Ferrous Response

These anomalies exhibit a typically strong magnetic response, often referred to as ‘iron spikes,’ and are the result of modern metal debris located within the topsoil.

Area of Magnetic Disturbance

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

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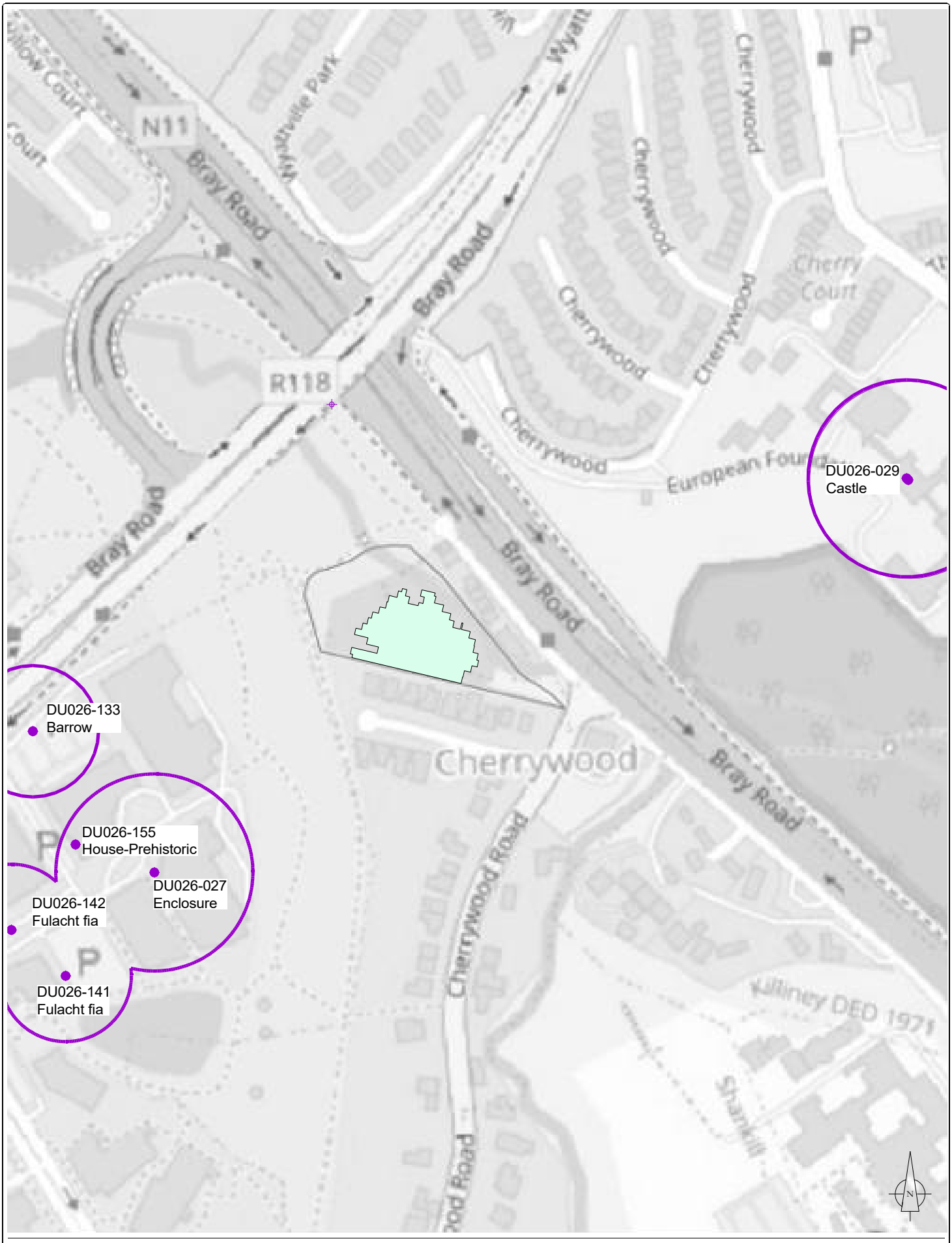
List of Figures

Archive Data Supplied as a PDF Upon Request



Detailed
Gradiometer Survey

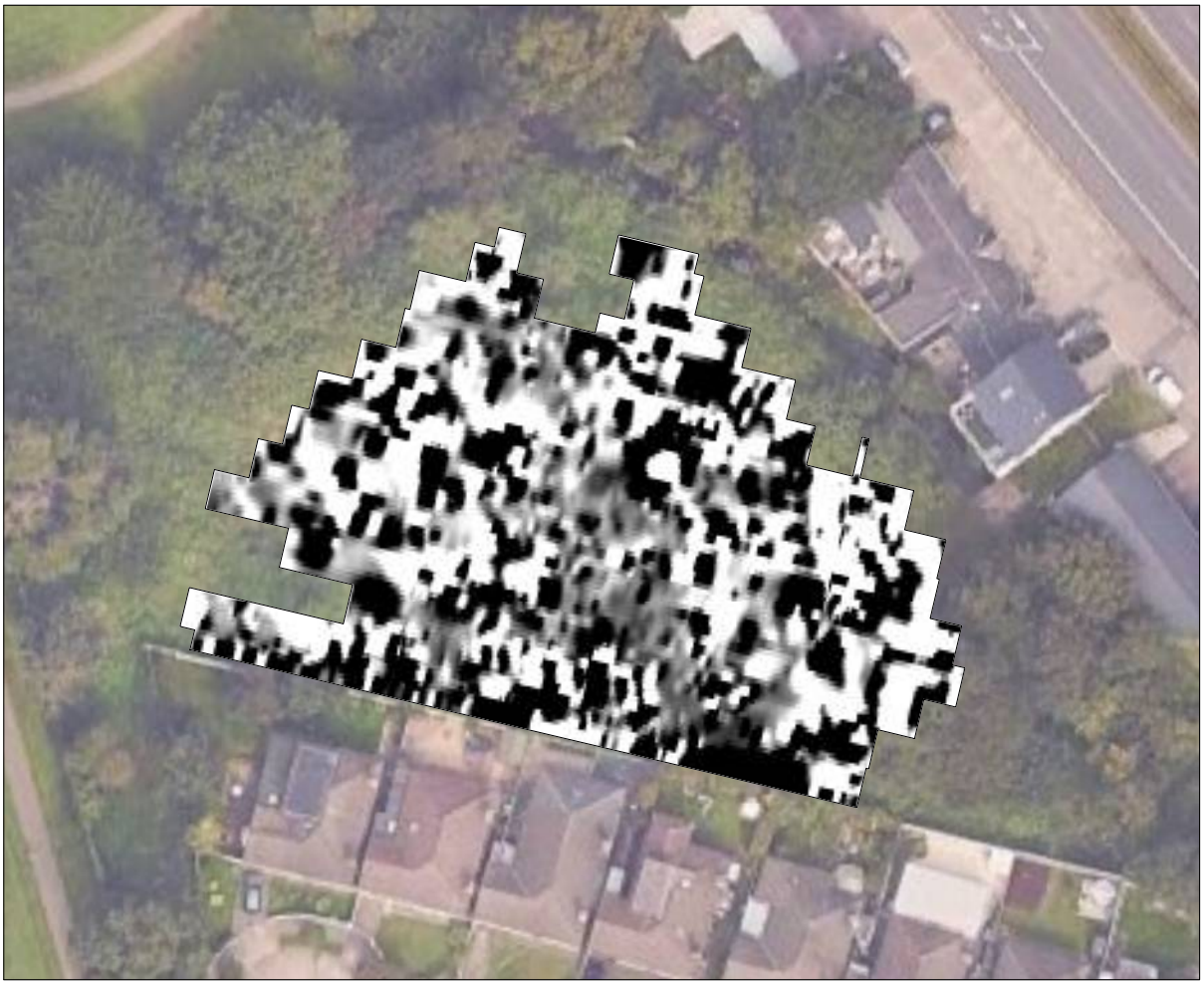
0 metres 120

Client:	Project:	Title:		
egis	Geophysical Survey Loughlinstown, County Dublin	Site Location	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:3,000 Figure: 1 Licence No.: 24R0431 Issue Date: 06.09.2024

Detailed
Gradiometer Survey

0 metres 30

Client:	Project:	Title:		
egis	Geophysical Survey Loughlinstown, County Dublin	Survey Location	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:750 Figure: 2 Licence No.: 24R0431 Issue Date: 06.09.2024



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Client: egis	Project: Geophysical Survey Loughlinstown, County Dublin	Title: Summary Greyscale Image	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:750 Figure: 3 Licence No.: 24R0431 Issue Date: 06.09.2024

Modern ferrous

Modern magnetic disturbance

0 metres 30

Client: egis	Project: Geophysical Survey Loughlinstown, County Dublin	Title: Summary Interpretation	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:750 Figure: 4 Licence No.: 24R0431 Issue Date: 06.09.2024

13.7 Archaeological Monitoring of Site Investigation Works

Yvonne Whitty

Unit 10,

Riverside Business Centre,

Tinahely,

Co. Wicklow

Final Monitoring Report

22E0794 Excavation and Detection Device 22R0382

Geotechnical Investigations

Shanganagh Carrickmines FRS

Co. Dublin

Yvonne Whitty

February 2023

Contents

Figures

Tables

1 Summary:

This report details the archaeological monitoring of Geotechnical Investigations (GI) by Yvonne Whitty on behalf of Ground Investigations Ireland (GII) for Phase 1 of the Shanganagh, Carrickmines Flood Relief Scheme (FRS).

Courtney Deery Heritage Consultancy Ltd was appointed by JBA Consulting on behalf of Dún Laoghaire Rathdown County Council to prepare a Cultural Heritage Constraints Study Report. A Site Investigations Impact Table for the proposed Shanganagh Carrickmines Flood Relief Scheme is attached as Appendix 1 and new SI locations were screened in September 2022 and is included in this monitoring report as Table 1.

Ground investigation is required to supplement the existing information and inform the design process of the scheme. The works will comprise of 71 investigations of which there are 19 cable percussion boreholes (CP), 9 cable percussion or rotary core boreholes (CP/RC), 7 dynamic probes (DP), 19 slit trenches (ST) and 17 trial pits (TP).

A table outlining specific cultural heritage constraints and archaeological potential associated with each site investigation (SI) is detailed in the attached report completed by Courtney Deery. Phase 1 works was for 11 ST and 3 TP and 5 IP (Inspection Pits). Out of these works 11 ST and 3 TP's required licenced archaeological monitoring and 1 ST's required Ministerial Consent given that it is in the published ZoN at Carrickmines Castle, DU026-005001. A separate ministerial consent application was submitted for monitoring of this ST; however, this was not excavated. A total of 10 ST, 2 IP and 2 TP which required monitoring were excavated as part of this phase of works. It was unclear at the time of writing if the remainder will be excavated.

The contractor set up on site in November 2022 and the works commenced on the 22nd November and were completed by the 24th November. The works were carried out under Section 26 Licence 22E0794 22R0382, issued by the Minister of Housing, Local Government and Heritage (MHLGH) in consultation with the National Museum of Ireland (NMI) to licensee Yvonne Whitty. All monitoring was carried out Yvonne Whitty for GII on behalf of TII and no finds or features of archaeological significance were exposed.

2 Scheme Location

The proposed scheme is centred on the flow of a network of watercourses in South County Dublin including the Cabinteely River, Carrickmines Stream, Barnacullia Stream, Kilgobbin Stream, Ballyogan Stream, Jamestown Stream, Glenamuck North Stream, Carrickmines River, Bride's Glen River and the Shanganagh River (Figure 1). All of the aforementioned river's feed into the Shanganagh River to flow into the Irish Sea at Shanganagh and Hackettsland. (O'Brien, 2022). For GI location see Appendix 2.

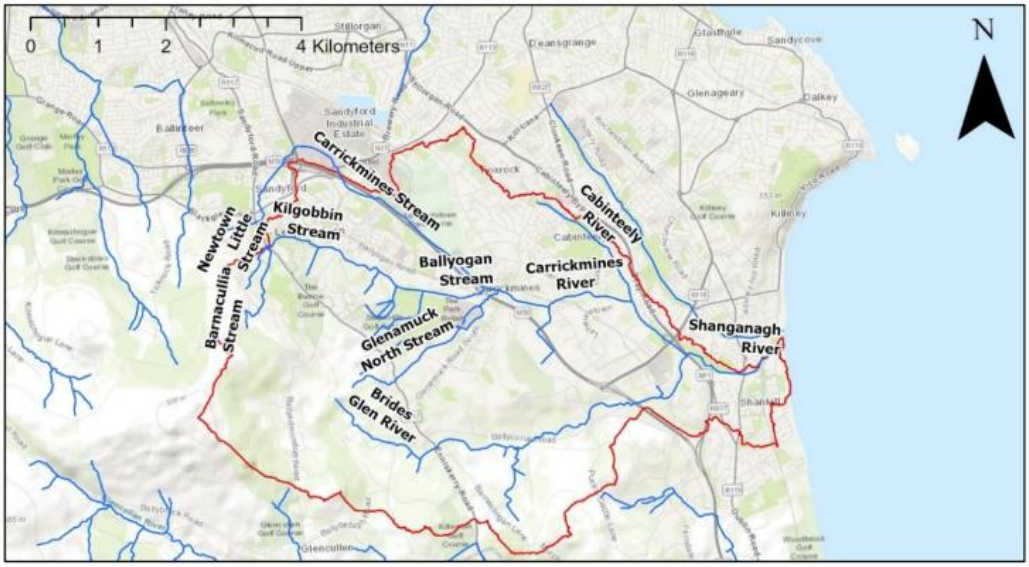


Figure 1: FRS location map (O'Brien, 2022).

