Ecological Impact Assessment

Cherrywood Green Routes Network, Cherrywood SDZ Lands, Cherrywood, Dublin 18

Prepared for Aecom

On behalf of Dún Laoghaire-Rathdown County Council

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1 Introduction

1 This Ecological Impact Assessment (EcIA) was authored by Colm Clarke ACIEEM and Alexis FitzGerald of Scott Cawley Ltd.

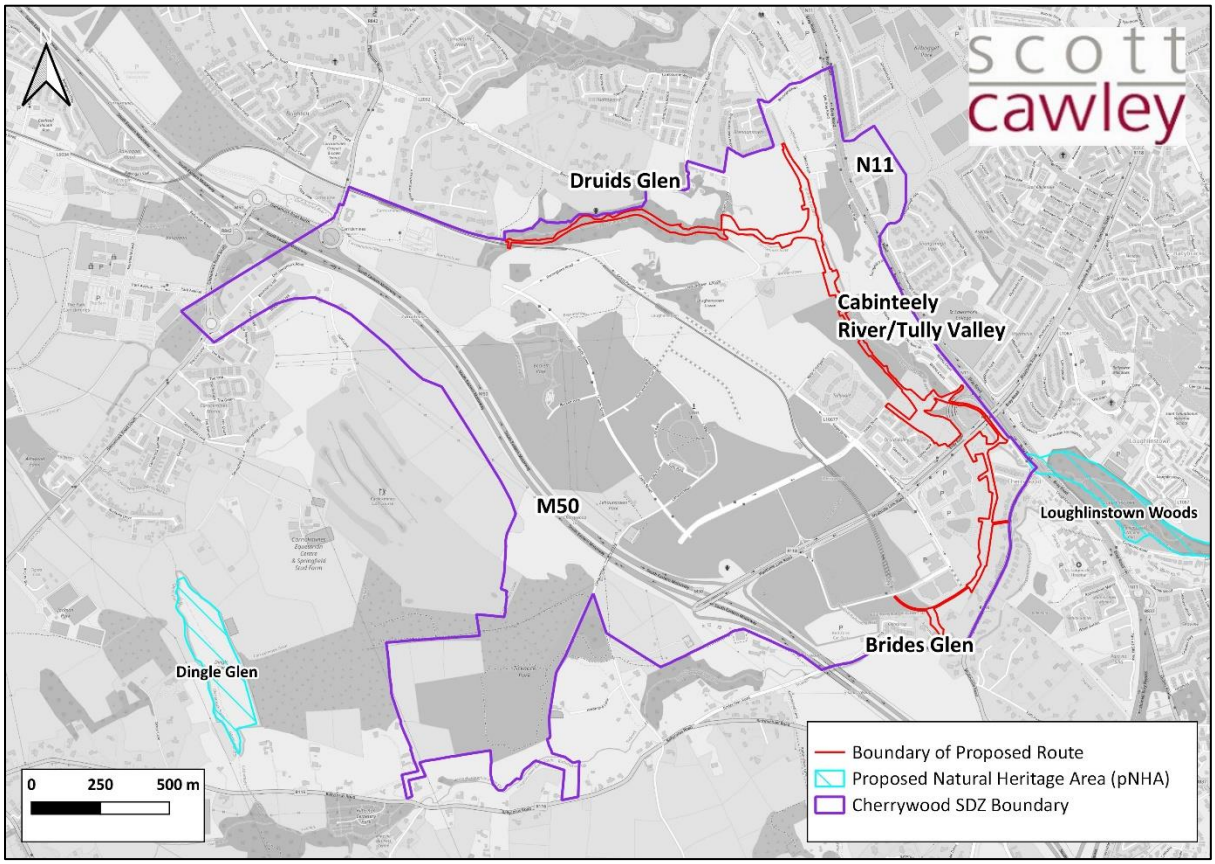
2 It provides an assessment of the potential ecological effects of the proposed development at lands in Druids Glen, Carrickmines Valley, Brides Glen and the Linear Park adjacent to Cherrywood Business Park (refer to Figure 1 for location). The proposed development consists of a Green Routes Network for the Cherrywood strategic development zone (SDZ) (herein referred to as "the proposed route"). A detailed description of the proposed route is included in Section 2.

3 The proposed route consists of a range of semi-natural and highly modified habitats, ranging from woodland to semi-natural grassland, parkland, rivers and wetlands, as well as smaller areas of hard surface.

4 The purpose of the report is to:

- Establish and evaluate the baseline ecological environment, as relevant to the proposed route
- Identify, describe and assess all potentially significant ecological effects associated with the proposed route
- Set out the mitigation measures required to address any potentially significant ecological effects and ensure compliance with relevant nature conservation legislation
- Provide an assessment of the significance of any residual ecological effects
- Identify any appropriate compensation, enhancement or post-construction monitoring requirements

Figure 1: Location of the proposed route in the context of the Cherrywood SDZ lands and the broader vicinity. Imagery © OpenStreetMaps.



2 Description of the Proposed Development

5 The proposed Cherrywood Green Routes Network provides a cycle and pedestrian network, for the area within the Cherrywood SDZ. The Green Routes Network is based on the preliminary routing indicated in the Cherrywood SDZ, extending for 3.0km from Brides Glen Road in the south to Lehaunstown Road and Brennanstown in the north. The Green Routes Network provides links to improve the pedestrian and cycle connections to key external desire lines, including links to the N11, Wyattville Link Road, and Brides Glen / Cherrywood Road in the south. The proposed Green Routes Network will be 4.0m wide, designed in accordance with TII Publication 'DN-GEO-03047-02 – Rural Cycleway Design (Offline), with the exception of a section through Druids Glen Woodland. In the Druids Glen Woodland, an 800m long pedestrian walking route is proposed, which will comprise resurfacing of existing pathways through the woodland through the existing Druids Glen Woodland. The pathway through Druids Glen will be 1.2m wide. Lighting proposals for the scheme has been divided into three separate zones as follows:

- Zone 1 comprises the area from Pond 5A to the rear of Cherrywood Business Park, the Wyattville Link Road and the Tully Vale section of Lehaunstown Valley (as far as Pond 2b). This zone will be lit with standard pole lighting. New technology in relation to bat sensitive lighting may be piloted here.
- Zone 2 comprises the area from Pond 2b to the Brennanstown development in the north and Lehaunstown Lane in the west. This area will be lit with bollard style lighting with light spill directed downwards from source.
- Zone 3 comprises the Druids Glen Woodland between Lehaunstown Lane in the east and the unopened Brennanstown Luas stop in the west. This area does not include the provision of any lighting, due to the sensitivity of habitats and fauna in the woodland.

3 Planning, Policy and Legislation

6 The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this EcIA.

7 The following international legislation is relevant to the proposed route:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network[1] was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
- Directive 2009/147/EEC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds; hereafter, referred to as the 'Birds Directive'. The Birds Directive is

[1] The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

the legislation under which special protection areas are designated for the protection of endangered species of wild birds listed in Annex I of that directive.

8 The following national legislation is relevant to the proposed development:

- *Wildlife Acts 1976 to 2021*; hereafter collectively referred to as the 'Wildlife Acts'. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
- *Planning and Development Acts 2000 to 2021*; hereafter collectively referred to as the 'Planning and Development Acts'. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
- *European Communities (Birds and Natural Habitats) Regulations 2011 to 2022*; hereafter the 'Birds and Habitats Regulations'. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- *Flora (Protection) Order, 2015 to 2022*. This lists species of plant protected under Section 21 of the Wildlife Acts.

9 The proposed route is located within the Cherrywood Strategic Development Zone (SDZ). All plans and developments within this area must comply with the policies and objectives of the *Cherrywood Strategic Development Zone (SDZ) Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014), including specific biodiversity objectives set out in the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). The biodiversity-related policies and objectives of the *Cherrywood SDZ Planning Scheme 2014* are listed in Appendix VI of this report, while the policies and objectives of the *Cherrywood Planning Scheme Bidoiversity Plan* are listed in Appendix VII of this report. The Cherrywood SDZ in turn is nested within the *Dún Laoghaire-Rathdown County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2022).

4 Methodology

4.1 Author Statement

10 This Ecological Impact Assessment (EcIA) was authored by Colm Clarke and Alexis FitzGerald of Scott Cawley. Field surveys were conducted by Colm Clarke, Alexis FitzGerald, Aoife O'Rourke, Shane Brien, Niall McHugh, Síofra Quigley, Kristie Watkin-Bourne, and Zuzana Erosova of Scott Cawley, and by independent ornithologist Hugh Delaney, and independent ecologist Kevin Delahunty. Surveys were designed and supervised by Colm Clarke of Scott Cawley. This report has been reviewed for quality assurance purposes by Niamh Burke of Coiscéim Consulting and Ashling Cronin of Scott Cawley Ltd. All personnel that have contributed to this ecological assessment are qualified and experienced ecologists. The professional profiles of all contributing ecologists for this project are listed in Appendix I of this report.

4.2 Scope of the Assessment

11 The study area is defined by the zone of influence of the proposed development with respect to the ecological receptors that could potentially be affected.

12 The Zone of Influence (ZoI), or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (KERs), depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken has established the habitats and species present within, and in the vicinity of, the proposed development site. The ZoI and study area was then informed and defined by the sensitivities of each of the KERs present, in conjunction with the nature and potential impacts associated with the proposed development.

13 The ZoI of habitat loss impacts will be confined to within 5-10m of the proposed route.

14 The ZoI of habitat fragmentation impacts could potentially extend to populations of species within the entire SDZ area.

15 The ZoI of potential impacts on surface water quality extends to the receiving watercourses downstream of the proposed route, e.g. the Carrickmines Stream, Cabinteely Stream, and Shanganagh River to its confluence with the Irish Sea at Killiney Bay. The potential zone of influence is informed by a Hydrogeological and Hydrological Risk Assessment of the Cherrywood Green Routes Network undertaken by Aecom (2021).

16 The ZoI of general construction activities (i.e. risk of spreading/introducing non-native invasive species, and disturbance due to increased noise, vibration, human presence and lighting) is not likely to extend more than several hundred metres from the proposed route.

4.3 Desk Study Methodologies

17 A desk study was initially undertaken in May 2019 to inform the scope of this report. The desk study has been continuously updated between May 2019 and January 2021, to collect any available information on the local ecological environment. The following resources assisted in the production of this report:

- Online data available from the National Parks and Wildlife Service (NPWS) on European sites[2] and other designated sites protected at the national level (*i.e.* Natural Heritage Areas, or NHAs, and proposed Natural Heritage Areas, or pNHAs)[3]
- National Biodiversity Data Centre (NBDC) Search of Online Database for 10km Grid Squares O22[4]
- Habitat GIS datasets available to download from the NPWS website specifically the following datasets:
  - Ancient and Long-Established Woodland (updated 2012)[5]
  - National Survey of Native Woodlands 2003 - 2008 (updated 2012)
  - Article 17 Data for Annex I habitats (2012)[6], and
  - 2019 Article 17 Data for Annex I habitats[7]

[2] European sites, are defined under the Habitats Directive (Article 3) as a European ecological network of Special Areas of Conservation and Special Protection Areas, composed of sites which host the natural habitat types listed in Annex I and habitats of the protected species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most vulnerable and threatened species and habitats. In Ireland these sites are designated as European sites – defined under the Planning Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special are of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

[3] NPWS (2019) *Protected Sites in Ireland*. Available from: www.npws.ie/protectedsites/ and http://webgis.npws.ie/npwsviewer/

[4] NBDC (2019) Online Database. Available from: https://maps.biodiversityireland.ie/Map [Accessed 07/01/2021]

[5] NPWS (2019) GIS Datasets for Ancient and Long-Established Woodland and National Survey of Native Woodland 2003-2008 Available at https://www.npws.ie/maps-and-data/habitat-and-species-data [Accessed 31/08/2020]

[6] NPWS (2019) Article 17 Data for Annex I habitats. Available from: https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17 [Accessed 31/08/2020]

[7] NPWS (2019) Article 17 Data for Annex I habitats. Available at: https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/2019/habitats [Accessed 31/08/2020]

- Spatial data relating to watercourses, downloaded from the Environmental Protection Agency's (EPA) online Geo Portal, specifically the following dataset:
  - WFD River Water Bodies-27/04/2017[8]
- Other available sources of habitat information, specifically the following publications:
  - Online map of Irish wetlands[9]
  - *National Survey of Native Woodlands 2003 – 2008* (Perrin *et al.,* 2008);
  - *A Provisional Inventory of Ancient and Long-Established Woodland in Ireland* (Perrin & Daly, 2010);
- Ecological Data pertaining to the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council 2014);
- *Otter Survey of Selected Rivers in the Dún Laoghaire-Rathdown County Council District. Dublin* (Macklin & Brazier, 2019), including spatial data on otter distribution along the Shanganagh River and its tributaries as provided by Dún Laoghaire-Rathdown County Council;
- A *Giant Hogweed Invasive Alien Species Survey* (Envirico, 2021) commissioned by Dún Laoghaire-Rathdown County Council, relating to the Ballyogan Stream, Carrickmines Stream, Golf Stream, and Loughlinstown South Stream and associated tributaries.
- An *Invasive Species Management Plan: Cherrywood SDZ, County Dublin* (Envirico, 2022) commissioned by Dún Laoghaire-Rathdown County Council for the Cherrywood SDZ. This is included as Appendix X to this report, and the management measures included in the report are cross-referenced in Section 6.5.3 Measures to Prevent the Spread of Invasive Species and in Section 9 in relation to the eradication of giant hogweed.
- A Tufa Catchment Study (JBA Consulting, 2020) or springs located north of the Tully Vale Residential Development, Cherrywood, completed by JBA Consulting on behalf of Dún Laoghaire-Rathdown County Council;
- Information on the location, nature and design of the proposed development supplied by the applicant's design team; and,
- Information on the conservation status of birds in Ireland (Gilbert *et al.*, 2021).

18 A consultation letter was sent to the Manager of the Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht on 20th December 2020 (G Pre00329/2019). The consultation letter outlined the scope of surveys and reporting being undertaken by Scott Cawley and requested feedback from the Department on the proposal. It also disclosed the identification of the rare flora species green-flowered helleborine *Epipactis phyllanthes* in the Druids Glen woodland. A follow-up email was submitted to the Development Applications Unit on 18th September 2020. No official response has been received to these consultation requests at the time of publication of this report.

19 A consultation email was submitted to Inland Fisheries Ireland (IFI) outlining the design of the proposed development on 13th August 2021, including a plan and design report for the proposal. The consultation email requested feedback from IFI on the proposal. No response has been received at the time of writing of this report.

20 Swift Conservation Ireland was consulted via email and telephone on 1st October 2021, and by email on 1st December 2021 in relation to proposals for the enhancement of the proposed route for nesting and

[8] EPA (2019) WFD River Water Bodies Dataset. Available from: http://gis.epa.ie/GetData/Download [Accessed 31/08/2020]

[9] Available from: http://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands--/map-of-irish-wetlands---map/index.html

foraging swifts. An initial proposal to install swift towers was changed to a proposal for the installation of brick swift chimney towers, which according to Swift Conservation Ireland have a higher likelihood of successfully attracting nesting swifts in the Irish context.

4.4 Field Survey Methodologies

Table 1: Ecological surveys and survey dates

Survey	Survey Date(s)	Surveyor(s)
Habitat surveys	August to September 2019 August 2020	Scott Cawley Ltd.
Terrestrial Mammal Surveys	August to September 2019 March 2020 January 2021	Scott Cawley Ltd.
Bat surveys: Appraisal of trees for Potential Roost Features Roost Presence/Absence Surveys Automated detector surveys Walked transect surveys	 March 2020, September 2020, January 2021 June-September 2019, August & September 2020 June/July 2020 July-September 2019	Scott Cawley Ltd. and independent ecologist Kevin Delahunty
Bird Surveys Breeding bird surveys Winter bird survey	 June & July 2019 March 2020	Scott Cawley Ltd. and independent ornithologist Hugh Delaney
Aquatic kick-sampling surveys	September 2021	Scott Cawley Ltd.

4.4.1 Habitats and Flora Survey

21 Habitat and flora surveys were conducted along the proposed route, and within its vicinity where accessible, by Colm Clarke and Alexis FitzGerald of Scott Cawley. Surveys were conducted on 29th August 2019, and between 12th and 13th September 2019 in bright, dry weather. Additional mop-up surveys of the southern section of the route were completed by Colm Clark on 25th August 2020. Survey methodologies broadly followed those of *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011), and involved a walkover of the lands noting the habitats and species within. Habitats were assigned to categories outlined within *A Guide to Habitats in Ireland* (Fossitt, 2000), and where present, habitats listed on Annex I of the EU Habitats Directive were assigned according to relevant classification criteria in Ireland[10]. Plant nomenclature follows the *BSBI's List of Accepted Plant Names*[11].

22 Surveys were conducted with the aid of habitat maps prepared for the *Cherrywood Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), and surveyors verified whether habitats along the route

[10] Habitats listed on Annex I of the EU Habitats Directive are summarised into their broad classifications within the European Commission document *Interpretation Manual of European Union Habitats* (European Commission, 2013). However as these habitat types vary somewhat over their European range, it is the responsibility of national experts to provide a description of the habitats as they occur at a national level. Reference materials for the classification of EU Annex I Habitats as they are described in Ireland are included within *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments* (NPWS, 2019).

[11] BSBI (2007). *BSBI's List of Accepted Plant Names*. Available online at www.bsbi.org

remain the same. Professional opinion was used to update habitat area and/or classification as necessary along the route. Surveyors made note of the locations of any species listed on the *Flora (Protection) Order 2015*, included within the threatened categories[12] of the *Ireland Red Data List No. 10: Vascular Plants* (Wyse Jackson *et al.,* 2016), or listed on the third schedule of the *Birds and Habitats Regulations 2011*. Habitats were mapped in the field and field data was uploaded to a geographical information systems (GIS) database.

4.4.2 Fauna Surveys

4.4.2.1 Terrestrial Mammals (excl. Bats)

23 A terrestrial fauna survey (excluding bats) was undertaken on the 29th August 2019, 24th September 2019, and 3rd March 2020 by Colm Clarke. The presence/absence of terrestrial fauna species were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats along the proposed route and immediate vicinity of the route (to 50m either side of the route, where landowner access was granted) on site were assessed for signs of usage by protected/red-listed fauna species, and their potential to support these species. Surveys to check for the presence of badger setts and otter holts within the study area, and to record any evidence of use, were undertaken on the aforementioned dates. An additional investigation of a potential otter holt identified in Macklin & Brazier (2019), was undertaken by Colm Clarke and Síofra Quigley of Scott Cawley on 8th January 2021.

4.4.2.2 Bats

24 Habitats along the proposed route were assessed for their suitability for roosting and foraging bats, based on professional judgement and with reference to guidelines on habitat suitability for bats contained within *Bat Surveys for Professional Ecologists: Good Practice Guidance* (Collins ed., 2016) (see Appendix III). Assessment of features was undertaken by Colm Clarke based on an initial site walkover in June 2019. Trees with potential roost features (PRFs) were assessed and catalogued on 3rd March 2020 by Colm Clarke, with a follow up survey of the same trees on 8th January 2021 by Colm Clarke and Síofra Quigley to record tree numbers assigned by the project arborist.

25 Bat activity surveys were carried out within the lands with the aim of identifying areas of greatest importance for foraging and/or commuting bats, and to identify roosts. Bat activity transect surveys were undertaken on 24th June 2019, 26th August 2019 and 24th September 2019 by Shane Brien, Niall McHugh, and Colm Clarke. Each survey included two walked transects, which were each walked by separate surveyors using a handheld ultrasound detector (Elekon BatLogger M) to record bat activity. Surveys took place between sunset and approximately two hours after sunset. The survey transects were complemented by the deployment of automated SM2 Bat detectors along the proposed route.

26 Bat roost presence/absence surveys were undertaken on structures which were assessed to have suitability for roosting bats in the vicinity of the proposed route. The identification of buildings with potential for roosting bats was guided by the database of known and/or potential roosts outlined within the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), a review of aerial imagery of the proposed route, and the author's professional judgement and experience. The ability to survey buildings also relied upon the provision of access by landowners. A series of buildings at the junction between Lehaunstown Lane and Brennanstown Road were surveyed from the roadside on 18th July 2019 and 30th August 2019, a former railway viaduct and associated private residential dwelling on Cherrywood Road were surveyed on 10th July 2019 and 25th September 2019, and a ruined stable building (Grovedale) was surveyed on 25th August 2020 and 17th September 2020. Survey effort corresponded to that for buildings/structures of moderate suitability for roosting bats (See Appendix II for suitability criteria for

[12] The threatened categories are: Critically Endangered; Endangered; and, Vulnerable (Wyse Jackson *et al.*, 2016).

bats). Surveys were organised for a property, Lehaunstown House, but were not completed due to lack of landowner consent for access on the requested survey dates (see Limitation Section 4.4.2.3, page 8). Details of survey dates, locations, and weather are included in Appendix IV.

27 Observations of bat activity from the aforementioned surveys was recorded, and where necessary, data collected in the field was analysed using specialist software (Elekon BatExplorer) to aid in the identification of bat species by their calls. Data generated from the bat activity survey transects and roost presence/absence survey were analysed using Elekon BatExplorer software, whereby calls were identified to species level (where this was possible), through professional judgement and with reference *British Bat Calls: A Guide to Species Identification* (Russ, 2012).

4.4.2.3 Birds

28 Three separate breeding bird surveys were undertaken along the route by ecologists Colm Clarke and Aoife O'Rourke of Scott Cawley and by Hugh Delaney on 18th June 2019, and 1st and 4th July 2019. Each survey included two walked transects, which were each walked by separate surveyors. The breeding bird surveys took place immediately following sunrise in order to coincide with the period of highest breeding bird activity.

29 Observations of wintering bird species were noted during a walkover survey of the proposed route on 3rd March 2020 by Colm Clarke.

4.4.2.1 Reptiles and Amphibians

30 it was determined that amphibian surveys for breeding amphibians were not required at scoping stage due to the habitats present along the proposed route. Nonetheless, the habitats along the route were assessed for their suitability for amphibians.

31 The proposed development traverse through relatively closed habitats (e.g. woodland and rank grassland) with low local scale vegetation heterogeneity which common lizard *Zootoca vivipara* rely upon for basking/foraging opportunities. For this reason, specific surveys for common lizard were scoped out from this EcIA at the tendering stage. Nonetheless, observations of lizards were undertaken as part of the scope of a multidisciplinary walkover survey of the proposed development site on 3rd March 2020, and the potential effects of the proposal on common lizard are considered in the impact assessment section of this report.

4.4.2.2 Aquatic Kick-sampling Surveys

32 Macro-invertebrate samples were conducted at three sampling locations along the Druids Glen section of the Carrickmines Stream. Riverine samples were taken in areas of riffle/run using a standard kick sampling hand net (250mm width, 500µm mesh size), as per ISO standards for water quality sampling (ISO 10870:2012). Thirty-seconds of stone washes were also conducted on large cobbles/boulders, where present.

33 Macro-invertebrate samples were converted to Q-ratings as per Toner *et al*. (2005). Macro-invertebrate samples were also assessed using the Biological Monitoring Working Party (BWMP) index and Average Score Per Taxon (ASPT) score (originally developed by Hawkes, 1997).

4.4.2.3 Limitations of Surveys

34 Habitat and flora surveys were undertaken during the period of vegetative growth, when invasive species, and Fossitt Habitats could be identified with certainty. While surveys of woodlands were outside of the optimal period (Springtime when vernal species are easiest to identify), this has not imposed limitations on the survey results in light of the comprehensive data on these habitats already available within the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014).

35 With regard to bats, absence of accessibility to private dwellings in the potential zone of influence of the proposed route mean that presence/absence of roosts could not be determined with certainty, e.g., for

Lehaunstown House, and Cottages on Lehaunstown Lane. With regard to potential tree roosts, roost presence/absence surveys were not undertaken on tree PRFs identified in Druids Glen. Bats that roost in trees are known to switch occupancy regularly in Ireland and Britain (Andrews, 2013), and therefore the level of survey effort required to confirm absence is high. In this instance, the PRFs identified on trees in Winter/Spring 2020 were obscured by vegetation during the growing season, making survey of the PRFs extremely challenging. These survey limitations have been overcome by adopting a conservative approach, and assuming that:

- Bats will utilise buildings assessed as having roosting potential
- Bats will utilise trees identified with PRF features.

36 This has informed input to the design of the proposed route. Mitigation measures have also been included for checks of trees in Druids Glen for roosting bats in advance of their removal, as outlined in Section 6.6.5, page 71.

4.5 Ecological Evaluation and Impact Assessment

4.5.1 Ecological Evaluation

37 Ecological receptors (including identified sites of ecological importance) are valued according to the ecological valuation examples set out in *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2*[13] and the guidance provided in *Guidelines for Ecological Impact Assessment in the UK and Ireland*[14] – refer to Appendix III for examples of how ecological importance is assigned. In accordance with these guidelines, important ecological features within what is referred to as the Zone of Influence (ZoI) of the proposed development which are "both of sufficient value to be material in decision making and likely to be affected significantly" are deemed to be 'Key Ecological Receptors' (KERs). These are the ecological receptors which may be subject to significant effects from the proposed development, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of local importance (higher value) or greater.

4.5.2 Impact Assessment

38 Ecological impact assessment is conducted following a standard source-pathway-receptor model, where, in order for an impact to be established all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potentially significant effect would not occur.

- Source(s) – e.g., pollutant run-off from proposed works
- Pathway(s) – e.g., groundwater connecting to nearby qualifying wetland habitats
- Receptor(s) – e.g., wetland habitats and the fauna and flora species they support

4.5.2.1 Characterising and Describing the Impacts

39 The parameters considered in characterising and describing the potential impacts of the proposed development are per the EPA's *Guidelines on the Information to be Contained in Environmental Impact*

[13] NRA (2009) Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2. National Roads Authority.

[14] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Chartered Institute of Ecology and Environmental Management, Winchester, UK.

Assessment Reports[15] and CIEEM's *Guidelines for Ecological Impact Assessment in the UK and Ireland*: whether the effect is positive, neutral or negative; the significance of the effects; the extent and context of the effect; the probability, duration and frequency of effects; and cumulative effects.

40 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. The following development types are included in considering cumulative effects:

- Existing projects (under construction or operational)
- Projects which have been granted consent but not yet started
- Projects for which consent has been applied for which are awaiting a decision, including those under appeal
- Projects proposed at a plan level, if relevant (e.g. future strategic infrastructure such as roads or greenways)

41 The likelihood of an impact occurring, and the predicted effects, can also be an important consideration in characterising impacts. In some cases, it may not be possible to definitively conclude that an impact will not occur. In these cases, the evaluation of significant effects is based on the best available scientific evidence but where reasonable doubt remains then the precautionary principle is applied, and it may need to be assumed that significant effects may occur. Professional judgement is used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

4.5.2.2 Significant Effects

42 In determining whether potential impacts will result in significant effects, the CIEEM guidelines were followed. The approach considers that significant effects will occur when there are impacts on either:

- the structure and function (or integrity) of defined sites, habitats or ecosystems; or
- the conservation status of habitats and species (including extent, abundance and distribution).

Integrity

43 The term "integrity" may be regarded as the coherence of ecological structure and function, across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (NRA, 2009).

44 The term 'integrity' is most often used when determining impact significance in relation to designated areas for nature conservation (e.g. SACs, SPAs or pNHA/NHAs) but can also be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and/or species exist with a defined ecosystem at a given geographic scale.

45 An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and/or species; affect the nature, extent, structure and functioning of component habitats; and/or, affect the population size and viability of component species.

Conservation Status

46 Similar definitions for conservation status given in the EU Habitats Directive 92/43/EEC, in relation to habitats and species, are also used in the CIEEM (2018) and NRA (2009) guidance which are summarised as follows:

[15] Environmental Protection Agency. (2017) Guidelines on the information to be contained in Environmental Impact Assessment Reports. Draft, August 2017. (refer to Table 3.3)

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its extent, structure and function as well as its distribution, or the long-term survival of the species it supports, at the appropriate geographical scale.
- For species, conservation status means the sum of influences acting on the species concerned that may affect the abundance of its populations, as well as its distribution, at the appropriate geographical scale.

47 An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status, having regard to the definitions of favourable conservation status provided in the EU Habitats Directive 92/43/EEC – i.e., into the future, the range, area and quality of habitats are likely to be maintained/increased and species populations are likely to be maintained/increased.

48 According to the CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological receptor will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e., local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant at a local, rather than an international level.

4.5.3 Appraisal Against Biodiversity Objectives of the Cherrywood SDZ

The proposed development has been reviewed against relevant policies and objectives of the *Cherrywood Strategic Development Zone Planning Scheme* (Dún Laoghaire-Rathdown County Council, 2014) (see Appendix VI), the policies and objectives of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) (see Appendix VII). The results of this appraisal are summarised within Section 11, page 88 of this report.

5 Baseline Ecological Conditions

49 The proposed route runs through Druid's Glen, Bride's Glen, and the Cabinteely River/Tully Valley. Each of these valleys contains relatively distinct but interconnected ecological communities, and form part of the primary ecological corridors[16] identified within the *Cherrywood Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). These ecological corridors are illustrated in Figure 2, overleaf. The lands through which the route runs are largely undeveloped.

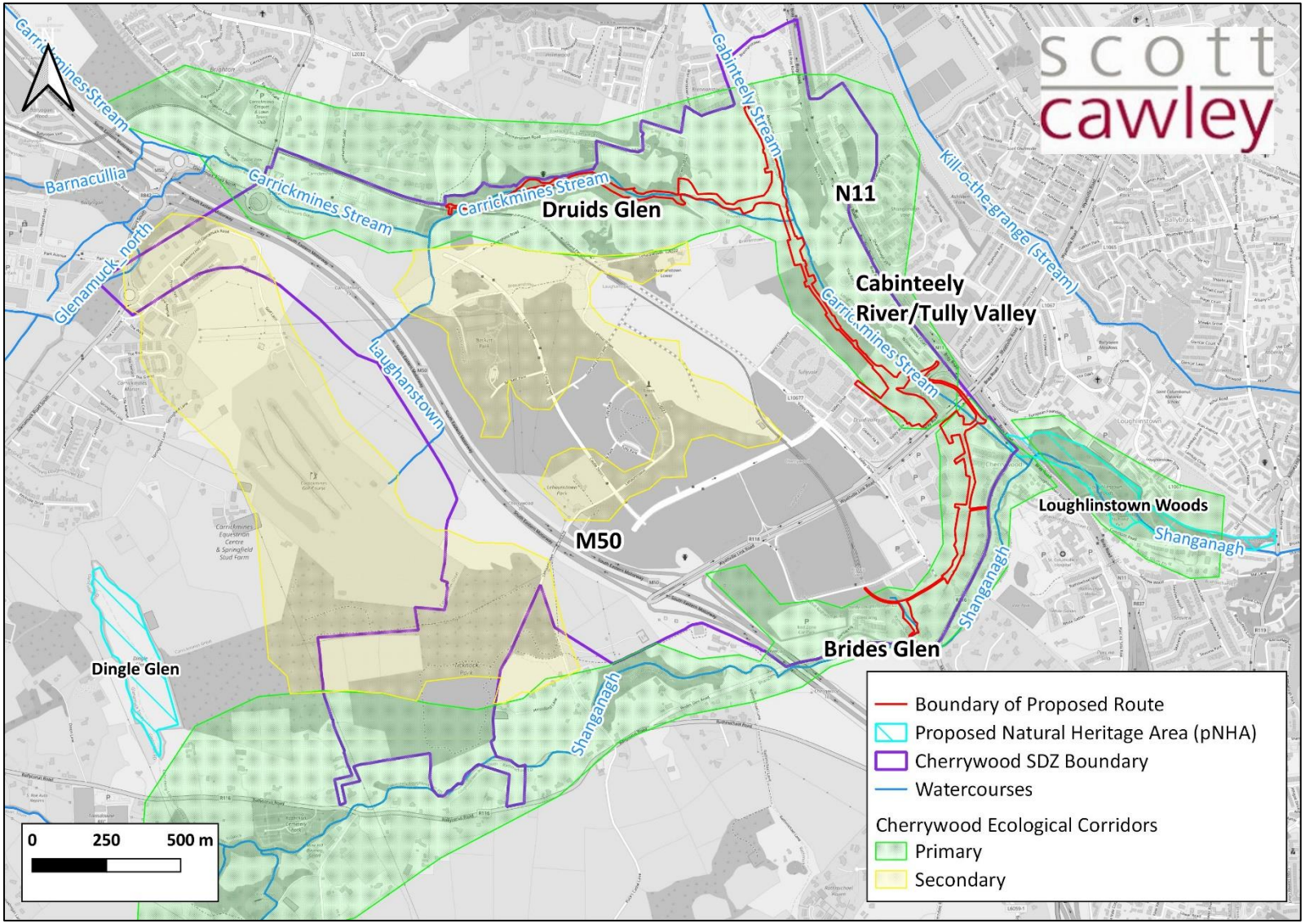
50 The Druid's glen is a steep-sided valley running roughly east-west. West of Lehaunstown Lane, it is almost entirely dominated by mixed broadleaved woodland, which is a rare habitat in the context of the Dún Laoghaire-Rathdown county area. Notwithstanding infestations of invasive species, the habitat contains good examples of semi-natural woodland floor communities, and also contains a population of a rare orchid species. The woodland in the valley is an important resource for local mammal and bird species, and contains several badger setts, breeding raptors, and a diversity of bat species. The Loughlinstown River is important for local otter populations, and a potential holt is located in the vicinity of the Lehaunstown crossing of the river. East of Lehaunstown Lane, the Glen is covered in a mixture of woodland, wetland and grassland habitats.

[16] The primary corridors identified within the *Cherrywood Biodiversity Plan* are P1 – Carrickmines-Druid's Glen Woodland-Carrickmines River Valley, and P2 – Ballycorus/Ticknick-Bride's Glen-Cherrywood. See page 32 of the *Cherrywood Biodiversity Plan* for details.

51 The Cabinteely River/Tully Valley runs roughly north-south between the Brennanstown development in the north, and the Wyatville link road in the south. The river valley is relatively steep-sided, but the valley floor is wider than that of Druid's Glen. The vegetation is also more variable, and contains areas of woodland, scrub, wetland, and grassland habitat. While grasslands may in the past have been managed for agricultural purposes, only small areas remain grazed by livestock. The result is that grassland habitats are transitioning towards scrub and woodland habitat types. The valley contains important examples of calcareous springs, corresponding to the EU Annex I priority habitat [7220] petrifying springs with tufa formation (*Cratoneurion*), as well as the wetland habitat type tall herb swamps, which corresponds to the EU Annex I habitat [6430] hydrophilous tall herb fringe communities of plains and of the montane to alpine levels. The valley contains several badger setts, and supports a range of fauna species associated with both woodland and grassland habitats. The Cabinteely River is heavily canalised and of limited passability for otter, however the Loughlinstown River contains suitable habitat for this species and evidence of the species has been recorded along its length.

52 The section of the Bride's Glen through which the route traverses has been heavily modified. It largely consist of a suburban park containing immature woodland and amenity grassland. While it is ecologically less diverse than other parts of the route, it contains suitable foraging habitat for a range of fauna species. It is currently unlit and provides a corridor for bats commuting between the Carrickmines Valley and upper Bride's Glen.

Figure 2: Proposed Route in relation to Primary and Secondary Ecological Corridors of the Cherrywood SDZ. Imager © OpenStreetMaps.



5.1 Designated Sites

5.1.1 European Sites

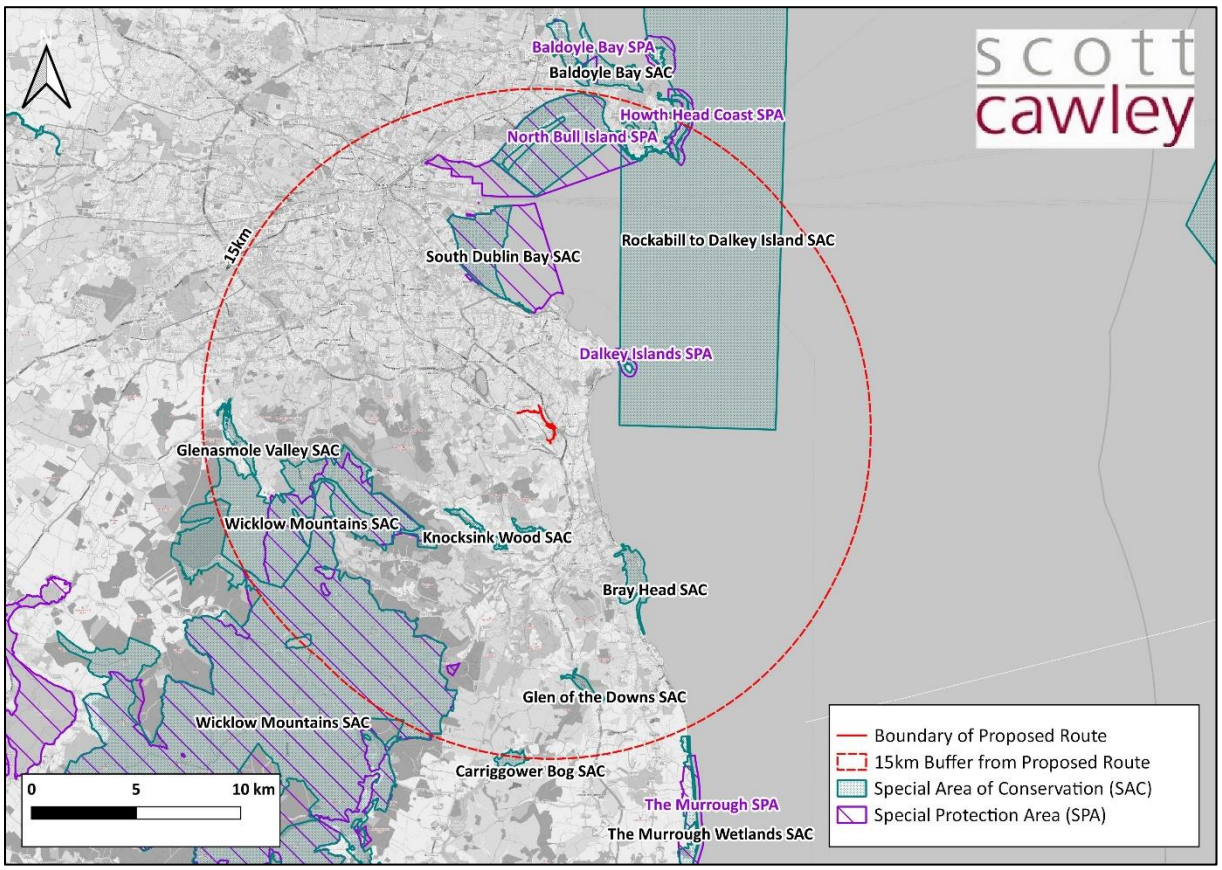
53 Special Areas of Conservation (SAC) are designated under the EC Habitats Directive (92/43/EEC) for the protection of habitats listed on Annex I and/or species listed on Annex II of the Directive. Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC) for the protection of bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

54 The proposed route is not located within or adjacent to any European sites. The closest European site is Rockabill to Dalkey Island SAC (003000), which is located *c* 3km east of the proposed route in Killiney Bay. The proposed route is connected to Killiney Bay via the surface water network, which discharges to the Bay north of the Shanganagh Wastewater Treatment Plant (WWTP).

55 The SAC and SPA sites in the vicinity of the proposed development, their distance from the proposed development and their qualifying interests/special conservation interests are presented in Appendix IV.

56 The locations of those SAC and SPA sites relative to the proposed development are illustrated on Figure 3, below.

Figure 3: European sites within the broad vicinity of the proposed route



5.1.2 Nationally Designated Sites

57 Natural Heritage Areas (NHAs) are designated under the Wildlife Acts to protect habitats, species or geology of national importance. In addition to NHAs there are proposed NHAs (referred to as pNHAs), which are also sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. Proposed NHAs are offered protection in the interim period under county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions.

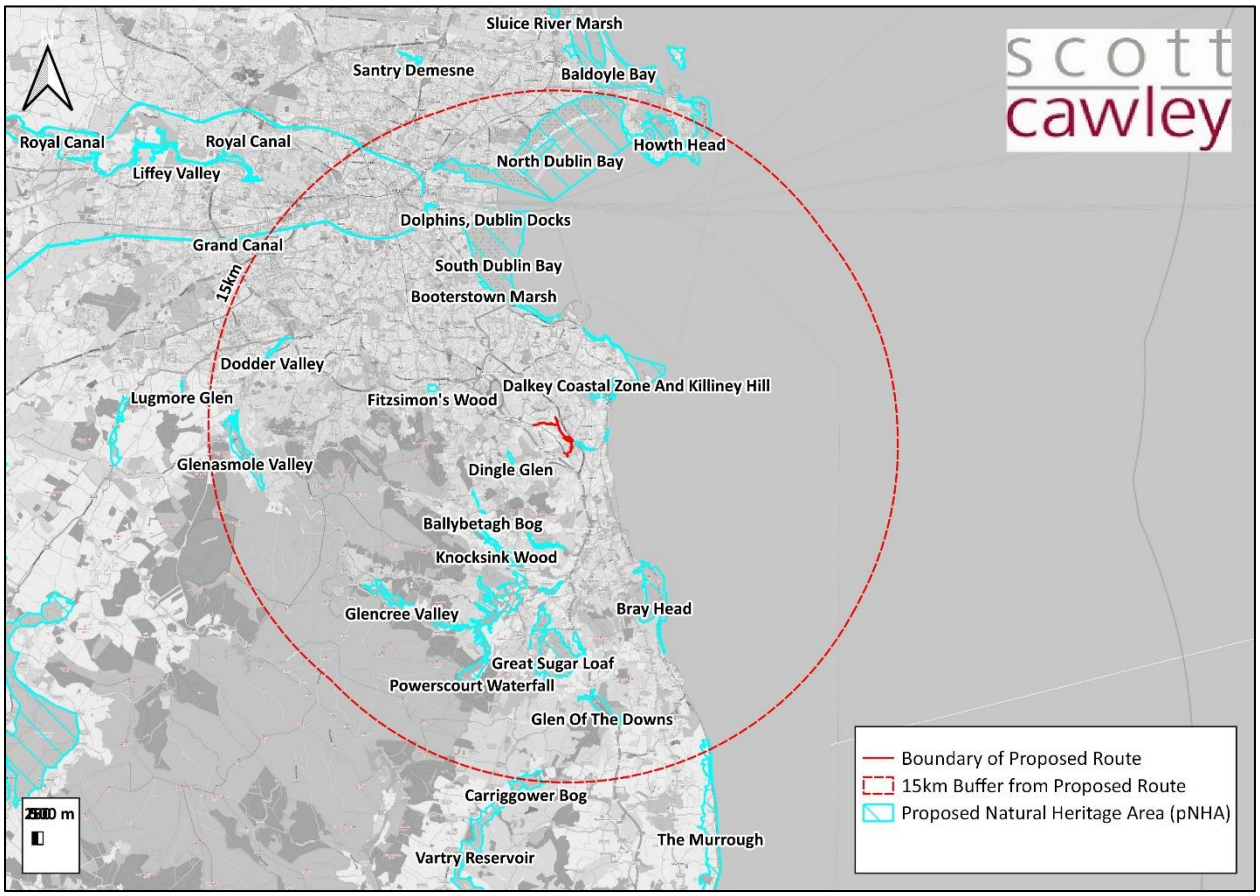
58 The proposed route does not overlap with any nationally designated sites, and is not located immediately adjacent to any NHAs or pNHAs. The nearest nationally designated site to the proposed route is Loughlinstown Woods pNHA (001211), c. 90m east of the proposed route, and separated from it by the Bray Road (N11) at Loughlinstown. According to a site synopsis available from the NPWS[17] Loughlinstown Woods pNHA has been designated for its example of demesne style woodland. Part of the woodland in the site is composed of the EU Annex I habitat [91E0] alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)[5] (Perrin & Daly, 2010). The proposed route is upstream of, and hydrologically connected to the Loughlinstown Woods pNHA. It is also upstream of the Dalkey Coastal Zone and Killiney Hill pNHA (001206), located c. 1.5km east at the closest point. The latter site has been designated for a range of features, including its coastal habitats.

59 The NHA and pNHA sites in the vicinity of the proposed development, their distance from the proposed development and their qualifying interests/special conservation interests are presented in Appendix V.

60 The locations of those NHA and pNHA sites relative to the proposed development are illustrated in Figure 4, overleaf.

[17] NPWS (2009). *Proposed Natural Heritage Area Site Synopsis Portfolio.* Updated November 2009. Available online at www.npws.ie [Accessed 10th September 2020]

Figure 4: Natural Heritage Areas within the broad vicinity of the proposed development



5.2 Habitats and Flora

5.2.1 Rare Flora and Invasive Species

61 Rare flora recorded in the Planning Scheme surveys in 2009-2012 included the relatively uncommon pale flax *Linum bienne*, a species of recolonising bare ground, which is listed as '*Near Threatened*' within the *Ireland Red List No. 10: Vascular Plants*. This species is known from the area south of the unopened Brennanstown Luas Stop (Author, Pers. Obs.) and in Development Area 8 (south of Barrington's Road) (Scott Cawley, 2020), and was not recorded along the proposed route or within the survey area in 2019 or 2020. It is most strongly associated with dry grassland. There are several historic records of rare flora species from Cherrywood, including basil thyme *Clinopodium acinos* from the Tully Church area (Doogue *et al.*, 1998), however these species have not been encountered along the proposed route or within the survey area and are likely to be extinct from the locality.

62 The orchid species green-flowered helleborine *Epipactis phyllanthes*, a species listed as vulnerable in Ireland (Wyse Jackson *et al.*, 2016), was encountered at two woodland locations at the western end of Druid's Glen. Orchid species present difficulties in terms of identification, and for this reason, photos of the specimen were sent to an expert, Brendan Sayers at the National Botanic Gardens, Glasnevin, for verification. The species is described in Curtis & McGough (1988) as occurring in dune slacks in the Dublin Wicklow and Wexford areas. Examination of its distribution on the BSBI Plant Distribution Maps Database[18]

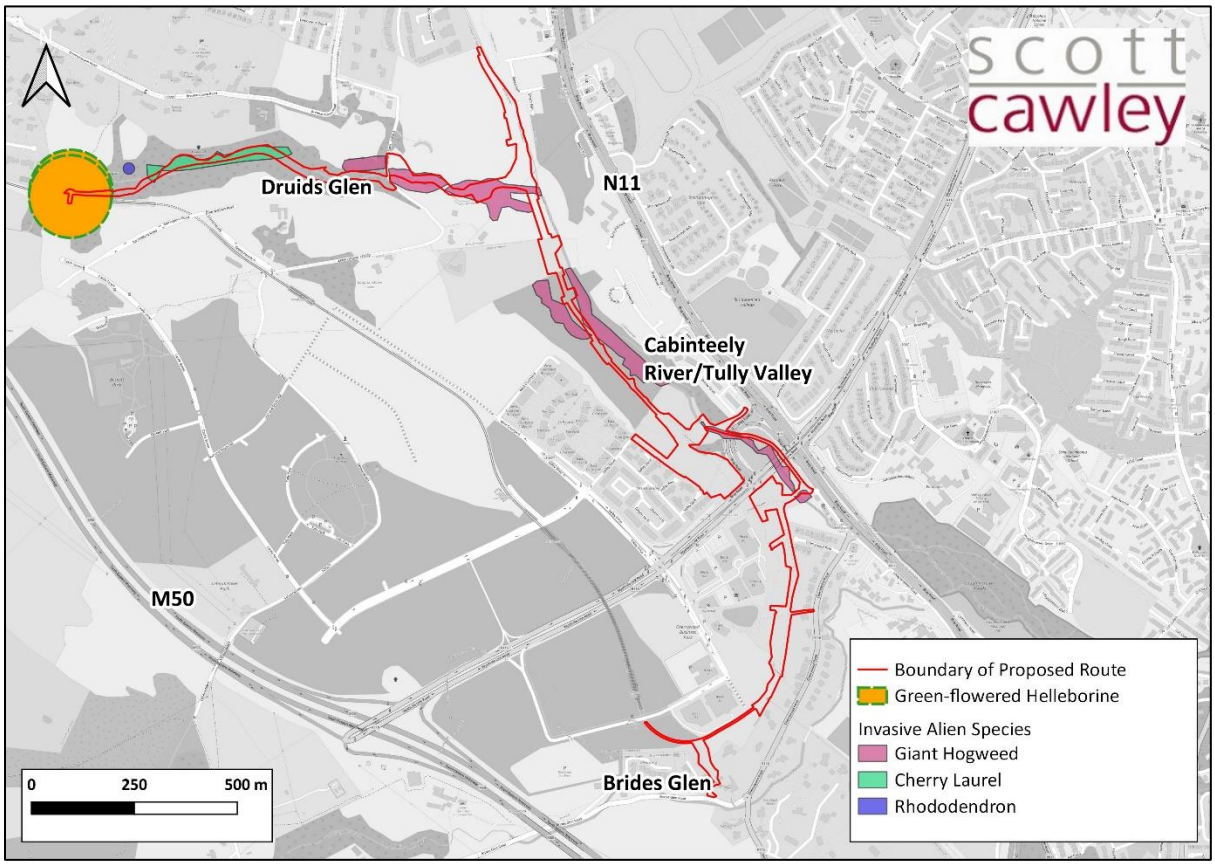
[18] The Botanical Society of Britain and Ireland Plant Distribution Maps. Available online at www.bsbi.org/map [Accessed 10th September 2020]

indicates that the species distribution in Ireland is restricted to widely scattered parts of the east, centre and northwest of the island. While the species is relatively inconspicuous (see Plate 1), and is therefore potentially under-recorded, based on assessment against the relatively few published records, the population within Druid's Glen is of county or national importance. The exact locations of green-flowered helleborine are not disclosed within this EcIA report, in order to minimise any risks of removal/disturbance by collectors. Confidential information pertaining to the locations of green-flowered helleborine are included in shapefile data that has been shared with Dún Laoghaire-Rathdown County Council by Scott Cawley.

