

# **FASSAROE PHASE 1 STRATEGIC HOUSING DEVELOPMENT**

**Screening for Appropriate Assessment and Natura Impact Statement**

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## Screening for Appropriate Assessment and Natura Impact Statement

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# 1 INTRODUCTION

This screening for appropriate assessment and Natura Impact Statement (NIS) provides information in support of the Appropriate Assessment (AA) of the proposed Phase One Strategic Housing Development at Fassaroe Masterplans, Bray, Co. Wicklow. This report provides information and appraises the potential that the proposed development, alone or in combination with other plans and projects, will have an adverse effect on the integrity of European sites in view of best scientific knowledge and the conservation objectives of the sites. European sites are those identified as sites of European Community importance designated as Special Areas of Conservation under the Habitats Directive (92/43/EEC) or as Special Protection Areas under the Birds Directive (79/409/ECC as codified by Directive 2009/147/EC).

The proposed development is described in **Section 2.2** of this report. The location of the proposed development is illustrated in **Figure 2-1**.

## 1.1 Statement of Competence

This NIS has been prepared by Karen Banks. Karen is an ecologist with 15 years' experience in the field of ecological assessment. She holds a BSc (Hons) in Environment and Development from Durham University and is a full member of the Chartered Institute of Ecology and Environmental Management. Karen has extensive experience in ecological field survey and impact assessment. In her career as an ecologist Karen has undertaken Appropriate Assessments (AA) covering the transport, energy and land use sectors, with work including assessment of Plans at the national, regional and local level; and numerous AAs of projects.

## 1.2 Legislative Background for Appropriate Assessment

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. As defined under the Habitats Directive (Article 3(1)) Natura 2000 is a European ecological network composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

In Ireland, these sites are designated as European sites and include SPAs, established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds and SACs, established under the Habitats Directive 92/43/EEC for habitats and species.

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act 2000 - 2020 and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites. Article 6(3) establishes the requirement for Appropriate Assessment (AA):

*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in this report to inform the assessment has had regard to the following legislation and guidance listed in Section 1.3.1:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (also known as the ‘Habitats Directive’);
- Council Directive 2009/147/EC on the conservation of wild birds, codified version, (also known as the ‘Birds Directive’);
- The European Communities (Birds and Natural Habitats) Regulations 2011 to 2015; and
- The Planning and Development Act 2000-2020.

### 1.3 Methodology

#### 1.3.1 Guidance Followed

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA has had regard to the following guidance:

- Department of the Environment, Heritage and Local Government (DoEHLG) (2009, rev 2010a), *Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities*.
- Department of the Environment, Heritage and Local Government (DoEHLG, 2010b), Department of Environment Heritage and Local Government *Circular NPWS 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities*.
- EPA (2013) *Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioners Manual*. Environmental Protection Agency.
- European Commission (2018), *Managing Natura 2000 Sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*, Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2000a), *Communication from the Commission on the Precautionary Principle*, Office for Official Publications of the European Communities, Luxembourg.
- European Commission Notice Brussels C(2021) 6913 final ‘*Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC*’ (EC, 2021);.
- European Commission (2007) *Guidance document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission*. Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2013), *Interpretation Manual of European Union Habitats*. Version EUR 28.
- European Commission (2006), *Nature and biodiversity cases: Ruling of the European Court of Justice*. Office for Official Publications of the European Communities.

#### 1.3.2 Information Consulted for this Report

This report has had regard to the following sources of data and information:

- Information on the location, nature and design of the proposed development;
- Department of Housing, Planning, and Local Government – online land use mapping [www.myplan.ie/en/index.html](http://www.myplan.ie/en/index.html);
- Department of Housing, Planning, and Local Government - EIA Portal <https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal>;
- Environmental Protection Agency (EPA) – Water Quality [www.epa.ie](http://www.epa.ie), <http://gis.epa.ie/Envision>;
- Geological Survey of Ireland – Geology, soils and Hydrogeology [www.gsi.ie](http://www.gsi.ie);
- Water Framework Directive website – [www.catchments.ie](http://www.catchments.ie);
- Inland Fisheries Ireland website and [www.wfdfish.ie](http://www.wfdfish.ie);



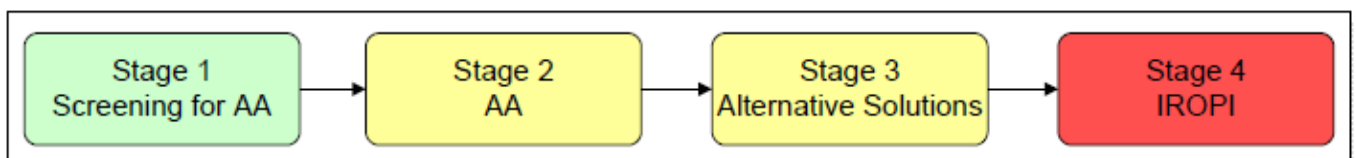
- National Parks and Wildlife Service – online European site network information, including site conservation objectives [www.npws.ie](http://www.npws.ie);
- National Parks and Wildlife Service – Information on the status of EU protected habitats in Ireland (NPWS 2019a, 2019b);
- National Biodiversity Data Centre – [www.biodiversityireland.ie](http://www.biodiversityireland.ie); and
- Ordnance Survey of Ireland – Mapping and Aerial photography [www.osi.ie](http://www.osi.ie).

### 1.4 Stages of Appropriate Assessment

Article 6(3) & (4) of the Habitats Directive defines a step-wise procedure where plans or projects are considered. The Department of the Environment, Heritage and Local Government guidelines (DoELHG, 2009, rev 2010) outlines the European Commission’s methodological guidance (EC, 2002) promoting a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 1-1**. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

**Figure 1-1: Four Stages of Appropriate Assessment<sup>1</sup>**



#### Stage 1 - Appropriate Assessment

Stage 1 AA comprises the Screening process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) as follows:

- whether a plan or project (in this instance the proposed project) is directly connected to or necessary for the management of the European sites, and
- whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the European sites in view of their conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA).

#### Stage 2 - Appropriate Assessment

The aim of the stage 2 AA process is to identify any adverse impacts that the plan or project might have on the integrity of relevant European sites. As part of the assessment, a key consideration is ‘in combination’ effects with other plans or projects. Where adverse impacts are identified, mitigation measures can be proposed that would avoid, reduce or remedy any such negative impacts and the plan or project can be amended and / or conditions and restrictions imposed. If it is considered that mitigation measures will not be able to satisfactorily reduce potential adverse impact on a Natura 2000 site then an assessment of alternative solutions is considered in Stage 3. This is then followed by Stage 4 in the event that adverse impacts remain and the proposed activity or development is deemed to be of Imperative Reasons of Overriding Public Interest (IROPI), allowing an assessment of compensatory measures to be considered.

<sup>1</sup> IROPI – Imperative Reasons for Overriding Public Interest



### 1.4.1 Screening Protocol

The sequence of events when completing the AA Screening process is provided below:

- Ascertain whether the plan or project is necessary for the management of the European site;
- Description of the plan or project;
- Definition of the likely zone of influence for the proposed development (including construction phase works);
- Identification of the European sites that are situated (in their entirety or partially or downstream) within the likely zone of influence of the proposed development;
- Identification of the most up-to-date Qualifying Interests (QIs) and Special Conservation Interests (SCIs) for each European site within the zone of influence;
- Identification of the environmental conditions that maintain the QIs/SCIs at the desired target of Favourable Conservation Status;
- Identification of the threats/impacts – actual or potential that could negatively impact the environmental conditions of the QIs/SCIs within the European sites;
- Highlighting the construction and operational activities of the proposed development that could give rise to significant negative impacts; and
- Identification of other plans or projects, for which in-combination impacts would likely have significant effects.

### 1.4.2 Screening Determination

In accordance with Regulation 42(7) of the Birds and Natural Habitats Regulations 2011 (S.I. No. 477/2011) as amended, the competent authority shall:

*“determine that an Appropriate Assessment of a plan or project is not required where the plan or project is not directly connected with or necessary to the management of the site as a European site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site”.*

Further, under Regulation 42(8) (a):

*“Where, in relation to a plan or project for which an application for consent has been received, a public authority makes a determination that an Appropriate Assessment is required, the public authority shall give notice of the determination, including reasons for the determination of the public authority, to the following—*

*the applicant, if appropriate, any person who made submissions or observations in relation to the application to the public authority, or if appropriate, any party to an appeal or referral.*

*(b) Where a public authority has determined that an Appropriate Assessment is required in respect of a proposed development it may direct in the notice issued under subparagraph (a) that a Natura Impact Statement is required”.*

### 1.4.3 Zone of Influence

In accordance with EC (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, identification of the European sites that may be affected should be done by taking into consideration all aspects of the plan or project that could have potential effects on any European sites located within the zone of influence of the plan or project. This should take into account all of the designating features (species, habitat types) that are significantly present on the sites and their conservation objectives.

In particular, it should identify:

- Any European sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;
- Any European sites within the likely zone of influence of the plan or project. Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;
- European sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);
- European sites whose connectivity or ecological continuity can be affected by the plan or project.
- The range of European sites to be assessed, i.e. the zone in which impacts from the plan or project may arise, will depend on the nature of the plan or project and the distance at which effects may occur.

### 1.4.4 Likely Significant Effects

The threshold for a likely significant effect is treated in the screening exercise as being above a de minimis level<sup>2</sup>. The opinion of the Advocate General in CJEU case C-258/11 outlines:

*“the requirement that the effect in question be ‘significant’ exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.”*

In this report, therefore, ‘relevant’ European sites are those within the potential zone of influence of the construction and / or operation of the proposed development, and to which likely significant effect pathways were identified through the source-pathway-receptor model.

### 1.4.5 Identification of Qualifying Species and Habitats for Stage 2 Appropriate Assessment

Various ecological surveys at the site have been undertaken over the course of a number of years. Surveys were initially undertaken in 2015 to inform a previous planning application (including NIS and EIS) for a similar development proposal at the lands (proposed under Wicklow County Council Planning Ref. 16/999 / An Bord Pleanála Ref. PL27.248705). More recently surveys were undertaken to inform the current proposals and application including this NIS.

Ecological surveys were carried out by ecologist Ms Karen Banks, MCIEEM, between August 2015 and September 2021.

Aquatic surveys were conducted by Aquens Ltd in October 2015 and September 2021. The water quality assessment was undertaken using macroinvertebrate indicators. The sampling method adopted was that applied by the EPA in the national river monitoring program (McGarrigle et. al., 2002). A copy of the Aquatic Ecology Report is enclosed in Appendix 5A of the EIAR (Volume 5).

A survey for Annex I habitats at Ballyman Glen was undertaken by Wetland Surveys Ireland in 2019. A copy of the Annex I Habitat Survey Report is enclosed in Appendix 5B of the EIAR (Volume 5).

The surveys assessed the potential for Qualifying Interests (QIs) and Species of Conservation Interest (SCIs) of European sites within the zone of influence of the proposed strategic housing development.

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<sup>2</sup> Sweetman v. An Bord Pleanála (Court of Justice of the EU, case C-285/11). A de minimis effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex II species present on a European site necessary to ensure their favourable conservation condition. If low level effects on habitats or individuals of species are judged to be in this order of magnitude and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be likely significant effects.

These surveys are detailed further in **Section 4**.

### 1.4.6 Consultation

Consultation undertaken for the proposed Fassaroe Phase One Strategic Housing Development is detailed in **Table 1.1**. This also references consultation undertaken in respect of the previous application proposed at the lands.

**Table 1-1: Consultation Undertaken for the Proposed Development**

Consultee	Method of Consultation	Summary of Consultation
<p>Inland Fisheries Ireland (IFI)</p>	<p>Email correspondence</p>	<p>Response email dated 14<sup>th</sup> October 2015 identified that the proposed development is located in the catchment of the Glencullen / Cookstown River. The Dargle (an EU-Designated Salmonid System) and its tributaries support a nationally significant population of Sea trout (<i>Salmo trutta</i>) in addition to a significant and biologically valuable population of Atlantic salmon (<i>Salmo salar</i>, listed under Annex II and V of the EU Habitats Directive). All proposed works must be designed and implemented in an environmentally sound and sustainable manner and should not impact negatively on the salmonid status of this system. Best practice should be implemented at all times in relation to any activities that may impact on surface water (stream and river) or riparian habitats. Comprehensive surface water management measures (GDSDS study recommendations) must be implemented at the construction and operational stage to prevent any pollution of local surface waters. On-site attenuation ponds may be required to allow for the settlement of fine/particulate materials out of potentially discharging surface waters during construction. Petrol/oil interception (and possibly hydrobrake controls) should be in place on primary surface water discharges to protect receiving freshwaters in terms of water quality. Only clean, uncontaminated water should discharge to local surface waters. The environmentally-sensitive design and implementation of surface water discharge structures would be required to ensure protection of ecological integrity at point of discharge.</p> <p>Watercourses should be maintained in their open natural state in order to prevent habitat loss, preserve and enhance biological diversity and aid in pollution detection. All proposed works must be designed and implemented in an environmentally sound and sustainable manner and should not impact negatively on the salmonid status of this system. Natural fish migration should be maintained by minimizing changes to the natural stream morphology and hydraulic conditions.</p> <p>It is essential that local infrastructural capacity is available to cope with increased surface and foul water generated by the proposed development in order to protect the ecological integrity of any receiving aquatic environment. All discharges must be in compliance with the European Communities (Surface Water) Regulations 2009 and the European Communities (Groundwater) Regulations 2010.</p> <p>It is recommended that the “Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites” (<a href="http://www.fishingireland.net/environment/constructionanddevelopment.htm">http://www.fishingireland.net/environment/constructionanddevelopment.htm</a>) be consulted when planning to undertake works on this site. The maintenance of habitat integrity (both in-stream and riparian) is essential in safeguarding the ecological value of this important urban natural resource. The specific details of any works directly affecting watercourses or riparian habitats in the area must first be submitted to IFI for assessment.</p>

Consultee	Method of Consultation	Summary of Consultation
The Development Applications Unit of the Department of Arts, Heritage and the Gaeltacht	Email	A response letter dated 26 <sup>th</sup> November 2015 outlined the need to consider the following: <ul style="list-style-type: none"> <li>• Cumulative and ex situ impacts;</li> <li>• Potential impacts from water and wastewater provisions;</li> <li>• Alien invasive species; and</li> <li>• Complete project details need to be considered, including construction management plans.</li> </ul>
The Development Applications Unit of the Department of Arts, Heritage and the Gaeltacht	Email correspondence dated 12 <sup>th</sup> March 2020 with EIA Scoping Document	No response received to date.
Wicklow County Council	Email	Response received on the 15 <sup>th</sup> of October 2015 requested that the following is addressed: <ul style="list-style-type: none"> <li>• Potential impacts of the development on Ballyman Glen SAC (It is noted you have indicated screening for Appropriate Assessment,</li> <li>• A Screening Document should be included in any application to assist the Planning Authority to carry out their Stage 1 AA Screening,</li> <li>• Impacts of the development on groundwater, Management of surface water.</li> </ul>
Wicklow County Council	Opinion of WCC issued to ABP during pre-application discussions. Copied to prospective applicant under cover of letter dated 20.07.20	The Opinion stated as follows in respect of Ballyman Glen SAC: <ul style="list-style-type: none"> <li>• Any works within Ballyman Glen SAC need to be designed to the highest standard and assessed as part of the Natura Impact Statement to be submitted with the application.</li> <li>• The boundary of the park area and the SAC needs to be treated carefully, to ensure that pedestrian movements will not result in negative impacts on the conservation values of the Ballyman Glen SAC.</li> </ul> <p>With reference to EIA and Appropriate Assessment the Opinion stated that:</p> <ul style="list-style-type: none"> <li>• An Environmental Impact Assessment Report and a Natura Impact Statement are required with any application. The applicant should be guided by the assessments / submission with respect to the previous application on site i.e. Appeal Reference PL PL27.248705 (PRR 16/999), which identify the key issues to be examined.</li> </ul>

### 1.4.7 Review of Relevant Planning and Consenting History

#### Planning Application Wicklow County Council Reference 16/999 / An Bord Pleanála Ref. PL27.248705

As noted above, a planning application was previously lodged by the applicant for a similar development proposal to the current application (proposed under Wicklow County Council Planning Ref. 16/999 / An Bord Pleanála Ref. PL27.248705). At that time, applications had been lodged by Wicklow County Council with the EPA for only 2 no. of the 4 no. landfill sites that require Certificates of Authorisation.

The NIS which accompanied the previous planning application was prepared by the author of this current NIS. The NPWS made submissions in the course of the application assessment by Wicklow County Council initially and thereafter by An Bord Pleanála.

At application stage with Wicklow County Council the NPWS submission recommended that all mitigation measures of the EIS be put in place and that a monitoring programme be put in place after the capping to monitor water quality in the springs. The NPWS made two submissions at appeal stage. With regard to nature conservation the first submission dated 11.10.16 noted the landfill remediation works which formed part of the application and recommended that all mitigation measures contained in the EIA be put in place. A second submission dated 31.03.17 stated that it had no objection on nature conservation grounds.

The An Bord Pleanála Inspectors Report set out a detailed Appropriate Assessment section. It considered the various aspects of the proposed development that may potentially impact on the Ballyman Glen SAC. The key issues identified are items which are also contained in this current application, works to the landfills, works to electricity lines within the SAC and foul and surface water services.

In concluding on appropriate assessment, the Inspector stated that *“It is my opinion that the development as proposed in the application documentation would not either individually or in combination with other plans or projects, have an adverse effect on the integrity of any European site. There remains however the issue of uncertainty regarding the final requirements for the remediation of the areas of waste on the application site pending. As set out previously in this report (7.5), pending certainty regarding the final remediation solution for the site it is not in my opinion possible for the competent authority, in the case the Board, to make a clear determination that there would not be an adverse impact on the Ballyman Glen SAC and that pending certainty on this issue the development is premature.”*

Section 7.5 of the Inspectors Report had noted that at that time, applications for Certificates of Authorisation for only two of the landfill sites had been made by Wicklow County Council with applications for the other sites still pending. It noted that there could be a significant delay in the time between grant of permission and receipt of relevant authorisations from An Bord Pleanála. It also noted that the EPA decision may not approve the remediation measures as proposed and that it could potentially require more comprehensive works which could have alternative environmental impacts including on the Ballyman Glen SAC. In particular the Board noted that the EPA could potentially require additional leachate control measures.

This reasoning of the Inspector followed through to a reason for refusal of the permission. However, it is noted that the basis of the Board’s conclusion that it could not make a definite determination that there would not be an adverse impact on the SAC as a consequence of the development was due to the fact that the landfill remediation as proposed had not yet been approved by the EPA and that alternative proposals and impacts could arise in such an event. As regards the proposals as presented in the application to the Board however it was satisfied that the development would not either individually or in combination with other plans or projects, have an adverse effect on the integrity of any European site.

It is noted that since that previous application and refusal by An Bord Pleanála, the EPA has issued Certificates of Authorisation for the remediation of the landfill sites. The remediation measures approved were the same as those proposed in the previous planning application and considered by the Board. No additional leachate control measures were required by the EPA. The EPA did require additional gas monitoring which was subsequently undertaken and the results of which gave rise to the inclusion of a gas collection and flare system which is now included in this planning application.

### **Certificates of Authorisation – EPA Refs H0474-02, H0475-01, H0476-01 and H0477-02, H04**

Since the previous planning application Wicklow County Council lodged applications for Certificates of Authorisation for the 4 No. landfill site which require these. The fifth (Site 1) did not operate within the years that require such authorisation. The NIS which accompanied the applications to the EPA was prepared by the author of this current NIS.

As competent authority for the appropriate assessment of the landfill remediation proposals, the EPA’s Inspector undertook an appropriate assessment. In this regard the EPA Inspectors Reports for each of 4 No. applications stated as follows:

*“An Inspector’s Appropriate Assessment has been completed and has determined, based on best scientific knowledge in the field and in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, pursuant to Article 6(3) of the Habitats Directive, that the activity, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site, in particular Ballyman Glen SAC [Site Code: 000713], having regard to their conservation objectives and will not affect the preservation of these sites at favourable conservation status if carried out in accordance with the application, risk assessment and recommended certificate of authorisation and the conditions attached hereto for the following reasons:*

## Screening for Appropriate Assessment and Natura Impact Statement

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- *Specifically, the remedial works will be undertaken to avoid the potential for water pollution and will ensure that there will be no significant impact on Ballyman Glen SAC [Site Code: 000713], and with a further objective to result in positive impacts to current water quality conditions.*
- *the project, alone or in-combination with other projects, will not adversely affect the integrity, and conservation status of any of the qualifying interests of the Ballyman Glen SAC [Site Code: 000713].*
- *Condition 3.5 requires ongoing environmental assessment and monitoring.*

*In light of the foregoing reasons, no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of those European Site: Ballyman Glen SAC [Site Code: 000713].”*

The approved remediation measures under these Certificates of Authorisation and as conditioned are now included within the current application. In this regard it is noted that the landfill remediation element of the current application has already been subject of appropriate assessment by the EPA which concluded that it will not adversely affect the integrity of any European Site, in particular Ballyman Glen SAC.

Nevertheless, the landfill remediation works are considered again in this current NIS along with the wider SHD development proposals.



## 2 SCREENING FOR APPROPRIATE ASSESSMENT

### 2.1 Introduction

This screening process is an assessment of the European sites that the proposed development could potentially affect. This process:

- Identifies sites within the likely zone of influence of the proposed development;
- Provides a summary of the proposed development;
- Summarises what the possible significant effects on those European Sites could be; and
- Screens out European sites that are unlikely to be affected.

### 2.2 Site Location and Description of the Project

The proposed application site forms part of a larger designated new development area under the Bray Municipal District Local Area Plan 2018 -2024 (LAP). These wider development lands are identified as an 'Action Area' in the LAP. The lands lie on the western side of Bray, as illustrated in the site location map included in **Figure 2-1**, and the map of zoned lands at Fassaroe with the Action Area boundary outlined in blue in **Figure 2-2**.

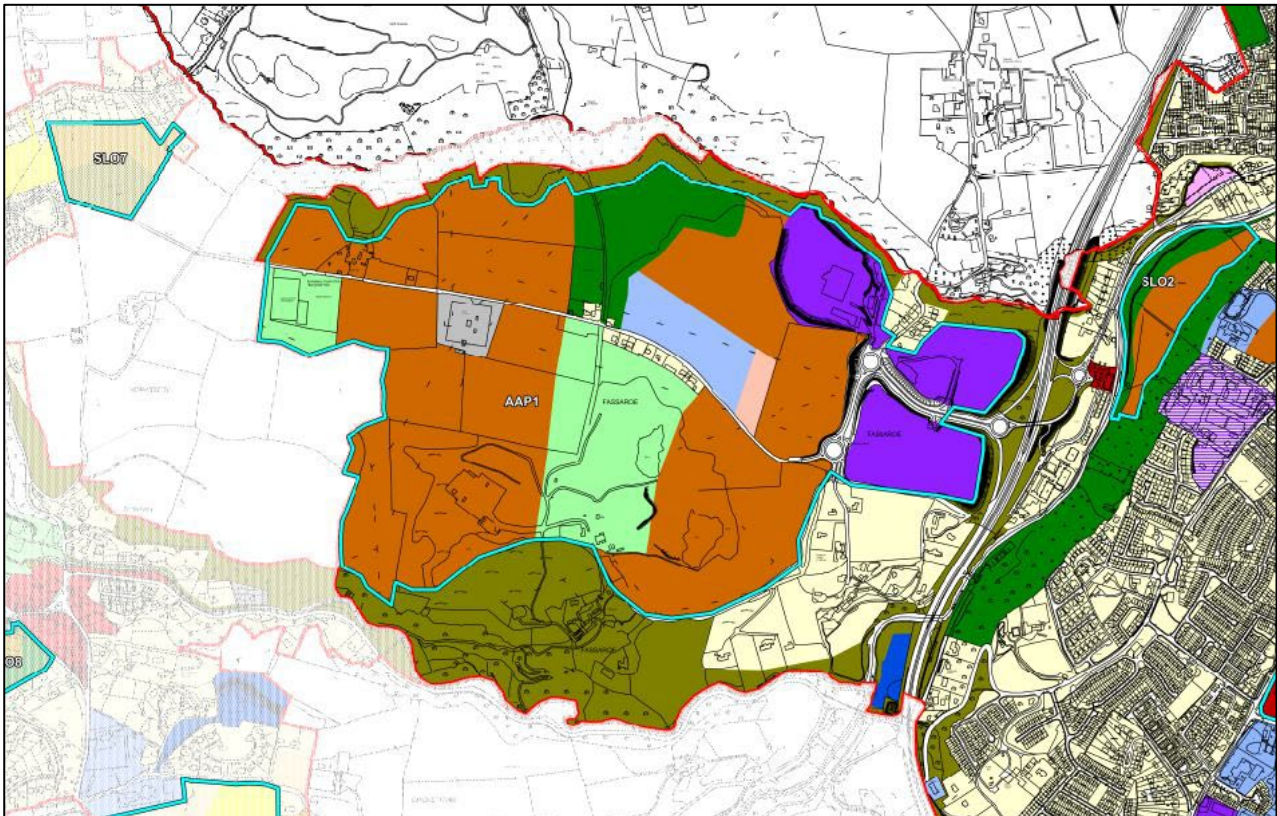
**Figure 2-1: Site Location Map**





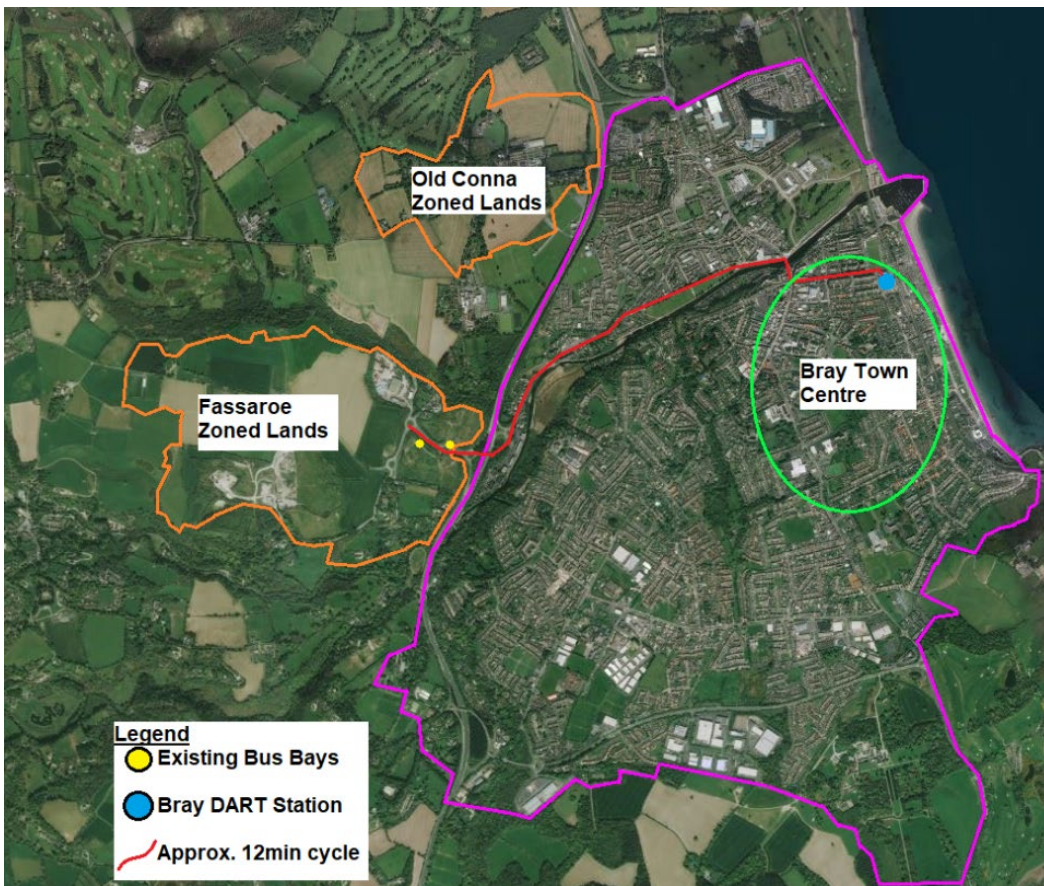
The majority of the zoned development lands within the Fassaroe Action Area are currently in agricultural use, although there are a number of other notable uses within the overall lands. They are framed by the Ballyman Glen in the north and the Cookstown River valley in the south. The most significant of these are a Roadstone quarry (no longer operational) and retail operation within the south eastern quadrant of the lands. This facility lies outside of the current proposed application site, beyond the south eastern boundary. There are also a number of residential clusters in the Fassaroe area; at Thornhill Road, adjacent to a Greenstar facility in the north east, along Kilbride Lane in the south east, and along Berryfield Lane which runs east-west through the development lands and connects to the Ballyman Road in the west. There are a number of small businesses located within the residential clusters at Thornhill Road and Berryfield Lane.