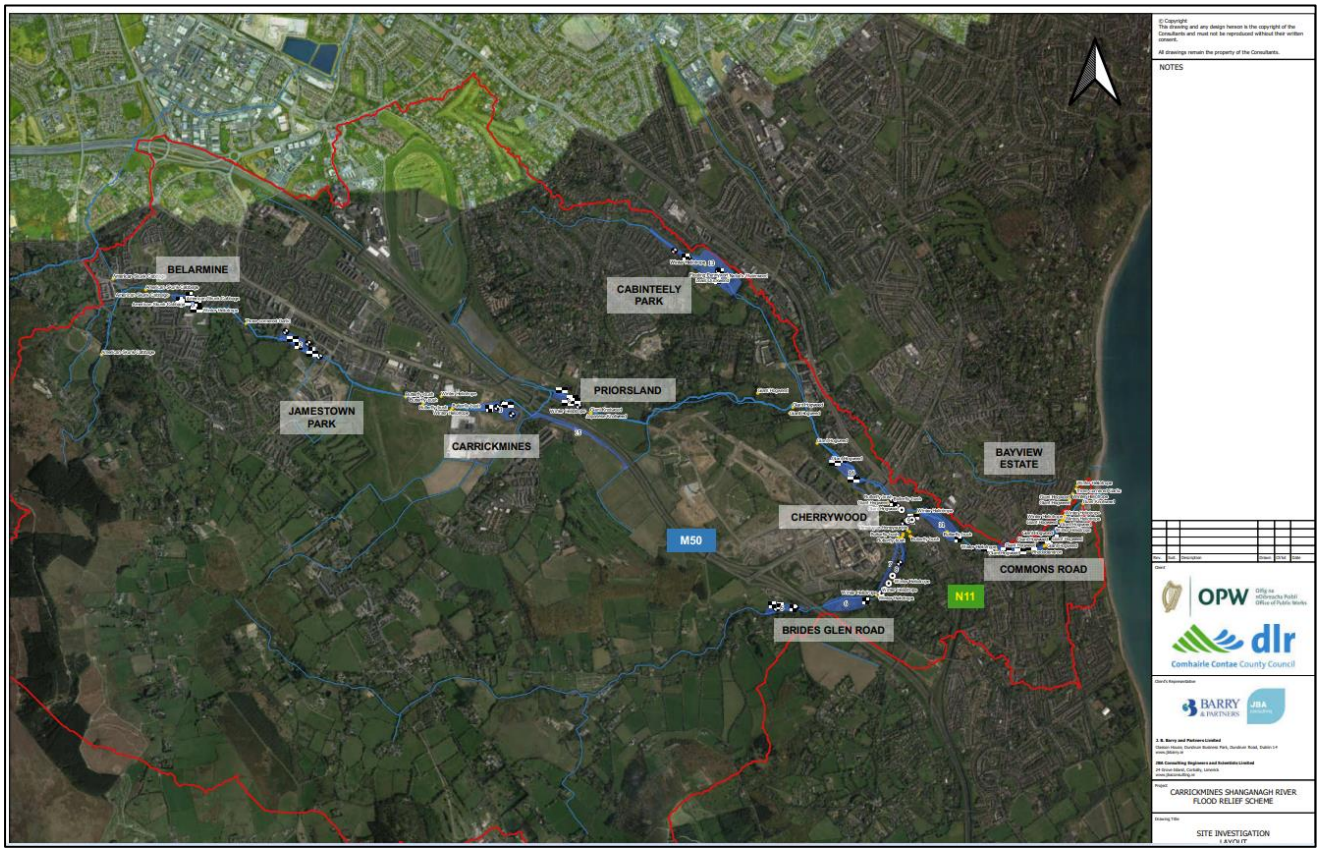


Figure 2: Site investigation layout- see Appendix 2 for Phase 1 maps.

3 Receiving Archaeological and Historical Environment

The attached Cultural Heritage Constraints Report which was completed by Courtney Deery and is attached to this Method Statement provides a high-level understanding of the key likely significant constraints within the study area along with providing an archaeological and historical background to the area:

> 'In summary there are 47 RMP / SMR sites located within 100m of a watercourse of which four are national monuments. Lands in proximity to watercourses are of high archaeological potential and may include sites related to settlement, burial, communication and industrial heritage. This has been confirmed through previous archaeological investigations within the study area, which have revealed a multitude of sites from the prehistoric period to the post-medieval period at developments at Kilgobbin, Carrickmines, Laughanstown and Cherrywood.
>
> There will be no impact to any protected structures under the Dún Laoghaire-Rathdown County Development Plan (2022-2028) or built heritage sites recorded by the NIAH'. (O'Brien, 2022, pp. 40-41).

Below is a list of Phase 1 SI works and the maps are attached as Appendix 2 (Table 1). Courtney Deery the project archaeologists were consulted in early September 2022 to screen new SI locations. The latest revision of the drawings and schedule was provided to them, and they assessed the new locations and updated their impact table as outlined below for all SI and IP works requiring archaeological monitoring, 2022-IP-018-22 to 2022-ST-020-24 as detailed below (Table 1 and Figure 3). These new locations will archaeological monitoring given their location adjacent to the Loughlinstown River and proximity, 100m north of Shanganagh Castle and Mill (Figure 3). The attached cultural heritage restraints report attached as Appendix 1 contains a Site Investigations Impact Table for the remainder of the ST locations 2022-ST-003 to 2022-ST-019 and recommends mitigation measures to ameliorate said impacts (O'Brien, 2022).

Exploratory Hole ID	Exploratory Hole Type	Area	Coordinates - Eastings	Coordinates - Northings	Archaeological Monitoring Required
2022-ST-003	Slit Trench	Belarmine	719018.5	724918.26	Yes
2022-ST-008	Slit Trench	Glenamuck Rd North	721876.8	724111.0	Yes- Ministerial Consent
2022-ST-011	Slit Trench	Cherrywood Park	724074.62	723520.68	Yes
2022-ST-012	Slit Trench	Cherrywood Park	724054.36	723517.05	Yes
2022-ST-018	Slit Trench	Brookdene	725425.1	723005.6	Yes
2022-ST-019	Slit Trench	Brookdene	725523.36	723044.83	Yes
2022-ST-020	Slit Trench	Commons Road	725033.0	723003.5	Yes
2022-ST-021	Slit Trench	Commons Road	725107.1	722998.1	Yes
2022-ST-022	Slit Trench	Commons Road	725172.7	722993.1	Yes
2022-ST-023	Slit Trench	Commons Road	725236.9	722988.9	Yes
2022-ST-024	Slit Trench	Brookdene	725385.8	722999.5	Yes

2022-TP-002	Trial pit	Belarmine	718973.6	724948.9	Yes
2022-TP-003	Trial pit	Belarmine	719039.9	724886.0	Yes
2022-TP-012	Trial pit	N11 Vet Clinic and Garage	724368.9	723360.1	Yes
2022-IP-018	Inspection Pit	Commons Road	725213.0	723000.2	Yes
2022-IP-019	Inspection Pit	Commons Road	725235.0	722998.8	Yes
2022-IP-020	Inspection Pit	Commons Road	725316.4	722989.8	Yes
2022-IP-021	Inspection Pit	Commons Road	725337.3	722987.2	Yes
2022-IP-022	Inspection Pit	Commons Road	725360.2	722985.6	Yes

Table 1: Site Investigations Impact Table screened and updated by Courtney Deery September 2022. Those highlighted in green were monitored, 12 GI locations in total.

Figure 3: ST and IP location on Commons Road.

4 Excavation Strategy

Site investigations (SI) were the first phase of exploratory works to be carried out. The proposed SI are required to inform the design of the FRS. Courtney Deery have identified areas of Archaeological Potential in which the SI works are located (see Appendix 2 for mapping). It should be noted that the list of locations may be dropped/added to as has been the case in similar projects e.g., LUAS Finglas. Any SI locations that are added will be archaeologically screened by Courtney Deery and the applicant will include these new locations in an amended MS for prior approval by NMS if archaeological monitoring is required following their screening.

Due to the small diameter of boreholes (CP, CP/RC and DP investigations), archaeological monitoring is not recommended of these SI. However, and the logs and reports of borehole investigations will be made available to the consultant archaeologist to inform on the nature and depth of stratigraphy in the area.

Given the volume of archaeological sites and features which have been discovered in the course of archaeological investigations along watercourses throughout the study area, it was recommended that all slit trenches and trial pits in such areas not subject previously to archaeological investigation will be archaeologically monitored.

For Phase 1 a total of 19 SI locations required archaeological monitoring as identified in the Cultural Heritage Constraints Report and Table 1 above (Appendix 1). There is one SI location 2022-ST-008 which is in the vicinity of Carrickmines Castle and the following is noted in the Cultural Heritage Assessment:

> 'While Carrickmines Castle is not designated a national monument, it has been treated as a national monument since controversies related to the site at the time of the construction of the South Eastern Motorway. The castle is located within 100m of a watercourse. In addition to this, the Zone of Notification (ZoN) of the castle in the published RMP map is significantly larger than the ZoN which is currently depicted on the Historic Environment Viewer (HEV) available at www.archaeology.ie (Figure 7). All works within the ZoNs for national monuments, including the published ZoN at Carrickmines Castle, must be undertaken with Ministerial Consent' (O'Brien, 2022, p. 26).

The monitoring of the SI location in the vicinity of Carrickmines Great was to be carried out under ministerial consent, however this was not subsequently completed.

All monitoring for the remaining 12 SI works was completed under licence 22E0794.

The TP were on average 0.5m x 2.5m in plan and the max depth was 2.5m. ST were on average 0.5m x 5mx and up to 2.7m deep.

All trial pits/excavations were opened, logged and backfilled on the same day as no archaeology was uncovered. Once declared free of utilities, trial pits will be excavated by a mini digger with flat grading bucket under archaeological supervision. A detection device under consent 22R0382 was also used on soils that had the potential to be artefact bearing.

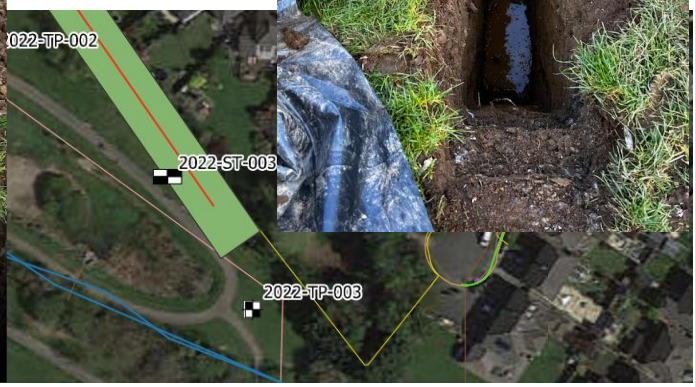
All SI pits were logged, photographed, and GPS coordinates will be taken of each location.

5 Monitoring Results

The following tables provide details of the stratigraphy, location, and photo of each archaeologically monitored trial pits (TP), slit trench (ST) and inspection pit (IP) which were monitored as part of the GI works for the Shanganagh Carrickmines FRS. The location maps for the GI pits are attached as Appendix 2.

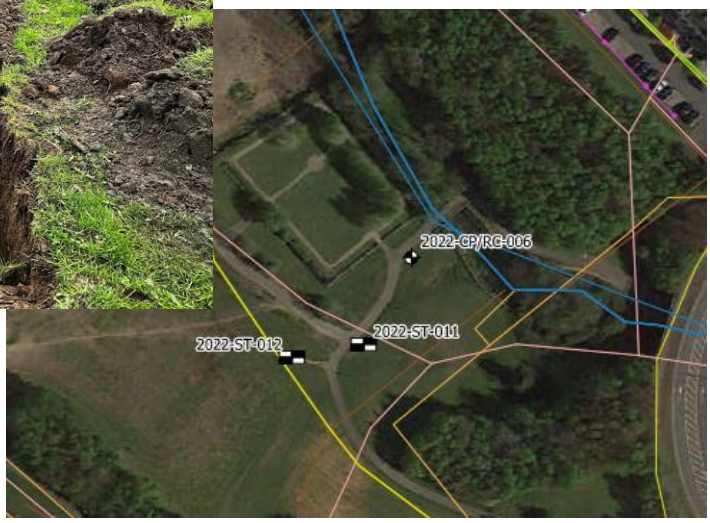
5.1 Slit Trenches

Exploratory Hole ID	**2022-ST-003**
Date	25/11/2022
Depth	2m
Width	0.40m
Length	3.30m
Location	Belarmine
Depth	**Description**
0.00m-0.10m	Sod
0.10m-1.00m	Made ground- dark brown silty clay with modern debris inclusions, red brick, plastic cables.
1.00m-1.75m	Made ground- possibly redeposited natural a mid orange brown sandy clay with grey mottling.
1.75m-2m	Made ground- Yellowish brown gritty sand
Comments	Natural ground not exposed. Trench comprised fill material which was used to landscape the park and layers of redeposited natural. A sewer pipe ran through the southern part of this trench below the excavated depth required for the SI works.



See Appendix 2, Plan 1.

Exploratory Hole ID	2022-ST-011
Date	25/11/2022
Depth	2m
Width	0.40m
Length	3.30m
Location	Cherrrywood Park
Depth	**Description**
0.00m-0.10m	Sod
0.10m-1.00m	Made ground- mid brown silty clay with modern debris inclusions, red brick, plastic.
1.00m-1.75m	Made ground- possibly redeposited natural a mid orange brown sandy clay with grey mottling.
1.75m-2m	Made ground- mid orange brown silty clay mixed with grey marl.
Comments	Natural ground not exposed. Trench comprised fill material which was used to landscape the park.



See Appendix 2, Plan 8.

Exploratory Hole ID	**2022-ST-018**
Date	23/11/2022
Depth	1.4m
Width	0.60m
Length	9.6m
Location	Brookdene
Depth	**Description**
0.00m-0.10m	Sod
0.10m-0.40m	Topsoil- dark brown silty clay.
0.40m-0.90m	Made ground- dark greyish brown asndy clay with modern debris including wooden planks, plastic strewn throughout and rounded cobbles.
0.90m-1.40m	Dark grey silty clay which contained modern debris including iron re-bars.
1.40m	Natural ground a mid yellowish brown medium sandy clay.
Comments	Natural ground was exposed at a depth of 1.40m The eastern end of the trench disturbed from excavation of electricity cables. A made ground layer 1m in thickness overlay natural, associated with the building of adjacent houses.

See Appendix 2, Plan 10.

Exploratory Hole ID	2022-ST-019
Date	23/11/2022
Depth	1.4m
Width	0.60m
Length	9.6m
Location	Brookdene
Depth	**Description**
0.00m-0.10m	Sod
0.10m-0.80m	Topsoil- mid brown silty clay.
0.80m-1.50m	Made ground- Dark grey sandy clay with moderate rounded cobble inclusions.
1.50m-1.70m	Natural ground-Dark grey sandy Dublin Boulder clay
Comments	Natural ground was exposed at a depth of 1.40m The eastern end of the trench disturbed from excavation of electricity cables. A made ground layer 1m in thickness overlay natural, associated with the building of adjacent houses.

See Appendix 2, Plan 10.