Plate 1: Green-flowered Helleborine in Druid's Glen

Several species of plant listed on the Third Schedule of the Birds and Habitats Regulations, and therefore subject to restrictions in Ireland, are known from the Druids Glen and Carrickmines River Valleys (Dún Laoghaire-Rathdown County Council, 2014) and were identified during surveys along the proposed route. These include giant hogweed *Heracleum mantegazzianum*, which occurs along the majority of the route downstream of the middle part of Druid's Glen, and *Rhododendron ponticum* which is restricted to the northern side of the Druid's Glen. Additionally, cherry laurel, a species that is not subject to restriction in Ireland, but which is highly invasive in woodland habitats, occurs in dense stands in the middle part of Druid's Glen. The locations of invasive species in relation to the proposed route is illustrated in Figure 5. The extents of giant hogweed in particular has expended since the original surveys undertaken to inform the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) were undertaken.

Figure 5: Extents of invasive species, and location of green-flowered helleborine in relation to the proposed route. Imagery © OpenStreetMaps



5.2.2 Habitats

63 Habitat types of the Heritage Council classification system (Fossitt, 2000) identified within the survey boundaries are mapped within Figure 6 and Figure 7, overleaf. A general description is provided of all habitats not considered to be KERs, *i.e.,* those that have been assigned a value of local importance (lower value). For habitats considered to be KERs, *i.e.,* those that have been valued of local importance (higher value) or higher, a more detailed description is provided.

Figure 6: Habitats, classified by Fossitt (2000) along the proposed route (northern section). Aerial Imagery © Google Satellite 2021.

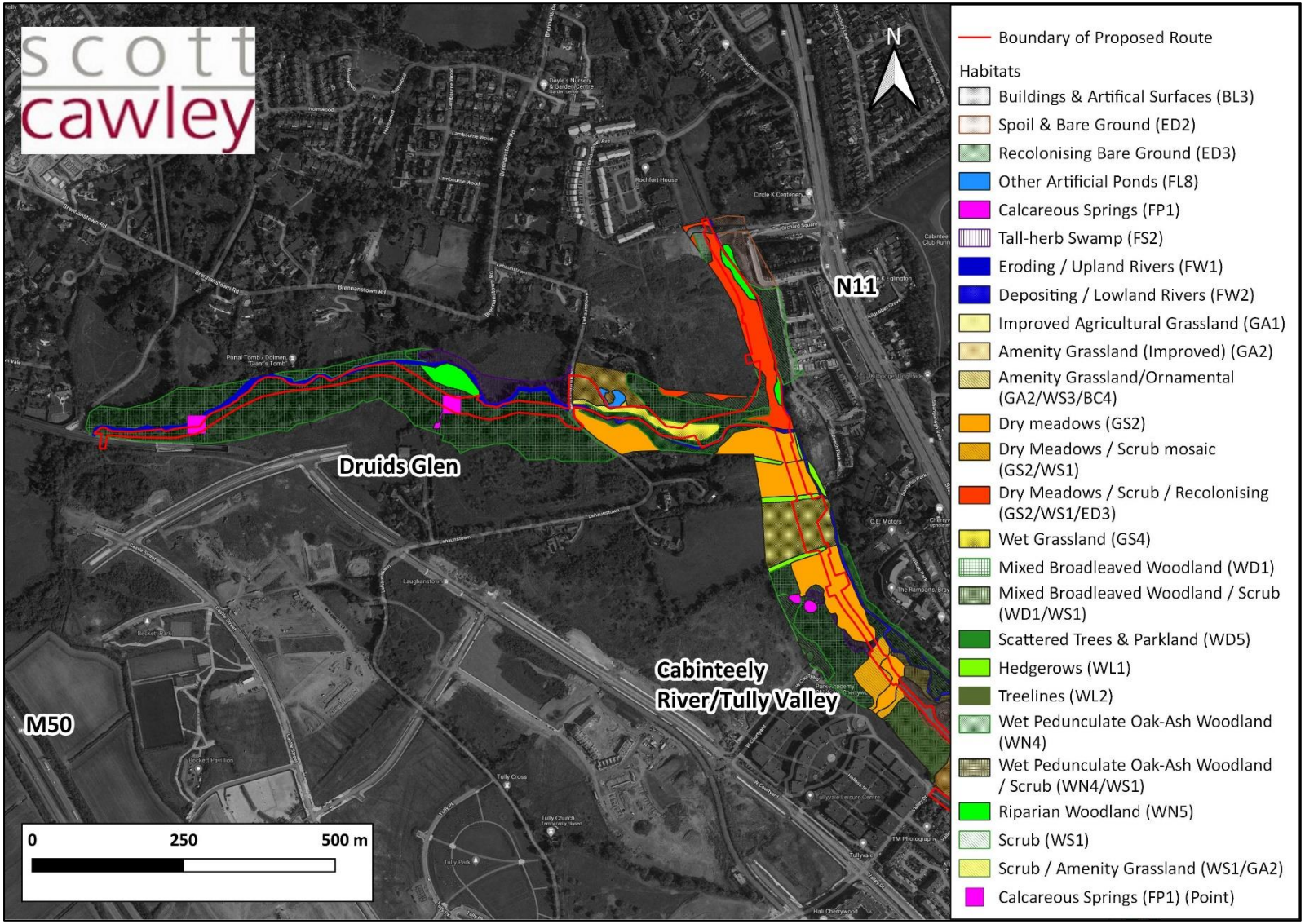
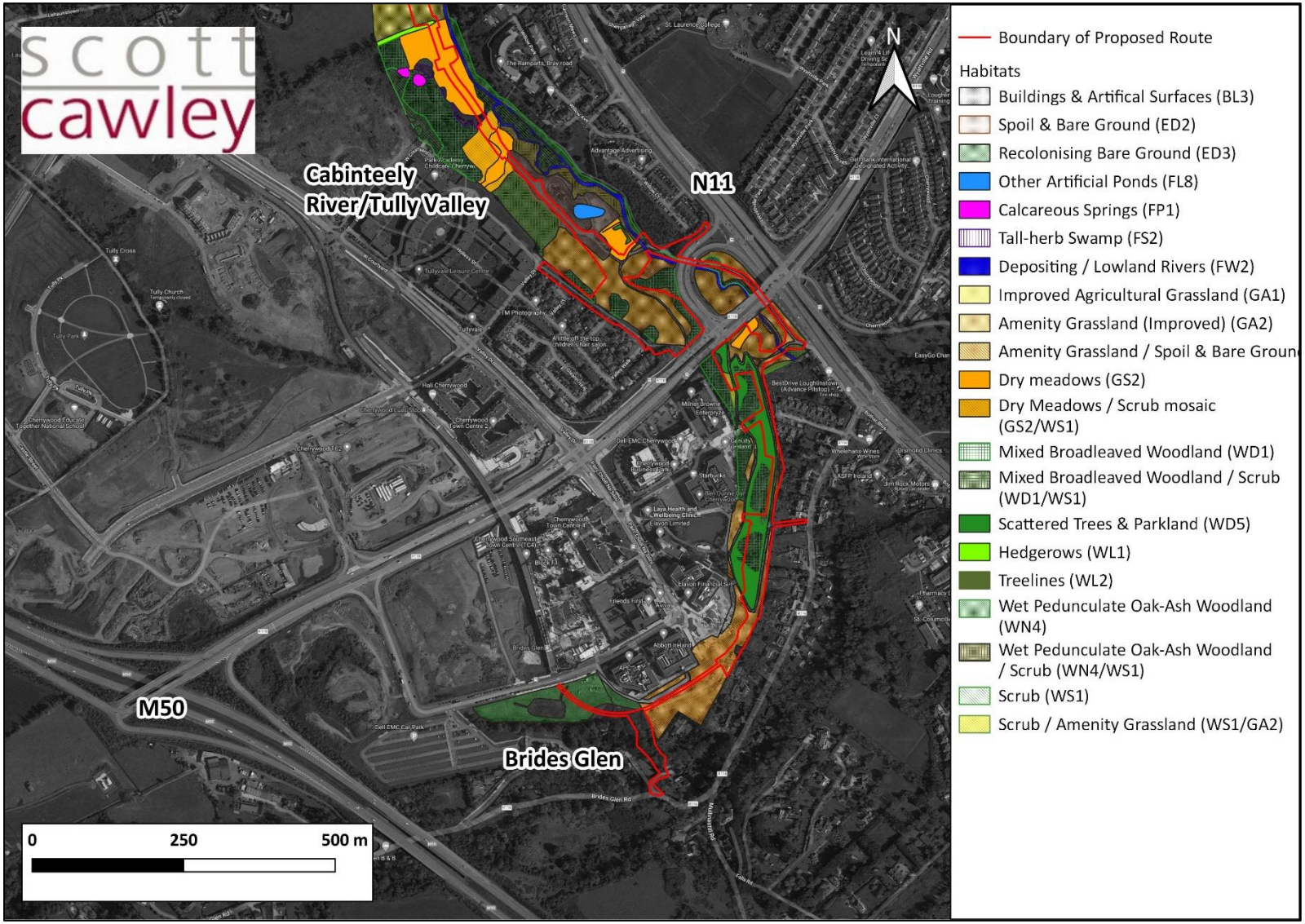


Figure 7: Fossitt Habitats along the proposed route (southern section). Habitat classifications are in Fossitt (2000) Codes for shorthand



5.2.2.1 Summary of non-KER Habitats

64 The following habitats are not KERs in the context of the proposed route as they are species-poor habitat types that are common and not threatened in the national, county and local context:

- Buildings and Artificial Surfaces (BL3) – Largely consisting of footpaths and other structures of recent origin. Footpaths are generally free of any vascular plant vegetation, with the exception of occasional weedy species and colonising grasses towards their edge.
- Spoil and Bare Ground (ED2) – Worked ground around an attenuation pond which was under construction in summer 2019. The spoil is largely free of vegetation, with occasional tufts of weedy grasses such as cock's-foot *Dactylis glomerate* and broadleaved dock *Rumex obtusifolius*.
- Recolonising Bare Ground (ED3) – Worked ground around an attenuation pond which was under construction in summer 2019. Recolonising bare ground tends to be dominated by a limited number of weedy species including creeping bent *Agrostis stolonifera*, cock's-foot, Yorkshire fog *Holcus lanatus*, and dock species *Rumex* spp.
- Improved Agricultural Grassland (GA1) – A small field in the central part of the Tully Valley. This site comprises a near monoculture of perennial rye-grass *Lolium perenne*. Other species are very infrequent, but include white clover *Trifolium repens* and common mouse-ear *Cerastium fontanum*.
- Amenity Grassland (GA2) – Found throughout the linear park in the vicinity of the Cherrywood Business Campus. Dominated by perennial Rye-grass, white Clover, and other grass species such as Yorkshire fog, cock's-foot, and crested dog's-tail *Cynosurus cristatus*.
- Amenity Grassland/Ornamental Shrub/Flower Border Mosaic (GA2/WS3/BC4) – Associated with the edges of the Cherrywood Business campus and comprised of a range of ornamental non-native species of negligible ecological value.
- Dry Meadows and Grassy Verges (GS2) – A rank (uncut) habitat type very similar in species composition to areas of amenity grassland, but with the addition of false oat-grass *Arrhenatherum elatius*. Located on steep banks within the linear park east of the Tully Vale development.
- Wet Grassland (GS4) – A small area in the Lehaunstown House compound. This is a species-poor showing signs of improvement, which is dominated by Yorkshire fog *Holcus lanatus* and rush species *Juncus* spp. In particular soft rush *Juncus effuses*. This habitat is heavily invaded in places by giant hogweed.
- Scattered Trees and Parkland (WD5) – This consists of sapling/young ornamental tree species planted over amenity grassland in the linear park in the southern part of the proposed route.

65 The Tully Valley southwards from the Tully vale development and Ramparts apartments is composed of a linear park, which is dominated by relatively low ecological value amenity grassland habitat, and scattered trees and parkland. This area has been managed as a park since the construction of the Tully vale site. The habitats in the linear park are generally species poor. The areas of scattered trees and parkland consist largely of non-native species and immature trees that have not developed to a large size. Dry meadows and grassy verges habitat within simply consists of rank coarse grassy species with very low forb diversity.

66 A small field of improved agricultural grassland is the only area of stocked land along the proposed route. Similar to areas of amenity grassland, it is a species-poor habitat type. Construction of attenuation pond 2B was completed in the Carrickmines River Valley and the Bride's Glen during surveys for the proposed route. Large areas were recently worked and are composed of spoil and bare ground, recolonising bare ground and buildings and artificial surfaces. These habitats are highly disturbed and do not support a large variety of flora species.

5.2.2.2 KER Habitats

67 The following habitat types (and mosaics of those habitats) of the Heritage Council classification system (Fossitt, 2000) were identified within the survey area and have been mapped in Figure 6 and Figure 7.

- Recolonising Bare Ground (ED3) – Area around attenuation pond in southeast of route
- Other Artificial Lakes and Ponds (FL8)
- Calcareous Springs (FP1)
- Tall-herb Swamps (FS2)
- Eroding Rivers (FW1)
- Depositing Rivers (FW2)
- (Mixed) Broadleaved Woodland (WD1)
- Hedgerows (WL1)
- Treelines (WL2)
- Wet Pedunculate Oak-Ash Woodland (WN4)
- Riparian Woodland (WN5)
- Scrub (WS1)

Recolonising Bare Ground (ED3)

Plate 2. Recolonising bare ground habitat south of the Brides Glen Luas Stop

68 An area around an attenuation pond immediately south of the Brides Glen Luas Stop contains a species-rich assemblage akin to dry calcareous grassland (GS1), but with a high proportion of bare ground. While the dominant species are grasses such as creeping bent *Agrostis stolonifera* and common couch *Elytrigia repens*, it is a habitat rich in forb species, including kidney vetch *Anthyllis vulneraria*, bird's-foot-trefoil *Lotus corniculatus*, colt's-foot *Tussilago farfara*, and fairy flax *Linum catharticum*. The forb component distinguishes this habitat from non-KER recolonising bare ground habitat. It is of local importance (higher value) on account of its calcicole flora.

Other Artificial Lakes and Ponds (FL8)

69 Three artificial ponds are located within the vicinity of the proposed route. These consist of an ornamental pond in the grounds of Lehaunstown House, in Druids Glen, and attenuation pond 2B between the Tully vale and Ramparts apartments, and an attenuation pond south of the Bride's Glen Luas Stop. The ponds are all relatively shallow and, with the exception of pond 2B, which has recently been developed, appear to be infilling at their edges. The longer-established ponds contain reed and sedge vegetation including common club-rush *Schoenoplectus lacustris* and bulrush *Typha latifolia*. This habitat is of local importance (higher value) as wetland habitats, including artificial features are relatively scarce in the locality.

Calcareous Springs (FP1)

Plate 3. Upper Druids Glen Spring (L) and Lower Carrickmines River Spring (R).

70 Calcareous springs were identified within the Cherrywood SDZ during surveys to inform the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), and the nomenclature for the springs in this paragraph follows that of the Biodiversity Plan. Two areas of spring are in the vicinity of the proposed route: The Druids Glen Springs; and the Lower Carrickmines River Springs.

Plate 4. New calcareous spring identified at the outfall from a culvert in Druids Glen. Note the tufa terracing from the cement culvert to the Carrickmines Stream, and colonisation by moss and algae.

71 There are two tufa springs located on the southern side of the Druids Glen. The Upper Druid's Glen Spring is located on the upper slopes of the Druid's Glen Valley (See Plate 3) and is within an area of dense woodland. It is difficult to access and heavily shaded. Tufa is depositing in stream crust and oncoid/ooid formations as described within Lyons & Kelly (2016). The habitat is forming down a moderately steep slope, with water flowing down valley to an area of riparian woodland (WN5). While calcareous springs are naturally species-poor, the example in Druids Glen contains very few species. Only fern-leaved hook-moss *Cratoneuron filicinum*, a species characteristic of calcareous springs, is particularly abundant, with patches of greater water-moss *Fontinalis antipyretica* appearing downstream of the main area of tufa formation. The species opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium* and curled hook-moss *Palustriella commutata* were not present, and may have disappeared since the spring was surveyed for the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). This may be a result of the heavy shading of the spring and/or nutrient enrichment of the water source. A second tufa spring was identified in early 2021 emerging from a pipe into the Carrickmines River (see Plate 4) directly north of the Brennanstown Luas Stop (unused). This spring is located north of the proposed route, but appears to arise from calcium rich water emerging from a pipe. Nonetheless the water is calcium rich, and the tufa deposits hosts a range of typical tufa spring species including green figwort *Scrophularia umbrosa*. The tufa deposits are also home to algae, indicating nutrient enrichment.

72 The Lower Carrickmines River Springs consist of two spring heads located on the top of the slope not far from the Tully vale Residential development. These springs have been subject to ongoing monitoring by Dr Joanne Denyer for Dún Laoghaire-Rathdown County Council. The southern spring is a massive tufa cascade with a large build-up of tufa colonised by curled hook-moss and other calcicole species. Giant hogweed is starting to colonise the tufa cascade, however it remains an excellent example of calcareous spring habitat. The northern spring is heavily vegetated and dominated by marsh vegetation such as hard rush *Juncus inflexus*, jointed rush *Juncus articulatus*, Angelica *Angelica sylvestris*, devil's-bit scabious *Succisa pratensis*, and common fleabane *Pulicaria dysenterica.*

73 Both calcareous springs correspond to the EU Annex I habitat [7220] petrifying springs with tufa formation (*Cratoneurion*). This is listed as a priority habitat, meaning that most of its range lies within the European Union, and it is at risk of disappearing (European Commission, 2013). The examples identified during surveys of the proposed route are within the favourable reference range and distribution for the habitat in Ireland (NPW, 2019). Notwithstanding the relative paucity of species at the Upper Druid's Glen Spring, and the invasion of the Lower Carrickmines River Valley Springs by giant hogweed, these habitats are relatively rare at a European level, and threatened[19] at a national level (NPWS, 2019) and are of international importance.

Tall-Herb Swamps (FS2)

Plate 5. Tall-herb Swamps habitat in Druids Glen (L) and in Lower Carrickmines Valley (R)

74 Tall-Herb Swamp habitat is a habitat dominated by forb species, including yellow iris *Iris pseudacorus*, hedge bindweed *Calystegia sepium*, great willowherb *Epilobium hirsutum* and meadowsweet *Filipendula ulmaria*. It is found at two locations within the survey area: in the valley floor of the Druid's Glen and in the Carrickmines River Valley Floor downgradient of the calcareous springs.

75 The area of this habitat in Druids Glen is relatively dry, and appears to be in transition between wet grassland (GS4) and tall-herb swamp. Hedge bindweed is very dominant (See Plate 5, picture on left), with abundant meadowsweet and occasional yellow iris. Creeping bent is also a significant part of the sward. This area transitions sharply to the north into dry meadows and grassy verges (GS2) at the break of the slope.

76 Tall-herb swamp habitat in the Lower Carrickmines Valley is more species-rich, possibly a result of the calcareous influence of the upstream calcareous springs (FS1) habitat, and contains species such as water figwort *Scrophularia auriculata*, bog stitchwort *Stellaria alsine* and marsh bedstraw *Galium palustre*. The habitat appears to be drier than the habitat as described within the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), with smaller areas of open water. The habitat is heavily infested with giant hogweed, and invasive species (See Plate 5, picture on right).

[19] The overall status of [7220] petrifying springs* is 'inadequate', indicating that the habitat is in decline and not adequately protected, as per *The Status of EU Habitats and Species in Ireland 2019* (NPWS, 2019).

77 Areas of Tall-Herb Swamp correspond to the EU Annex I habitat [6430] hydrophilous tall herb fringe communities of plains and of the montane to alpine levels as per the Irish definition of the habitat outlined within the *Irish Semi-natural Grasslands Survey 2007-2012* (O'Neill *et al*., 2013). The area of known national resource of this habitat is relatively small, at 1.004km^2 (NPWS, 2019), and the habitat type has a conservation status of 'bad' (NPWS, 2019) indicating it is undergoing ongoing decline in range. For these reasons the examples in Cherrywood are of at least county level importance, and potentially of national importance.

Depositing Rivers (FW1)

Plate 6. Depositing river, The Carrickmines River, in the study area.

78 The length of the habitat encountered within the survey area largely correspond to depositing rivers. The river is in its lowland stages here, and is relatively slow flowing. In the Carrickmines River Valley, the river breaks into several small channels separated by islands of scrubby vegetation. As the river is mostly shaded by trees and shrubs, in-stream vegetation is limited to algal growth. The substrate is a mixture of fine sand with very occasional patches of gravel and cobble. The most prominent species forming parts of the riverbank community is the invasive species giant hogweed. While the river may have been canalised in the past in sections, the banks remain vegetated with semi-natural vegetation. The river system is one of a very few in Dún Laoghaire-Rathdown or Dublin context that retains semi-natural vegetation along much of its length. This habitat is of county importance on this basis.

Eroding Rivers (FW2)

Plate 7. Section of eroding river, Druids Glen.

79 The Druids Glen River is almost entirely composed of sections of eroding river. This river in this area descends through a series of rapids and there is no floating vegetation. Vegetation is confined to

bryophytes growing on rocks in-stream and on the water edge (see Plate 7). As per the areas of depositing river, the area of this habitat type of relatively semi-natural condition in the context of the Dublin area is very small. Therefore, this habitat is of county level importance.

(Mixed) Broadleaved Woodland (WD1)

Plate 8: (Mixed) Broadleaved Woodland Habitat in Druids Glen.

80 (Mixed) Broadleaved Woodland is the dominant habitat type in Druid's Glen, particularly west of Lehaunstown Lane. The woodland overstorey is composed of over-mature trees of a range of native and non-native species, with a heavy cohort of Scot's pine *Pinus sylvestris*, as well as beech *Fagus sylvatica*, sycamore *Acer pseudoplatanus*, oak *Quercus* spp., ash *Fraxinus excelsior* and Sitka spruce *Picea Sitchensis*. The mix of overstorey species suggests that the woodland was either planted or heavily modified in the past, due to the predominance of non-native and naturalised species. The woodland is marked on historic maps of the area, including on the Historic 25-inch Maps (1888-1913) and Historic 6-inch Colour Maps (1837-1842) of the Ordnance Survey Ireland[20], indicating that it has covered this part of Druids Glen for approximately 200 years at least.

81 Overstorey Scots' pine are coming to the end of their life cycle, and several examples are standing dead, have fallen or are decaying on the forest floor. A semi-natural understorey has developed in places. On the valley slopes, it tends to be dominated by holly *Ilex aquifolium*, with occasional elder *Sambucus nigra* and hazel *Corylus avellana*. The invasive species cherry laurel forms heavy infestations in the mid and lower parts of the Druids Glen, where it completely outcompetes all other species. No understorey develops under the canopy of cherry laurel. In other parts of the Glen, a semi-natural understorey has developed, including of great wood-rush *Luzula sylvatica*, honeysuckle *Lonicera periclymenum*, bramble, soft shield-fern *Polystichum setiferum* and lords-and-ladies *Arum maculatum*. Wood anemone *Anemone nemorosa* is known to occur in the Glen (Dún Laoghaire-Rathdown County Council, 2014) but was not encountered during surveys in 2019, likely due to the time of year surveys were conducted. Closer to the Druids Glen River, bankside species include pendulous sedge *Carex pendula*, wood-sedge *C. sylvatica* and Hart's-tongue *Phyllitis scolopendrium*. As mentioned in Section 5.2.1, page 16, the endangered species green-flowered helleborine was encountered in the western part of Druids Glen in (Mixed) Broadleaved Woodland Habitat.

82 This habitat type also occurs along the Carrickmines River Valley, where it is concentrated on the higher slopes of the valley west of the Carrickmines River. Although an understorey similar to that described above has developed in places, it tends to be more open, or dominated by Bramble. It merges with scrub at its edges in the Carrickmines River Valley.

83 While (Mixed) Broadleaved woodland is not a semi-natural woodland type, the variant in the Druids Glen contains many semi-natural woodland features due to its age and complexity. Broadleaved woodland is a

[20] Historic OSI Maps accessed via the OSI GeoHive online map database at map.geohive.ie/mapviewer on 30th September 2019.

rare habitat both in the context of the county and at a national scale. The value of the woodland in this instance is enhanced by its location in a river valley and its association with other habitats in the Druids Glen and Lower Carrickmines River valleys. This habitat is likely to be of county level importance due to its overall naturalness, its relative scarcity at a county level, as it contains the endangered species green-flowered helleborine, and as it has recently been marked as a locally important biodiversity site (LBS) in the *Dún Laoghaire-Rathdown County Council Draft County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2021)(see Supplementary Map B1 Ecological Network Map).

Hedgerows (WL1)

Plate 9: Hedgerow dominated by hawthorn and ash in the Lower Carrickmines Valley.

84 Hedgerows dissect the proposed route in the Carrickmines River Valley where they run perpendicular to the Carrickmines River. These hedgerows are generally dominated by hawthorn *Crataegus monogyna* and bramble, occasionally with an overstorey of ash (see Plate 9) or sycamore. Hedgerows have been acknowledged as being one of the most important habitats in the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) on account of their value for local fauna. Several hedgerows along the proposed route are scheduled for retention as part of the SDZ Planning Scheme. This habitat is of local importance (higher value).

Treelines (WL2)

85 The only treeline mapped during the surveys for the proposed route is located along a boundary separating the linear park south of the Wyatville Link Road with a fallow field in Loughlinstown village. This treeline is dominated by mature horse chestnut trees *Aesculus hippocastanum*. This habitat is of local importance (higher value).

Wet Pedunculate Oak-Ash Woodland (WN4)

Plate 10: Wet Pedunculate Oak-Ash Woodland.

86 This habitat occurs in small slivers along the banks of the Druids Glen River, before it merges with the Carrickmines River and along the eastern bank of the Carrickmines River. It is dominated by ash with hawthorn and blackthorn *Prunus spinosa* and occasional willow *Salix* spp. The understorey includes cow parsley *Anthriscus sylvestris*, wood sedge and remote sedge *Carex remota*. It is heavily invaded by giant hogweed in places. This habitat is connected to other woodland habitat types in the Lower Carrickmines Valley and within Druids Glen, and it is likely to be of county importance in this context.

Riparian Woodland (WN5)

87 Riparian woodland occurs in several small pockets along the Druids Glen River and Carrickmines River. The largest area of this habitat is located in the grounds of Glen Druid. This area of woodland was previously mapped as reed and tall sedge swamp (FS1) (Dún Laoghaire-Rathdown County Council, 2014), however observations of the site in 2019 noted that the canopy has closed over the habitat, and it now is considered to be a woodland habitat type. Overstorey species are alder *Alnus glutinosa*, willow including osier *Salix viminalis*, and ash. The field layer is similar to that of the adjacent tall-herb swamp (FS2) habitat, and contains meadowsweet in combination with yellow iris and other wetland species.

88 Other sections of Riparian Woodland habitat occur as patches of willow on the banks of the Cabinteely Stream. These areas are relatively small, and a typical wet woodland understorey has not developed.

89 The Riparian Woodland in Druids Glen corresponds to the EU Annex I priority habitat type [91E0} alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*), while the areas of riparian woodland along the Cabinteely Stream are not the EU Annex I habitat type. Although the examples in Cherrywood are very small, the area of this priority habitat type in Ireland is limited. It is therefore likely to be of at least national importance. The smaller areas of riparian woodland in the Carrickmines River Valley are of local importance (higher value).

Scrub (WS1)

90 The scrub encountered along the proposed route is variable, although it generally is dominated by bramble and other pioneer species. This habitat has become established in areas where agricultural or other land management practices have declined, and it represents a transitional phase between grassland/open habitats and woodland/closed habitats. The type encountered along the route is generally comprised of bramble in combination with other shrubby species such as gorse *Ulex europaeus*, blackthorn, willow and occasionally hazel. It is particularly abundant on steep slopes in the Tully Valley and at the edge of woodland habitats. The scrub encountered in the survey area is relatively rich in woody species and shares common characteristics with neighbouring woodland habitats. These types of habitats are relatively scarce in the local context, and for this reason are of local importance (higher value).

5.3 Fauna

91 The exact locations of mammal breeding/resting places are not disclosed within this EcIA report, in order to minimise any risks of persecution. Confidential information pertaining to the locations of otter holts, couch sites, badger setts, and/or Bat roosts are included in shapefile data that has been shared with Dún Laoghaire-Rathdown County Council by Scott Cawley.

5.3.1 Terrestrial Mammals

92 The proposed route largely follows the trajectory of the Loughlinstown River and the Carrickmines Stream through the Druid's Glen and then the Carrickmines River/Tully Valley. The river corridors are relatively inaccessible and contains large tracts of semi-natural vegetation and therefore is of high suitability for a range of terrestrial mammal species.

Otter

93 Otter *Lutra lutra* sprainting posts have previously been recorded along the Loughlinstown River during surveys undertaken by Scott Cawley to inform the *Cherrywood Strategic Planning Scheme Biodiversity Plan*. These sprainting posts are located under the bridge crossing of Lehaunstown Lane, on a rock in-stream in the section of the Carrickmines River/Tully Valley between the Ramparts and Tully vale apartment complexes, and on a section of river between the Wyatville Link Road intersections with the N11. All three sprainting posts continue to be used by otter. In their survey of watercourses in the Dún Laoghaire-Rathdown County Council District, Macklin *et al*. (2019) have identified a potential otter holt (underground resting/breeding place) in the vicinity of the Lehaunstown Lane crossing of the Loughlinstown River. This potential holt was surveyed by Scott Cawley ecologists in March 2020, however the diameter of its entrance was determined to be too narrow to be used by an adult otter. Trail cameras were not deployed at this site due to the absence of a suitable location for deployment in the vicinity of the potential holt entrance. It is considered likely that the holt is used occasionally by juvenile otter, as per the findings of Macklin *et al*. (2019).

94 From observations of the author, the Loughlinstown River appears to suffer from intermittent pollution events, likely arising from inputs upstream of the proposed route. Nonetheless, the Loughlinstown River contains a range of glides, pools and riffles, which are suitable for otter prey species such as salmonid fish. The semi-natural character of the vegetation surrounding the watercourse, and its relative isolation from human activity is relatively rare in the context of both Dún Laoghaire-Rathdown and County Dublin generally and for these reasons, the watercourses along the proposed route are of at least county level importance for otter.

Badger

95 Badgers in the UK and Ireland tend to hold a territory that includes one main sett occupied all year and several satellite setts that are used intermittently (Scottish Badgers, 2018). The Cherrywood SDZ Planning Scheme boundary contains multiple badger territories, with four main setts identified during surveys to inform the *Cherrywood Strategic Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). To provide clarity for the reader, numbering system for badger setts in this report follows that of the *Cherrywood Strategic Planning Scheme Biodiversity Plan*. Confidential information pertaining to the locations of badgers setts are included in shapefile data that have been shared with Dún Laoghaire-Rathdown County Council by Scott Cawley :

- Sett 2 – Located on a bank in scrub. This consists of a main sett with multiple entrances. Five entrances were identified in September 2019, however all entrances are overgrown and heavily obscured by vegetation. An absence of spoil heaps, bedding and latrine and feeding signs in the vicinity suggests that this main sett is not currently active. The proposed route is within approximately 10m of some of the entrances to this sett, but is located downhill of the entrances.
- Sett 3 – Located in dense woodland in the Druid's Glen. This is a very large series of mammal holes, and includes both main sett and associated annex setts in the vicinity. Eight entrances were identified during surveys in September 2019. While some entrances appear to be disused, there is a large amount of bedding, spoil, prints and latrines in the vicinity, indicating recent use.

Additionally, badgers were observed foraging in the vicinity during bat activity surveys undertaken in September 2019. This sett is located approximately 20m south of the proposed route through Druid's Glen but is obscured from view by dense vegetation and by a steep bank.

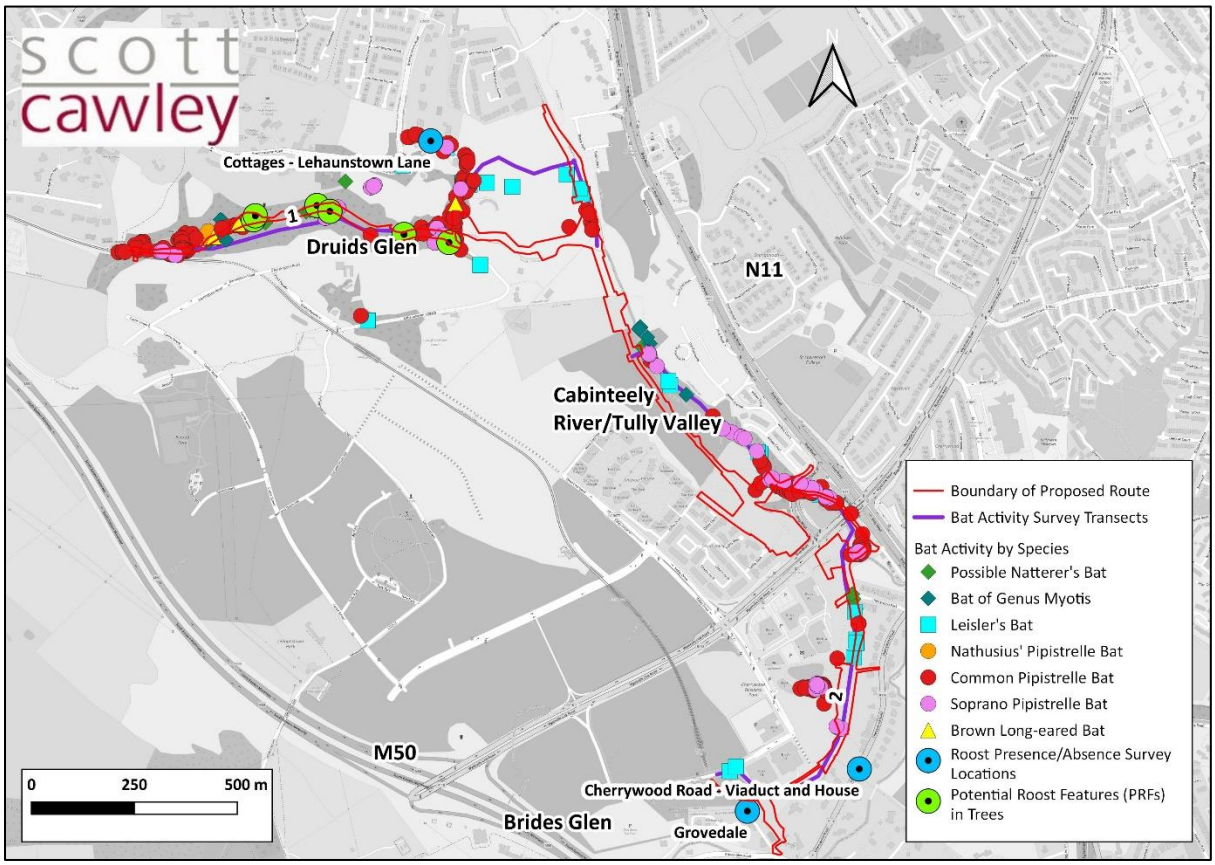
96 In addition to the aforementioned main setts, two outlier setts (satellite setts that are not connected by any obvious pathway to other sett) were identified in the vicinity of the proposed route. Sett 1 is located *c.* 60m southwest of Sett 2 and consists of two entrances. It is *c*. 50m from the proposed development and had bedding and signs of activity in February 2020 Sett 4 consists of two entrances on a field boundary in the Tully Valley, neither of which appeared to be active during surveys in September 2019. Notwithstanding current levels of activity, the badger population along the proposed route is of local importance (higher value). This valuation is based on the number of potential territories (2) along the proposed route.

Other Terrestrial Mammals

97 Evidence of other mammal species included sightings of brown rat *Rattus norvegicus* in the vicinity of residential dwellings on Lehaunstown Lane and grey squirrel *Sciurus carolinensis* in woodland in both Druid's Glen and the Tully Valley. Although not encountered, red fox *Vulpes vulpes* is widespread and abundant in the Dublin region and occurs in the Cherrywood Area. No signs of pine marten *Martes martes* were encountered during surveys undertaken in 2019, or in surveys that informed the Cherrywood Planning Scheme Biodiversity Plan (Dún Laoghaire-Rathdown County Council, 2014). This species is protected through its inclusion in the Wildlife Acts (as amended), and has undergone an expansion in its Irish range in the 20th and 21st centuries following its protection by law (O'Mahoney et al., 2017). The closest reliable records for the species are from the Dublin Mountains, however it could conceivably occur in low densities in suitable habitat along the proposed route, including in woodland at Druid's Glen. Pygmy shrew *Sorex minutus* and hedgehog *Erinaceus europaeus* are both protected under the Wildlife Acts (as amended). Both species have a widespread distribution in Ireland and while not observed during surveys of the lands, are considered to be present along the survey route. Deer, likely hybrids of Sika deer *Cervus nippon* and red deer *C. elaphus*, occur across the Cherrywood SDZ (Author, Pers. Obs.) and are likely to occur on occasion particularly in wooded habitats. The lands are considered to be of local importance (higher value) for other terrestrial mammal species (e.g. mammal species excluding otter, badger, and bats).

5.3.2 Bats

Figure 8: Records of bat activity along the proposed route.



98 Several roosts or structures deemed likely to be suitable for roosting bats were identified in the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). Some of these structures, e.g., Druid House, Glen Druid Mews, Glen Druid Main House, and Glen Druid Outbuildings, are located *c.* 150-250m north of the proposed route at the junction between Lehaunstown Lane and Brennanstown Road and are connected to the proposed route via hedgerows and treelines. These buildings are described together as "Cottages, Lehaunstown Lane" in this report (location illustrated in Figure 8), and presence/absence surveys were undertaken on them from the publicly accessible parts of Lehaunstown Lane.

99 The proposed route traverses a broad range of semi-natural habitats, most of which are unlit and relatively remote from human activities. In particular, the area of dense mixed broadleaved woodland in Druid's Glen west of the Lehaunstown Lane crossing of the Loughlinstown River contains high suitability foraging habitat for woodland specialist bat species. This area also contains a large number of mature and over-mature trees. Many trees in Druid's Glen, particularly Scot's Pine, are reaching the end of their lives, and have developed features such as hollows, plating bark and rot holes, which act as potential roost features (PRFs) for bats. PRFs identified by Scott Cawley surveyors are described and illustrated in detail in Table 2, overleaf. The locations of these features have been shared with Dún Laoghaire-Rathdown County Council by Scott Cawley. The Cabinteely River/Tully Valley is also of high suitability for foraging and commuting bats due to its unlit character and range of semi-natural habitats, comprising a mosaic of woodland, wetland and grassland vegetation. This area contains more edge habitat than Druid's Glen and is less suitable for woodland specialist bat species. The section of Bride's Glen within the proposed route is dominated by more recent plantings of woodland intermixed with parkland. It is generally unlit, and is of high suitability for foraging bats, albeit containing more edge habitat than other sections of the route, and therefore less suitable for woodland specialist bat species.

Table 2: Trees with potential roost features (PRFs) for bats in Druids Glen.

Tree Tag No.	ITM Grid Ref	Tree Species	Tree Alive or Dead?	PRF Type	PRF Height (m)	Evidence of bats	Notes	Photos
0913	O 22900 24135	Sycamore *Acer pseudoplatanus*	Dead / Dying	Lifting Bark	2	None	Flaking bark between 0 and 200cm. Suitable for individual bats from time to time	
0916	O 22895 24126	Beech *Fagus sylvatica*	Alive	Transverse snap	15	None	Transverse snap on eastern side of tree high in canopy. Difficult to tell depth of cracks, may be quite small and therefore suitable only for a few individual bats	

Tree Tag No.	ITM Grid Ref	Tree Species	Tree Alive or Dead?	PRF Type	PRF Height (m)	Evidence of bats	Notes	Photos
0944	O 23049 24164	Sycamore *Acer pseudoplatanus*	Alive	Butt rot	1.2	None	Large cavity in bole extends from ground. Covered partially with ivy, providing additional insulation/protection. Valued high in light of woodland setting and woodland species occurring in Druids Glen	
0956	O 23081 24151	Sycamore *Acer pseudoplatanus*	Alive	Frost crack	2.5	None	Large frost crack extending from base of stem up tree length. Smallish cavity at c 250cm with some potential to host roosting bats from time to time	

Tree Tag No.	ITM Grid Ref	Tree Species	Tree Alive or Dead?	PRF Type	PRF Height (m)	Evidence of bats	Notes	Photos
0989	O 23082 24099	Hornbeam *Carpinus betulus*	Alive	Frost crack	2	None	Relatively open crack, potential to act as night roost or day roost for small number of bats	
1030	O 23371 24083	Sycamore *Acer pseudoplatanus*	Alive	Transverse snap	5	None	Snap located on lowest branch on NW side of tree. Viewed from ground level only, however likely to be a relatively small crack	

100 The following species of bat were recorded during bat activity survey transects of the proposed route:

- Woodland-associated bat species:
    - Brown Long-eared Bat *Plecotus auritus*. This is a species strongly associated with broadleaved woodland in Ireland (Roche *et al.*, 2014). It generally has a low rate of detectability during bat activity surveys, as they have very quiet calls, which may not be picked up by a device if the bat is more than 5m from the surveyor. This species was recorded in woodland at Druid's Glen immediately north of the Brennanstown Luas stop on 24th September 2019 (see Figure 8). The species was recorded in the same separated by an interval of approximately 45 minutes, indicating the woodland is a foraging territory for the species. A single recording of the species was also captured on 26th August 2019 in Druid's Glen close to the Lehaunstown Lane bridge over the Loughlinstown River.
    - Species of the genus *Myotis*. There are three species in the genus *Myotis* that are known to have resident populations in Ireland. Two of the species; Whiskered Bat *Myotis mystacinus* and Natterer's Bat *Myotis nattereri* are more strongly associated with woodland habitat. The third species, Daubenton's Bat *Myotis daubentonii*, is associated with both woodland and riparian habitats, and it was most frequently observed foraging above waterbodies (Author, Pers. Obs.). Daubenton's Bat is discussed separately, below. The calls of Whiskered Bat and Natterer's Bat are often difficult to distinguish, and therefore where there is uncertainty as to identification to species level, calls have been identified to genus. Bat species of the genus *Myotis* were recorded along both transect routes in Druid's Glen, the Carrickmines River/Tully Valley and in Bride's Glen in June and August 2019. The greatest concentration of recordings were in Druid's Glen west of the Lehaunstown Lane bridge (see Figure 8). This habitat is particularly suitable for these species as the parts of the woodland not shaded by Cherry Laurel have a complex woodland understorey with a high diversity of native species, which are likely to host a good diversity of bat forage species (insects). It is considered likely that both Natterer's Bat and Whiskered Bat utilise woodland in Druid's Glen for forage. *Myotis* species were also recorded in open woodland in the vicinity of the Ramparts apartment complex.
- Species associated with woodland edge and hedgerow/treeline habitats.
    - Common Pipistrelle Bat *Pipistrellus pipistrellus* and Soprano Pipistrelle Bat *Pipistrellus pygmaeus* are the most frequently encountered species during bat activity surveys. This is likely to be a result of their tendency to forage along the edge of woodlands, and along linear woodland features such as hedgerows and treelines. They also appear to be somewhat more tolerant of light pollution than most other Irish bat species (Leisler's Bat *Nyctalus leisleri* is similar in this regard) and are therefore found in urban and suburban locations where other bat species are rarely encountered. Common Pipistrelle Bat were the most frequently recorded species in the survey area, followed by Soprano Pipistrelle Bat. Activity of both species was concentrated in and around woodland at Druid's Glen, and again along linear woodland flanking the Loughlinstown River through the Tully Valley (see Figure 8). Smaller pockets of activity was recorded in Bride's Glen south of the Cherrywood Business Campus.
- Other Bat Species
    - Leisler's Bat was the most commonly encountered bat species after Common Pipistrelle Bat and Soprano Pipistrelle Bat, respectively. This species tends to forage at higher altitudes than other Irish bat species, frequently foraging at between 20-50m above ground level. It is also one of the more light-tolerant species, albeit still showing an aversion to illuminated landscapes. Observations from the survey transects were that individual bats were foraging high above the ground, or commuting through the lands. The only part of the survey area that it was not recorded was in woodland at Druid's Glen.

- Nathusius' Pipistrelle is most associated with large waterbodies in Ireland and has a population distribution centred on the northeast of the island (Roche *et al.*, 2014). Its echolocation calls are similar to those of Common Pipistrelle Bat, albeit with a lower peak frequency (Russ, 2012).Only two recordings of this species were captured in close succession, in woodland at Druid's Glen on 26th August 2019 (see Figure 8). Surveyors did not observe the flight of the animal.

101 An additional species, Daubenton's Bat was not recorded during survey transects, but was recorded flying along Cherrywood Road during roost presence/absence surveys of buildings on Cherrywood Road in July 2019. This species is most frequently observed foraging close to the surface of watercourses, particularly sections of still water up-stream of riffles. There is very little of this type of habitat in the vicinity of the proposed route, with a small area of such habitat along the Loughlinstown River south of the Wyatville Link Road Interchange with the N11.

102 No bats were confirmed emerging from or returning to roosts in the Cottages Lehaunstown Lane, at the Viaduct and associated house on Cherrywood Road, or at Grovedale. The condition of render on the viaduct is such that there are few opportunities in the arches for roosting bats. It is considered unlikely that the house on Cherrywood Road hosts roosting bats. Grovedale provides some roosting opportunities for bats in cracks between stones on the northern side of the structure, and in remaining tin-roofed sections of the structure. The level of activity at the Cottages in Lehaunstown Lane was such that it is considered possible that bats continue to roost at these properties. The level of surveyor coverage of the cottages (without access to the rear of dwellings) was such that the presence of roosts could not be ruled out entirely, and for the purpose of this report, it is assumed that bats continue to roost in the Lehaunstown Cottages.

103 In summary, the results of the transect survey demonstrate that bat activity is concentrated in the vicinity of woodland along the route. In particular, the long-established woodland habitat of the Druid's Glen is an important resource for bat populations and is rare in the context of both County Dublin and the Dún Laoghaire-Rathdown Council area. Development of greenfield sites in the Dublin area is such that these types of habitats are becoming increasingly rare. For these reasons, and in light of the large number of species identified in the survey area, the survey area is considered to be of county level importance for foraging bats.

5.3.3 Birds

104 Records of bird fauna for the Cherrywood SDZ area are included within the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). Wintering migrants including curlew *Numenius arquata*, lapwing *Vanellus vanellus* and ringed plover *Charadrius hiaticula* have been identified in the SDZ lands in the past. Lapwing and ringed plover are also known to breed in the vicinity of the Cherrywood and Brides Glen Luas stops (Author, Pers. Obs.). The habitats along the proposed route are suboptimal for these species – they tend to utilise open habitats where they can detect predators from a long distance. In contrast the habitats along the proposed route are either densely wooded or covered largely in tall grasses. Barn owl *Tyto alba*, a rare (red-listed) and cryptic species, was observed in the vicinity of Priorsland by Paul Scott in 2006 (Dún Laoghaire-Rathdown County Council, 2014). Buildings at Grovedale, in the extreme south of the proposed route, are potentially suitable for nesting barn owl, although no signs or evidence of nesting was observed by surveyors in 2020. It is possible that this species forages in the area and exists in very low densities, with nesting in more rural areas of the county west of the M50.

105 A range bird species were identified and recorded along the two survey transects through. Transect 1, which traversed the Druid's Glen, and the Carrickmines River Valley is generally more heavily wooded than Transect 1, which was from the linear park south of Cherrywood Business Campus to the Tully Valley between Tully vale Apartments and the Ramparts Apartments.