**Figure 2-2: Extent of Masterplan Zoned Lands under Bray Environs Local Area Plan 2009 – 2015**



**Figure 2.3** below presents an aerial photograph of the lands at Fassaroe in the overall context of Bray. Lands to the north of Fassaroe at Old Conna are also zoned for future development under the Dún Laoghaire Rathdown County Development Plan 2016. Given the physical restrictions on the future growth of Bray to the east by the sea and to the south by Bray Head and Sugar Loaf Mountains, the most significant direction for future growth of Bray is westwards to Fassaroe with new development also identified at Woodbrook to the north of Bray.

Figure 2-3: Aerial Photo of Fassaroe Action Area Lands



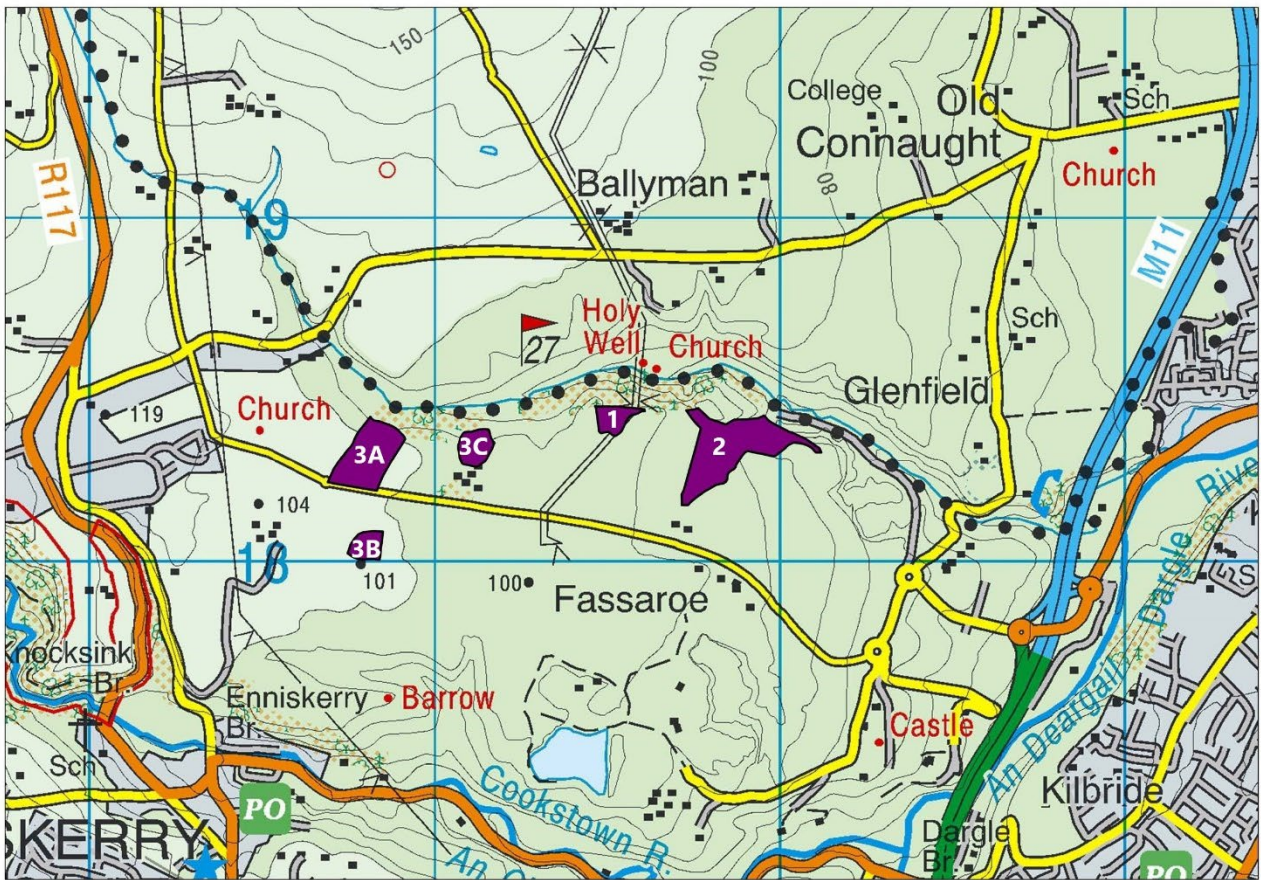
The lands at Fassaroe benefit from significant roads access infrastructure from the N11 which was previously constructed by Cosgrave Property Group (CPG) as part of a permitted commercial development that was subsequently not constructed. This comprises of part of a distributor road with existing laybys and a series of 3 no. roundabouts. Drainage infrastructure was also installed within these roads by CPG at the time. In addition, 280m approx. of an access road into the Fassaroe lands from Ballyman Road to the west has also recently been provided by the Applicants (which was granted as part of a housing development permission at Monastery, Enniskerry (Wicklow County Council Ref. 17/15 / ABP Ref. PL 27.248914)).

There are 5 no. historic landfill locations within the northern part of the overall Action Area Plan lands which were previously operated by Wicklow County Council. These landfill sites had previously been used for quarrying activities. The landfill operations ceased in the early 1990s at which time these areas were covered in topsoil and returned to agricultural use. The locations of these sites and their designated numbers are shown on **Figure 2.4** below. Localised landslips have occurred in four areas to the north of Landfill Site 2.

In accordance with the requirements of the Waste Management Act 1996, 4 no. of these former landfill sites are classified as Historic Unlicensed Waste Disposal sites which require Certificates of Authorisation from the EPA for their remediation. One of the sites, though operated by Wicklow County Council, does not fall under the certification requirements of the Waste Management Act due to its age. In any event, applications were made by Wicklow County Council to the EPA for the remediation of the 4 sites. The Environmental Risk Assessment for the applications had regard to the presence and need for remediation of all 5 sites. A Natura Impact Assessment (also prepared by the author of this current NIS) accompanied the application to the EPA. In November 2019, the EPA issued final Certificates of Authorisation for the remediation of the 4 no. sites. The landfill remediation proposals now included within the SHD planning application (and considered again as part of this current NIS) comprise of the remediation measures approved by the EPA, subject of that previous NIS and subject of Appropriate Assessment by the EPA as competent authority.



Figure 2-4: Locations of Historic Unregulated Landfill Sites



The Action Area lands rise steeply to the west from the N11. They also rise from Ballyman Glen in the north and from Cookstown River valley in the south. The highest point of the overall lands is just to the south of Berryfield Lane at the western extent of the Action Area boundary from where the land falls north-eastwards and south-eastwards and rises to the west.

The current planning application and NIS relate to the first phase of proposed development within the Action Area. The lands which are the subject of this Phase 1 proposed development comprise a substantial part of the northern portion of the overall Action Area lands.

Figure 2-5: Masterplan for CPG Owned Lands at Fassaroe

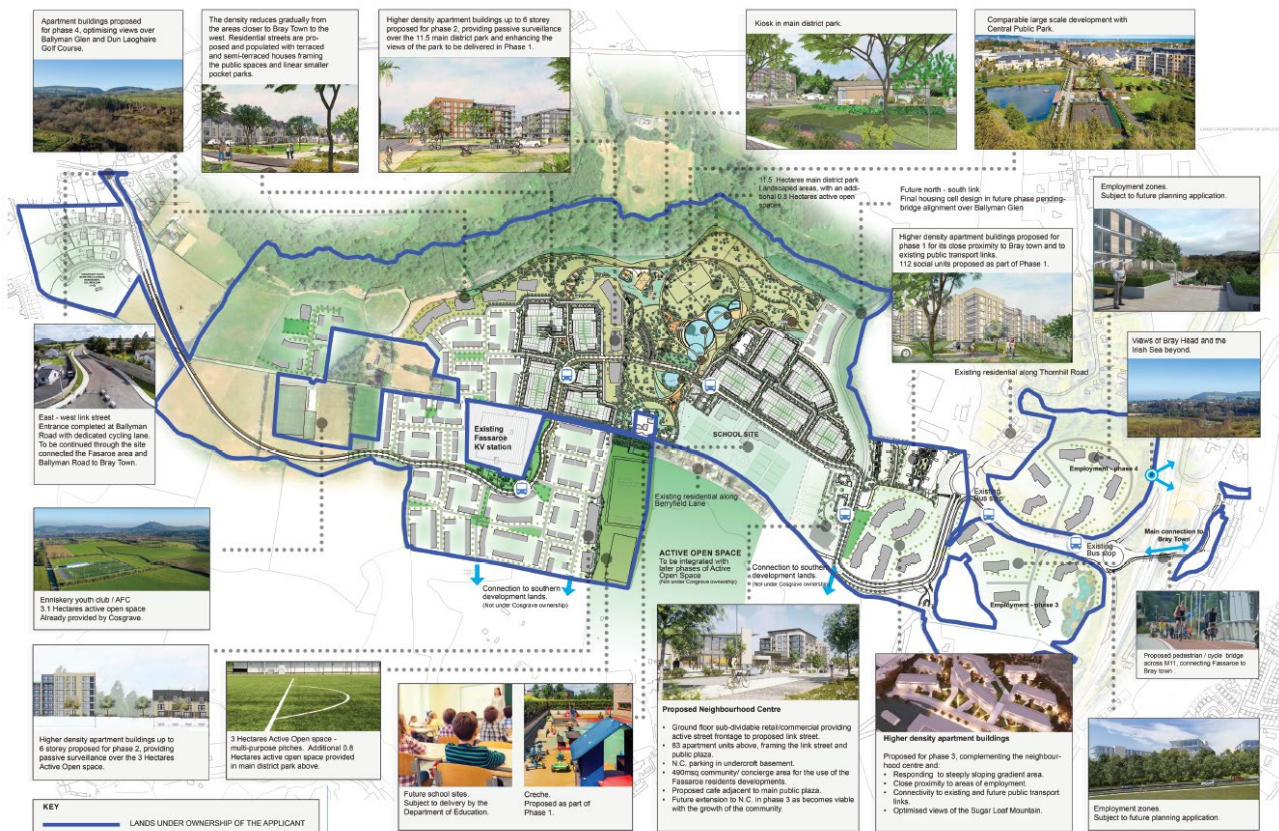


Figure 2.5 presents a Masterplan for all land at Fassaroe owned / in control of the applicant, and which will be subject of a number of phased planning applications. It is envisaged that it will be undertaken across four phases. The location of these phases are identified on Figure 2.6. The extent of the Phase 1 development subject of this NIS is identified in turquoise and blue. The turquoise (Phase 1A) will be the first areas constructed followed by the blue (Phase 1B).



Figure 2-6: Phased Approach to Full Build out of CPG Owned Lands at Fassaroe



## 2.3 General Application Content

The development now proposed under the Phase 1 application and subject of this current Natura Impact Statement comprises of the construction of 650 no. residential units comprising a mix of apartments and houses along with a neighbourhood centre, a crèche, a district park, local parks, the diversion and rerouting of ESB electricity lines, a distributor road connecting to Ballyman Road, a new pedestrian / cycle route across the N11 connecting to Dargle Road, historic landfill remediation works, landscaping works, parking facilities, ancillary services and facilities and associated site development works.

The various elements of the application then include:

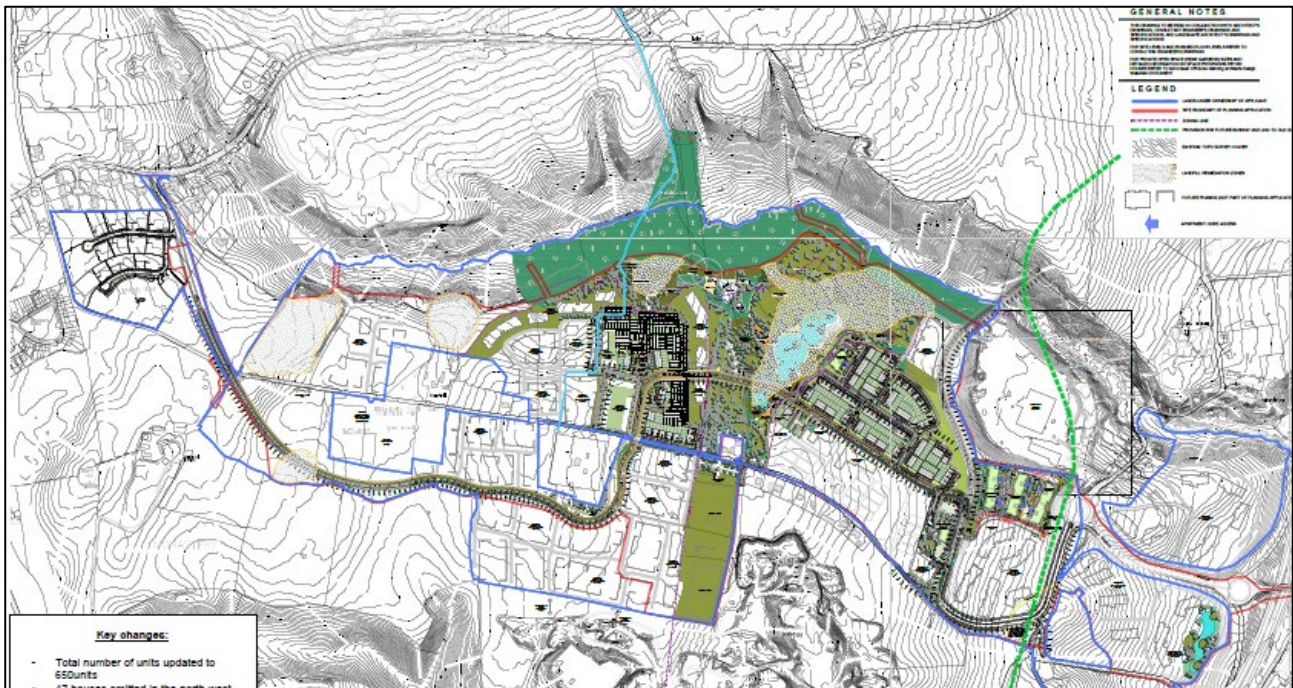
- Road link (2.4km) connecting N11 to Ballyman Road (with westerly connection to Ballyman Road already in place).
- Pedestrian / cycle route including bridge across the N11 to Dargle Road Upper.
- 15.3ha of District Park / Active Open Space.
- 650 no. residential units comprising 241 no. houses and 409 no. apartments.
- 3 No. pocket park areas comprising a total of 0.43ha.
- 733sq.m approx. crèche with capacity for approx. 138 no. childcare spaces.
- Retail unit / kiosk (108sq.m.) in district park.
- Neighbourhood Centre Phase 1 comprising:
  - 1,035sq.m. retail;
  - 360sq.m. café;
  - 480sq.m community concierge (serving entire Fassaroe community);





**Figure 2-8: Phase 1 Site Area and General Layout**

This proposed link road runs through existing large open agricultural fields. It also passes through part of one of the historic landfill sites. The roadworks here, combined with the landfill remediation as authorised by the EPA, require a modest amount of waste removal along with a cap and gas management strategy.



### 2.3.2 Internal Street Network

There will be five types of street typology provided within Fassaroe. These comprise the existing roads infrastructure at the eastern side of the site which is a Boulevard typology. Berryfield Avenue east west link to Ballyman Road is a Link Street. The typologies within the residential areas will comprise of local streets and homezone street types. The fifth typology is the existing Berryfield Lane which has a boreen quality.

### 2.3.3 Pedestrian / Cycle Route (including bridge across the N11) Connecting to Dargle Road Upper

The segregated cycle track provided along the main east west link road will connect with the existing segregated cycle track already in place at the eastern extent of the Fassaroe lands between the Junction 6 roundabout and the Thornhill Road roundabout. From The Junction 6 roundabout a new segregated cycle track and footpath will be provided to link to the La Vallee roundabout at Upper Dargle Road. This will include a new pedestrian / cycle bridge immediately south of the existing road bridge. The bridge will comprise a main span of approximately 45m across the N11 which would accommodate future widening of the N11 by an extra lane in each direction, if required as part of the N11 / M11 Junction 4 to Junction 14 Improvement Scheme.

The bridge construction will be undertaken by the applicant in consultation with Wicklow County Council and Transport Infrastructure Ireland. This bridge will serve the full build out of Fassaroe and will form a key link on cycle route W2a between Bray, Fassaroe and Enniskerry as set out in the Greater Dublin Area Cycle Network Plan. This cycle route will be fully completed through Fassaroe in the first phase of development. The bridge will be completed and open for use in advance of the occupation of dwellings in Phase 1.



### 2.3.4 District Park / Active Open Space

The District Park will provide the principle green open space for the Fassaroe development. It will in time, along with future phases of development, also connect the Ballyman Glen with the Cookstown Dargle Glen creating a North - South green corridor enhancing biodiversity through the development.

The Ballyman Glen SAC straddles the County boundary between Dublin and Wicklow and extends beyond this proposed planning application boundary. It is orientated in an east-west direction with a stream running through the centre. Currently the glen is bounded by steeply sloping ground with Gorse and areas of woodland and scrub. The masterplan design retains the open space adjacent to this glen by locating the district park along its length acting as a buffer for the glen to ensure nature conservation and to discourage and prevent access into the glen through the use of landscape. The design of this open space has been sensitively developed to protect the SAC and its surrounding woodland with levels to the perimeter of the park seamlessly integrating with the existing levels so as to avoid any disturbance of the tree rooting zones of Ballyman Glen.

The District Park will consist of the following elements:

- Parkland areas.
- Attenuation ponds with viewing platforms. These are designed to provide an aesthetic focus in the park, maximise the restorative benefits of the open space, increase biodiversity and amenity and operate as part of the overall SuDS strategy for the development. The ponds are designed as 3 lily pads gradually stepping down in height and flowing from one into the next. Each pond provides a 600mm free board for water attenuation. The perimeter of the ponds will be formed with shelves to facilitate marginal planting. This coupled with riparian corridors flanking the ponds the biodiversity and amenity of the park is maximised.
- Path infrastructure and steps.
- Entrance area.
- Crossing points.
- Kiosk and car park area.

### 2.3.5 Soft Landscaping and Biodiversity Enhancement

The overarching aim for the establishment of vegetation communities in Fassaroe District Park is to produce a mosaic of native habitats. This is seen to be a way of maximizing the biodiversity potential of the site, providing new opportunities for expansion of (and cross-interaction between) habitats whilst also providing attractive areas of green open space with high amenity value.

The habitats that are proposed across the park include:

- Areas of native deciduous and mixed woodland.
- Areas of mixed scrub.
- Areas of tall herb grassland.
- Wildflower meadows.
- Areas of close-cropped amenity grassland.
- Marshland and riparian planting.
- Areas of loose rock and scree for lichens, mosses and chasmophytic plants.

### 2.3.6 Residential Development

The proposed development incorporates a total of 650 no. residential units. These comprise of 241 no. houses and 409 no. apartments. Pocket parks are proposed within the residential areas.

### 2.3.7 Creche

A crèche of 733sq.m with capacity for 138 no. childcare spaces approx. is proposed to be delivered as part of the Phase 1 development. This is proposed to be located at the western end of the Community and Education zoned lands adjacent to the proposed district park.

### 2.3.8 Retail Unit / Café Kiosk

The first phase of the Neighbourhood Centre proposed under the current application will be provided at the latter stages of construction, when an on-site customer base has been established. In advance of this, in order to provide some element of local retail provision within Fassaroe in the short term, it is proposed to provide a retail unit / café kiosk within the public park close to the main access road through the site.

### 2.3.9 Neighbourhood Centre Phase 1

The proposed development comprises the first phase of a Neighbourhood Centre at Fassaroe. This first phase comprises of ground floor parking, retail, café and community concierge / gym uses. At podium level above this are two apartment blocks of five storeys above ground.

### 2.3.10 Demolition of Existing Dwelling at Berryfield Lane

There is an existing single storey dwelling on the northern side of Berryfield Lane which will be demolished to accommodate the district park and to enhance the connectivity between the passive and active parts of the park. This dwelling is not protected.

### 2.3.11 Car Parking Proposals

A range of parking solutions is proposed across the development including in curtilage private parking within house, parking bays perpendicular to streets, parking plots and basement car parking. Car parking provisions have been designed so that they do not dominate the visual character of the surrounding environment.

### 2.3.12 District Heating System

A centralised district heating system is proposed to serve all houses and apartments.

### 2.3.13 Services and Utilities Proposals

A number of new and upgraded utilities / services are proposed as part of the proposed Phase 1 development application. Utilities and services comprise, inter alia, water mains, storm water and foul sewers; electricity ducts and cabling; gas mains; as well as telecommunications ducting and cabling. In addition, and as part of the initial development the provision for suitably protected underground crossings of the roadbed will be made where required. New utilities will be laid at a location, depth and spacing in agreement with the utility owner. They will also be tested and commissioned by the utility owner prior to any of the existing utilities being decommissioned. The existing network on site includes the following infrastructure:

- Watermains – including existing 24", 33" and 800mm strategic mains;
- Foul Sewers;
- Storm Water Drainage;
- Gas Network;
- Electricity (110 kV, 38 kV and other lower voltage lines);
- Telecommunications (such as Eircom);
- Public Lighting; and
- Utilities owned by other stakeholders.

The proposed services include for the provision of the services to facilitate the proposed Phase 1 development but also, in the majority of cases, to provide the service requirements associated with the ultimate development anticipated under the Action Area for the lands in question. A description of each of those services is as outlined below.

### 2.3.13.1 Water Supply

The current permanent plan for the region is to supply water via two storage reservoirs permitted at Ballyman – high and low level reservoirs (at 100m and 120m OD). This will serve the future water supply needs of Fassaroe lands and general south Dun Laoghaire /North Wicklow lands. These reservoirs will be served by the existing 33” main. These reservoirs are permitted.

It is agreed with IW that a proposed temporary reservoir will be constructed as part of the phase 1 development that will be supplied from the existing 800mm along Berryfield Lane and will be located within apartment Block 3 at the eastern end of the site to allow for required management and maintenance. The temporary reservoir will have a maximum volume of 98m<sup>3</sup> of capacity and has been sized based on providing sufficient storage to allow for water supply to the phase 1 during times of low pressure from the IW main supply.

Following completion of the proposed Ballyman Reservoir and associated infrastructure by IW, which have been indicated by IW in the confirmation of feasibility letter to be due for completion in 2022, potable water supply for the proposed developed will be transferred and the temporary reservoir will be decommissioned. All necessary connections required to connect to the new mains from the Ballyman Reservoir have been included as part of this application and will be constructed as part of the proposed Phase 1 construction works.

### 2.3.13.2 Foul Waste Disposal

The proposed Foul Drainage has been designed in accordance with the following documents:

- Wastewater Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, December 2017 (Revision 03) IW-CDS-5030-01.
- Design Risk Assessment for Wastewater Infrastructure Standard Details, Connection and Developer Services, Construction Requirements for Self-Lay Developments, December 2017 (Revision v4.01) IW-CDS- 5030-02.
- Code of Practice for Wastewater Infrastructure, Connection and Developer Services, Design & Construction Requirements for Self-Lay Developments, December 2017 (Revision 1) IW-CDS-5030-03.
- Design Risk Assessment Associated with Code of Practice for Wastewater Infrastructure, Connection and Developer Services, April 2018 (Revision 0) IW-CDS-5030-04.

The nearest existing foul water connection to the proposed Fassaroe development is located close to the Berryfield Lane Roundabout at the western end of Fassaroe Lane. This sewer line was constructed by the Cosgrave Property Group in anticipation of a previously proposed (but not constructed) Fassaroe Business Park development and it caters for the entire development lands. This sewer system ultimately connects to an existing 450mm diameter sewer, which was laid under the N11 National Road by CPG as part of the above development and which in turn connects into the Upper Dargle Road sewer. The Upper Dargle Road sewer is a 525mm diameter sewer which drains the western Bray catchment into the existing system.

A recent Drainage Area Plan (DAP) was undertaken by Irish Water to determine the capacity of the existing Foul drainage network within Bray. It is noted that some constraints within the existing network may need some upgrade works, however, none are envisaged as part of the Phase 1 application. Bray PS and the Shanganagh WWTP have sufficient capacity to cater foul loadings from Fassaroe.