Exploratory Hole ID	2022-ST-020
Date	22/11/2022
Depth	1.60m
Width	0.60m
Length	3m
Location	Commons Road
Depth	**Description**
0.00m-0.10m	Sod and topsoil- dark brown sandy clay
0.10m-0.50m	Made ground- dark brown silty sandy clay which contained frequent red and yellow bricks, a modren plank of wood and large rounded cobble inclusions
0.50m-1.80m	Made ground- possible redeposited natural a mid yellowish brown silty clay which contained occasional red brick inclusions.
Comments	Natural ground not exposed in this trench nor were any features/finds of archaeological significance. There were three pipes cutting through this trench at depths of 0.50m (service)

See Appendix 2, Plan 9.

Exploratory Hole ID	2022-ST-021
Date	22/11/2022
Depth	1.10m
Width	0.60m
Length	3.50m
Location	Commons Road
Depth	**Description**
0.00m-+0.80m	Stream bank- a dark brown silty sand.
0.0m-0.10m	Pavement- tar pavement
0.10m-1.10m	Made ground- layers of grey 804, pea gravel which overylay three pipes visible in trench, one cut conatined service pipes and the deepest at 1.10m contained gas.
Comments	Natural ground not exposed in this trench nor were any features/finds of archaeological significance. There were three pipes cutting through this trench at depths of 0.50m (service)

See Appendix 2, Plan 9.

Exploratory Hole ID	2022-ST-022
Date	22/11/2022
Depth	1.10m
Width	0.60m
Length	3.50m
Location	Commons Road
Depth	**Description**
0.00m-0.20m	Pavement- tar and harcdore
0.20m-0.1.50m	Made ground- mid greyish brown coarse sandy clay with moderate rounded cobble inclusions. Fill above three pipes.
0.70m-1.50m	Made ground- layers of grey 804, pea gravel which overylay three pipes visible in trench, one cut conatined service pipes and the deepest at 1.10m contained gas.
Comments	Natural ground not exposed in this trench nor were any features/finds of archaeological significance. There were three pipes cutting through this trench at depths of 0.90m (service) 0.70m (gas). The ground was completey disturbed to a depth of 1.50m under the footpath.

See Appendix 2, Plan 9.

Exploratory Hole ID	2022-ST-023
Date	22/11/2022
Depth	1.10m
Width	0.60m
Length	2.40m
Location	Commons Road
Depth	**Description**
0.00m-0.20m	Pavement- tar and harcdore
0.20m-0.1.10m	Made ground- mid greyish brown coarse sandy clay with 804 moderate rounded cobble inclusions. Fill above three pipes.
Comments	Natural ground not exposed in this trench nor were any features/finds of archaeological significance. There were three pipes cutting through this trench at depths of 0.90m (service) 0.95m (gas). The ground was completey disturbed to a depth of 1.10m The footing of the retaining wall adjacent the river was exposed at 0.90m BGL and was visible for a width of 1m in the trench.

See Appendix 2, Plan 10.

Exploratory Hole ID	2022-ST-024
Date	23/11/2022
Depth	2m
Width	0.60m
Length	2.50m
Location	Brookdene
Depth	**Description**
0.00m-0.10m	Topsoil
0.10m-0.60m	Made ground- dark brown silty clay with moderate sub rounded cobble inclusions.
0.60m-1.60m	Made ground- 19th century debris layer, garden soils contained occasional red brick pottery and a clay pipe bowl.
1.60m-2m	Natural ground a mid yellowish brown medium sandy clay.
Comments	Natural ground was exposed at a depth of 1.60m The eastern end of the trench disturbed from excavation of electricity cables. A 19th century debris later 1m in thickness extended across the trench at 0.60m BGL and it would appear to have been a plot associated with a house depicted on the third edition map. Blue dot marks the location of the SI trench.

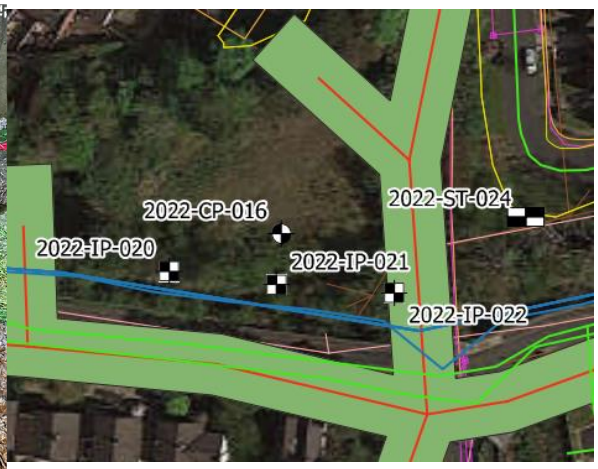
See Appendix 2, Plan 10.

5.2 Inspection Pit

Exploratory Hole ID	**2022-IP-020**
Date	24/11/2022
Depth	1.8m
Width	0.60m
Length	2.5m
Location	Council yard north of Commons Road
Depth	**Description**
0.00m-0.10m	Sod
0.10m-1.80m	Made ground- dark greyish brown sandy clay with modern debris inclusions including plastic and a large boulder.
Comments	Natural ground not exposed. Trench comprised fill material which overlay at least three pipes in the trench.

See Appendix 2, Plan 9.

Exploratory Hole ID	**2022-IP-021**
Date	24/11/2022
Depth	2.1m
Width	0.60m
Length	2.5m
Location	Council yard north of Commons Road
Depth	**Description**
0.00m-0.10m	Sod
0.10m-2.10m	Made ground- dark greyish brown sandy clay with modern debris inclusions, red brick modern potter. Groundwater at 2m approx.
Comments	Natural ground not exposed. Trench comprised fill material which overlay two pipes in the trench.



See Appendix 2, Plan 9.

5.3 Trial Pits

Exploratory Hole ID	**2022-TP-002**
Date	25/11/2022
Depth	1.50m
Width	0.60m
Length	3.20m
Location	Belarmine
Depth	**Description**
0.00m-0.10m	Sod
0.10m-2.70m	Made ground- dark brown silty clay with modern debris inclusions, red brick, plastic cables.
Comments	Natural ground not exposed. Trench comprised fill material which was used to landscape the park.

See Appendix 2, Plan 1.

Exploratory Hole ID	2022-TP-003
Date	25/11/2022
Depth	2.70m
Width	0.60m
Length	3m
Location	Belarmine
Depth	**Description**
0.00m-0.10m	Sod
0.10m-2.70m	Made ground- dark brown silty clay with modern debris inclusions, red brick modern pottery. Groundwater at 2.70m approx.
Comments	Natural ground not exposed. Trench comprised fill material which was used to landscape the park. Concrete blocks were uncovered at 2.70m BGL.

See Appendix 2, Plan 1.

Exploratory Hole ID	2022-TP-012
Date	25/11/2022
Depth	2m
Width	0.40m
Length	2.5m
Location	N11 Vet Clinic and Garage
Depth	**Description**
0.00m-0.10m	Sod
0.10m-1.10m	Made ground- mid yellowish silty clay with modern debris inclusions, red brick, plastic.
1.10m-1.80m	Made ground- mid brown stony clay.
1.80m-2.00m	Natural ground?- Possible Dublin boulder clay, mid brown sandy clay with frequent large rounded cobble inclusions.
Comments	Natural ground?- Possible Dublin boulder clay, mid brown sandy clay with frequent large rounded cobble inclusions exposed at 1.80m BGL.

See Appendix 2, Plan 8.

6 Conclusion

Monitoring of the GI works confirmed the natural ground comprises a blanket of cohesive glacial till (Dublin Boulder Clay). This was however only exposed in GI pits at Brookdene 2022-ST-018 and 2022-ST-019 2022-ST-024 at a minimum depth of 1.4m and maximum depth of 1.8m. The uppermost horizon of this boulder clay was also possibly uncovered at the N11 Veterinary Clinic at GI pit 2022-TP-012. Elsewhere natural ground was not exposed.

Although historically much of the land along the proposed route was pasture construction in recent years has altered the landscape dramatically.

At Commons Road the trenches were excavated were adjacent the Loughlinstown Stream in the footpaths (2022-ST-020-023). The ground was completely made up, natural ground was not exposed in any of the trenches which were disturbed from the laying of service pipes beneath the footpaths for an average depth of 1.1m.

The trenches excavated in the council yard adjacent to the north of Commons Road were excavated adjacent the retaining wall for the Loughlinstown River (2022-IP-20-21). The IP

trenches were 2.5m in average length and were excavated to a depth of 1.8m. Services ran parallel to the retaining wall and the natural ground was completely disturbed from the excavations associated with these services. Natural ground was not exposed as the trench filled with water at a depth of 1.8m.

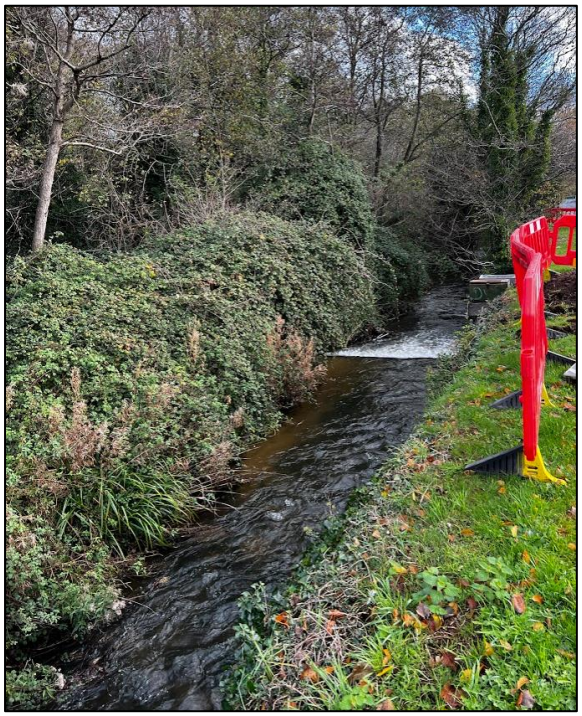


Plate 1: Commons Road and Loughlinstown River facing W.

Plate 2: Commons Road, facing W.

At Brookdene, the trenches were excavated in green areas to the north of the housing estate adjacent the river (2022-ST-018-19and 2022-ST-024). A 19th century debris garden soil layer

was visible at 0.60m BGL which corresponded to the location of a house and garden visible on the third edition map. Natural boulder clay was exposed at an average depth of 1.40m BGL.

Plate 3: Brookdene trench locations, facing SW.

The GI works at Belarmine are in a landscaped park surrounded by apartments, schools, and houses (2022-TP-002-003 and 2022-ST-003) (Plate 4). A stream ran through the southern boundary of the site. The park comprised made up ground which was landscaped. A concrete block was recovered from a depth of 2.40m from the base of 2022 TP 003.

Plate 4: Plate test at Belarmine.

The GI works at Cherrywood are in a landscaped park surrounded by apartments (Plate 5). The park comprised made up ground, natural ground was not exposed in the one GI pit which was excavated (2022-ST-011).

Plate 5: Cherrywood Park.

At the N11 Veterinary Clinic the ground was overgrown and under rough pasture, one GI trench was excavated in this area (2022-TP-012). The uppermost horizon of this boulder clay was also possibly uncovered at the N11 Veterinary Clinic at GI pit 2022-TP-012.

Plate 6: N11 Veterinary Clinic.

No archaeological stratigraphy or objects were identified during the course of monitoring the above-described works. All further archaeological mitigation measures will be agreed between the project archaeologist and the National Monuments Service of the DHLGH. All mitigation measures will consider the findings of this GI Archaeological Monitoring Report.

7 References

O'Brien, Y., 2022. Cultural Heritage Constraints Report Shanganagh Carrickmines FRS Co. Dublin, s.l.: Unpublished report for JBA.

13.8 Method Statement and Specification – Structural Conservation

Method Statement and Specification
Structural conservation

Carrigmines - Shanganagh flood relief scheme

For:

Dunlaoghaire Rathdown Council

Courtney Deery Archaeologists

Southgate Associates

June 2024

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Financial Director: Myrtle McGivern

Contents

Sketches

1. Specification for Repairs to Shanganagh Bridge and arched wall

Conservation Specifications and Methodologies

- Masonry consolidation is required to the bridge abutments as shown on drawing.**SA202413 /SKC2** and parapet **SA202413 /SKC1.** The masonry work to the arched wall is shown on SA202413 **/SKC5.**

Environmental considerations

- When removing material from the bridge to clean and expose the masonry, this should be removed into buckets and spread out on plastic on the ground to avoid contamination of the river.
- If archaeological material is noted by the builder the archaeologist should be informed.

Cleaning Masonry- Removal of Vegetation:

- Carefully remove minor plants, root systems and associated soil/debris from joints, voids and facework.

- Use dampened temporary timber wedges or other approved method to assist removal of roots. Where growths cannot be removed completely without disturbing masonry seek instructions. Where a significant root or trunk is heavily ingrained in a section of masonry not easily removeable it should be cut as close as possible to the face of the masonry, a 15mm copper pipe should be cored into the cut face and an approved Glyphosphate treatment applied regularly by syringe, this will gradually kill the plant which will reduce in size as it dies and event rots or falls away.

Bottom Areas of Arch (1000mm above footing)

- Deep repointing in 3 passes. Lime Prompt NHL5 sand, Wexford sand or similar local graded medium aggregate Cork grit 5-7mm. Pinning included.

Other Areas of Bridge and arched wall

- Deep pointing in up to 3 passes.
- Lime Secil NHL 3.5.
- Medium aggregate grit 5-7m.

- Pinning included.

Grouting at Base of Abutments Prior to Micro Piling.

- Grout NHL prompt 0-1000mm
- Coulinex NHL 3.5 other areas.
- See **SA202413/SKC2** for details.

Reviewing scope of work:

- Inspect each relevant area of masonry with Conservation Professional to confirm the type and extent of the work.
- Mark clearly on face any masonry any areas to be repaired.
- Identify each masonry unit that is to be repaired with a code number cross-referenced to drawings/photographs.
- Adequately record the characteristics of existing masonry in areas affected by repair works. Use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.

Workmanship Generally

Raking out:

• Rake out joints by hand to a depth at least twice the width of the joint opening, or as much as is necessary. Remove loose debris from the joints using a dry brush.

• Power tools for the removal of mortar is generally not permitted.

Pointing:

• Dampen the masonry prior to pointing

• Neatly point to the specified flush profile in a continuous operation from the side of the arch. If the joints are very deep, it may be necessary to leave out the larger aggregate in the first few passes in order to ensure mortar is packed right to the back of the joint.