106 The area of woodland in Druid's Glen supports several common/woodland garden bird species. Wren *Troglodytes troglodytes*, blue tit *Cyanistes caeruleus*, woodpigeon *Columba palumbus*, robin *Erithacus rubecula* and blackbird were particularly plentiful, and the woodland is contains multiple territories of each of these species. The woodland is also host to a rookery of jackdaw *Corvus monedula* and rook *Corvus frugilegus*. A pair of dippers *Cinclus cinclus* were observed foraging along the Carrickmines Stream in Druids

Glen in January 2021, but were not observed on other survey visits. It is likely that this pairs' territory extends along the eroding sections of the Carrickmines River. The eastern side of the woodland, close to the bridge over the Loughlinstown River, contained a sparrowhawk *Accipiter nissus* nest in 2019. This bird of prey species is relatively widespread in Ireland, but most frequently nests in woodland in Ireland[21] (All of the aforementioned species are relatively common and with a broad distribution across a range of habitats in Ireland. With the exception of Robin and Sparrowhawk (both of which are amber-listed), all species are green-listed[22] on *Birds of Conservation Concern in Ireland 4: 2020-2026* (Gilbert *et al.*, 2021).

107 The Carrickmines River/Tully Valley is more open in nature than the Druid's Glen, with grassland/relatively open habitat down to the Loughlinstown River's edge in places. Wetland bird species were encountered in this area including moorhen *Gallinula chloropus* (Green-listed on BoCCI 4), mallard *Anas platyrhynchos* (Amber-listed on BoCCI 4), and grey heron *Ardea cinerea* (Green-listed on BoCCI 4). Of these moorhen were observed feeding a pair of chicks in June 2019 and therefore breed in the survey area. Mallard potentially also breed in the area. No heronry (heron breeding tree) was identified along the survey route, and the observations were most likely of a foraging bird which may breed outside of river valleys.

108 A variety of other bird species were observed displaying, foraging and flying through the linear park and the Tully Valley, including dunnock *Prunella modularis*, great tit *Parus major*, robin, bullfinch *Pyrrhula pyrrhula*, greenfinch *Chloris chloris*, song thrush *Turdus philomelos*, blackbird *Turdus merula*, chaffinch *Fringilla coelebs*, and goldfinch *Carduelis carduelis*. These are all common parkland species that are widespread in the Dublin area. While robin and greenfinch are amber listed (Gilbert *et al.*, 2021), they remain relatively common species. The bird of prey species buzzard *Buteo buteo* was noted flying over the entire survey area. This species is green listed in Ireland. A pair are known to nest in the Ticknick Park area west of the M50 (Author, Pers. Obs.), and the proposed route is likely to form part of this territory. The summer migrant species swift *Apus apus*, sand martin *Riparia riparia* and house martin *Delichon urbicum* were also noted flying over grassland and along woodland and riparian areas of the Carrickmines River/Tully Valley, and in the vicinity of Lehaunstown House. These species are crevice-nesting, and no suitable nesting habitat was noted along the survey route. House martins nested under the viaduct for the Luas between Cherrywood and Brides Glen stops (Author, Pers. obs.) prior to the development of the Cherrywood Town Centre site. All three species have undergone declines in their Irish populations and are red listed in Gilbert *et al.* (2021).

109 The habitats in the river valleys, which are varied and relatively un-managed provide a range of foraging opportunities for a large variety of bird species. While the range of species identified during surveys are largely common species, the complexity and quality of the habitats for foraging and breeding bird species is such that the proposed route is likely to be of county level importance for birds.

5.3.4 Reptiles and Amphibians

110 No reptiles or amphibians were noted during surveys in 2019 and 2020. However, these cryptic species can often be overlooked, are widespread in Ireland, and their presence or absence can be inferred from the habitats present within the lands.

111 Ireland has one species of reptile that is native to the island, the common lizard *Zootoca vivipara*, which is associated with heathland and coastal habitats, as well as stone walls and roadside verges (King *et al.*, 2011). This species is protected in Ireland through its inclusion on the Wildlife Acts. The vegetation within

[21] BirdWatch Ireland Bird Profiles: Sparrowhawk. Available online at https://birdwatchireland.ie/birds/sparrowhawk/. Accessed 27th February 2020.

[22] *Birds of Conservation Concern in Ireland* (Colhoun & Cummins, 2013) uses a traffic-light system for classification of species conservation status. Those that are green-listed are of least conservation concern, those that are amber-listed have undergone a moderate decline in their range and/or population, while red-listed species have undergone a more dramatic decline in their range and/or population and are therefore of greatest conservation concern.

the lands is generally dense, with some localised variability in vegetation structure, which lizards require for basking, foraging and avoiding predators. The lands are of low suitability for lizards on this basis.

112 Both common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris* and their breeding places are protected in Ireland through the Wildlife Acts. Although none were observed along the proposed route, it is considered likely that common frog forage across the site, and there is potential for newts to occur in areas of tall herb swamp north of Tully Vale. The pond in the grounds of Lehaunstown House, and to a lesser extent, attenuation pond 2b and attenuation pond 4 are suitable for breeding amphibian, but are not within the footprint of the proposed development.

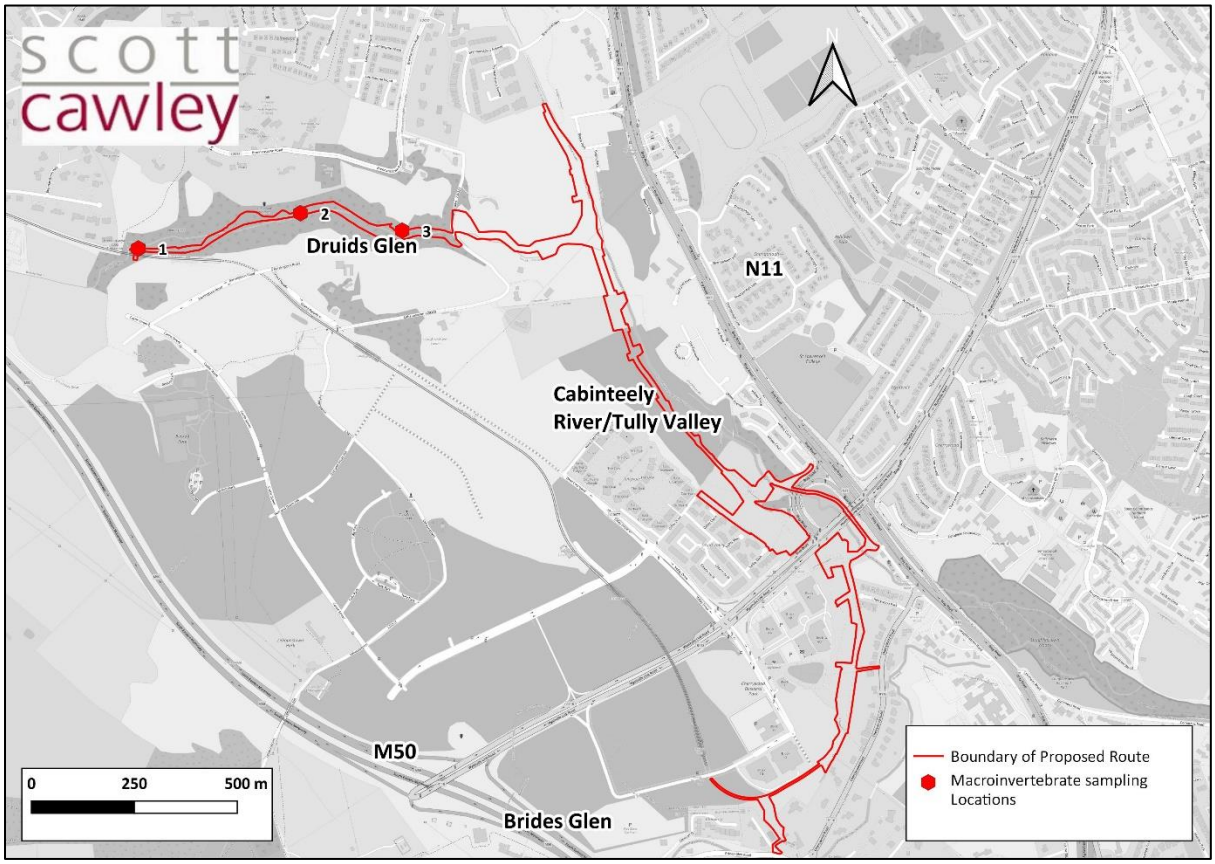
113 The proposed route and survey area are likely to contain populations of amphibians and reptiles that are of local importance (higher value).

5.3.5 Aquatic Fauna in the Receiving Freshwater Environment

114 The *Otter survey of selected rivers in Dún Laoghaire-Rathdown County Council district with management recommendations* (Macklin & Brazier, 2019) included observations on water quality in the context of otter. The authors observed that the Loughlinstown River (north) suffers from poor water quality, potentially associated with run-off from the M50 motorway (Macklin & Brazier, 2019). Notwithstanding these observations, the River is known to host populations of salmonids, and much of the channel north of the Wyatville Link Road is relatively unaltered, with the exception of a few old weirs in the Druid's Glen area. It is one of the few rivers in the Dún Laoghaire Council area that has not been heavily canalised and/or culverted, and for this reason has the potential to support a diversity of freshwater invertebrate and vertebrate species if water quality is appropriately managed. It is therefore considered to be of county level importance.

In-stream Aquatic Fauna

Figure 9: Macroinvertebrate sampling points in the Druids Glen



115 The locations of in-stream aquatic macroinvertebrate kick-sampling in the Druids Glen are illustrated in Figure 9, above, with results of sampling summarised in Table 3.

116 Kick-sampling survey results at the Druids Glen section of the Carrickmines stream included an overarching dominance of pollution tolerant species. River conditions are shaded by vegetation (approximately 70%) with limited public access and few signs of in-stream littering. Substrate is variable with gravel, boulder and cobble present, and calcified in some locations. There is a low discharge, moderate flow rate and the water is slightly coloured.

117 The Q rating assigned to Sampling points 1 and 2 was Q3-4. This Q-value is assigned as Group A invertebrates are few or common, Group B invertebrates are absent and Group C invertebrates are dominant. Group D invertebrates are absent or few and Group E invertebrates (the most pollution tolerant) are few or absent. BWMP and APST scores are between 43 and 49 (poor) and between 4.3 and 4.5 (fair), respectively for sampling points, signifying a slightly polluted river.

118 The Q rating assigned to Sampling point 3 is Q3. This Q-value scored lower than sampling points 1 and 2 due to the absence of Group A invertebrates. Group B invertebrates are present however in singular numbers which could not be scored in Q-Value assessment. The presence of Groups C-E is similar to sampling points 1 and 2. BWMP and APST scores are 39 (poor) and 3.9 (fair), respectively, signifying a moderately polluted river.

Table 3: Q-Value Macroinvertebrate Groups and Abundance

Indicator Group	Taxon	Dominance		
		Monitoring Point 1	Monitoring Point 2	Monitoring Point 3
Group A - Very Pollution Sensitive	Ephemeroptera - Rhithrogena	Few	Common	Absent
Group B - Moderately Pollution Sensitive	Plecoptera - Leuctra	Absent	Absent	Absent
	Tricoptera (Cased spp.)	Absent	Absent	Absent
Group C - Moderately Pollution Tolerant	Ephemeroptera - Baetis rhodani	Absent	Abundant	Abundant
	Diptera - Chironomidae (ex. Chironomus)	Common	Absent	Absent
	Diptera - Simuliidae	Common	Common	Few
	Coleoptera (excluding larvae)	Few	Abundant	Few
	Molusca - Hydrobiidae	Absent	Few	Absent
	Crustacea - Gammarus spp.	Excessive	Dominant	Dominant
	Tricoptera (uncased spp.)	Common	Absent	Few
Group D - Very Pollution Tolerant	Crustacea - Asellus spp.	Absent	Absent	Absent
	Hirudinea	Few	Absent	Absent
Group E - Most Pollution Tolerant	Oligochaeta - Tubificidae	Few	Common	Common

5.4 Summary of Ecological Evaluation

119 Table 4 below summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance, and identifies the Key Ecological Receptors (KERs). Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features: CIEEM and TII guidelines (CIEEM, 2018 and National Roads Authority, 2009).

Table 4: Summary of the ecological evaluation

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
Rockabill to Dalkey Island SAC	International importance	Yes
Dalkey Island SPA	International importance	Yes
Loughlinstown Woods pNHA	National importance	Yes
Dalkey Coastal Zone and Killiney Hill pNHA	National importance	Yes
All other SAC or SPA sites	International importance	No
All other NHA or pNHA sites	National importance	No
Flora and Habitats		
Protected and rare flora	County importance	Yes
Invasive flora	None – constraint feature	Yes
Buildings and Artificial Surfaces (BL3) Spoil and Bare Ground (ED2) Recolonising Bare Ground (ED3) Improved Agricultural Grassland (GA1) Amenity Grassland (GA2) Amenity Grassland/Ornamental Shrub/Flower Border Mosaic (GA2/WS3/BC4) Dry Meadows and Grassy Verges (GS2) Wet Grassland (GS4) Scattered Trees and Parkland (WD5)	Local importance (lower value)	No
Recolonising Bare Ground (ED3) – Area around attenuation pond in southeast of route	Local importance (higher value)	No – not within footprint of proposed works
Other Artificial Lakes and Ponds (FL8)	Local importance (Higher value)	No – not within footprint of proposed works
Calcareous Springs (FP1)	International importance	Yes
Tall-herb Swamps (FS2)	County to national importance	Yes
Eroding Rivers (FW1)	County importance	Yes

Ecological Receptor	Ecological Valuation	KER?
And Depositing Rivers (FW2)		
(Mixed) Broadleaved Woodland (WD1)	County importance	Yes
Hedgerows (WL1) And Treelines (WL2)	Local importance (higher value)	Yes
Wet Pedunculate Oak-Ash Woodland (WN4)	County importance	Yes
Riparian Woodland (WN5)	Local importance (higher value) to County importance	Yes
Scrub (WS1)	Local importance (higher value)	Yes
Fauna Species		
Otter	County importance	Yes
Badger	Local importance (higher value)	Yes
Other terrestrial mammals	Local importance (higher value)	Yes
Bats	County importance	Yes
Birds	County importance	Yes
Reptiles and amphibians	Local importance (higher value)	Yes
Aquatic Fauna in the Receiving Environment	County importance	Yes

6 Assessment of Effects and Mitigation Measures

6.1 European Sites

6.1.1 Assessment of Effects on European Sites

120 This section describes and assesses the possibility for the proposed route to result in likely significant effects on any European sites. In the context of European sites this is focussed on the habitats and species for which the sites are selected (qualifying interests (QIs) for SACs and special conservation interests (SCIs) for SPAs) and the conservation objectives supporting their conservation status in each site. This assessment is directly related to the assessment methodology for European sites required under the Habitats Directive, which is presented in the Appropriate Assessment (AA) Screening report for the proposed route which accompanies this application.

121 Section 3.3 of the AA Screening report identified the following potential impacts of the proposed route in relation to European sites, which are explored in more detail below:

- Habitat loss and fragmentation
- Disturbance and displacement impacts
- Habitat degradation as a result of introducing / spreading non-native species
- Habitat degradation as a result of hydrological / hydrogeological impacts
- Mortality of QI/SCI species arising from hydrological / hydrogeological impacts

Habitat Loss and Fragmentation

122 The proposed route does not overlap with the boundary of any European sites and therefore no European sites are at risk of direct habitat loss impacts. As the proposal does not traverse any European sites, there is also no potential for habitat fragmentation to occur. While it is acknowledged that populations of QI species of European sites (*e.g.,* otter), and areas of EU Annex I habitat occur in the vicinity of the proposed route, they are outside of the Natura 2000 network. The populations of QI species in the potential ZoI of the proposal is not an *ex-situ* population of any European sites, on account of the distance of separation between the Loughlinstown River and the closest European site for otter, and the absence of a direct hydrological connection between the two.

123 As the proposed route will not result in habitat loss or fragmentation effects on any European sites on its own, there is no possibility of in-combination effects in this regard.

Disturbance and Displacement Impacts

124 Construction or operation-related disturbance and displacement of fauna species could potentially occur within the vicinity of the proposed route. For mammal species such as otter, construction-phase disturbance effects from noise would not be expected to extend beyond 150m (Cutts *et al.*, 2009)[23]. As discussed above, the population of otter in the Shanganagh River is not part of any SAC population. Therefore, disturbance from the construction or operation of the proposal will not affect any mammalian QIs of any European sites. Similarly, there is a large distance of separation between the proposed route and European sites which have been designated for other fauna species (including birds), and / or known *ex situ* sites for these species. For this reason, there is no possibility of significant effects on European site arising from disturbance or displacement impacts.

125 As the proposed route will not result in disturbance displacement effects on any European sites on its own, there is no possibility for in-combination effects in this regard.

Habitat Degradation as a Result of Introducing / Spreading Non-native Species

126 Dense stands of giant hogweed are located along the proposed route. This species spreads largely by seed, with vectors of dispersal including in watercourses and via transport of soils by construction vehicles (Klingenstein, 2007). The seeds of the species are small and papery and will not survive extended immersion in saltwater. Therefore, there is no risk of spread of the species via hydrological pathways to European sites from the proposed route. In its alien range, giant hogweed tends to occur close to streams and in marshy land, on waste ground and along roadsides. The spread of giant hogweed from the proposed route however there is no possibility of spread to European sites on account of the large distance of separation between the proposed route and nearby European sites, and on account of their remoteness from major roads.

127 Stands of cherry laurel occur in the Druid's Glen section of the route. This species is invasive in woodland habitats, where it outcompetes native understorey species and suppresses tree canopy replacement[24]. The vectors of spread of this species are largely asexual by layering and suckering with most stands being of planted origin dating to Victorian times[25], although animals may also aid dispersal by ingesting berries. As

[23] This is consistent with Transport Infrastructure Ireland (TII) guidance (*Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* and *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes*) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual zone of influence of construction related disturbance likely to be much less in reality.

[24] Invasive Species Ireland Profile for Cherry Laurel on the National Biodiversity Data Centre website: https://species.biodiversityireland.ie/profile.php?taxonId=28940&taxonDesignationGroupId=25 [Accessed 18/08/2020]

[25] Cherry Laurel Webpage of Invasive Species in Norther Ireland. http://www.habitas.org.uk/invasive/species.asp?item=3420. [Accessed 18/08/2020]

the proposal does not include the deliberate planting of this species, there is no possibility of construction or operation of the proposed route facilitating the spread of the species to any European sites.

128 While Rhododendron occurs in the northern side of the Druids Glen, the proposed route does not traverse stands of this species, and there is no possibility of construction or operation of the proposal facilitating spread of the species to any European sites.

129 As the development or operation of the proposed route will not result in habitat degradation through the spread/introduction of invasive species within any European site, there is no potential for any in combination effects to occur in that regard.

Habitat Degradation as a Result of Hydrological / Hydrogeological Impacts

Surface Waters

130 The proposed route is located upstream of Killiney Bay. European sites in Killiney Bay have been designated for QIs and SCIs which occur in or utilise estuarine and coastal habitats, e.g. harbour porpoise *Phocoena phocoena*, and three species of Tern *Sterna* spp. Additionally, the coastal waters of Killiney Bay may host *ex situ* populations of SCI species of European sites in the broader vicinity: Birds are mobile species, and some wintering birds can travel up to 20km between roosting and feeding sites (Scottish Natural Heritage, 2016), while some breeding marine birds routinely travel up to 50km between roosting/nesting sites and marine feeding grounds (Chivers *et al*., 2012). It is therefore possible that bird SCI species of sites within 50km of Killiney Bay could utilise waters within the Bay.

131 A hydrogeological and hydrological risk assessment report was prepared for the proposed route by Aecom (Aecom, 2021). The assessment was carried out using a conceptual site model (CSM) which was based on a good understanding of the hydrogeological and hydrological environment, plausible sources of impact and knowledge of receptor requirements. This allows possible source-pathway-receptor linkages to be identified. Potential sources of impacts during construction and operation are considered in the CSM and all potential sources of contamination are considered without taking account of any measures intended to avoid or reduce harmful effects of the proposed development (mitigation measures) *i.e*., a worst-case scenario.

132 Results of the CSM carried out by Aecom and which inform this report, indicate that although water quality in the immediate downstream environment may be affected by surface run-off from the proposed route during both construction and operational phases respectively, there will be no perceptible impact on water quality in downstream receiving waters in Killiney Bay. Therefore, there will be no impact on the European sites within Killiney Bay or any *ex-situ* SCIs of European sites which utilise Killiney Bay. This is due to the small anticipated volume of material that could potentially be discharged to the surface water network during any event, and the attenuation and dilution capacities of the surface waters downstream of the proposed development site.

133 The CSM also considered in-combination effects and concluded that there would be no risk of impact on water quality in Killiney Bay as a result of the proposed development in-combination with surface water arisings from other developments.

Mortality of QI / SCI Species Arising from Hydrological / Hydrogeological Impacts

134 As outlined above, there is no possibility of the proposed route negatively affecting water quality in Killiney Bay either on its own or in-combination with other plans or projects. For this reason, there is also no possibility of mortality of QI or SCI species of any European sites arising from hydrological / hydrogeological impacts of the proposed development on its own or in combination with other plans or projects.

6.2 Assessment of Effects on Nationally Designated Sites

135 Based on the information contained within Aecom's hydrogeological and hydrological risk assessment, the potential zone of influence for nationally designated sites extends to those located immediately downstream of the proposed route. The only nationally designated site within this potential ZoI is Loughlinstown Wood pNHA. The Dalkey Coastal Zone and Killiney Hill pNHA, although located at the mouth of the Shanganagh River in Killiney Bay, has not been designated for aquatic features. As the proposed

development does not overlap with or cross any nationally designated sites, there is no potential for significant effects to arise from habitat loss or fragmentation impacts.

136 The proposal is located immediately upstream of an area of EU Annex I habitat [91E0] alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*), which forms part of Loughlinstown Woods pNHA. It is not clear from the site synopsis for this designated site whether alluvial woodland is a reason for designation of the site, however it has been treated as such on a precautionary basis. According to most recent Article 17 reporting on EU Annex I habitats (NPWS, 2019), the main threats and pressures facing Alluvial woodland in Ireland are from invasive alien species, problematic native species, and clear-cutting or removal of trees (NPWS, 2019). As mentioned above, the proposal does not traverse Loughlinstown Woods pNHA, and therefore there is no potential for habitat loss (e.g., tree removal).

137 In the absence of any mitigation, there is potential for the construction-phase of the proposal to facilitate dispersal of the invasive species giant hogweed. The most likely vector of dispersal is hydrological (e.g., seeds entering the receiving surface water network and being transported to a suitable location for germination in Louhglinstown Woods pNHA), via the Shanganagh River and/or its tributaries. At the time of writing of this report, a catchment-wide treatment of giant hogweed is being completed for the Shanganagh / Loughlinstown river catchment (DLRCC Biodiversity Officer, Pers. Comm). There is potential, in the absence of any mitigation, for seed mobilised from the proposed works area to germinate downstream in the Loughlinstown Wood pNHA. Any recolonisation of Loughlinstown Wood pNHA would be significant at the national scale.

138 Alluvial woodland habitat is characterised by a regime of periodic high-water flooding. While in theory, and in the absence of any mitigation, there is potential for contaminated discharges (e.g., leaks or spills of hydrocarbons from plant, release of cementitious materials) to surface waters to reach the woodland (e.g., during or immediately after a storm event when elevated river levels result in flooding of the woodland), no significant effects are anticipated on alluvial woodland habitat. This conclusion has been reached in light of the following:

- The distance between the area of construction works and alluvial woodland habitat
- The dilution factor in the receiving groundwater body and the Shanganagh River and its tributaries
- A contamination event would have to coincide with a period of high water, which is considered to be unlikely
- The limited scale of the proposal and the setback of the majority of the proposed route from the surface water network.

139 As the proposed development will not result in significant effects on nationally designated sites on its own, there is no potential for cumulative effects arising from the proposal in-combination with other plans or projects.

6.3 Measures to Prevent the Spread of Invasive Species to Nationally Designated Sites

140 It is understood that Dún Laoghaire-Rathdown County Council have engaged the services of Envirico for the identification and treatment of giant hogweed in the Shanganagh Catchment. A management plan for the treatment of giant hogweed and other invasive species within the proposed scheme area has been prepared by Envirico and is attached as Appendix X of this report. The measures contained within this section are directly referenced from the Envirico Report.

141 This section contains biosecurity protocols and treatment of giant hogweed which will prevent the spread of this species to nationally designated sites downstream. The treatment of invasive species on site will be undertaken by a specialist invasive species contractor, with appropriate licensing with regard to removal of materials and use of herbicides. The methods contained within this section reference the following guidance documents:

- *Horticulture Code of Good Practice To Prevent the Introduction and Spread of Invasive Non-native Species* (Invasive Species Ireland, 2012).

- *Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (National Roads Authority, 2010).
- *Best Practice Management Guidelines for Giant Hogweed Heracleum mantegazzianum* (Invasive Species Ireland, 2008).
- *The Management of Giant Hogweed in an Irish River Catchment* (Caffrey, 2001).

142 A Habitat and Species Management Plan (HSMP) is included with this report as Appendix VIII and outlines the roles and responsibilities of personnel at the construction phase of the project. A project ecologist will be appointed in an ecological clerk of works (ECoW) role to complete the following:

- Monitor and record adherence to construction phase mitigation, including in relation to invasive species.
- Advise contractors and other relevant construction-phase personnel of their obligations in relation to ecological mitigation and commitments; and,
- Report to the local authority biodiversity officer and if necessary, the NPWS ranger on adherence to ecological commitments contained within this report.

143 The project ecologist will monitor adherence to protective measures and treatment in relation to invasive species, and will deliver toolbox talks to contractors / ground personnel involved in construction outlining biosecurity protocols, and advising how to identify invasive species.

Biosecurity Protocols

144 Persons/machinery entering or working within an area infested with an invasive alien species must take certain precautions to prevent the spread of that species. **These guidelines must be strictly adhered to at all times.**

Exclusion Zones

- Exclusion zones must be clearly marked or fenced off to prevent accidental incursion.
- Any personnel or machinery accessing the area is entering a potentially contaminated area and as such must be subject to strict biosecurity protocols.
- Exclusion zones must also be set up to keep machinery and personnel away from any stored contaminated clay or plant material.

Machinery/Equipment

- All equipment and machinery to enter an exclusion zone must be thoroughly clean before entering.
- The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum.
- Machinery will stick to pre-set haulage routes at all times.
- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within the exclusion zone(s). A power washer and stiff bristled brushes will be made available at these locations.
- In the washdown area, all equipment and machinery must be thoroughly cleaned before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, bucket, machine arm, wheel arches etc.
- All equipment and machinery must be certified as clean by the Ecological Clerk of Works (ECoW) before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery and the geo-textile used to line the wash down area will be added to the material to be removed/encapsulated/incinerated.

- Personnel are at all times to be mindful of the threat posed by the spread of giant hogweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Ground Personnel

- A toolbox talk with emphasis on biosecurity measures must be carried out prior to works by the Ecological Clerk of Works (ECoW). Further toolbox talks may be required in the case of new working constraints, new operatives or refresher talks.
- All PPE to enter an exclusion zone must be thoroughly clean before entering.
- Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for seeds, rhizomes, or other plant fragments that may be stuck on.
- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within each exclusion zone. A bucket with soapy water, a hoof pick and a stiff bristled brush will be situated at these locations.
- In the washdown area, all PPE and equipment must be thoroughly cleaned before personnel leave the exclusion zone.
- All personnel should use a hoof pick to thoroughly clean the treads of their footwear. All footwear must be thoroughly cleaned before leaving the exclusion zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush before leaving an infested zone.
- PPE (incl. boots) and equipment should be certified as clean by the Ecological Clerk of Works (ECoW before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of invasive species and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Haulage Routes

- All haulage routes must be pre-defined and lined with an appropriate geotextile.
- If required to protect the integrity of the geotextile from the wheels of the trucks, a layer of sand blinding will be laid over top.
- Trucks must stick to predefined haulage routes at all times.
- Geotextiles that overlaid haulage routes can be added to the material to be removed/encapsulated/incinerated.

Loading of Contaminated Materials

- When contaminated material is being loaded, particular care must be taken that a minimum of the material is dropped so as to avoid spreading giant hogweed on- or off-site.
- Geotextile will be laid to cover all the areas where the material will pass while in the loading bucket.
- Where the truck collecting the material is parked, geotextile will extend out 2m on either side of the truck so as to ensure any spillages land on the geotextile.
- Any spillages will be cleaned up immediately and loaded onto the truck.
- With the final load, the geotextile membrane will be added to the load of material to be removed/encapsulated/incinerated.

Eradication of Giant Hogweed

145 A qualified, experienced, and licensed invasive species specialist will be appointed to treat giant hogweed on site as per according to the measures outlined here and in the Invasive Species Management Plan (See Appendix X). The following are the options for eradication/treatment of giant hogweed:

Soil Removal Options

146 This section relates to any soil removal from the greenway outside of the Druids Glen woodland section. As areas of the greenway adjacent to giant hogweed must be considered contaminated with giant hogweed seeds, any soil removal must be under strict biosecurity measures (listed above).

- The soil may be stored within the site at a height no more than 750mm, where it can be treated over a number of years or
- may be buried at least one metre below ground level in an area where it is not likely to be disturbed.
- Records should be kept of the quantity of material that has buried and a map showing the location of the burial pit and its depth.
- Use signs to mark the burial pit and keep heavy tracked machinery off the area.
- Subject to a site engineer review it should not be buried deeply within 7 metres of an adjacent landowner's site.
- Precautions must be taken that deep burial does not interfere with the ground water level.
- It is advisable to fence off stands of giant hogweed, including a 4m buffer zone and put-up warning notices.
- Buried soil and plant material must only have been treated with glyphosate type herbicide as herbicide that does not break down in the environment could cause groundwater pollution.
- Soil contaminated with giant hogweed seed or other plant material cannot be removed off site except under licence issued by National Parks and Wildlife.

Eradication and control

147 Chemical treatment of giant hogweed is currently underway adjacent to the proposed scheme (Envirico, 2022). According to Envirico, the application of herbicides over several years, prior to seed set, has been proven effective for both control and eradication. It is important to again remember that the seeds of this plant can remain viable for seven years (possibly up to 15) although most will become unviable after just two years. Once a plant has produced seed, it should be assumed that the seeds will be present in the surrounding area for at least this length of time. Control measures will only affect those plants which have already germinated, and viable seed may continue to germinate each year until the seed bank is exhausted. Eradication, as opposed to temporary control will therefore require annual checks to ensure that any germinating plants are controlled before they can seed. See giant hogweed treatment schedule in Table 5.

Table 5: Programme of monitoring and treatment of giant hogweed.

Treatment	Action	Time	Year
1	Monitor for new growth and take appropriate action if new plants emerge	April to June	1
2	Monitor for new growth and take appropriate action if new plants emerge	April to June	2

Treatment	Action	Time	Year
3	Monitor for new growth and take appropriate action if new plants emerge	April to June	3
4	Monitor for new growth and take appropriate action if new plants emerge	April to June	4
5	Monitor for new growth and take appropriate action if new plants emerge	April to June	5

6.4 Residual Effects for Nationally Designated Sites

148 Following the implementation of measures detailed in Section 6.3, residual effects on nationally designated sites will not be significant at any geographic scale.

6.5 Assessment of Effects and Mitigation for Habitats and Flora

6.5.1 The Effects of Loss or Degradation of Rare Flora

149 The proposed route through the western part of the Druids Glen has been designed to ensure that it does not result in the removal of the rare orchid species green-flowered helleborine. Specifically, the resurfaced area does not extend to the green-flowered helleborine colony. There is however potential for additional footfall during both construction and operation of the proposed route to result in trampling of the species. Additionally, there is an increased risk of the species being picked because of the increased accessibility to Druids Glen, although as it is a relatively inconspicuous plant, the likelihood of this occurring is low. As stated previously, this species is relatively inconspicuous, and therefore its known current distribution in Ireland may be a result of under-recording. Notwithstanding this, the damage or loss of the population identified in Druids Glen would be significant at the county scale or potentially at the national scale.

150 The levels of activity along the proposed route in Druids Glen is anticipated to increase in the medium to long term, linked to the rate of development of undeveloped plots in the Cherrywood SDZ lands. While the risk of degradation of rare flora, in the absence of any mitigation is likely to increase with increased use of the route, the scale effects of degradation arising from the proposal in combination with any other plans or projects will not be greater than the effects arising from the proposal on its own.

6.5.1 Design Measures to Prevent the Loss or Degradation of Rare Flora

151 The locations of green-flowered helleborine populations in Druids Glen have been shared by Scott Cawley with the design team, and the locations have influenced the design of the proposal in this area.

152 A suitable fencing design will be agreed at detailed design stage with DLR's Biodiversity Officer. At a minimum the fencing will:

1. Guide and direct users through Druids Glen to reduce disturbance and other potential negative impacts on ecologically sensitive features, including rare flora;
2. A fencing design that is sympathetic to the natural surroundings, whereby the fencing does not impact negatively on ecologically sensitive features, e.g. through its installation or ongoing maintenance;
3. Incorporate any design features if and where needed, to facilitate movement of fauna through the area;

4. Use sustainable and low maintenance materials
5. Not impede water or water flow through the area

153 An example of a potentially suitable design is a slatted fence, similar to fencing designed for boardwalks[26]. In addition to the provision of fencing through the Druids Glen, signposts containing a visitors code of conduct, which will include at minimum the following, will be installed at all access/egress points to the Druids Glen Woodland:

1. Visitors to the Druids Glen Woodland commit to staying on the boardwalk, and will not diverge off the boardwalk to avoid disturbing sensitive flora and fauna contained in the woodland.
2. Visitors with dogs will maintain their dogs on a lead/restraining device at all times to avoid disturbing sensitive flora and fauna contained in the woodland.
3. Visitors to the woodland will leave no trace of their visit, and take only pictures of the site.

154 While some users may choose to scale the fence, it is anticipated that vast majority of users will be directed away from the orchid populations, and the likelihood of tramping/damage to the species will be reduced to levels not considered significant.

6.5.2 The effects of Introduction or Facilitating the Spread of Invasive Species

155 Planting, dispersing, or allowing/causing the dispersal, spread or growth of certain non-native plant species is controlled under Article 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011; and refers to plant or animal species listed on the Third Schedule of those regulations. The accidental spread of non-native invasive plant species because of construction works has the potential to impact upon terrestrial habitats within and immediately adjacent to the proposed development boundary; potentially affecting plant species composition, diversity and abundance over the long-term.

156 Site clearance and excavation has the potential, in the absence of mitigation, to result in the spread of the listed invasive species giant hogweed, either within the subject lands or offsite. Removal of trees in Druids Glen, e.g., for health and safety reasons, could facilitate the spread of the listed species Rhododendron, and the unlisted but nonetheless invasive species cherry laurel.

157 Giant hogweed is a large annual or biennial herbaceous species which produces copious papery seeds (Klingenstein, 2007). As outlined in Section 5.2.1 page 16, the species is widespread along the proposed route, and it is likely that soils along the route contain a large bank of seeds of this invasive species. Vegetation clearance and earthworks along the proposed route is likely to provide opportunities for additional colonisation by this species. Additionally, there is potential for seeds of the species to be carried off-site on machinery and equipment (e.g., in the treads of plant tyres), and therefore for the species to establish in other sites.

158 *Rhododendron* occurs on the northern side of Druids Glen, outside of the area of proposed works. This species is invasive in Ireland, where it colonises a range of habitats including woodland, and outcompetes native species. In the absence of any mitigation measures, there is some potential for the species to become established in canopy gaps arising from removal of trees (e.g., for health and safety reasons) on the southern side of the glen. The proposal in Druids Glen will involve relatively minor works (installation of cell web membranes, resurfacing of existing pathways), and it is not anticipated that large gaps in the canopy will be created in the construction of the proposed route. For this reason, the likelihood of spread of this species is low.

159 Cherry Laurel forms large impenetrable stands in the central part of the Druids Glen Woodland where it has outcompeted native species. This species is invasive in woodland habitats, where it outcompetes native

[26] An example is available for view at the following website: HC4 Decking Planks | Projects | EcoChoice [Accessed 02/03/2022].

understorey species and suppresses tree canopy replacement[27] The vectors of spread of this species are largely asexual by layering and suckering with most stands being of planted origin dating to Victorian times[28], although animals may also aid dispersal by ingesting berries. The proposal does not include the deliberate planting of this species, however, as per Rhododendron, there is potential for this species to exploit any canopy gaps created during the upgrade of existing pathways through the Druids Glen. It is most likely that any spread of the species will be within the immediate vicinity of existing stands.

160 The facilitation/spread of invasive species from the proposed route is significant. The scale of effects depends on the vector and context of the receiving environment: The woodland habitat in Druids Glen has been valued as being of county importance, however any potential spread of invasive species in this habitat will be limited to localised sections along the resurfaced pathways. The spread of giant hogweed is most likely also to be confined to the area where plant and machinery associated with the construction of the route operate, e.g., any spread is likely to be within the Cherrywood SDZ area.

161 The scale pf potential cumulative effects of the proposal in-combination with other plans or projects will not be greater than the potential effects of the proposal on its own.

6.5.3 Measures to Prevent the Spread of Invasive Species

162 It is understood that Dún Laoghaire-Rathdown County Council have engaged the services of Envirico for the identification and treatment of giant hogweed in the Shanganagh Catchment. A management plan for the treatment of invasive species within the proposed scheme area has been prepared by Envirico and is attached as Appendix X of this report. All of the mitigation listed in this section of the EcIA report are derived from recommendations contained within Appendix X.

163 This section contains biosecurity protocols and treatment of giant hogweed and cherry laurel which will prevent the spread of these species from the proposed scheme. The treatment of invasive species on site will be undertaken by a specialist invasive species contractor, with appropriate licensing with regard to removal of materials and use of herbicides. The methods contained within this section reference the following guidance documents:

- *Horticulture Code of Good Practice To Prevent the Introduction and Spread of Invasive Non-native Species* (Invasive Species Ireland, 2012).
- *Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (National Roads Authority, 2010).
- *Best Practice Management Guidelines for Giant Hogweed Heracleum mantegazzianum* (Invasive Species Ireland, 2008).
- *The Management of Giant Hogweed in an Irish River Catchment* (Caffrey, 2001).

164 A Habitat and Species Management Plan (HSMP) is included with this report as Appendix VIII and outlines the roles and responsibilities of personnel at the construction phase of the project. A project ecologist will be appointed in an ecological clerk of works (ECoW) role to complete the following:

- Monitor and record adherence to construction phase mitigation, including in relation to invasive species.

[27] Invasive Species Ireland Profile for Cherry Laurel on the National Biodiversity Data Centre website: https://species.biodiversityireland.ie/profile.php?taxonId=28940&taxonDesignationGroupId=25. [Accessed 18/08/2020]

[28] Cherry Laurel Webpage of Invasive Species in Norther Ireland. http://www.habitas.org.uk/invasive/species.asp?item=3420. [Accessed 18/08/2020]

- Advise contractors and other relevant construction-phase personnel of their obligations in relation to ecological mitigation and commitments; and,
- Report to the local authority biodiversity officer and if necessary, the NPWS ranger on adherence to ecological commitments contained within this report.

165 The project ecologist will monitor adherence to protective measures and treatment in relation to invasive species, and will deliver toolbox talks to contractors / ground personnel involved in construction outlining biosecurity protocols, and advising how to identify invasive species.

6.5.3.1 Biosecurity Protocols

166 Persons/machinery entering or working within an area infested with an invasive alien species must take certain precautions to prevent the spread of that species. **These guidelines must be strictly adhered to at all times.**

Exclusion Zones

- Exclusion zones must be clearly marked or fenced off to prevent accidental incursion.
- Any personnel or machinery accessing the area is entering a potentially contaminated area and as such must be subject to strict biosecurity protocols.
- Exclusion zones must also be set up to keep machinery and personnel away from any stored contaminated clay or plant material.

Machinery/Equipment

- All equipment and machinery to enter an exclusion zone must be thoroughly clean before entering.
- The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum.
- Machinery will stick to pre-set haulage routes at all times.
- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within the exclusion zone(s). A power washer and stiff bristled brushes will be made available at these locations.
- In the washdown area, all equipment and machinery must be thoroughly cleaned before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, bucket, machine arm, wheel arches etc.
- All equipment and machinery must be certified as clean by the Ecological Clerk of Works (ECoW) before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery and the geo-textile used to line the wash down area will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of giant hogweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Ground Personnel

- A toolbox talk with emphasis on biosecurity measures must be carried out prior to works by the Ecological Clerk of Works (ECoW). Further toolbox talks may be required in the case of new working constraints, new operatives or refresher talks.
- All PPE to enter an exclusion zone must be thoroughly clean before entering.
- Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for seeds, rhizomes, or other plant fragments that may be stuck on.

- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within each exclusion zone. A bucket with soapy water, a hoof pick and a stiff bristled brush will be situated at these locations.
- In the washdown area, all PPE and equipment must be thoroughly cleaned before personnel leave the exclusion zone.
- All personnel should use a hoof pick to thoroughly clean the treads of their footwear. All footwear must be thoroughly cleaned before leaving the exclusion zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush before leaving an infested zone.
- PPE (incl. boots) and equipment should be certified as clean by the Ecological Clerk of Works (ECoW before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of invasive species and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Haulage Routes

- All haulage routes must be pre-defined and lined with an appropriate geotextile.
- If required to protect the integrity of the geotextile from the wheels of the trucks, a layer of sand blinding will be laid over top.
- Trucks must stick to predefined haulage routes at all times.
- Geotextiles that overlaid haulage routes can be added to the material to be removed/encapsulated/incinerated.

Loading of Contaminated Materials

- When contaminated material is being loaded, particular care must be taken that a minimum of the material is dropped so as to avoid spreading giant hogweed on- or off-site.
- Geotextile will be laid to cover all the areas where the material will pass while in the loading bucket.
- Where the truck collecting the material is parked, geotextile will extend out 2m on either side of the truck so as to ensure any spillages land on the geotextile.
- Any spillages will be cleaned up immediately and loaded onto the truck.
- With the final load, the geotextile membrane will be added to the load of material to be removed/encapsulated/incinerated.

6.5.3.2 Eradication of Giant Hogweed

167 A qualified, experienced, and licensed invasive species specialist will be appointed to treat giant hogweed on site as per according to the measures outlined here and in the Invasive Species Management Plan (See Appendix X). The following are the options for eradication/treatment of giant hogweed:

Soil Removal Options

168 This section relates to any soil removal from the greenway outside of the Druids Glen woodland section. As areas of the greenway adjacent to giant hogweed must be considered contaminated with giant hogweed seeds, any soil removal must be under strict biosecurity measures (listed in Section 6.5.3.1 above).

- The soil may be stored within the site at a height no more than 750mm, where it can be treated over a number of years or
- may be buried at least one metre below ground level in an area where it is not likely to be disturbed.
- Records should be kept of the quantity of material that has buried and a map showing the location of the burial pit and its depth.
- Use signs to mark the burial pit and keep heavy tracked machinery off the area.
- Subject to a site engineer review it should not be buried deeply within 7 metres of an adjacent landowner's site.
- Precautions must be taken that deep burial does not interfere with the ground water level.
- It is advisable to fence off stands of giant hogweed, including a 4m buffer zone and put-up warning notices.
- Buried soil and plant material must only have been treated with glyphosate type herbicide as herbicide that does not break down in the environment could cause groundwater pollution.
- Soil contaminated with giant hogweed seed or other plant material cannot be removed off site except under licence issued by National Parks and Wildlife.

Eradication and control

169 Chemical treatment of giant hogweed is currently underway adjacent to the proposed scheme (Envirico, 2022). According to Envirico, the application of herbicides over several years, prior to seed set, has been proven effective for both control and eradication. It is important to again remember that the seeds of this plant can remain viable for seven years (possibly up to 15) although most will become unviable after just two years. Once a plant has produced seed, it should be assumed that the seeds will be present in the surrounding area for at least this length of time. Control measures will only affect those plants which have already germinated, and viable seed may continue to germinate each year until the seed bank is exhausted. Eradication, as opposed to temporary control will therefore require annual checks to ensure that any germinating plants are controlled before they can seed. See giant hogweed treatment schedule in Table 5.

Table 6: Programme of monitoring and treatment of giant hogweed.

Treatment	Action	Time	Year
1	Monitor for new growth and take appropriate action if new plants emerge	April to June	1
2	Monitor for new growth and take appropriate action if new plants emerge	April to June	2
3	Monitor for new growth and take appropriate action if new plants emerge	April to June	3
4	Monitor for new growth and take appropriate action if new plants emerge	April to June	4
5	Monitor for new growth and take appropriate	April to June	5

Treatment	Action	Time	Year
	action if new plants emerge		

6.5.3.3 Treatment of Cherry Laurel

170 Based on recommendations contained within the Invasive Species Management Plan prepared by Envirico (see Appendix X), the management of cherry laurel will be a combination of Stump Treatment and Snip and Treat. Disposal of brash generated from treatment of cherry laurel will necessitate the services of an appropriately licensed waste contractor. According to Envirico the stem can be cut, and the stump immediately treated with Roundup Biactive XL in accordance with the label. Monitoring of the exposed stumps for re-growth will be required.

Timeline Management

Table 7: Timeline for management of cherry laurel. This timeline may be altered by the appointed invasive species contractor subject to the date of their appointment.

Year	Period of Works	Proposed Treatment(s)
2022 (anticipated site preparation phase)	February/March	Stump treatment, snip and treat, seedling removal
2023 (anticipated construction phase)	September/October	Inspect stands and seedlings, retreat if necessary
2024 (anticipated operational phase)	February/March	Inspect stands and seedlings, retreat if necessary
2025 and ongoing (anticipated operational phase)	February/March	Monitor new growth and retreat if necessary

171 The proposed treatment of cherry laurel will be completed on a phased basis, including pre-construction clearance (e.g. site-preparation phase), construction phase management, and operational phase management (e.g. following the installation of infrastructure, and the commencement of use by members of the public). An indicative timeline as provided by Envirico in Appendix X, is included in Table 7 above for the treatment of cherry laurel. The timeline may need to be revisited, as commencement of treatment will be subject to the decision of DLRCC to proceed with the part 8 project.

172 A resurvey of the proposed scheme for cherry laurel will be necessary at the beginning of each phase of management (site preparation phase, construction phase and operation phase) to ensure that an up-to-date map of infestations is generated and referenced for each management phase. It is preferable to complete these surveys in winter or early spring when the evergreen foliage of this species is most easily differentiated from other species, but surveys are not seasonally restricted and should be identifiable by a qualified professional year-round.

173 Records should include the works carried out in each sector (i.e. how the area has been treated) so that at the end of each phase areas can be re-evaluated.

Site Preparation Phase

174 Site preparation will include the removal and treatment of cherry laurel in an east-west or west-east direction. Where possible, young seedlings will be pulled from ground by hand while ensuring the root structure is attached. If this is not possible then younger single stemmed seedlings will be cut and treated with herbicide. Plants which have been previously cut back and are multi-stemmed will be cut to stump level and treated with herbicide.

175 Seed will be present in the substrate surrounding the infestations. Its presence may not be apparent until it is disturbed, for example during clearance works, moving of soil, construction works and landscaping.

Strict biosecurity protocols as detailed in Section 6.5.3.1 will be implemented when working in these locations to prevent the spread of this invasive species.

Construction Phase

176 Exclusion zones will be set up around treated cherry laurel stands and marked as outlined in Section 6.5.3.1. Other biosecurity protocols will continue to apply during this phase of works.

Operation phase – short term

177 Areas subject to treatment during site preparation will be checked annually for re-growth and to identify where supplementary treatment is required. Any emergent cherry laurel seedlings will be pulled and treated. Stumps which have not been killed and have sprouted will be snipped and treated.

178 Once final clearance is achieved, that is, when all plants are dead then Operational Phase (long term) can commence. The duration of the short-term operational phase treatment will depend on no new regrowth being identified for at least two years in a row.

Operation phase – long term

179 During this phase, once all areas have been treated, restoration of damaged or degraded areas will include replanting of native understorey species, preferably using seed stock collected from within Druids Glen. Appropriate species may include *Ilex aquifolium*, *Vaccinium myrtillus*, *Lonicera periclymenum*, *Dryopteris affinis* and *Luzula sylvestris* all occur in the Druids Glen as understorey species and are suitable for replanting in areas previously occupied by cherry laurel. The establishment of native species within the area of former cherry laurel infestation will reduce the likelihood of cherry laurel exploiting canopy gaps in the future.

Stump Treatment

180 According to Envirico, Stump Treatment is the preferred treatment of invasive plants within a woodland setting. This involves cutting the plant 2-4 cm from the ground and immediately applying 20% glyphosate herbicide to the wound. According to Envirico, Biactive XL. Roundup Biactive XL is suitable for use in the context of Druids Glen, as it is an aquatic-approved, glyphosate-based herbicide that is highly effective and is considered suitable to use in and near watercourses. Note that based on information provided by Envirico, the Snip and Treat method of herbicide application is more appropriate for plants located beside or near watercourses (e.g. the Carrickmines Stream).