### 2.3.13.3 Surface Water Management

#### 2.3.13.3.1 Surface Water Drainage Design

The majority of the Phase 1 lands (and indeed the wider Fassaroe Action Area lands) drain naturally at present to the Brook, Cookstown and Dargle River systems. There are minimal existing piped storm

drainage facilities except in the lower eastern section of the Fassaroe lands, where water and drainage services were previously installed by the Cosgrave Property Group in anticipation of a previously proposed Business Park development which ultimately did not proceed. This existing storm drainage system extends from the Berryfield Lane roundabout eastwards to the N11 National Road. A connection is available at this roundabout at the head of the system to a 750mm diameter culvert laid under the N11 Road, into the River Dargle.

The new network to serve the Phase 1 development lands will be provided within the alignment of the proposed roads network with spurs into individual development areas. Soakaway areas will be provided throughout the development in order to retain infiltration rates as close to existing pre-development conditions as possible. The overall network will allow excess flow in storm events to discharge to the County Brook at a controlled rate via the proposed attenuation ponds within the District Park, and the River Dargle and the Cookstown Stream, via the connection previously installed as described above.

The proposed Surface Water Drainage including SuDS has been designed in accordance with the following documents:

- Wicklow County Development Plan 2016 – 2022.
- Greater Dublin Strategic Drainage Study (GSDSDS).
- CIRIA report C753 The SuDS Manual-v6.

The principles behind the proposed design have been discussed and agreed in principle between Atkins and Wicklow County Council (WCC) drainage department.

The proposed SuDS measures included (where suitable) within the design proposal are as follows:

- Swales in open space areas adjacent to roads.
- Permeable paving type systems in light traffic areas (parking bays).
- Porous asphalt in parking bays within car park areas.
- Green roofs to a minimum of 60% of the total roof area of suitable flat roofs (apartments).
- Underground modular attenuation system within green corridors / park areas.
- Filter drains in rear gardens where suitable.
- Attenuation ponds incorporated into landscape features in public parks.
- Flow control devices including vortex and orifice plates.

Surface water generated from the proposed development will be conveyed through a new surface water network including SuDS and attenuated at the agreed Qbar greenfield run-off rates prior to discharging to the existing watercourse / storm drainage network. The site drainage will be designed in compliance with GSDSDS Design Criteria and SuDS design criteria in accordance with CIRIA report C753.

### **2.3.13.4 ESB Connections and Proposals**

This application incorporates the undergrounding and alteration of 2 no. existing high voltage (HV) overhead lines (2 No 110kV (as a single circuit)) and 2 no. 38kV. The proposed works are required to facilitate the development of the land immediately to the north of the existing ESB substation on Berryfield Lane.

Two No. existing single circuit overhead 110kV line (the Fassaroe – Carrickmines East 110kV and Fassaroe – Carrickmines West 110kV) runs from the north of the site (within Dun Laoghaire Golf Club lands at Ballyman) across Ballyman Glen in a north south direction. Just to the south of the glen, it currently swings south-westwards (from 2 No. existing pylons) to a point on the northern side of Berryfield Lane just to the northwest of the sub-station. From here, it swings back to a north south alignment and enters the ESB substation on its western side.

It is proposed to underground part of the existing route. The existing 2 no. Pylons to the South of the Ballyman Glen will be decommissioned and replaced with 2 no. proposed Line Cable Interface Masts (steel lattice masts to a maximum height of 17m), approximately at the location of the existing pylons (just to the south). From here, the 2 No. 110kV lines will be undergrounded and will travel in a pre-agreed route with the ESB within the proposed open space areas and through the alignment of proposed future Fassaroe phase 2

roads. The underground cables will then cross Berryfield Lane to enter the ESB substation underground at its western boundary. The 2 No. new underground routes will measure 605m in length.

Three sets of existing towers (6 no. towers in total) and 3 poles along the route of the existing 110kv line between the glen and the substation will be removed along with the cables. A total of approx.1,030m of existing 110kv cables will be removed.

An existing overhead 38kV line (Fassaroe-Little Bray 38kV single circuit) runs from a point to the northeast of the subject site across the proposed development lands to the ESB Fassaroe substation. It is proposed to underground this line from a point on the southern side of Ballyman Glen to the ESB Fassaroe substation. This proposed underground 38kV cable will be routed through the proposed open space park and within the distributor road alignment. 1.No new Type 63E - 12meter cable to line interface mast 12m above ground will be required to the South of the Ballyman Glen where the 38kV overhead line is proposed to go underground. Approximately 655m of 38kV overhead line (wires) and (4.No) four double wood pole sets of the existing 38kV overhead line will be removed from this point to the ESB Fassaroe sub-station. The replacement underground 38kV cable route will be a total of 750m.

There is also another existing 38kV (Fassaroe-Bray 38kV single circuit) overhead line running south-eastwards from the ESB substation to Fassaroe Lane. The current alignment runs to the south of Berryfield Lane to a point adjacent to the Kilbride Lane roundabout. It is proposed to remove 855m of 38kV overhead line (wires), 5 no. pole sets of double wood poles and and 1 no. cable to line interface mast between these two points and to replace it with a new underground 38kV cable running from ESB Fassaroe substation along the distributor road to the roundabout and back to start of Berryfield Lane. The replacement underground route will be a total of 615m.

### 2.3.13.5 Utilities

There will be a comprehensive site infrastructure provided throughout the scheme. Services to be ducted around the site are:

- Gas
- Water
- ESB
- Eir
- Virgin

### 2.3.13.6 Public Lighting

Public lighting is proposed through the scheme at three main levels of lighting. Lighting on the proposed main access route on Fassaroe Avenue and Berryfield Avenue will be provided at 60W LED and will tie in the lighting already provided at the part of Fassaroe Avenue already constructed. Lighting along the access routes within the residential areas and in the parking areas of the Neighbourhood Centre will be at a 20W LED. Lower lighting level provisions at 12W LED will be made along pedestrian routes within open spaces and accessing communal areas around apartment blocks.

## 2.3.14 Site Development and Ground Works

Construction of the proposed development will require considerable amounts of cut and fill across the site. This is to achieve suitable site development levels on a site with variations in height. The proposed east-west road through the site will require significant amounts of cut while the landfill remediation capping works will require significant amounts of fill / cover.

The site layout and site levels across the site have been designed so as to maximise the opportunity for achieving a sustainable materials balance which will minimise the need for import of material to the site. Due to the need for significant additional fill material on site for the landfill remediation capping however, it has not been possible to avoid a deficit of fill of c.129,748m<sup>3</sup>.

As a sustainable approach to development, it is proposed that the Developer, if possible, will identify a permitted development site(s) where excess clean inert soils by-product material is generated and which



needs to be moved off that site, and which can be used as fill material at the application site. This is a more sustainable approach than sourcing materials as a virgin 'primary' resource from a commercial quarrying operation. Any by-product material imported to the site will be appropriately notified to the EPA under Article 27 of the European Communities (Waste Directive) Regulations 2011 as amended.

### 2.3.15 Landfill Remediation Proposals

As described at section 2.2 above there are 5 No. historic landfill sites which were previously operated by Wicklow County Council within the Fassaroe area. These sites which are designated Sites 1, 2, 3A, 3B and 3C were operated by the Local Authority between the early 1970s and the mid-1990s. The locations are identified in **Figure 2-4**.

At the time of operation of these landfill sites there were no licensing provisions in place. The Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 require Local Authorities to register unlicensed closed landfills which operated between 15<sup>th</sup> July 1977 and 27<sup>th</sup> March 1997 with the EPA and to obtain Certificates of Authorisation (CoA) to control and remediate (as appropriate) them. The objective of the legislation and the CoAs from the EPA is to ensure that waste disposed or recovered in unlicensed closed landfills is not causing, or is not likely to cause, environmental pollution. The operation of Fassaroe Site No. 1 was terminated prior to 15<sup>th</sup> July 1977 and accordingly was not subject of a CoA application to the EPA. Wicklow County Council has however applied to the EPA and received CoAs in respect of Fassaroe Site Nos 2, 3A, 3B and 3C. The application documentation lodged with the EPA provided information in respect of Site 1 also to the same standard as that supplied for Sites 2, 3A, 3B and 3C. This allowed the EPA to assess remediation requirements at Fassaroe in a comprehensive manner, in the full knowledge of how all of the historic landfill sites are currently behaving (in terms of potential impact on groundwater and gas generation).

Significant site investigations were undertaken at the site in order to prepare an Environmental Risk Assessment (ERA) which in turn was used to inform and the remediation measures proposed to the EPA and for which Certificates of Authorisation have now issued. The ERA assesses and presents the potential risks to human or environmental receptors associated with the presence of the waste material in the historical landfills. It also provided an outline assessment of options for managing risks identified and sets out recommendations for remedial options. A subsequent accompanying remediation proposal report was prepared by RPS 'Fassaroe Historic Landfills Remediation Strategy Report', July 2018 and was lodged with the EPA also by WCC. This presents the remediation proposals necessary to ensure that the closed landfills are not causing, or are not likely to cause, environmental pollution, and in turn to facilitate future development proposals such as the current proposed development.

Finally, a Gas Management Strategy has also now been prepared which sets out the gas management requirements for the proposed Phase 1 development in line with the principles set out in the Remediation Strategy and the CoA issued by the EPA. It presents an outline design for the management of gas and a monitoring and sampling plan to ensure the effectiveness of the remedial measures are verified.

The proposed landfill capping remedial measures proposed in the current application are as permitted under the Certificates of Authorisation issued by the EPA and as required to accommodate the construction of the Phase 1 proposed development, specifically to:

- Minimise infiltration of water and maximise clean run off from the landfill areas;
- Promote surface drainage and maximise clean run off from the landfill areas;
- Control landfill gas migration; and
- Provide a physical separation between waste and human and environmental receptors.

The proposed landfill capping measures comprise mitigation and management proposals to eliminate any potential adverse impacts of the landfills on the development proposed, and in particular any potential to impact on human health or the uses proposed which include residential and amenity uses. The proposals will effectively close off any potential pathways from the landfills to the proposed new uses, including amenity uses on top of the landfills and residential uses adjacent to them, all in accordance with best practice.

It should be noted that while the lands on which Sites 2, 3A, 3B and 3C are located are owned by Cosgrave Property Group, Wicklow County Council as the CoA holder, is responsible for the operation, control and maintenance the sites and for ensuring the conditions of the Certificates of Authorisation are complied with. Accordingly, agreement has been obtained from Wicklow County Council to include the capping of the

landfills (including Site 1) within the proposed Phase 1 development as it is acknowledged that the remediation of the sites in accordance with the Certificates of Authorisation is intrinsically linked to the future after-use of the site post-development.

The remediation measures include:-

- **A Landfill Capping System.** The proposed capping remediation works will be carried out in accordance with the Environmental Protection Agency (EPA) Landfill Capping Guidelines. The *EPA Landfill Manual: Landfill Site Design* (EPA 2000) provides guidance on landfill capping and construction of the various capping system components.
- **Landfill Gas Management.** With the installation of a low permeability capping layer the gas will be prevented from venting through surface of the landfill and will therefore build up in pressure and eventually migrate laterally beneath the edges of the sites, potentially towards residential units. To prevent this occurring a gas management system is incorporated into the rehabilitation measures. This comprises of a Virtual Gas Curtain which is a fully enclosed barrier that is proposed around the perimeter of each of the landfill sites. The concept of the VGC is to form a low pressure or low gas concentration area relative to the surrounding gassing ground, to encourage gas to flow towards the barrier, and allow subsequent venting to atmosphere. In addition, further, to pumped gas trials undertaken on foot of Certificates of Authorisation issued by the EPA for sites No. 2, 3a, 3b and 3c, a pumped gas collection system and flare compound is proposed to serve sites 2, 3a and 3c. The flare required is a small 100m<sup>3</sup> /hr Lo-Cal flare which will be provided in a small compound of approx. 6m x 6m.
- **Leachate Interception.** In order to redirect any localised leachate seepages back into the waste, it is proposed that the gas drainage geocomposite shall be returned into the ground at the edge of the waste body. This will mean that any minimal amounts of leachate which may have seeped upwards into the geocomposite, will be directed back down into the waste body by the vertical element of the geocomposite. This volume of leachate would be minuscule in comparison to the total volume of leachate currently within and below the waste body. Leachate generation, and therefore the likelihood of any seepage, will be greatly reduced by the installation of the proposed best practice low permeability capping system, which will minimise infiltration of rainfall.
- **Surface Water Drainage.** Once the low permeability geomembrane liner has been installed, infiltration of surface water through the capping system will be minimal. Surface water at finished ground level (e.g. on grassed areas, pathways etc.) will drain overland towards the river, as currently takes place. However, some infiltration of surface water will continue to occur through the soils overlying the capping system. This will need to be managed independently in a subsurface drainage system.
- **Excavation and Disposal (in localised areas).**

### 2.3.15.1 Slope Stabilisation

In order to accommodate both the construction of the landfill capping system and the Phase 1 development, slope stabilisation measures will need to be installed in four landslip areas previously identified to the north of Site 2.

This will need to be done at an early stage in the Phase 1 development and prior to the installation of the capping system or loading/surcharging on the landfill areas.

### 2.3.16 Summary of Works within and adjacent to Ballyman Glen

While the substantive elements of the proposed development, as described above, do not extend into or next to Ballyman Glen there are a number of localised areas in which works are required adjacent to and within Ballyman Glen SAC. These include the following:-

- Removal and decommissioning of steel lattice tower and replacement with terminal pylon to the south of Ballyman Glen SAC serving 110kV line (towers outside the boundary of Ballyman Glen SAC but construction work will extend into the SAC);
- A new 3-pole cable interface structure adjacent to (but outside of) the Ballyman Glen SAC where the 38kV line is proposed to go underground
- Localised structural stabilisation works at northern boundary of Landfill No. 1 and 2 adjacent to and within Ballyman Glen SAC;



- Edge of Landfill Remediation Measures adjacent to and within Ballyman Glen SAC;
- Landfill gas flare compound and collection system adjacent to (but outside of) the SAC;
- Storm drainage outfalls to County Brook watercourse within Ballyman Glen SAC; and
- Open space / landscaping proposals.

## 2.4 Description of European Sites

This stage of the screening for AA process describes European sites within the likely zone of influence of the works. The methodology for establishing the likely zone of influence is described in **Section 1.4.3**.

Connectivity between the proposed works and European sites has been reviewed. Connectivity is identified via the potential source-pathway-receptor model which identifies the potential impact pathways such as land, air, hydrological, hydrogeological pathways etc. which may support direct or indirect connectivity of the proposed works to European sites and/or their qualifying features.

In view of the location of the proposed development in relation to European sites (see **Figure 2-9**) and the characteristics of the proposed project (see Section 2-2) and the source, pathway and receptors of potential impacts, a 15km radius is considered an appropriate zone of influence to screen all likely significant effects that might impact upon the European sites. The establishment of the likely zone of influence is in line with EC (2021) *Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.

The integrity of a European site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the conservation status of the Qualifying Interests (QIs) of the SAC or Special Conservation Interests (SCIs) of the SPA. The QIs/SCIs for each site have been obtained through a review of the Conservation Objectives available from the NPWS website [www.npws.ie](http://www.npws.ie).

**Figure 2-9** and **Table 2-1** identify the European sites that are within a 15km radius of the proposed development. There are fourteen European sites located within 15km of the proposed works; ten SACs and four SPAs. A brief description of each European Site is provided below based on the Site Synopses, which have been obtained from the NPWS website [[www.npws.ie](http://www.npws.ie)].

**Table 2-1: Designated Sites within 15km of the Proposed Development**

Site Name and Code	Qualifying Interests	Distance from Proposed Site (km) <sup>3</sup>	Connectivity with the Application Site
Ballyman Glen SAC (000713)	<b>Annex I Habitats</b> Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220] Alkaline fens [7230]	Within and directly adjacent	Direct.
Knocksink Woods SAC (000725)	<b>Annex I Habitats</b> Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	0.5km south-west	There is no connectivity via surface water, groundwater or any other pathway.
Bray Head SAC (000714)	<b>Annex I Habitats</b> Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	2.7km east	Indirect and remote connectivity via County Brook (Fassaroe Stream) which flows into the River Dargle and then into Killiney Bay.

<sup>3</sup> Measured "as the crow flies".

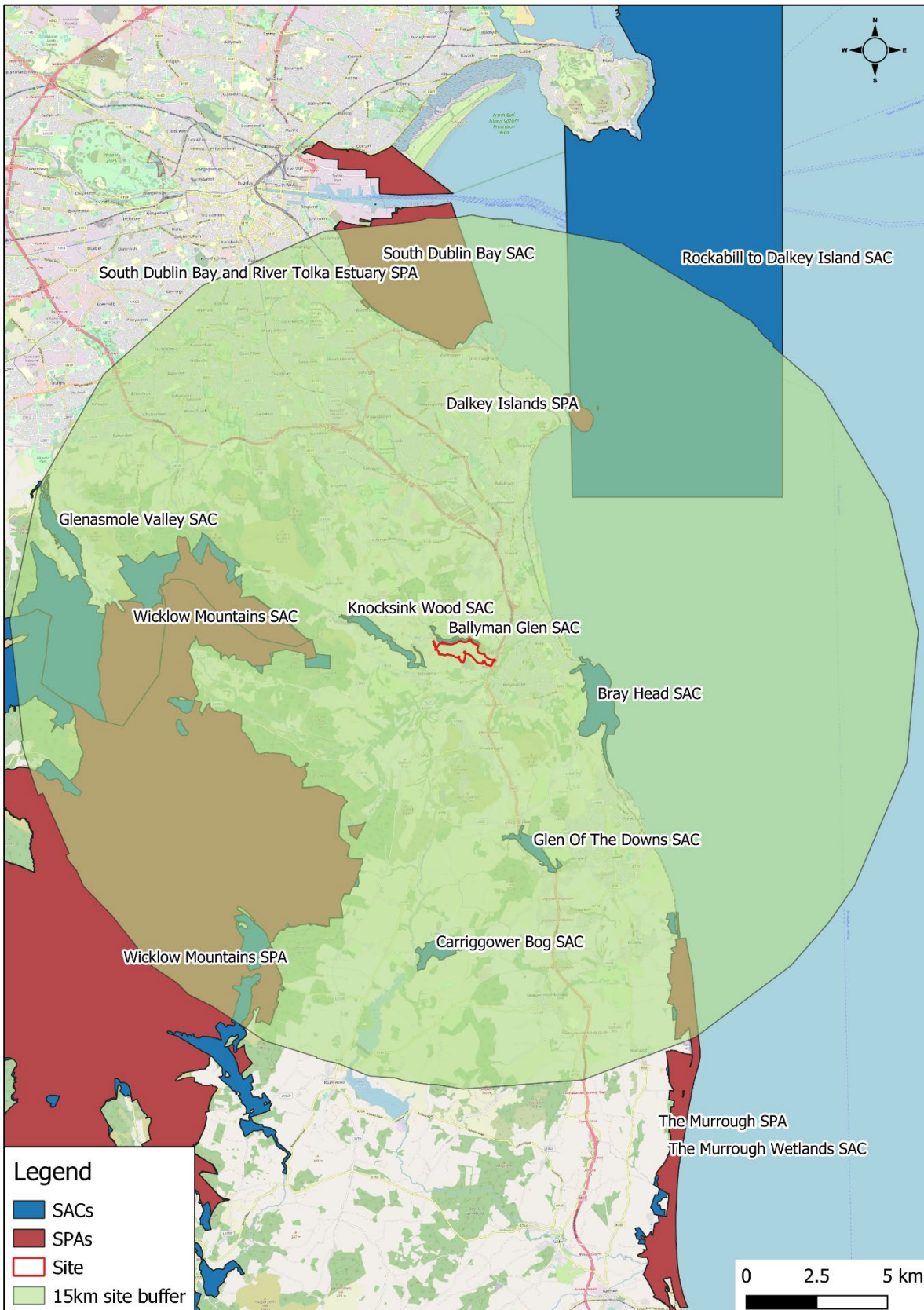
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Site Name and Code	Qualifying Interests	Distance from Proposed Site (km) <sup>3</sup>	Connectivity with the Application Site
Glen of the Downs SAC (000719)	<b>Annex I Habitats</b> Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	5.7km south	There is no connectivity via surface water, groundwater or any other pathway.
Glenasmole Valley SAC (001209)	<b>Annex I Habitats</b> Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220]	12.6km north-west	There is no connectivity via surface water, groundwater or any other pathway.
Wicklow Mountains SAC (002122)	<b>Annex I Habitats</b> Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] <b>Annex II Species</b> <i>Lutra lutra</i> (Otter) [1355]	3.8km west	There is no connectivity via surface water, groundwater or any other pathway.
Carriggower Bog SAC (000716)	<b>Annex I Habitats</b> Transition mires and quaking bogs [7140]	9.7km south	There is no connectivity via surface water, groundwater or any other pathway.
The Murrough Wetlands SAC (002249)	<b>Annex I Habitats</b> Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Atlantic salt meadows (Glauco-Puccinellietalia maritima) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Calcareous fens with <i>Cladium mariscus</i> and species of the Caricion davallianae [7210] Alkaline fens [7230]	10.8km south-east	There is no connectivity via surface water, groundwater or any other pathway.
South Dublin Bay SAC (000210)	<b>Annex I Habitats</b> Mudflats and sandflats not covered by seawater at low tide [1140]	10.4km north	Remote and tenuous connectivity via the Irish Sea.

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Site Name and Code	Qualifying Interests	Distance from Proposed Site (km) <sup>3</sup>	Connectivity with the Application Site
Rockabill to Dalkey Islands SAC (003000)	<b>Annex I Habitats</b> Reefs [1170] <b>Annex II Species</b> <i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	6.3km north-east	Remote and tenuous connectivity via the Irish Sea.
Wicklow Mountains SPA (004040)	Merlin ( <i>Falco columbarius</i> ) [A098] Peregrine ( <i>Falco peregrinus</i> ) [A103]	4.2km west	There is no connectivity via surface water, groundwater or any other pathway.
South Dublin Bay & River Tolka Estuary SPA (004024)	Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> ) [A046] Oystercatcher ( <i>Haematopus ostralegus</i> ) [A130] Ringed Plover ( <i>Charadrius hiaticula</i> ) [A137] Grey Plover ( <i>Pluvialis squatarola</i> ) [A141] Knot ( <i>Calidris canutus</i> ) [A143] Sanderling ( <i>Calidris alba</i> ) [A144] Dunlin ( <i>Calidris alpina</i> ) [A149] Bar-tailed Godwit ( <i>Limosa lapponica</i> ) [A157] Redshank ( <i>Tringa totanus</i> ) [A162] Black-headed Gull ( <i>Chroicocephalus ridibundus</i> ) [A179] Roseate Tern ( <i>Sterna dougallii</i> ) [A192] Common Tern ( <i>Sterna hirundo</i> ) [A193] Arctic Tern ( <i>Sterna paradisaea</i> ) [A194] Wetland and Waterbirds [A999]	10.3km north	Remote and tenuous connectivity via the Irish Sea.
Dalkey Islands SPA (004172)	Roseate Tern ( <i>Sterna dougallii</i> ) [A192] Common Tern ( <i>Sterna hirundo</i> ) [A193] Arctic Tern ( <i>Sterna paradisaea</i> ) [A194]	8.4km north-east	Remote and tenuous connectivity via the Irish Sea.
The Murrough SPA (004186)	Red-throated Diver ( <i>Gavia stellata</i> ) [A001] Greylag Goose ( <i>Anser anser</i> ) [A043] Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> ) [A046] Wigeon ( <i>Anas penelope</i> ) [A050] Teal ( <i>Anas crecca</i> ) [A052] Black-headed Gull ( <i>Chroicocephalus ridibundus</i> ) [A179] Herring Gull ( <i>Larus argentatus</i> ) [A184] Little Tern ( <i>Sterna albifrons</i> ) [A195] Wetland and Waterbirds [A999]	11.7km south-east.	Remote and tenuous connectivity via the Irish Sea.

Figure 2-9: European Sites within 15km of the Proposed Development





### 2.4.1 Ballyman Glen SAC (000713)

Ballyman Glen SAC is situated adjacent to and partially within the application lands approximately 3km north of Enniskerry, where it straddles the county boundary. The Glen is characterised by pastoral ground sloping up from a small stream (the County Brook) that winds its way along the Glen floor. The site has been designated SAC due to the presence of petrifying springs with tufa formation (Cratoneurion) [7220], a priority Annex I habitat and Alkaline fens [7230]. The fen vegetation at this site is well developed, with an unusually large number of sedge species present. The presence of alkaline fen and of petrifying spring/seepage areas is also particularly notable, as these habitats are listed, the latter with priority status, on Annex I of the E.U. Habitats Directive. Fens are rare in Wicklow and Dublin, and this is one of only two sites in Wicklow for the Narrow-leaved Marsh orchid.

### 2.4.2 Knocksink Wood SAC (000725)

Located in a steeply-sided valley, just north-west of Enniskerry in Co. Wicklow, the fast flowing Glencullen River winds its way over granite boulders along the valley floor. Much of the terrain is covered with calcareous drift and supports extensive areas of woodland as well as other ecological features. The SAC has been designated specifically due to the presence of two priority Annex I habitats, namely: Petrifying springs with tufa formation (Cratoneurion) [7220] and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]. The site has national importance as having one of the most diverse woodland invertebrate faunas in the country, some of which are considered to be under threat at an international level. A large proportion of the site has also been designated as a Statutory Nature Reserve.

### 2.4.3 Bray Head SAC (000714)

This coastal site is situated in the north-east of Co. Wicklow between the towns of Bray and Greystones. The SAC has been designated specifically for the presence of two Annex I habitats, namely Vegetated Sea Cliffs [1230] and Dry Heath [4030]. Dry heath is the principal habitat over much of Bray Head, while Calcareous dry grassland, typically species-rich, occurs on deposits of glacial till. Rocky sea cliffs form most of the seaward boundary at this site and extend for approximately 2 km. Steep clay cliffs extend southwards for a further 1 km, with a small area of clay cliff also at the northernmost part of site. The lower cliffs are fairly steep in places but above the track they are less steep, and often support heath or dry grassland vegetation. A stand of mostly native woodland occurs in the northern part of the site. Other habitats which are found at this site include bedrock shore, a sandy/shingle beach and an area of shallow marine water. Bray Head is of high conservation importance as it has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the E.U. Habitats Directive. It also supports a number of rare plant species and has ornithological importance.

### 2.4.4 Glen of the Downs SAC (000719)

Glen of the Downs is a semi-natural oak wood situated within a glacial overflow channel. It is located on the Dublin-Wexford road, about 7 km south of Bray, Co. Wicklow. The site is selected as an SAC for the presence of the Annex I habitat Old Oak Woodlands [91A0]. Much of the site comprises Sessile Oak (*Quercus petraea*) woodland referable to the *Blechno-Quercetum petraeae* association. Sessile Oak is especially dominant on the mid to upper slopes. Glen of the Downs is notable for some rare invertebrates, including *Mycetobia obscura* (Order Diptera) which is found in only one other locality in Britain and Ireland. Although exploited heavily in the past, this woodland is well developed, rich in species and is of high conservation significance.