• The pointing operation may involve removing loose stones and resetting.

• The trial mix for pointing will be as detailed above in 1:2.5 lime sand. The sand must be dry, sharp, and well-washed. In order to maintain the sharpness of the sand and accurately use the correct volume of sand it is vital that it is stored correctly – ensure storage conditions at the suppliers are adequate in addition to ensuring appropriate storage conditions are available on-site, i.e., as a minimum, on a pallet off the ground and covered. A separate sample in NHL 5 Prompt should be carried out also for inspection.

• It is recommended on historic structures that the original lime mortar mix be replicated in terms of the selection of aggregates

Laying:

• Dampen stones to control suction as necessary and lay on their natural bed on a full even bed of NHL3.5 lime mortar with all joints filled and between 12–18 mm wide.

• Keep stonework clean during construction and until Practical Completion. Ensure that no mortar encroaches on face when laying. Turn back scaffolding boards at night and during heavy rain. Rubbing to remove marks or stains will not be permitted.

Adverse Weather:

• Do not use frozen materials or work in freezing conditions.

• Do not lay masonry when the air temperature is at or below 3 degC unless mortar has minimum temperature of 4 degC when laid and walling is protected. Do not lay mortar. on frozen surfaces.

• Maintain temperature of the work above freezing until mortar has fully hardened.

• Rake out and replace mortar damaged by frost. When instructed, rebuild damage work.

• Protect newly erected walling against rain and snow by covering when precipitation occurs, and at all times when the work is not proceeding.

• If mud or clay is being used this should not be carried out in wet conditions generally

Aftercare of Lime work

• To prevent from drying out too rapidly allow each pass to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying the next pass.

• Adequately protect newly applied lime work against drying out too quickly using hessian or against frost and rain for the first 48 hours using polythene sheeting hanging clear of the work.

1.2 Grouting

On the abutments and parapets, low pressure grouting is to be carried out. See SA/SK C2 for details.

- The methods used for low-pressure void-filling grouting are as follows: The area to be grouted is to be carefully cleaned and inspected and a decision needs to be taken as to which method and type of grout is to be employed. In this case Coulinex NHL 3.5 is to be used, NHL 5.0 Prompt NHL 5 is to be used for the bottom 1000mm.

- Methods of administering grout differ from situation to situation, but generally a decision is made based on the condition of the wall; if the wall is constructed with little through-bonding or is constructed of very small nodes or unit sizes, such as flintwork, or low quality small rubblework, then the amount of grout-fill and pressure of application is kept low as too much wet-fill administered with an excess head of pressure can easily push the masonry apart. In the case of the arch a very low pressure is required due to the location and shallowness of the masonry arch.

- In cases where the masonry is very unstable it is sometimes necessary to introduce mechanical ties to bond the wall together first, then, once stabilized, to remove odd, individual, non-through stones and carefully grout the affected area from ground up using, even, as little pressure as from pouring the grout through a watering can, re-fixing the individual stone as necessary whilst carefully monitoring the conditions of the walling and amount of wet liquid poured. If employing the above approach, bear in mind the limitations of achieving a reasonable flow of grout, as with only, say,

300mm to 600mm head of gravity pressure through a 22mm diameter pipe, the amount and spread of grout may be very limited.

- Hand help mortar pumps can be used also for grout filling, and are relevant, as work proceeds at higher levels. Generally, the term 'low pressure' means, when used on mass masonry, approximately between three meters and six hundred millimetres in height, through a twenty-two to twenty-five millimetres in diameter pipe. For example, for a solid masonry wall which is (A) or washed out, loose hearting fill (B) we would fully rake out any defective pointing as necessary, clean down and inspect and if practical, drill through the joints into the core of the wall with a twenty five millimetre masonry drill to attempt to connect with the voids within the walling at four hundred to five hundred millimetres along the crack (five number holes per square meter

- Once aa strip is cleared and entry points into the masonry are identified, they can be tested to see which ones will take grout by washing out with a hosepipe of water. This is not always applicable because the introduction of more water into a mass of masonry is sometimes not advisable, although more often successful grouting will not be achieved without washing out and dampening of the voids prior to grouting, even if ideally you would not allow more moisture to be introduced to the mass of masonry.

- At this stage, mark up drill holes which take water i.e., connected to the void, then re-point the arch as necessary and fill unusable holes. In some cases, re-pointing can be carried out after the grouting operation, especially when the core is remote from the face of the masonry.

- Allow the pointing to cure/set ideally beyond the initial set. Set up the grout equipment, grout and mixing equipment as close to each other as possible. It is important to check thoroughly for small holes, cracks, or voids in the areas to be grouted as, if successful, grout will find any small tracts within the arch.

- Mixing should ideally be done using a mechanical, slow turning plasterers' whisk. The consistency required will vary, in simple terms, thicker than good quality emulsion

paint and thinner than porridge. Wetting the holes immediately before grouting is most effective (from grouting terms!) Continual mixing whilst pouring is usually required.

- Continually check where the grout is going and once the head is established, keep the length of pipe to a minimum as resistance along the length of pipe will have a bearing on the flow rate. When grouting cracks (A) depending on the amount of grout being taken only attempt to fill in say, two to three holes at a time, fill them and leave the grout to settle and start to set. As the nozzle is removed from each hole it can be temporarily filled with clay. When grouting walling i.e. (B) then it is preferable to work horizontally along the structure and allowing set to occur before re-visiting the same area of elevation, remembering that with three meters of head, say, without knowing you could be filling an area up to three meters above the nozzle. This is especially relevant at the base of the abutments.

- All equipment must be kept clean and free of setting grout as with the surrounding areas i.e., scaffolding etc. and spilt grout should be thoroughly washed off walling, masonry, and structures before it sets and stains; clean water and churn brushes are usually sufficient.

- Good practices of manual handling should be applied throughout the operation as often the bags of grout will exceed twenty kilograms. More often grouting works will need to be undertaken from suitable access scaffolding, therefore, all current legislation and good working practices whilst working from height should be adhered to. If the scaffold needs adjusting to facilitate the grout operation, this must be carried out by a competent, certified operative. All the appropriate warning and information signage should be evident adjacent to the works and site curtilage.

- Bearing in mind that grouting can be a dusty and messy operation, site operatives and the general public should be adequately protected. Refer to Preliminary Health & Safety Plan for details.

1.3 Structural cracks

- There are in this case a few structural cracks evident on masonry structures of this type and they can be treated as follows:
- A suitable horizontal joint should be raked out across the crack to be repaired at 750mm centres.
- An M8-M10 800mm long Helibars should be placed into the raked-out joint which should be chased 450mm into the masonry.
- The Helibars should then be pointed, and the joint filled to match the surrounding masonry and pointing profile.
- Suitable stainless steel Helibars are available form Stoneware Studios, Youghal, Co. Cork.

NOTE A 250mm x 200 deep RC beam is also used to reinforce the parapet as shown on **SA202413/SKC1**

2. Conservation Proposals for Historic Arched Wall

This wall in its original state is completely incapable of withstanding the lateral loads in flood. Provided masonry repairs in NHL 3.5 lime mortar are carried out as above, the wall is to be reinforced by 2 254x254 Grade 316 stainless steel whalings fixed to the masonry as as shown on **SA 202313/ SKC5** The masonry repair specification will follow that of the upper section of the bridge in section 1.

These whalings are stabilised by flood defence wall and a buttress wall constructed as section 3.

The whalings are a high quality modern intervention which is reversible and in accordance with good conservation practice. The existing structure can be conserved and presented in its original state. The whalings are only required on the downstream side of the wall.

3. New flood relief walls cladding and capping and buttress to the arched bridge

These are shown on **SA 202413/ SKC3 ,SK C4 AND SKC5**

Stone

Where possible reuse existing stone which in the case of this scheme is Wicklow granite. Sufficient reclaimed stone is expected to be available from the works. In the unlikely event of a shortfall a similar size and colour of stone should be obtained from a salvage source.

Mortar Specification

- We would recommend 1:1:6 cement has sand for wall cladding, as it is the most appropriate for durability and strength and appears similar in appearance to an historic mortar.
- Binder: Ordinary Portland cement: Cloghrennane lime 1:1
- Medium aggregate: 5mm-7mm washed grit – stone type dependant on mortar texture. No fines.
- Pinnings: Where mortar joints are larger than 2 thumb widths generally pinnings (small stones 25-50mm) will be required (in pointing course only). A sample panel should be prepared and approved.

Workmanship Generally

Pointing:

- Dampen the masonry prior to pointing.
- Neatly point to the specified flush profile in a continuous operation from the top of the wall. If the joints are very deep it may be necessary to leave out the larger aggregate in the first few passes in order to ensure mortar is packed right to the back of the joint.

- The pointing operation may involve removing loose stones and resetting. This will allow any existing vegetation roots to be removed from the area, but it appears that there is little to no vegetation present overall.

Laying:

- Dampen stones to control suction as necessary and lay on their natural bed on a full even bed of NHL 3.5 lime mortar with all joints filled and between 12–18 mm wide.
- Accurately plumb all wall faces, angles, and features. Set out carefully to ensure satisfactory junctions and joints with adjoining or built-in elements and components.
- Keep stonework clean during construction and until Practical Completion. Ensure that no mortar encroaches on face when laying. Turn back scaffolding boards at night and during heavy rain. Rubbing to remove marks or stains will not be permitted.

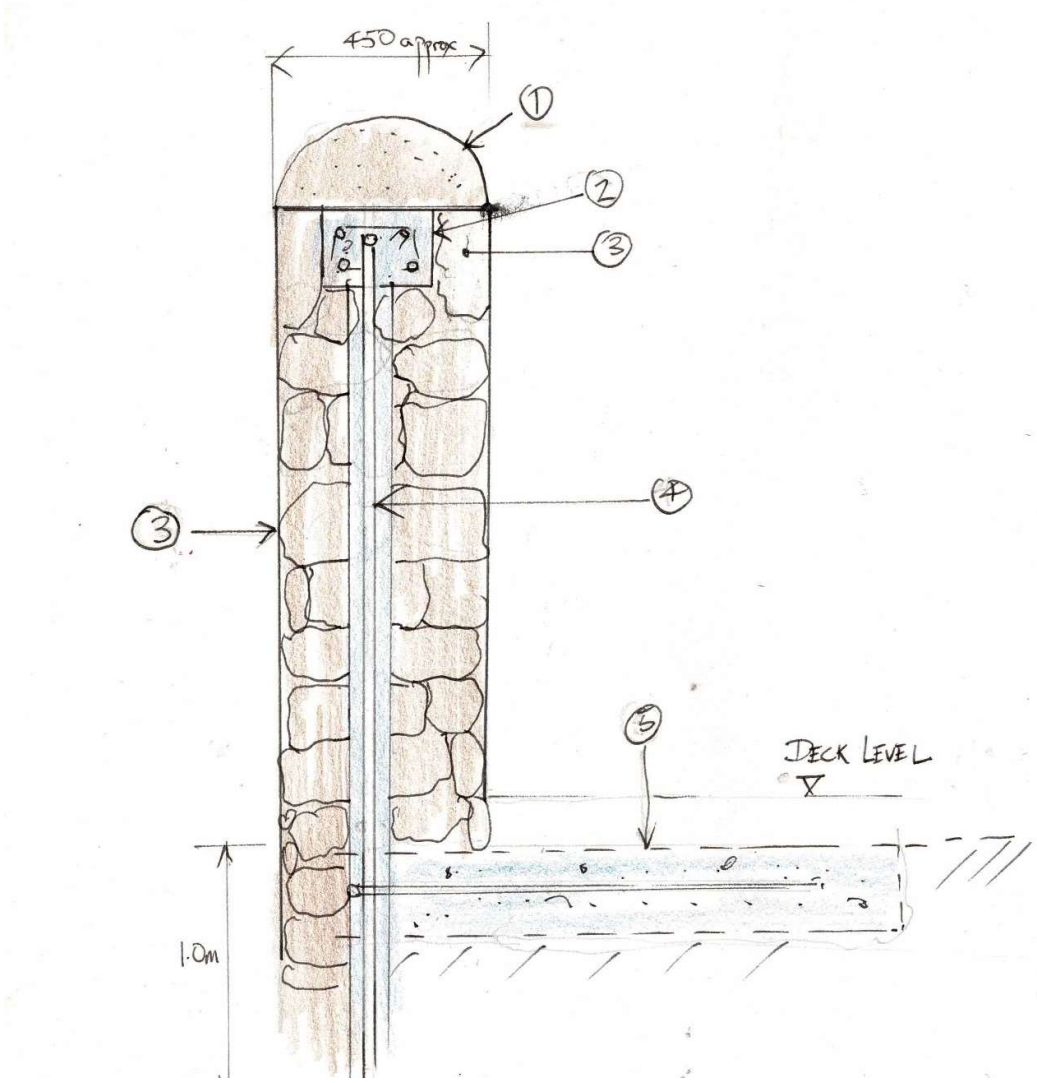
Adverse Weather:

- Do not use frozen materials or work in freezing conditions.
- Do not lay masonry when the air temperature is at or below 3 degC unless mortar has a minimum temperature of 4 degC when laid and walling is protected. Do not lay mortar on frozen surfaces.
- Maintain temperature of the work above freezing until mortar has fully hardened.
- Rake out and replace mortar damaged by frost. When instructed, rebuild damaged work.
- Protect newly erected walling against rain and snow by covering when precipitation occurs, and at all times when the work is not proceeding.
- Allow each pass to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying the next pass.
- Adequately protect newly applied masonry against drying out too quickly using hessian or against frost and rain for the first 48 hours using polythene sheeting hanging clear of the work.

Domed mortar capping for masonry clad walls

- The wall top which is to be capped should be free of debris and any loose stones.
- Once the base is complete a 1:1:6 mortar should be built up to the desired domed shape.
- Flat stones of 15 to 20mm depth should be added to the upper layer of mortar this adds strength to the weather bearing face of the capping.
- Once the capping is laid it should be finished similarly top other areas of pointing i.e. brushed and sponged down etc.