181 Herbicide application will be restricted to periods of suitable weather conditions comprising:

- Period after which any dew has dried (e.g. application will not be conducted in early morning);
- Application will take place on dry days where there is no rain forecast for a period of at least six hours; and,
- Application will take place on days where wind speeds are less than or equal to Beaufort Force 3.

182 The completion of herbicide application will be subject to the completion of an environmental risk assessment in advance of the works. These measures will minimise risks of herbicide drift or accidental application of herbicide to unintended targets. Envirico have stated that blue tracer dye will be added to herbicide to mark treated stems.

183 As discussed under timeline management above, the treatment of cherry laurel will involve revisits following the completion of initial treatment at the site preparation phase. Stumps will be checked at 15-18 months after treatment to ascertain is follow-up treatment is required (likely to be via the snip and treat method outlined below). Rechecks will be undertaken of treated areas a minimum of once annually thereafter until there is no regeneration of the species.

Snip and Treat

184 According to Envirico, the snip and treat method is the same as the stump treatment method, but is applied on smaller plants, on plants close to watercourses, and on plants that have strongly regrown following initial application and on which foliar treatment is unlikely to be successful. Similar to the stump treatment

method, stems are cut back to ground level or old stumps and spot treated with 20% glyphosate (in this instance Envirico recommend the use of Roundup Biactive XL).

185 Herbicide application will be restricted to periods of suitable weather conditions comprising:

- Period after which any dew has dried (e.g. application will not be conducted in early morning);
- Application will take place on dry days where there is no rain forecast for a period of at least six hours; and,
- Application will take place on days where wind speeds are less than or equal to Beaufort Force 3.

186 The completion of herbicide application will be subject to the completion of an environmental risk assessment in advance of the works. These measures will minimise risks of herbicide drift or accidental application of herbicide to unintended targets. Envirico have stated that blue tracer dye will be added to herbicide to mark treated stems.

Brash Management

187 Excess brash will be removed from site and disposed of at an appropriately licensed facility. Some brash may be left in situ as wood piles for the duration of treatment, although these wood piles will need to be checked frequently for regrowth.

6.5.4 The Effects of Habitat Loss on Habitats

Loss of Non-KER Habitats

188 The non-KER habitats buildings and artificial surfaces (BL3), spoil and bare ground (ED2), recolonising bare ground (ED3), dry meadows and grassy verges (GS2) and its mosaics, improved agricultural grassland (GA1), amenity grassland (GA2), wet grassland (GS4), and scattered trees and parkland (WD5). The proposal will include the permanent loss of small sections of these habitats, which will be replaced by hard surfaces. During construction, a corridor either side of the proposed route will be lost, however this loss will be for the duration of the construction phase only. These habitats are species-poor examples, and the loss of these habitats is not significant at any scale.

Loss of Mixed Broadleaved Woodland (WD1) Habitat

189 An area of this habitat type, located immediately east of Pond 4 in the linear park will be permanently lost, arising from the reprofiling of the park slope to facilitate a universally accessible gradient for the proposed route. The area of habitat is relatively small and is of recent origin, containing a poorly developed ground flora, and with a canopy of single-age-class trees.

190 A linear strip of mixed broadleaved woodland of *c*. 250m^2 at the intersection between the Druids Glen Valley and Carrickmines River Valley will be removed to facilitate the construction of the proposed route. The woodland here is a mix of Ash, Blackthorn and Oak. The loss will be permanent.

191 The proposed route in Druids Glen comprises the resurfacing of existing pathways that meander through the woodlands. The proposal does not include widening of these pathways or the removal of woodland habitat. Individual trees in the Druids Glen woodland will be removed where they pose an elevated health and safety risk to construction workers and/or members of the public. For more information on the trees which will be removed for the proposal, refer to the Arboricultural Impact Assessment Report for the proposal, which has been prepared by Arbor Care Consulting Tree Services. While the loss of these trees will result in canopy gaps in the Druids Glen, the habitat in the Glen will remain wooded.

192 In light of the relatively small coverage of woodland at a county level, the loss of any woodland habitat in Dun Laoghaire-Rathdown is considered to be significant. In this instance, the effects of habitat loss are at the local level only, as the total area of habitat that will be lost is small. The loss of habitat will not affect the network of continuous woodland habitat in Cherrywood, with continuous woodland corridors remaining in the river valleys following the completion of construction.

193 There is potential for habitat loss arising from the proposal on its own to act cumulatively with habitat loss from other plans or projects in the Cherrywood SDZ, if these are timed to coincide with works along the

route, and involve loss of the same KER habitats mentioned above. However, in light of the protection afforded to habitats in the Cherrywood SDZ arising from objectives and policies of the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014), specifically the requirement of Policies GI19, GI 62, GI 63, and GI 69, which relate to developments within Druids Glen, cumulative effects are not anticipated to be any greater than those arising from the proposal on its own.

Riparian Woodland (WN5)

194 The proposed route passes in close proximity to small sections of riparian woodland on the true right bank of the Cabinteely Stream, but will not result in the loss of any of this habitat.

Loss of Hedgerows

195 Three sections of hedgerow cross the Carrickmines River Valley in an east-west direction, north of the Tully Vale development. These hedgerows form barriers to the proposed route, and the proposal will therefore result in removal of small sections of them (*c.* 4m sections). These hedgerows are marked for retention on Figure 12 of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014). The loss of the sections of hedgerow is significant, albeit at the local level. The loss of the hedgerow sections will not affect the structure and function of the hedgerows in the long-term.

196 There is potential for cumulative loss of hedgerows arising from the proposed development in-combination with other plans or projects within the Cherrywood SDZ plan area. However, considering the protective policies for hedgerows contained within the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) and the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), namely GI 42, GI 59 and BP01, and the objective to supplement/plant new hedgerows contained within GI 38, the cumulative effects of habitat loss are not anticipated to be greater than the effects of the proposal on its own.

Loss of Wetland Habitats

197 The proposal will traverse a small section of tall-herb swamp (FS2), corresponding to the EU Annex I habitat [6430] hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, in the Carrickmines River/Tully Valley. This section of the valley is a pinch-point where the tall-herb swamp vegetation creates a barrier to north-south movement. There will be loss of a small area of vegetation from the footprint of the path during construction. Although the habitat type as a whole is valued as being of national importance, the scale of loss will be very small (several square meters) and will not compromise the hydrogeological regime of the remaining vegetation, whose water source originates from calcareous springs on the western slope of the Carrickmines River/Tully Valley. For this reason, the potential effects are likely to be significant at the local level only.

198 The proposal will cross a section of calcareous spring habitat in Druids Glen corresponding to the EU Annex I habitat [7220] petrifying springs with tufa formation (*Cratoneurion*)* (Upper Druids Glen Spring). The spring in the Druids Glen is a tufa cascade which crosses the Druids Glen pathway before continuing downstream to the Carrickmines Stream. The spring source is located up-slope in the Druids Glen valley and will not be affected by the proposed development, as per the findings of a Hydrological and Hydrogeological Risk Assessment for the scheme (Aecom, 2021). Again, the crossing of the spring will be by an elevated timber platform to avoid impeding the flow of calcium-rich water downslope. The shading of the small section of spring by the proposed crossing during operation is not significant at any geographic scale, as the spring is already heavily shaded by the woodland overstorey, with little or no development of typical tufa moss communities on the existing pathway.

199 A second tufa spring emerges from a pipe north of the unused / unopened Brennanstown Luas stop will not be affected by the resurfacing of the pathway through Druids Glen, as the water is likely to be piped from the Luas stop to the south of the proposed route, and water flow will not be impeded by the resurfacing of the pathway.

6.5.6 The Effects of Habitat Degradation as a Result of Construction Practices

Aquatic and Riparian Habitats

200 As outlined in Section 6.1.1, page 41, a hydrogeological and hydrological risk assessment of the proposed route has been prepared (Aecom, 2021). The risk assessment has identified that there is a low risk, in the absence of mitigation, for pollutants from the proposal to affect water quality in the Shanganagh River and its tributaries downstream of the proposed route. The risk assessment concluded that there is no risk of perceptible effects on waters in Killiney Bay (Aecom, 2021). These conclusions were risked following an analysis of the proposal on its own, and in-combination with other potential plans or projects in the catchment of the Shanganagh River and its tributaries (Aecom, 2021). Any potential spills arising during the construction phase of the proposed route, e.g. during construction of watercourse crossings, or a pollutant spill, could affect water quality in the downstream environment, but is likely to be short in duration (e.g. limited to a short period immediately after the pollution event), and minor in scale (Aecom, 2021). Nonetheless, any effects of pollution would be significant at a local to county level, in light of the importance of the watercourses downstream of the proposed route.

201 As outlined in Section 6.2, page 43, the effects of habitat degradation arising from pollution will not be significant for downstream examples of the EU Annex I habitat [91E0] alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

202 Policies GI 53, GI60, GI 62, and GI 69 of the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) and BP 11 of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) relate specifically to consideration of effects on aquatic / riparian habitats and species, and these policies apply to all planning proposals within Cherrywood SDZ. Notwithstanding these policies, there is potential for cumulative effects on water quality in the Loughlinstown River arising from activities not captured within the planning system, e.g., arising from a pollution event up-stream of the proposed route, however any potential cumulative effects are not anticipated to be greater than the effects of the proposal on its own.

Woodland Habitats

203 The use of heavy machinery during construction of the route has the potential to affect areas of mixed broadleaved woodland and hedgerow habitats through compaction of tree roots, and accidental strike and damage of branches and trunks of mature trees and hedges. The area of woodland in the Druids Glen would be at highest risk of any such effects, as the canopy contains a large proportion of Beech, which has shallow roots and is very sensitive to compaction of the root zone. The effects of these impacts would likely be long term, as soil compaction can result in the slow degradation of trees and their eventual death. For these reasons, the potential effects of habitat degradation are significant. The scale of effects could potentially be at the county scale if root-compaction resulted in die-back of a large proportion of trees in the Druids Glen, although local-scale impacts would be more likely, since the angle of slope in the Glen constrains widening of footpaths.

204 Several protective policies of the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) apply specifically to developments in and adjacent to the Druids Glen including GI19, GI 62, GI 63, and GI 69. The woodland habitats in Druids Glen are marked for retention on Figure 12 of the *Cherrywood Planning Scheme Biodiversity Plan*. For these reasons, the potential for cumulative habitat loss effects on Druids Glen are not anticipated to be any greater than the effects arising from the proposal on its own.

6.5.7 Measures to Protect Aquatic and Riparian Habitats

205 Measures are included in this section to address potential effects of water quality impacts on aquatic and riparian habitats. These measures are included within a fisheries protection method statement (FPMS), which will be referenced by the appointed contractor(s). The monitoring of water quality is a specialist field, which may be undertaken by a suitably qualified and experienced environmental scientist who will have experience monitoring water quality, and access to sampling gear. The project environmental scientist will provide results of water quality monitoring to the project ecologist. The project ecologist, working in

an ECoW capacity, will be responsible for reporting on adherence to the measures in this section and the FPMS. The contractor will be responsible for adherence to all measures.

206 During in-stream works, and the construction of watercourse crossings, the environmental scientist will monitor water quality, including the following parameters: turbidity (using a handheld turbidity meter); hydrocarbons (e.g. using hydrocarbon detection strips); and dissolved oxygen levels (using a handheld dissolved oxygen meter), at locations 50m upstream and 50m downstream of each crossing point. The project environmental scientist will determine a baseline for water quality at these locations based on measurements taken over a period of at least three months in advance of commencement of construction. Water quality samples will be taken during variable flow rates (e.g. low water/rainfall, and high water/rainfall). Water quality samples will be collected for the duration of the project, at a frequency to be determined by the project environmental scientist in consultation with the site manager and local authority, and informed by the construction programme, and the results of baseline water quality monitoring.

207 All personnel working on the site will be trained in the implementation of emergency procedures with respect to water quality and protection. Measures for protection of water quality described in this section have been formulated in consideration of best international practice including but not limited to:

- CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams et al., 2001);
- CIRIA C692: Environmental Good Practice on Site, (Audus et al. 2010);
- BPGCS005, Oil Storage Guidelines;
- CIRIA C648: Control of Water Pollution from Linear Construction Projects: Technical Guidance (Murnane et al. 2006a);
- CIRIA C648: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006b); and,
- *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters* (IFI, 2016).

208 The following measures will be adhered to in order to prevent pollutants and other deleterious materials entering the aquatic environment:

- Process waters, machine washings etc. will not be directly discharged to surface waters
- In-stream works (e.g. construction of river crossings) will be undertaken between 1st July and 30th September inclusive so as to minimise any potential effects of works on migrating / breeding salmonids.
- Prior to any machinery working on site for any purpose, the working area will be marked out with wooden stakes and where deemed necessary, hazard tape will be erected to identify the working limits
- Provision of measures to prevent the release of sediment during the construction work will be installed prior to the commencement of site clearance. Protective measures may include but are not limited to the use of silt fences and sedimentation mats.
- Provision of exclusion zones and barriers (sediment fences) between earthworks, stockpiles and temporary surfaces will be enacted to prevent sediment washing into the receiving water environment.
- Temporary construction surface drainage and sediment control measures will be in place before earthworks commence.
- If pouring of cementitious materials is required for the works adjacent to the watercourses, this will be carried out in the dry.

- Discharge water generated during placement of concrete will be removed off site for treatment and disposal.
- Where stockpiling is required, temporary stockpiles will be located as far as possible (preferably >50 metre)s from any water features. Three sides will be surrounded with silt fences with access from the fourth (uphill) side. Sides will be smoothened, and collection of run-off considered *i.e*. discharging to a settlement pond *etc*.
- Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to surface water. Concrete washout areas will be located remote from any surface water drainage features to avoid accidental discharge to watercourses
- No storage of hydrocarbons or any polluting chemicals will occur within 50m of the surface water network. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank (plus an allowance of 30mm for rainwater ingress). Re-fuelling of plant will not occur within 50m of the surface water network and only in bunded refuelling areas
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste
- If dewatering is required, water will be treated prior to discharge to the existing watercourse. This will include treatment for silt removal either via silt trap, settlement tanks or ponds.
- There will be no direct pumping of contaminated water from the works to the surface water drainage/stream network at any time
- Foul drainage from site offices and compounds, where not directed to the existing waste water network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations, to prevent the pollution of watercourses
- An Emergency Response Plan detailing the procedures to be undertaken in the event of flooding, a spill of chemical, fuel or other hazardous wastes, a fire, or non-compliance incident will be prepared
- Ensure site staff are trained in the implementation of the Emergency Response Plan and the use of any spill control equipment as necessary.

209 A Fisheries Protection Method Statement has been included with this proposal, as per the requirement of BP11[29] of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014).

6.5.8 Measures to Prevent Degradation of Woodland Habitats During Construction

210 The working corridor in the woodland areas will be as small as possible, with activity concentrated on the existing path network in the Druids Glen. The working corridor will be demarcated in advance of all other works. It is preferable to use Heras-style fencing along the entire route, however the suitability of this fencing will depend on the local terrain, and alternatives may be required in the woodland sections of the route. A cell web-type surface will be installed in areas of woodland and over the root protection zones of trees to be retained, that are located within the working corridor. The adherence to working practices will

[29] BP11 Where works are taking place within 10m of the edge of a watercourse or tributary thereof, a Fisheries Protection/Construction Method Statement must be prepared demonstrating how pollution of watercourse during and after the construction period will be prevented and/or mitigated. This shall be developed in consultation with Inland Fisheries Ireland at application stage. (Dún Laoghaire-Rathdown County Council, 2014)

be monitored and documented by an appointed project environmental lead, acting in an Ecological Clerk of Works (ECoW) capacity.

6.5.9 The Effects Habitat Degradation from Increased Footfall and Dog Fouling on Habitats

211 Large parts of the proposed route are relatively free of human activities, particularly the sections north and west of the Tully Vale development. During operation it is anticipated that there will be a marked increase in footfall through the Carrickmines River Valley and Druids Glen. Footfall is likely to increase in the medium to long-term following the development of lands in the Cherrywood SDZ area. While it is anticipated that footfall will be concentrated on built infrastructure, there is also likely to be some increase in footfall off of pathways. The effects of increased footfall are potentially negative if sufficiently frequent to result in erosion/loss of vegetation. Habitats at higher risk include calcareous springs (FP1), and mixed broadleaved woodland. The Druids Glen and Lower Carrickmines Valley Springs are located in relatively inaccessible terrain on steep-sided slopes and furthermore are wet underfoot for much of the year, which is likely to preclude ready access by users of the proposed route. For this reason, the potential effects of increased footfall on calcareous springs is negligible. Areas of woodland adjacent to the pathway in Druids Glen are at higher risk of erosion/trampling, particularly habitat between the proposed pathway and the Carrickmines River.

212 The potential effects of increased footfall on woodland in Druids Glen are significant in the absence of any mitigation. Increased footfall could result in compaction of root zones along the proposed route and in small areas of woodland immediately adjacent to the proposed route, e.g., at particularly scenic sections of the Druids Glen where pedestrians may be tempted to go off-trail. There is a risk of alteration of ground flora due to trampling near the riverbank. However, these effects are anticipated to be very localised.

213 Uncontrolled dog fouling can affect vegetation through altering the nutrient status of soils, and therefore influencing species composition. The only habitats within the vicinity of the proposed development likely to be at risk of such effects are calcareous springs (FP1). While dogs may roam further from pathways than their owners, the location of calcareous spring habitats relative to the proposed route means that dog fouling at these habitats is likely to be very occasional, and for this reason no significant effects are anticipated.

6.5.10 Design Measures to Minimise Potential Effects of Increased Footfall and Dog Fouling

214 A suitable fencing design will be agreed at detailed design stage with DLR's Biodiversity Officer. At a minimum the fencing will:

1. Guide and direct users through Druids Glen to reduce disturbance and other potential negative impacts on ecologically sensitive features, including rare flora;
2. A fencing design that is sympathetic to the natural surroundings, whereby the fencing does not impact negatively on ecologically sensitive features, e.g. through its installation or ongoing maintenance;
3. Incorporate any design features if and where needed, to facilitate movement of fauna through the area;
4. Use sustainable and low maintenance materials
5. Not impede water or water flow through the area

215 An example of a potentially suitable design is a slatted fence, similar to fencing designed for boardwalks[30]. In addition to the provision of fencing through the Druids Glen, signposts containing a visitors code of

[30] An example is available for view at the following website: HC4 Decking Planks | Projects | EcoChoice [Accessed 02/03/2022].

conduct, which will include at minimum the following, will be installed at all access/egress points to the Druids Glen Woodland:

1. Visitors to the Druids Glen Woodland commit to staying on the boardwalk, and will not diverge off the boardwalk to avoid disturbing sensitive flora and fauna contained in the woodland.
2. Visitors with dogs will maintain their dogs on a lead/restraining device at all times to avoid disturbing sensitive flora and fauna contained in the woodland.
3. Visitors to the woodland will leave no trace of their visit, and take only pictures of the site.

216 While some users may choose to scale the fence, it is anticipated that vast majority of users stick to the fenced route and the potential effects of increased footfall and dog fouling will be reduced to levels not considered significant.

6.5.11 Residual Effects for Habitats and Flora

217 Mitigation measures, including mitigation measures through design, have been outlined in the Sections above, which are intended to remove and reduce significant effects on habitats and flora along the proposed route. Following the implementation of these measures, the residual effects of loss or degradation of rare flora, introduction or spread of invasive species, and habitat degradation on aquatic habitats arising from construction practices will not be significant at any scale. Residual effects arising from habitat loss cannot be avoided in this instance, and the effects remain significant, albeit at the local geographic scale.

6.6 Assessment of Effects and Mitigation Measures for Fauna

6.6.1 Assessment of Effects on Badger

Construction-phase Disturbance Effects

218 Increased human presence and/or noise and vibration associated with construction works has the potential to displace badgers from both breeding/resting places and from foraging habitat. The noise and vibration associated with general construction works (*e.g.*, heavy machinery movements and excavations) can affect badger setts at distances of up to 50m. Specifically, rock breaking, blasting and pile driving can potentially affect setts at greater distances; up to 150m[31]. No rock-breaking, blasting or pile driving are proposed as part of the proposed development.

219 As construction works will typically be undertaken during normal daylight working hours and badgers are nocturnal in habit, displacement of badgers from foraging areas (outside of areas where foraging habitat will be lost as a result of the proposed development) is extremely unlikely to affect the local badger population and will not result in a likely significant negative effect, at any geographic scale.

220 Although the proposed development is within 50m of three badger setts (S1, S2, and S3), it is our professional opinion that there is no possibility of construction in the Druids Glen to disturb badgers occupying S3. This is because Sett 3 is located at the top of a steep slope, above the area of proposed works and outside of the footprint of any works or vehicular or pedestrian access to works. The difference in elevation means that there is no risk of sett collapse, and the dense vegetation separating the sett entrances from the works will obscure human presence from badgers should they be active diurnally at the sett entrance.

221 Construction works have the potential to affect the setts S1 and S2 as both are within 50m of the area of proposed works. Both setts are located on the slopes of a narrow valley, and the proposed route will be constructed along the valley floor. Both setts are likely to be subject to temporary

[31] Disturbance distances based on construction activity restrictions at badger setts described in *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (NRA, 2006)

disturbance/displacement effects during construction (*i.e.*, over a period of three years). Disturbance to both setts over a prolonged period could affect the local badger population, at least over the short-to medium term. Specific measures have been developed to address this as outlined in Section 6.6.2, below.

222 On a precautionary basis, disturbance/displacement effects during construction have the potential to negatively affect the conservation status of local badger groups/populations (at least in the short-term) and could result in significant negative effect, at a local geographic scale.

Operational Phase Habitat Loss, Disturbance and Displacement Effects

223 During operation, the existing baseline levels of disturbance currently experienced by setts S1, S2 and S3, will change as there will be increased human (and pet) activity through the river valleys in Cherrywood. The setts are currently screened from the proposed route by existing dense scrubby and woodland vegetation which will be retained and/or enhanced as part of the proposed development. Nonetheless, there is potential for increased visitation to setts which could result in disturbance, particularly by domestic pets (dogs). The potential effects of disturbance are likely to be significant at the local geographic scale.

224 The introduction of artificial lighting to established foraging areas could theoretically affect badger foraging activity (Longcore & Rich, 2004). However, the area of proposed lighting installation is confined to pathways and their immediate vicinity. While there may be some initial displacement of foraging badgers from these lit areas, it is anticipated that the local badgers will habituate to the presence of lighting and continue to feed in areas subject to lighting. Significant impacts arising from the introduction of artificial lighting from the proposal on its own are not likely at any geographic scale on the basis of the relatively small area of the route that will be lit. Nonetheless, residual effects of the reduction of suitable foraging habitats through lighting and loss of optimal foraging habitat (woodland and grassland) arising from the proposed development cumulatively with other developments in the Cherrywood Planning Scheme area are likely to be significant at the local scale and cannot be avoided.

6.6.2 Mitigation Measures for Badger during Construction

225 The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (NRA, 2006). These guidelines set out the best practice approach in considering and mitigating impacts on badgers during construction works.

226 As the usage of setts by badgers can change over time, a pre-construction check of the activity status of all setts will be carried out within 12 months of any construction work commencing within the zone of influence of the setts discussed below.

227 As badger could potentially establish new setts in the future within the zone of influence (ZoI) of the proposed development, a pre-construction check of all suitable habitat within the proposed development boundary will be required within 12 months of any constructions works commencing. Any new badger setts present will be afforded protection in line with the requirements set out in the TII/NRA guidance document as follows:

- Badger setts will be clearly marked, and the extent of bounds prohibited for vehicles clearly marked by fencing and signage
- No heavy machinery shall be used within 30m of badger setts; lighter machinery (generally wheeled vehicles) shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of sett entrances
- During the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts
- Works can be undertaken within these zones following consultation with and approval of, an ecologist and if required, under the supervision of a badger ecologist

228 As the proposed development will not result in the permanent loss of any badger setts, there is no requirement to construct any artificial setts as part of the mitigation strategy. This also applies in relation to the proposed [temporary] exclusion of one of the main sett entrances, as there are other sett entrances

within that main sett complex, and other setts within the territory of that badger group (S1) that will remain available for use throughout the construction period as they are beyond the ZoI of construction related disturbance effects.

229 The mitigation measures, as they relate to each of the badger setts present within the ZoI of the proposed development (S1, S2, S3, S4) are presented below in Table 8.

Table 8: Badger Sett Mitigation Measures

Ref. No.	Mitigation Measures
S1	[Active sett within 20m of construction works] Annex/subsidiary sett – active Two entrances c. 20m from the proposed development boundary Although the sett is in close proximity of excavation works associated with the build of the proposed route, the risk of disturbance to badgers is relatively low as it is screened from the proposed development by existing dense Blackthorn and Bramble scrub. There is no risk of sett collapse as the proposed development does not cross over the sett, and access to the area of works will not require movement over the sett. For these reasons, it is not considered proportionate or appropriate to close the sett for the duration of works. The mitigation measures that apply to sett S1 are as follows: Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing. Monitoring of activity at the sett throughout the construction-phase of the proposed development. Working extents in the vicinity of the sett entrances will be staked/marked by the appointed project ecologist. The works extents will be within 20m of the sett entrances. Works in the area will be subject to supervision by the project ecologist. Vegetation removal, where required may take place between September and February, to avoid the breeding bird season. Should work be necessary outside of this period, then clearance will be carried out in the presence of a suitably qualified ecologist who will undertake a check of vegetation in advance of clearance. Clearance will only be feasible where the ecologists confirms absence of nesting birds. Vegetation will be retained at the sett entrances to ensure that they continue to be screened from other works, and any removal of vegetation within 20m of the sett will be by hand / consist of light works. Earthworks in the vicinity of the sett will take place outside of the badger breeding season (December to June, inclusive) so as to avoid any risks of disturbing breeding sows.
S2	[Inactive sett within 30m of construction works] Main sett – appears inactive in 2019/2020 At least five entrances, additional entrances may be obscured by vegetation c. 30m from the proposed development boundary Although the sett is in close proximity of excavation works associated with the build of the proposed route, the risk of disturbance to badgers is relatively low as it is screened from the proposed development by existing dense Blackthorn and Bramble scrub. There is no risk of sett collapse as the proposed development does not cross over the sett, and access to the area of works will not require movement over the sett. For these reasons, it is not considered proportionate or appropriate to close the sett for the duration of works. The mitigation measures that apply to sett S2 are as follows: Pre-construction check of sett to establish current activity status within 12 months of any construction works commencing. Monitoring of activity at the sett throughout the construction-phase of the proposed development.

Ref. No.	Mitigation Measures
	Working extents in the vicinity of the sett entrances will be staked/marked by the appointed project ecologist. The works extents will be within 30m of the sett entrances. Works in the area will be subject to supervision by the project ecologist. Vegetation removal, where required may take place between September and February, to avoid the breeding bird season. Should work be necessary outside of this period, then clearance will be carried out in the presence of a suitably qualified ecologist who will undertake a check of vegetation in advance of clearance. Clearance will only be feasible where the ecologists confirms absence of nesting birds. Vegetation will be retained at the sett entrances to ensure that they continue to be screened from other works, and any removal of vegetation within 20m of the sett will be by hand / consist of light works. Earthworks in the vicinity of the sett will take place outside of the badger breeding season (December to June, inclusive) so as to avoid any risks of disturbing breeding sows.
S3	[Active sett 30-50m from construction works] Complex of Main sett and Associated Annex Setts – active At least eight entrances c. 20m from the proposed development boundary The sett will not be directly affected by construction works and the sett will be retained post-construction. Although works are proposed within 20m of one of the entrance of this sett, the works will be downslope from the sett and access to the works are will not include traversing the setts or their vicinity. There is also no rock-breaking or pile driving proposed within 150m of this sett. The mitigation measures that apply to sett S3 are as follows: Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing. Subject to consultation with, the approval of and, if required, under the supervision of a badger ecologist: no heavy machinery shall be used within 30m of badger setts; lighter machinery shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of the sett entrances, during the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts.
S4	[Inactive sett >50m from construction works] Outlier/Subsidiary Sett – inactive in 2019/2020 Two entrances c. 70m from the proposed development The sett will not be directly affected by construction works and the sett will be retained post-construction. No works are proposed within 50m of the sett. There is also no rock-breaking or pile driving proposed within 150m of this sett. The mitigation measures that apply to sett S4 are as follows: Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing. Subject to consultation with, the approval of and, if required, under the supervision of a badger ecologist: no heavy machinery shall be used within 30m of badger setts; lighter machinery shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of sett entrances, during the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts.

6.6.3 Measures to Minimise and Avoid Disturbance Effects on Badger During Operation

230 A suitable fencing design will be agreed at detailed design stage with DLR's Biodiversity Officer. At a minimum the fencing will:

1. Guide and direct users through Druids Glen to reduce disturbance and other potential negative impacts on ecologically sensitive features, including rare flora;
2. A fencing design that is sympathetic to the natural surroundings, whereby the fencing does not impact negatively on ecologically sensitive features, e.g. through its installation or ongoing maintenance;
3. Incorporate any design features if and where needed, to facilitate movement of fauna through the area;
4. Use sustainable and low maintenance materials
5. Not impede water or water flow through the area

231 An example of a potentially suitable design is a slatted fence, similar to fencing designed for boardwalks[32]. In addition to the provision of fencing through the Druids Glen, signposts containing a visitors code of conduct, which will include at minimum the following, will be installed at all access/egress points to the Druids Glen Woodland:

1. Visitors to the Druids Glen Woodland commit to staying on the boardwalk, and will not diverge off the boardwalk to avoid disturbing sensitive flora and fauna contained in the woodland.
2. Visitors with dogs will maintain their dogs on a lead/restraining device at all times to avoid disturbing sensitive flora and fauna contained in the woodland.
3. Visitors to the woodland will leave no trace of their visit, and take only pictures of the site.

232 While some users may choose to scale the fence, it is anticipated that vast majority of users will be directed away from badger foraging and resting places, and the likelihood of disturbance and displacement of badgers will be reduced to levels that are not considered to be significant.

6.6.4 Assessment of Effects on Bats

<u>Removal of Foraging and Roosting Habitats</u>

233 As mentioned in Section 6.5.4, page 56, small sections of woodland habitat will be removed to facilitate the construction of the proposal, namely a patch of mixed broadleaved woodland east of the Cherrywood Business Park campus. There will also be a cumulative removal of grassland habitats along the proposed route, which are to be replaced by artificial surfaces.

234 The area of woodland in Cherrywood Business Park is of recent origin, dating to the completion of the park in the late 1990s/early 2000s. It is a dense woodland block with very little understorey and is located in the context of an urban park. Bat activity in this area was heavily dominated by common pipistrelle bat, soprano pipistrelle bat and Leisler's bat, species that tend to utilise edge habitat, and are the most commonly encountered species in Ireland, particularly in urban and semi-urban settings. It is anticipated that these bat species will continue to forage in this area following removal of woodland vegetation. Similarly, the removal of vegetation along the remainder of the route is not anticipated to significantly reduce available prey species for bats on account of the small loss of habitat. The construction of footpaths through Druids Glen, the area of highest bat activity, is over existing paths and will not result in removal of

[32] An example is available for view at the following website: HC4 Decking Planks | Projects | EcoChoice [Accessed 02/03/2022].

foraging habitat. Therefore, it is unlikely that removal of vegetation along the proposed route will significantly affect foraging bats.

235 The proposal will not involve the removal of any structures which have potential to host roosting bats. Several trees in Druids Glen that have been identified as having suitability for roosting bats have been identified as requiring work by the project arborist(Arborist Associates, 2021), and are to be removed as part of the proposal. The locations of trees, cross referenced against their tree tags, and the approach with regards to avoidance of effects on roosting bats are detailed in Table 9, overleaf.

Table 9: Mitigation measures for identified trees with PRFs along the proposed route.

Tree Tag No.	ITM Ref	Tree Species	PRF Type	PRF Height (m)	Notes	Mitigation Measures
0913	O 22900 24135	Sycamore *Acer pseudoplatanus*	Lifting Bark	2	Flaking bark between 0 and 200cm. Suitable for individual bats from time to time. Listed as category U in the Arborist's Assessment (Arborist Associates, 2021), and scheduled for removal	Inspect before completion of any works
0916	O 22895 24126	Beech *Fagus sylvatica*	Transverse snap	15	Transverse snap on eastern side of tree high in canopy. Difficult to tell depth of cracks, likely to be quite small and therefore suitable only for a few individual bats. Listed as category U in the Arborist's Assessment (Arborist Associates, 2021), and scheduled for removal	Inspect before completion of any works
0944	O 23049 24164	Sycamore *Acer pseudoplatanus*	Butt rot	1.2	Large cavity in bole extends from ground. Covered partially with ivy, providing additional insulation/protection. Valued high in light of woodland setting and woodland species occurring in Druids Glen. The arborist has listed the tree as C2, and recommended removal of dead/unstable material, and monitoring/assessment of basal decay, with potential for additional remedial work	Presence/absence checks to determine if used (April through September/October). Continued inspection with endoscope. If required for felling, licence may be required.
0956	O 23081 24151	Sycamore *Acer pseudoplatanus*	Frost crack	2.5	Large frost crack extending from base of stem up tree length. Smallish cavity at c 250cm with some potential to host roosting bats from time to time. The tree has been listed as C2 by the Arborist (Arborist Associates, 2021), and recommended removal of dead/unstable material, and monitoring/assessment of basal decay, with potential for additional remedial work	Inspect before completion of any works
0989	O 23082 24099	Hornbeam *Carpinus betulus*	Frost crack	2	Relatively open crack, potential to act as night roost or day roost for small number of bats. The Arborist has listed it as C2 (Arborist Associates, 2021) and recommended reduction in crown size above 3m and removal of dead/unstable growth	Inspect before completion of any works

Tree Tag No.	ITM Ref	Tree Species	PRF Type	PRF Height (m)	Notes	Mitigation Measures
01030	O 23371 24083	Sycamore *Acer pseudoplatanus*	Transverse snap	5	Snap located on lowest branch on NW side of tree. Viewed from ground level only, however likely to be a relatively small crack. The Arborist has recommended reduction in crown size.	Inspect before completion of any works

236 The removal of these trees could result in the loss of a roost and mortality or disturbance of roosting bats, should the trees be occupied at the time of felling. Bats tend to move between tree roosts regularly (up to every night) in Ireland and Britain (Andrews, 2013), and for this reason, the likelihood of bats being present during felling of the trees is low. Nonetheless, all bats and their roosts are protected by law in Ireland, and the loss of a roost would be significant, most likely at the local geographic scale given the small number of trees scheduled for removal. It should be noted that PRF features deteriorate and arise from events such as storms, or growth defects in trees. Considering the large tracts of woodland that will remain during the operation of the proposal, it is likely that PRF features will continue to develop and be occupied by bats in Druids Glen.

237 There is potential for habitat loss arising from the proposal on its own to act cumulatively with habitat loss from other plans or projects in the Cherrywood SDZ, if these are timed to coincide with works along the route, and involve loss of bat foraging and roosting habitat. However, in light of the protection afforded to habitats in the Cherrywood SDZ arising from objectives and policies of the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014), specifically the requirement of Policies GI19, GI 62, GI 63, and GI 69, which relate to developments within Druids Glen, cumulative effects are not anticipated to be any greater than those arising from the proposal on its own.

The Effects of Artificial Lighting of the Proposal on Bats

238 The sensitivity of woodland habitats and the fauna they support has been a consideration during the design of the proposal. Lighting proposals for the scheme has been divided into three separate zones as follows:

- Zone 1 comprises the area from Pond 5A to the rear of Cherrywood Business Park, the Wyattville Link Road and the Tully Vale section of Lehaunstown Valley (as far as Pond 2b). This zone is lit with standard pole lighting.
- Zone 2 comprises the area from Pond 2b to the Brennanstown development in the north and Lehaunstown Lane in the west. This area will be lit with bollard style lighting with light spill directed downwards from source.

239 Zone 3 comprises the Druids Glen Woodland between Lehaunstown Lane in the east and the unopened Brennanstown Luas stop in the west. This area does not include the provision of any lighting, due to the sensitivity of habitats and fauna in the woodland.

240 Considering the importance of the woodland and riparian corridor that the proposed route traverse for a range of fauna species, including bats, public lighting has been omitted from the entire scheme, except for a short *c.* 100m section pathway linking the N11 with the linear park immediately north of the Wyatville interchange with the N11.

241 The introduction of artificial lighting to an unlit area has the potential to affect bats in the following ways:

- Increasing the risk of predation by avian species. Bats are most vulnerable to predation as they emerge from or return to their roost (Institution of Lighting Professionals, 2018).
- Increased light spill on a roost entrance or in the immediate vicinity can result in a delay in emergence of bats. This delay can affect fitness if it results in reduced foraging hours (Stone, 2013).
- Many bats will avoid flying and foraging under lights due to the increased predation risk. The introduction of blocks of lighting in previously unlit environment can create a barrier effect to the movement of bats through the landscape, or can affect a commuting route between a roost and foraging areas (Institution of Lighting Professionals, 2018; Stone, 2013).
- In some instances, prey species (insects), are attracted to luminaires, particularly those with a stronger blue (ultraviolet or UV) spectrum. While some species continue to forage around lamps (e.g., pipistrelle species and Leisler's bat *Nyctalus leisleri*), rarer species (*Myotis* species, brown long-eared bat *Plecotus auritus*) will tend to avoid all streetlights. The reduction in available prey can have a significant effect on fitness and survival (Institution of Lighting Professionals, 2018; Stone, 2013).

242 These behavioural changes can affect reproductive rates and mortality of bats. Woodland specialist bat species, e.g., Daubenton's bat *Myotis daubentonii*, whiskered bat *M. mystacinus*, Natterer's bat *M. nattereri*, and brown long-eared bat are particularly sensitive to the effects of light pollution, while species such as common pipistrelle bat, soprano pipistrelle bat, and Leisler's bat, while still sensitive to light, appear to be more tolerant of lit environments (Roche *et al*., 2014).

243 As outlined in Section 5.3.2, page 31, eight of Ireland's nine bat species are likely to occur along the proposed route. Bat activity was concentrated in Druids Glen and along riparian areas of the proposed route. The introduction of lighting within zone 1 and zone 2 is likely to result in significant effects on foraging bat species. Lighting zone 1 consists of an existing park with some small copses of woodland, while lighting zone 2 contains higher suitability habitat for bats, including riparian areas and semi natural habitats. The introduction of artificial lighting to these zones is likely to result in significant effects on foraging bat species. For zone 1, some displacement of common bat species (e.g. common pipistrelle bat, soprano pipistrelle bat, and Leisler's bat) is most likely. Lighting in zone 2 has been designed to avoid any light spill over rivers and above 1.5m height, to avoid typical foraging locations and heights of more sensitive woodland specialists (e.g. Daubenton's bat *Myotis daubentonii*, Natterer's bat *Myotis nattereri*, and whiskered bat *Myotis mystacinus*). Nonetheless, there will be some limited displacement of bats from the area of lighting in zone 2.

244 The introduction of lighting is not anticipated to result in fragmentation effects on foraging or commuting bats. It is anticipated that bats will continue to travel over light columns, and along unlit features such as trees and hedgerows that will remain a feature of the valley post construction.

245 Significant effects on roosting bats are not likely, as lighting will not be introduced to the Druids Glen Woodland, which contains numerous trees with potential PRFs. No roosts were identified arising from roost presence/absence surveys undertaken for this project, and lighting from the proposal will not illuminate any buildings which could host roosting bats.

246 Although roads and public amenity infrastructure (parks) for the Cherrywood SDZ lands were built or in the process of being built at the time of writing of this report, the Cherrywood SDZ lands remain only partially developed. The lighting regime across the Cherrywood SDZ will be substantially altered in the short to medium term as plots of land are developed. The cumulative effects of additional lighting across the SDZ area is likely to result in the displacement, particularly of more light-sensitive bat species, from otherwise suitable habitat. Notwithstanding this, the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) and the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) include policies and objectives which will minimise cumulative effects on foraging bats through the retention of features of importance for commuting and feeding bats, e.g., GI 43, GI 51, GI 52, GI 59, GI 62, GI 63. GI 50 requires the minimisation of public lighting within 30m of existing or proposed hedgerows across the Cherrywood SDZ. For this reason, the effects of the proposed route in combination with any other plans or projects is not likely to be any greater than the effects of the proposal on its own.

6.6.5 Measures to Avoid Disturbance or Mortality of Roosting Bats

Pre-felling Checks of Trees

247 As the absence of bats from trees in Druids Glen could not be confirmed through surveys to inform this report, a precautionary approach will be adopted with regard to any tree surgery along the proposed route. In general, tree surgery will be undertaken between March and April or between mid-August and mid-November, coinciding with the season where bats are unlikely to either be in torpor or raising young, and therefore at least risk of disturbance. Tree surgery will not take place on days where daytime temperatures fall below 10˚C, e.g., when bats are likely to enter torpor. Trees will be appraised for the presence of cavities. If cavities are identified, they will be checked / assessed by a suitably qualified, experienced, and licensed bat worker for the presence of bats or signs of bats. The bat worker will be familiar with the methodologies for PRF identification and inspection as contained within the *Bat Tree Habitat Key* (Andrews, 2013). If bats or signs of bats are identified, works on the relevant tree will cease the contracted bat worker may need to prepare a mitigation strategy for the removal of a roost, in consultation with the NPWS, and

a derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario.

248 In some instances, cavities may not be accessible for inspection due to their height or location on a tree. In other scenarios a cavity may not contain bats or signs of bats, but be suitable for roosting bats. In such scenarios, the relevant part of the tree/tree limb/branch will be section felled where feasible[33], in such a manner as to retain the cavity within a single felled section of tree. Where feasible[33], the sections will be soft felled, e.g., lowered to the ground in a controlled manner, which will minimise risk of trauma and mortality of bats. The sections will be left in situ at ground level for a minimum of 24 hours. This will ensure if bat are present within, they will be afforded time to escape from the cavity.

249 Trees identified with PRF features have been listed in Table 9. In brief all trees identified as containing PRFs are to be inspected using endoscope in advance of any tree surgery. With respect to tree number 0944 which has been identified as a category U tree and therefore will be removed to facilitate the proposed route, the following specific measures will also be required in order to avoid potential disturbance or mortality of bats:

- Roost presence/absence checks will be undertaken for tree number 0944 prior to felling to rule out the presence of roosting bats. These checks may include extended observations of the tree at dawn and/or dusk, to identify bats emerging from or returning to the tree. In light of the location of the tree within dense woodland, specialist equipment such as infrared cameras are likely to greatly enhance the ability of the surveyor to determine roost presence/absence and will be utilised where considered appropriate. If bats are identified roosting in tree number 0944, the contracted bat worker may need to prepare a mitigation strategy for the removal of a roost, in consultation with the NPWS. A derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario. If the surveyors confirm that the tree is not likely to be occupied by bats, or used as a roost, the tree will be section felled (where feasible), in such a manner as to retain the cavities within single sections of tree. Where feasible, the sections will be soft-felled, and the sections left at ground level for a minimum of 24-hours.

Measures for the Unforeseen Discovery of Bats

250 In the event of the unforeseen discovery of bats during tree removals, all works in the relevant tree will cease. A suitably qualified, experienced, and licensed bat worker will be engaged to prepare a mitigation strategy for bats, and to liaise with the NPWS. A derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario.

6.6.6 Assessment of effects on Otter and Aquatic fauna

Effects of Construction-phase Water Quality Impacts on Otter and Aquatic Fauna

251 As outlined in Section 6.1.1, page 41, and Section 6.5.5, page 58,in the absence of any mitigation, there is potential for pollutant-laden surface waters to affect water quality in the Shanganagh River and its tributaries, where they are located downstream of works. The risk of such effects is low in light of the attenuation capacities of the receiving surface water network and the size of the proposed works area (Aecom, 2021). With regard to otter and other aquatic fauna, the risk of surface water quality is not likely to be significant: Any potential effects are not anticipated to be of a scale and duration as to affect prey abundance in the Shanganagh River and its tributaries, and the river already appears to be somewhat polluted based on the outcomes of macro-invertebrate sampling documented in Section 5.3.5, page 38.

252 Policies GI 58, GI 60, and GI 62 of the *Cherrywood SDZ Planning Scheme* (Dún Laoghaire-Rathdown County Council, 2014) relate specifically to the protection of surface waters. In light of the protective nature of these policies, cumulative effects of water quality impacts on surface waters are not likely to arise from

[33] The appropriateness of section felling, and soft felling is to be also subject to workplace health and safety considerations of the tree surgeon. For example, trees located on a steep slope may not be section felled due to their location.

plans or projects within the SDZ lands. The potential effects of the proposal in combination with other land-use activities in the Shanganagh River catchment are not anticipated to be any greater than the effects of the proposal on its own, e.g., significant cumulative effects on otters and aquatic fauna are not predicted.

Potential Construction-phase Disturbance Effects on Otter

253 The construction-phase of the proposal will include works within 150m of a potential otter holt, located in Druids Glen. The potential holt is located in a wall and works do not have the capacity to result in the collapse of the holt due to the separation of the holt from the area of works by the Carrickmines Stream. However, the continuing presence of construction personnel during the resurfacing of pathways in the vicinity of the potential holt, could result in temporary abandonment. In light of the size and dimensions of the entrance to the potential holt (<25cm), it is likely to be too small to accommodate adult otters, but may be used by juvenile non-breeding individuals. Therefore, the effects of disturbance are likely to be significant at the level of an individual non-breeding animal only, and effects on a breeding pair are unlikely. The effects of disturbance are expected to be temporary, e.g., they will correspond to the period of construction within close proximity (approximately 150m) of the potential holt.

254 In-combination effects of disturbance during construction is not anticipated to be any greater than disturbance arising from the proposed route on its own.

Potential Operational-phase Disturbance Effects on Otter

255 The footpaths through the Druids Glen, are currently subject to low levels of use by humans, while the remainder of the route includes sections that have very low levels of human activity due to dense vegetation, e.g., the Carrickmines River/Tully Valley between Tully Vale apartments in the south and the Brennanstown development in the north. The improved access along the proposed route for humans will result in a dramatic rise in human activity over the existing baseline. Otter are known to be somewhat sensitive to disturbance and may time their activity to avoid encounters with humans or their pets (e.g., dogs) (NRA, 2006; Macklin & Brazier, 2019).

256 Increased levels of human presence, in the Druids Glen could affect local otters and result in changes to diurnal activity, and/or the abandonment of a potential holt. The latter is only likely if the holt entrance was subject to overlooking or frequent visitation. However, the likelihood of humans entering the riparian environment will be low along Druids Glen section due to the inclusion of fencing in the design of the proposal. The effect on diurnal activity is likely to be reduced over the baseline, and therefore significant, albeit any effects will be confined to the population resident along the proposed route (likely 1-2 otter families). The location of the potential holt in Druids Glen is on the opposite bank from the proposed route, and shielded from view by existing vegetation. Therefore, the risk of operational phase disturbance is low, and abandonment is unlikely.

6.6.1 Mitigation for Otter and Aquatic fauna

Measures to Protect Water Quality in the Receiving Environment

257 Notwithstanding the conclusion of an absence of significant effects on otter and aquatic fauna arising from the proposed route, the measures for the protection of watercourses outlined in Section 6.5.7, page 58 and the FPMS accompanying this report as Appendix IX will address the potential for pollutants to enter the downstream receiving environment and thus provide protection for aquatic fauna.

Measures to Avoid and Reduce the Effects of Disturbance on Otters during Construction

258 The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2008). These guidelines set out the best practice approach in considering and mitigating impacts on otters during construction works.

259 As the usage of the potential holt can change over time, a pre-construction check of the activity status of the identified potential holt at Druids Glen will be carried out within three months of any construction work commencing within 150m of the potential holt. Wildlife cameras will be deployed to monitor activity at the potential holt for a period of at least 14 days, to confirm whether it is active/inactive, and that it does not host a breeding female with cubs.

260 In the event that the potential holt hosts a breeding female with cubs, works will not commence within 150m of the holt until breeding ceases (to be determined by deployment of wildlife cameras, or similarly suitable methodologies).

261 In addition to the above, contractors for the proposed route will be briefed on the sensitivity of otters and other fauna receptors along the proposed route as part of a toolbox talk delivered by an appropriate qualified and experienced Project Ecologist in advance of commencement on site.