### 2.4.5 Glenasmole Valley SAC (001209)

Glenasmole Valley in south Co. Dublin lies on the edge of the Wicklow uplands, approximately 5 km from Tallaght. The River Dodder flows through the valley and has been impounded here to form two reservoirs which supply water to south Dublin. The site has been designated as an SAC specifically due to the presence of two Annex I priority habitats, namely Orchid-rich Calcareous Grassland [6210] and Petrifying Springs [7220]; and also *Molinia* Meadows [6410], an Annex I habitat. At this site, examples of calcareous fen and flush occur between the two reservoirs. Tufa depositing springs are long-known from the site, along the valley sides, and some have substantial tufa mounds and banks. Tufa formation is also known from small streams within the woodland at the site. Orchid-rich grassland occurs in the drier parts of this site, grading

into *Molinia* meadow in seepage and flushed areas. The site also supports four Red Data Book plant species and populations of several mammal and bird species of conservation interest.

### 2.4.6 The Murrough Wetlands SAC (002249)

The Murrough is a coastal wetland complex which stretches for 15 km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1 km. The site is designated for the presence of Annex I habitats Annual Vegetation of Drift Lines [1210], Perennial Vegetation of Stony Banks [1220], Atlantic Salt Meadows [1330], Mediterranean Salt Meadows [1410], Alkaline Fens [7230]; and also Cladium Fens [7210], a priority Annex I habitat. Drift line vegetation has developed on the seaward side of the shingle bank which runs along the Murrough Wetlands SAC site. Low sand hills occur at Kilcoole and in other areas and further inland a rich grassy sward, which is most extensive at the south of the site, has developed. Saltmarsh is present within the site in two distinct areas. At the southern end of the site is found Broad Lough. This is a brackish, partly tidal lake, and has a well-developed saltmarsh community. Saltmarsh is also present in the northern end of the site in the vicinity of The Breaches. Fen vegetation is well developed in the Murrough wetlands, with both alkaline and calcareous fen. A wide range of freshwater and brackish marsh habitats also occur within the site. This site is of importance as it is the largest coastal wetland complex on the east coast of Ireland. It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the E.U. Birds Directive.

### 2.4.7 Carriggower Bog SAC (000716)

Carriggower Bog is situated on Calary plateau at the eastern edge of the Wicklow Mountains. The site is an area of wet bog and poor fen, flanked by the Vartry River on the south-western side. The site has been designated as an SAC due to the presence of Transition Mires [7140]. Very wet areas of transition mire occur on the south-western side of the site. The whole area is quaking and is characterised by a mosaic of sedges, grasses and rushes. This site is of conservation importance because it shows a good transition between fen and bog vegetation (with the fen being colonised by characteristic bog species). The area holds a rich and varied flora, and it provides a habitat for some rare invertebrates. Carriggower Bog is the last remaining site in Wicklow from which some of these invertebrates are recorded. It also has ornithological interest, being an important site for Jack Snipe.

### 2.4.8 Wicklow Mountains SAC (002122)

This site comprises a complex of upland areas in Counties Wicklow and Dublin, flanked by the Blessington reservoir to the west and Vartry reservoir in the east, Cruagh Mountain in the north and Lybagh Mountain in the south. Most of the site occurs at elevations over 300 m, the highest point being Lugnuquilla at 925m. Within its boundaries there is considerable topographical and geomorphological diversity as well as ecological richness. There is for much of its extent overlap with the Wicklow Mountains SPA. The qualifying features for the site include eleven Annex I Habitats, namely; Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]; Natural dystrophic lakes and ponds [3160]; Northern Atlantic wet heaths with *Erica tetralix* [4010]; European dry heaths [4030]; Alpine and Boreal heaths [4060]; Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110]; Calcareous rocky slopes with chasmophytic vegetation [8210]; Siliceous rocky slopes with chasmophytic vegetation [8220]; Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] as well as 2 priority Habitats: Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] and Blanket bogs (\* if active bog) [7130] along with a single Annex II species: *Lutra lutra* (Otter) [1355].

### 2.4.9 South Dublin Bay SAC (000210)

Extending from the South Wall to the west pier at Dún Laoghaire, this intertidal site is characterised by extensive areas of sand and mudflats. Its landward perimeters are largely bounded by coastal constructions – seawalls, etc. However, a number of small sandy beaches occur at Poolbeg, Irishtown and Merrion/Boosterstown. There is evidence of incipient dune formation in areas, notably on the seaward side of Boosterstown marsh, which is of recent origin. The site is designated for a single Qualifying Interest, namely: Mudflats and sandflats not covered by seawater at low tide [1140]. South Dublin Bay is also part of a more extensive SPA (South Dublin Bay & River Tolka Estuary SPA 004024) supporting a number of internationally important birds.

### 2.4.10 Rockabill to Dalkey Islands SAC (003000)

This is a long linear site within the Irish Sea, approximately 7km wide and 40km long runs from Rockabill southwards towards Frazer Bank. It encompasses inshore and coastal waters and includes the seabed, reefs, sandbanks and a small number of islands (Dalkey, Muglins and Rockabill Islands). Its Qualifying Interests are: - Reefs [1170] and Harbour Porpoise (*Phocoena phocoena*) [1351]. The NPWS note that Reefs are an uncommon feature along the Eastern seaboard. Conversely, the SAC is a key habitat for the Porpoise within the Irish Sea. As part of the wider Dublin Bay complex, the area is an important national and international resource for birds. In relation to terrestrial element of the SAC, Dalkey Island supports large number of terns (Arctic, Common and Roseate while other seabirds commonly seen include Kittiwake, Razorbill, Guillemot, Puffin, Fulmar, Shag, Cormorant, Manx Shearwater, Gannet and Gulls.

### 2.4.11 Wicklow Mountains SPA (004024)

This is an extensive upland site, which largely overlaps with Wicklow Mountains SAC. The SPA comprises a substantial part of the Wicklow Mountains within County Wicklow but extends into Co. Dublin. Given its extent, it is considered a site of high ornithological importance owing in part to the range of habitats and the bird species that have been recorded there, in particular Merlin (*Falco columbarius*) [A098] and Peregrine (*Falco peregrinus*) [A103], both of which are the qualifying species for the SPA.

### 2.4.12 South Dublin Bay and River Tolka Estuary SPA (004024)

South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It far exceeds the boundaries of the preceding SAC. It includes the intertidal area between the River Liffey and Dún Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included. The site is an important site for wintering waterfowl, being an integral part of the wider Dublin Bay complex. The Special Conservation Interests for the site include 13 Annex I Bird Species and 1 Habitat, namely; Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]; Oystercatcher (*Haematopus ostralegus*) [A130]; Ringed Plover (*Charadrius hiaticula*) [A137]; Grey Plover (*Pluvialis squatarola*) [A141]; Knot (*Calidris canutus*) [A143]; Sanderling (*Calidris alba*) [A144]; Dunlin (*Calidris alpina*) [A149]; Bar-tailed Godwit (*Limosa lapponica*) [A157]; Redshank (*Tringa totanus*) [A162]; Black-headed Gull (*Chroicocephalus ridibundus*) [A179]; Roseate Tern (*Sterna dougallii*) [A192]; Common Tern (*Sterna hirundo*) [A193]; Arctic Tern (*Sterna paradisaea*) [A194] & Wetland and Waterbirds [A999].

### 2.4.13 Dalkey Islands SPA (004172)

The SPA comprises a string of three small islands, namely Dalkey Island, Lamb Island and Maiden Rock, as well as the intervening rocks and reefs, and the surrounding sea to a distance of 200 m. As the largest island, Dalkey Island lies approximately 400 m off Sorrento Point on the mainland from which it is separated by a deep channel. This site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest due to the presence of the following Annex 1 bird species- Roseate Tern (*Sterna dougallii*) [A192], Common Tern (*Sterna hirundo*) [A193] and Arctic Tern (*Sterna paradisaea*) [A194].

South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dún Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included. The site is an important site for wintering waterfowl, being an integral part of the wider Dublin Bay complex. The Special Conservation Interests for the site include 13 Annex I Bird Species and 1 Habitat, namely; Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]; Oystercatcher (*Haematopus ostralegus*) [A130]; Ringed Plover (*Charadrius hiaticula*) [A137]; Grey Plover (*Pluvialis squatarola*) [A141]; Knot (*Calidris canutus*) [A143]; Sanderling (*Calidris alba*) [A144]; Dunlin (*Calidris alpina*) [A149]; Bar-tailed Godwit (*Limosa lapponica*) [A157]; Redshank (*Tringa totanus*) [A162]; Black-headed Gull (*Chroicocephalus ridibundus*) [A179]; Roseate Tern (*Sterna dougallii*) [A192]; Common Tern (*Sterna hirundo*) [A193]; Arctic Tern (*Sterna paradisaea*) [A194] & Wetland and Waterbirds [A999].

### 2.4.14 The Murrough SPA (004186)

The Murrough SPA comprises a coastal wetland complex that stretches for 13 km from Kilcoole Station, east of Kilcoole village in the north to Wicklow town in the south and extends inland for up to 1 km in places. The site includes an area of marine water to a distance of 200m from the low water mark. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following



protected species Red-throated Diver (*Gavia stellata*) [A001], Greylag Goose (*Anser anser*) [A043], Light-bellied Brent Goose (*Branta bernicla hrota*) [A046],

Wigeon (*Anas penelope*) [A050], Teal (*Anas crecca*) [A052], Black-headed Gull (*Chroicocephalus ridibundus*) [A179], Herring Gull (*Larus argentatus*) [A184], Little Tern (*Sterna albifrons*) [A195] and Wetland and Waterbirds [A999].

The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. The shingle ridge at Kilcoole is a traditional nesting area for Little Tern, and the site now supports one of the largest colonies in the country. The Murrough SPA is an important site for wintering waterbirds, being internationally important for Brent Goose and nationally important for Red-throated Diver, Greylag Goose, Wigeon, Teal, Black-headed Gull and Herring Gull. It is probably the most important site in the country for nesting Little Tern. The site also supports a typical diversity of birds associated with reed swamp, including Reed Warbler, a very localised species in Ireland.

## 2.5 SCREENING ASSESSMENT OF SIGNIFICANCE

### 2.5.1 Elements of the Project Likely to Give Rise to Impacts on European Sites

Only those features of the proposed development that have the potential to impact on features and conservation objectives of the identified European sites are considered.

The proposed development includes works within the Ballyman Glen SAC boundary to enable the provision of a surface water outfall to the County Brook. Therefore, there is potential for direct impacts to Ballyman Glen SAC, including land take, fragmentation of habitats and degradation of habitats.

The proposed mixed development itself is located adjacent to Ballyman Glen SAC, which is designated specifically for the presence of petrifying springs with tufa formation (Cratoneurion) [7220], a priority Annex I habitat, and Alkaline fens [7230]. Both of these habitats are dependent on groundwater regime and quality. The proposed development encompasses works on five historical landfill sites.

A Tier 1 Risk Assessment<sup>4</sup> which was undertaken to inform the landfill remediation proposals approved by the EPA (and for which planning permission is now sought along with this SHD application) found that four of these landfill sites are situated within 50m of Ballyman Glen SAC (see **Figure 2.4**). The Risk Assessment found that groundwater flow direction from all the historic landfill sites is ultimately towards the County Brook (Fassaroe Stream) and Ballyman Glen to the north and northeast. The Risk Assessment identified an existing risk of vertical and horizontal flow of leachates into this European Site.

The proposed development includes proposals to cap the areas of landfill. It also includes large open space proposals (some of which cover the former landfill sites), along with residential, retail and childcare development. There is potential for the remediation works and the SHD development works to affect the water table and flow to the springs and alkaline fen. There is therefore potential for direct impacts to the qualifying interests of Ballyman Glen SAC by reason of impact on the local hydrological regime as a result of the proposed development. There is also potential for the remediation works and the SHD development works to alter surface and groundwater quality, which may result in an impact to the qualifying interests of Ballyman Glen SAC.

Knocksink Woods SAC is situated approximately 550m to the south-west of the proposed development. This European Site has been designated for the presence of the Annex I habitats petrifying springs with tufa formation (Cratoneurion) [7220] and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnus incanae*, *Salicium albae*) [91E0]. No surface water connectivity between the study area and Knocksink Woods has been identified. The study area is within the Dargle Lower River sub-basin (Water Framework Directive (WFD) Code: IE\_EA\_10\_1275), while Knocksink Woods is within Glencullen River sub-basin (WFD Code: IE\_EA\_10\_1277). The land between the proposed development and Knocksink Woods SAC comprises agricultural fields bound by hedgerows. In consideration of the lack of hydrological connectivity and the significant buffer of vegetated land between the proposed development and Knocksink Woods SAC, no impacts to the qualifying interests this SAC are anticipated.

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<sup>4</sup> RPS (2015) Fassaroe Historic Landfill, Phase 1 Report. RPS.

There is a remote indirect connectivity from the proposed development to the Bray Head SAC via overland flow to the County Brook (Fassaroe Stream), which confluences with the River Dargle approximately 1.1km downstream of the proposed development, before flowing out into the Irish Sea approximately 1.8km downstream again, and approximately 1.6km along the coast from Bray Head SAC. Rockabill to Dalkey SAC and South Dublin Bay SAC both have a tenuous indirect connectivity to the proposed development, being approximately 4.5km and 16.5km north along the coast from the point the Dargle discharges into the Irish Sea. These European Sites are designated for coastal habitats and species associated with routine estuarine and or tidal inundations and fluctuations. To this end, habitats and species associated with these European Sites are accustomed to high levels of water turbidity, fluctuations in sediment accretion, deposition and erosion. As a result, these habitats are not as sensitive (when compared to freshwater / terrestrial habitats and species) to potential impacts associated with the proposed development (in particular sporadic increases in sediment load). Therefore, these sites would not be significantly affected by low level or sporadic release in sediment or particulate matter that may be associated with the development. Similarly, the risk of release of other deleterious substances such as hydrocarbons, particulate matter, wet cement etc. to these coastal European sites is low. Therefore, potential impacts to Bray Head SAC, Rockabill to Dalkey SAC and South Dublin Bay SAC are no longer considered as part of this assessment.

There is no surface water or groundwater connectivity to the Glen of the Downs SAC, Glenasmole Valley SAC, Wicklow Mountains SAC, Carriggower Bog SAC and The Murrough Wetlands SAC. Further, the sites are situated between 5.7 and 12.6km distance from the site and will not be impacted either directly or indirectly. Therefore, potential impacts to Glen of the Downs SAC, Glenasmole Valley SAC, Wicklow Mountains SAC, Carriggower Bog SAC and The Murrough Wetlands SAC are no longer considered as part of this assessment.

There is no desktop evidence to suggest that the qualifying species of Wicklow Mountains SPA, South Dublin Bay & River Tolka Estuary SPA, Dalkey Islands SPA and The Murrough SPA are using lands in the vicinity of the proposed works. Bird species identified during the site walkover surveys undertaken for the Biodiversity Chapter of the EIAR reflect the habitat assemblages present in the majority of the study area; i.e. improved pasture and arable fields fringed by hedgerow and treeline habitats. The study area also includes private residential dwellings, gardens and farm holdings, which also influence species composition and abundance. No Annex I or Red list species were recorded during the site visits. Further, the coastal SPAs are separated from the development by the busy M11 road. It is not anticipated that the proposed works would result in a significant increase in the level of background noise disturbance in the local areas. Any disturbance to bird species within nearby European sites as a result of the proposed works is considered extremely unlikely. Furthermore, potential disturbances will be temporary and confined to the construction phase of the development only.

Therefore, it is not anticipated that the proposed works will impact the Wicklow Mountains SPA, South Dublin Bay & River Tolka Estuary SPA, Dalkey Islands SPA and The Murrough SPA with regards to noise disturbance of bird species.

**Table 2-2: Potential Significant Impacts on European Sites from the Proposed Development**

Site Name	Direct Impacts	Indirect/ Secondary	Resource Requirements (Drinking Water Abstraction, etc.)	Emissions (Disposal to Land, Water or Air)	Excavation Requirements	Transportation Requirements	Duration of Construction, Operation, Decommissioning
South Dublin Bay SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Ballyman Glen SAC	Potential loss or degradation of alkaline fen and petrifying spring Annex I habitats during the construction phase. Potential degradation of alkaline fen and petrifying spring Annex I habitats as a result of increased human presence during the operational phase.	Potential impacts on surface water quality via run-off which may affect petrifying spring Annex I habitat. Potential impacts to groundwater quality which may affect alkaline fen and petrifying spring Annex I habitats. Potential impacts to the hydrological and hydro-geological regime which may affect alkaline fen and petrifying spring Annex I habitats.	No impact on qualifying interest	Construction activities within the development area will involve the transport of materials to and from construction areas leading to air emissions and potential spillages and runoff of polluting substances to the County Brook (Fassaroe Stream) and receiving European sites	Potential impacts to qualifying interests from excavation for the surface water outfall.	Access and egress will be required within the Ballyman Glen SAC during the proposed construction of surface water outfall.	Potential impacts on hydrological regime and groundwater quality during construction and operation which may affect fen and petrifying spring Annex I habitats.
Bray Head SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Carriggower Bog SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Glen Of The Downs SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Wicklow Mountains SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest

Screening for Appropriate Assessment and Natura Impact Statement

Site Name	Direct Impacts	Indirect/ Secondary	Resource Requirements (Drinking Water Abstraction, etc.)	Emissions (Disposal to Land, Water or Air)	Excavation Requirements	Transportation Requirements	Duration of Construction, Operation, Decommissioning
Knocksink Wood SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
The Murrrough SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Glenasmole Valley SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Rockabill to Dalkey Island SAC	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
South Dublin Bay and River Tolka Estuary SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
The Murrrough SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Dalkey Islands SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest
Wicklow Mountains SPA	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest	No impact on qualifying interest

## 2.5.2 Likely Changes to the European Site(s)

The likely changes that will arise from the proposed Fassaroe Phase One Strategic Housing Development have been examined in the context of a number of factors that could potentially result in a significant effect on the identified European sites (**Table 2-3**).

**Table 2-3: Likely Effect on European Sites**

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality etc.)	Climate Change
South Dublin Bay SAC	None	None	None	None	None	None
Ballyman Glen SAC	Potential negative impact to petrifying springs and alkaline fen during construction; Potential negative impact to petrifying springs and alkaline fen during operational phase due to increased human presence; Potential negative impact during construction of surface water outfall.	None	Potential fragmentation of habitats from excavation for surface water outfall	None	Potential negative impact during construction to surface and groundwater quality; Potential negative impact due to changes in hydrological regime during construction and operation; Potential long-term positive impact from improvement to groundwater quality during operation	None
Bray Head SAC	None	None	None	None	None	None
Carrigower Bog SAC	None	None	None	None	None	None
Glen Of The Downs SAC	None	None	None	None	None	None
Wicklow Mountains SAC	None	None	None	None	None	None
Knocksink Wood SAC	None	None	None	None	None	None
The Murrrough SAC	None	None	None	None	None	None
Glenasmole Valley SAC	None	None	None	None	None	None



Screening for Appropriate Assessment and Natura Impact Statement

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality etc.)	Climate Change
Rockabill to Dalkey Island SAC	None	None	None	None	None	None
South Dublin Bay and River Tolka Estuary SPA	None	None	None	None	None	None
The Murrough SPA	None	None	None	None	None	None
Dalkey Islands SPA	None	None	None	None	None	None
Wicklow Mountains SPA	None	None	None	None	None	None

### 3 SCREENING CONCLUSIONS

The likely impacts that will arise from the proposed development have been examined in the context of a number of factors that could potentially have a significant effect on the Natura 2000 network (Table 2-2 and Table 2-3). With regards to the European sites which do not support connectivity, either direct or indirect, to the proposed development, or where it has been established that there are no impacts, it can be objectively concluded that there is no likelihood of any significant effects on these European sites and therefore no further assessment is required.

On the basis of the findings of this screening for Appropriate Assessment report, it is concluded that the proposed Fassaroe Phase One Strategic Housing Development including the landfill remediation element:

- Is not directly connected with or necessary to the management of a European site;
- May have significant effects on petrifying springs with tufa formation (Cratoneurion) [7220], a priority Annex I habitat, and Alkaline fens [7230] an Annex I habitat for which Ballyman Glen SAC is designated; and
- May result in positive impacts to current water quality conditions.

Therefore, applying the Precautionary Principle which requires that the conservation objectives of the European site should prevail where there is uncertainty and in accordance with Article 6(3) of the Habitats Directive, likely changes to the Ballyman Glen SAC may arise from the proposed development if robust and effective mitigation measures are not implemented.

It is evident that there may be significant impacts from the proposed Fassaroe Phase One Strategic Housing Development, therefore, due to this uncertainty, a Stage 2 'Appropriate Assessment' is considered necessary.

## 4 STAGE 2: APPROPRIATE ASSESSMENT – NATURA IMPACT STATEMENT

### 4.1 INTRODUCTION

In this section, Annexed habitats for which Ballyman Glen SAC is designated are described and all potential impacts resulting from the proposed works are discussed in relation to the conservation objectives of these Annexed habitats.

### 4.2 DESCRIPTION OF PROJECT

The proposed development will comprise of an initial phase of development as identified within the overall development lands at Fassaroe identified in the Bray Municipal District Local Area Plan. The main elements of the proposed Phase 1 planning application are described in Section 2.2.

### 4.3 ECOLOGICAL DESCRIPTION OF STUDY AREA

As detailed in Section 1.4.5, a number of ecological surveys have been conducted of the proposed Fassaroe Phase 1 development lands. This Section of the NIS provides a summary of habitats present at the proposed site and describes the results of field surveys undertaken for qualifying interests of Ballyman Glen SAC.

For a full description of the terrestrial habitats and species present within the proposed site please refer to the EIAR accompanying the planning application for Fassaroe Phase One Strategic Housing Development. The Annex I Habitat Survey of Ballyman Glen Report is enclosed in **Appendix 5B of the EIAR**.

#### 4.3.1 Terrestrial Habitats

The proposed site predominantly comprises arable fields (BC1), which are present adjacent to Ballyman Glen SAC to the north west of the Phase 1 development lands. Fields of agriculturally improved grassland (GA1) are present adjacent to Ballyman Glen SAC to the north of the proposed Phase 1 development lands and there are a further two large fields of improved grassland to the west of the study area towards Monastery. The sward in these areas is species poor and dominated by Perennial Rye-grass (*Lolium perenne*). Amenity grassland (GA2) is located in two areas adjacent to Berryfield Lane. The sward is of low botanical interest and is dominated by Perennial Rye-grass.

Fields across the study area are generally bound by good quality hedgerows (WL1) and treelines (WL2) comprised of native species.

Areas of mixed scrub (WS1) adjoin parts of the southern edge of the woodland in Ballyman Glen SAC, extend south from Ballyman Glen to the west of Greenstar Recycling Centre and also surround the ESB substation south of Berryfield Lane.

##### 4.3.1.1 Ballyman Glen SAC

###### 4.3.1.1.1 Woodland Habitats

To the north-west of the site, within Ballyman Glen SAC, the river valley supports a wet woodland habitat (WN4/ WN6). Plant species composition here includes abundant canopy species such as Ash (*Fraxinus excelsior*) and Alder (*Alnus glutinosa*) with a shrub layer of Grey Willow (*Salix cinerea*) and occasional Hazel (*Corylus avellana*) and Holly (*Ilex aquifolium*) is a rare component of the woodland. Further west, and west of the proposed development boundary, Downy Birch (*Betula pubescens*) occurs locally within wet woodland areas.

The ground layer of this woodland area was flushed, wet underfoot and slightly waterlogged in parts. Plant species composition was diverse and included Remote Sedge (*Carex remota*), Great Willowherb (*Epilobium hirsutum*), Creeping Buttercup (*Ranunculus repens*), Water Mint (*Mentha aquatica*), Cleavers (*Galium*

aparine), Wavy Bitter-cress (*Cardamine flexuosa*), Nettle (*Urtica dioica*), Herb Robert (*Geranium robertianum*), Meadowsweet (*Filipendula ulmaria*), Bugle (*Ajuga reptans*), Primrose (*Primula vulgaris*), Sanicle (*Sanicula europaea*), Yellow Pimpernell (*Lysimachia nemorum*), Marsh Hawk's-beard (*Crepis paludosa*) Violet (*Viola* spp.), Great Horsetail (*Equisetum telmateia*), Broad Buckler fern (*Dryopteris dilatata*), Male Fern (*Dryopteris filix-mas*) and Lady Fern (*Athyrium filix-femina*). Bryophytes present in these areas include *Mnium hornum*, *Thuidium tamarascinum* and *Thamnobryum alopecurum*. Yellow Iris (*Iris pseudacrous*), and Reed Canary-grass (*Phalaris arundinacea*) are found in localised areas of marsh located near the river main channel. The species recorded within the woodland and ground layer does not support the list of positive indicator species and criteria for classification as Annex I Habitat '91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (6410), in accordance with the National Survey of Native Woodland (NSNW) (2003-2008).

Parts of the woodlands fringe; i.e. the southern bounds of Ballyman Glen SAC are drier and correspond to habitats WD1 and WN2. WD1 areas comprise Sycamore (*Acer pseudoplatanus*) and Ash. Drier areas corresponding to WN2 include abundant Ash with Hazel frequent in the understorey. Plant species composition within understorey of drier woodland areas notes the replacement of Great Horsetail with Bramble (*Rubus fruticosus* agg.). Species recorded here include Germander Speedwell (*Veronica chamedrys*), Herb Robert, Sanicle, Ivy, Lords and Ladies (*Arum maculatum*), Hart's-tongue fern (*Asplenium scolopendrium*), Wood Sedge (*Carex sylvatica*) and Spindle (*Euonymus europaeus*).

### 4.3.1.1.2 Aquatic Habitats

The results of the aquatic ecology survey (Aquens, 2021, see Appendix 5A of the EIAR) indicate that County Brook Stream was generally less than 2.5m wide for most of its length assessed with depths averaging 12 cm to 20 cm at the time of sampling. Run (fast, rippled flow) habitat interspersed with pool predominated at most survey sites. The benthic substrates were dominated by gravel and cobbles at all sites.