SKETCHES

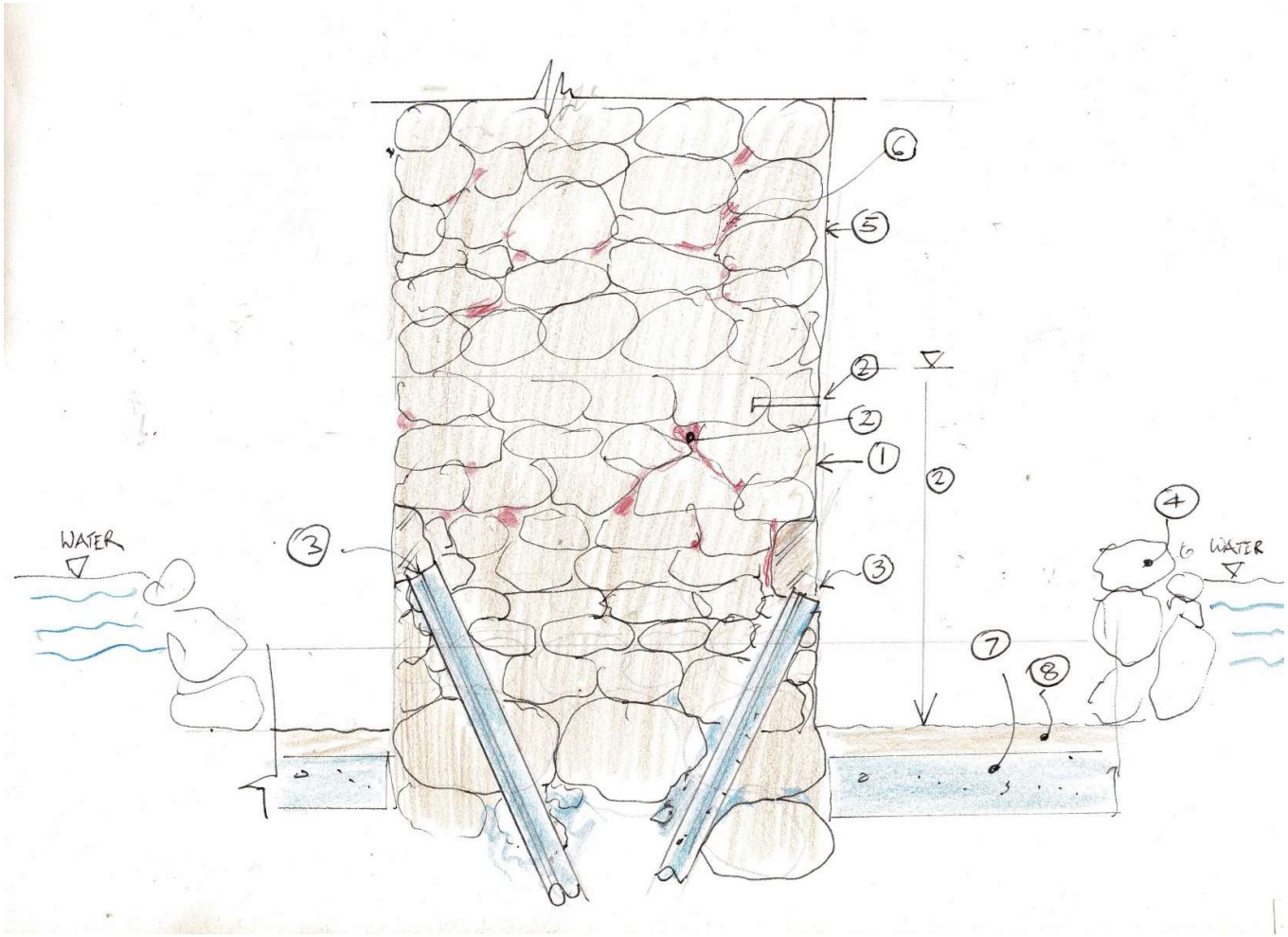


Key

1. Lift granite coping and relay in NHL3.5 mortar
2. 250x200 deep RC beam
3. Cut top course of masonry and reset in NHL3.5 mortar. Point masonry in NHL3.5 mortar to SA spec
4. M20 Gr 8.8 steel bars at 750mm horizontal centres in 50m core filled with fine aggregate (10mm) concrete embedded at least 1.0m below deck structural level
5. If required form frictional ties at 750mm centres formed in bridge structural deck level

Grout voids where bedding mortar has disintegrated with Coulinex NHL 3,5 grout to conservation engineer's specification.

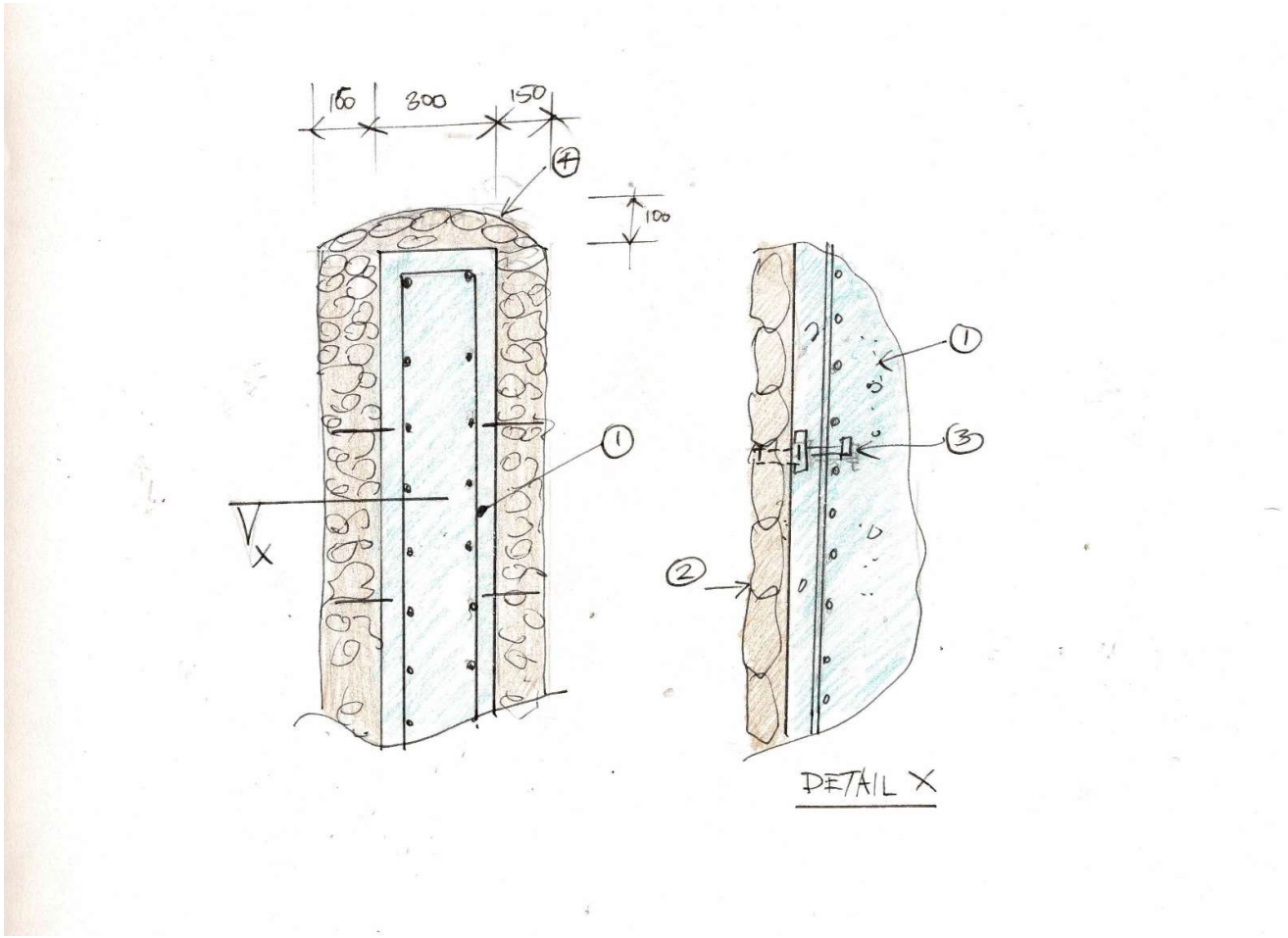
Sketch SA 202413/SK C1 Strengthening proposals to Shangangh Bridge parapet



Key

1. Repoint bottom 1m in NHL 5 Prompt fast setting mortar for marine works.
2. Carefully grout masonry in NHL 5 prompt introduce grout with hand pump in 20mm hoes at 450mm c/c to SA specification.
3. After grouting Mini piling to specialist details. Remove stone to set piles within piers and abutments and original stone footing. Allow concrete to flow into voids under pressure between boulders and in gravelly water bearing pockets.
4. Point above 1m level in NHL3.5
5. Grout with Coulinex NHL 3,5
6. PVC sheeting and ply deck to avoid environmental contamination during works.
7. Anti-scouring slab set below bed level.
8. Silt to disguise slab.

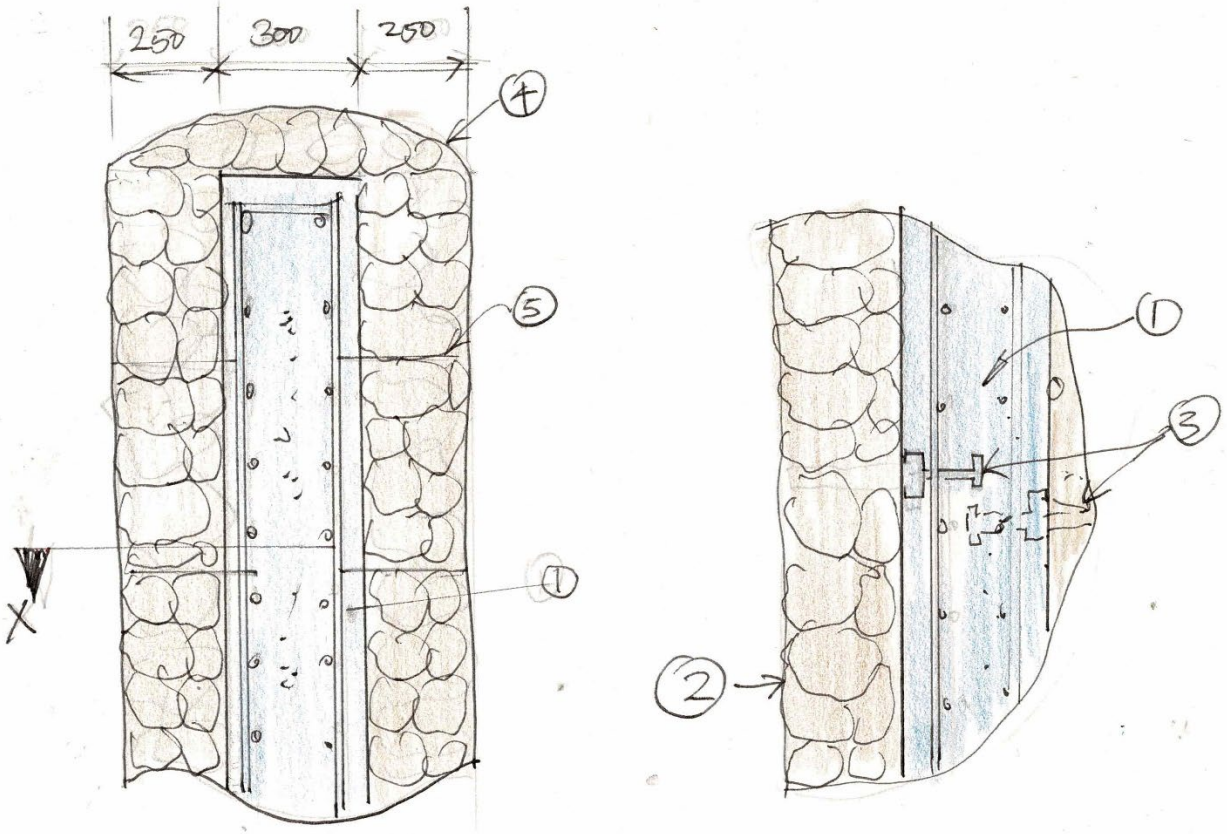
Sketch SA 202413/SK C2 Shanganagh Bridge- Consolidation of piers and abutments



Key

1. Reinforced concrete flood wall to engineer's specifications.
2. Reclaimed stone facing in M4 (1:1:6) mortar with 5-7mm grot nd pinning stones to conservation engineer's specification.
3. Halfen or similar cast in restraint channels at 750mm horizontal centres with masonry ties at approximately 450mm vertical centres.
4. Domed mortar capping in M4 (1:1:6) mortar with flat stones 10 to 20mm deep as per conservation engineer's specification.