6.6.2 Assessment of effects on Birds

The Effects of Habitat Loss on Birds

262 The loss of rank habitats, e.g., sections of woodland, tall grassland, and other structurally dense vegetation, to facilitate construction and operation of the route will be permanent. These habitats are particularly suitable for nesting passerine species identified along the proposed route, e.g., robin, wren, blackbird etc. Ground-nesting specialists such as meadow pipit *Anthus pratensis*, skylark *Alauda arvensis* and plover species were not observed during breeding bird surveys of the proposed route (although they are known from the wider Cherrywood SDZ Lands (Author, pers. Obs.)), and are not likely to be affected by clearance of vegetation along the proposed route. The effects of habitat loss will be significant, albeit at a local scale only. Although he bird fauna of the proposed route has been valued as being of county importance, vegetation clearance will affect only a portion of this fauna.

263 As outlined already, the Cherrywood SDZ is likely to be developed in the short to medium term, and there is therefore potential for cumulative effects arising from habitat loss from the proposal in combination with other plans or projects. Nonetheless, protective policies of the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) and the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) include the set aside of habitats of highest value for breeding birds. For this reason, the cumulative effects of the proposal are not anticipated to be any greater than the effects of the proposal on its own.

Disturbance and/or mortality arising from construction in breeding season.

264 The proposed route and surrounding areas contain a range of common bird species, which are associated with urban and suburban habitats in Ireland. The proposed route also contains more specialist species such as dipper, and species that tend to nest in woodland (e.g., raptor species). It is anticipated that most species along the proposed route will habituate to human presence, including activities associated with the construction phase of the proposal, however raptor species and corvids nesting in Druids Glen are likely to be disturbed by activities such as operation of machinery, removal of trees and management of understorey species (e.g., removal of cherry laurel) in Druids Glen, should such activities take place when they are nesting. While any such activities would be temporary or short-term, they would be significant albeit at the local geographic scale only.

265 In the absence of any mitigation measures, there is potential for disturbance and/or mortality of bird species arising from the removal of vegetation, including rank grassland, bramble and trees and shrubs to facilitate access to and construction of the proposed development. Such effects are relevant for the entire proposed route, e.g., they would not be confined to the Druids Glen. The effects of vegetation clearance, in the absence of mitigation and if it coincided with the breeding bird season, would be significant given the legal protections afforded to all birds and their nests. The scale of significance would likely be at a local level: Although the proposed route contains a bird fauna of county level importance (see Section 5.3.3, page 36 for valuation of birds), the sum total of nesting habitat that will be removed will likely host only a portion of the total breeding bird fauna along the proposed route. The duration of effects from disturbance would likely be short-term, e.g., confined to one or two breeding seasons coinciding with the construction of the proposed route.

266 There is potential for disturbance/mortality of breeding birds during the construction of the proposed route to act in-combination with effects of other proposals in the Cherrywood SDZ. Several planning applications that have been granted planning or are in the planning process are likely to progress to construction between publication of this report and commencement of works on the proposed route.

However, the scale of effects of disturbance/mortality on breeding birds in-combination with other plans or projects is not likely to be any greater than the level of effects from the proposed route on its own. This is because habitats of highest suitability for breeding birds (e.g., hedgerows, treelines and woodland) in Cherrywood are afforded protective policies in the *Cherrywood SDZ Planning Scheme 2014* (Dún Laoghaire-Rathdown County Council, 2014) and the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014), including GI 43, GI 51, GI 52, GI 59, GI 62, GI 63. GI 50. Policy BP 08 of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) relates specifically to breeding birds, and requires checks of suitable vegetation in advance of clearance or activities which could disturb breeding birds.

Disturbance of Birds during Operation of the Proposed Route

267 Increased human presence along the proposed route both on its own and in-combination with other proposals is likely to result in changes to activity of birds. Raptor species are likely to nest in denser areas of woodland away form footpaths, while dipper may avoid sections of river that is exposed to overlooking by the resurfaced footpath in Druids Glen. These effects are not likely to be significant at any geographic scale however, since the species identified along the route are common and widespread species that are encountered in urban parks, and heavily utilised riparian corridors in the Dublin region. It is anticipated that all species will adapt to changes in human activity but will continue to occupy and utilise habitats along and in the vicinity of the proposed route.

6.6.3 Measures to Avoid Mortality and Disturbance of Breeding Birds

268 Rank vegetation (e.g., hedgerows, treelines, tall grass, dense bramble, nettles etc) along the proposed route will be removed outside of the breeding bird season (e.g., between 1st September and 28th/29th February, inclusive). Trees identified in Druids Glen for removal or tree surgery, as mentioned in Section 6.6.5 page 71, may need to be worked on within the breeding bird season in order to comply with measures to void the mortality of roosting bats. In such a scenario, the area of proposed works will be checked in advance by a suitably qualified and experienced ecologist for nesting birds. Where the presence of nesting birds cannot be ruled out, tree surgery will be postponed until the appropriate window when nesting has finished and when tree surgery is of low risk to roosting bats.

6.6.4 Assessment of Effects on Reptiles and Amphibians

Effects of Habitat Loss and Degradation

269 The proposed route will not result in the loss of any breeding habitat for amphibians, as it does not include the infill or removal of any ponds or other temporary waterbodies. There will be some removal of suitable foraging habitat for amphibians. Most of this loss is of habitat that is relatively low suitability for amphibians, e.g. the loss of dry rank grassland types (dry meadows and grassy verges, and improved agricultural grassland). A small area of tall-herb swamp vegetation north of Tullyvale, which is of high suitability for amphibians due to its damp nature, will be lost as a result of the construction of the proposal. The loss of habitat is small and will not affect the conservation condition of either smooth newt or common frog at any geographical scale, and therefore the effects of this habitat loss are not likely to be significant.

270 As outlined in Section 5.3.4, page 37, the habitats along the proposed route are predominantly closed. They are suboptimal for common lizard due to their closed nature and the relative absence of basking sites. For this reason the loss of vegetation along the proposed route is not likely to have any significant effects on lizards.

Mortality Effects during Construction

271 In the absence of mitigation, there is potential for works in the vicinity of the following locations to result in the mortality of foraging amphibians:

- An area of tall-herb swamp in the Carrickmines River Valley (e.g. in vicinity of Irish Grid reference O 23879 23732);
- An attenuation pond in the Carrickmines River Valley (O 24036 23594); and,

- A pond in the grounds of Lehaunstown house (O 23445 24112).

272 Mortality is most likely to arise from the removal of vegetation by mechanical means, and through the operation of plant and machinery through this area. Although mortality effects are not likely to affect the conservation status or condition of either smooth newt or common frog at any geographic scale, both species are afforded protection under the wildlife acts, and it is considered appropriate to provide measures to reduce and avoid any mortality effects on these species.

6.6.5 Measures to Avoid Mortality Effects on Amphibians

273 Rank vegetation in the vicinity of the locations described in paragraph 271 will be removed during the winter months (e.g. between November and February), when the risk of encountering foraging amphibians is lowest.

274 Amphibian-proof fencing will be installed around the three locations to prevent any potential amphibians entering the area of proposed works along the route. The fencing will be installed following clearance of vegetation within the proposed works area and in advance of the operation of heavy machinery within the proposed works area. A project ecologist acting in an Ecological Clerk of Works role will oversee the implementation of the amphibian fencing. While risks of mortality of individual amphibians will remain, any such mortality events will not affect the conservation status of either common frog or smooth newt, and will not affect the population at the local scale. The actions provided in this section will reduce the potential effects of mortality on amphibians from the proposed development to levels that are not significant.

6.6.6 Residual Effects for Fauna

275 Mitigation measures, including mitigation measures through design, have been outlined in the Sections above, which are intended to avoid, remove, and reduce significant effects on fauna along the proposed route. Following the implementation of these measures, the residual effects of loss of foraging habitat on bats, mortality of roosting bats, construction-phase disturbance on otter, and all effects on birds will not be significant at any scale. Residual effects arising from displacement of bats from the introduction of operational stage lighting through part of the Green Routes Network, disturbance and displacement of badgers during construction and operation, loss of roosting habitat for bats, and disturbance of otter during operation remain significant, albeit at the local geographic scale.

6.7 Table of Effects and Mitigation

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
Designated Sites	National to International importance	Yes	Spread of giant hogweed to Loughlinstown Wood pNHA	Biosecurity measures contained within Section 6.5.3 page 50, and in the Habitat and Species Management Plan in Appendix VIII	None
Habitats and Flora					
Protected and rare flora	County importance	Yes	Loss or degradation through unsympathetic construction or design, trampling at operational stage	Design measures have been included to avoid loss of the species during construction. The route has been designed to discourage trampling of green-flowered helleborine. See Section 6.5.1 page48	None
Invasive flora	None – Constraint feature	Yes	Facilitation of spread of invasive species within and outside the proposed route	Measures to control and prevent the spread of invasive species as documented in Section 6.5.3 page 50 and in HSMP, Appendix VIII and invasive species management plan, Appendix X	None

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
Buildings and Artificial Surfaces (BL3) Spoil and Bare Ground (ED2) Recolonising Bare Ground (ED3) Improved Agricultural Grassland (GA1) Amenity Grassland (GA2) Amenity Grassland/Ornamental Shrub/Flower Border Mosaic (GA2/WS3/BC4) Dry Meadows and Grassy Verges (GS2) Wet Grassland (GS4)Scattered Trees and Parkland (WD5)	Local importance (lower value)	No	None	None	None
Recolonising Bare Ground (ED3) – Area around attenuation pond in southeast of route	Local importance (higher value)	No – not within footprint of proposed works	None	None	None
Other Artificial Lakes and Ponds (FL8)	Local importance (higher value)	No – not within footprint of proposed works			
Calcareous Springs (FP1)	International importance	Yes	Habitat loss effects not significant at any scale as outlined in Section 6.5.4, page 56. No significant effects anticipated due to the	None	None

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
			distance of these features from the proposed route, as outlined in Section 6.5.9 page 61. The proposal is located downgradient of this habitat and there is no possibility of construction of the proposal affecting the springs catchment areas.		
Tall-herb Swamps (FS2)	County to national importance	Yes	Shading of a small section of this habitat type will result in significant effects at a local level only as outlined in Section 6.5.4, page 56.	None	Residual effects remain significant at a local level with respect to loss of habitat through shading.
Eroding Rivers (FW1) And Depositing Rivers (FW2)	County importance	Yes	Surface water run-off from the proposal could affect water quality in watercourses along and downstream of the proposed route, as documented in Section 6.5.5 page 58	Measures for the protection of watercourses are described in Section 6.5.7 page 58	None
(Mixed) Broadleaved Woodland (WD1)	County importance	Yes	Loss of habitat, degradation of habitat during construction and during operation, as described in Section 6.5.4 page 56, and Section 6.5.5 page 58,	Design measures include the provision of balustrades in Druids Glen to discourage off-piste travel. Working practices to avoid and prevent accidental degradation of	Residual effects remain significant at a local level with respect to habitat loss. Residual effects of habitat degradation arising from additional footfall during operation

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
			and Section 6.5.9 page 61.	woodland habitats during works are outlined in Section 6.5.9 page 61	will be reduced but cannot be ruled out entirely and remain significant, albeit at a very localised level No significant residual effects arising from construction phase degradation of woodland habitats
Hedgerows (WL1) And Treelines (WL2)	Local importance (higher value)	Yes	Loss of habitat, degradation of habitat during construction as described in Section 6.5.4 page 56, and Section 6.5.5 page 58.	Working practices to avoid and prevent accidental degradation of woodland habitats during works are outlined in Section 6.5.9 page 61	Residual effects remain significant at a local level with respect to habitat loss. No significant residual effects arising from construction phase degradation of woodland habitats
Wet Pedunculate Oak-Ash Woodland (WN4)	County importance	Yes	Loss of habitat, degradation of habitat during construction and during operation, as described in Section 6.5.4 page 56, and Section 6.5.5 page 58, and Section 6.5.9 page 61.	Design measures include the provision of balustrades in Druids Glen to discourage off-piste travel. Working practices to avoid and prevent accidental degradation of woodland habitats during works are outlined in Section 6.5.9 page 61	Residual effects remain significant at a local level with respect to habitat loss. Residual effects of habitat degradation arising from additional footfall during operation will be reduced but cannot be ruled out entirely and remain significant, albeit at a very localised level

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
					No significant residual effects arising from construction phase degradation of woodland habitats
Riparian Woodland (WN5)	Local importance (higher value) to county importance	Yes	Degradation of habitat during construction and during operation, as described in Section 6.5.5 page 58, and Section 6.5.9 page 61.	Design measures include the provision of balustrades in Druids Glen to discourage off-piste travel. Working practices to avoid and prevent accidental degradation of woodland habitats during works are outlined in Section 6.5.9 page 61	Residual effects of habitat degradation arising from additional footfall during operation will be reduced but cannot be ruled out entirely and remain significant, albeit at a very localised level No significant residual effects arising from construction phase degradation of woodland habitats
Scrub (WS1)	Local importance (Higher value)	No	None	None	None
Fauna					
Otter	County importance	Yes	Disturbance during construction and operation of the proposed route as described in Section 6.6.6 page 72	Monitoring of potential holt site prior to commencement of construction to confirm absence of breeding female and cubs.	Significant residual effects remain at a local level.
Badger	Local importance (higher value)	Yes	Disturbance during construction and operation of the proposed route as	Monitoring of main sett S2 in advance of construction works. Restriction of working in	Residual effects are not significant for disturbance and lighting during operation.

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
			described in Section 6.6.1 page 62. Significant effects arising from lighting have been avoided through design measures. Significant cumulative effects arising from habitat loss across the Cherrywood SDZ are predicted	the vicinity of S2 to outside of the maternity season (December-June, inclusive). Planting between the proposed route and Sett S2	Significant residual effects remain at a local level arising from habitat loss cumulatively with other plans and projects in Cherrywood.
Other terrestrial mammals	Local importance (higher value)	Yes	None	None	None
Bats	County importance	Yes	Habitat loss arising from loss of woodland habitat Displacement arising from artificial lighting in lighting zones 1 and 2 Disturbance and mortality of bats during construction	Protocols for checks/examination of trees prior to tree surgery, restriction of removal of trees with PRFs to shoulder seasons for bats (Spring and Autumn), protocols for felling trees with PRFs as described in Section 6.6.5 page 71 Design of lighting in zone 2 to reduce potential zone of impacts of lighting for woodland specialists	Residual effects remain significant arising from habitat loss Residual effects remain significant at the local scale for displacement of bats arising from lighting No residual effects for disturbance or mortality of bats
Birds	County importance	Yes	Loss of habitat Disturbance and mortality during	Protocols for checks of potential nesting bird habitat in advance of works, protocols for	Significant residual effects arising from

Ecological Feature	Value	Key Ecological Receptor?	Effect of Proposal	Mitigation	Residual Effect
			construction and operation	timing of clearance of vegetation as outlined in Section 6.6.3 page 75	habitat loss, albeit at a local scale. No significant residual effects arising from disturbance or mortality during construction or operation.
Reptiles and amphibians	Local importance (higher value)	Yes	None	None	None
Aquatic Fauna in the Receiving Environment	County importance	Yes	None – Impacts arising from surface water run-off are not predicted to have a significant effect on aquatic fauna	None	None

6.8 Compliance with the Biodiversity Objectives of the Cherrywood Planning Scheme

276 The proposed route has been assessed against the Biodiversity policies and objectives of the *Cherrywood Strategic Development Zone Planning Scheme* (Dún Laoghaire-Rathdown County Council, 2014) in appendix VI, and against the policies and objectives of the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) in Appendix VII of this report. The proposed route is complaint in principle with the policies and objectives of both documents generally. With regards to policies GI 42 of the *Cherrywood Strategic Development Zone Planning Scheme* and BP01 of the *Cherrywood Planning Scheme Biodiversity Plan*, both of which relate to retained habitats across the SDZ lands, the proposal will include the removal of small segments of hedgerow/treeline earmarked for retention in Figure 12 of the *Cherrywood Planning Scheme Biodiversity Plan*. The sections to be removed are to facilitate north-south movement along the Carrickmines River valley, and cannot be avoided whilst delivering the proposed scheme. Compensation measures included in Section 7, below are intended to offset the loss of these sections of hedgerow/treeline.

7 Cumulative Effects

277 The potential cumulative effects of the proposal in combination with other plans, projects, or activities are considered with respect to land zoning of the current *Dún Laoghaire-Rathdown County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2022), *Cherrywood Strategic Development Zone Planning Scheme* (Dún Laoghaire-Rathdown County Council, 2014), and any other relevant land use plans in Section 6.5 and Section 6.6 of this report. This section includes evaluation of several large-scale proposals in the vicinity of the proposed route, which were on public display, in the planning system or publicly advertised at the time of writing of this report (January 2021). A list of these projects is provided in Table 10, below.

Table 10: Large-scale projects and proposals within the vicinity of the proposed route which could potentially act in-combination with impacts arising from the proposal.

Planning/Project Reference	Developer / Applicant	Grant of permission	Description
Loughlinstown Flood Relief Scheme 1st Phase	OPW in conjunction with DLRCC	On public display	Flood relief works to the Kill-o-the-Grange stream, which runs through Kilgobbet Park and discharges to Killiney Bay north of the Shanganagh River
DZ20A/0399	Quintain Developments Ireland Ltd.	22/01/2020	Mixed residential development across multiple plots in the Cherrywood SDZ area
DZ19A/0863	Tudor Homes Ltd.	14/01/2020	Large residential development in north of Cherrywood SDZ lands
DZ18A/1129	Hines Cherrywood Development Fund ICAV	04/02/2019	Attenuation pond for Beckett Park, Cherrywood SDZ Area
DZ17A/0714	William Neville & Sons	07/08/2018	Mixed residential scheme east of Tully Park, Cherrywood SDZ area

Planning/Project Reference	Developer / Applicant	Grant of permission	Description
DZ17A/0862 (parent application) DZ19A/0148 DZ19A/0458 DZ19A/1024 DZ20A/0002 DZ20A/0824	Hines Cherrywood Development Fund ICAV / CWTC Multi-family ICAV sub funds	29/05/2018 24/04/2019 19/06/2020 09/09/2020 09/09/2020 11/01/2021	Mixed-use town centre development and amendments / additions to same

278 As mentioned in previous sections, much of the Cherrywood SDZ lands are zoned for development, and are anticipated to be developed in the short to medium term. This will result in loss of habitats across the Cherrywood SDZ area. Nonetheless, the *Cherrywood Strategic Development Zone Planning Scheme* (Dún Laoghaire-Rathdown County Council, 2014) and the *Cherrywood Planning Scheme Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014) include an extensive list of policies and objectives which are intended to reduce, avoid, minimise, as well as offset potential effects of developing the Cherrywood SDZ lands. The full list of policies and objectives relating to biodiversity are reproduced in Appendix VI and Appendix VII of this report. All proposals that are submitted for planning in the Cherrywood SDZ area are required to comply with these policies and objectives. All of the proposals listed in Table 10 which have been granted planning, have committed to measures intended to comply with the protective policies and objectives of the *Cherrywood Strategic Development Zone Planning Scheme* and the *Cherrywood Planning Scheme Biodiversity Plan*.

279 The Loughlinstown Flood Relief Scheme, the consent for which lies outside of the planning system, will include the completion of an ecological assessment of the scheme. The proposal will be required to comply with the policies and objectives of the *Dún Laoghaire-Rathdown County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2022). The flood relief scheme is in a separate catchment to the proposed route, e.g., no flood relief works are proposed within the Shanganagh River or its tributaries as part of the Loughlinstown Flood Relief Scheme. There is therefore no possibility of cumulative effects arising for aquatic habitats or species within the Shanganagh River or its tributaries arising from works on the proposed route in-combination with works on the Loughlinstown Flood Relief Scheme. As the Loughlinstown Flood Relief Scheme is hydrologically connected to European sites in Killiney Bay, it will require the completion of an Appropriate Assessment Screening, and potentially a Natura Impact Statement. As detailed in Section 6.1.1, page 41, the assessment of effects on European sites arising from the proposed route has relied upon a CSM of hydrological / hydrogeological effects designed by Aecom. The CSM has included consideration of cumulative effects, and concluded that there is no possibility of the proposed route affecting water quality in Killiney Bay on its own or cumulatively with other plans or projects.

280 In conclusion, cumulative effects are not predicted to be any greater than residual effects arising from the proposed route on its own.

8 Compensation

Planting of Native Woodland

281 The proposed route will include supplementary planting of woodland habitats along the Carrickmines River/Tully Valley in the area north of the Tully Vale apartments. The area of supplementary planting will correspond to the western slope of the Carrickmines/Tully Valley, which is currently consists of improved agricultural grassland interspersed with hedgerows, and will be downslope of the proposed pond 2A. Planting will be with native species that are appropriate to the locality and soils. The tree mix will aim to reflect species that are present in the valley, and will include oak *Quercus* spp., hazel, alder, blackthorn and hawthorn. The understorey component will be allowed to develop naturally, with intervention as necessary to control invasive species e.g., giant hogweed. The intention of this supplementary planting is to offset

the loss of mixed broadleaved woodland further south in the vicinity of Cherrywood Business Park, whilst also enhancing the ecological connectivity of the Carrickmines River/Tully Valley: At present there is a gap between sections of woodland along the valley slope.

Management of Grassland for Biodiversity

282 Grassland along the proposed route will be managed to maximise its biodiversity value. A regime of grassland management whereby grass is cut once or twice a year, outside of the breeding bird season (1st March through 31st August, inclusive) will ensure that the suitable habitat for ground nesting specialists, e.g., meadow pipit and skylark, is retained in the Cherrywood SDZ lands following its development. The area of such grassland management will be undertaken on sections of the route which are not infested by giant hogweed, as there is a risk that such a regime could facilitate ongoing dominance of giant hogweed in the sward. The locations of grassland management will need to be refined and agreed with the council biodiversity officer post-construction. This measure will offset the loss of habitat arising from the proposal, as a greater area of rank grassland will be created than lost. Grassland across the scheme will not be resown with a commercial rye-grass mix following completion of the proposal (except in the immediate vicinity of watercourses where rapid regeneration is required to minimise and avoid soil run-off to the watercourse), and instead be allowed to regenerate naturally. This will ensure that the flora of local origin will develop. Verges either side of the proposed route, e.g., up to 1-2m either side of the cycleway may be cut for sight-line / security purposes.

Installation of Bat Boxes and Management of Woodland for Bats

283 A scheme of bat box installation will be undertaken to offset the loss of roosting habitat in the Druids Glen. As uptake of bat boxes is estimated to be 50%, it is considered appropriate to instal at least twice as many bat boxes as PRFs being lost. However, in this instance, there is an opportunity to enhance the PRF baseline, particularly in the Carrickmines River/Tully Valley which contains relatively few bat PRFs.

284 Twenty-five Schwegler type 1FF[34], and twenty-five Schwegler type 2F bat boxes will be installed at suitable locations to be determined by an appointed project ecologist, who will have experience in mitigation for bats. The bat boxes will be installed either by the ecologist or by the construction contractor under the supervision of the ecologist. It is preferable that each faces a slightly different aspect from southeast to southwest facing, to provide a range of slightly differing temperature regimes (Bat Conservation Ireland, 2015). They should also be located at least 3m above ground level to minimise the risk of interference by humans. The bat boxes will be located away from areas that are subject to artificial light spill. The GPS coordinates of the bat boxes will be logged, and the boxes will be catalogued to facilitate ongoing checks as part of a monitoring programme of their use (see Section 10 page 87).

9 Enhancement

Enhancement of Grasslands for Pollinators

285 Most grassland along the proposed route is relatively species-poor, dominated by grass species and with a poor forb component. The existing swards are likely to be of relatively low value for pollinating insects, species which have undergone a sharp decline in the recent past. The rank nature of grass species is likely to exclude colonisation by forbs. To open the sward and encourage colonisation by forb species, yellow-rattle *Rhinanthus minor*, a hemi-parasitic plant species which suppresses grass growth, will be sown over targeted areas of retained rank grassland. The areas of highest suitability for this are in the vicinity of the Cherrywood Business Park, as these areas are not infested with giant hogweed. Yellow rattle seed will be sourced from local stock where feasible, or alternatively from an Irish source. Sowing will be undertaken during the season of active growth to encourage germination. Multiple sowings may be necessary to establish a viable and self-sustaining population of this species.

[34] Schwegler Bat Box 1FF Schwegler. Information on bat box and suppliers available from https://www.schwegler-natur.de/portfolio_1395072079/fledermaushoehle-2f/?lang=en

Eradication / Control of Giant Hogweed in the Shanganagh River Catchment

286 Measures that are appropriate for the control of invasive species along the proposed route are included within a site-specific Invasive Species Management Plan, prepared by Envirico, and included as Appendix X of this report. To ensure against recolonisation of the proposed route by giant hogweed from upstream seed sources, a catchment-wide eradication/control programme will be implemented for giant hogweed. The programme will be developed by an appointed invasive species specialist contractor, who will work in close contact with the local authority. It is likely that the programme will need to run over a sustained period (e.g., at least five years) to deplete the seed source for giant hogweed in the catchment of the Shanganagh River.

Installation of Swift Chimney Tower to Provide Swift Nesting Habitat

287 Numbers of breeding swifts have declined markedly since the 1990s (Gilbert *et al.*, 2021). This decline can partially be attributed to a decline in the availability of suitable nesting sites. Swifts nest in crevices, much like bats do, but require a large area free of obstructions in the vicinity of their nesting site, e.g., they are unlikely to nest in crevices in cluttered settings such as woodlands. No suitable habitat for nesting swifts was observed during surveys to inform this report, although swifts were observed foraging above the route. There is therefore an opportunity to enhance the proposed route for swifts through the provision of swift towers.

288 One swift chimney tower[35] will be installed along the proposed Green Routes Network. One of the towers will be located at the northernmost point of the proposed route, close to the boundary with the Brennanstown Development. It will be located close to the existing roadway to facilitate power connection. The precise location of the tower will be decided at detailed design stage in consultation with the DLRCC Biodiversity Officer. In order to maximise the chances of occupancy by swifts, it will be located in open space on a ridge crest, where clutter such as trees and shrubs are at a minimum. Attraction call systems for swifts should be considered to encourage uptake of swift towers by swifts.

10 Monitoring

289 This section details construction-phase and post-construction monitoring. The success of mitigation, compensation and enhancement measures will be measured by their completion. A Project Ecologist employed in an Ecological Clerk of Works (ECoW) role will be appointed to record completion of measures outlined in this report. Post-construction monitoring is proposed to gather information and assess whether the flora and fauna across the proposed route has responded favourably to mitigation, compensation and enhancement measures outlined in Section 5.4, Section 6.8, and Section 9 of this report.

290 Post-construction monitoring will be undertaken for the items listed below. A programme has been suggested for each item, although the programme will need to be agreed between the appointed Project Ecologist and the local authority. This is because several variables can influence programme, such as the completion date of the proposed route, whether the proposal is completed as a single entity or as several separate projects, or if the proposal is amended in the future:

- Green flowered helleborine in Druids Glen: Checks for the presence of green-flowered helleborine in Druids Glen will be undertaken by a suitably qualified and experienced ecologist (with a specialism in botany) in years 1, 3, and 5 post-construction during the summer months when flowering stems are visible (most likely between June and August). The target will be presence of orchid on each survey. The project ecologist may provide management recommendations pending the outcome of surveys.

[35] The design of swift chimney towers can be varied and bespoke for particular areas/sites. The proposal for swift chimney towers has been proposed based on consultation with Swift Conservation Ireland These chimney towers are purpose built, and an example of such structures can be seen at the following website: https://www.georgiaaudubon.org/chimney-swift.html [Accessed 01/12/2021].

- Invasive species: It is considered appropriate to monitor invasive species along the proposed route post-construction. In light of the long programme for eradication of invasive species (likely 5+ years), monitoring will be undertaken annually for at least the first five years post-construction. The need for further monitoring following the elapse of this period will be determined by the project ecologist in consultation with the DLRCC Biodiversity Officer. The target for monitoring will be absence of regenerating giant hogweed and cherry laurel from the Cherrywood SDZ area (e.g. along the proposed route, and in the linear parks through which the proposed route runs).
- The banks of the river along Druids Glen will be check for signs of erosion and trampling post construction. A baseline survey will be completed immediately after the completion of construction of the route, whereby any areas of human-induced erosion are identified. The target will be avoidance of additional areas of erosion. Monitoring will be undertaken in years 1, 3, and 5 post-construction. The project ecologist may provide management recommendations pending the outcome of surveys.
- The potential otter holt in Druids Glen will be monitored post-construction to determine activity. A baseline survey will be completed as part of the pre-construction checks of the holt detailed in Section 6.6.1, page 62 of this report. The target will be continued signs of use of the holt/its vicinity by otter. Post-construction surveys will be completed in years 1, 3 and 5 post-construction. The project ecologist may provide management recommendations pending the outcome of surveys
- The bat boxes erected as part of the compensation strategy for bats will be monitored by appropriately licensed, trained, and experienced bat workers and/or bat groups, to determine uptake by bats. The target will be occupancy or signs of occupancy of boxes by bats. Boxes will be monitored in years 1, 3, and 5 post-installation. There is an opportunity to involve local bat groups in the monitoring scheme. The appointed bat worker/bat group may provide management recommendations pending the outcome of any supervised, post-monitoring surveys.
- The swift chimney tower erected as part of the enhancement strategy for birds will be monitored by a suitably qualified and experienced swift specialist to determine uptake by swifts. The target will be occupancy or signs of occupancy of boxes by swifts. Swift towers will be monitored in years 1, 3, and 5 post-installation. There is an opportunity to engage local groups in the swift box monitoring scheme, in order to generate interest in the biodiversity of the proposed route, subject to supervision by a suitably licensed and qualified swift specialist. The swift specialist may provide management recommendations pending the outcome of surveys.

11 Conclusions

291 The AA Screening assessment of the potential for the proposed development to result in likely significant effects on any European sites, concluded that there is no possibility of likely significant effects on any European sites arising from the proposed route on its own or in-combination with other plans or projects.

292 The proposed route will not result in significant negative effects on any nationally designated areas for nature conservation downstream of the proposed development site.

293 Mitigation measures, including mitigation measures through design, have been outlined in the Section 6, which are intended to avoid, remove, and reduce significant effects on key ecological receptors (KERs) along the proposed route. Following the implementation of these measures, residual effects remain for habitat loss with regard to KER habitats, displacement of bats from the introduction of operational stage lighting through part of the Green Routes Network (Lighting Zones 1 & 2), disturbance and displacement of badgers during construction, loss of roosting habitat for bats, and disturbance of otter during operation. Cumulative effects are considered both in Section 6 and Section 7, and it is concluded that cumulative effects are not predicted to be any greater than the effects of the proposal on its own.

294 Compensatory woodland planting along the Carrickmines River/Tully Valley as described in Section 8 will however offset habitat loss arising from the proposed route. Measures outlined in Section 9 will enhance the biodiversity of grassland habitats along the proposed route and will represent an improvement in terms of habitat complexity and diversity over the baseline of the proposed route. The management of invasive

species on a catchment-wide scale will enhance the proposed route in terms of its floristic biodiversity, and ensure against the development of monospecific stands of non-native species. The installation of bat boxes as outlined in Section 8, will offset the loss of any roosting habitat, while the installation of a swift chimney tower as outlined in Section 9 will enhance the proposed route for swifts. Residual effects will remain significant at the local scale following compensatory and enhancement measures with respect to displacement of foraging bats from newly illuminated sections of the proposed route, and residual effects will remain at the local scale for the disturbance of badgers during construction.

295 It can therefore be concluded that although some residual effects will arise from the proposed route, the cumulative effects of mitigation, compensation and enhancement will have a neutral or positive effect on biodiversity.

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Appendix I – Ecologist Qualifications and Pen Profiles

Colm Clarke, MCIEEM, Principal Ecologist

Colm Clarke is a Senior Ecologist with Scott Cawley and has over seven

years' experience in ecological consultancy. He obtained an honours degree in Natural Sciences, with a specialisation in Botany, from Trinity College Dublin, and a Masters in Biodiversity and Conservation from the same institution. Colm is a full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), a member of the Irish Environmental Law Association (IELA), and chairperson of the Dublin Bat Group (an associated group of Bat Conservation Ireland (BCI). Colm also organises field excursions for the Botanical Society of Britain and Ireland (BSBI) Dublin/East Coast Local Group. Colm has been project manager and lead author on a large number of Ecological Assessments for Scott Cawley, and regularly undertakes both field work and report writing as part of his role. Colm undertook field surveys for a proposed route in 2019 and 2020, and is the principal author of this report.

Alexis FitzGerald, Consultant Ecologist

Alexis FitzGerald is a Consultant Ecologist at Scott Cawley. He holds an honours degree in Natural Sciences, with a specialisation in Botany, from Trinity College Dublin and obtained a distinction in his Masters in Biodiversity and Conservation from the same institution. Alexis has expertise in vascular plant, charophyte and bryophyte identification and habitat surveying, developed from his experience in university, professional ecological surveying and with natural history groups such as the BSBI and the Dublin Naturalists' Field Club (DNFC). He has been the BSBI County Recorder for Co. Monaghan since 2015. Alexis' professional experience includes vegetation and habitat classification and mapping (including EU Habitats Directive and Fossitt classification and statistical vegetation analysis), as well as rare, protected and invasive plant species surveying and monitoring. Alexis contributed to habitat surveys of the proposal, and co-authored Section 5.2 of this report.

Aoife O'Rourke, Consultant Ecologist

Aoife O'Rourke was a Consultant Ecologist with Scott Cawley. She holds an honours degree in Environmental Biology from University College Dublin, specialising in zoology and botany and obtained a distinction in her Masters in Biodiversity and Conservation from Trinity College Dublin. She subsequently completed a Research Masters in Trinity College Dublin which focused on investigating the forage and landscape requirements of pollinators on fixed dune ecosystems in Ireland. Aoife is an experienced ecologist with extensive experience in the areas of species, habitat and land management and monitoring for conservation, having worked within the NGO, research, and ecological consultancy sectors in the UK and Ireland. Aoife has undertaken ecological assessments for a range of projects including tourism, industrial, residential and renewable energy developments. She has a specialist interest in invertebrates and plants, particularly pollinating insects and their host plants, however, is also competent in a range of other fauna surveys (e.g., birds, mammals, and amphibians).

Shane Brien, ACIEEM, Consultant Ecologist

Shane Brien is a Consultant Ecologist with Scott Cawley. He holds an honours degree in Environmental Science from NUI Galway and completed his Masters in Ecological Assessment from University College Cork and is an associated member of the CIEEM. Shane has professional experience working in Spain and different parts of Ireland for the last four years. His work has included conducting habitat surveys, floral species lists, bird surveys, mammal surveys (e.g., bats, otters, and badgers), and invertebrate surveys. He has a great interest and enthusiasm in ecology, with a special interest in botany, and continues to further his skills with training courses and volunteering with various environmental NGOs in Ireland. Since joining Scott Cawley his work has been assisting with senior ecologists on the collection of ecological data, data analysis, desktop work and preparation of Appropriate Assessment Screening reports.

Niall McHugh, Field Ecologist

Niall McHugh was a Field Ecologist with Scott Cawley. He obtained an honours degree in Freshwater and Marine Biology from the Galway-Mayo Institute of Technology. He has been actively involved in numerous

ecological surveys with Scott Cawley and completed wintering bird surveys for the proposed development under the supervision of Colm Clarke. He is also a member of BirdWatch Ireland and has regularly undertaken volunteer bird surveys over the past 3 years including IWeBS, Garden Bird surveys and Hen Harrier surveys

Síofra Quigley, Senior Consultant Ecologist

Síofra Quigley is a Senior Consultant Ecologist with Scott Cawley. She obtained an honours degree in Undenominated Science, specialising in Zoology, from National University of Ireland Galway, and a master's in wildlife biology and Conservation from Edinburgh Napier University. She has three years' professional experience working in the UK on large to small scale infrastructure projects, with governmental and private clients. Síofra is experienced in carrying out field surveys in several protected species , including bat, otter, badger, red squirrel, reptile, pine marten and mountain hare. She has also been involved in radio tracking mountain hares and bats, bat call analysis, badger bait marking, acting as an Ecological Clerk of Works, Phase 1 habitat surveys and reports, and desk top studies. Since joining Scott Cawley, Síofra's work involves the preparation of reports, including Ecological Impact Assessment and Appropriate Assessment reports for residential, commercial, and infrastructural projects across Ireland.

Kristie Watkin-Bourne, Senior Consultant Ecologist

Kristie Watkin-Bourne is a Senior Consultant Ecologist at Scott Cawley Ltd. She holds a first-class honours degree in Physical Geography from Swansea University, and a first-class master's degree in Applied Environmental Science from University College Dublin. She is a CIEEM Member (Qualifying) and is experienced in conducting a range of terrestrial and aquatic ecological surveys for habitat and site appraisals, species monitoring, and impact assessment. With five years consultancy experience, Kristie has a wide range of experience in Appropriate Assessment, Ecological Impact Assessment, Cumulative Impact Assessment, and Strategic Environmental Assessment of plans and projects within the Irish planning environment. Kristie has worked on behalf of public sector bodies including Irish Water, The National Transport Authority, and several County Councils in addition to private developers across infrastructure, renewable energy, and residential development projects. Kristie undertook aquatic kick-sampling surveys to inform the assessment of effects of the proposed route on aquatic fauna.

Zuzana Erosova, Field Ecologist

Zuzana Erosova is a field ecologist with Scott Cawley Ltd. She holds an honours degree in Wildlife Biology from Institute of Technology Tralee. She has experience in habitat surveys, bat surveys including analysis, environmental sampling, and river quality surveys. She is working towards her CIEEM membership. She is a volunteer for Bat Conservation Ireland and Vincent Wildlife Trust. During her studies, she volunteered for conservation projects in Costa Rica and South Africa. Zuzana undertook aquatic kick-sampling surveys to inform the assessment of effects of the proposed route on aquatic fauna.

Hugh Delaney, Independent Ornithologist

Hugh Delaney is an Independent Ornithologist with over 12 years' experience in bird surveying, he has worked on a broad range of sites across Ireland primarily associated with wind farm projects and has very extensive knowledge of bird distribution, ecology and Identification and has contributed to bird surveys and record gathering for over 20 years. He has worked with Scott-Cawley on a range of projects including the Dun Laoghaire Harbour Deep Port proposal, Brent Geese surveys in North Dublin in 2015/16 and 2016/17, and the Sutton To Sandycove Promenade and Cycleway (S2S) project

Kevin Delahunty, Independent Ecologist

Kevin Delahunty is an independent ecologist with extensive experience in mammal surveys including bat, otter and badger as well as breeding bird and wintering bird surveys but also has experience in cetacean identification and fish stock surveys, including electrofishing surveys. He completed his Bachelor of Science degree in Zoology at University College Dublin and then a Master of Science in Biodiversity and Conservation at Trinity College Dublin. Kevin is the Education Officer of the Dublin Bat Group, an associate group of Bat Conservation Ireland. He has undertaken multiple surveys over the past three years in Ireland working with clients at the private and government level. Kevin has conducted mammal and bird surveys

for residential developments and linear infrastructure and completed Appropriate Assessment reports and Biodiversity Chapters of Environmental Impact Assessment Reports.

Niamh Burke CEnv, MCIEEM, Principal Ecologist, Coiscéim Ecology

Niamh Burke is Principal Ecologist with Coiscéim Ecology. She holds a BSc in Natural Sciences with Environmental Science and a PhD in salmonid ecology. She is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Full Member of the CIEEM. Niamh is a senior scientist with academic research and consulting experience in terrestrial ecology, aquatic ecology and fluvial geomorphology. She is an experienced project manager with a full working knowledge of EIA, the planning process and relevant environmental legislation, both national and European. With a specialism in aquatic habitats, she also has experience of terrestrial species' surveys and mitigation approaches. In her extensive consultancy roles, she has acted as reviewer for all ecological reporting and ensured consistency of standards and approach.

Ashling Cronin, ACIEEM, Technical Director

Ashling Cronin is Technical Director at Scott Cawley. She is an associate member of the CIEEM and holds a Masters in Ecological Assessment, an honours degree in Applied Ecology from University College Cork and an Advanced Diploma in Planning and Environmental Law from Kings Inns. She has over ten years' experience in environmental management and environmental / ecological assessment across both the private and public sector. Ashling has provided environmental and ecological support on a variety of planning applications. Ashling has a keen interest in both national and international environmental legislation and has extensive experience in the Appropriate Assessment (AA) process. She has been the lead ecologist for the preparation of a number of Natura Impact Statements for a range of development types and national plans, and Natura Impact Reports for a range of land use plans. Ashling also provides technical review and due diligence of Appropriate Assessment documentation for public and local authorities to aid their decision-making process as well as peer review of AA documentation prior to lodgement of planning applications.

Appendix II – Examples of Ecological Evaluation from NRA (2009)

Ecological Valuation Criteria

International Importance:
• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
• Proposed Special Protection Area (pSPA).
• Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
• Features essential to maintaining the coherence of the Natura 2000 Network.[36]
• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
• Resident or regularly occurring populations (assessed to be important at the national level)[37] of the following:
  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or
  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
• Biosphere Reserve (UNESCO Man & The Biosphere Programme).
• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
• Biogenetic Reserve under the Council of Europe.
• European Diploma Site under the Council of Europe.
• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[38]

National Importance:
• Site designated or proposed as a Natural Heritage Area (NHA).
• Statutory Nature Reserve.
• Refuge for Fauna and Flora protected under the Wildlife Acts.
• National Park.
• Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
• Resident or regularly occurring populations (assessed to be important at the national level)[39] of the following:
  ○ Species protected under the Wildlife Acts; and/or
  ○ Species listed on the relevant Red Data list.
• Site containing 'viable areas'[40] of the habitat types listed in Annex I of the Habitats Directive.

[36] See Articles 3 and 10 of the Habitats Directive.

[37] It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population, or the species is at a critical phase of its life cycle.

[38] Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

[39] It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population, or the species is at a critical phase of its life cycle.

[40] A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

Ecological Valuation Criteria

County Importance:
• Area of Special Amenity.[41]
• Area subject to a Tree Preservation Order.
• Area of High Amenity, or equivalent, designated under the County Development Plan.
• Resident or regularly occurring populations (assessed to be important at the County level)[42] of the following:
  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
  ○ Species protected under the Wildlife Acts; and/or
  ○ Species listed on the relevant Red Data list.
• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
• County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.
• Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):
• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared.
• Resident or regularly occurring populations (assessed to be important at the Local level)[43] of the following:
  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive.
  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
  ○ Species protected under the Wildlife Acts; and/or
  ○ Species listed on the relevant Red Data list.
• Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.
• Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value): • Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. • Sites or features containing non-native species that are of some importance in maintaining habitat links.

[41] It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

[42] It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County importance where the population forms a critical part of a wider population, or the species is at a critical phase of its life cycle.

[43] It is suggested that, in general, 1%of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population, or the species is at a critical phase of its life cycle.

Appendix III – Guidelines for the assessment of foraging and roosting habitat for bats

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (*i.e.,* unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well. connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

Appendix IV – Bat Roost Presence/Absence Survey Dates

Structure(s)	Survey type	Date	Surveyor and Device	Weather
Cottages Lehaunstown Lane	Dusk Emergence	18th July 2019	Niall McHugh – Batlogger M 1805-3081 Shane Brien – Batlogger M 1616-2486	17-18°C Light south-westerly wind no precipitation
	Dawn Re-entry	30th August 2019	Niall McHugh – Batlogger M 1616-2486 Shane Brien – Batlogger M 1616-2578	18-19°C Moderate southerly breeze no precipitation
Cherrywood Road – Viaduct and House	Dusk Emergence	10th July 2019	Shane Brien – Batlogger M 1616-2578	18-19°C Light southerly wind no precipitation
	Dusk Emergence	25th September 2019	Colm Clarke – Batbox Duet	20°C Moderate southerly breeze. Rain towards end of survey
Grovedale	Dusk Emergence	26th August 2020	Colm Clarke – Batlogger M 1616-2486 Kevin Delahunty – Batlogger M 1928-3815	14°C Virtually no breeze
	Dawn Re-entry	17th September 2020	Colm Clarke – Batlogger M 1616-2486 Kevin Delahunty – Batlogger M 1928-3815	17-19°C Virtually no breeze

Appendix V – Designated Sites within the Vicinity of the Proposed Development

Table 11: European sites within the broad vicinity of the proposed route

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	**Location Relative to the Proposed Development Site**
Special Area of Conservation (SAC)	
Ballyman Glen SAC (000713) [7220] Petrifying springs with tufa formation (Cratoneurion)* [7230] Alkaline fens *S.I. No. 92/2019 - European Union Habitats (Ballyman Glen Special Area Of Conservation 000713) Regulations 2019* NPWS (2019) Conservation Objectives: Ballyman Glen SAC 000713. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.[44]	Located *c.* 4km south of the proposed route.
Rockabill to Dalkey Island SAC (003000) [1170] Reefs [1351] Harbour porpoise *Phocoena phocoena* *S.I. No. 94/2019 - European Union Habitats (Rockabill To Dalkey Island Special Area Of Conservation 003000) Regulations 2019* NPWS (2013) *Conservation Objectives: Rockabill to Dalkey Island SAC 003000.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located *c.*4.2km east of the proposed route. The European site is located in Killiney Bay to which surface waters from the proposed development will be directed.
South Dublin Bay SAC (000210) [1140] Mudflats and sandflats not covered by seawater at low tide [1210] Annual vegetation of drift lines [1310] *Salicornia* and other annuals colonising mud and sand [2110] Embryonic shifting dunes *S.I. No. 525/2019 - European Union Habitats (South Dublin Bay Special Area of Conservation 000210) Regulations 2019* NPWS (2013) *Conservation Objectives: South Dublin Bay SAC 000210.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located *c.* 4.4km north of the proposed route.

[44] The versions of the conservation objectives documents referenced in this table are the most recent published versions at the time of writing

Knocksink Wood SAC [000725] [7220] Petrifying springs with tufa formation (*Cratoneurion*)* [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)* *S.I. No. 93/2019 - European Union Habitats (Knocksink Wood Special Area Of Conservation 000725) Regulations 2019* NPWS (2021) *Conservation Objectives: Knocksink Wood SAC 000725. Version 1.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.	Located *c.* 4.9km south-west of the proposed route.
Bray Head SAC (000714) [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts [4030] European dry heaths *S.I. No. 620/2017 - European Union Habitats (Bray Head Special Area of Conservation 000714) Regulations 2017* NPWS (2017) *Conservation Objectives: Bray Head SAC 000714*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located *c.* 6km south-east of the proposed route.
Wicklow Mountains SAC (002122) [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3160] Natural dystrophic lakes and ponds [4010] Northern Atlantic wet heaths with *Erica tetralix* [4030] European dry heaths [4060] Alpine and Boreal heaths [6130] *Calaminarian* grasslands of the *Violetalia calaminariae* [6230] Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [7130] Blanket bogs (* if active bog) [8110] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8210] Calcareous rocky slopes with chasmophytic vegetation [8220] Siliceous rocky slopes with chasmophytic vegetation [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [1355] Otter *Lutra lutra* NPWS (2017) *Conservation Objectives: Wicklow Mountains SAC 002122.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located *c.*7km south-west of the proposed route.

North Dublin Bay SAC (000206) [1140] Mudflats and sandflats not covered by seawater at low tide [1210] Annual vegetation of drift lines [1310] *Salicornia* and other annuals colonising mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1395] Petalwort *Petalophyllum ralfsii* [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [2110] Embryonic shifting dunes [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2190] Humid dune slacks *S.I. No. 524/2019 - European Union Habitats (North Dublin Bay Special Area of Conservation 000206) Regulations 2019* NPWS (2013) *Conservation Objectives: North Dublin Bay SAC 000206.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located *c.* 10km north of the proposed route.
Glen of the Downs SAC (000719) [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles *S.I. No. 526/2019 - European Union Habitats (Glen of the Downs Special Area of Conservation 000719) Regulations 2019* NPWS (2020). *Conservation Objectives: Glen of the Downs SAC 000719*. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.	Located *c.* 11km south of the proposed development site.
Howth Head SAC (000202) [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts [4030] European dry heaths *S.I. No. 524/2021 - European Union Habitats (Howth Head Special Area of Conservation 000202) Regulations 2021* NPWS (2016) *Conservation Objectives: Howth Head SAC 000202.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located *c.* 12.5km north-east of the proposed route.
Glenasmole Valley SAC (001209) [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [7220] Petrifying springs with tufa formation (*Cratoneurion*) *S.I. No. 345/2021 - European Union Habitats (Glenasmole Valley Special Area of Conservation 001209) Regulations 2021*	Located *c.* 12.7km west of the proposed route

NPWS (2021) *Conservation Objectives: Glenasmole Valley SAC 001209. Version 1.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage	
Carrigower Bog SAC (000716) [7140] Transition mires and quaking bogs *S.I. No. 293/2018 - European Union Habitats (Carriggower Bog Special Area of Conservation 000716) Regulations 2018* NPWS (2019) Conservation Objectives: Carriggower Bog SAC 000716. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	Located *c.* 14.5km south of the proposed route.
Baldoyle Bay SAC (000199) [1140] Mudflats and sandflats not covered by seawater at low tide [1310] *Salicornia* and other annuals colonising mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) NPWS (2012) *Conservation Objectives: Baldoyle Bay SAC 000199.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht	Located *c.* 15km north of the proposed route.
The Murrough Wetlands SAC (002249) [1210] Annual vegetation od drift lines [1220] Perennial vegetation of stony banks [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [7210] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** [7230] Alkaline fens *S.I. No. 622/2017 - European Union Habitats (The Murrough Wetlands Special Area of Conservation 002249) Regulations 2017* NPWS (2021) *Conservation Objectives: The Murrough Wetlands SAC 002249. Version 1.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.	Located *c.* 15.5km south-east of the proposed route.
Ireland's Eye SAC (002193) [1220] Perennial vegetation of stony banks [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts *S.I. No. 501/2017 - European Union Habitats (Ireland's Eye Special Area of Conservation 002193) Regulations 2017* NPWS (2017) Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located *c.* 17km north-east of the proposed route.
Rye Water Valley / Carton SAC (001398) [1014] Narrow-mouthed whorl snail *Vertigo angustior* [1016] Desmoulin's whorl-snail *Vertigo moulinsiana* [7220] Petrifying springs with tufa formation (*Cratoneurion*)*	Located *c* 25km north-west of the proposed route.