The survey sites were located in reaches which had circa 40% and 80% cover of overhanging vegetation, with one site unshaded. The tree cover was predominately Willow (*Salix* sp.) and Hazel (*Corylus* sp.) with some Ash (*Fraxinus* sp.) and Sycamore (*Acer pseudoplatanus*). Due to the considerable shading there was little instream vegetation apart from isolated small patches of mosses attached to cobbles and *Helosciadium nodiflorum* (Fool's Watercress) along the stream margins at three of the five sites surveyed.

With regards to macroinvertebrate communities, sites 1, 3 and 5 (see Figure 4.1) were rated Q3-4 based on the dominance of Group C taxa and sparse numbers of Group A (pollution sensitive) indicating moderate pollution. The absence of Group A taxa at Site 3 resulted in a Q3 score. Ecological water quality at Site 5 was better than in the 2015 survey (Q3) (Aquens, 2015). Site 4 was rated Q4 due to the presence of three Group A taxa, albeit in low numbers which is probably due to the time of year as all were small nymphs. The EPT richness (11), ASPT score (>6) for this site also indicate good water quality.

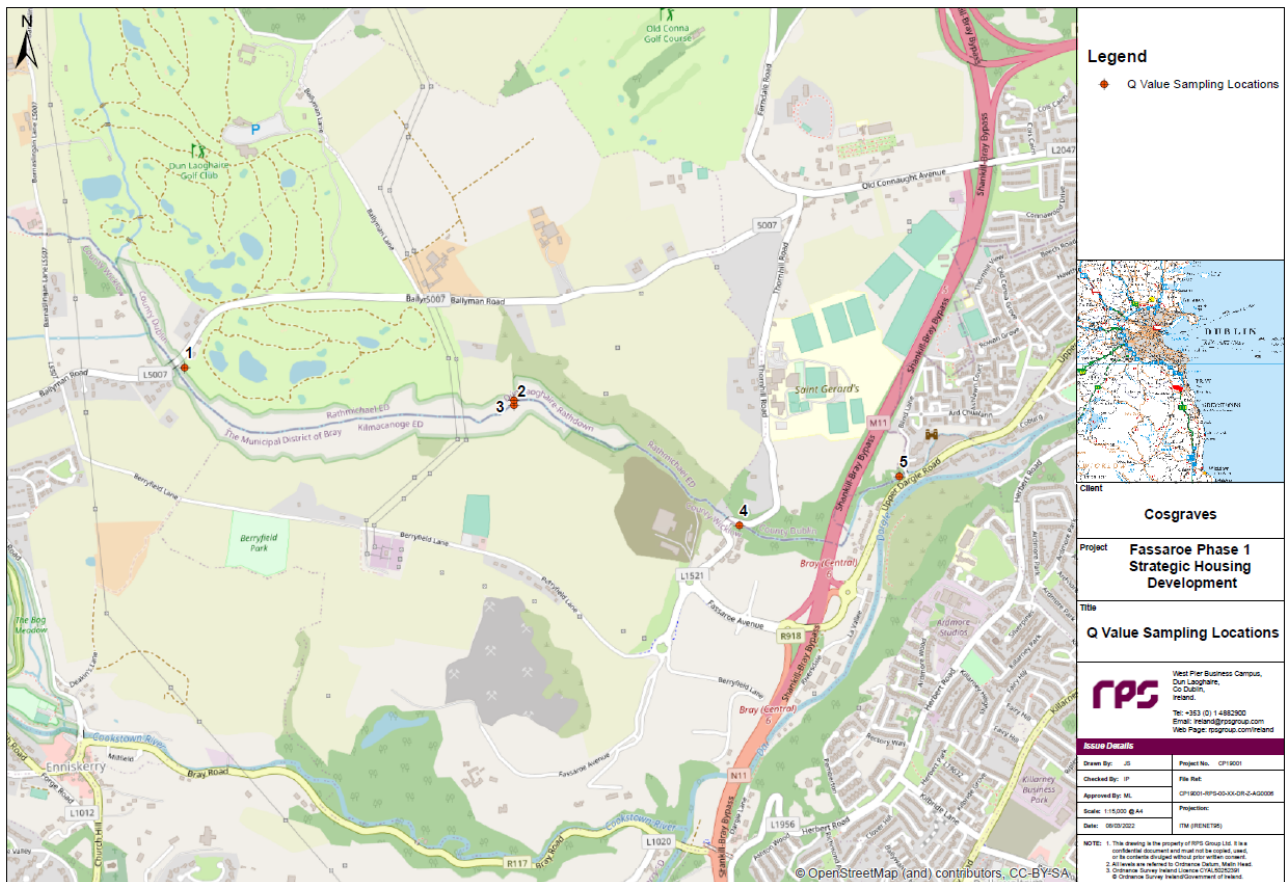


Figure 4-1: Q Value Sampling Locations (2021)

### 4.3.1.1.3 Annex I Habitats

#### Petrifying Springs with Tufa Formation [7220]

##### Desktop Study

Petrifying Springs with Tufa Formation are defined as springs and seepages where tufa is actively deposited and where characteristic species of bryophytes are dominant or abundant.

‘Petrifying springs with tufa formation (Cratoneurion) 7220’ are a priority habitat in Annex I of the Habitats Directive. They form where lime-rich spring water deposits tufa (calcium carbonate) on the ground surface. Tufa-depositing waters are characterised by having a high pH, high levels of dissolved calcium and bicarbonate ions and by being oligotrophic (low in nitrogen and phosphorus).

Petrifying springs fall into three physiognomic categories:

- (i) clearly defined spring heads with consolidated tufa,
- (ii) spring heads with associated tufaceous flushes, and
- (iii) tufa-forming seepage areas on level ground.

They contain Cratoneurion vegetation, typically dominated by bryophytes, and characterised by the presence of *Palustriella commutata* (formerly *Cratoneurion commutatum*) along with *Pellia endiviifolia*, *Cratoneurion filicinum*, *Eucladium verticillatum*, *Bryum pseudotriquetrum*, *Palustriella falcata* and *Didymodon tophaceus*. Frequently occurring vascular plants are *Festuca rubra*, *Carex lepidocarpa*, *C. panicea*, and *Equisetum telmateia*.



Three subtypes of petrifying spring vegetation can be distinguished depending on the setting of the spring: Woodland springs; Coastal springs; and Springs of inland, open habitats. Springs occurring on the Ben Bulbin Range constitute a distinct group of high conservation value.

The ecological significance of petrifying springs is seldom confined to a point source; rather, there is often a continuum of intergrading hydrological conditions from the spring head, through a flushed slope and into small streams. Spring heads may be distinct point locations giving rise to small streams immediately below the point of emergence, or water may seep to the surface in a more diffuse pattern over a larger area.

The above description of the habitat is from Lyons and Kelly (2013). A more detailed review of the habitat and associated plant communities is provided in Lyons and Kelly (2013), Lyons (2015), and Lyons and Kelly (2016).

Lyons and Kelly (2016) describe eight distinct plant communities associated with Irish petrifying springs.

Key features used in assessing correspondence with EU Annex I Habitat are as follows:

- Presence of tufa;
- Fed by base rich oligotrophic water;
- Generally dominated by bryophytes;
- Presence of characteristic species of the Cratoneurion;
- Wooded or un-wooded;
- May occur as discrete spring location with local influence or extend as seepage zones over larger areas.

Petrifying spring habitat was recorded frequently throughout the western and northern sections of the study area during survey of Ballyman Glen undertaken by Wetland Surveys Ireland (WSI) in 2019 and also during survey work by WSI in the same area in December 2016. Two additional petrifying springs and associated seepage zones were recorded south of the County Brook River during the 2019 survey.

### Survey Results

Springs and associated seepage zones were recorded throughout the lower slopes of the Glen on both the northern and southern sides of the County Brook River. In all, springs were recorded at 29 locations within the glen (see **Figure 4-2**).

The type, distribution, extent and quality of petrifying spring habitat recorded within the survey area are described in the following sections.

In areas where the extent of tufa extended beyond a local area of ca 100 m<sup>2</sup> (10 X 10m), these are mapped as 'seepage zones' in the habitat map (**Figure 4-2**). Elsewhere, where the influence of tufa is more localised these are mapped as point locations.

There are seven seepage zones mapped during the current survey, four of which occur to the north of the County Brook River and three of which occur to the south (see **Figure 4-2**).

- Zone I (ca 303 m<sup>2</sup> in extent) located to north of river in the western end of study area.
- Zone II (ca 1492 m<sup>2</sup> in extent) located north of river, extends in west-east direction parallel to the river.
- Zone III (ca 1882 m<sup>2</sup> in extent) located to north of river in the central part of study area.
- Zone IV (ca 431 m<sup>2</sup> in extent) located to north of river in the eastern part of study area.
- Zone V (ca 2923 m<sup>2</sup> in extent) located to the south of the river in the western part of the study area.
- Zone VI (ca 2017 m<sup>2</sup> in extent) located circa 20m to the east of Zone V on the southern slopes.
- Zone VII (ca 1928 m<sup>2</sup> in extent) located circa 20m to the east of Zone VI on the southern slopes.

The petrifying springs at Ballyman Glen occur on moderate wooded slopes within the glen and also along the banks of the County Brook River. The seepage zones extend up to 40m upslope from the river bank.

They mostly occur as seepage areas with a dominance of paludal tufa, although oncoids/ooids (plant fragments coated in tufa deposits) are also occasional. Massive tufa cascades are mostly restricted to river banks, although less dramatic example of this tufa formation also occur on moderate slopes removed from the river where there is a constant trickle of water. Tufa fused stones and boulders (cemented rudites) were recorded within the riverbed in some areas often in close proximity or just down-stream of tufa cascades on the stream bank, with stream crust tufa (sheet like deposits of tufa) also noted.

The two main types of tufa springs noted during the survey are described in the following paragraph.

**Seepage areas vegetation description:** The plant communities of the seepage areas mostly correspond with the *Palustriella commutata*-*Geranium robertianum* springheads as described by Lyons and Kelly (2016). Bryophyte cover is mostly patchy on the sloped paludal tufa sites and is interspersed with a high cover of leaf litter. The dominant species is *Palustriella commutata* at all sites. Other bryophytes that are common in the ground layer include; *Pellia endiviifolia*, *Cratoneuron filicinum*, *Eucladium verticillatum*, and *Calliergonella cuspidata*. The field layer is mostly sparse with *Equisetum telmateia*, *Carex remota*, *Chrysosplenium oppositifolium*, *Adjug reptans* occurring most frequently with *Eupatorium cannabinum* and occasional ferns. A low cover of *Rubus fruticosus* agg. is usually present.

Canopy cover is moderate to high and consists of a mix of *Salix cinerea*, *Alnus glutinosa*, *Fraxinus excelsior*, *Betula pubescens*, *Corylus avellana*, and associated *Hedera helix*.

Ground surface is typically damp and relatively firm although may be extremely soft and almost quaking in places where the slope is reduced. Where trickling water is present there is often the presence of oncoids / ooids or low firm consolidated tufa ridges.

**Massive, consolidated tufa vegetation description:** Along the river bank massive consolidated tufa often occurs (see spring assessment B3 below). In these examples bryophytes have an almost complete cover with *Palustriella commutata*, *Pellia endiviifolia*, *Aneura pinguis*, and *Conocephalum conicum* most frequent.

Higher plants are sparse and mostly occur around the margins of the solid tufa, and include species such as *Adjug reptans*, *Chrysosplenium oppositifolium*, *Geranium robertianum*, *Oxalis acetosella*, *Galium odoratum* and *Ranunculus repens*, and occasional ferns. The canopy is complete and dominated by *Corylus avellana* and *Salix cinerea*, with *Hedera helix* and *Rubus fruticosus* frequently present.

An assessment of conservation status of five representative springs at Ballyman Glen using the methodology outlined in Lyons and Kelly (2016) was undertaken as part of a previous study (Crushell and Foss 2017). Each spring was assessed according to; range and area, structures and functions, and future prospects. The overall condition assessment of four springs was considered unfavourable – inadequate while a single spring was deemed to be in favourable conservation status.

### Conservation Status

The main reason that four of the five springs did not attain favourable conservation status was due to the high levels of deer grazing and associated trampling effects on the surface of springs. Most of the springs within the Glen are likely to conform to this in that as deer grazing is occurring at a similar intensity throughout the wooded slopes of the glen. The exception being those springs along the river bank where trampling by deer is less evident.

A further assessment of conservation importance was undertaken using a scoring system proposed by Lyons and Kelly (2016). This confirmed that the springs varied from being of moderate to high conservation importance.

**Evaluation:** There are extensive seepage areas on both slopes of Ballyman Glen which are associated with calcareous springs. These springs and seepage areas correspond with the EU Annex I habitat Petrifying springs with tufa formation (Cratoneurion) [7220] and are therefore deemed to be of international conservation significance.

### **Alkaline fen [7230]**

#### Desktop Study

Alkaline fens are typically calcareous basin or flush fen systems with extensive areas of species-rich small sedge communities. These fen systems are often a complex mosaic of habitats, often occurring in association with tall sedge swamp, reedbeds, wet grasslands, springs, and open-water. Alkaline fen is characterised by a broad range of small to medium *Carex* spp., carpets of brown mosses and high species diversity including black bog-rush (*Schoenus nigricans*), blunt-flowered rush (*Juncus subnodulosus*), devil's bit scabious (*Succisa pratensis*), hemp agrimony (*Eupatorium cannabinum*) and purple moor-grass (*Molinia caerulea*).

The habitat requires a high water table, a calcareous, low nutrient water supply and minimal water level fluctuation. Low intensity mowing and/or grazing are often important for maintaining species richness. In Ireland, the most extensive areas of alkaline fens are thought to occur in lowland basins underlain by limestone groundwater bodies with a karstic or poorly productive flow regime. Alkaline fens within upland and lowland flushes, along the fringes of calcareous lakes (e.g. Lough Corrib) and within turloughs, dune slacks and machair are thought to be more limited in local extent but more widespread.

Key features used in assessing correspondence with EU Annex I Habitat

- Presence of a range of small sedge species;
- Presence of brown moss layer;
- Occurring in natural habitat (e.g., lake edge; flush; infilling hollow, fen areas at the edge of reed swamp);
- Waterlogged peat soils; and
- Base rich conditions.

An area of alkaline fen has previously been reported from the southern part of Ballyman Glen (Curtis 1976, NPWS site synopsis). The fen at this location occurs on moderately sloping lands and is fed by a continuous supply of calcareous groundwater from a series of tufa forming springs emerging on the upper slopes. The fen is dominated by a field layer of Purple moor-grass (*Molinia caerulea*), with abundant Blunt-flowered Rush (*Juncus subnodulosus*), and long-stalked Yellow-sedge (*Carex lepidocarpa*). Notable species from the fen area include Narrow-leaved Marsh-orchid (*Dactylorhiza traunsteineri*), and Broad-leaved Cottongrass (*Eriophorum latifolium*). Moss species occurring in the ground layer include: *Palustriella commutata*, *Calliergonella cuspidata*, *Ctenidium molluscum*, and *Campylium stellatum*.

This area of fen was confirmed as being present during the survey undertaken by WSI in 2019. However, scrub encroachment was noted as a threat to the habitat. The results of the survey undertaken by WSI are detailed below and illustrated in **Figure 4-2**.

### Survey Results

A single area of Alkaline fen was recorded on a north-facing un-wooded slope to the south of the County Brook River (see **Figure 4-2**). The fen habitat is fed by continuous supply of calcareous rich water which has formed extensive tufa substrate. The fen is associated with an extensive seepage area that extends through the woodland to the north to the County Brook River, where strongly consolidated massive tufa formation occurs on the southern river bank.

The fen habitat is surrounded by scrub and woodland and, based on a review of aerial photography and personal observations by WSI surveyors, is being encroached by scrub vegetation, predominantly downy birch (*Betula pubescens*). The extent of open fen is currently estimated to cover 0.18ha compared to ca 0.5ha in the year 2000.

The fen vegetation is dominated by Purple Moor-grass (*Molinia caerulea*) with abundant Great Horsetail (*Equisetum telmateia*) and Black Bog Rush (*Schoenus nigricans*). Locally, the ground layer has an almost complete cover of brown mosses with *Calliergonella cuspidata*, *Cratoneuron filicinum*, *Palustriella communata* and *Ctenidium molluscum* all present.

The timing of the survey (November 2019) did not allow a comprehensive assessment of the fen flora. The vegetation of the area is described in the NPWS Site synopsis for the site as follows:

“The vegetation of the main part of the fen is dominated by Greater Tussock-sedge (*Carex paniculata*), Tall Fescue (*Festuca arundinacea*), butterworts (*Pinguicula vulgaris* and *P. lusitanica*), Black Bog-rush (*Schoenus nigricans*) and Broad-leaved Cottongrass (*Eriophorum latifolium*). The site is particularly notable for its orchids, with species including Early Marsh-orchid (*Dactylorhiza incarnata*), Narrow-leaved Marsh-orchid (*D. traunsteineri*) and Marsh Helleborine (*Epipactis palustris*) occurring. In addition, twenty species of sedge have been recorded in the area, including the scarce Long-stalked Yellow-sedge (*Carex lepidocarpa*).”

**Evaluation:** The habitat is of high ecological interest, corresponding with Annex I Alkaline Fen. The fen is known to support two notable higher plant species; *Dactylorhiza traunsteineri* and *Eriophorum latifolium*. The habitat is somewhat degraded and threatened due to encroachment of scrub and woodland from the edges. However, as the habitat corresponds with an EU Annex I habitat and is a qualifying feature of the SAC, it is deemed to be of international conservation significance.

The Annex I Habitat Survey of Ballyman Glen Report is enclosed in **Appendix 5B of the EIAR**.

### 4.3.2 Invasive Species

Non-native invasive species may have a significant impact on native habitats and species, causing significant decline or loss and may jeopardise the conservation objectives of European sites.

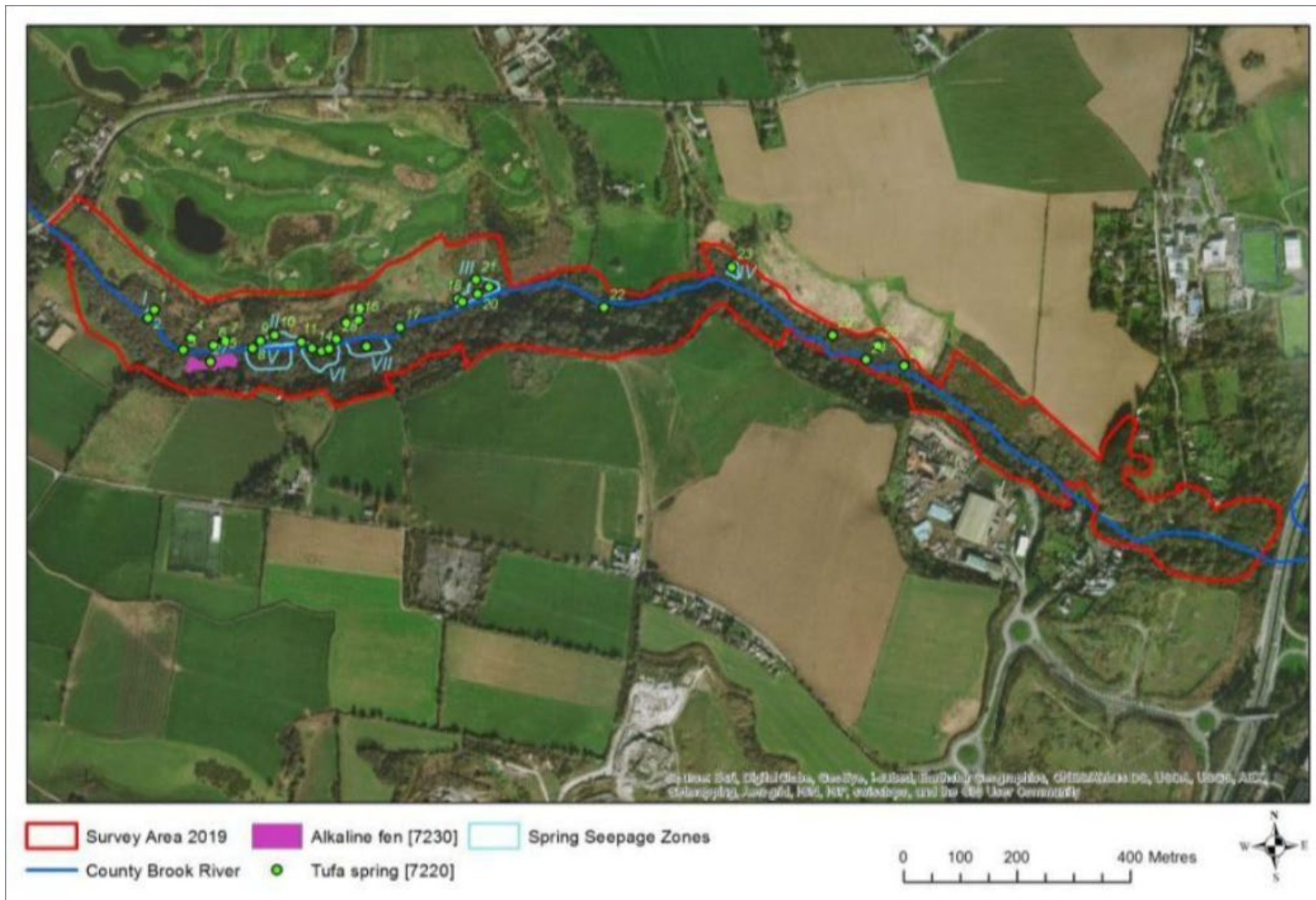
There are four records of Japanese Knotweed (*Fallopia japonica*) from the vicinity of the proposed site (O21 grid square), including a record from 2013 from the Crookstown River approximately 0.5km to the south of the site. Giant Hogweed (*Heracleum mantegazzianum*) has been recorded between 1978 and 1987 by the River Dargle at Bray, which is approximately 0.6km to the east of the site. Cherry Laurel (*Prunus laurocerasus*) was recorded in 2007 from the Dargle Glen, approximately 1.1km to the south of the site, and also in 2005 at Knocksink Woods, approximately 1.6km to the west of the site. Rhododendron (*Rhododendron ponticum*) has been recorded in 2005 in Tithewer, approximately 2.5km south of the site.

Four stands of Japanese Knotweed were noted during the field surveys at the proposed site undertaken in 2016 and 2021. These stands are located to the north-west of the site in an area of scrub adjacent to the SAC; there is also a stand to the east of the site. Butterfly Bush (*Buddleja davidii*) is present scattered throughout the southern edge of woodland in Ballyman Glen, and is also present in the same area as the Japanese Knotweed at the north-west of the site.

A map illustrating the location of Japanese Knotweed at the proposed site is included in the Japanese Knotweed management plan enclosed in **Appendix A**.



Figure 4-2: Location of Annex I Habitats within Ballyman Glen SAC





## 4.4 GEOLOGY AND HYDROGEOLOGY

The subsoils (Quaternary Geology units above the rock) at the site consist of glaciofluvial sands and gravels. According to the Geological Survey of Ireland (GSI), these sand and gravel deposits derived dominantly from Limestones make up the Fassaroe Delta. The site forms part of the Enniskerry delta, listed as an Irish Geological Heritage Site (WW020).

The sands and gravels are a glacial outwash delta comprising glaciofluvial and glaciolacustrine sediments also known as the Fassaroe Delta. The sediments are arranged in the typical delta sequence: topset gravels composed of up to 2m depth of horizontally bedded gravels on top; foreset gravels which are steeply dipping and well bedded deposited at the front of the delta; and bottomset, finer sediments of sands and silts, usually underlying the foresets and representing sediment that was originally deposited beyond the steep delta front on the sea floor. The thickness of the sand and gravel unit has not been established as it extends below the maximum reach of the drilling rigs used in site investigations to date (35m below ground level). However, bedrock outcrop was noted in the river bed to the north of the site, the County Brook.

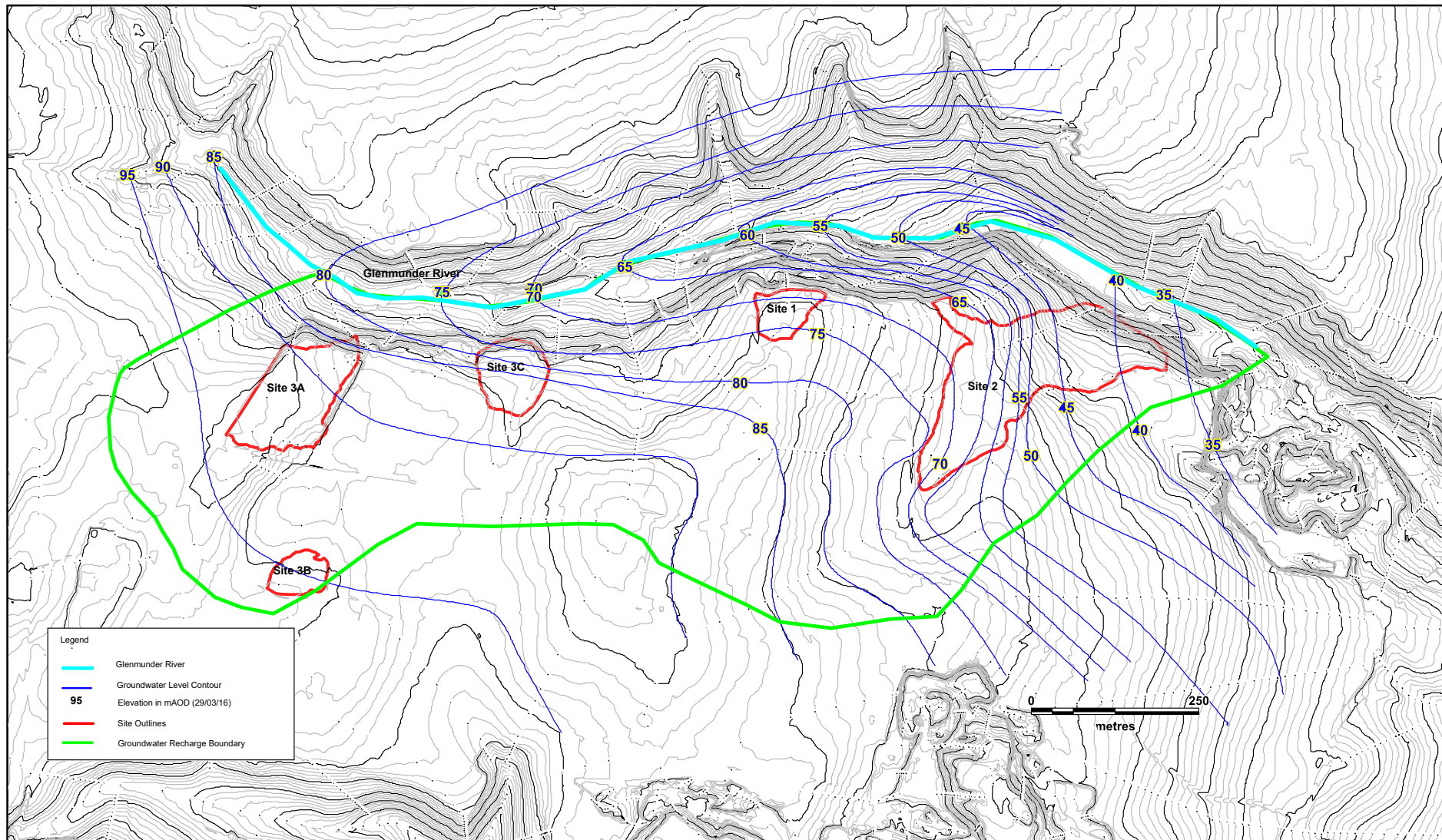
The unconsolidated sands and gravels are comprised largely of limestone from the Irish Midlands, and form part of the Enniskerry gravel aquifer body, classed as locally important gravel aquifer of “Good” WFD status. Groundwater discharges emerge as springs and seeps along the lowest boundary of the groundwater body in the river valley and feed a small strip of alkaline fen and tufa deposits within the Ballyman Glen. The aquifer vulnerability at the site is classified as High, due to the proximity of the gravel aquifer to ground level.