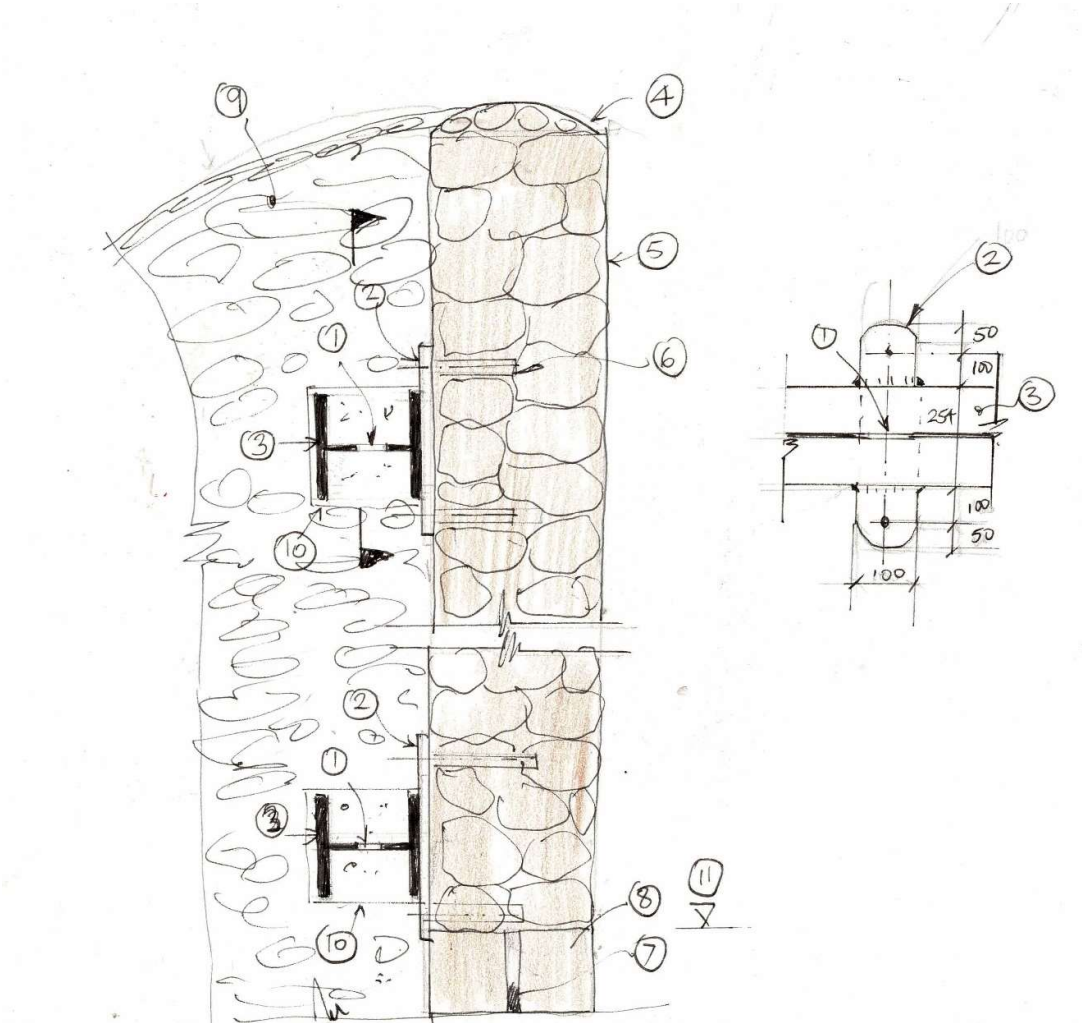
Sketch SA 202413/SK C3 New flood relief wall cladding and capping



Key

1. Reinforced concrete flood wall to engineer's specifications.
2. Reclaimed stone facing in NHL 3.5 lime mortar with 5-7mm grit and pinning stones
3. Halfen or similar cast in restraint channels at 750mm horizontal centres with masonry ties at approximately 450mm vertical centres.
4. Domed mortar capping in NHL 3.5 lime mortar with flat stones 10 to 20mm deep as per conservation engineer's specification.

Sketch SA 202413/SK C4 |variation at Kilgoblin using 250mm masonry to maximise reclaiming of original wall fabric and texture. This wall cladding is built in lime mortar without expansion joints in order to reflect the original character



Sketch SA 202413/SK C4 Arched wall-Strengthening proposals to arch masonry

Key

1. Cut weep holes in web 50mm diameter at 750mm c/c.
2. !00x550mm x 20 grade 316 stainless steel plate welded to U|C with 5mm fillet weld all around with 2 no 20mm holes for Hiltu resin anchors.
3. 254x254x73 UC Grade 316 stainless steel or similar to engineer's specifications
4. Existing capping pointed in NHL 3.5 1:2.5 lime sand mortar.
5. Lime patch pointing as required.
6. Hilti Hitfix resin anchors M16 stainless steel or similar
7. Carefully deep point arched voussoirs in lime mortar to SA specifications
8. Existing arch voussoir stones to be repointed in lime mortar and grouted if required.
9. The new horizontal whalings are supported by the flood defence wall and a short wing wall on the opposite bank on the down stream side. The profile IS TO match the elevation of the flood wall. The length of the wall approximately 3 metres on new foundations to design engineer's details. This wall is to be clad on both sides with stone with a domed mortar capping as per flood defence walls

Condition Report and Recommendations

Shanganagh
Masonry Bridge

Prepared by: Southgate Associates
June 2024

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http://southgateassociates.ie

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Associate director: Emma Baume B.A. H.DIP., M.A.
Financial Director: Myrtle McGivern

Contents:

1.0 Overview and Context

Southgate Associates were engaged to carry out a conservation heritage assessment of the bridge.

This report is informed by a site visit on Tues 30th April by Southgate Associates (Chris Southgate , Conservation Engineer MA (Cantab) MIStructE FIEI C Eng) and Southgate Associates inspection was visual only and some areas of the structure were inaccessible or not visible and Southgate Associates cannot state that these areas are free from defect.

Our inspection was for conservation issues relating to the bridge only and overall design assessment is the responsibility of the project engineering team.

2.0 Conservation Condition issues during Inspection of bridge in accordance with TII NRA BD21/14 for masonry arch bridges Arch Barrel

(i) Nature and condition of the brickwork or stonework including the location and extent of any crushing.

The engineering drawings show a flattening of the arches which in practice was not evident on inpsection. A revised survey was recommended. There is no information available to suggest that there are significant defects of the arch barrel. During work a thorough inspection is recommended once access is fully available.

(ii) Thickness of the joints and depth of mortar missing in arch barrel

The construction of the arch barrel should be checked during construction and any joints with missing mortar repointed in NHL 3,5 in accordance with SA specifications

(iii) Condition of the mortar.

The joints are not visible at the time of inspection and any loose mortar should be removed and repointed as above

(iv) Presence of cracks - their width, length, position, and number.

No significant structural cracking was noted

(v) Location of any displaced voussoir.

The condition appears satisfactory

(vi) Deformation of the arch barrel from its original shape.

There were no significant deformations noted in the main arch barrel on the basis of visual inspection and the deformation implied by the engineering drawings appeared incorrect. We have suggested revised survey of the arch barrel

(vii) Any additional strengthening rings or saddling.

The arch is in original condition, no strengthening rings

(i) The thickness of the arch ring under the parapet cannot be measured, but it does not follow that the thickness is the same under the roadway.

Not visible but appears satisfactory

(ii) Some old bridges have been strengthened by removing the fill and replacing it with Concrete at the abutment.

No previous strengthening works noted

(iii) Services which are laid over or through the arch rings may affect the strength. The position and size of these should be determined.

None noted

Parapets and spandrel walls

Tilting, bulging, or sagging.

The parapets appear robust and will be strengthened as shown in SA specifications

Lateral movement of parapet or spandrel wall relative to the face of the arch barrel.

Not evident

Lateral movement of parapet or spandrel wall accompanied by longitudinal cracking of arch barrel.

Not evident

Weathering and lack of pointing.

Cementitious ribbon pointing to be removed and repointing in lime according to SA specification is recommended

Evidence of vehicular impact.

None

Conclusion

The bridge is in reasonable condition for a structure of this type and age. Interventions are required to prevent scouring and undermining flood conditions due to environmental effects and have been planned to ensure minimum intervention and to retain the character of the bridge.

Chris Southgate MA(Cantab) MIStructE FIEI C Eng

Conservation Engineer

Heritage Consultant

June 2024

14 Landscape and Visual Impact Assessment Appendices

14.1 Verified Photomontages and CGIs

Verified View Photomontages of Proposed

Carrickmines - Shanganagh River Flood Relief Scheme

November 2024

Document at A3 prepared by

G-Net 3D, NSC Campus, Mahon Cork

Tel: 021-230 7043

www.gnet3d.com

G-NET 3D

WE VISUALISE

Photomontage Methodology

The methodology used to develop the photomontages is based on the "Visual Representation of Development Proposals" Guidance note by the Landscape Institute, 2019.

Photography

The photography was carried out on the April 5th and May 14th, 2024, using Sony α7RIII full frame camera.
A 24mm lens was used for the photography. This wide lens was selected for the photography to provide more information on the context around the proposed development. The horizontal field of view of these photographs is 74°. The above-mentioned guidance suggests that 40° angle is the closest to human eye vision and is recommended for the verified photomontages. In the cases where the wide lens is used, there should be an indication of 40° field of view, which is shown at the bottom of each view
A recommended viewing distance of the photomontages taken using 24mm lens is approximately 300mm from eyes when printed on A3 paper.

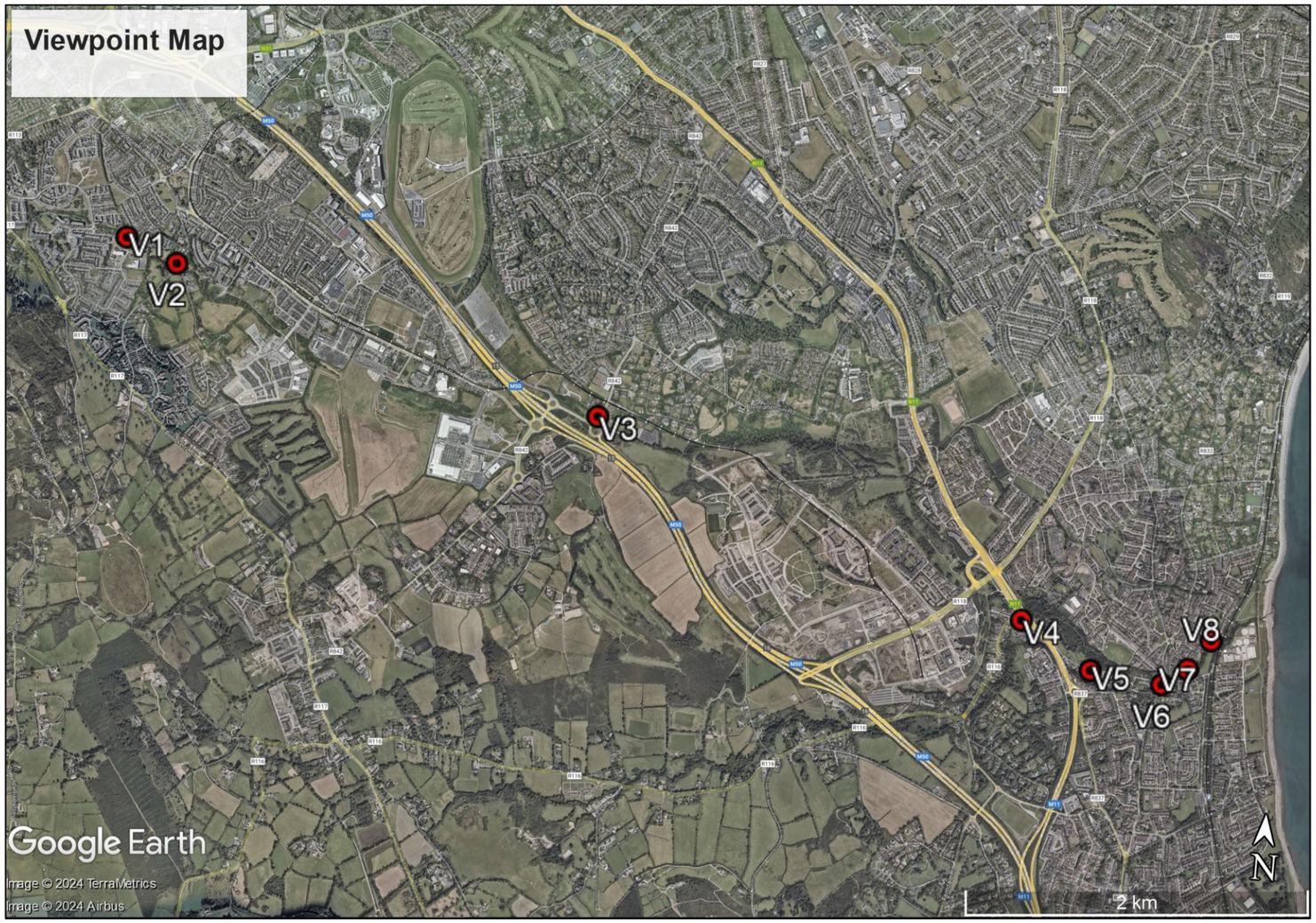
Geomax Zenith 60 GPS Antennae was used to accurately record the viewpoint and reference markers' coordinates and height levels. Viewpoint locations are indicated in the viewpoint map to the right, viewpoint coordinates and information on photography is under each photo.

Modelling

Preparation of an accurate 3D model of all visible in the views flood relief elements including walls, gates, landscape details, etc.

Setup

The following information is used to accurately position the model of the proposed development into the photographs:
-Site survey,
-Photographs,
-Verified viewpoint coordinates and height levels are accurately marked on the location OSi map.
To match the 3D camera view with the photograph we take the following steps:
The camera height is taken from information gathered on the levels from where the photos are taken (table below). The height levels of the proposed development are outlined on the site. Focal length is based on the photograph EXIF info.
This data is imported into our 3D software and the 3D camera is matched with the selected photographs. To match the 3D camera accurately we use all the above data and the reference 3D models. The reference 3D models are existing structures i.e. buildings, roads, lamps, etc which are visible on the photographs. These items are modelled based on the survey information. After all the above conditions are fulfilled and we are satisfied that the camera matches correctly, we proceed to the next step.



Rendering

We apply the materials and textures prior to rendering the photomontage images. Light settings are adjusted to match the brightness of the photographs and sun is positioned according to the date and time the photo was taken.

Post processing

This process means incorporating a 3D image of the proposed development into the photograph to achieve the final result.