S.I. No. 494/2018 - European Union Habitats (Rye Water Valley/Carton Special Area of Conservation 001398) Regulations 2018 NPWS (2021*) Conservation Objectives: Rye Water Valley/Carton SAC 001398. Version 1.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.	
Red Bog, Kildare SAC (000397) [7140] Transition mires and quaking bogs *S.I. No. 76/2018 - European Union Habitats (Red Bog, Kildare Special Area of Conservation 000397) Regulations 2018* NPWS (2019) Conservation Objectives: Red Bog, Kildare SAC 000397. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	Located *c.* 25.5km west of the proposed route.
Special Protection Area (SPA)	
Dalkey Islands SPA (004172) [A192] Roseate Tern *Sterna dougallii* [A193] Common Tern *Sterna hirundo* [A194] Arctic Tern *Sterna paradisaea* *S.I. No. 238/2010 - European Communities (Conservation of Wild Birds (Dalkey Islands Special Protection Area 004172)) Regulations 2010* NPWS (2022) *Conservation objectives for Dalkey Islands SPA [004172].* Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located *c.* 4km north-east of the proposed route. The European site is partially located within Killiney Bay, to which the proposed route is hydrologically connected.
South Dublin Bay and River Tolka Estuary SPA (004024) [A046] Light-bellied Brent Goose *Branta bernicla hrota* [A130] Oystercatcher *Haematopus ostralegus* [A137] Ringed Plover *Charadrius hiaticula* [A141] Grey Plover *Pluvialis squatarola* [A143] Knot *Calidris canutus* [A144] Sanderling *Calidris alba* [A149] Dunlin *Calidris alpina* [A157] Bar-tailed Godwit *Limosa lapponica* [A162] Redshank *Tringa totanus* [A179] Black-headed Gull *Croicocephalus ridibundus* [A192] Roseate Tern *Sterna dougallii* [A193] Common Tern *Sterna hirundo* [A194] Arctic Tern *Sterna paradisaea* [A999] Wetland and Waterbirds *S.I. No. 212/2010 - European Communities (Conservation of Wild Birds (South Dublin Bay and River Tolka Estuary Special Protection Area 004024)) Regulations 2010.*	Located *c.* 4.5km north of the proposed route.

NPWS (2015) *Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
Wicklow Mountains SPA (004040) [A098] Merlin *Falco columbarius* [A103] Peregrine *Falco peregrinus* *S.I. No. 586/2012 - European Communities (Conservation of Wild Birds (Wicklow Mountains Special Protection Area 004040)) Regulations 2012.* NPWS (2022) *Conservation objectives for Wicklow Mountains SPA [004040].* Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located *c.* 7km east of the proposed route.
North Bull Island SPA (004006) [A046] Light-bellied Brent Goose *Branta bernicla hrota* [A048] Shelduck *Tadorna tadorna* [A052] Teal *Anas crecca* [A054] Pintail *Anas acuta* [A056] Shoveler *Anas clypeata* [A130] Oystercatcher *Haematopus ostralegus* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A143] Knot *Calidris canutus* [A144] Sanderling *Calidris alba* [A149] Dunlin *Calidris alpina* [A156] Black-tailed Godwit *Limosa limosa* [A157] Bar-tailed Godwit *Limosa lapponica* [A160] Curlew *Numenius arquata* [A162] Redshank *Tringa totanus* [A169] Turnstone *Arenaria interpres* [A179] Black-headed Gull *Croicocephalus ridibundus* [A999] Wetlands & Waterbirds *S.I. No. 211/2010 - European Communities (Conservation of Wild Birds (North Bull Island Special Protection Area 004006)) Regulations 2010.* NPWS (2015) *Conservation Objectives: North Bull Island SPA 004006.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located *c.* 10km north of the proposed route.
Howth Head Coast SPA (004113) [A188] Kittiwake *Rissa tridactyla* *S.I. No. 185/2012 - European Communities (Conservation of Wild Birds (Howth Head Coast Special Protection Area 004113)) Regulations 2012.* NPWS (2022) *Conservation objectives for Howth Head Coast SPA [004113].* Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located *c.* 13km north-east of the proposed route.
Baldoyle Bay SPA (004016) [A046] Light-bellied Brent Goose *Branta bernicla hrota*	Located *c.* 15km north of the proposed route.

[A048] Shelduck *Tadorna tadorna* [A137] Ringed Plover *Charadrius hiaticula* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A157] Bar-tailed Godwit *Limosa lapponica* [A999] Wetland and Waterbirds *S.I. No. 275/2010 - European Communities (Conservation of Wild Birds (Baldoyle Bay Special Protection Area 004016)) Regulations 2010.* NPWS (2013) *Conservation Objectives: Baldoyle Bay SPA 004016. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	
The Murrough SPA (004186) [A001] Red-throated Diver *Gavia stellata* [A043] Greylag Goose *Anser anser* [A046] Light-bellied Brent Goose *Branta bernicla hrota* [A050] Wigeon *Anas penelope* [A052] Teal *Anas crecca* [A179] Black-headed Gull *Chroicocephalus ridibundus* [A184] Herring Gull *Larus argentatus* [A195] Little Tern *Sterna albifrons* *S.I. No. 439/2009 - European Communities (Conservation of Wild Birds) (the Murrough (Part of) Special Protection Area 004186) Regulations 2009.* NPWS (2022) Conservation objectives for The Murrough SPA [004186]. Generic Version 9.0. Department of Housing, Local Government and Heritage	Located *c.* 16km south of the proposed route.
Ireland's Eye SPA (004117) [A017] Cormorant *Phalacrocorax carbo* [A184] Herring Gull *Larus argentatus* [A188] Kittiwake *Rissa tridactyla* [A199] Guillemot *Uria aalge* [A200] Razorbill *Alca torda* *S.I. No. 240/2010 - European Communities (Conservation of Wild Birds (Ireland's Eye Special Protection Area 004117)) Regulations 2010.* NPWS (2022) *Conservation objectives for Ireland's Eye SPA [004117].* Generic Version 9.0. Department of Housing, Local Government and Heritage.	Located *c.* 16.5km north-east of the proposed route.

Table 12: Natural Heritage Areas (NHAs) within the broad vicinity of the proposed route

Code	Name	Distance
1211	Loughlinstown Woods pNHA	*c.* 100m
1206	Dalkey Coastal Zone and Killiney Hill pNHA	*c.* 1.5km
1207	Dingle Glen pNHA	*c.* 1.5km
713	Ballyman Glen pNHA	*c.* 4km
1202	Ballybetagh Bog pNHA	*c.* 4km
210	South Dublin Bay pNHA	*c.* 4.5km
1753	Fitzsimon's Wood pNHA	*c.* 4.5km
725	Knocksink Wood pNHA	*c.* 5km
1754	Dargle River Valley pNHA	*c.* 5.5km
1768	Powerscourt Woodland pNHA	*c.* 6km
714	Bray Head pNHA	*c.* 6km
1205	Booterstown Marsh pNHA	*c.* 6.5km
1769	Great Sugar Loaf pNHA	*c.* 7km
724	Kilmacanoge Marsh pNHA	*c.* 8km
1755	Glencree Valley pNHA	*c.* 8.5km
206	North Dublin Bay pNHA	*c.* 10km
1767	Powerscourt Waterfall pNHA	*c.* 10km
201	Dolphins, Dublin Docks pNHA	*c.* 10km
2104	Grand Canal pNHA	*c.* 10.5km
719	Glen of The Downs pNHA	*c.* 10.5km
2103	Royal Canal pNHA	*c.* 11.5km
991	Dodder Valley pNHA	*c.* 12km
202	Howth Head pNHA	*c.* 12.5km
1209	Glenasmole Valley pNHA	*c.* 12.5km
730	The Murrough pNHA	*c.* 14.5km
716	Carriggower Bog pNHA	*c.* 14.5km
199	Baldoyle Bay pNHA	*c.* 15km
1771	Vartry Reservoir pNHA	*c.* 16km
1212	Lugmore Glen pNHA	*c.* 16km
128	Liffey Valley pNHA	*c.* 17km
203	Ireland's Eye pNHA	*c.* 17km
178	Santry Demesne pNHA	*c.* 17km
1763	Sluice River Marsh pNHA	*c.* 18km
211	Slade Of Saggart And Crooksling Glen pNHA	*c.* 18.5km
731	Poulaphouca Reservoir pNHA	*c.* 22.5km

1398	Rye Water Valley/Carton pNHA	*c*. 25km

Appendix VI – Appraisal Against Cherrywood Planning Scheme Objectives

Planning Scheme Objective	Compliance with Objective
GI 2 - To comply with all of the policies of the current Dún Laoghaire-Rathdown County Development Plan relating to open space, biodiversity and green infrastructure, except for quantitative Class 2 open space provision.	The proposed route is compliant with policies on biodiversity as contained within the *Dún Laoghaire-Rathdown County Development Plan 2022-2028*.
GI 9 - To require that public open space includes a range of natural habitats and facilitates preservation of flora and fauna where consistent with recreational requirements, landscape improvement and visual amenity.	The design of the proposed route has included consideration of biodiversity, namely flora, habitats, and fauna along the proposed route. A range of measures have been proposed in Sections 6.5 page 48 and Section 6.6 page 62 of this report to avoid, remove and reduce effects on flora and fauna. Measures to compensate for any significant effects have been provided in Section 6.8 page 84, and measures to enhance the route for biodiversity are provided in Section 9 page 86. Habitats, flora, and fauna will be preserved and enhanced along the proposed route.
GI 15 - To require that SuDS corridors alongside roads and greenways incorporate wildlife habitat, pedestrian links and structural planting where appropriate, in accordance with the requirements of 4.1.2.	The landscape plan as prepared by Aecom has addressed this policy item
GI 19 **To safeguard the ecological integrity of the Carrickmines, Loughlinstown and Bride's Glen rivers and the linear park adjacent to Cherrywood Business Park, and to require the sensitive improvement and management of these areas for biodiversity, education, landscape integration and visual amenity.**	The proposal traverse the river valley mentioned in GI 19. The comprehensive suite of mitigation, compensation and enhancement measures documented in Section 6.5 page 48, Section 6.6 page 62, Section 6.8 page 84, and Section 9 page 86 will ensure that the ecological integrity of the proposed route will be retained following completion of the proposal.
GI 20 - To require sensitive low-key improvement of the Druid's Glen Valley, such as the control of non-native vegetation, provision of a safe and naturalistic pedestrian pathway, provision of appropriate interpretation, and the minimisation of access points and disturbance, with particular regard to the Cherrywood SDZ Biodiversity Plan	The design of the proposed route has taken into consideration the sensitivity of flora and fauna in the Druids Glen. Measures have been included for the control/management of invasive species in Section 6.5.3 page 50 in Appendix VIII – Habitat and Species Management Plan, and Appendix X Invasive Species Management Plan, for this report. Access to the Druids Glen will be provided at the eastern and western extremities, and the proposal comprises resurfacing of existing pathways.
GI 21 - To require an ecological buffer area on the south side of Druid's Glen, in compliance with the Cherrywood SDZ Biodiversity Plan, that includes an avenue of large canopy trees, pedestrian and cycle routes, native shrub, woodland and meadow planting, and a SuDS swale. The need for this buffer area is detailed in Appendix D.	The proposed route is not located within the Druids Glen buffer zone, which is located south of the proposed route.

GI 36 **To require that greenways function as green infrastructure by facilitating an ecological role in addition to their transport role.**	The design of the proposed route has included consideration of biodiversity, namely flora, habitats and fauna along the proposed route. A range of measures have been proposed in Sections 6.5 page 48 and Section 6.6 page 62 of this report to avoid, remove and reduce effects on flora and fauna. Measures to compensate for any significant effects have been provided in Section 6.8 page 84, and measures to enhance the route for biodiversity are provided in Section 9 page 86. The habitats along the proposed route will continue provide an ecological function following development of the proposed route.
GI 38 - Lehaunstown Lane to require that Lehaunstown Lane, between Lehaunstown Village and the M50 pedestrian bridge, is retained as a route of ecological and cultural importance and incorporates the following principles: **Limit vehicular access to the lane** **Retain and supplement where appropriate the lane's rural hedges, trees, banks and other features to preserve elements of the lane's rural character** **Create a buffer circa 10m either side of the lane where indicated by Planning Scheme drawings** **Locate Class 2 pocket parks (circa 0.2ha), associated with adjacent residential areas, along the lane (refer to Figure 5.3). The pocket parks should straddle the lane** **The lane shall form part of a walking route linking Cabinteely and Brennanstown with lands south of the M50 (Ballycorus, Carrickgollogan, Rathmichael etc.) and east of the Planning Scheme (the coast, Shanganagh etc.)** **Promote reconfiguration of the existing Lehaunstown Lane M50 bridge to include soft landscape elements that enable wildlife to cross the motorway and increase pedestrian connectivity with the proposed recreation lands in Ticknick.**	Although the proposed route crosses Lehaunstown Lane, it does not include the development/alteration of Lehaunstown Lane within its scope.
GI 40 - To promote the incorporation, within the linear SUDS provision running parallel with the M50 motorway, of trees and other native vegetation that can contribute to wildlife linkages, visual screening and perceived noise attenuation. Soft landscaping shall lead up to M50 crossing points as per the Cherrywood Biodiversity Plan.	The proposed route is not located along the boundary with the M50, and therefore this policy is not relevant to the proposed route.

GI 43. - To require the retention and protection (in accordance with BS5837) of trees and hedgerows which are of particular significance to amenity and biodiversity or listed for retention. These are highlighted on Map 5.2. These include but are not necessarily limited to the following: **Turkey Oaks, Priorsland (within proposed SUDS provision).** **Trees along Loughlinstown River to rear of The Ramparts and Willow Court.** **Wooded areas, Bride's Glen.** **Extensive woodland, Druid's Glen.** **Trees along Lehaunstown Lane.** **Tree line, southwest boundary Lehaunstown House/Castle.** **Mature treeline running along ridge line from Tully Church down to the Cherrywood Luas stop.** **Hedgerows along Lehaunstown Lane.** **Hedgerows within and around proposed Beckett Park** **Hedgerow linking northern end of Lehaunstown Lane to the Lehaunstown Valley.** **Hedgerow north of confluence of Cabinteely Stream and Carrickmines River.** **Retained hedgerows in an urban setting may require management work or reshaping to prevent conflict with health and safety requirements. This detail shall be outlined by the applicant in the Habitat Management Plan required under Biodiversity Policy BP 03.**	The proposed route traverses a section of hedgerow that is marked for retention, e.g., the hedgerow north of the confluence of the Cabinteely Stream and Carrickmines Stream, which will require removal of a section of this hedgerow. The loss of the hedgerow is to be offset through the compensatory planting of woodland along the western slope of the Carrickmines River/Tully Valley, as outlined in Section 6.8 page 84.
GI 46 **To require the involvement of a suitably qualified Ecologist prior to and when undertaking ecologically sensitive, or ecologically related works or proposals e.g. ecological surveys, reports, proposals, site supervision.**	This Ecological Impact Assessment report, and the Appropriate Assessment Screening report accompanying it have been authored by qualified and experienced professional ecologists. The authors and surveyors that have contributed to this report are listed alongside their qualifications and experience, in Appendix I of this report.
GI 48 **To ensure that the development complies with the Cherrywood SDZ Biodiversity Plan.**	Compliance with the policies of the *Cherrywood Planning Scheme Biodiversity Plan* is documented in Appendix VII.
GI 49 **Promote liaison with National Parks and Wildlife Service during the development design, construction, monitoring and management stages.**	A formal consultation letter was submitted to the NPWS on 15th September 2020. No formal response has been received at the time of publication of this report.

GI 50 **Require that any public lighting is minimised in areas within 30m of existing or proposed hedgerows, treelines, watercourses or woodland edges, specifically in areas that are important for bats such as along commuting routes and at foraging and roosting locations. In these locations, lighting shall be installed only where necessary for public safety, with directional illumination and to the minimum lux level consistent with this need.**	The proposed public lighting scheme has been reviewed as part of the Ecological Impact Assessment process. The sensitivities of ecological receptors has been a consideration of the lighting design. Measures to reduce and minimise lighting are detailed in Section 6.6.3 page 66.
GI 51 **Ensure that the design and function of green infrastructure can allow the movement of species across the Planning Scheme lands and to maintain connectivity between the ecological corridors at Druid's Glen, Lehaunstown Valley and Bride's Glen. This provision may be required within development plots where there is insufficient space e.g. alongside some greenways.**	The proposal is located within the Ecological Corridors of the Druids Glen, Lehaunstown Valley and Brides Glen. Although the proposal includes habitat loss to facilitate construction of the proposed route, the relative area of habitat lost will be small. The public lighting and layout of the proposed route has included consideration of effects on fauna. It is anticipated that fauna species will continue to utilise the ecological corridors in the Cherrywood SDZ following completion of the proposed route.
GI 52 **Ensure that the design of all development takes account of the sensitivities of retained habitats and greenways and avoids adverse impacts resulting from noise, lighting and other types of disturbance.**	The proposal has been designed around particularly sensitive habitats, e.g. groundwater dependent habitats in the Druids Glen and Carrickmines River/Tully Valley. Measures to reduce and minimise lighting are detailed in Section 6.6.3 page 66.
GI 54 - Ensure that the design of swales and stormwater attenuation areas and SuDS proposals within private developments include commitments to addressing a net gain in biodiversity. Where planting is required, native species must be used, including trees where suitable.	The proposed route is a public infrastructure development as opposed to a private development, and this policy is not relevant in light of this.
GI 55 - To require that SuDS features in river valley areas shall be designed as extensive, naturalistic open features (e.g. ponds, wetlands) of value to wildlife and local amenity. Their water quality and storage objectives shall be dealt with in combination with landscape integration, visual amenity and protection/enhancement of biological diversity.	The proposal does not include the creation of SUDS features in river valleys, and for this reason this policy is not relevant to the proposal.
GI 56 - To require that the approach to retained and new ponds, basins or watercourses throughout the Planning Scheme shall incorporate best practice with respect to design, landscaping and management techniques to promote biodiversity and visual amenity.	Measures for the protection of watercourses are included within Section 6.5.7 page 58 and Appendix IX of this report.

GI 57 **To require that where SuDS features are connected to open watercourses then best practice will apply and consultation with Inland Fisheries Ireland will take place to agree on the methodology for such works so as to minimise impacts on the watercourse and its ecology**	No SuDS features are proposed which will require tie-in to existing watercourses.
GI 58 **To require the submission and adherence to site-specific method statements demonstrating how pollution of watercourses during and after the construction period will be prevented and/ or mitigated. These shall be developed in consultation with the relevant river authorities or fisheries boards.**	Measures for the protection of watercourses are included within Section 6.5.7 page 58 and Appendix IX of this report, which have been designed in accordance with best practice. Scott Cawley engages with IFI as a matter of routine on watercourse crossings.
GI 59 **Require the protection of existing hedgerows, treelines, woodland, scrub and other semi-natural habitats. Retention of habitats should consider the environmental conditions required to maintain their condition (e.g. shading, drainage). In these areas, the applicant shall provide a Habitat Management Plan detailing how this will be achieved.**	Measures to protect retained semi-natural habitats, including protocols for working within sensitive habitats are included in Section 6.5.8 page 60 of this report. Measures for the management of retained habitats are included in Section 6.8 page 84, and Section 9 page 86 of this report. A habitat and species management plan is included as Appendix VIII of this report.
GI 60 **Ensure the protection of the biodiversity associated with watercourses and their riparian (bankside) habitats through detailed design and protective measures during construction. Where diversion and flood relief measures are required then best practice will apply and consultation with Inland Fisheries Ireland will take place to agree on the methodology for such works to minimise impacts on the watercourse and its ecology, in accordance with the requirements of the Water Framework Directive. No projects shall give rise to significant erosion and deposition of soil into natural watercourses.**	Measures to protect the biodiversity associated with watercourses are outlined in Section 6.5.7 page 58 and Section 6.6.1 page 73 of this report, as well as in a Fisheries Protection Method Statement that forms Appendix IX to this report. The proposal will not result in significant erosion and deposition of soils to natural watercourses, and following adoption of measures for protection of watercourses, the potential for significant effects will be avoided.
GI 61 Ensure the protection of calcareous (tufa) springs and the area surrounding them by having no net effect on the hydrogeological and other physical conditions on which these springs rely. Any Planning Application that is located within the hydrogeological catchment of these areas as outlined in the protection zone map of the Hydrogeological Study in Appendix E will have to be accompanied by evidence of how this will be achieved. Collection of hydrogeological data may be required in some cases to prove that there will be no effect on these features.	The proposed route is located downgradient of all tufa springs in Cherrywood. In light of this, there is no possibility of the proposed route interacting with or affecting any tufa springs catchments. The potential for increased footfall and dog-fouling to affect tufa springs is explored in Section 6.5.9 page 61. Significant effects are not predicted in this instance.

GI 62 **Ensure the protection of the physical and biological structure of Bride's Glen and Druid's Glen ecological corridors including the habitat and species diversity and richness of terrestrial and aquatic habitats. Development applications within 150m of the edge of the corridor and any proposals within the corridor should provide details on how the corridor will be protected from direct/indirect effects of lighting, noise, visual disturbance and how surface water runoff quality will be controlled.**	The ecological corridors will be retained following completion of the proposed development. As outlined in the conclusion of this Ecological Impact Assessment report, the biodiversity value of the proposed route will be enhanced following the completion of the proposed route. The potential effects and mitigation measures with respect to disturbance and surface water run-off are outlined in Section 6.5 and Section 6.6. It is acknowledged in the conclusion of this report that residual disturbance arising from increased human presence along the proposed route will remain significant for badger and otter, albeit at the local geographic scale. Disturbance arising from the proposal will not however negatively affect the physical and biological structure of Brides Glen and Druids Glen Ecological corridors.
GI 63 - The ecological sensitivity of Druid's Glen has been examined and the full details of the study are contained in the report in Appendix D. Due to the complexity of the habitats within the Glen, buffer zones have been created along the southern valley edge and within the northern valley. These are designed to separate the effects of development (light, visual disturbance) from the sensitive habitats and species in the Glen and at its edge. Any development on lands affected by this buffer shall ensure the maintenance and appropriate use of the 50m buffer around Druid's Glen in accordance with the report in Appendix D.	The proposed route does not traverse the Druids Glen buffer zone.
GI 65 **To require the use of native trees, shrubs and grasses in landscaping proposals and promote the re-use of existing topsoil and subsoils within landscaping plans in both public and private open space areas to allow the preservation of the native seed bank within landscaping schemes.**	The compensation and enhancement proposals contained within Section 6.8 page 84 and Section 9 page 86 of this report includes the use of native trees, shrubs and grasses in landscaping proposals. Measures also include the reuse of the soil seedbank to facilitate the regeneration of vegetation post-construction in areas of grassland habitat.
GI 66 **To require that all proposals for open space and landscape design to include biodiversity conservation and enhancement measures.**	The compensation and enhancement proposals contained within Section 6.8 page 84 and Section 9 page 86 are located in proposed areas of open space.
GI 67 **Require that any developments retaining semi-natural habitats set out clear commitments to managing these areas to maximise their visual amenity and ecological value.**	A monitoring scheme with a range of targets in relation to biodiversity is included in Section 10 page 87 of this report. Management commitments are also documented in the Habitat and Species Management Plan that forms Appendix VIII of this report.
GI 68 **Require the effective control of invasive species within the Planning Scheme Area. To achieve this, landowners will be required to work with the Council to develop a strategic approach to**	Measures for the control and management of invasive species are briefly outlined in Section 6.5.3 page 50 of this report. An invasive species management plan has been prepared by Envirico and is included as Appendix X to this report.

controlling invasive species throughout these lands.	
GI 69 - Ensure that the crossing of Druid's Glen is designed to be the best ecological option. Proposals should demonstrate measures to avoid significant habitat loss, disturbance to surrounding habitats and species, proposals to prevent water pollution and protect riparian habitats.	This proposal does not correspond to the (bridged) crossing of the Druids Glen and therefore this policy is not relevant to this proposal.

Appendix VII – Appraisal Against Cherrywood Planning Scheme Biodiversity Plan Objectives

Biodiversity Plan Objective	Compliance of application with Objective
BP01 Require the preservation, as indicated in Figure 12 in Appendix 1 of existing hedgerows, treelines, woodland, scrub and other semi-natural habitats.	The habitats indicated within Figure 12 will be retained. The proposed route traverses a section of hedgerow that is marked for retention, e.g., the hedgerow north of the confluence of the Cabinteely Stream and Carrickmines Stream, which will require removal of a section of this hedgerow. The loss of the hedgerow is to be offset through the compensatory planting of woodland along the western slope of the Carrickmines River/Tully Valley, as outlined in Section 6.8 page 84.
BP03 the applicant must provide a Habitat Management Plan detailing how retained habitats will be retained, protected and managed.	A Habitat and Species Management Plan is included as Appendix VIII of this report.
BP04 Require the re-survey of buildings identified as being bat roosts, or suitable for bats at an appropriate time of year (at least 2 surveys separated by a minimum of a week carried out between May and September) by a qualified bat worker, should these roosts be potentially affected by development proposals.	Bat roosts with potential for roosting bats within the vicinity of the proposed route have been surveyed as part of this Ecological Impact Assessment Report. The methodologies for bat surveys are documented in Section 4.4.2.2 page 7.
BP05 Require an assessment of potential impacts of lighting on bats where development is proposed within 100m of known or suspected roosts. At these locations, potential adverse impacts on bats must be avoided. If adverse impacts are anticipated, a derogation licence must be obtained from the NPWS.	The potential effects of lighting on roosting and foraging bats has been assessed in Section 6.6.3 page 66. Design measures to avoid and minimise the effects of lighting on bats are documented in the same section. Measures to avoid potential adverse effects on bats are documented in Section 6.6.5 page 71.
BP06 Require that a badger survey is carried out by developers prior to submitting applications for development to account for any changes to sett activity or establishment of new setts within the application site and up to 150m outside of the boundary of the site. Appropriate mitigation measures may be required in some cases.	This ecological impact assessment report has included surveys for badgers along the proposed route and within its vicinity. The methodology of the badger surveys are described in detail in Section 4.4.2.1 page 7. A mitigation strategy for badgers has been prepared and is described in Section 6.6.2 page 63. The strategy was submitted to the NPWS for comment, although no response has been received at the time of publication of this report.
BP07 Ensure the protection of badgers, their setts, paths and feeding areas are taken account of within the design and delivery of developments. Setts cannot be disturbed or removed without permission from the National Parks and Wildlife Service.	A mitigation strategy for badgers has been prepared and is described in Section 6.6.2 page 63. The strategy was submitted to the NPWS for comment, although no response has been received at the time of publication of this report.
BP 08 Where habitat that could be used by breeding birds must be removed or disturbed during the breeding season (generally February-August), a qualified ecologist must check the	These measures have been included as a commitment in Section 6.6.3 page 75.

habitat concerned to ensure that no nests are present. The NPWS must be consulted if nests are found to determine the course of action.	
BP 09 Should any areas of permanent or semi-permanent standing water require infilling then they must be first checked by an ecologist for presence of Newts and/or frogs or evidence of their breeding. If required, a licence permitting their removal should be applied for from the NPWS. Developers must ensure that there is no net loss of breeding sites in the delivery of development projects in the SDZ.	The proposed route does not include the infilling of any permanent or semi-permanent standing water. Assessment of suitability for frogs and newts was undertaken for waterbodies along the proposed route, and is documented in Section 4.4.2.1 page 8.
BP 10 Ensure that crossing points identified in the Biodiversity Plan are retained in the SDZ and that they connect to landscaped grassy verge or hedgerow habitats at each end. Developments near (within 50m) of the crossing points should be designed to take account of the sensitivity of some species to light and disturbance.	This refers to the crossing of the M50, which is outside of the scope of the proposed route.
BP 11 Where works are taking place within 10m of the edge of a watercourse or tributary thereof, a Fisheries Protection/Construction Method Statement must be prepared demonstrating how pollution of watercourses during and after the construction period will be prevented and/or mitigated. This shall be developed in consultation with Inland Fisheries Ireland at application stage.	A Fisheries Protection Method Statement has been prepared and is included as Appendix IX of this report.
BP 12 Require the planting of new hedgerows to take the form of a double line of native tree with shrub species. Translocation of existing hedgerows and their seed banks to new locations should be considered where feasible.	The proposal does not include the planting of new hedgerows.
BP 13 Require the planting of new grassland to include native species that are appropriate to the soil chemistry and the function of the grassland.	Biodiversity enhancement measures described in Section 9 page 86 include the use of a native hemi-parasitic species, yellow-rattle, to enhance retained grassland habitats along the proposed route.
BP 14 Cycleways/footpaths within the southern buffer zone at Druid's Glen will be designed to be no more than 10m from the southern edge of the buffer zone. Supplementary planting will help to screen the path from the main body of woodland.	The proposed route is not located within the Druids Glen buffer zone or 10m south of the same buffer zone.
BP 15 Any proposals for lighting within 70m of the river on the north side of Druid's Glen must be supported by data showing how background light levels can be maintained at the river.	The proposal does not include the introduction of any lighting to the Druids Glen or the north side of the river from Druids Glen (e.g., Glen Druid house and lands).
BP 16 Require that the detailed design of the crossing over the Loughlinstown River addresses the ecological features on the north side including the marsh and calcareous springs and that these features are retained as far as possible, taking into	The crossing of the Loughlinstown River (located off the Ballycorus Road), is not within the scope of the proposed route.

account other environmental factors such as visual impacts.	
Objective BP17 Require the monitoring of specific ecological parameters to measure the success of certain aspects of the Biodiversity Plan and the overall ecological 'health' of the SDZ lands: **Bats in Druid's Glen, Bride's Glen and a transect following the line of the original Lehaunstown Lane. Indicator parameters will include bat activity index (bat recordings per hour), species distribution density and species diversity.** **Floral richness at calcareous springs in Lower Carrickmines valley. Species numbers at the springs will be recorded including bryophytes to provide an indication of any changes in the groundwater conditions at this sensitive site.** **Breeding bird diversity: Measured in the March-May period along fixed transects through the SDZ lands. This will reflect any changes due to provision/loss of hedgerows and use of green infrastructure.** **Freshwater invertebrate sampling in Carrickmines and Loughlinstown River upstream and downstream of the SDZ lands to detect any changes in the water quality.** **Badger sett activity: indicators of activity (e.g. bedding, latrine use, feeding, excavation) will be recorded in the early spring when badgers are active.** **Invasive species: the distribution of invasive species in the SDZ land will be recorded to detect any spread in their ranges.** **Each of these monitoring programmes will be designed by a qualified ecologist and the results will be discussed with the Council's Biodiversity Officer with a view to amending any of the objectives or measures contained within this Plan if this is required.**	A list of ecological monitoring is outlined in Section 10 page 87 of this report. It is the understanding of the author of this report, that BP 17 is to be undertaken as part of a review of the Cherrywood Biodiversity Plan by the local authority.

Appendix VIII – Habitat & Species Management Plan

1 Introduction

This Habitat & Species Management Plan (HSMP) has been produced to support the planning application for the Proposed Cherrywood Green Routes Network Cycle and Pedestrian Routes Network for Cherrywood SDZ.

Objective **GI50** of the *Cherrywood Strategic Development Zone Planning Scheme*[45] for the SDZ and Objective **BP03** of the *Cherrywood Planning Scheme Biodiversity Plan*[46] require that a HSMP be produced to support development applications. HSMPs must detail how habitats will be retained, protected and managed. The HSMP is in addition to, and should be read in conjunction with the mitigation measures outlined in the Ecological Impact Assessment Report (EcIA) for the proposed development. Wherever appropriate the mitigation measures in the EcIA have been duplicated in this HSMP.

The aim of the HSMP is to ensure the retention, protection, maintenance and where possible, enhancement of the existing habitats on the site. The HSMP focuses on habitats and species of conservation importance and potential construction/operational impacts.

2 Roles and Responsibilities

The following are the key personnel who will be involved in the implementation of the HSMP:

1. Project Co-ordinator (PC)
2. Site Manager (SM)
3. Project Ecologist (PE)
4. Landowners (LO)
5. Invasive Species Specialist Contractor

The SM will inform the PC of any conflicts between the recommendations of the HSMP and other site management issues. The PC will be responsible for resolving any conflict, in consultation with the relevant specialists.

Project Co-ordinator (PC)

The primary responsibility of the PC is to ensure that the Site Manager and contractor comply with the environmental recommendations in this report.

In addition, the PC shall:

- Ensure the HSMP is included in the Contractor's contract;
- Ensure that the HSMP is given to the Contractors and Site Manager;
- Ensure the Contractors are trained in accordance with the HSMP requirements;
- Inform the Project Ecologist of the date of **construction at least one-month prior to commencing works**.

[45] Dún Laoghaire-Rathdown County Council (2014). *Cherrywood Strategic Development Zone Planning Scheme*. Published online at https://www.dlrcoco.ie/en/planning/cherrywood-sdz

[46] Dún Laoghaire-Rathdown County Council (2014). *Cherrywood Planning Scheme Biodiversity Plan* Prepared by Scott Cawley on behalf of Dún Laoghaire-Rathdown County Council. Published online at https://www.dlrcoco.ie/en/planning/cherrywood-sdz

Site Manager (SM)

The primary responsibility is to ensure that the HSMP is implemented by the contractor. This includes implementation of any on-site mitigation measures and any revisions, additions, or amendments that may arise to the HSMP during the course of the proposed development. The Site Manager shall also:

- Ensure compliance with the recommendations of the HSMP during site inspections;
- Schedule meetings with the PC to discuss progress towards completing the HSMP actions and involve the PE as necessary;
- Report and record any incidents resulting in damage to or destruction of habitats, and injury or death to fauna (including all badgers, bats, birds, otters)

Project Ecologist (PE)

The PE will be a member of a professional standards body for ecologists or environmental practitioners, and will have experience in Ecological Clerk of Works roles. The project includes checks of trees for roosting bats. The project ecologist will require experience surveying for bats, and will have the appropriate licence to facilitate such surveys. The primary responsibilities will be to:

- Act as the primary on-site ecological contact for the PC and SM regarding implementation of the HSMP
- Monitor compliance with all recommendations of the HSMP during regular site inspections and advise site personnel on how to comply with measures in HSMP
- Request relevant records and documentation from the SM where necessary
- Attend routine meetings with the SM and deliver toolbox talks to personnel on site, including toolbox talks on invasive species.
- Keep detailed records of any ecological incidents and report these to the PC
- Keep records of any variations to construction methods or design brief and modify HSMP recommendations in consultation with PC
- Produce the staged monitoring reports on flora and fauna as detailed in the section *Schedule of Reporting Requirements.* The PE will submit these to the PC. The PE will also act as overall technical advisor to the PC and PE regarding implementation of the HSMP actions.

Project Environmental Specialist (PEnv)

The PEnv will collect baseline data on water quality for the proposed route (cross reference Section 4.1.2), and will provide this data to the PE as part of the reporting process.

Invasive Species Specialist Contractor (ISSC)

The ISSC will undertake treatment of giant hogweed and cherry laurel as per the methodologies contained within the Invasive Species Management Plan for the proposed scheme (See Appendix X). The ISSC will work closely with the PE and PEnv.

3 Baseline Ecological Conditions

The proposed route runs through Druid's Glen, Bride's Glen, and the Cabinteely River/Tully Valley. Each of these valleys contains relatively distinct but interconnected ecological communities, and form part of the primary ecological corridors identified within the *Cherrywood Biodiversity Plan* (Dún Laoghaire-Rathdown County Council, 2014).

The Druid's glen is a steep-sided valley running roughly east-west. West of Lehaunstown Lane, it is almost entirely dominated by mixed broadleaved woodland, which is a rare habitat in the context of the Dún Laoghaire-Rathdown county area. Notwithstanding infestations of invasive species, the habitat contains good examples of semi-natural woodland floor communities, and also contains a population of a rare orchid species. The woodland in the valley is an important resource for local mammal and bird species, and

contains several badger setts, breeding raptors, and a diversity of bat species but is heavily infested with the invasive species cherry laurel *Prunus laurocerasus*. The Loughlinstown River is important for local otter populations, and a potential holt is located in the vicinity of the Lehaunstown crossing of the river. East of Lehaunstown Lane, the Glen is covered in a mixture of woodland, wetland and grassland habitats.

The Cabinteely River/Tully Valley runs roughly north-south between the Brennanstown development in the north, and the Wyatville link road in the south. The river valley is relatively steep-sided, but the valley floor is wider than that of Druid's Glen. The vegetation is also more variable, and contains areas of woodland, scrub, wetland, and grassland habitat. While grasslands may in the past have been managed for agricultural purposes, only small areas remain grazed by livestock. The result is that grassland habitats are transitioning towards scrub and woodland habitat types. The valley contains important examples of calcareous springs, corresponding to the EU Annex I priority habitat [7220] petrifying springs with tufa formation (*Cratoneurion*), as well as the wetland habitat type tall herb swamps, which corresponds to the EU Annex I habitat [6430] hydrophilous tall herb fringe communities of plains and of the montane to alpine levels. The valley contains several badger setts, and supports a range of fauna species associated with both woodland and grassland habitats. The valley is infested with giant hogweed *Heracleum mantegazzianum* which has recently been subject to treatment. The Cabinteely River is heavily canalised and of limited passability for otter, however the Loughlinstown River contains suitable habitat for this species and evidence of the species has been recorded along its length.

The section of the Bride's Glen through which the route traverses has been heavily modified. It largely consist of a suburban park containing immature woodland and amenity grassland. While it is ecologically less diverse than other parts of the route, it contains suitable foraging habitat for a range of fauna species. It is currently unlit and provides a corridor for bats commuting between the Carrickmines Valley and upper Bride's Glen.

4 Ecological Mitigation, Compensation and Enhancement Measures

4.1 Construction Phase Working Practices

The measures contained in this section will form part of the contract documents for the build of the proposed route. The contractor will include for the provision of services outlined in the sections below.

4.1.1 Measures to Prevent the Spread of Invasive Species

4.1.1.1 Biosecurity Protocols

Persons/machinery entering or working within an area infested with an invasive alien species must take certain precautions to prevent the spread of that species. **These guidelines must be strictly adhered to at all times. It is the responsibility of all site personnel to follow the below.**

Exclusion Zones

- Exclusion zones will be clearly marked or fenced off to prevent accidental incursion.
- Any personnel or machinery accessing the area is entering a potentially contaminated area and as such must be subject to strict biosecurity protocols.
- Exclusion zones will be set up to keep machinery and personnel away from any stored contaminated clay or plant material.

Machinery/Equipment

- All equipment and machinery to enter an exclusion zone must be thoroughly clean before entering.
- The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum.
- Machinery will stick to pre-set haulage routes at all times. Design of haulage routes will include consultation between the SM, PE and invasive species specialist.

- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within the exclusion zone(s). A power washer and stiff bristled brushes will be made available at these locations.
- In the washdown area, all equipment and machinery must be thoroughly cleaned before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, bucket, machine arm, wheel arches etc.
- All equipment and machinery must be certified as clean by the Ecological Clerk of Works (ECoW) before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery and the geo-textile used to line the wash down area will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of giant hogweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Ground Personnel

- A toolbox talk with emphasis on biosecurity measures must be carried out prior to works by the Ecological Clerk of Works (ECoW). Further toolbox talks may be required in the case of new working constraints, new operatives or refresher talks.
- All PPE to enter an exclusion zone must be thoroughly clean before entering.
- Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for seeds, rhizomes, or other plant fragments that may be stuck on.
- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within each exclusion zone. A bucket with soapy water, a hoof pick and a stiff bristled brush will be situated at these locations.
- In the washdown area, all PPE and equipment must be thoroughly cleaned before personnel leave the exclusion zone.
- All personnel should use a hoof pick to thoroughly clean the treads of their footwear. All footwear must be thoroughly cleaned before leaving the exclusion zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush before leaving an infested zone.
- PPE (incl. boots) and equipment should be certified as clean by the Ecological Clerk of Works (ECoW before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of invasive species and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

Haulage Routes

- All haulage routes must be pre-defined and lined with an appropriate geotextile.
- If required to protect the integrity of the geotextile from the wheels of the trucks, a layer of sand blinding will be laid over top.
- Trucks must stick to predefined haulage routes at all times.
- Geotextiles that overlaid haulage routes can be added to the material to be removed/encapsulated/incinerated.

Loading of Contaminated Materials

- When contaminated material is being loaded, particular care must be taken that a minimum of the material is dropped so as to avoid spreading giant hogweed on- or off-site.
- Geotextile will be laid to cover all the areas where the material will pass while in the loading bucket.
- Where the truck collecting the material is parked, geotextile will extend out 2m on either side of the truck so as to ensure any spillages land on the geotextile.
- Any spillages will be cleaned up immediately and loaded onto the truck.
- With the final load, the geotextile membrane will be added to the load of material to be removed/encapsulated/incinerated.

4.1.1.2 Eradication of Giant Hogweed

Soil Removal Options

This section relates to any soil removal from the greenway outside of the Druids Glen woodland section. As areas of the greenway adjacent to giant hogweed must be considered contaminated with giant hogweed seeds, any soil removal must be under strict biosecurity measures (listed above).

- The soil may be stored within the site at a height no more than 750mm, where it can be treated over a number of years or
- may be buried at least one metre below ground level in an area where it is not likely to be disturbed.
- Records should be kept of the quantity of material that has buried and a map showing the location of the burial pit and its depth.
- Use signs to mark the burial pit and keep heavy tracked machinery off the area.
- Subject to a site engineer review it should not be buried deeply within 7 metres of an adjacent landowner's site.
- Precautions must be taken that deep burial does not interfere with the ground water level.
- It is advisable to fence off stands of giant hogweed, including a 4m buffer zone and put-up warning notices.
- Buried soil and plant material must only have been treated with glyphosate type herbicide as herbicide that does not break down in the environment could cause groundwater pollution.
- Soil contaminated with giant hogweed seed or other plant material cannot be removed off site except under licence issued by National Parks and Wildlife.

Eradication and control

Chemical treatment of giant hogweed is currently underway adjacent to the proposed scheme (Envirico, 2022). According to Envirico, the application of herbicides over several years, prior to seed set, has been proven effective for both control and eradication. It is important to again remember that the seeds of this plant can remain viable for seven years (possibly up to 15) although most will become unviable after just two years. Once a plant has produced seed, it should be assumed that the seeds will be present in the surrounding area for at least this length of time. Control measures will only affect those plants which have already germinated, and viable seed may continue to germinate each year until the seed bank is exhausted. Eradication, as opposed to temporary control will therefore require annual checks to ensure that any germinating plants are controlled before they can seed. See giant hogweed treatment schedule in Table 13.

Table 13: Programme of monitoring and treatment of giant hogweed.

Treatment	Action	Time	Year
1	Monitor for new growth and take appropriate action if new plants emerge	April to June	1
2	Monitor for new growth and take appropriate action if new plants emerge	April to June	2
3	Monitor for new growth and take appropriate action if new plants emerge	April to June	3
4	Monitor for new growth and take appropriate action if new plants emerge	April to June	4
5	Monitor for new growth and take appropriate action if new plants emerge	April to June	5

4.1.1.3 Treatment of Cherry Laurel

Based on recommendations contained within the Invasive Species Management Plan prepared by Envirico (see Appendix X), the management of cherry laurel will be a combination of Stump Treatment and Snip and Treat. Disposal of brash generated from treatment of cherry laurel will necessitate the services of an appropriately licensed waste contractor. According to Envirico the stem can be cut, and the stump immediately treated with Roundup Biactive XL in accordance with the label. Monitoring of the exposed stumps for re-growth will be required.

Timeline Management

Table 14: Timeline for management of cherry laurel. This timeline may be altered by the appointed invasive species contractor subject to the date of their appointment.

Year	Period of Works	Proposed Treatment(s)
2022 (anticipated site preparation phase)	February/March	Stump treatment, snip and treat, seedling removal
2023 (anticipated construction phase)	September/October	Inspect stands and seedlings, retreat if necessary
2024 (anticipated operational phase)	February/March	Inspect stands and seedlings, retreat if necessary
2025 and ongoing (anticipated operational phase)	February/March	Monitor new growth and retreat if necessary

The proposed treatment of cherry laurel will be completed on a phased basis, including pre-construction clearance (e.g. site-preparation phase), construction phase management, and operational phase management (e.g. following the installation of infrastructure, and the commencement of use by members

of the public). An indicative timeline as provided by Envirico in Appendix X, is included in Table 14 above for the treatment of cherry laurel. The timeline may need to be revisited, as commencement of treatment will be subject to the decision of DLRCC to proceed with the part 8 project.

A resurvey of the proposed scheme for cherry laurel will be necessary at the beginning of each phase of management (site preparation phase, construction phase and operation phase) to ensure that an up-to-date map of infestations is generated and referenced for each management phase. It is preferable to complete these surveys in winter or early spring when the evergreen foliage of this species is most easily differentiated from other species, but surveys are not seasonally restricted and should be identifiable by a qualified professional year-round.

Records should include the works carried out in each sector (i.e. how the area has been treated) so that at the end of each phase areas can be re-evaluated.

Site Preparation Phase

Site preparation will include the removal and treatment of cherry laurel in an east-west or west-east direction. Where possible, young seedlings will be pulled from ground by hand while ensuring the root structure is attached. If this is not possible then younger single stemmed seedlings will be cut and treated with herbicide. Plants which have been previously cut back and are multi-stemmed will be cut to stump level and treated with herbicide.

Seed will be present in the substrate surrounding the infestations. Its presence may not be apparent until it is disturbed, for example during clearance works, moving of soil, construction works and landscaping. Strict biosecurity protocols as detailed in Section 4.1.1.1 will be implemented when working in these locations to prevent the spread of this invasive species.

Construction Phase

Exclusion zones will be set up around treated cherry laurel stands and marked as outlined in Section 4.1.1.1. Other biosecurity protocols will continue to apply during this phase of works.

Operation phase – short term

Areas subject to treatment during site preparation will be checked annually for re-growth and to identify where supplementary treatment is required. Any emergent cherry laurel seedlings will be pulled and treated. Stumps which have not been killed and have sprouted will be snipped and treated.

Once final clearance is achieved, that is, when all plants are dead then Operational Phase (long term) can commence. The duration of the short-term operational phase treatment will depend on no new regrowth being identified for at least two years in a row.

Operation phase – long term

During this phase, once all areas have been treated, restoration of damaged or degraded areas will include replanting of native understorey species, preferably using seed stock collected from within Druids Glen. Appropriate species may include *Ilex aquifolium*, *Vaccinium myrtillus*, *Lonicera periclymenum*, *Dryopteris affinis* and *Luzula sylvestris* all occur in the Druids Glen as understorey species and are suitable for replanting in areas previously occupied by cherry laurel. The establishment of native species within the area of former cherry laurel infestation will reduce the likelihood of cherry laurel exploiting canopy gaps in the future.

Stump Treatment

According to Envirico, Stump Treatment is the preferred treatment of invasive plants within a woodland setting. This involves cutting the plant 2-4 cm from the ground and immediately applying 20% glyphosate herbicide to the wound. According to Envirico, Biactive XL. Roundup Biactive XL is suitable for use in the context of Druids Glen, as it is an aquatic-approved, glyphosate-based herbicide that is highly effective and is considered suitable to use in and near watercourses. Note that based on information provided by Envirico, the Snip and Treat method of herbicide application is more appropriate for plants located beside or near watercourses (e.g. the Carrickmines Stream).

Herbicide application will be restricted to periods of suitable weather conditions comprising:

- Period after which any dew has dried (e.g. application will not be conducted in early morning);
- Application will take place on dry days where there is no rain forecast for a period of at least six hours; and,
- Application will take place on days where wind speeds are less than or equal to Beaufort Force 3.