The underlying bedrock consists of Ordovician Metasediments of the Maulin Bedrock Formation characteristic of dark blue-grey slate, phyllite and schist. The Maulin Formation is classified by the GSI as a locally important, moderately productive bedrock aquifer in local zones (LI). The Maulin Bedrock Formation forms part of Wicklow Groundwater Body which is a very large but characteristic of a poorly productive aquifer flow regime.

As the bedrock at Fassaroe is characteristic of significantly lower transmissivity than the overlying sand and gravel deposits, it is assumed that the contact with the underlying bedrock constitutes the hydraulic base to the overlying granular sand/gravel aquifer system. The groundwater flow regime at Fassaroe is that of a shallow, unconfined, largely granular aquifer system with groundwater flow directions generally reflecting the surface topography.

A groundwater contour map for the local system is presented in **Figure 4-3**, based on water levels measured on 29<sup>th</sup> March 2016. This figure confirms that a water-table is present within the sand and gravel deposits, and groundwater flow direction at all sites is ultimately towards the County Brook (Fassaroe Stream) to the north and northeast.

Figure 4-3: Groundwater Catchment Area for the Fassaroe Phase 1 Strategic Housing Development



## 4.5 QUALIFYING INTERESTS OF THE EUROPEAN SITE

The importance of a site designated under the Habitats Directive is defined by its qualifying features or interests. Qualifying interests for any European Site are listed on a pro forma, called the Natura 2000 standard data form, which forms the basis of the rationale behind designation, and informs the Conservation Management Plan for targeted management and monitoring of key species and habitats.

Qualifying interests for the Ballyman Glen SAC are given in **Table 4-1**, along with the conservation status and specific sensitivities and main threats relevant to each feature. Information on conservation status for each habitat within the SAC was extracted from the Natura 2000 Standard Data Form (which was last updated in September 2019) on the NPWS website <http://www.npws.ie/protectedsites/>. This information provides specific details on the conservation status of each habitat within the SAC. The environmental sensitivities have been derived from The Status of EU Protected Habitats and Species in Ireland<sup>5</sup>.

**Table 4-1: Conservation Status and Main Threats to the Qualifying Interests of Ballyman Glen**

Annex I Habitat	Conservation Status at Ballyman Glen SAC	Environmental Sensitivity/ Main Threats (Ranked High to Medium)
[7220] Petrifying springs with tufa formation ( <i>Cratoneurion</i> )	C= Average or reduced conservation status.	A06 Abandonment of grassland management (e.g. cessation of grazing or mowing) (M) A10 Extensive grazing or undergrazing by livestock (M) E01 Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (H) F07 Sports, tourism and leisure activities (M) J01 Mixed source pollution to surface and ground waters (limnic and terrestrial) (H) K02 Drainage (H) K04 Modification of hydrological flow (H) H08 Other human intrusions and disturbance not mentioned above (H) L02 Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)
[7230] Alkaline fens	A= Excellent conservation status.	A06 Abandonment of grassland management (H) A09 Intensive grazing or overgrazing by livestock (H) K02 Drainage (H) K04 Modification of hydrological flow (H) L02 Natural succession resulting in species composition change (H) J01 Mixed source pollution to surface and ground waters (M) K01 Abstraction from groundwater, surface water or mixed water (M) A26 Agricultural activities generating diffuse pollution to surface or ground waters (M) N02 Droughts and decrease in precipitation due to climate change (M) N03 Increases or changes in precipitation due to climate change (M)

<sup>5</sup> NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

## 4.6 CONSERVATION OBJECTIVES

Article 6.3 of the Habitats Directive requires that the impact of the project (either alone or in combination with other projects or plans) on the integrity of the European Site is considered with respect to the conservation objectives of the site and to its structure and function. The EC guidance on Natura 2000 (MN2000) states that:

*The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site’s conservation objectives (MN2000, para 4.6(3)).*

The maintenance of favourable condition of qualifying interests at the site level will contribute to the overall maintenance of favourable conservation status of those habitats and species at national level:-

- **Favourable conservation status of a habitat can be described as being achieved when:** “its natural range, and the area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable”.
- **Favourable conservation status of a species can be described as being achieved when:** “population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, sufficiently large habitat to maintain its populations on a long term basis”.

Site-specific conservation objectives aim to define favourable conservation conditions for the qualifying interests, i.e. Annex I habitat and Annex II species, as applicable. The conservation objectives are presented as a list of attributes against which targets have been set. All of the attributes in relation to each relevant feature have been considered in relation to the potential impacts associated with the proposed strategic housing development. Site specific conservation objectives (SSCOs) for the qualifying interests of Ballyman Glen SAC are detailed in **Table 4-2**. Conservation Objectives were downloaded from the NPWS website ([www.npws.ie](http://www.npws.ie)). The date of issue for the Ballyman Glen Conservation Objectives is 17<sup>th</sup> July 2019 (Version 1).

**Table 4-2: Site Specific Conservation Objectives, Attributes and Targets for Ballyman Glen SAC**

Conservation Objectives of Ballyman Glen SAC		
7220 Petrifying Springs with Tufa Formation (Cratoneurion)		
Attribute	Measure	Target
Habitat area	Square metres	Area stable or increasing, subject to natural processes
Habitat distribution	Occurrence	No decline, subject to natural processes
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes
Water quality - nitrate level	mg/l	No increase from baseline nitrate level and less than 10mg/l
Water quality - phosphate level	µg/l	No increase from baseline phosphate level and less than 15µg/l
Vegetation composition: positive indicator species	Number per spring	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number
Vegetation composition: negative	Cover (DAFOR scale)	Potentially negative indicator species should not be Dominant or Abundant; potentially negative woody species should be absent in unwooded springs; invasive species should be absent



**Conservation Objectives of Ballyman Glen SAC**

indicator species		
Vegetation structure: sward height	Centimetres	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm)
Physical structure: trampling/dung	Cover (DAFOR scale)	Cover should not be Dominant or Abundant

**7230 Alkaline Fens**

Habitat area	Hectares	Area stable or increasing, subject to natural processes
Habitat distribution	Occurrence	No decline, subject to natural processes
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes
Vegetation composition: brown mosses	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical brown moss species
Vegetation composition: typical vascular plants	Percentage cover at a representative number of 2m x 2m monitoring stops	Maintain adequate cover of typical vascular plant species
Vegetation composition: native negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of native negative indicator species at insignificant levels
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%

**Conservation Objectives of Ballyman Glen SAC**

Vegetation composition: soft rush and common reed cover	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of soft rush ( <i>Juncus effusus</i> ) and common reed ( <i>Phragmites australis</i> ) less than 10%
Vegetation structure: litter	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of litter not more than 25%
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground not more than 10%
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes

## 5 IMPACT ASSESSMENT

The following sections assess the potential impacts, in the absence of mitigation, of the proposed development on the conservation objectives of Ballyman Glen SAC.

### 5.1 Potential Significant Impacts during the Construction Phase

This section comprises an evaluation of the potential significance of impacts of the construction phase of the proposed development on the conservation objectives of the European Site that has been selected for Appropriate Assessment: Ballyman Glen SAC. Desktop studies and field survey have been undertaken in order to inform a robust impact assessment of the proposal on the qualifying interests of the European Site. Potential impacts include:

- Loss of habitat area/ distribution and degradation of habitats;
- Alteration of water quality;
- Alteration of hydrological regime; and
- Introduction or spread of invasive species during construction.

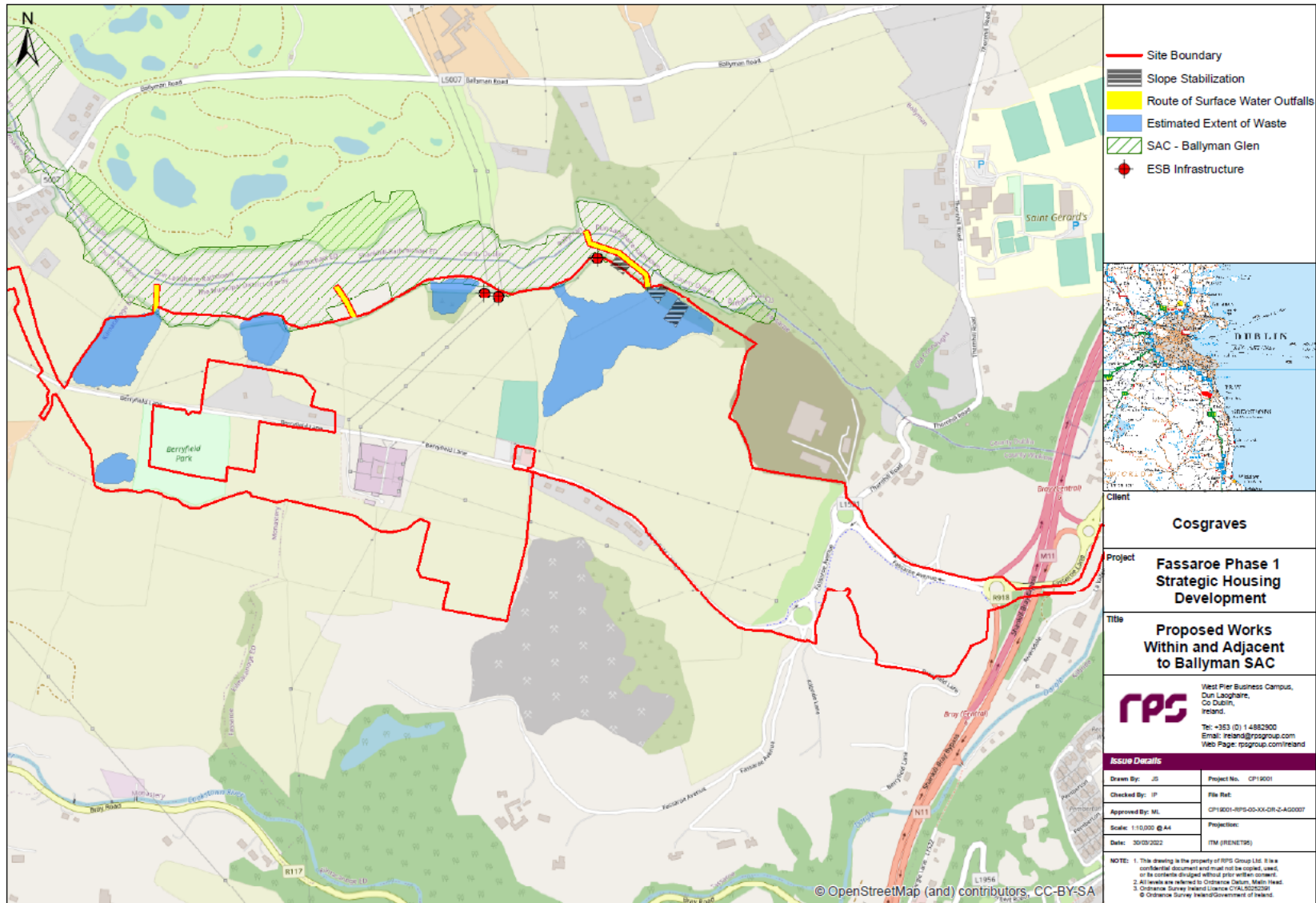
#### 5.1.1 Loss of Habitat Area/ Distribution and Degradation of Habitats

As noted in Section 2.3.16, there are a number of localised areas in which works are required within, and adjacent to, Ballyman Glen SAC. These include the following:-

- Removal and decommissioning of steel lattice tower and replacement with terminal pylon to the south of Ballyman Glen SAC serving 110kV line (towers outside the boundary of Ballyman Glen SAC but construction work will extend into the SAC);
- A new 3-pole cable interface structure adjacent to (but outside of) the Ballyman Glen SAC where the 38kV line is proposed to go underground
- Localised structural stabilisation works at northern boundary of Landfill No. 1 and 2 adjacent to and within Ballyman Glen SAC;
- Edge of Landfill Remediation Measures adjacent to and within Ballyman Glen SAC;
- Landfill gas flare compound and collection system adjacent to (but outside of) the SAC;
- Storm drainage outfalls to County Brook watercourse within Ballyman Glen SAC; and
- Open space / landscaping proposals (adjacent to the SAC).

The location of these proposed works in relation to the Qualifying Interests of Ballyman Glen SAC are illustrated in **Figure 5-1**. The potential impacts of these proposed works on the Qualifying Interests of Ballyman Glen SAC are detailed below.

Figure 5-1: Location of Proposed Works Proximal to Ballyman Glen SAC





### Petrifying Springs

The proposed storm water outfall, landfill remediation measures and associated slope stabilisation works and potential construction works area associated with ESB works are located within scrub, mixed broadleaf woodland and wet woodland habitats. No works or associated vegetation clearance is proposed within, or adjacent to, the location of any springs identified as petrifying springs with tufa formation, therefore no direct loss to this habitat is anticipated to arise from the proposed construction works. The location of the proposed works in relation to the Qualifying Interests of Ballyman Glen is illustrated in **Figure 5-1**.

However, the construction works detailed above, in addition to those immediately adjacent to the SAC as identified at section 2.3.16, if unmitigated, could potentially lead to suspended solids runoff. Excavation and ground disturbance will result in soil disturbance extending overflow runoff impacts. There is potential for this runoff to degrade the petrifying spring habitat as a result of pollution of surface waters.

There is potential for a reduction in habitat or loss of habitat as a result of alteration in hydrological regime, as detailed in Section 5.1.3.

### Alkaline Fen

The areas of alkaline fen within Ballyman Glen SAC (Figure 4-1) are located to the west of the main Phase I strategic housing development lands and to the north of landfill area 3A. No works are proposed within, or directly adjacent to, the location of any alkaline fen, therefore no direct loss to this habitat is anticipated to arise from the proposed construction works. However, remediation of landfill 3A, if unmitigated, could potentially lead to suspended solids runoff. Excavation and ground disturbance will result in soil disturbance extending overflow runoff impacts. There is potential for this runoff to degrade the alkaline fen habitat as a result of pollution of surface waters.

There is potential for a reduction in habitat area as a result of alteration in hydrological regime, as detailed in Section 5.1.3.

## 5.1.2 Alteration of Water Quality

The areas of historic landfill will be remediated as part of the proposed development in line with Certificates of Authorisation issued to Wicklow County Council by the EPA in 2019 (see **Section 2.2.16**). The disturbance of waste could potentially mobilise landfill leachate resulting in further contamination of the groundwater aquifer. This could occur by the breaching of a confining layer allowing downward vertical migration or lateral movement along utility trenches.

### Landfill Capping

The results of the Environmental Risk Assessment (ERA) at Fassaroe (undertaken to inform the proposed remediation measures required) showed that there were elevated levels of ammonia and heavy metals in up-gradient and down-gradient boreholes, indicating that groundwater quality beneath the landfill sites has been impacted by the historic landfilling of waste (for location of historic landfill sites see **Figure 2-4**). The vertical pathway for leachate generation is driven by direct rainfall percolating through the waste body. The recharged water travels northeast through higher permeability sections of the waste. The leachate then pools within the base of the waste and from there percolates into the underlying unsaturated sand and gravel deposits. Upon reaching the water-table, the sand and gravel aquifer provides both lateral and vertical migration pathways for leachate mixed with groundwater. The groundwater flow within the sandy gravel deposits is orientated in a northeast direction towards Ballyman Glen SAC.

Survey work conducted by RPS to inform the ERA found that two springs in Ballyman Glen showed visual evidence of ochre staining, indicating contamination from leachate. As detailed in the ERA, there is a clear difference in chemistry between the two sets of springs (i.e. those identified as petrifying springs and those with ochre deposits). The ochre springs had high ammonia and lower pH, which limits the calcium carbonate saturation of groundwater and hence the potential for tufa forming at the springs. The tufa springs had lower ammonia and higher pH which allows a higher calcium carbonate saturation level which then promotes the precipitation of tufa. The results also showed that the water quality at the three petrifying springs is compromised with some elevated BOD and metals concentrations.

The provision of a landfill capping system is proposed as part of the Phase 1 development in order to mitigate the potential risks to human health and the water receptors from the historic landfills. The proposed landfill capping remedial measures (as detailed in the Fassaroe Historic Unlicensed Landfill Remediation Natura Impact Statement, RPS, 2018 and the Fassaroe Phase 1 Development Remediation Strategy Report, 2022) have been designed to accommodate the construction of the Phase 1 Development and specifically to:

- Minimise infiltration of water and maximise run off from the landfill areas;
- Promote surface drainage and maximise run off from the landfill areas;
- Control landfill gas migration; and
- Provide a physical separation between waste and plant and animal life.

Leachate generation as a result of rainfall infiltration will be significantly reduced by the installation of the capping system. A leachate interceptor drain will also be installed at the edge of the waste bodies on the downgradient side of the waste in order to mitigate against any potential localised leachate seepage and slope instability and will drain for treatment at the nearest waste water treatment facility.

As noted previously, there is potential for the localised construction works for the installation of infrastructure to have negative impacts on groundwater quality. However, the water quality at the springs will improve following the capping of the landfill due to the reduced recharge through the waste and reduced leachate generation. This is expected to result in a rise in the pH level, a reduction in contaminants and an increase in the calcium carbonate saturation and the precipitation of tufa. The water quality at the three petrifying springs is compromised with some elevated BOD and metals concentrations. Therefore, it would be reasonable to expect an improvement in the amount of tufa being deposited, from the current conditions, following the capping of the landfills. The proposed development therefore has the potential to provide a positive impact on the groundwater quality and potential for the improvement of spring water quality and petrifying conditions at the springs.

Overall, it is anticipated that the landfill remediation measures proposed as part of the development will have a positive impact on the current situation with regards to water quality.

The areas of alkaline fen within Ballyman Glen SAC (Figure 4-1) are located to the west of the main Phase 1 strategic housing development lands and to the north of landfill area 3A. The direction of groundwater flow from the proposed strategic housing development site is to the north-east, away from the area of alkaline fen. However, as a precautionary measure the potential impact to the quality of the groundwater is considered on a groundwater catchment level. As noted above, the capping of the landfill is expected to result in a reduction in contaminants within the groundwater. Consequently, no adverse impacts on the qualifying habitat alkaline fen are anticipated to arise from an alteration of groundwater quality, however, there is potential for a positive impact as a result of potential improvement in water quality.

### 5.1.3 Alteration of Hydrological Regime

#### Fassaroe Mixed Use Housing Development

The storm water management design for the proposed housing and road development routes the storm water to soakaways to promote percolation back to ground. The soakaways are designed to accommodate the 1 in 5 year storm events. Runoff in excess of the 1 in 5 year event will overflow from the soakaway storage to attenuation ponds which discharge to surface water. The storm water management system for the housing and road development (other than the landfill capping measures discussed below) will therefore have a negligible impact on groundwater recharge rates and may even promote additional recharge due to the additional storage provided in the soakaway tanks.

#### Landfill Capping

The objective of the landfill capping system is to minimise the infiltration of water into the waste, control gas migration and provide a physical separation between the waste and plant, animal life and human contact.

In terms of groundwater impact, a landfill capping system has the effect of reducing the amount of effective rainfall or recharge percolating to groundwater and increasing surface water run-off from the area. The runoff

from the capping will be diverted to a surface water management system and discharged directly to surface water and therefore represents a loss to the groundwater recharge.

The resulting reduction in ground recharge in the catchment may result in the lowering of the water-table. A significant reduction in the water-table elevation at the Fassaroe site will reduce the head driving the flow to the springs which could result in a reduction or cessation of spring flow along the banks of the river which could have a direct impact on the petrifying springs.

### Groundwater Recharge and Levels

The scale of the potential impact of the landfill capping is examined by estimating the total groundwater recharge for the catchment to the springs and then determining the reduction in recharge which is anticipated due to capping of the landfills during the proposed development phases.

#### Pre-Development Recharge

The total groundwater recharge supporting the river baseflow and spring discharges along the development area is a product of the catchment area and the recharge rate. As part of the ERA prepared for the landfill remediation proposals, a groundwater catchment for the area of the proposed development was delineated using groundwater elevation contours developed by RPS and detailed topographic data. The resulting catchment is shown in **Figure 4.2** and represents the assumed area of 0.658 square kilometres. There is some uncertainty in relation to location of the up-gradient catchment boundary as the groundwater contours are based on monitoring boreholes located around the perimeter of the landfill cells. In lieu of groundwater monitoring locations in that area the topographic contours have been used to guide the groundwater catchment delineation.

The Geological Survey of Ireland (GSI) provides estimates for groundwater recharge on a regional scale. The groundwater recharge for the Fassaroe site is estimated at 575mm/yr. This yields a total recharge for the catchment to the springs of approximately 378,400m<sup>3</sup>/yr.

#### Post-Development Recharge

For the post-development scenario a reduced infiltration rate of 67mm/year for each of the capped landfill areas is used. This estimated infiltration rate is equal to the average effective rainfall through a 0.6m compacted layer with hydraulic conductivity of 1X10<sup>-9</sup>m/s.

The recharge rate is estimated using the reduced rate for the landfill cells and paved areas. The resulting recharge rate for the catchment as a whole is 533mm/year which yields approximately 350,918m<sup>3</sup>/year. The catchment and landfill areas, recharge rates and total recharge results are summarised in **Table 5-1**.

**Table 5-1: Recharge Calculation for the Fassaroe Site and Landfills**

Phase	Site	Area (Ha)	Recharge Rate (mm/yr)	Recharge (m <sup>3</sup> /yr)
<b>Pre-Development</b>	Total Catchment	65.8	575	<b>378,350</b>
<b>Post- Development</b>	Site 1	0.5	67	335
	Site 2	4.5	67	3,015
	Site 3B	0.4	67	268
	Site 3A	1.9	575	10,925
	Site 3C	0.9	575	5,175
	Greenfield	57.6	575	33,1200
	Total Catchment	65.8	533	<b>350,918</b>
<b>Post-Development Reduction</b>				<b>7%</b>

The post-development recharge represents a potential reduction of 7% in the recharge rate. This is based on a reduction from 575mm/yr to 533mm/yr, which is a reduction of 42mm/yr. The reduction in the average

groundwater levels as a result of the decrease in recharge rate of 42mm/yr can be estimated based on the storage parameters for the gravel aquifer. A typical effective porosity for a gravel deposit of 15% is adopted for the basis of the assessment. To estimate the drop in levels resulting from a decrease in recharge rate the reduction in question (42mm/yr or 0.042m/yr) is divided by the porosity (15% or 0.15) which yields a water level fluctuation of 0.28m. This result was rounded up to 0.3m for the purposes of reporting.

Similarly, it is estimated that a consistent reduction in recharge percolating to groundwater across the larger landfill cells (landfill site 2) from 575 to 67mm could result in a potential ground water level decrease directly beneath the landfill of up to 3.4m. The observed reduction in groundwater level will be less as the potential drop in groundwater levels directly beneath the landfill will promote groundwater flow in from the surrounding areas, which will equilibrate the levels with the effect of marginal drawdown being observed from the wider area.

The springs and seepages which feed the tufa deposits emanate at the seepage face where groundwater emerges from the river valley. The extent of the seepage face above the river elevation is related to the groundwater elevation in the gravels, which in turn is related to the recharge.

The reduced recharge rate in the aquifer could lead to a comparable reduction in the seepage face elevation. Therefore, potentially there may be a drop of 0.3m from the top of the seepage face and the reduction in flow at the springs could reduce by 7%. This is illustrated in a diagram included in **Appendix B**, which illustrates the pre and post development water table and artesian levels through a typical valley section. This illustrates that the predicted reduction of 0.3m is a small change when compared to the total saturated thickness of the gravel. The tufa springs are mapped lower down in the river valley, rather than at the top of the seepage face and therefore it is unlikely that this minor amount of drawdown would lead to a significant loss of any of the petrifying springs. The reduced recharge rate (by 7% in comparison to pre-development conditions) could lead to a comparable reduction in flow from the springs (7%). However, it is expected the springs would continue to flow and the tufa would continue to be deposited.

Therefore, negative impacts on the petrifying springs and alkaline fen within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.

### 5.1.3.1 Introduction or Spread of Invasive Species

There are four stands of Japanese Knotweed present to the north-west of the site in an area of scrub and there is also a stand to the east of the site (see **Appendix A**). There is potential for the proposed development to spread Japanese Knotweed into Ballyman Glen SAC.

### 5.1.4 Potential Significant Impacts during the Operational Phase

#### 5.1.4.1 Loss of Habitat Area/ Distribution and Degradation of Habitats

The proposed development will result in an increase in the quantity of people and animals (pets) in the vicinity of Ballyman Glen SAC. The SAC will be buffered from the main development area by the District Park. The District Park includes a network of pathways which run close to the boundary of the SAC in places. Ballyman Glen SAC is situated on steep sided slopes and is covered by woodland that is generally dense and impenetrable. These characteristics of Ballyman Glen are likely to discourage visitors from entering the SAC. Ballyman Glen SAC is currently bordered by stock proof fencing for the majority of its length and there are no proposals to remove this fencing. However, there is currently a farm access track that leads down into Ballyman Glen, therefore it cannot be ruled out that people and their pets would enter the SAC via this track. As noted previously, the areas of alkaline fen within Ballyman Glen (**Figure 4.2**) are located to the west of the proposed development area. There is potential access to lands to the west, including Ballyman Glen SAC through gaps in the hedgerow along the western boundary of Fassaroe Phase 1 lands.