View 1. Baseline View

< 24mm 73.7°

<<50 mm 39.6°

39.6° 50mm>>

73.7° 24mm >

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 12:49
Camera: Sony a7RIII

Viewpoint Location: In Belarmine Park, looking southwest towards the proposed defences and the open space.
Viewpoint Coordinates (ITM): 719022.777;724907.000;107.624

G-NET 3D WE VISUALISE

View 1. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 12:49
Camera: Sony a7RIII

Viewpoint Location: Belarmine Park, looking southwest towards the proposed defences and the open space.
Viewpoint Coordinates (ITM): 719022.777;724907.000;107.624

View 2. Baseline View

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 13:08
Camera: Sony a7RIII

Viewpoint Location: At Kilgobbin Road Bridge, looking northwest upstream towards the proposed walls either side of watercourse.
Viewpoint Coordinates (ITM): 719336.237;724784.656;102.386

G-NET 3D WE VISUALISE

View 2. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 13:08
Camera: Sony a7RIII

Viewpoint Location: At Kilgobbin Road Bridge, looking northwest upstream towards the proposed walls either side of watercourse.
Viewpoint Coordinates (ITM): 719336.237;724784.656;102.386

G-NET 3D WE VISUALISE

View 3. Baseline View

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 13:46
Camera: Sony a7RIII

Viewpoint Location: At Castle View, looking south towards the proposed walls.
Viewpoint Coordinates (ITM): 721916.297;724159.766;66.377

View 3. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 13:46
Camera: Sony a7RIII

Viewpoint Location: At Castle View, looking south towards the proposed walls.
Viewpoint Coordinates (ITM): 721916.297;724159.766;66.377

View 4. Baseline View

< 24mm 73.7° | <<50 mm 39.6° | 39.6° 50mm>> | 73.7° 24mm >

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:09
Camera: Sony a7RIII

Viewpoint Location: At Loughlinstown Road, looking upstream towards the proposed walls at Waterfall Cottage.
Viewpoint Coordinates (ITM): 724521.092;723248.045;16.780

G-NET 3D WE VISUALISE

View 4. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:09
Camera: Sony a7RIII

Viewpoint Location: At Loughlinstown Road, looking upstream towards the proposed walls at Waterfall Cottage.
Viewpoint Coordinates (ITM): 724521.092;723248.045;16.780

G-NET 3D WE VISUALISE

View 5. Baseline View

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 14.05.2024
Photo Time: 11:49
Camera: Sony a7RIII

Viewpoint Location: On Commons Road, at the western end of the proposed flood wall, looking east.
Viewpoint Coordinates (ITM): 724951.594;723000.520;11.597

View 5. As Proposed

< 24mm 73.7°

<<50 mm 39.6°

39.6° 50mm>>

73.7° 24mm >

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 14.05.2024
Photo Time: 11:49
Camera: Sony a7RIII

Viewpoint Location: On Commons Road, at the western end of the proposed flood wall, looking east.
Viewpoint Coordinates (ITM): 724951.594;723000.520;11.597

G-NET 3D WE VISUALISE

View 6. Baseline View

< 24mm 73.7° | <<50 mm 39.6° | 39.6° 50mm>> | 73.7° 24mm >

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:42
Camera: Sony a7RIII

Viewpoint Location: At the junction of Shanganagh Road and Shanganagh Wood, looking northwest towards Shanganagh Road Bridge and Commons Road
Viewpoint Coordinates (ITM): 725376.230;722964.402;9.078

G-NET 3D WE VISUALISE

View 6. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:42
Camera: Sony a7RIII

Viewpoint Location: At the junction of Shanganagh Road and Shanganagh Wood, looking northwest towards Shanganagh Road Bridge and Commons Road
Viewpoint Coordinates (ITM): 725376.230;722964.402;9.078

G-NET 3D WE VISUALISE

View 7. Baseline View

< 24mm 73.7° | <<50 mm 39.6° | 39.6° 50mm>> | 73.7° 24mm >

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:52
Camera: Sony a7RIII

Viewpoint Location: In Brookdene estate, looking south along the line of the proposed flood wall.
Viewpoint Coordinates (ITM): 725519.557;723069.475;6.572

G-NET 3D WE VISUALISE

View 7. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 14:52
Camera: Sony a7RIII

Viewpoint Location: In Brookdene estate, looking south along the line of the proposed flood wall.
Viewpoint Coordinates (ITM): 725519.557;723069.475;6.572

View 8. Baseline View

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 15:08
Camera: Sony a7RIII

Viewpoint Location: In Bayview Lawns, looking east at the proposed flood wall.
Viewpoint Coordinates (ITM): 725640.127;723251.034;6.458

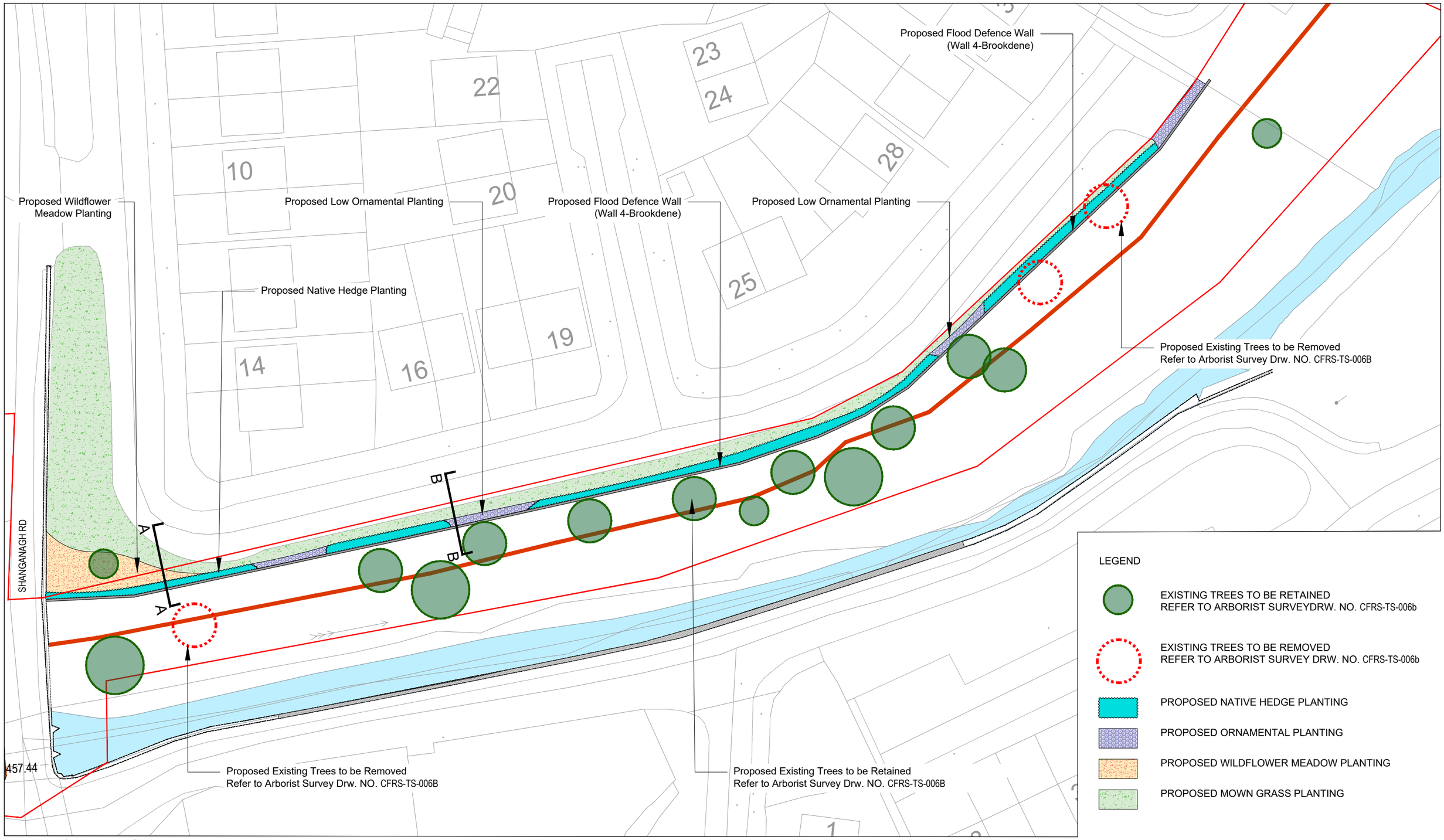
View 8. As Proposed

Project Name:
Carrickmines - Shanganagh River Flood Relief Scheme

Photo Date: 05.04.2024
Photo Time: 15:08
Camera: Sony a7RIII

Viewpoint Location: In Bayview Lawns, looking east at the proposed flood wall.
Viewpoint Coordinates (ITM): 725640.127;723251.034;6.458