The completion of herbicide application will be subject to the completion of an environmental risk assessment in advance of the works. These measures will minimise risks of herbicide drift or accidental application of herbicide to unintended targets. Envirico have stated that blue tracer dye will be added to herbicide to mark treated stems.

As discussed under timeline management above, the treatment of cherry laurel will involved revisits following the completion of initial treatment at the site preparation phase. Stumps will be checked at 15-18 months after treatment to ascertain is follow-up treatment is required (likely to be via the snip and treat method outlined below). Rechecks will be undertaken of treated areas a minimum of once annually thereafter until there is no regeneration of the species.

Snip and Treat

According to Envirico, the snip and treat method is the same as the stump treatment method, but is applied on smaller plants, on plants close to watercourses, and on plants that have strongly regrown following initial application and on which foliar treatment is unlikely to be successful. Similar to the stump treatment method, stems are cut back to ground level or old stumps and spot treated with 20% glyphosate (in this instance Envirico recommend the use of Roundup Biactive XL).

Herbicide application will be restricted to periods of suitable weather conditions comprising:

- Period after which any dew has dried (e.g. application will not be conducted in early morning);
- Application will take place on dry days where there is no rain forecast for a period of at least six hours; and,
- Application will take place on days where wind speeds are less than or equal to Beaufort Force 3.

The completion of herbicide application will be subject to the completion of an environmental risk assessment in advance of the works. These measures will minimise risks of herbicide drift or accidental application of herbicide to unintended targets. Envirico have stated that blue tracer dye will be added to herbicide to mark treated stems.

Brash Management

Excess brash will be removed from site and disposed of at an appropriately licensed facility. Some brash may be left in situ as wood piles for the duration of treatment, although these wood piles will need to be checked frequently for regrowth.

4.1.2 Measures to Protect Aquatic and Riparian Habitats

The monitoring of water quality is a specialist field, which may be undertaken by a suitably qualified and experienced environmental scientist (PEnv) who will have experience monitoring water quality, and access to sampling gear. The PEnv will provide results of water quality monitoring to the PE.

During in-stream works, and the construction of watercourse crossings, the PEnv will monitor water quality, including the following parameters: turbidity (using a handheld turbidity meter); hydrocarbons (e.g. using hydrocarbon detection strips); and dissolved oxygen levels (using a handheld dissolved oxygen meter), at locations approximately 50m upstream and 50m downstream of each crossing point. The PEnv will determine a baseline for water quality at these locations based on measurements taken over a period of **several months in advance** of commencement of construction. Water quality samples will be taken during variable flow rates (e.g., low water/rainfall, and high water/rainfall). Water quality samples will be collected for the duration of the project, at a frequency to be determined by the PEnv in consultation with the site

manager and local authority, and informed by the construction programme, and the results of baseline water quality monitoring.

The following measures will be adhered to by all site personnel. The SM will be responsible for adherence to these measures, to prevent pollutants and other deleterious materials entering the aquatic environment:

- Process waters, machine washings etc. will not be directly discharged to surface waters
- **In-stream works (e.g., construction of river crossings) will be undertaken between 1st July and 30th September inclusive so as to minimise any potential effects of works on migrating / breeding salmonids.**
- Prior to any machinery working on site for any purpose, the working area will be marked out with wooden stakes and, where deemed necessary, hazard tape will be erected to identify the working limits
- Provision of measures to prevent the release of sediment during the construction work will be **installed prior to the commencement of site clearance**. Protective measures may include but are not limited to the use of silt fences and sedimentation mats.
- Provision of exclusion zones and barriers (sediment fences) between earthworks, stockpiles and temporary surfaces will be enacted to prevent sediment washing into the receiving water environment.
- Temporary construction surface drainage and sediment control measures will be **in place before earthworks commence**.
- If pouring of cementitious materials is required for the works adjacent to the watercourses, this will be carried out in the dry.
- Discharge water generated during placement of concrete will be removed off site for treatment and disposal.
- Where stockpiling is required, temporary stockpiles will be located as far as possible (preferably >50 metres) from any water features. Three sides will be surrounded with silt fences with access from the fourth (uphill) side. Sides will be smoothened, and collection of run-off considered *i.e*. discharging to a settlement pond *etc*.
- Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to surface water. Concrete washout areas will be located remote from any surface water drainage features to avoid accidental discharge to watercourses
- No storage of hydrocarbons or any polluting chemicals will occur within 50m of the surface water network. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank (plus an allowance of 30mm for rainwater ingress). Re-fuelling of plant will not occur within 50m of the surface water network and only in bunded refuelling areas
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste
- If dewatering is required, water will be treated prior to discharge to the existing watercourse. This will include treatment for silt removal either via silt trap, settlement tanks or ponds.
- There will be no direct pumping of contaminated water from the works to the surface water drainage/stream network at any time

- Foul drainage from site offices and compounds, where not directed to the existing waste water network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations, to prevent the pollution of watercourses
- An Emergency Response Plan detailing the procedures to be undertaken in the event of flooding, a spill of chemical, fuel or other hazardous wastes, a fire, or non-compliance incident will be prepared
- Ensure site staff are trained in the implementation of the Emergency Response Plan and the use of any spill control equipment as necessary.

4.1.3 Tree and Woodland Protection Measures

The working corridor in the woodland areas will be as small as possible, with activity concentrated on the existing path network in the Druids Glen. The working corridor will be demarcated in advance of all other works by the SM, with checks for compliance by the PE.

It is preferable to use Heras-style fencing along the entire route, however the suitability of this fencing will depend on the local terrain, and alternatives may be required in the woodland sections of the route. A cell web-type surface will be installed in areas of woodland and over the root protection zones of trees to be retained, that are located within the working corridor. The adherence to working practices will be monitored and documented by an appointed PE.

4.1.4 Mitigation Measures for Badger

The PE will carry out a pre-construction check of all setts identified along the proposed route, and a more general check for any new setts within the potential zone of influence of the proposed route. Checks will take place well in advance of works (e.g., **at least one month before works commence**) Locations of setts will be shared with the PE by the data owner (Dún Laoghaire-Rathdown County Council).

Any new badger setts present will be afforded protection in line with the requirements set out in the TII/NRA guidance document as follows:

- Badger setts will be clearly marked, and the extent of bounds prohibited for vehicles clearly marked by fencing and signage
- **No heavy machinery shall be used within 30m of badger setts**; lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of sett entrances
- **During the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts**, nor blasting or pile driving within 150m of active setts
- Works can be undertaken within these zones following consultation with and approval of the PE and if required, under the supervision of the PE

The mitigation measures, as they relate to each of the badger setts identified during the ecological impact assessment at planning stage are presented below in Table 15.

Table 15: Badger Sett Mitigation Measures

Ref. No.	Mitigation Measures
S1	[Active sett within 20m of construction works] Annex/subsidiary sett – active Two entrances c. 20m from the proposed development boundary • Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing.

Ref. No.	Mitigation Measures
	• Monitoring of activity at the sett throughout the construction-phase of the proposed development. • Working extents in the vicinity of the sett entrances will be staked/marked by the PE. The works extents will be within 20m of the sett entrances. Works in the area will be subject to supervision by the PE. Vegetation removal, where required may take place between September and February, to avoid the breeding bird season. Should work be necessary outside of this period, then clearance will be carried out in the presence of a suitably qualified ecologist who will undertake a check of vegetation in advance of clearance. Clearance will only be feasible where the ecologists confirms absence of nesting birds. Vegetation will be retained at the sett entrances to ensure that they continue to be screened from other works, and any removal of vegetation within 20m of the sett will be by hand / consist of light works. Earthworks in the vicinity of the sett will take place outside of the badger breeding season (December to June, inclusive) so as to avoid any risks of disturbing breeding sows.
S2	[Inactive sett within 30m of construction works] Main sett – appears inactive in 2019/2020 At least five entrances, additional entrances may be obscured by vegetation c. 30m from the proposed development boundary • Pre-construction check of sett to establish current activity status within 12 months of any construction works commencing. • Monitoring of activity at the sett throughout the construction-phase of the proposed development. • Working extents in the vicinity of the sett entrances will be staked/marked by the appointed project ecologist. The works extents will be within 30m of the sett entrances. Works in the area will be subject to supervision by the project ecologist. Vegetation removal, where required may take place between September and February, to avoid the breeding bird season. Should work be necessary outside of this period, then clearance will be carried out in the presence of a suitably qualified ecologist who will undertake a check of vegetation in advance of clearance. Clearance will only be feasible where the ecologists confirms absence of nesting birds. Vegetation will be retained at the sett entrances to ensure that they continue to be screened from other works, and any removal of vegetation within 20m of the sett will be by hand / consist of light works. Earthworks in the vicinity of the sett will take place outside of the badger breeding season (December to June, inclusive) so as to avoid any risks of disturbing breeding sows.
S3	[Active sett 30-50m from construction works] Complex of Main sett and Associated Annex Setts – active At least eight entrances c. 20m from the proposed development boundary • The mitigation measures that apply to sett S3 are as follows: • Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing. • Subject to consultation with, the approval of and, if required, under the supervision of a badger ecologist: no heavy machinery shall be used within 30m of badger setts; lighter machinery shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of the sett entrances, during the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts.
S4	[Inactive sett >50m from construction works]

Ref. No.	Mitigation Measures
	Outlier/Subsidiary Sett – inactive in 2019/2020 Two entrances c. 70m from the proposed development • The mitigation measures that apply to sett S4 are as follows: • Pre-construction check of sett to establish current activity status within 12 months of any constructions works commencing. • Subject to consultation with, the approval of and, if required, under the supervision of a badger ecologist: no heavy machinery shall be used within 30m of badger setts; lighter machinery shall not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance shall not take place within 10m of sett entrances, during the breeding season (December to June inclusive), none of the above works shall be undertaken within 50m of active setts, nor blasting or pile driving within 150m of active setts.

4.1.5 Measures to Avoid Disturbance or Mortality of Roosting Bats

Pre-felling Checks of Trees

Locations of trees containing PRFs as identified at the planning stage will be shared with the PE by the data owner (Dún Laoghaire-Rathdown County Council).

In general, **tree surgery will be undertaken between March and April or between mid-August and mid-November**, coinciding with the season where bats are unlikely to either be in torpor or raising young, and therefore at least risk of disturbance. **Tree surgery will not take place on days where daytime temperatures fall below 10˚C**.

Trees will be appraised for the presence of cavities. If cavities are identified, they will be checked / assessed by the PE for the presence of bats or signs of bats. If bats or signs of bats are identified, works on the relevant tree will cease the contracted bat worker may need to prepare a mitigation strategy for the removal of a roost, in consultation with the NPWS, and a derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario. **NB: the discovery of bats or a roost is likely to result in a delay to the completion of tree felling, as licences may take up to six weeks (or longer) from submission to grant by NPWS.**

In some instances, cavities may not be accessible for inspection due to their height or location on a tree. In other scenarios a cavity may not contain bats or signs of bats, but be suitable for roosting bats. In such scenarios, the relevant part of the tree/tree limb/branch will be section felled where feasible[47], in such a manner as to retain the cavity within a single felled section of tree. Where feasible[33], the sections will be soft felled, e.g., lowered to the ground in a controlled manner. The sections will be left *in situ* at ground level for a minimum of 24 hours.

The following specific measures will apply to tree number 0944, which is highly suitable for roosting bats, and will be removed to facilitate the proposed route:

- Roost presence/absence checks will be undertaken for tree number 0944 prior to felling to rule out the presence of roosting bats. These checks may include extended observations of the tree at dawn and/or dusk, to identify bats emerging from or returning to the tree. In light of the location of the tree within dense woodland, specialist equipment such as infrared cameras is likely to greatly enhance the ability of the surveyor to determine roost presence/absence and will be utilised. If bats are identified roosting in tree number 0944, the PE may need to prepare a

[47] The appropriateness of section felling, and soft felling is to be also subject to workplace health and safety considerations of the tree surgeon. For example, trees located on a steep slope may not be section felled due to their location.

mitigation strategy for the removal of a roost, in consultation with the NPWS. A derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario. If the PE confirm that the tree is not occupied by bats, or used as a roost, the tree will be section felled (where feasible), in such a manner as to retain the cavities within single sections of tree. Where feasible, the sections will be soft-felled, and the sections left at ground level for a minimum of 24-hours.

Measures for the Unforeseen Discovery of Bats

In the event of the unforeseen discovery of bats during tree removals, all works in the relevant tree will cease. The PE will be consulted to prepare a mitigation strategy for bats, and to liaise with the NPWS. A derogation licence for the removal of a roost and/or disturbance of bats may be required in such a scenario.

4.1.6 Measures to Avoid and Reduce the Effects of Disturbance on Otters during Construction

Locations of a potential holt identified at the planning stage will be shared with the PE by the data owner (Dún Laoghaire-Rathdown County Council).

A pre-construction check of the activity status of the identified potential holt at Druids Glen will be carried out **within three months of any construction work commencing within 150m of the potential holt**. Wildlife cameras will be deployed to monitor activity at the potential holt for a period of at least 14 days, to confirm whether it is active/inactive, and that it does not host a breeding female with cubs.

In the event that the potential holt hosts a breeding female with cubs, works will not commence within 150m of the holt until breeding ceases (to be determined by deployment of wildlife cameras, or similarly suitable methodologies).

In addition to the above, contractors for the proposed route will be briefed on the sensitivity of otters and other fauna receptors along the proposed route as part of a toolbox talk delivered by an appropriate qualified and experienced Project Ecologist in advance of commencement on site.

4.1.7 Measures to Avoid Mortality and Disturbance of Breeding Birds

Rank vegetation (e.g., hedgerows, treelines, tall grass, dense bramble, nettles etc) along the proposed route will be removed outside of the breeding bird season (e.g., between 1st September and 28th/29th February, inclusive). Trees identified in Druids Glen for removal or tree surgery, as mentioned under Section 4.1.5, may need to be worked on within the breeding bird season in order to comply with measures to void the mortality of roosting bats. In such a scenario, the area of proposed works will be checked in advance by a suitably qualified and experienced ecologist for nesting birds. **Where the presence of nesting birds cannot be ruled out, tree surgery will be postponed until the appropriate window when nesting has finished and when tree surgery is of low risk to roosting bats**.

4.1.8 Measures to Avoid Mortality of Amphibians

Rank vegetation in the vicinity of the following locations will be removed during the winter months (e.g. between November and February), when the risk of encountering foraging amphibians is lowest:

- An area of tall-herb swamp in the Carrickmines River Valley (e.g. in vicinity of Irish Grid reference O 23879 23732);
- An attenuation pond in the Carrickmines River Valley (O 24036 23594); and,
- A pond in the grounds of Lehaunstown house (O 23445 24112).

Amphibian-proof fencing will be installed around the three locations to prevent any potential amphibians entering the area of proposed works along the route. **The fencing will be installed following clearance of vegetation within the proposed works area and in advance of the operation of heavy machinery within the proposed works area**. The PE will determine the appropriate extent of the fencing, in consultation with the Local Authority Biodiversity Officer, if necessary.

4.2 Construction-Phase – Delivery of Compensatory/Enhancement Items

4.2.1 Planting of Native Woodland

The western slope of the Carrickmines/Tully Valley north of the Tully Vale apartments will be planted with native woodland species by the appointed contractor. Planting will be with native species that are appropriate to the locality and soils. The planting mix and details will be updated at the detailed design phase of the proposal. The tree mix will aim to reflect species that are present in the valley, and will include oak *Quercus* spp., hazel, alder, blackthorn and hawthorn.

4.2.2 Installation of Bat Boxes and Management of Woodland for Bats

The appointed contractor will purchase 50 no. bat boxes (25 no. Schwegler type 1FF[48], and 25 no. Schwegler type 2F bat boxes). The bat boxes will be installed either by the ecologist or by the construction contractor under the supervision of the ecologist. It is preferable that each faces a slightly different aspect from southeast to southwest facing, to provide a range of slightly differing temperature regimes (Bat Conservation Ireland, 2015). They should also be located at least 3m above ground level to minimise the risk of interference by humans. The bat boxes will be located away from areas that are subject to artificial light spill. The GPS coordinates of the bat boxes will be logged by the PE, and the boxes will be marked and catalogued by the PE.

4.2.3 Installation of Swift Tower to Provide Swift Nesting Habitat

The appointed contractor will construct and install a swift chimney towers[49] along the proposed Green Routes Network. The location of the towers will be determined by the PE in consultation with Swift Conservation Ireland/a swift expert and the Local Authority Biodiversity Officer. Tower will be located in relatively open habitat away from trees and other clutter, and remote from residential dwellings and sources of artificial light in the northern part of the proposed route (location to be determined at detailed design stage with DLRCC Biodiversity officer).

4.3 Post-Construction – Taking-In-Charge/Management Phase

Delivery of biodiversity enhancement and compensation measures contained within the Ecological Impact Assessment of the Cherrywood Cycle and Pedestrian Route Network will depend on ongoing sensitive management of the route and its vicinity.

4.3.1 Management of Grassland for Biodiversity

Grassland along the proposed route will be managed to maximise its biodiversity value. A regime of grassland management whereby grass is cut once or twice a year, outside of the breeding bird season (1st March through 31st August, inclusive) will ensure that the suitable habitat for ground nesting specialists, e.g., meadow pipit and skylark, is retained in the Cherrywood SDZ lands following its development.

The area of such grassland management will be undertaken on sections of the route which are not infested by giant hogweed, as there is a risk that such a regime could facilitate ongoing dominance of giant hogweed in the sward. The locations of grassland management will need to be refined and agreed with the council biodiversity officer and parks department at the taking-in-charge phase.

To open the sward and encourage colonisation by forb species, yellow-rattle *Rhinanthus minor*, a hemi-parasitic plant species which suppresses grass growth, will be sown over targeted areas of retained rank

[48] Schwegler Bat Box 1FF Schwegler. Information on bat box and suppliers available from https://www.schwegler-natur.de/portfolio_1395072079/fledermaushoehle-2f/?lang=en

[49] The design of swift towers can be varied and bespoke for particular areas/sites, an example of a swift chimney tower is provided here: https://www.georgiaaudubon.org/chimney-swift.html

grassland. The areas of highest suitability for this are in the vicinity of the Cherrywood Business Park, as these areas are not infested with giant hogweed. Yellow rattle seed will be sourced from local stock where feasible, or alternatively from an Irish source. Sowing will be undertaken during the season of active growth to encourage germination. Multiple sowings may be necessary to establish a viable and self-sustaining population of this species.

4.3.2 Eradication / Control of Giant Hogweed in the Shanganagh River Catchment

The eradication of giant hogweed is listed as a commitment to enhance the ecological value of the proposed route. Long-term management of giant hogweed by herbicide application is likely to be the most effective method for eradication and eradication is only likely if hogweed is treated at the catchment scale. The ISSC will develop a catchment-scale eradication plan for giant hogweed in consultation with the local authority, and this will be implemented across multiple years to deliver upon eradication (eradication is likely to take at least five years from initial treatment). While the eradication programme is detailed under the construction phase, it is likely to cross into the post-construction phase of the proposal.

4.3.3 Management of Woodland for Biodiversity

Woodland in Druids Glen includes areas that have become infested with cherry laurel. A management regime for the control and/or eradication of this species will be prepared and implemented across the construction and post-construction phase of the proposed route. Areas subject to control will be replanted with native tree species to encourage the regeneration of woodland in the Druids Glen.

5 Actions and Objectives of the HSMP

Note that the actions and objectives outlined in the table below are outline only and should be read against the relevant sections above.

Action Ref	Porgramme	Habitat/Species	Objective	Action(s)	Responsible Personnel	Target Outcomes
4.1.1 1.1.1 4.3.2	Construction period Post-construction	Invasive species	Avoid and prevent the spread of invasives species from and within the proposed route	Adherence to best practice for works in areas infested with invasive species Adoption of detailed Invasive species management plan Treatment of hogweed	SM (adherence to best practice) ISSMP (preparation of management plan; treatment of hogweed) PE (Document adherence to plans and practices)	Invasive species contained within site during construction phase Eradication of giant hogweed and cherry laurel post-construction
4.1.2	Construction period	All aquatic habitats and species	Avoid and prevent contaminated run-off entering the receiving surface water network	Adherence to best practice methods for works in and adjacent to watercourses Good workplace hygiene	SM (adherence) PEnv (Monitor water quality parameters) PE (document adherence to practices)	No pollution events
4.1.3	Construction period	Trees and woodland	Avoid machine strikes and compaction of root zones of trees along the proposed route	Installation of protective measures for trees and woodland Adherence to working corridors by contractors and site personnel	SM (adherence) PE (document adherence)	Adherence to avoidance measures
4.1.4	Construction period	Badger	Avoid disturbance or mortality of badgers	Pre-construction checks of badger setts Timing of works outside of period of greatest sensitivity for badgers Working corridors and specific work practices in vicinity of setts	SM (adherence) PE (survey setts; document adherence)	Adherence to avoidance measures
4.1.5	Construction period	Bats	Avoid disturbance and mortality of bats	Pre-felling checks of trees Prepare mitigation strategy/derogation licence application (if necessary)	SM (adherence) Tree Surgeon (adherence)	Adherence to avoidance measures

Action Ref	Porgramme	Habitat/Species	Objective	Action(s)	Responsible Personnel	Target Outcomes
				Adherence to soft felling techniques Fell trees with PRFs in shoulder seasons for bats (spring and autumn – refer to Section 4.1.5 for detail)	PE (survey, prepare licence, document adherence)	
4.1.6	Construction period	Otters	Avoid disturbance and mortality of bats	Pre-construction checks of potential otter holt Prepare mitigation strategy/derogation licence application (if necessary)	SM (adherence) PE (survey potential holt; document adherence)	Adherence to avoidance measures
4.1.7	Construction period	Birds	Avoid disturbance and mortality of bats	Clearance of rank vegetation outside of the breeding bird season (with limited exceptions, see Section 4.1.7)	SM (adherence) Tree Surgeon (adherence) PE (conduct checks/supervision; document adherence)	Adherence to avoidance measures
4.2.1	Construction period	Woodland	Delivery of additional woodland habitat	Planting of woodland in Carrickmines River/Tully Valley	SM (delivery) PE (document delivery)	Delivery of additional woodland habitat
4.2.2	Construction period	Bats	Installation of bat boxes	Purchase of bat boxes (for specifications refer to Section 4.2.2). Installation of bat boxes	SM (purchase; installation) PE (supervision of install; document installation)	Installation of bat boxes in suitable locations along the proposed route
4.2.3	Construction period	Swifts	Installation of swift towers	Installation of swift chimney towers (for specifications refer to Section 4.2.3).	SM (purchase; installation) PE (supervision of install; document installation)	Installation of swift towers in suitable locations along the proposed route
4.3.1	Post-Construction Taking in Charge / Management	Grassland	Management of grassland for biodiversity enhancement	Minimum cut regime in select grassland locations along the proposed route. Use of yellow-rattle at select locations to suppress grass dominance	Taking-in-charge authority (management) PE (document management,	Adherence to management regime

Action Ref	Porgramme	Habitat/Species	Objective	Action(s)	Responsible Personnel	Target Outcomes
					monitor management)	
4.3.3	Post-Construction Taking in Charge / Management	Woodland	Eradication/control of cherry laurel and supplementary planting of Druids Glen woodland floor	Adherence to a regime of management of cherry laurel (multi-annual) Planting of woodland understorey with native tree saplings	Taking-in-charge authority (management) PE (document management, monitor management)	Adherence to management regime

6 Schedule of Reporting Requirements

The PE will document the actions outlined in the table above and in Section 4 of this HSMP. The measure of success in relation to monitoring in this instance, will be adherence to all measures committed to in this report. As part of their role, the PE will agree a schedule of reporting with the local authority for the construction phase of the proposal. The schedule of monitoring will depend on the programme of works, which in turn will depend on the programme of the construction contractor.

7 Post-Construction Monitoring of Biodiversity Compensation and Enhancement

The PE will be retained post-construction by the taking-in-charge authority to complete multi-annual monitoring of the compensation and enhancement measures delivered at the construction phase. Elements such as the monitoring of the bat box scheme and/or swift towers may be taken on by special interest groups (e.g. Bat Conservation Ireland; BirdWatch Ireland).

A proposed programme of construction monitoring for specific ecological receptors is outlined in Table 16, below. The programme may be revisited by the PE in consultation with the local authority. This is because several variables can influence programme, such as the completion date of the proposed route, whether the proposal is completed as a single entity or as several separate projects, or if the proposal is amended in the future. The PE may provide additional recommendations based upon the outcome of any monitoring.

Table 16: Proposed schedule of monitoring of ecology post-construction.

Species / Habitat	Seasonality	Target	Year post-construction/completion										
			0	1	2	3	4	5	6	7	8	9	10
Green-flowered helleborine *Epipactis phyllanthes*	May-early July	Presence of orchid stems		■		■		■					
Giant hogweed *Heracleum mantegazzianum* and cherry laurel *Prunus laurocerasus*	April-August	No live stems	■	■	■	■	■	■					■
Riparian margins of Druids Glen	Year round	No additional areas of erosion over year 0 baseline	■	■		■		■					
Otter holt in Druids Glen	Year round	Continued signs of use of holt and/or vicinity		■		■		■					
Bat boxes	April; Mid-August-October	Occupancy of some boxes by bats		■		■		■					
Swift towers	May-early August	Occupancy of towers by swifts		■		■		■					

Appendix IX – Fisheries Protection Method Statement

1 Introduction

This Fisheries Protection Method Statement (FPMS) has been produced to support the planning application for the proposed Cherrywood Green Routes Network for Cherrywood SDZ.

The aim of the FPMS is to ensure the protection of watercourses downstream of the proposed development. The proposed route crosses the Carrickmines Stream, and the proposal drains to the river.

Dun Laoghaire-Rathdown County Council are advised to integrate these commitments into any Planning Conditions as they see fit.

2 Roles and Responsibilities

The following are the key personnel who will be involved in the implementation of the HSMP:

1. Project Co-ordinator (PC)
2. Site Manager (SM)
3. Project Ecologist (PE)
4. Landowners (LO)

The Site Manager (SM) will inform the Project Co-ordinator (PC) of any conflicts between the recommendations of the FPMS and other site management issues. The PC will be responsible for resolving any conflict, in consultation with the relevant specialists.

Project Co-ordinator (PC)

The primary responsibility of the PC is to ensure that the SM and contractor comply with the environmental recommendations in this report.

In addition, the PC shall:

- Ensure the FPMS is included in the Contractors contract;
- Ensure that the FPMS is given to the Contractors and SM;
- Ensure the Contractors are trained in accordance with the FPMS requirements;
- Inform the Project Ecologist (PE) of the date of construction 2 weeks prior to commencing works.

Project Co-ordinator (PC)

The primary responsibility of the PC is to ensure that the SM and contractor comply with the environmental recommendations in this report.

In addition, the PC shall:

- Ensure the FPMS is included in the Contractors contract;
- Ensure that the FPMS is given to the Contractors and SM;
- Ensure the Contractors are trained in accordance with the FPMS requirements;
- Inform the Project Ecologist (PE) of the date of construction 2 weeks prior to commencing works.

Site Manager

The primary responsibility is to ensure that the FPMS is implemented by the contractor. This includes implementation of any on-site mitigation measures and any revisions, additions, or amendments that may arise to the FPMS during the course of the proposed development.

The SM shall also:

- Ensure compliance with the recommendations of the FPMS during site inspections;
- Schedule meetings with the PC to discuss progress towards completing the FPMS actions and involve the PE as necessary;
- Report and record any incidents resulting in damage to or destruction of habitats, and injury or death to fauna.

Project Ecologist

The primary responsibilities of the PE will be to:

- Act as the primary on-site ecological contact for the PC and SM regarding implementation of the FPMS;
- Ensure compliance with all recommendations of the FPMS during regular site inspections;
- Request relevant records and documentation from the SM where necessary;
- Attend routine meetings with the SM;
- Keep detailed records of any ecological incidents and report these to the PC;
- Keep records of any variations to construction methods or design brief and modify FPMS recommendations in consultation with PC;
- Produce the staged monitoring reports on flora and fauna as detailed in the section *Schedule of Reporting Requirements*. The PE will submit these to the PC. The PE will also act as overall technical advisor to the PC and PE regarding implementation of the HSMP actions.

Project Environmental Specialist (PEnv)

The PEnv will collect baseline data on water quality for the proposed route (cross reference Section 4.1.2), and will provide this data to the PE as part of the reporting process.

3 Baseline Ecological Conditions

The proposed route runs through Druid's Glen, Bride's Glen, and the Cabinteely River/Tully Valley. Each of these valleys contains relatively distinct but interconnected ecological communities, and form part of the primary ecological corridors identified within the Cherrywood Biodiversity Plan (Dún Laoghaire-Rathdown County Council, 2014). The proposed route drains to tributaries of the Shanganagh River, and the proposal includes multiple watercourse crossings, and works in close proximity to watercourses. The Shanganagh and its tributaries are one of the few remaining semi-natural riparian corridors in the context of Dún Laoghaire-Rathdown. The Shanganagh River is a salmonid river, and the rivers that dissect the proposed route host an important population of otter, a protected species.

4 Mitigation Measures

The monitoring of water quality is a specialist field, which may be undertaken by a suitably qualified and experienced environmentalist (PEnv) who will have experience monitoring water quality, and access to sampling gear. The PEnv will provide results of water quality monitoring to the PE.

During in-stream works, and the construction of watercourse crossings, the PEnv will monitor water quality, including the following parameters: turbidity (using a handheld turbidity meter); hydrocarbons (e.g. using hydrocarbon detection strips); and dissolved oxygen levels (using a handheld dissolved oxygen meter), at locations approximately 50m upstream and 50m downstream of each crossing point. The PEnv will determine a baseline for water quality at these locations based on measurements taken over a period of **several months in advance** of commencement of construction. Water quality samples will be taken during variable flow rates (e.g., low water/rainfall, and high water/rainfall). Water quality samples will be collected for the duration of the project, at a frequency to be determined by the PEnv in consultation with the site

manager and local authority, and informed by the construction programme, and the results of baseline water quality monitoring.

The following measures will be adhered to by all site personnel. The SM will be responsible for adherence to these measures, to prevent pollutants and other deleterious materials entering the aquatic environment:

- Process waters, machine washings etc. will not be directly discharged to surface waters
- **In-stream works (e.g., construction of river crossings) will be undertaken between 1st July and 30th September inclusive so as to minimise any potential effects of works on migrating / breeding salmonids.**
- Prior to any machinery working on site for any purpose, the working area will be marked out with wooden stakes and, where deemed necessary, hazard tape will be erected to identify the working limits
- Provision of measures to prevent the release of sediment during the construction work will be **installed prior to the commencement of site clearance**. Protective measures may include but are not limited to the use of silt fences and sedimentation mats.
- Provision of exclusion zones and barriers (sediment fences) between earthworks, stockpiles and temporary surfaces will be enacted to prevent sediment washing into the receiving water environment.
- Temporary construction surface drainage and sediment control measures will be **in place before earthworks commence**.
- If pouring of cementitious materials is required for the works adjacent to the watercourses, this will be carried out in the dry.
- Discharge water generated during placement of concrete will be removed off site for treatment and disposal.
- Where stockpiling is required, temporary stockpiles will be located as far as possible (preferably >50 metres) from any water features. Three sides will be surrounded with silt fences with access from the fourth (uphill) side. Sides will be smoothened, and collection of run-off considered *i.e*. discharging to a settlement pond *etc*.
- Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to surface water. Concrete washout areas will be located remote from any surface water drainage features to avoid accidental discharge to watercourses
- No storage of hydrocarbons or any polluting chemicals will occur within 50m of the surface water network. Fuel storage tanks will be bunded to a capacity at least 110% of the volume of the storage tank (plus an allowance of 30mm for rainwater ingress). Re-fuelling of plant will not occur within 50m of the surface water network and only in bunded refuelling areas
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste
- If dewatering is required, water will be treated prior to discharge to the existing watercourse. This will include treatment for silt removal either via silt trap, settlement tanks or ponds.
- There will be no direct pumping of contaminated water from the works to the surface water drainage/stream network at any time

- Foul drainage from site offices and compounds, where not directed to the existing waste water network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations, to prevent the pollution of watercourses
- An Emergency Response Plan detailing the procedures to be undertaken in the event of flooding, a spill of chemical, fuel or other hazardous wastes, a fire, or non-compliance incident will be prepared

Ensure site staff are trained in the implementation of the Emergency Response Plan and the use of any spill control equipment as necessary

Monitoring

To ensure that FPMS actions are achieving the required objective, supervision and monitoring is required. As part of their role, the PE will agree a schedule of monitoring and reporting with the local authority. The schedule of monitoring will depend on the programme of works, which in turn will depend on the programme of the construction contractor.

Appendix X – Invasive Species Management Plan

Invasive Species Management Plan

Cherrywood Greenway, Co. Dublin

March 2022

Prepared by Envirico on behalf of

Dún Laoghaire-Rathdown County Council

www.envirico.com

Revision: 01			
Action	**Personnel**	**Company**	**Date**
Report Prepared by:	Thomas Sheehan MSc	Envirico	07th October 2021
Reviewed by:	Maurice O'Connor	Envirico	21st October 2021

Contents

1. INTRODUCTION

Envirico have been engaged by Dún Laoghaire-Rathdown County Council (DLRCC) to prepare an Invasive Species management plan for the Linear Park Green Route at Cherrywood, County Dublin. This plan will detail the invasive species identified and recommend treatments for their control.

Senior Ecologist, Thomas Sheehan, visited the site on the 6th and 7th of September 2021 to carry out a site survey and to determine the presence and extent of any IAS. DLRCC propose to develop a greenway with cycle and pedestrian routes along a route from Druids Glen, Carrickmines Valley, Brides Glen and the Linear Park adjacent to Cherrywood Business Park as part of the network for the Cherrywood strategic development zone (SDZ) (see figure 1)

This Invasive Species Management plan (IASMP) has been prepared in accordance with current Irish best practice guidelines such as 'The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' – NRA (2010); and Best Practice Management Guidelines Rhododendron *Rhododendron ponticum* and Cherry Laurel *Prunus laurocerasus* – Maguire *et al.* (2008)

Site Manager/Owner: Dún Laoghaire-Rathdown County Council (DLRCC)

Site Address: Cherrywood Strategic Development Zone
Cherrywood
Dublin 18

Figure 1 ***Location of area of investigation in green marked "application site". Source: DLRCC***

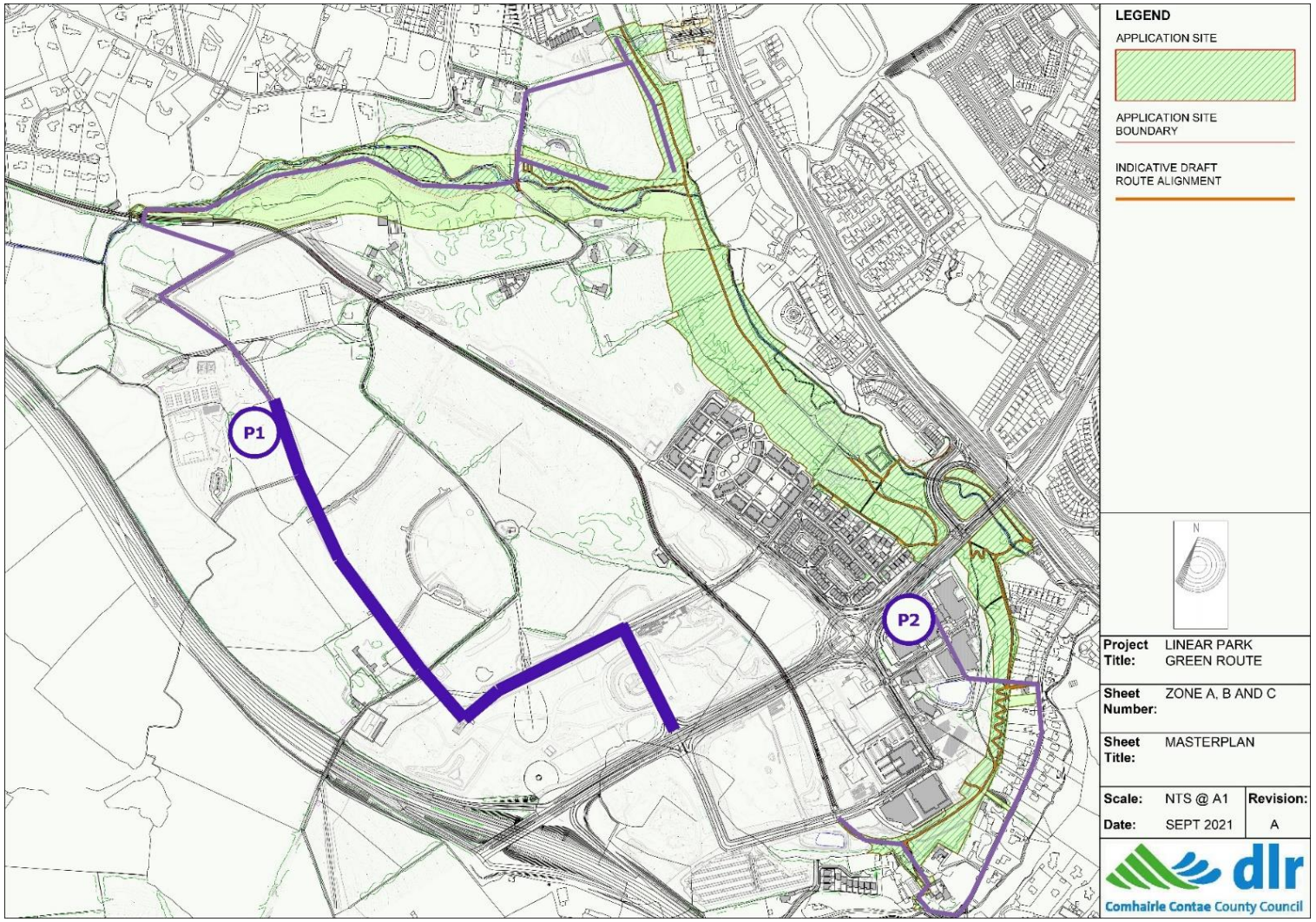
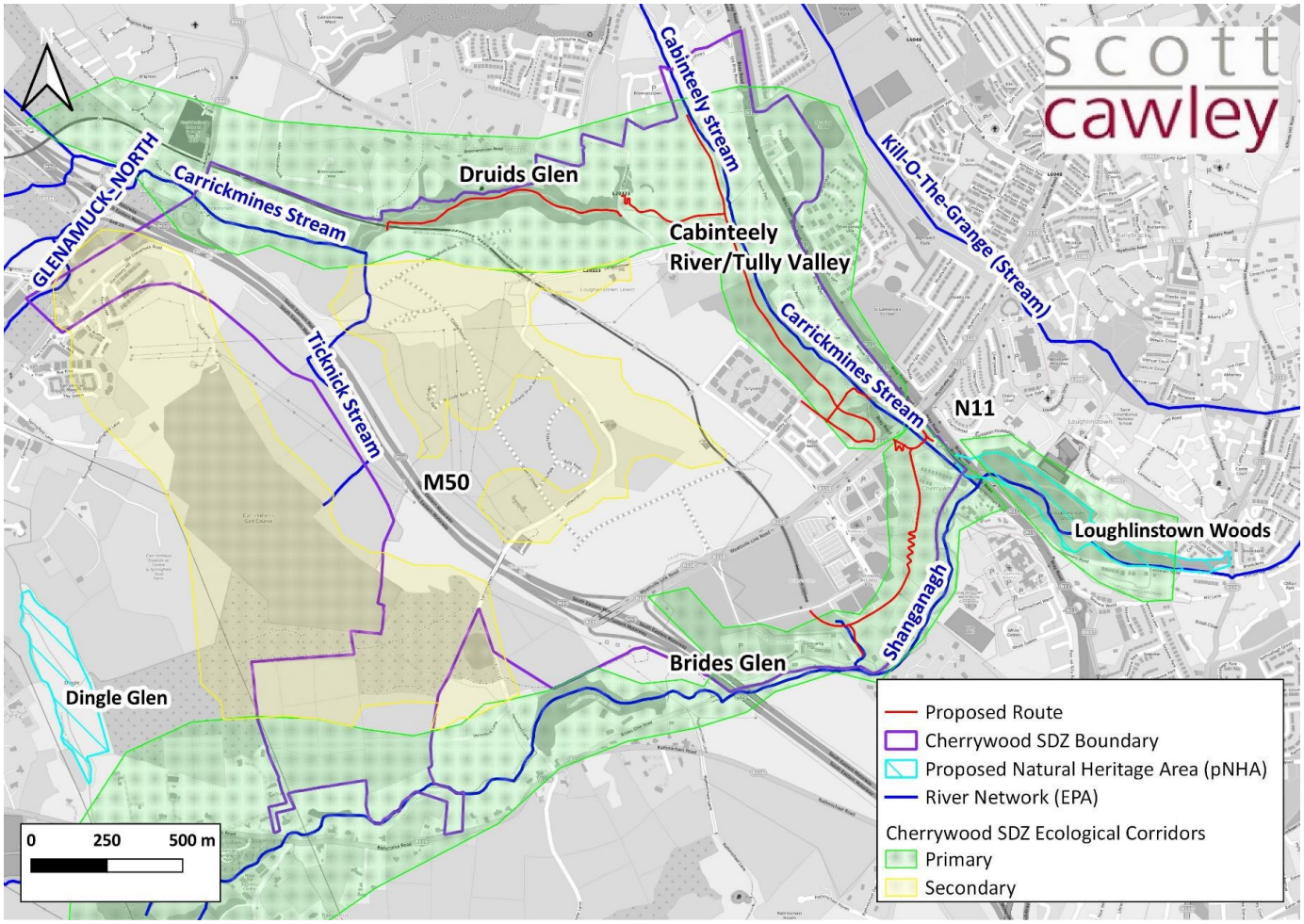


Figure 2 *Figure 2. Proposed route in red within the Cherrywood SDZ*



Source: Ecological Impact Assessment; Scott Cawley Ltd, Prepared for AECOM on behalf of Dún Laoghaire-Rathdown County Council

1.2 Scope of Survey

Our survey covered the following items:

- Botanical identification of all Third Schedule Invasive Alien Plant Species and other IAS of note.
- Map and describe the extent of the infestation.
- Collect a georeferenced photograph for each infestation.
- Discuss the implications of any invasive alien species located and make outline recommendations.

1.3 Survey Limitations:

While every effort was taken to identify the presence or absence of invasive alien plant species on the site, this survey consisted of a visual inspection only and cannot be taken as a guarantee that the invasive alien plant stands identified are the only ones on site. Invasive alien plant species can be temporarily concealed if they have been mown or covered over with gravel, mulch, turf, hard standing, etc.

1.4 Site Description:

The proposed Cherrywood Greenway provides a cycle and pedestrian greenway network, for the area within the Cherrywood SDZ. The greenway network is based on the preliminary routing indicated in the Cherrywood SDZ, extending for 3.0km from Brides Glen Road in the south to Lehaunstown Road and Brennanstown in the north. The greenway provides links to improve the pedestrian and cycle connections to key external desire lines, including links to the N11, Wyattville Link Road, and Brides Glen / Cherrywood Road in the south. The proposed greenway will be 4.0m wide, designed in accordance with TII Publication 'DN-GEO-03047-02 – Rural Cycleway Design (Offline), with the exception of a section through Druids Glen Woodland. In the Druids Glen Woodland, an 800m long pedestrian walking route is proposed, which will comprise resurfacing of existing pathways through the existing Druids Glen Woodland. The pathway through Druids Glen will be 1-2m wide in keeping with the terrain (TBC). A type of barrier is also proposed to restrict walkers and their dogs straying from the designated pathway.

The Cherrywood Strategic Development Zone (SDZ) lands are located approximately 16km southeast from Dublin City Centre, 8 km south of Dún Laoghaire, 3 km from the coastline, and 4km from the Dublin and Wicklow mountains. The lands have a varied landscape and topography, flanked by three valleys; Druid's Glen, Bride's Glen and the Cherrywood / Loughlinstown River Valley. The site is currently under development with a mix of residential, retail, commercial and community uses.

1.5 Site Management Objectives and Threats to Objectives

The site management objectives, threats to achieving those objectives and the planned strategies for minimising these threats are outlined in Table 1.

Table 1: Site management objectives, threats and mitigation for these threats.

Objective	Threat(s)	Mitigation
1. **To prevent the spread of invasive species**	Movement of equipment and personnel throughout areas contaminated with invasive species. Movement of contaminated clay/ peat. Digging amongst invasive species or areas containing propagules.	All machinery that is working in infested areas must be thoroughly washed down and certified as clean before exiting the site. All personnel and equipment that enter the site will be certified as clean before exiting. Strict biosecurity protocols will be implemented.
2. **To mitigate against the threat of Invasive species**	Invasive species growths pose a threat to the integrity of semi-natural habitats and human health, particularly in relation to Cherry Laurel (*Prunus laurocerasus*) and Giant Hogweed (*Heracleum mantegazzianum*).	All works within and adjacent to stands of invasive plant should be adequately monitored and completed with appropriate PPE.
3. **To enable semi-natural habitat enhancement works to go ahead in a timely fashion without compromising objectives 1 or 2.**	Works may be delayed due to the implementation of biosecurity protocols, particularly in relation to the on-site treatment of invasives.	Delays will be minimised by following the protocols laid out in this management plan.

2. ABOUT THE INVASIVE SPECIES

2.1 Cherry Laurel (*Prunus laurocerasus*)

Cherry Laurel is an evergreen shrub that grows up to 10 metres high, with wide spreading, dense, coarse-textured waxy foliage. Leaves are alternate, oblong, range from slightly to fully serrated, and are between 5 – 15 cm long. The leaves range from medium to dark green and are often confused with those of Rhododendron (*Rhododendron ponticum*). The flowers of Cherry Laurel are white and fragrant, they consist of 5 – 10 cm long blooms in clusters predominantly seen in mid spring. The plant produces berries in the summer, which are purple to black and poisonous to humans. It may spread by suckering (underground buds along a root system) and by seeds which are dispersed by wind, water or by birds who eat the fruit.

Native to south-east Europe, this terrestrial plant grows on acidic, well drained soils and is tolerant of salt spray. This species is often observed in woodlands where it can be seen to outcompete native flora. Cherry Laurel (*Prunus laurocerasus*) is not part of the Third Schedule Invasive Species in S.I. 477/2011. This plant has been assessed as a High Impact Invasive species and allocated as score of 18. (Species score 18+ is a species with a risk of High Impact). The threats imposed by Cherry Laurel is that all parts are considered poisonous (cyanide), it reduces biodiversity by forming dense coppices, therefore out-shading native species and preventing tree seedlings from growing.

2.2 Giant Hogweed (*Heracleum mantegazzianum*)

An introduced invasive species in Ireland, thought to have been brought into the country in the 19th Century as an ornamental plant, Giant Hogweed has since spread across Irelands riversides and ditches. Common along riverbanks, this species, native to the Caucasus Mountains, displays a highly aggressive growth and can easily outcompete native flora with mature plants reaching heights of 5-6m.

Giant Hogweed's leaves are serrated and sharply divided, they can grow up to 3m in length and 1.5m id width. The leaves are in contrast to those of the native hogweed (*Heracleum sphondylium*), which are lobed and of smaller stature. The main stem of Giant hogweed is large in mature plants, the presence of these tall dead 'canes' is a common sign that the

species is present within the area. These canes, which can be 5-10cm in diameter, are hollow and are covered in hairy bristles. Throughout the lifecycle of Giant Hogweed purple blotches or freckles are always present along the length of the stem, this is a particularly good indicator of differentiating between native and giant hogweed saplings allowing for treatment at the early stages of growth.

The white, or rarely pink, flowers of Giant Hogweed are visible from June to August. These large flat heads can produce up to 50,000 (1.5 cm) seeds per plant per year, resulting in mass spread of the species throughout a particularly venerable area.

Giant Hogweed poses a threat to human health due to production of a hazardous sap that can cause severe burns and scarring by sensitising the skin to light (UV radiation). Its large surface area means it shades out native species and its high volume of seed production means it easily propagates. The species can also increase soil erosion along riverbanks.

Giant Hogweed (*Heracleum mantegazzianum*) is part of the Third Schedule Invasive Species in S.I. 477/2011. This plant has been assessed as a High Impact Invasive species and allocated as score of 19.

2.3 Buddleia/Butterfly-bush (*Buddleja davidii*)

Butterfly-bush is a small multi-stemmed tree often planted in gardens for its ability to attract pollinators. It is native to China and Japan but is found to be more successful outside of its home range in places such as New Zealand, much of central Europe and in the UK & Ireland. The first record of the invasive in Ireland was in 1957 and is thought to have been introduced for ornamental purposes. Since then, it has become established all across the country and is still grown and sold in garden centres.