Although, as previously noted, the habitats and topography of the Glen do not make access into Ballyman Glen easy, using the precautionary principle, degradation of Petrifying Spring and Alkaline Fen habitats as a result of trampling cannot be ruled out.



There is potential for indirect effects through degradation in habitat or loss of habitat as a result of alteration in hydrological regime, as assessed in **Section 5.1.3**.

#### 5.1.4.2 Alteration of Water Quality

As described in **Section 5.1.2**, there is an existing migration of leachate from the landfills into the groundwater body feeding the petrifying springs and alkaline fen that are a qualifying interest of Ballyman Glen SAC. It is anticipated that the landfill capping system to be installed during the construction phase of the proposed development will continue to reduce leachate generation as a result of rainfall infiltration during the operational phase of the proposed development. This is likely to have a positive impact on the water quality of the groundwater system feeding the petrifying springs and alkaline fen within Ballyman Glen.

#### 5.1.4.3 Alteration of Hydrological Regime

As described in **Section 5.1.3**, it is predicted that the capping of the landfills is likely to reduce the current recharge to groundwater up to 7% over the life of the development. However, the potential drop of 0.3m at the top of the seepage face is located above the level of elevation of the petrifying springs and alkaline fen, therefore negative impacts on the petrifying springs and alkaline fen within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.

#### 5.1.4.4 Introduction or Spread of Invasive Species

The operational phase of the proposed development is not expected to result in any further risk of introduction or spread of invasive species.

### 5.1.5 Summary of Impacts on the Qualifying Interests of Ballyman Glen SAC

A summary of potential impacts on the habitats of conservation value and qualifying interests of Ballyman Glen SAC is provided in **Table 5-2**.

**Table 5-2: Summary of Impacts on the Qualifying Interests of Ballyman Glen SAC**

Qualifying Interest/ Habitat of Conservation Value	Potential Impacts	Brief Explanation	Mitigation Required
Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220]	Alteration of water quality	There is potential for the localised constructionworks for the installation of infrastructure to have negative impacts on groundwater quality. However construction of the landfill capping system will result in a reduction of leachate generation in the groundwater feeding the petrifying spring habitat.	Yes
	Alteration of hydrological regime	It is predicted that the capping of the landfills is likely to reduce the current recharge to groundwater up to 7% over the life of the development. However, the potential drop of 0.3m at the top of the seepage face is located above the level of elevation of the petrifying springs; therefore negative impacts on the petrifying springs within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.	No
	Degradation of habitat	The construction works, if unmitigated, could potentially lead to suspended solids runoff. Excavation and ground disturbance will result in soil disturbance extending over overflow runoff impacts. There is potential for this runoff to degrade the petrifying spring habitat as a result of pollution of surface waters.	Yes
		Although unlikely, it cannot be ruled out that the operational phase of the proposed development, if unmitigated, has potential to result in degradation of	Yes

Qualifying Interest/ Habitat of Conservation Value	Potential Impacts	Brief Explanation	Mitigation Required
		petrifying spring habitat as a result of trampling from increased visitor pressure.	
Alkaline Fen [7230]	Alteration of water quality	Construction of the landfill capping system will potentially result in a reduction of leachate generation in the groundwater feeding the alkaline fen habitat.	No
	Alteration of hydrological regime	groundwater up to 7% over the life of the development. However, the potential drop of 0.3m at the top of the seepage face is located above the level of elevation of the alkaline fen, therefore negative impacts on the alkaline fen within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.	No
	Degradation of habitat	The landfill remediation works, if unmitigated, could potentially lead to suspended solids runoff. Excavation and ground disturbance will result in soil disturbance extending overflow runoff impacts. There is potential for this runoff to degrade the alkaline fen habitat as a result of pollution of surface waters.  Although unlikely, it cannot be ruled out that the operational phase of the proposed development, if unmitigated, has potential to result in degradation of alkaline fen habitat as a result of trampling from increased visitor pressure.	Yes

### 5.1.6 Cumulative and In-Combination Impacts

It is a requirement of Appropriate Assessment that the cumulative or in-combination effects of the proposed development together with other Plans or projects are assessed. Cumulative impacts can result from the successive, incremental, and/or combined effects of a development (plan, project or activity) when added to other existing, planned, and/or reasonably anticipated developments.

A search of Wicklow County Council planning enquiry system (<http://www.wicklow.ie/online-enquiries>) and Dún Laoghaire-Rathdown County Council planning enquiry system (<http://planning.dlrccoco.ie>) was conducted for developments permitted since 2016 that may have in-combination effects on European Sites with the proposed development. Plans relevant to the Fassaroe area were searched in order to identify any elements of the plans that may act cumulatively or in-combination with the proposed development.

**Table 5-3** lists those projects and Plans which may potentially contribute to Cumulative or In-Combination Impacts with the proposed development.

**Table 5-3: List of Potential Plans and Projects which may Contribute to Cumulative Impacts**

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
<p>Bray Municipal District Local Area Plan 2018</p>	<p>Strategies and Objectives within the LAP include the following:</p> <p><i>To promote and facilitate the rapid delivery of the maximum number of housing units in the key development areas of Fassaroe and the former Bray golf club.</i></p> <p><i>For Bray, the key location for new employment development shall be in Fassaroe, where it is the objective to secure the delivery of up to 3,000 new jobs.</i></p> <p><i>Within the expansion area of Fassaroe, the Planning Authority will facilitate the provision for the development of appropriately scaled retail provision, which provides for the immediate needs of residents and employees of the area but does not undermine the role of Bray town centre as the principal shopping destination in the settlement.</i></p> <p><i>To promote the linkage of the Luas extension or other mass transit to Bray town centre, Bray train station and Fassaroe; with respect to the major development area of Fassaroe, west of the N11, the development of this area shall make provision for mass transit such as Luas or BRT, including any necessary infrastructure such as stabling;</i></p> <p><i>All development proposals within the Fassaroe Action Area shall take cognisance of the requirement to maintain the rate, quality and general areas where groundwater recharge occurs in order to maintain or enhance the recharge supplying the groundwater-dependent habitats of Ballyman Glen SAC. This shall be through the review of existing hydrogeological assessment(s) and the carrying out of new hydrogeological assessment to inform the development of an appropriate SuDS system(s) throughout any development site and taking into account the cumulative in-combination impact of other development.</i></p> <p>Details on the Action Area Plan for Fassaroe are included in Section 2 of this report.</p>	<p>The proposed line for a possible Luas / BRT under the Bray MD LAP crosses the Ballyman Glen SAC. However the exact nature of such a public transport link is not yet known and will be determined at a future application stage. Therefore an informed cumulative impact assessment of the potential future link across the Glen and the proposed Fassaroe development cannot be undertaken at this time. It is noted that the Wicklow County Development Plan 2016 – 2022 includes objectives NH2, NH3 and NH4 on the protection of European sites, as detailed below. When the link across the Glen is progressed in line with future phases of development at Fassaroe, a full assessment of the potential ecological impacts associated with the proposals will be required, to include the appropriate research and survey work necessary in order to inform a robust assessment of the potential impacts associated with the proposed works.</p>

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
<p>Wicklow County Development Plan 2016 - 2022</p>	<p>Biodiversity Objectives include the following:</p> <p><b>NH1</b> To ensure that the impact of new developments on biodiversity is minimised and to require measures for the protection and enhancement of biodiversity in all proposals for large developments.</p> <p><b>NH2</b> No projects giving rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this plan (either individually or in combination with other plans or projects).</p> <p><b>NH3</b> To contribute, as appropriate, towards the protection of designated ecological sites including candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs); Wildlife Sites (including proposed Natural Heritage Areas); Salmonid Waters; Flora Protection Order sites; Wildfowl Sanctuaries (see S.I. 192 of 1979); Freshwater Pearl Mussel catchments; and Tree Preservation Orders (TPOs). To contribute towards compliance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines, including the following and any updated/superseding documents:</p> <ul style="list-style-type: none"> <li>• EU Directives, including the Habitats Directive (92/43/EEC, as amended), the Birds Directive (2009/147/EC), the Environmental Liability Directive (2004/35/EC), the Environmental Impact Assessment Directive (85/337/EEC, as amended), the Water Framework Directive (2000/60/EC) and the Strategic Environmental Assessment Directive (2001/42/EC).</li> <li>• National legislation, including the Wildlife Act 1976, the European Communities (Environmental Impact Assessment) Regulations 1989 (SI No. 349 of 1989) (as amended), the Wildlife (Amendment) Act 2000, the European Union (Water Policy) Regulations 2003 (as amended), the Planning and Development Act 2000 (as amended), the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477 of 2011) and the European</li> </ul>	<p>Policies and objectives of the Wicklow County Development Plan 2016 – 2022 to ensure that local planning applications comply with proper planning and sustainability and with the requirements of relevant EU Directives and environmental considerations, there is no potential for adverse in-combination effects on European sites.</p>



Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
	<p>Communities (Environmental Liability) Regulations 2008.</p> <ul style="list-style-type: none"> <li>• National policy guidelines (including any clarifying Circulars or superseding versions of same), including the Landscape and Landscape Assessment Draft Guidelines 2000, the Environmental Impact Assessment Sub-Threshold Development Guidelines 2003, Strategic Environmental Assessment Guidelines 2004 and the Appropriate Assessment Guidance 2010.</li> <li>• Catchment and water resource management Plans, including Eastern and South Eastern River Basin Management Plan 2009-2015 (including any superseding versions of same).</li> <li>• Biodiversity Plans and guidelines, including Actions for Biodiversity 2011-2016: Ireland’s 2nd National Biodiversity Plan (including any superseding version of same).</li> <li>• Ireland’s Environment 2014 (EPA, 2014, including any superseding versions of same), and to make provision where appropriate to address the report’s goals and challenges.</li> </ul> <p><b>NH4</b> All projects and plans arising from this plan (including any associated improvement works or associated infrastructure) will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. A plan or project will only be authorised after the competent authority has ascertained, based on scientific evidence, Screening for Appropriate Assessment, and a Stage 2 Appropriate Assessment where necessary, that:</p> <ol style="list-style-type: none"> <li>1) The Plan or project will not give rise to significant adverse direct, indirect or secondary effects on the integrity of any European site (either individually or in combination with other plans or projects); or</li> <li>2) The Plan or project will have significant adverse effects on the integrity of any European site (that does not host a priority natural habitat type and / or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in</li> </ol>	

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
	<p>legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or</p> <p>3) 3) The Plan or project will have a significant adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000.</p>	
<p>Dún Laoghaire Rathdown CDP 2016- 2022</p>	<p>It is a policy of the Council to prepare a Local Area Plan for Old Conna once existing infrastructural constraints in the water supply have been overcome. Any developments with potential impacts to Ballyman Glen SAC will be bound by the following policies set out in the draft County Development Plan:-</p> <p><b>Policy LHB17:</b> Protection of Natural Heritage and the Environment is an overall policy for the protection of the natural heritage:-</p> <p><i>“It is Council policy to protect and conserve the environment including, in particular, the natural heritage of the County and to conserve and manage Nationally and Internationally important and EU designated sites - such as Special Protection Areas, candidate Special Areas of Conservation, proposed Natural Heritage Areas and Ramsar sites - as well as non-designated areas of high nature conservation value which serve as ‘Stepping Stones’ for the purposes of Article 10 of the Habitats Directive”.</i></p> <p><b>Policy E14 -</b> Groundwater Protection &amp; Appropriate Assessment which states that: <i>‘It is Council policy to ensure the protection of the groundwater resources in and around the County and associated habitats and species in accordance with the Groundwater Directive 2006/118/EC and the European Communities Environmental Objectives (groundwater)</i></p>	<p>Associated developments included within the Old Conna LAP area could potentially pose impacts on Ballyman Glen SAC. However, any developments with potential impacts to Ballyman Glen will be bound by the overarching Policy LHB17 and Policy E14, LHB22 and E123. With the inclusion of these protective policies within the Dún Laoghaire Rathdown CDP 2016-2022, no adverse cumulative impacts with the proposed Phase I development at Fassaroe on European Sites are anticipated.</p>

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
	<p><i>Regulations, 2010</i>; and</p> <p><b>Policy LHB22</b> - Rivers and Waterways which states 'It is Council policy to maintain and protect the natural character and ecological value of the river and stream corridors in the County and where possible to enhance existing channels and to encourage diversity of habitat. It is also policy (subject to the sensitivity of the riverside habitat) to provide public access to riparian corridors to promote improved passive recreational activities'.</p> <p><b>Policy EI23</b> is also noted: Rathmichael Ground and Surface Water Protection stated – <i>"It is Council policy to refuse planning permission for any new developments which include an on-site wastewater treatment facility within the Rathmichael area until the groundwater issues in the area are resolved or ameliorated"</i></p>	
<p>River Basin Management Plan 2018-2021</p>	<p>The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021.</p> <ul style="list-style-type: none"> <li>• Ensure full compliance with relevant EU legislation</li> <li>• Prevent deterioration</li> <li>• Meeting the objectives for designated protected areas</li> <li>• Protect high status waters</li> <li>• Implement targeted actions and pilot schemes in focus sub-catchments aimed at: targeting water bodies close to meeting their objective and addressing more complex issues which will build knowledge for the third cycle.</li> </ul>	<p>The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed development.</p>
<p>Inland Fisheries Ireland Corporate Plan 2021 -2025</p> <p>The Inland Fisheries Act 2010</p>	<p>To place the inland fisheries resource in the best sustainable position possible for the benefit of future generations. To protect, manage and conserve Ireland's inland fisheries and sea angling resources and to maximise their sustainability and natural biodiversity.</p> <ul style="list-style-type: none"> <li>• To sustainably develop and improve fish habitats.</li> <li>• To protect, maintain and enhance Ireland's wild fish populations.</li> <li>• To actively engage with stakeholders in the continued stewardship of our shared resource.</li> </ul>	<p>The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive in-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.</p>

Screening for Appropriate Assessment and Natura Impact Statement

Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
	<ul style="list-style-type: none"> <li>• To play a leadership role in achieving our climate action and biodiversity goals.</li> <li>• To value our people and support their development and performance.</li> <li>• To foster a culture of value for money and evaluation of performance in a measurable, transparent and accountable manner.</li> <li>• Harness the power of innovation to continue to deliver a modern fisheries service.</li> </ul>	
<p>Old Connaught/ Woodbrook Water Supply Scheme (WSS) at Ballyman Road, Ballyman, Co. Dublin (Ref: D18A/0606</p>	<p>The Old Connaught-Woodbrook WSS is a major scheme being undertaken by Irish Water to provide storage and distribution capacity for the area (including Woodbrook, Old Conna, Ballyman, Rathmichael and Fassaroe (County Wicklow)). The WSS will consist of new watermains and associated supporting infrastructure such as reservoirs and pumping stations. The WSS project is permitted and expected to be implemented shortly, though no exact dates are confirmed.</p>	<p>The NIS undertaken for the development found that no significant residual effects are anticipated on the Qualifying Interests of Ballyman Glen SAC. The conclusion of the NIS was that there will be no potential for cumulative impacts arising in combination with any other plans or proposals, with the implementation of best practice and the recommended mitigation measures. It is considered that the proposed development will not adversely affect the integrity of Ballyman Glen SAC.</p> <p>Adherence to the overarching policies and objectives of the Dún Laoghaire Rathdown County Development Plan 2016-2022 will ensure that local planning applications and subsequent grant of planning will comply with the core strategy of proper planning and sustainability, including consideration of the requirements of relevant environmental Directives.</p> <p>In view of the above, no in-combination effects on European sites will occur with the proposed development.</p>
<p>Dún Laoghaire Golf Club, Ballyman Road and Ballyman Lane and lands to the east of Dún Laoghaire Golf Course at Ballyman and Phrompstown, Enniskerry, Co. Dublin (Ref: D21A/0103)</p>	<p>Permission sought for development. The development will consist of the demolition of existing agricultural shed (c.230sq.m) and yard and the construction of an additional nine golf course holes to the existing Dún Laoghaire Golf Course (Reg. Ref. D03A/0410).</p>	<p>This application has not yet been determined.</p> <p>Adherence to the overarching policies and objectives of the Dún Laoghaire Rathdown County Development Plan 2016-2022 in the decision making process will ensure that local planning applications and subsequent grant of planning will comply with the core strategy of proper planning and sustainability, including consideration of the requirements of relevant environmental Directives.</p> <p>In view of the above, no in-combination effects on European</p>



Name of Plan or Project	Key Issues Directly Linked to Relevant European Sites	Potential Cumulative or In-Combination Impacts on Relevant European Sites
		sites are deemed likely to occur with the proposed development.

No elements of the Plans or development projects detailed in **Table 5-3** are anticipated to act cumulatively or in-combination with the proposed Fassaroe Phase 1 Strategic Housing Development to have a significant effect upon Ballyman Glen SAC. No other development projects or Plans were identified that may have a significant effect upon Ballyman Glen SAC in combination with the proposed Phase 1 Strategic Housing Development at Fassaroe.

## 5.2 MITIGATION MEASURES

For the purposes of this assessment the term “mitigation measures” are considered to be *‘those measures which aim to minimise, or even cancel, the negative impacts on a site that are likely to arise as a result of the implementation of a plan or project. These measures are an integral part of the specifications of a plan or project’* (Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC, January 2007).

### 5.2.1 Construction Environmental Management Plan

The Construction Environmental Management Plan – Fassaroe Phase 1 SHD Development (Atkins, 2022) has been reviewed as part of this Appropriate Assessment. The Construction Environmental Management Plan (CEMP) forms part of the EIAR being submitted for the proposed development.

The Contractor will be required to comply with and implement the requirements and mitigation measures as set out in the EIAR and any conditions imposed as part of the granted planning approval.

All of the measures are based on national and international best practice and have proven to be effective in this and other jurisdictions. The proposed measures have been specifically tailored to suit this proposed development having regard to the particular environmental constraints.

The works will be undertaken in compliance with following documents supplemented by specific additional measures proposed below:

- DOMNR (1998). Fishery guidelines for Local Authority works. Department of the Marine and Natural Resources, Dublin;
- Environment Agency (2013) The Knotweed Code of Practice. Managing Japanese knotweed on development sites (Version 3);
- NRA (2010) Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads. National Roads Authority, Dublin;
- H. Masters-Williams et al (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA;
- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Inland Fisheries Ireland, Dublin;
- Murnane et al (2002) Control of Water Pollution from Construction Sites- Guide to Good Practice. SP156; and
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.

## 5.2.2 Sediment and Erosion Management Measures

This section describes a number of general mitigation measures which will be implemented by Cosgrave Property Group to minimise the effects of sediment and erosion during the construction activities.

Construction of the proposed works will be restricted to the minimum area necessary, and construction activities will be minimised, and monitored in the vicinity of Ballyman Glen SAC. The following mitigation measures, as a minimum, will be implemented by Cosgrave Property Group, where appropriate, to reduce the risk of pollution of water bodies during the Construction:

- Top soil stripping in proximity to any watercourses shall be undertaken as much as feasible in dry weather conditions and all stockpiles will be located greater than 100m from the watercourse. Stockpiles within 200m of the watercourses will be covered.
- Appropriate management of excess material stockpiles to prevent siltation of watercourses
- Temporary construction compounds will not be located close to road cuttings, watercourses or Ballyman Glen SAC or where it is likely that groundwater will be encountered.
- All oils, solvents and paints will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container.
- Refuelling will take place in designated areas of hardstanding. A supply of spill kits and hydrocarbon adsorbent packs will be stored along the construction areas. Personnel will be trained in the use of this equipment. Waste oils and hydraulic fluids will be collected in suitable leak-proof containers and transported from the site and off-site areas for disposal or recycling.
- Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses.
- Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area).
- Concrete, including, but not limited to, waste and wash-down water, will be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall. Use of quick setting mixes will be used.
- Protection measures will be put in place by the Cosgrave Property Group to ensure that all hydrocarbons used during the Construction are appropriately handled, stored and disposed of in accordance with recognised standards as detailed by the Environmental Protection Agency and/or Wicklow County Council, e.g., approved waste contractor, off-site treatment/ recycling/disposal, etc.
- Eroded sediments will be retained on Site with erosion and sediment control structures such as sediment traps, silt fences, sediment control ponds. Cut off ditches to divert surface water run-off from entering excavations will be utilised.
- Guidelines for minimising impacts on water quality and fisheries in relation to Construction will be implemented including, but not limited to, CIRIA C532 "Control of water pollution from construction sites - Guidance for consultants and contractors", Inland Fisheries Ireland guidelines and TII guidelines.
- All watercourses that occur in areas of land that are to be used for Site compounds and storage depots will be fenced off at a minimum distance of 50 metres from the watercourse. In addition, appropriate measures will be taken to ensure that silt laden or contaminated surface water runoff from such compounds and depots do not discharge directly to watercourses.
- Run-off velocities and erosive energy will be reduced by increasing the lengths of flow paths for precipitation run-off, through the Construction of interceptor ditches and channels with low gradient, and by lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.
- The length and steepness of slopes will be minimised where practicable.
- Riparian vegetation will be left intact where practicable. Protection will be afforded to riparian vegetation by fencing prior to commencement of any Works. Where practicable, the fencing will be set a minimum distance of 5 metres from the bank of the watercourse or at the edge of a woody canopy, whichever is the greatest.
- Runoff and wash down water from exposed aggregate surfaces, cast in place concrete and from concrete trucks will be trapped on site to allow sediment to settle out and reach neutral pH. Cosgrave Property Group will consult and comply with the requirements of the National Parks and Wildlife Service and the Inland Fisheries of Ireland. Waste products and pollutants associated with the works will not be

permitted to enter watercourses or groundwater and all precautions necessary will be taken to prevent the spillage of diesel fuel or other solvents.

### 5.2.3 Measures for the Installation of Surface Water Outfall

- As detailed above (**Section 5.2.2**), rigorous sediment, erosion and pollution control measures have been provided for the proposed works. Good practice measures for the prevention of pollution will be employed at all times during the construction and operational period of the development to prevent run off into the springs and alkaline fen within Ballyman Glen SAC or into County Brook.
- As part of the construction of the outfalls within and adjacent to Ballyman Glen SAC, bunding shall be put in place to prevent run off into the springs and alkaline fen within Ballyman Glen SAC or into County Brook.
- Valuable habitats adjacent to working areas shall be demarcated to indicate clearly that no access is permitted. Where construction activity takes place in habitats categorised as ecological features (i.e., valuable habitats) it is important that activity is limited to the footprint of the infrastructure and immediate surrounds. Again areas where access is restricted should be demarcated.
- Access and egress to the location of the new outfall will be via the area cleared for the surface water pipe.
- Mitigation measures to prevent the spread of invasive non-native species are provided in **Section 5.2.5.1**.

### 5.2.4 Measures for Capping, ESB Works and Localised Slope Stabilisation Works at Northern Boundary

Measures to avoid impact on the surrounding environment will include:

- Landfill capping to be placed at the base of the new slope construction to the required thickness wherever land fill is present.
- Slopes (existing or resulting from excavation) steeper than 1(v):5(h) will be benched prior to receiving fill.
- Temporary drainage will be installed to prevent surface water runoff from the adjacent land from flowing onto the slopes and cause instability and/or erosion.
- Bunding and silting ponds will be constructed/installed at the toe of the slope to intercept running water with suspended solids and/or concrete spillage (or other chemicals, oil, diesel etc) entering the Glen. Water will then be flowing to siltation ponds and discharged when clear of suspended solids. Water found contaminated with cement, oil, petrol or other chemical will be pumped for treatment or safe disposal.
- Minimise run-off velocities and erosive energy by maximising the lengths of flow paths for precipitation runoff, constructing interceptor ditches and channels with low gradients to minimise secondary erosion and transport, and lining unavoidably steep interceptors or conveyance ditches with filter fabric, rock or polyethylene lining to prevent channel erosion.
- Sediment basins and traps should be installed before any major site grading takes place. Additional sediment traps and silt fences should be installed as grading takes place to keep sediment contained on site at appropriate locations.
- Runoff-control measures should be located in conjunction with sediment traps to divert water from planned undisturbed areas away from the traps and sediment-laden water into the traps.

### 5.2.5 Additional Measures for the Protection of Petrifying Springs and Alkaline Fen

The following measures will be implemented for the storage and use of hydrocarbons on site:

- Diesel tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled.
- Refuelling will be carried out from these tanks or from delivery vehicles and will not be left unattended.
- Fuels, lubricants and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice - (Enterprise Ireland BPGCS005).
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or recycling.
- Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction site to deal with any accidental spillage.

### 5.2.5.1 Measures to avoid the Spread of Invasive Species

The presence of invasive species has the potential to lead to an offence under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Regulation 49 of the 2011 Regulations prohibits (unless under licence) the breeding, release, or allowing or causing the dispersal from confinement of any animal listed in the Third Schedule of the Regulations; or the planting, allowing or causing dispersal, and spreading of any plant listed in the Third Schedule. Japanese Knotweed is a plant listed in the Third Schedule.

It is an offence to plant or encourage the spread of Japanese Knotweed by moving contaminated soil from one place to another, or incorrectly handling and transporting contaminated material or plant cuttings. Persons must therefore take all reasonable steps and exercise due diligence to avoid committing an offence under the 2011 Regulations:-

- Japanese Knotweed is present within the proposed Phase One lands at Fassaroe. A Japanese Knotweed Management Plan for the proposed development has been prepared and is included in **Appendix A**.
- The contractor and Cosgrave Developments Representative must ensure that the source locations for materials which are introduced to the site during the construction phase of the project are free from non-native invasive species.

### 5.2.5.2 Measures to avoid Degradation of Petrifying Springs and Alkaline Fen

- Landscaping design includes planting schemes to close any existing gaps at the boundary of Ballyman Glen SAC to discourage visitors from entering the SAC.
- Landscaping design will include tree/ shrub planting along the western boundary of the Fassaroe Phase 1 lands to close any gaps in the hedgerow to discourage visitors from entering the SAC at this location.

## 5.3 RESIDUAL IMPACTS

Residual impacts and significance of effects on Ballyman Glen SAC arising from the proposal are summarised in **Table 5-4** below.