14.2 Landscape Plans at Brookdene and Bayview



Plan View Scale 1:500@A3

Project: Carrickmines Shanganagh FRS

Client: DLRCC and OPW

Drawing Number
20108-JBA -XX-XX-DR-L-0001

Drawing Title:
Brookene Landscape Plan

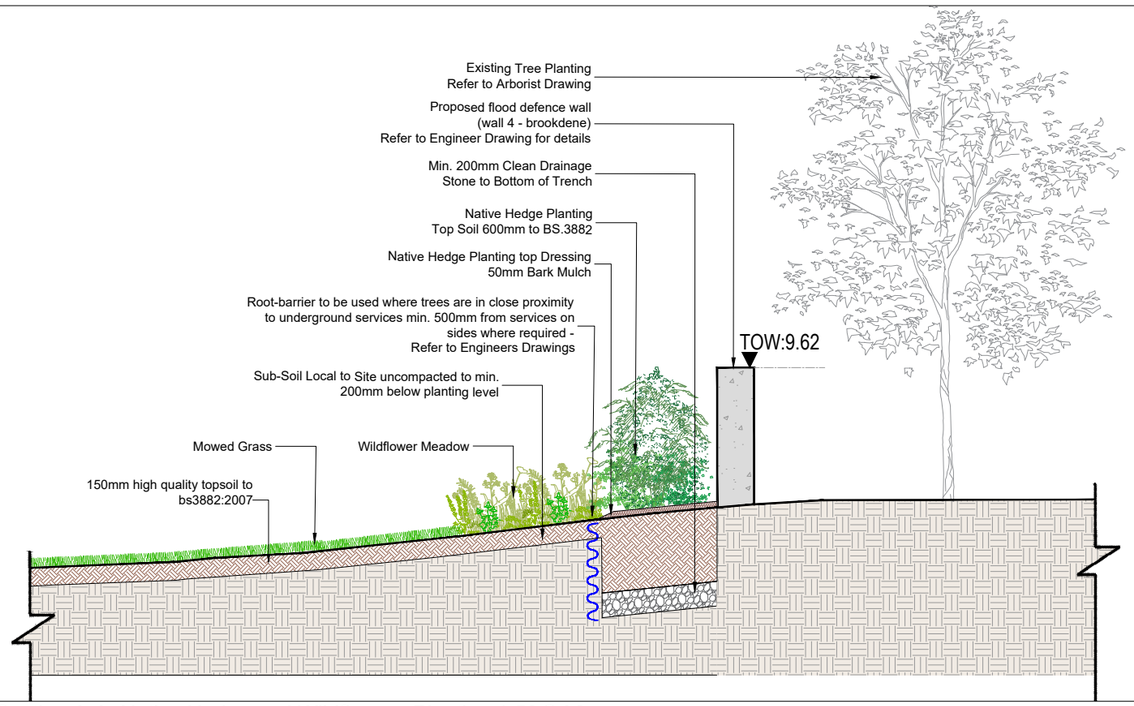
Design ES

Checked CP

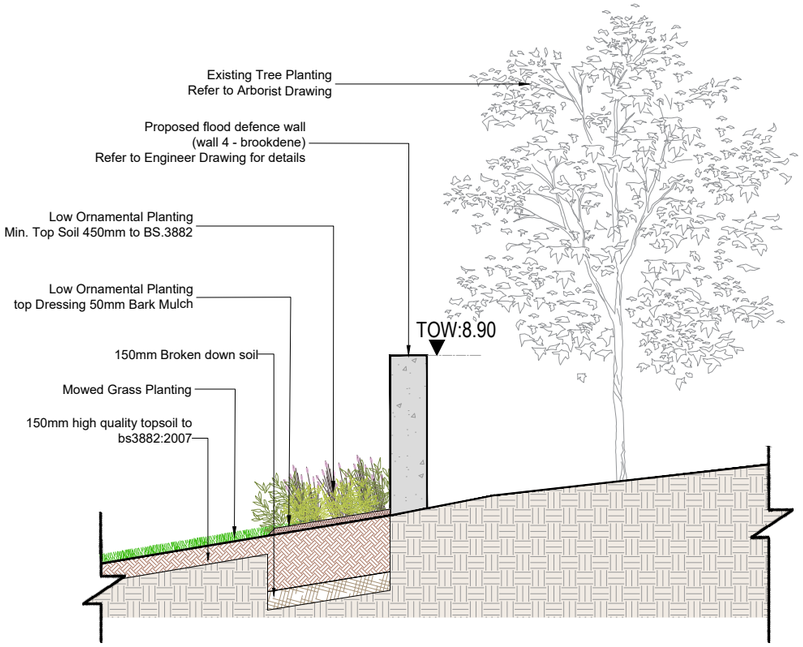
Approved CON

Date 09/10/2024

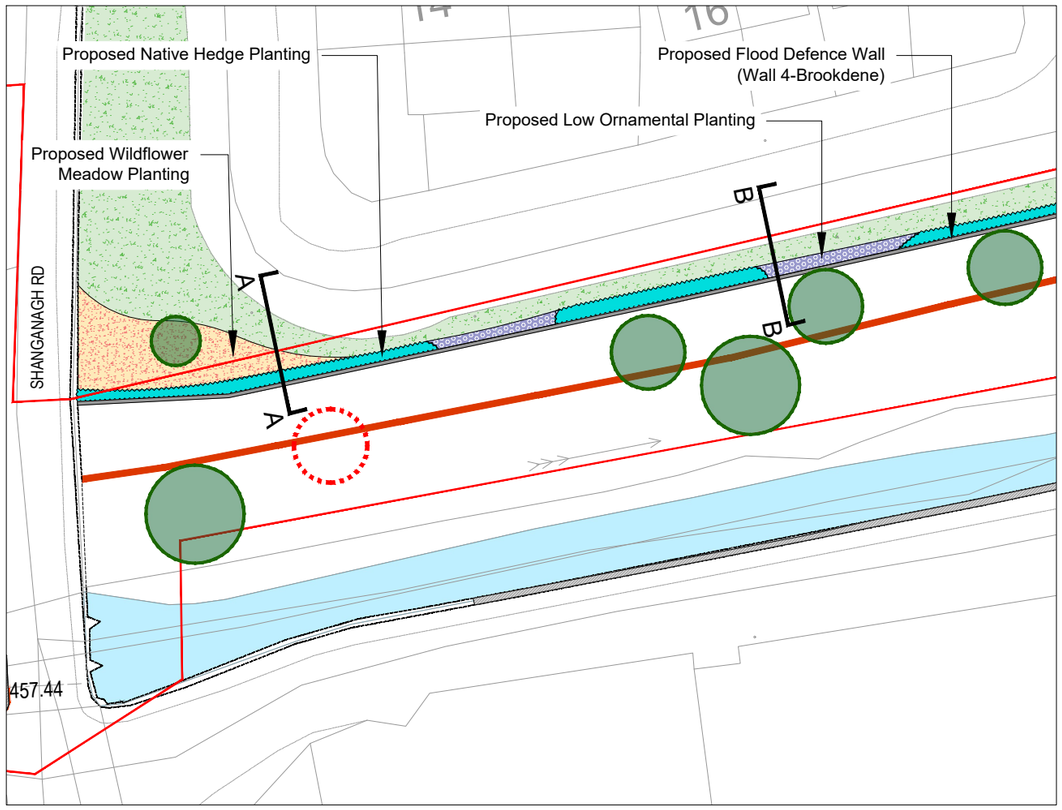
JBA consulting



Typical Section A-A_Native Hedge and Wildflowers Planting 1:50@A3



Typical Section B-B_Low Ornamental Shrub and Mown Grass Planting 1:50@A3



Plan View Scale 1:500@A3

LEGEND

EXISTING TREES TO BE RETAINED
REFER TO ARBORIST SURVEYDRW. NO. CFRS-TS-006b

EXISTING TREES TO BE REMOVED
REFER TO ARBORIST SURVEY DRW. NO. CFRS-TS-006b

PROPOSED NATIVE HEDGE PLANTING

PROPOSED ORNAMENTAL PLANTING

PROPOSED WILDFLOWER MEADOW PLANTING

PROPOSED MOWN GRASS PLANTING

Project: Carrickmines Shanganagh FRS

Client: DLRCC and OPW

Drawing Number
20108-JBA -XX-XX-DR-L-0002

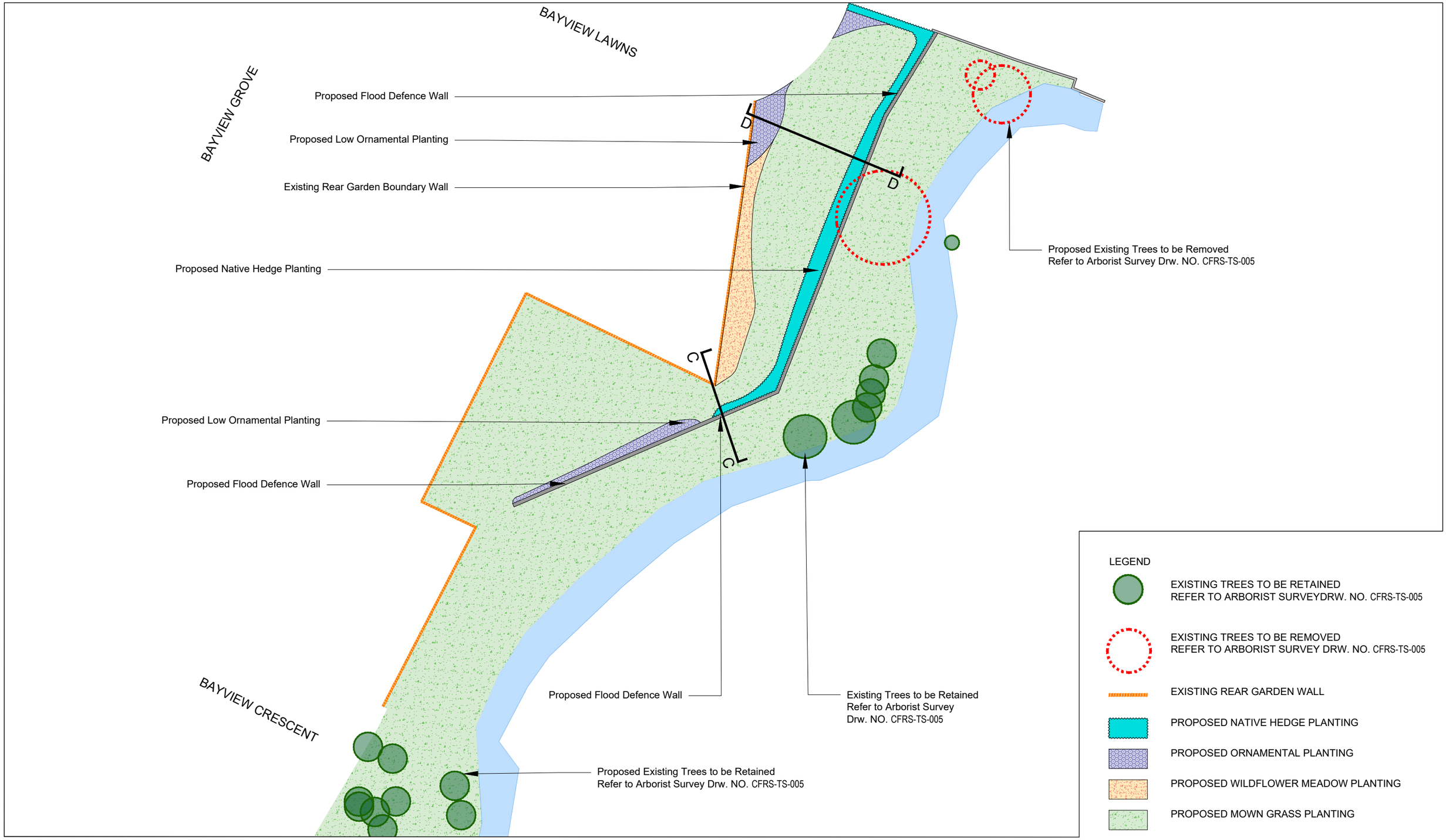
Drawing Title:
Brookdene Typical Landscape Sections & Plan View

Design ES

Checked CP

Approved CON

Date 09/10/2024



Plan View Scale 1:500@A3

Project: Carrickmines Shanganagh FRS

Client: DLRCC and OPW

Drawing Number
20108-JBA -XX-XX-DR-L-0003

Drawing Title:
Bayview Landscape Plan

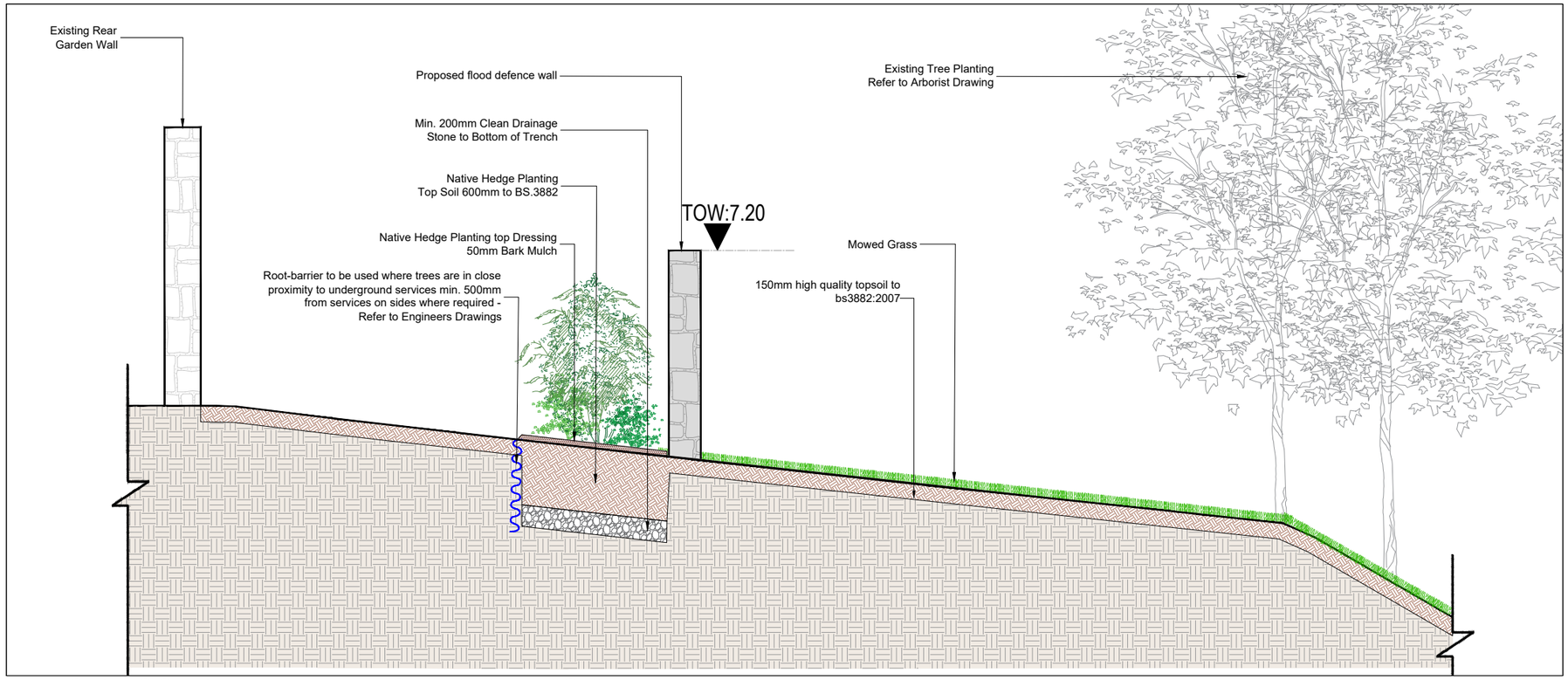
Design ES

Checked CP

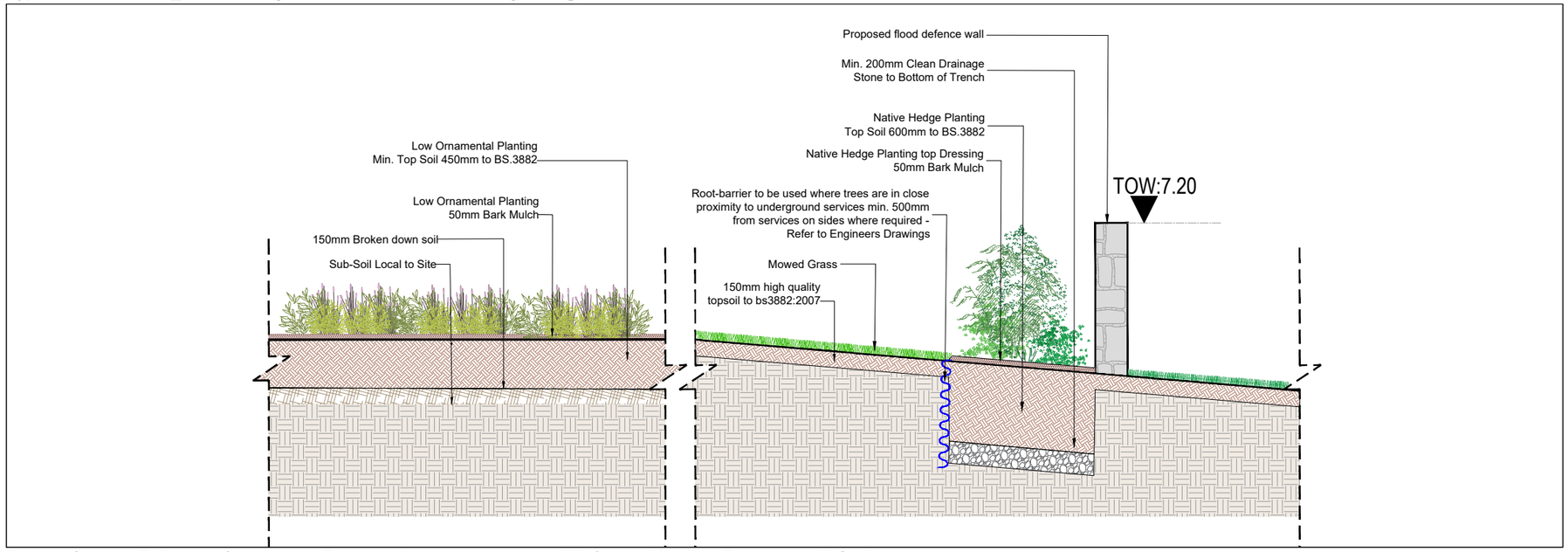
Approved CON

Date 12/12/2024

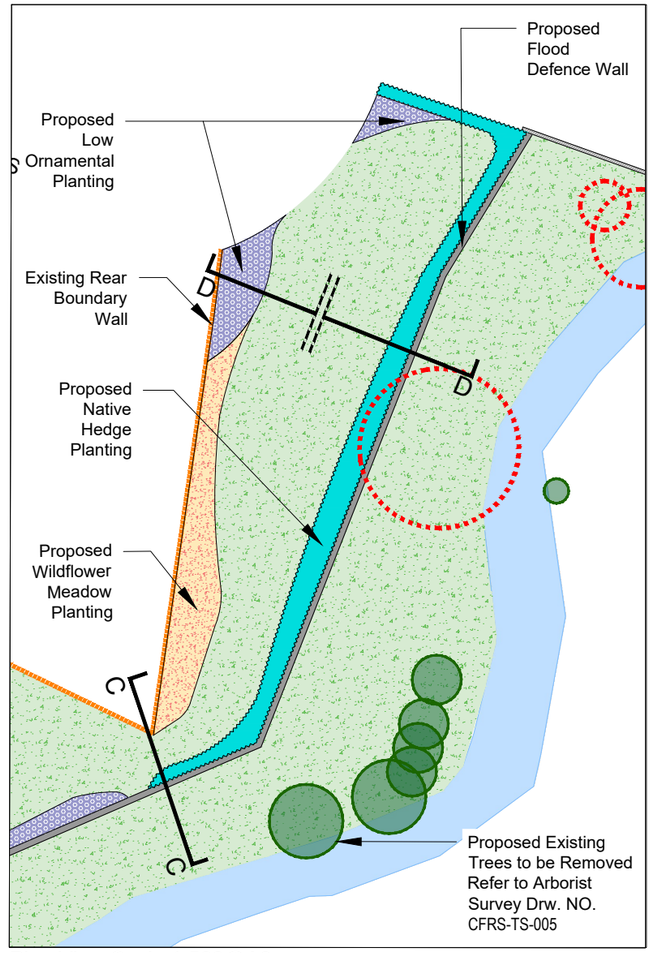
JBA consulting



Typical Section C-C_Native Hedge and Mown Grass Planting 1:50@A3



Typical Section D-D_Low Ornamental Planting, Native Hedge and Wildflower Meadow Planting 1:50@A3



Plan View Scale 1:500@A3

LEGEND

- EXISTING TREES TO BE RETAINED
  REFER TO ARBORIST SURVEYDRW. NO. CFRS-TS-005
- EXISTING TREES TO BE REMOVED
  REFER TO ARBORIST SURVEY DRW. NO. CFRS-TS-005
- EXISTING REAR GARDEN WALL
- PROPOSED NATIVE HEDGE PLANTING
- PROPOSED ORNAMENTAL PLANTING
- PROPOSED WILDFLOWER MEADOW PLANTING

Project: Carrickmines Shanganagh FRS

Client: DLRCC and OPW

Drawing Number
20108-JBA -XX-XX-DR-L-0003

Drawing Title:
Bayview Typical Landscape Sections & Plan View

Design ES

Checked CP

Approved CON

Date 12/12/2024

JBA consulting

15 Interactions Appendices

No appendices.

16 Cumulative Impacts Appendices

No appendices.

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