The species is thought to impact ecological features and native flora and fauna due to its invasive nature. Buddleia is classed as being a species of 'Medium Invasive Impact' by Kelly, et al., (2013) and is not listed in Part 1 of the Third Schedule of Statutory Instrument 477/2011.

The Butterfly-bush is a semi-deciduous shrub/tree with finely toothed opposite leaves that are ovate and shortly petiolate. They are hairless and green on-top, with the underside being paler and hairy, and can reach 20cm long. The shrub can grow up to 2m annually and reach 5m tall, with long arching branches that produce dense pyramidal panicles of lilac or

purple flowers. However, there are now seven subspecies and over 90 cultivars, meaning flowers have variation in form and size, and can be any colour. Flowering is short, not lasting much more than a fortnight with panicles producing seeds that are small and can be smooth or hairy. This is the main method of reproduction but can also spread asexually through a fragment of the root or stem.

Suitable habitats include forb or moss-dominated grasslands, scrub, woodland or riparian habitats, but common receiving environments are disturbed grounds in constructed or industrial areas. One notable example is railway line verges, where it has spread prolifically in the UK. Its growth habit means it can interfere with railway power lines and obscure visibility of the track. The association with urban areas has become an issue where it can exploit and weaken crumbling brickwork, and the seeds can germinate within decaying mortar. Another problem is that it is highly effective at attracting native pollinators and can result in declines in native plant species.

Network Rail cuts large plants down before spraying the stumps with herbicide to kill the plant. Gardeners are asked in the UK by DEFRA to remove seed heads after flowering. The National Biodiversity Data Centre recommends reporting any sightings. *Buddleja davidii* has a risk of Medium Impact and has an invasive score of 15.

3. INVASIVE ALIEN SPECIES LEGISLATION

Invasive species in Ireland, depending on their invasive impact, are categorized within a number of articles of legislation. These articles assist in the control of these species and, in some cases, allow for the prosecution of those who knowingly or unknowing allow their spread. Ireland has also ratified a number of international conventions that oblige the Government to address the issue of non-native invasive species, including the Convention on Biological Diversity, the Bern Convention and the International Plant Protection Convention.

3.1 Irish Statutory Instrument 477/2011

The EC Birds and Natural Habitats Regulations introduced important legislation concerning invasive species in the Republic of Ireland. There is a total of thirty-four terrestrial and aquatic alien plant species currently listed in Part 1 of the Third Schedule (as amended by S.I. No. 355/2015) which is included in Table 2 below;

Table 2: Third Schedule of S.I. 477/2011 as amended

Common Name	Scientific Name
American skunk-cabbage	*Lysichiton americanus*
A red alga	*Grateloupia doryphore*
Brazilian giant-rhubarb	*Gunnera manicata*
Broad-leaved rush	*Juncus planifolius*
Cape pondweed	*Aponogeton distachyos*
Cord-grasses	*Spartina* (all species and hybrids)
Curly waterweed	*Lagarosiphon major*
Dwarf eel-grass	*Zostera japonica*
Fanwort	*Cabomba caroliniana*
Floating pennywort	*Hydrocotyle ranunculoides*
Fringed water-lily	*Nymphoides peltate*
Giant hogweed	*Heracleum mantegazzianum*
Giant knotweed	*Fallopia sachalinensis*
Giant-rhubarb	*Gunnera tinctoria*
Giant Salvinia	*Salvinia molesta*
Himalayan balsam	*Impatiens glandulifera*
Himalayan knotweed	*Persicaria wallichii*

Hottentot-fig	*Carpobrotus edulis*
Japanese knotweed	*Fallopia japonica*
Large-flowered waterweed	*Egeria densa*
Mile-a-minute weed	*Persicaria perfoliate*
New Zealand pigmyweed	*Crassula helmsii*
Parrot's feather	*Myriophyllum aquaticum*
Rhododendron	*Rhododendron ponticum*
Salmonberry	*Rubus spectabilis*
Sea-buckthorn	*Hippophae rhamnoides*
Spanish bluebell	*Hyacinthoides hispanica*
Three-cornered leek	*Allium triquetrum*
Wakame	*Undaria pinnatifida*
Water chestnut	*Trapa natans*
Water fern	*Azolla filiculoides*
Water-primrose	*Ludwigia* (all species)
Waterweeds	*Elodea* (all species except *E. canadensis*)
Wireweed	*Sargassum muticum*

Article 49 prohibits the introduction, breeding, release or dispersal of certain species; and Article 50 prohibits dealing in and keeping certain species.

> **Article 49 (2)** "Save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence."

Article 49 (3) states that you can defend against allegations that you committed an offence under Article 49 (1) or (2) by proving that you took all reasonable steps and exercised all due diligence to avoid committing the offence:

> **Article 49 (3)** "Subject to paragraph (4), it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.
>
> **Article 50 (2)** "Save in accordance with a licence granted under paragraph (7), a person shall be guilty of an offence if he or she imports or transports –

(a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule

(b) anything from which an animal or plant referred to in Part 2 of the Third Schedule can be reproduced or propagated, or

(c) a vector material listed in Part 3 of the Third Schedule,

into or in or to any place in the State specified in relation to such an animal or plant or vector material in relation to that animal or plant or vector material in the third column of the Third Schedule."

The Wildlife Amendment Act (2000) of ***The Wildlife Act (1976)*** made it an offence to cause an exotic species of flora to grow in the wild anywhere in the state**:**

"Any person who plants or otherwise causes to grow in a wild state in any place in the State any (exotic) species of flora, or the flowers, roots, seeds or spores of flora, otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence."

3.2 EU Regulation 1143/2014

EU Regulation 1143/2014 on invasive alien species entered into force on 1 January 2015. It provides for a set of measures to be taken across the EU in relation to invasive alien species included on a list of Invasive Alien Species of Union concern. The list of invasive alien plant species can be seen in Table 3 below;

Table 3: Plants listed as Invasive Alien Species of Union Concern (EU Regulation 1143/2014)

Scientific name	English name	Entered
Acacia saligna	Golden wreath wattle	2019
Ailanthus altissima	Tree of heaven	2019
Alternanthera philoxeroides	Alligator weed	2017
Andropogon virginicus	Broomsedge bluestem	2019
Asclepias syriaca	Milkweed	2017
Baccharis halimifolia	Eastern baccharis	2016
Cabomba caroliniana	Green cabomba	2016
Cardiospermum grandiflorum	Balloon vine	2019
Cortaderia jubata	Purple pampas grass	2019
Ehrharta calycina	Perennial veldtgrass	2019
Eichhornia crassipes	Water hyacinth	2016

Elodea nuttallii	Nuttall's waterweed	2017
Gunnera tinctoria	Chilean rhubarb	2017
Gymnocoronis spilanthoides	Spadeleaf plant	2019
Heracleum mantegazzianum	Giant hogweed	2017
Heracleum persicum	Persian hogweed	2016
Heracleum sosnowskyi	Sosnowski's hogweed	2016
Humulus scandens	Japanese hop	2019
Hydrocotyle ranunculoides	Floating pennywort	2016
Impatiens glandulifera	Himalayan balsam	2017
Lagarosiphon major	Curly waterweed	2016
Lespedeza cuneata	Chinese bushclover, sericea	2019
Ludwigia grandiflora	Water primrose	2016
Ludwigia peploides	Floating primrose	2016
Lygodium japonicum	Vine-like fern	2019
Lysichiton americanus	American skunk cabbage	2016
Microstegium vimineum	Japanese stiltgrass	2017
Myriophyllum aquaticum	Parrot's feather	2016
Myriophyllum heterophyllum	Broadleaf watermilfoil	2017
Persicaria perfoliata	Asiatic tearthumb	2016
Parthenium hysterophorus	Whitetop weed	2016
Pennisetum setaceum	Crimson fountaingrass	2017
Prosopis juliflora	Mesquite	2019
Pueraria montana* var. *lobata	Kudzu vine	2016
Salvinia molesta	Giant salvinia, kariba weed	2019
Triadica sebifera	Chinese tallowtree	2019

4. SURVEY FINDINGS

4.1 Summary of Site Visit

Site visits were conducted by Envirico Ecologist, Thomas Sheehan, on the 6th and 7th of September 2021 and were supported by Sophie Barwich, Assistant Parks Superintendent for Dun Laoghaire Rathdown County Council on the 6th September for route locations as well as safe entry and exit points.

In total, three invasive/ non-native species were noted within and or adjacent to the site.

4.1.1 Giant Hogweed

Of these species, Giant Hogweed (*Heracleum mantegazzianum*) is listed in the Third Schedule of S.I. 477/2011. The Giant Hogweed is currently under treatment by Envirico Ltd.

4.1.2 Buddleia (*Buddleja davidii)*

Two stands of Buddleia/Butterfly-bush (*Buddleia davidii*) of approx. 0.5m height were noted near the overpass/stream at 0724148, 0723531 and can be treated by removing the seed heads after flowering, cutting down of the plants and treating the stumps with herbicide to kill the plant.

4.1.3 Cherry Laurel (*Prunus laurocerasus*)

Cherry Laurel, a High Impact Invasive species, was noted throughout the woodland at Druid's Glen.

In total, an area of **1128m^2** of Cherry laurel was estimated in the Druids Glen woodland. This area was arrived at assuming a 2m cutback requirement from the pathway. This included 470 linear metres (470 x 2m = 940m^2) estimated along the northside (stream side) and 94 linear metres (94 x 2 = 188m^2) along the southern edge of the pathway. It should be noted that several mature Cherry Laurel plant overhangs will require removal with a chainsaw with an estimated height of approximately 8m and diameter of approximately 30cm in places. (see Appendix II – Photographic Record).

4.1.4 Japanese Laurel/Spotted Laurel (*Aucuba japonica*)

Two areas, 1m^2 x 1m height and 18m^2 x 3m height of Japanese laurel/ Spotted laurel (*Aucuba japonica*) was also found within the Druid's Glen woodland (0723138, 0724125) it has not be yet assessed as invasive and is probably a garden escapee, still it is

recommended that it should be removed and treated in the same manner as the Cherry laurel.

Table 4 Coordinates and estimates of Cherry Laurel with the Druid's Glen woodland (points are taken from east to west)

Point	Coordinates	Point	Coordinates	Estimated length	Height	No. plant	No. plant
A	0723227, 0724130	**B**	0723208, 0724117	A-B = 20m	0.5 -5m	10-15 x 4-5m	10 x 0.5-1m
B	0723208, 0724117	**C**	0723174, 0724121	B-C = 40m	3-5m	Unknown	Unknown
C	0723174, 0724121	**D**	0723136, 0724132	C-D = 45m	3-5m	Unknown	Unknown
D	0723136, 0724132	**E**	0723095, 0724138	D-E = 40m	5-6m+	Unknown	Unknown
E	0723095, 0724138	**F**	0723059, 0724172	E-F = 60m	0.5-5,	Unknown	Unknown
F	0723059, 0724172	**G**	0723022, 0724189	F-G = 35m	1-8m+ up to 30cm stem thickness	Unknown	Unknown
G	0723022, 0724189	**H**	0722972, 0724186	G-H = 0	N/A	N/A	N/A
H	0722972, 0724186	**J**	0722828, 0724145	H-J = 150m	1-8m+ up to 30cm stem thickness	Unknown	Unknown
J	0722828, 0724145	**K**	0722765, 0724125	J-K = 80m	1-8m+ up to 30cm stem thickness	Unknown	Unknown
K	0722765, 0724125	**L**	0722553, 0724072	0			
L	0722553, 0724072	**AQUADUCT**		**END**			

4.2 Site Access

There are several access points to the overall site however access to the Druid's Glen woodland area is limited and can only be accessed by foot. At the western end of Druid's Glen access is adjacent to the new Luas stop by descending an embankment (53.2526866, 6.160244), while at the eastern end, there is a break in a boundary wall that allows access to the woodland from the Lehaunstown road (53.253028, -6.151818). An old archway in the

wall which is currently bricked up is proposed to be reinstated as a permanent access point for the public, (see Appendix II – Photographic Record). Various other access points are present including at the N11 junction to the northeast (0723645, 0724430). For the most part other areas can be accessed by vehicle and then a short walk.

4.3 Previous Site Management

There is evidence of previous management of the Cherry Laurel within the woodland, possibly by local walkers attempting to keep the current woodland walkway clear. It appears that only cutting methods were used.

4.4 Possible Source of Infestation

Unknown.

4.5 Likely Sources of Reintroduction

Unless the Cherry Laurel in the woodland area is managed in its entirety, then there is a very high risk that the Cherry Laurel will continue to spread and be introduced back along the proposed walkway. Annual management may restrict the spread somewhat, however the Cherry Laurel will continue to reduce the semi-natural state of the woodland.

4.6 Future Site Development

The site and surrounds form part of the Cherrywood Strategic Development Zone (SDZ) lands and is currently under development with a mix of residential, retail, commercial and community uses.

5. RECOMMENDED MANAGEMENT PLAN

It should be noted that the treatment of the Cherry laurel within the Druid's Glen woodland may in places undermine the stability of the soil bank of the walkway as the Cherry laurel root structure dies after treatment and structural mitigation should be put in place for this risk.

Strict biosecurity measures will need to be implemented around all works in the areas (see section 6).

Ann understanding of the ecology of Cherry laurel and Giant hogweed along with careful planning should provide successful management and eradication outcomes.

It is also important to consider the presence of Cherry Laurel and Giant hogweed throughout the siteand the possibility of other non-native species in the surrounding environment, especially adjacent to the site as reintroduction may occur. Discussions with neighbouring landowners and informing the general public about native biodiversity, including addressing the issues of non-native species, is advisable.

An experienced Invasive Species Clerk of Works should supervise any construction works that occur within or adjacent to an area infested with Cherry Laurel or Giant hogweed.

5.1 Specific Mitigation in Relation Cherry Laurel

Recommended treatment will be a combination of Stump Treatment and Snip and Treat. Treatments recommended within this plan in relation to this species are done so in order to retain the integrity of and prevent further impact on the semi-natural habitats present.

An option for the disposal of Cherry Laurel brash includes its removal and disposal using an appropriately licensed waste contractor, as with any other trees, as this species is not controlled under Irish legislation. The stem can be cut, and the stump immediately treated with Roundup Biactive XL in accordance with the label.

Monitoring of the exposed stumps for re-growth will be required. Best-practice dictates that all equipment that is used on the site is thoroughly washed down before exiting, in order to prevent the spread of this species.

5.1.1 Timeline Management

A site survey including updating maps should be carried out at the beginning of each phase of management during the winter to early spring when evergreen plants are highly visible.

Records should include the works carried out in each sector (i.e. how the area has been treated) so that at the end of each phase areas can be re-evaluated.

Site Preparation Phase

Preliminary clearance should comprise of the removal and treatment of the Cherry Laurel. Normally this would begin in the densest areas of infestation and then work towards the areas of lower density, however due to limitations of access, it will be more feasible to work along the pathway from either east to west or west to east and finish each section "as you go".

Where possible, young seedlings should be pulled from the ground by hand while ensuring the root structure is attached. If this is not possible then younger single stemmed seedlings should be cut and treated. Plants which have been previously cut back and are multi-stemmed should be cut to stump level and treated.

Some brash could be stored and during Phase 2 placed back as piles into treated areas that are free from Cherry Laurel and have reduced ground vegetation. *These Piles will provide shelter for re-establishing plants, bring insects and other wildlife back into the area* (Higgins, 2008).

Seed will be present in the substrate surrounding the infestations. Its presence may not be apparent until it is disturbed, for example during clearance works, moving of soil, construction works and landscaping. Strict biosecurity protocols should be implemented when working in these locations to prevent the spread of this invasive species. These protocols should continue to be enforced right throughout the construction works.

Construction Phase

Exclusion zones should be marked off as described in Section 6. All biosecurity protocols outlined in Section 6 should be strictly enforced for the duration of the construction works.

Operation phase – short term

During years 2 to 3 areas that have been treated in phase 1 must be surveyed at least annually to check the effectiveness of treatment. Again, new younger seedlings can be pulled and treated. Stumps which have not been killed and have sprouted can be snipped and treated.

Once final clearance is achieved, that is, when all plants are dead then phase 3 can begin.**Operation phase – long term**

Monitoring and Maintenance During this phase, once all areas have been treated, restoration of damaged or degraded areas should be considered with replanting of native shrubs. This is important as these areas are liable to invasive seed establishment and this restoration will also minimise soil erosion. For Cherry laurel eradication to succeed it is vital that this phase is undertaken otherwise missed seedlings from Phase 2 and seeds blown in from outside the site are likely to re-establish and flower.

- Monitor and remove any regrowth that arises every 2 years.
- reinstate an understorey by under-planting cleared areas.

Table 5 Cherry Laurel treatment times– Maguire *et al.* (2008)

Cutting	J	F	M	A	M	J	J	A	S	O	N	D
Glyphosate	J	F	M	A	M	J	J	A	S	O	N	D
Tryclopyr*	J*	F*	M*	A*	M*	J*	J*	A*	S*	O*	N*	D*
Ammonium sulphate	J	F	M	A	M	J	J	A	S	O	N	D

Optimum treatment time. **Remember to consider breeding birds before embarking on a programme**.

Suboptimum treatment time but can be effective. In the case of glyphosate-based herbicides consider higher concentrations 25--100% during this time period.

* Suitable for treatment any time after cutting and appearance of new growth.

Table 6 Management Plan for Cherry laurel

Year	Dates for Works	Proposed Treatment(s)
2022	Feb/March	Stump Treatment, Snip and treat
2023	Sept/Oct	Inspect stands and seedlings, retreat if necessary
2024	Feb/March	Inspect stands and seedlings, retreat if necessary
2025 and ongoing	Feb/March	Monitor for new growth and retreat if necessary

Stump Treatment

Stump Treatment is the preferred treatment of invasive plants within a woodland setting. This involves cutting the plant 2-4 cm from the ground and immediately applying 20% glyphosate herbicide to the wound. If conditions are sub-optimal, it is possible to make a higher cut up to 40cm then wait for optimal conditions to then cut the remaining stump to ground level and apply herbicide (Higgins, 2008). The herbicide used will be Roundup

Biactive XL. Roundup Biactive XL is an aquatic-approved, glyphosate-based herbicide that is highly effective and is considered suitable to use in and near watercourses.

Herbicide application will only be undertaken when weather conditions are suitable – after dew has dried, with no rain forecast for six hours and a wind speed of Beaufort force ≤3, and after an environmental risk assessment has been carried out.

Every effort will be made to ensure that herbicide is only applied to the invasive plant species, and no spray drift occurs onto the surrounding environment.

- A blue tracer dye should be added to the herbicide to highlight treated stems.
- Stumps will need to be checked 15-18 months after treatment to ascertain if follow up treatment is required
- Follow up should consist of the snip and treat method.
- follow up treatment and record keeping are essential.

Advantages of stump method

- More likely to be killed by one treatment and therefore less follow up treatments.
- Less herbicide is required than that of foliar application.
- As plant is physically removed, surrounding native plants can immediately begin to recover.

Snip and Treat

This method is essentially the same as the stump treatment method except that it is carried out on smaller plants, as well as plants which are located nearer watercourses*, or plants which are too large for controlled foliar application or on the re-growth of stumps that have been previously treated during phase 1. Stems are cut back to ground level/old stump and spot treated with 20% glyphosate (Higgins, 2008).

The herbicide used will be Roundup Biactive XL. Each individual stem of will be cut between 2-4 cm from the ground. Roundup Biactive XL at a concentration of 20% will be applied to the cut stump by trained operatives by targeted application using a 1L pressure sprayer. A blue tracer dye will be added to the herbicide to highlight previously treated stems.

Herbicide application will only be undertaken when weather conditions are suitable – after dew has dried, with no rain forecast for six hours and a wind speed of Beaufort force ≤3, and after an environmental risk assessment has been carried out.

Every effort will be made to ensure that herbicide is only applied to the invasive plant species, and no spray drift occurs onto the surrounding environment.

*While Roundup Biactive XL is an aquatic-approved product it is still best practice to reduce its interaction with waterways.

Table 7 Methods for the control of seedlings and small plants

Method	Factors critical to success	Advantages	Disadvantages/ Constraints
Snip & Treat	Must cut at ground level Weather Chemicals and concentration used	Potentially very high kill rate Lower risk of non-target damage Low volume of herbicide used No soil disturbance	Requires use of herbicides Not suitable in wet weather Discarded cut stems may obscure missed plants, especially where there is a high density of plants.
Pull	Need to remove majority of root Need to remove soil from root system Need to dispose of pulled plants carefully	Potentially very high kill rate No herbicides required Not dependant on good weather	Some soil disturbance; particularly if plants are so large as to require the use of pick or mattock. Potential for uprooting of native vegetation, especially where high densities of larger plants May be labour intensive Dry, hard ground can result in snapping off from roots.
Spot Spray	Weather Timing of application of herbicide Chemicals and concentration used Adjuvant used Complete coverage	Potentially very high kill rate Can be done as part of spraying of regrowth if that was initial clearance method	Dry weather required for spraying Very high risk of herbicide drift and damage to existing and recovering native vegetation. Can create suitable conditions for reinfestation by seed. Standing dead shoots remain

Table 8 Eradication techniques options for larger plants (Higgins, 2008)

Method	Factors critical to success	Other issues
Cut plants to ground level & treat stumps with herbicide	Immediate herbicide application Requires low cut Chemical and concentration used Ensure all stumps treated (dye) Dry conditions required Quality control is required	Main kill achieved in single work phase Less herbicide used Very low risk of herbicide drift Reduced soil disturbance
Apply herbicide directly to stem	Chemical and concentration Timing of herbicide application Weather requirement Quality control is required	Requires access to stem base Very low risk of herbicide drift Very low volumes of herbicide used Standing dead plants
Cut plants to ground level & spray regrowth/ spray standing plants *Herbicide Options:* *Glyphosate (water or emulsion based)* *Triclopyr*	Completeness of spraying Dry weather & 6 hours after Timing of herbicide application (month) Chemical and concentration used Adjuvant used Age of regrowth Quality control is required	Need for second major work phase Time delay in completing initial kill Damages native vegetation and may delay recovery by several years May facilitate reinfestation Less effective on waterlogged plants Standing dead plants
Cut plants to ground level, knock off regrowth after 12-18 months & treat stump collar with herbicide	Requires low cut Chemical and concentration used Ensure all stumps treated (dye) Dry conditions required Quality control is required	Need for second major work phase Less herbicide used & very low risk of herbicide drift Reduced soil disturbance
Extraction of root ball/ or entire plant *Machine mounted bucket/fork*	Entire root ball must be extracted Quality control required	Requires site to be accessible Potential damage to mature trees & their roots High soil disturbance. Risk of erosion & run off
Cut plants and grub out stumps	Entire root ball must be extracted Quality control is required; some herbicide use may be necessary	Very labour intensive Moderate soil disturbance

5.1.2 Brash Management

There are several options available for the managing of brash (woody debris) generated during Cherry laurel management. The creation of “wood piles” within open areas can be valuable as invertebrate and bird habitats. If the brash is left in situ it may need to be monitored for regrowth.

In some areas, the quantity of brash may be considered excessive, and its removal and disposal of using an appropriately licensed waste contractor would be required.

Windrow/Brash Pile

Brash may be stacked into distinct piles or windrows. This will allow for monitoring and follow up treatments if necessary. Attention must be paid to possible regrowth within the windrow.

Table 9 Summary of Options for Brash Management (Higgins, 2008)

Brash Treatment - Dense stands	Advantages	Disadvantages
Leave in situ	Less labour required during initial clearance	Inhibits access for stump/re-growth follow up
	May deter browsing animals from site	Inhibits access for seedling follow up
	Brash can act like shrub layer – bird perches, invertebrate habitat etc.	Rotting biomass may affect soil chemistry
Leave in situ, pile after several months	Faster initial clearance	May be more difficult to clear collapsed and tangled brash
	Only chainsaw labour used during initial clearance	Adds an extra work-phase to clearance programme
	Can employ unskilled labour for piling	Will disturb any wildlife that has used brash as habitat
	Acts as barrier to browsers and shelter to vegetation for duration in-situ	Fire risk
Burn green/after drying out	Removes material from site, so easy access for follow up management	Risk of air pollution
		Danger of damage to other vegetation
		Currently illegal: Waste Management & Air Pollution Acts.
Windrow/discrete piles	Leaves site relatively clear for access for follow up management	May require control of re-growth/seedlings from within/under pile
	May provide shelter to recovering vegetation and act as wildlife piles	Piles may pose fire hazard
Dead Hedging	Leaves site relatively clear for follow up management	Requires control of re-growth/seedlings from under hedge
	Excludes browsers to facilitate native vegetation recovery	Hedge may pose fire hazard and require fire break
	Act as shelter and habitat for wildlife	
Mulch	Can provide usable material (paths and gardens)	Requires access for mulcher
	Mulched stumps much less likely to re-sprout	Mulcher can be expensive
		Must then dispose of mulch/accept mulch piles
Remove from site	Leaves site clear for follow up management	Requires good access
	Firewood may provide income source to offset clearance cost	Requires labour

5.2 Specific Mitigation in Relation to Giant Hogweed

5.2.1 Precautions

This plant is part of the Third Schedule Invasive Species in S.I. 477/2011 and has been assessed as a High Impact Invasive species with an allocated as score of 19. It is particularly important to consider this species in the wider environment around the greenway. As this species is growing on an adjacent site then recolonisation is likely. Thus, an understanding of the wider catchment context is necessary to determine if eradication or control efforts are likely to be successful. In some situations, eradication of all Giant Hogweed on site might not be possible due to the likelihood of re-colonisation, but infested areas accessed by staff or public must receive control measures.

The seeds of Giant Hogweed can be viable for up to 15 years and pose a real threat of further dispersal. They are easily dispersed by wind, water, animal or human influence. On average 10,000 – 20,000 seeds are dispersed from each Giant Hogweed plant. The majority of seeds fall close to the main plant and therefore it is a successful invasive plant due to its prolific seed bank and its ability to disperse seeds easily. Humans can influence seed dispersal on the treads of footwear, on clothing, by moving soil containing seeds and by vehicle transport including seeds that may be stuck to tyres.

Giant Hogweed sap contains a chemical, which in the presence of sunlight causes a painful and potentially dangerous skin reaction in almost everyone who comes into contact with it, resulting in burning, itching and blistering. The lesions are slow to heal, and any consequent scarring may persist for at least 6 years. The reaction can occur by individuals accidentally brushing past leaves and can be especially acute in children. For this reason, it is considered to be a serious and significant danger to public health. For this reason, it is particularly important that public access to any locations containing Giant hogweed, or its seed is prevented.

Giant Hogweed is currently under treatment in areas adjacent to the greenway and surrounding areas must be considered to be contaminated with Giant hogweed seed therefore, biosecurity measures (see section 6) including designated washdown areas, site access and egress must be strictly enforced in all work areas. These precautions should be

enforced during the site preparation phase, as well as during the construction phase and should follow the protocols described in Section 6.

Once construction works have been completed, annual monitoring of the site for the presence of Giant hogweed seedlings and/or more mature plants should be carried out. If Giant hogweed plants are found onsite or adjacent to the site, liaison with other project leaders in the area should take place. A treatment programme should be implemented immediately using an experienced reputable eradication specialist. A record should be kept of any treatments or site monitoring carried out.

5.2.2 Soil Removal Options

This section relates to any soil removal from the greenway outside of the Druids Glen woodland section. As areas of the greenway adjacent to Giant Hogweed must be considered contaminated with Giant Hogweed seeds, any soil removal must be under strict biosecurity measures (see section 6).

- The soil may be stored within the site at a height no more than 750mm, where it can be treated over a number of years or
- may be buried at least one metre below ground level in an area where it is not likely to be disturbed.
- Records should be kept of the quantity of material that has buried and a map showing the location of the burial pit and its depth.
- Use signs to mark the burial pit and keep heavy tracked machinery off the area.
- Subject to a site engineer review it should not be buried deeply within 7 metres of an adjacent landowner's site.
- Precautions must be taken that deep burial does not interfere with the ground water level.
- It is advisable to fence off stands of Giant Hogweed, including a 4m buffer zone and put-up warning notices.
- Buried soil and plant material must only have been treated with glyphosate type herbicide as herbicide that does not break down in the environment could cause groundwater pollution.

- Soil contaminated with Giant hogweed seed or other plant material cannot be removed off site except under licence issued by National Parks and Wildlife.

5.2.3 Eradication and control

The following procedure is currently underway adjacent to the site.

The application of herbicides over several years, prior to seed set, has been proven effective for both control and eradication. It is important to again remember that the seeds of this plant can remain viable for 7 years (possibly up to 15) although most will become unviable after just 2 years. Once a plant has produced seed, it should be assumed that the seeds will be present in the surrounding area for at least this length of time. Control measures will only affect those plants which have already germinated, and viable seed may continue to germinate each year until the seed bank is exhausted. Eradication, as opposed to temporary control will therefore require annual checks to ensure that any germinating plants are controlled before they can seed. See Giant hogweed treatment schedule in Table 10.

Table 10 Giant Hogweed Treatment/Monitoring Programme

Treatment	Action	Time	Year
1	Monitor for new growth and take appropriate action if new plants emerge	*Apr - Jun*	*1*
2	Monitor for new growth and take appropriate action if new plants emerge	*Apr - Jun*	*2*
3	Monitor for new growth and take appropriate action if new plants emerge	*Apr - Jun*	*3*
4	Monitor for new growth and take appropriate action if new plants emerge	*Apr - Jun*	*4*
5	Monitor for new growth and take appropriate action if new plants emerge	*Apr - Jun*	*5*

5.3 Specific Mitigation in Relation to Buddleia

Buddleia can be removed from the site following the same methods used for any trees or large shrubs as it does not possess a rhizomatic root system. It is also advised that any plant and machinery operating on site be thoroughly washed down before exiting the site to avoid the spread of this plant via seed to new locations. This should be considered during all phases, from site preparation through construction phase and ongoing in operation phase.

Please Note: Although medium-impact invasive species Buddleia was noted during the survey, as this species is not listed in the Third Schedule of S.I. 477/2011 there is no special legal requirement surrounding this species other than not to cause it to grow in the wild.

6. BIOSECURITY PROTOCOLS

Persons/machinery entering or working within an area infested with an invasive alien species must take certain precautions to prevent the spread of that species.

These guidelines must be strictly adhered to at all times.

6.1 Exclusion Zones

• Exclusion zones must be clearly marked or fenced off in order to prevent accidental incursion.

• Any personnel or machinery accessing the area is entering a potentially contaminated area and as such must be subject to strict biosecurity protocols.

• Exclusion zones must also be set up to keep machinery and personnel away from any stored contaminated clay or plant material.

6.2 Machinery/Equipment

• All equipment and machinery to enter an exclusion zone must be thoroughly clean before entering.

• The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum.

• Machinery will stick to pre-set haulage routes at all times.

• A designated wash-down area(s) lined with appropriate geo-textile will be set-up within the exclusion zone(s). A power washer and stiff bristled brushes will be made available at these locations.

• In the washdown area, all equipment and machinery must be thoroughly cleaned before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, bucket, machine arm, wheel arches etc.

• All equipment and machinery must be certified as clean by the Ecological Clerk of Works (ECoW) before they are removed from the exclusion zone.

• Any material that is washed off equipment and machinery and the geo-textile used to line the wash down area will be added to the material to be removed/encapsulated/incinerated.

• Personnel are at all times to be mindful of the threat posed by the spread of Giant Hogweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

6.3 Ground Personnel

- A toolbox talk with emphasis on biosecurity measures must be carried out prior to works by the Ecological Clerk of Works (ECoW). Further toolbox talks may be required in the case of new working constraints, new operatives or refresher talks.
- All PPE to enter an exclusion zone must be thoroughly clean before entering.
- Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for seeds, rhizomes, or other plant fragments that may be stuck on.
- A designated wash-down area(s) lined with appropriate geo-textile will be set-up within each exclusion zone. A bucket with soapy water, a hoof pick and a stiff bristled brush will be situated at these locations.
- In the washdown area, all PPE and equipment must be thoroughly cleaned before personnel leave the exclusion zone.
- All personnel should use a hoof pick to thoroughly clean the treads of their footwear. All footwear must be thoroughly cleaned before leaving the exclusion zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush before leaving an infested zone.
- PPE (incl. boots) and equipment should be certified as clean by the Ecological Clerk of Works (ECoW before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the material to be removed/encapsulated/incinerated.
- Personnel are at all times to be mindful of the threat posed by the spread of invasive species and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

6.4 Haulage Routes

• All haulage routes must be pre-defined and lined with an appropriate geotextile.

• If required to protect the integrity of the geotextile from the wheels of the trucks, a layer of sand blinding will be laid over top.

• Trucks must stick to predefined haulage routes at all times.

•Geotextiles that overlaid haulage routes can be added to the material to be removed/encapsulated/incinerated.

6.5 Loading of Contaminated Materials

• When contaminated material is being loaded, particular care must be taken that a minimum of the material is dropped so as to avoid spreading Giant hogweed on- or off-site.

• Geotextile will be laid to cover all the areas where the material will pass while in the loading bucket.

• Where the truck collecting the material is parked, geotextile will extend out 2m on either side of the truck so as to ensure any spillages land on the geotextile.

• Any spillages will be cleaned up immediately and loaded onto the truck.

• With the final load, the geotextile membrane will be added to the load of material to be removed/encapsulated/incinerated.

7. CODES OF PRACTICE

Ireland

- Invasive Species Ireland Horticultural Code of Good Practice (http://invasivespeciesireland.com/wp-content/uploads/2010/07/Horticulture-Code-Final.pdf)
- National Roads Authority – The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (http://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf)
- National Biodiversity Data Centre Invasive Species (http://www.biodiversityireland.ie/projects/invasive-species/)
- Invasive Species Ireland Website (http://invasivespeciesireland.com/)
- Sligo Institute of Technology Alien Species (http://staffweb.itsligo.ie/staff/dcotton/Alien_Species.html)
- Online Atlas of the British and Irish Flora (http://www.brc.ac.uk/plantatlas/) – *UK also*

UK

- Department for Environment, Food and Rural Affairs Horticultural Code of Practice (http://www.botanicgardens.ie/gspc/pdfs/defra%20code%20of%20practice.pdf)
- GB Non-Native Species Secretariat (http://www.nonnativespecies.org)

8. ABOUT ENVIRICO

Envirico are an Irish ecological company that specialise in invasive species monitoring and control. We tackle invasive alien species found in domestic, commercial and amenity sites in terrestrial, riparian and freshwater habitats.

Our qualifications include:

- MSc Ecology/Microbiology
- MSc Aquatic Ecology
- PA1 – Safe use of chemicals
- PA6A – Operating hand-held pesticide equipment
- PA6AW – Operating hand-held applicators to apply pesticides near water
- PA6INJ – Operating hand-held pesticide injection equipment
- PA6MC – Operating other hand-held applicators
- Registered Professional Pesticide User of Pesticides
- SOLAS Safe Pass Certified
- CSCS Personnel
- PTS Certified
- HSE Commercial Divers
- National Powerboat Certificate (Level 2)

Our services include:

- Site-Specific, Best-Practice Management Plans
- Site Excavation and Management
- Chemical Control
- Post-Treatment Monitoring
- Completion Certificate
- Habitat Restoration
- LANTRA Certified Training in Biosecurity and Identification

9. REFERENCES

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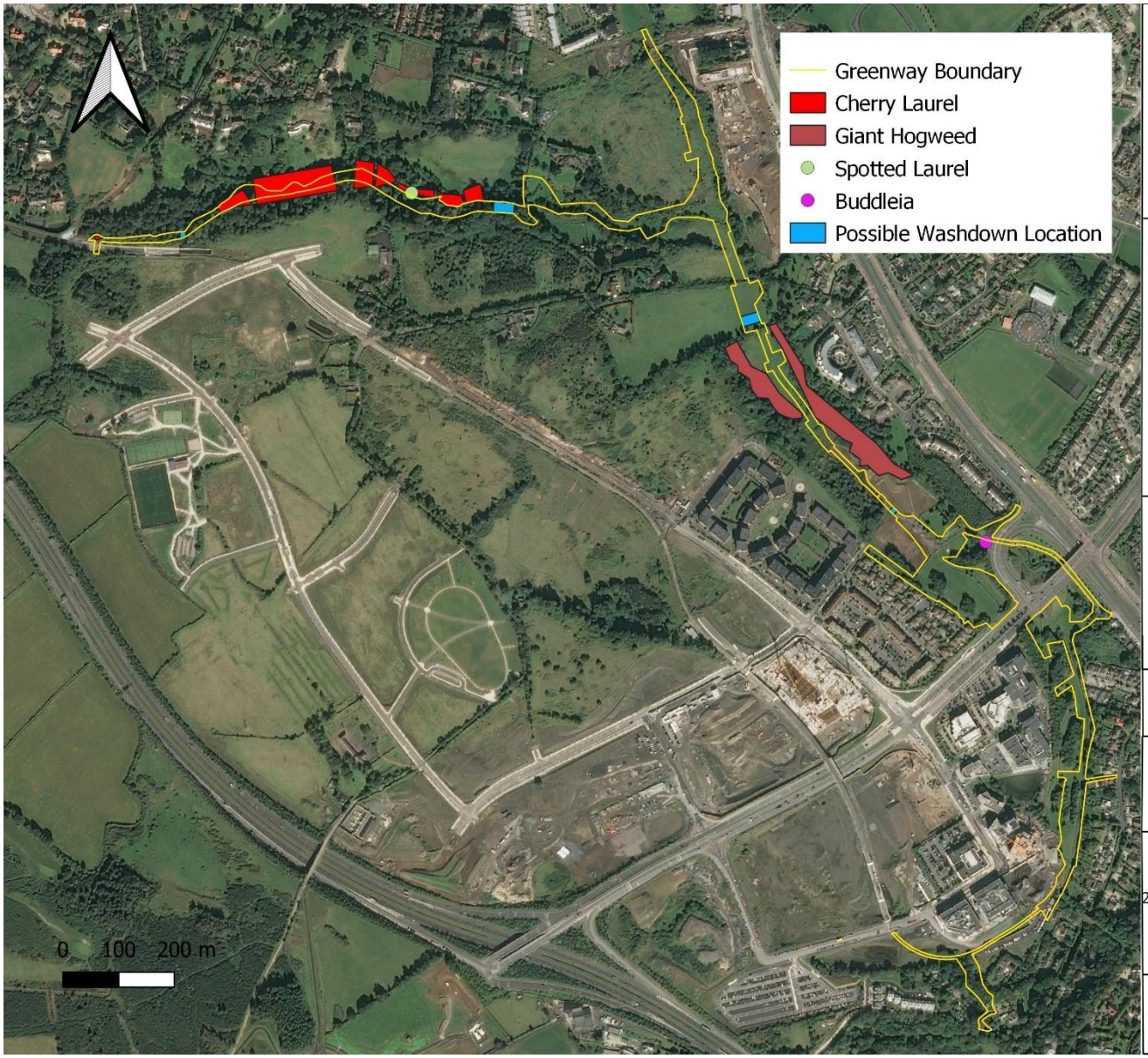
amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

APPENDIX I – Drawings



Client:

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Dún laoghaire
Co. Dublin

Consultant:

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Bonnetstown,
Co. Kilkenny.
R95 V2T4
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Email: info@envirico.com
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Drawing Title:

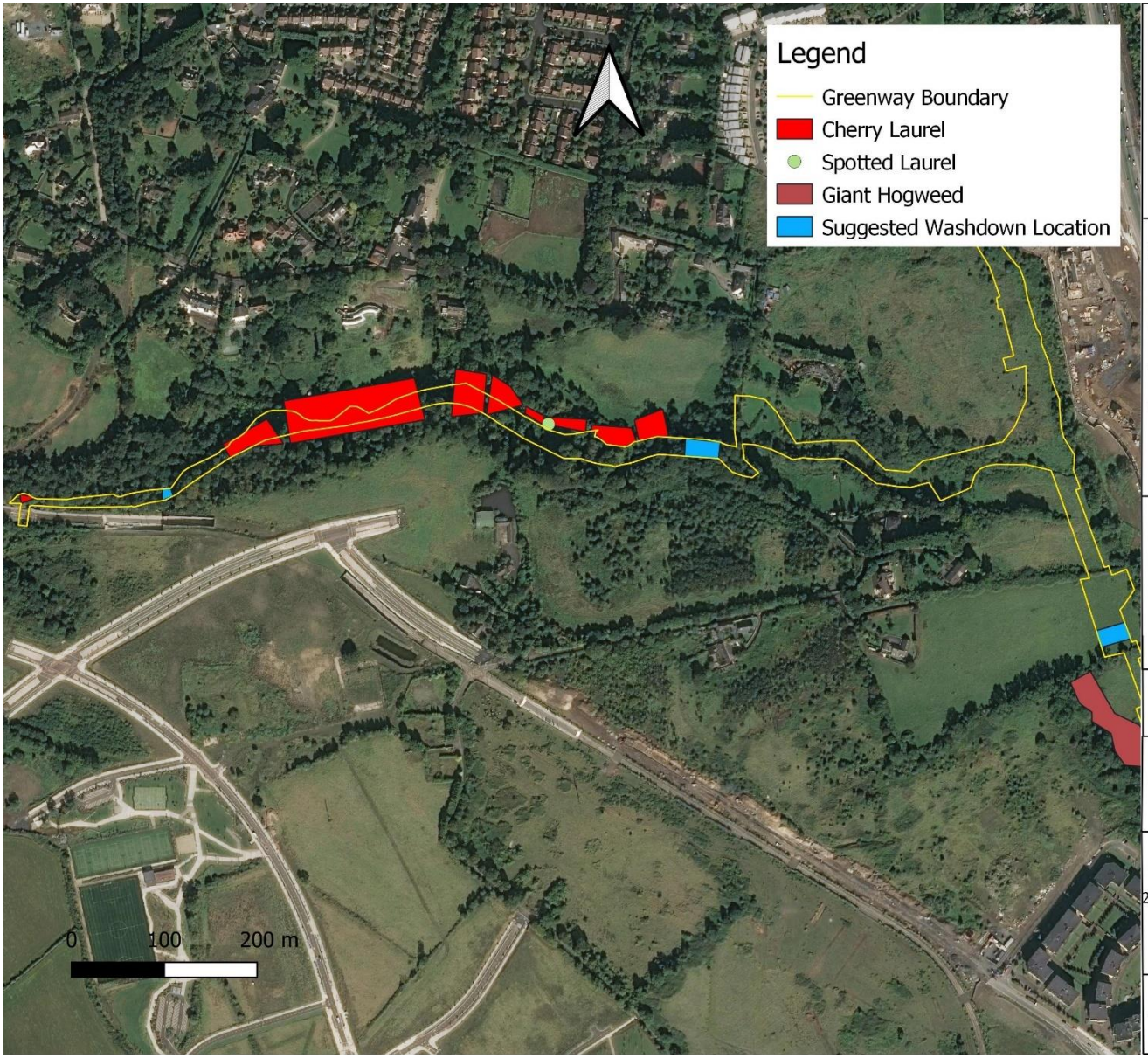
Drawing 1: Overview Cherrywood Greenway

Project Name:
Cherrywood Greenway IAS

Project Code:	*Drawn:*	*Approved:*
0383	NS	MOC

Date:	*Drawing Number:*
20/03/2022	0383/Cherrywood Greenway/DLR Co Co/ 2022

Source Background:
Google Satellite



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Drawing Title:

Drawing 2: Cherrywood Greenway Druids Glen Section

Project Name:
Cherrywood Greenway IAS

Project Code:	*Drawn:*	*Approved:*
0383	NS	MOC

Date:	*Drawing Number:*
20/03/2022	0383/Cherrywood Greenway/DLR Co Co/ 2022

Source Background:
Google Satellite

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Drawing Title:

Drawing 3: Cherrywood Greenway Cabinteely River/Tully Valley Section

Project Name:
Cherrywood Greenway IAS

Project Code:	*Drawn:*	*Approved:*
0383	NS	MOC

Date:	*Drawing Number:*
20/03/2022	0383/Cherrywood Greenway/DLR Co Co/ 2022

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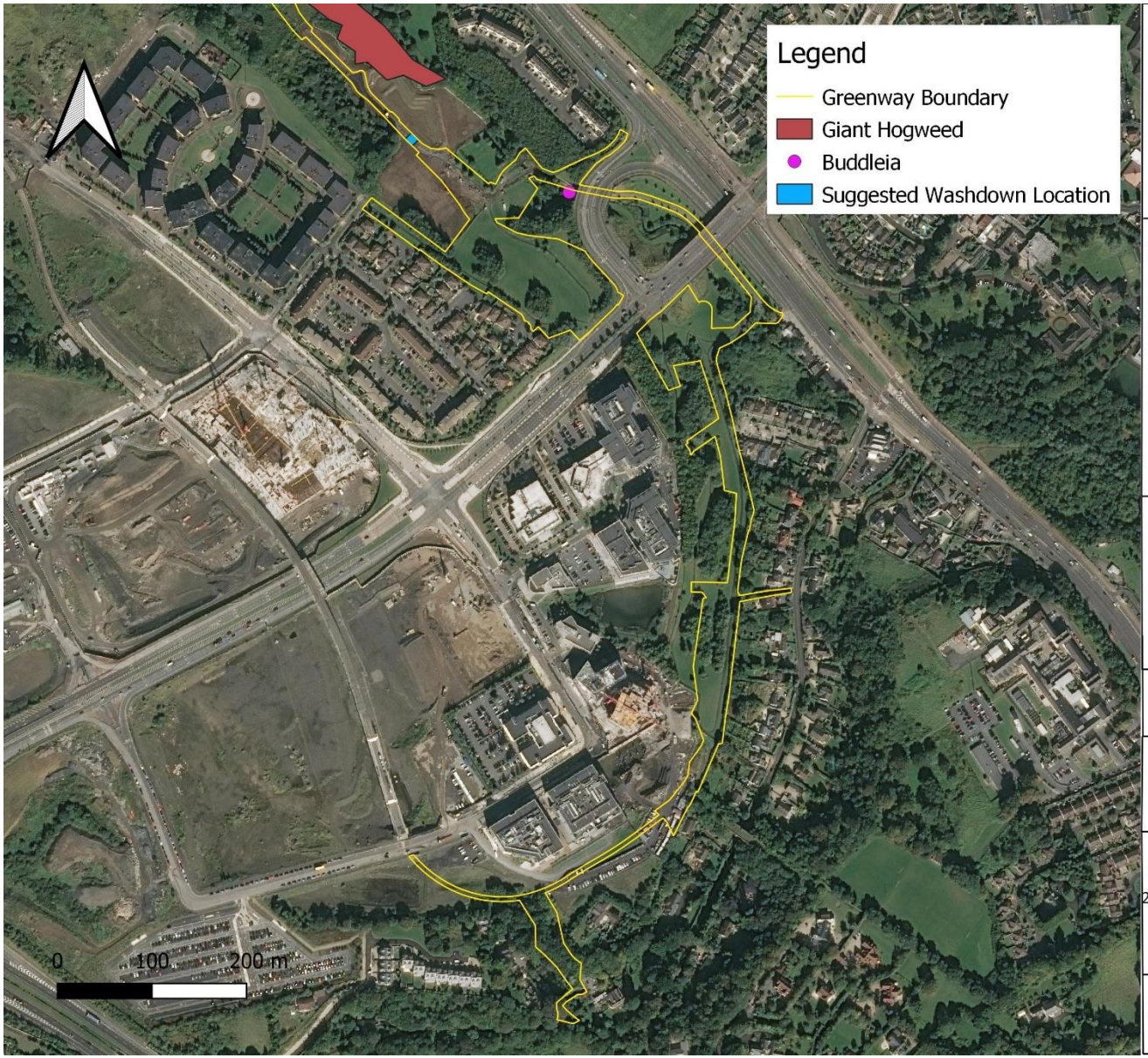

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Drawing Title:

Drawing 4: Cherrywood Greenway Southern Section

Project Name:
Cherrywood Greenway IAS

Project Code:	*Drawn:*	*Approved:*
0383	NS	MOC

Date:	*Drawing Number:*
20/03/2022	0383/Cherrywood Greenway/DLR Co Co/ 2022

Source Background:
Google Satellite

APPENDIX II – Photographic Record

Image 1 Cherry laurel within the Druid's Glen Woodland

Image 2 Mature Cherry laurel within the Druid's Glen Woodland

Image 3 Regrowth of Cherry laurel that has been previously managed

Image 4 Mature Cherry Laurel plant overhangs requiring removal with chainsaw

Image 5 An old archway in the wall which is currently bricked up and is proposed to be reinstated as a permanent access point for the public at Lehaunstown road

Image 6 Cherry laurel adjacent to stream within the Druid's Glen Woodland requiring careful management for erosion and stream integrity

Image 7 Previous management within the woodland

Image 8 Previous management within the woodland with regrowth

Image 9 Japanese laurel/ Spotted laurel within the woodland

Image 10 Current access point to woodland at Lehaunstown road