Table 5-4: Residual Impacts Potentially Affecting European Sites within the Zone of Influence of the Proposed Works

Site Name and Code	Qualifying Interests	Potential Impacts	Potential Cumulative Impacts	Proposed Mitigation	Residual Impacts
Ballyman Glen SAC (Site Code: 000713)	Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220]	<p><b>Alteration of water quality:</b> There is potential for the localised construction works for the installation of infrastructure to have negative impacts on groundwater quality. However construction of the landfill capping system will result in a reduction of leachate generation in the groundwater feeding the petrifying spring habitat.</p> <p><b>Alteration of hydrological regime:</b> It is predicted that the capping of the landfills is likely to reduce the current recharge to groundwater up to 7% over the life of the development. However, the potential drop of 0.3m at the top of the seepage face is located above the level of elevation of the petrifying springs, therefore negative impacts on the petrifying springs within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.</p> <p><b>Degradation of habitat:</b> The construction works, if unmitigated, could potentially lead to suspended solids runoff. Excavation and ground disturbance will result in soil disturbance extending overflow runoff impacts. There is potential for this runoff to degrade the petrifying spring habitat</p>	No potential cumulative impacts with other plans or projects have been identified.	<p><b>Alteration of water quality:</b> As detailed in <b>Section 5.2</b>, rigorous sediment, erosion and pollution control measures will be implemented for the proposed works. Good practice measures for the prevention of pollution of groundwater and surface waters will be employed at all times during the construction and operational period of the development.</p> <p><b>Alteration of hydrological regime:</b> As detailed in <b>Section 2.2</b>, the project design already incorporates Sustainable Drainage Systems (SuDS) and principles, e.g. permeable surfaces, filter drains, swales, green areas and landscaping ponds. Further, the storm water management design for the proposed housing and road development routes the storm water to soakaways to promote percolation back to ground. No further mitigation measures are proposed.</p> <p><b>Degradation of habitat:</b> As detailed in <b>Section 5.2</b>, rigorous sediment, erosion and pollution control measures will be implemented for the proposed works. Good practice measures for the prevention of pollution of groundwater and surface waters will</p>	<p><b>Alteration of water quality:</b> With the effective implementation of mitigation measures and the reduction of leachate generation in groundwater as a result of the installation of a capping system, the overall residual impact on the quality of the groundwater feeding the petrifying spring habitat is anticipated to be positive.</p> <p><b>Alteration of hydrological regime:</b> Residual negative impacts on the petrifying springs within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.</p> <p><b>Degradation of Habitat:</b> With the effective implementation of mitigation measures no significant residual impact on petrifying springs as a result of degradation of surface waters at the springs or trampling from increased visitor pressure is anticipated.</p>

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Site Name and Code	Qualifying Interests	Potential Impacts	Potential Cumulative Impacts	Proposed Mitigation	Residual Impacts
		as a result of pollution of surface waters. Degradation of petrifying spring habitat as a result of trampling from increased visitor pressure to Ballyman Glen is unlikely but cannot be ruled out.		be employed at all times during the construction and operational period of the development. As detailed in <b>Section 5.2</b> , landscaping proposals include planting as required along the boundary of Ballyman Glen SAC and the western boundary of Fassaroe Phase I lands in order to discourage visitors from entering the SAC.	
Alkaline Fen [7230]		<p><b>Alteration of water quality:</b> There is potential for the localised construction works for the installation of infrastructure to have negative impacts on groundwater quality. However construction of the landfill capping system will result in a reduction of leachate generation in the groundwater feeding the alkaline fen habitat.</p> <p><b>Alteration of hydrological regime:</b> It is predicted that the capping of the landfills is likely to reduce the current recharge to groundwater up to 7% over the life of the development. However, the potential drop of 0.3m at the top of the seepage face is located above the level of elevation of the alkaline fen, therefore negative impacts on the alkaline fen within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.</p> <p><b>Degradation of habitat:</b> The construction works, if</p>	No potential cumulative impacts with other plans or projects have been identified.	<p><b>Alteration of water quality:</b> As detailed in <b>Section 5.2</b>, rigorous sediment, erosion and pollution control measures will be implemented for the proposed works. Good practice measures for the prevention of pollution of groundwater and surface waters will be employed at all times during the construction and operational period of the development.</p> <p><b>Alteration of hydrological regime:</b> As detailed in <b>Section 2.2</b>, the project design already incorporates Sustainable Drainage Systems (SuDS) and principles, e.g. permeable surfaces, filter drains, swales, green areas and landscaping ponds. Further, the storm water management design for the proposed housing and road development routes the storm water to soakaways to promote percolation back to ground. No further mitigation measures are</p>	<p><b>Alteration of water quality:</b> With the effective implementation of mitigation measures and the reduction of leachate generation in groundwater as a result of the installation of a capping system, the overall residual impact on the quality of the groundwater feeding the alkaline fen habitat is anticipated to be positive.</p> <p><b>Alteration of hydrological regime:</b> Residual negative impacts on the alkaline fen within Ballyman Glen SAC due to reduced groundwater flow contribution are predicted to be not significant.</p> <p><b>Degradation of habitat:</b> With the effective implementation of mitigation measures no significant residual impact on alkaline fen as a result of degradation of surface waters at the springs or trampling from increased visitor pressure is anticipated.</p>

Screening for Appropriate Assessment and Natura Impact Statement

Site Name and Code	Qualifying Interests	Potential Impacts	Potential Cumulative Impacts	Proposed Mitigation	Residual Impacts
		<p>unmitigated, could potentially lead to suspended solids runoff. Excavation and grounddisturbance will result in soil disturbance extending overflow runoff impacts.</p> <p>There is potential for this runoff to degrade the alkaline fen habitat as a result of pollution of surface waters. Degradation of alkaline fen habitat as a result of trampling from increased visitor pressure to Ballyman Glen is unlikely butcannot be ruled out.</p>		<p>proposed.</p> <p><b>Degradation of Habitat:</b></p> <p>As detailed in <b>Section 5.2</b>, rigorous sediment, erosion and pollution control measures will be implemented for the proposed works. Good practice measures for the prevention of pollution of groundwater and surface waters will be employed at all times during the construction and operational period of the development. As detailed in <b>Section 5.2</b>, landscaping proposals include planting as required along the boundary of Ballyman Glen SAC and the western boundary of Fassaroe Phase I lands in order to discourage visitors from entering the SAC.</p>	

### 5.3.1 Residual Impacts Conclusion

With the effective implementation of best practice and the mitigation measures provided in this Natura Impact Statement, adverse impacts on Petrifying springs with tufa formation (Cratoneurion) [7220] and Alkaline Fen [7230] as a result of pollution of surface waters will be minimised and no significant residual effects are anticipated,

The result of the recharge assessment has highlighted that the capping of landfills is likely to reduce the current recharge to groundwater by up to 7% over the life of the development. The development may therefore have a minor negative impact on the springs and seepages supporting the tufa deposits and alkaline fen identified within Ballyman Glen SAC due to reduced groundwater flow contribution. The reduced recharge is expected to result in a local drop in groundwater levels of approximately 0.3m. As a result, the potential drop in the top of the seepage face supporting the springs may drop by 0.3m; however the tufa springs and alkaline fen are not located at the top of the seepage face. Therefore, while the flow discharging from the springs may reduce by 7%, it is expected that they will continue to flow and the impact is not significant.

An assessment of the water quality has shown that the capping of the landfills will have a beneficial impact on the groundwater quality and could potentially lead to an increase in tufa deposition rates as the groundwater quality at existing springs improves. While there may be a reduction in flow from the springs, the improvement in water quality could lead to an increase in the tufa deposition rate and also an increase in the number of tufa deposits. Similarly, the quality of the groundwater supporting alkaline fen within Ballyman Glen SAC will improve. With the effective implementation of best practice and the mitigation measures provided in this Natura Impact Statement, adverse impacts on groundwater quality during localised construction works will be minimised. The net potential impact on the ground water at the springs and alkaline fen is therefore considered to be a positive impact as a result of the reduced leachate seepage rate.

Ballyman Glen SAC supports dense scrub and woodland growth on steep slopes, as such, degradation of alkaline fen and petrifying springs due to increased visitor pressure during the operational phase is considered unlikely. With the successful implementation of the landscaping proposals, including planting along the boundary of Ballyman Glen SAC and the western boundary of Fassaroe Phase I lands, no significant residual effects are anticipated.



## **6 APPROPRIATE ASSESSMENT CONCLUSION**

### **6.1 INTEGRATION OF APPROPRIATE ASSESSMENT AND THE PROPOSAL**

As stated in DoEHLG Guidance Document (2010), the requirement of the AA is not to prove what the impacts and effects will be, but rather to establish beyond reasonable scientific doubt that adverse effects on site integrity will not result.

The current Appropriate Assessment of the proposed Phase 1 Strategic Housing development at Fassaroe has been incorporated into the planning process and has informed the proposal with changes being made as necessary to minimize potential for impact on European sites. Initial reviews of the proposed Phase 1 Strategic Housing development at Fassaroe indicated that there was a risk of adverse effects on the integrity of Ballyman Glen SAC unless appropriate mitigation was undertaken. Mitigation measures in the form of specific actions designed to protect the environment have been provided to ensure compliance with the Habitats Directive Article 6 requirements by integrating measures for the protection of European sites into all areas covered by the proposal. Mitigating policies clearly indicate that where any physical development, water quality alteration or any other form of disturbance has the potential to significantly impact on a European site, the works will be subject to mitigation measures to ensure full compliance with Article 6(3) and (4) of the Habitats Directive (1992).

### **6.2 NIS CONCLUSION AND STATEMENT**

This Appropriate Assessment has been prepared following the Department of the Environment, Heritage and Local Government guidance 'Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities' (DoEHLG, 2010a). The current assessment for the proposed Phase 1 Strategic Housing development at Fassaroe investigates the potential adverse effects on the qualifying interests of the European sites arising from the proposal. The assessment considers whether the proposal, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects.

Provided that the above mitigation measures are implemented in full, it is envisaged that there will be no significant adverse effects on the integrity of Ballyman Glen SAC in view of the sites conservation objectives and that the conservation status of the qualifying Annex I habitats will not be compromised by the proposal either directly, indirectly or cumulatively.

The conclusion of this Natura Impact Statement is that there will be no potential for cumulative impacts arising in combination with any other plans or proposals, with the implementation of best practice and the recommended mitigation measures, it is considered that the proposed Phase I Strategic Housing development at Fassaroe will not adversely affect the integrity of Ballyman Glen SAC.

A large, light grey graphic element on the left side of the page, resembling a stylized 'L' or a corner bracket. It has rounded corners and a dark purple, teardrop-shaped cutout on its right side. The text 'Appendix A Japanese Knotweed Management Plan' is positioned within the upper right portion of this graphic.

**Appendix A**  
Japanese Knotweed  
Management Plan

# FASSAROE PHASE 1 STRATEGIC HOUSING DEVELOPMENT

Japanese Knotweed Management Plan

CP19001  
F01  
04 April 2022

## Japanese Knotweed Management Plan

### Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	For Planning	KB	ML	ML	11.03.22

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ML

4 April 2022

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# 1 INTRODUCTION

This Japanese Knotweed Management Plan (JKMP) has been prepared by RPS for Cosgrave Property Group in response to the findings of ecological survey work undertaken in June 2021 for Fassaroe Phase 1 Strategic Housing Development.

A JKMP has been prepared to ensure measures are taken so that development activities are carried out so as to minimise and mitigate any invasive species problem. The JKMP will be revised as required to confirm/update the details of construction provided within the document (e.g. actions and control measures).

The main objective of this JKMP for the project is to:

- Prevent the spread of Japanese Knotweed both within and off the application site during the construction and operational stages

## 1.1 Project Overview

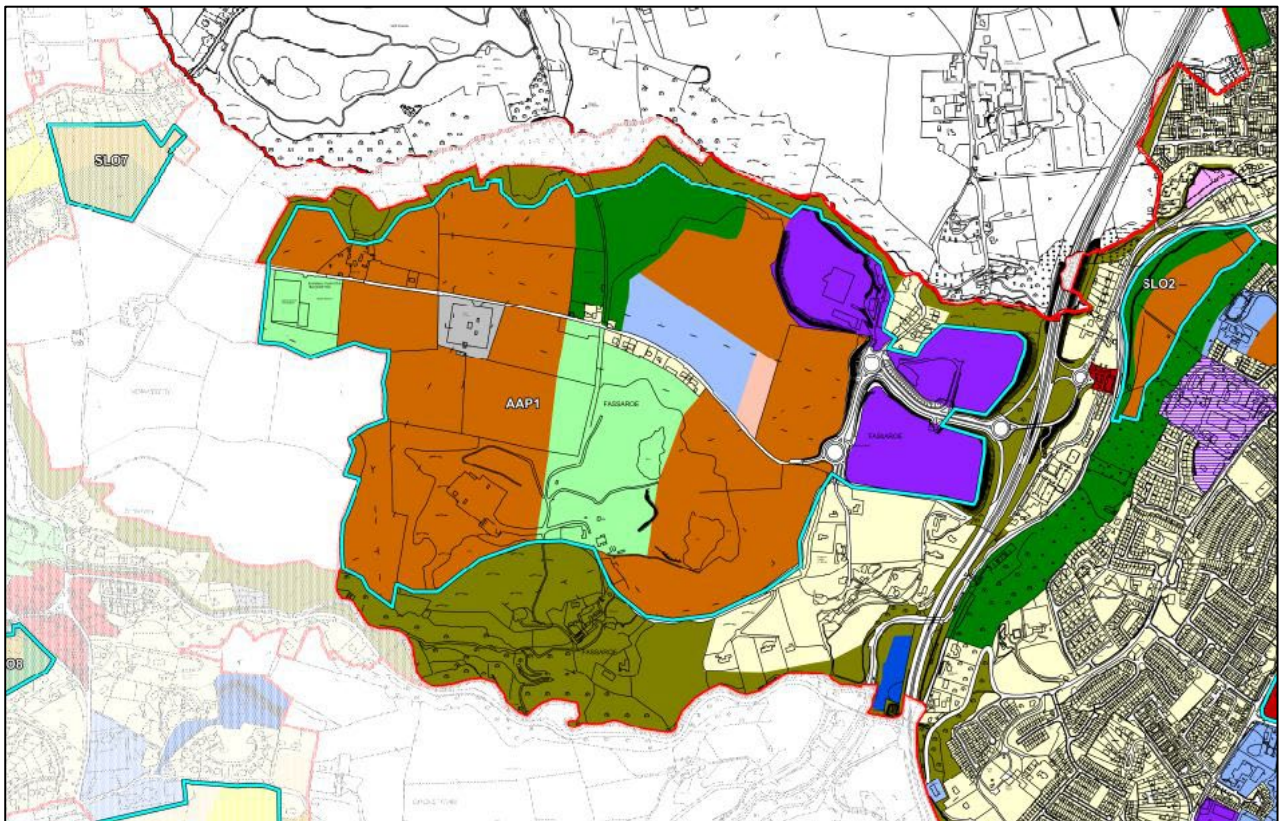
The proposed planning application relates to the first phase of proposed development within a larger designated new development area under the Bray Municipal District Local Area Plan 2018 -2024 (LAP). These wider development lands are identified as an ‘Action Area’ in the LAP.

The proposed site is located to the west of Bray, and to the north east of Enniskerry, as illustrated in **Figure 1-1**. The map of zoned lands at Fassaroe, with the Action Area boundary outlined in blue, is illustrated in **Figure 1-2**.

**Figure 1-1: Site Location Map**



Figure 1-2: Extent of Masterplan Zoned Lands under Bray Environs Local Area Plan 2009-2015



The Masterplan lands will be subject of a number of phased planning applications. It is envisaged that development at Fassaroe will be undertaken across four phases. The location of these phases are identified on **Figure 1-3**.

The extent of the Phase 1 development subject of this Japanese Knotweed Management Plan is identified in turquoise and blue. The turquoise (Phase 1A) will be the first areas constructed followed by the blue (Phase 1B).



Figure 1-3: Phased Approach to Full Build out of CPG Owned Lands at Fassaro



## 1.2 Limitations and Threats To The Proposed Development Site

The presence of IAS has the potential to lead to an offence under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Regulation 49 of the 2011 Regulations prohibits (unless under licence) the breeding, release, or allowing or causing the dispersal from confinement of any animal listed in the Third Schedule of the Regulations; or the planting, allowing or causing dispersal, and spreading of any plant listed in the Third Schedule. Japanese Knotweed is listed in the Third Schedule of these regulations.

It is an offence to plant or encourage the spread of Third Schedule listed invasive species by moving contaminated soil from one place to another, or incorrectly handling and transporting contaminated material or plant cuttings. Persons must therefore take all reasonable steps and exercise due diligence to avoid committing an offence under the 2011 Regulations.

If buried on site, the location of buried material should be accurately mapped and recorded, and future owners of the land advised. When considering excavation and containment / disposal methods, regards must be paid to the Waste Management Acts 1996 to 2008. A waste license or waste facility permit may be required for containment / disposal of excavated material. It is also required that the waste haulier employed to haul waste is authorised by a waste collection permit or is exempt from such a requirement.

Furthermore, Knotweed can spread vegetatively from the crown, stem and rhizome (underground root) if disturbed. Even tiny amounts of cut stem, crown or rhizome are capable of producing a new plant. Controlling spread of Japanese Knotweed and Giant Knotweed is therefore dependent on preventing the spread of the stem, crown or rhizome.

### 1.3 Location of Japanese Knotweed

During the course of the site surveys undertaken in June 2021, four stands of Japanese Knotweed were recorded within the north of the site in an area of scrub; there is also a stand further east within the site at its northern boundary

Japanese Knotweed is classified as a 'high impact' invasive species<sup>1</sup>. No other high impact or Third Schedule<sup>2</sup> invasive species were observed in the study area.

The location of the Japanese Knotweed is shown on the map in **Figure 1-4**.

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<sup>1</sup> <http://invasivespeciesireland.com/wp-content/uploads/2013/03/Risk-analysis-and-prioritization-29032012-FINAL.pdf>

<sup>2</sup> Species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)

Figure 1-4: Location of Japanese Knotweed on Fassaroe Phase One Lands





## 2 OVERVIEW OF MANAGEMENT PLAN

### 2.1 Brief Description of Management Plan

The contractor will be responsible for the management of Japanese Knotweed on the site and the implementation of the Japanese Knotweed Management Plan (JKMP). Cosgrave Property Group will be responsible for ensuring that the Japanese Knotweed is treated in an appropriate manner according to the JKMP and that provisions are made for avoiding any further contamination. The Japanese Knotweed Management Plan is a working document, any revisions of the plan should be kept for future site owners.

### 2.2 GENERAL CONTROL MEASURES

Great care is needed to ensure that plant material (i.e. fragments of stems, leaves and roots) is not spread whilst performing any of the eradication measures; effective site hygiene is essential. Such hygiene measures include, but are not limited to, the following:

- Fencing-off and signing the infested area by a suitably qualified ecologist/ IAS management specialist (a specimen sign is presented in the Environment Agency 2013 publication – “*The Knotweed Code of Practice. Managing Japanese Knotweed on Development sites V3*”);
- All machinery and vehicles on site will be dry brushed on to a geotextile membrane and cleaned immediately prior to leaving the contaminated area. Where dry brushing is not practicable, all machinery and vehicles on site will be washed down on to a geotextile membrane and cleaned immediately prior to leaving the contaminated area. However, due to the risk of uncontrolled run-off of water potentially containing small pieces of Knotweed, the use of a dry brush is preferred and water should be used only where necessary. Where the use of water is unavoidable, it shall be filtered before disposal; and
- Ensuring adequate site supervision.

Further good hygiene measures for management of the Japanese Knotweed on Fassaroe Phase 1 lands are provided in **Section 3.1.1**.

### 2.3 CHEMICAL TREATMENT

The use of herbicides is often the most effective option for the control of Japanese Knotweed but there are issues that need to be considered first.

In keeping with A Guide to Landscape Treatments for National Road Schemes in Ireland (NRA 2006), the use of herbicides should be minimized and application should be targeted rather than broad-spread application.

Where there is a need to use herbicides in and around waterbodies, it is imperative that only herbicides specifically approved for such use are used, and that they are used in line with the manufacturers’ specifications.

In general, the application of herbicides should not be undertaken:

1. in windy weather (above Force 2 on the Beaufort Scale) where there is a risk of spray drift occurring,
2. during or preceding rainfall (no rain for 6 hours, preferably 24 hours), which can result in the chemical being washed off, or
3. during periods of particularly cold weather, which can reduce the plants ability to uptake the chemical.

There are health and safety issues and those administering herbicide need to be competent to do so and, consequently, must have sufficient training, experience and knowledge in the area of herbicides/pesticides application. It is important that all staff involved in the application of herbicides have received appropriate training, which may include achieving an appropriate FETAC award in this area.

The application of herbicide must be used in compliance with the product label and in accordance with Good Plant Protection Practice as prescribed in the European Communities (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003). The application will be undertaken by trained operators who are registered under the European Communities (Sustainable Use of Pesticides) Regulations 2012. The use of trained professionals to apply the herbicides in accordance with

the Sustainable Use of Pesticides Directive will ensure that the potential impact from the application of herbicides will be minimised.

Knotweed can become very tall, which makes it difficult to apply herbicides. Where the Knotweed stands are tall, the plants should ideally be sprayed initially when they are about 1m tall (May). There are various methods of application including tractor-mounted spraying for large areas; knapsack spraying for small areas; lance sprayer for tall stands or for stands in inaccessible places (such as steep slopes and river banks); controlled droplet application; injection method for small stands and weed wiper or herbicide gloves for direct application onto leaves of specific plants.

Dense stands of Knotweed can be treated with a glyphosate-based herbicide, such as 'Roundup Pro Biactive'. Glyphosate is a systemic herbicide which acts by blocking a plant's enzyme system. The herbicide is absorbed through growing leaves and stems where it is translocated throughout the plant and root network. It kills virtually all annual and perennial weeds including grasses. Glyphosate is quickly broken down in soil or sediment and is harmless to animal life.

If the Knotweed is sparsely distributed, it is recommended that a 2,4-D amine preparation be used, which is specific to broadleaved plants and will not harm the grasses.

More targeted methods of applying herbicides should be used for sites where it is important to protect the native flora. This includes using a weed wiper to apply the herbicide directly to the leaves of the plant rather than spraying or injecting herbicide directly into the plant. This ensures that only target plants are treated.

Plant protection products containing glyphosate should be applied in late September or early October. However, it is further advised that the plants be treated early in the growing season (May) to stunt the growth of the plant, consequently reducing the amount of viable above-ground growth.

It may take at least three years before Knotweed stops growing back.

## 2.4 PHYSICAL CONTROL

A number of methods have been developed to deal with and control Japanese Knotweed on development sites which are all based on mechanical excavation of the rhizome material and its subsequent containment either at depth, within an impermeable membrane, or its disposal off-site.

However, the use of these methods should be avoided where possible. Where feasible, preference should be given to treating Japanese Knotweed in its original location (Environmental Agency, 2013). Excavation should only be considered where construction requires it (NRA, 2010).

Excavation and removal off-site of the potentially contaminated soil is generally considered to be the least favourable option because of the high costs involved. The removal of Knotweed contaminated material off site requires a licence from the National Parks and Wildlife Service in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) and the provisions of the waste management legislation must be adhered to.

Physical control options are described in **Section 2.4.1** to **Section 2.4.5** below.

### 2.4.1 Excavation and Deep Burial

1. Mapping of underground rhizomes (roots) by digging test pits is required to determine the extent of underground infestation or alternatively it can be assumed that underground infestation extends for 7m in all directions from the nearest stem and to 3m depth (NRA, 2010).
2. The 'receiving pit' will be excavated prior to excavation of the infested area. Excavated material from this pit will be set aside and used for backfilling.
3. The contaminated material must be buried to a depth of 5m; hence the receiving pit must be excavated to a depth sufficient to accommodate the contaminated material plus an additional depth of 5m above for covering/ backfilling.
4. An access way leave between the infested area and the receiving pit will be fenced-off and signed.
5. A designated brush/ wash-down area will be established at the entrance to this way leaved area (see **Section 2.2**).
6. The infested area as defined above will be excavated to a depth of 3m.

7. Material from the infested area will be transported to the receiving pit and deposited.
8. A root barrier membrane layer will be placed over the contaminated material in the pit (see 'Vertical Root Barrier Membrane' below for specification).
9. Vehicles and machinery used for transportation of the contaminated material between the infested area and the receiving pit will be dry brushed/ pressure washed in the designated area (see **Section 2.2**). This is to avoid cross-contamination of the backfill material.
10. The pit will be backfilled to a depth of at least 5m above the root barrier membrane.
11. The receiving pit area will be mapped and permanent signage erected around its periphery.
12. Another disposal option includes removal to (licensed) landfill, and
13. On exiting the fenced way leave area vehicles and machinery will be dry brushed/ pressure washed in the designated wash down area (see **Section 2.2**).

### 2.4.2 Vertical Root Barrier Membrane

A vertical root barrier membrane involves the placement of vertical root barrier membrane along the exposed edge of the excavation prior to filling / backfilling. This is intended to prevent knotweed from the infested area beyond the works from spreading back into the works area in future years via horizontal rhizome (root stock) growth.

Commercially available 'Japanese Knotweed-proof' membranes should be used. These should be installed under expert supervision, ideally provided by the supplier. Key considerations in the installation of the membrane are:

- Avoid joins; ideally use a single sheet of the membrane.
- Joins must be sealed securely.
- Damaged membrane will not be used.

### 2.4.3 Cell Formation

Where burial is the preferred disposal method but it is not possible to bury Japanese Knotweed to 5m, it may be completely encapsulated into a root barrier membrane cell. These cells may be placed where they will not be disturbed. It is important that the deeds to the property show where these cells are located, to avoid damage in the future that could be caused, for example by trenching to lay services. To avoid damage after it has been installed, the upper cell surface must be covered by a capping layer, at least 2m deep.

### 2.4.4 Excavation and Bund

Where there is not sufficient depth on a site for deep burial the excavated material may be placed in a structured bund. The bund is a raised area above ground level or a shallow excavation, no more than 0.5m deep, and is lined with a root barrier membrane. The membrane must stay intact for at least 50 years and a manufacturer's guarantee is required. This method of treatment can also be used where the Knotweed material needs to be moved from a location and there is another ideal area of the site available to contain it. Following the provisions of the Waste Management Act 1996, as amended, a license or permit may be required for the burial of excavated material.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly signed and protected from potential accidental damage.

Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

## 2.4.5 Excavation and Removal from Site

Where the above treatment options are not possible (site is too small to contain excavated material, too shallow for burial, or where there is lack of space) removal of excavated material may be the only option. Where there are small amounts of Japanese Knotweed material to be removed it is possible to double bag the material and send to a fully licenced waste facility for disposal (i.e. landfill). Where the amount of material is larger in volume it will be necessary to haul from site to a suitably licenced waste facility.

It should also be noted that in the process of excavating the Japanese Knotweed if it has been treated with a persistent herbicide, the excavated material will need to be classified as hazardous waste and will need to be disposed of to a hazardous waste facility.

This option is generally considered to be the least favourable option because of the high costs involved.

Furthermore, if Japanese knotweed contaminated material is removed off site it will require a licence from the National Parks and Wildlife Service in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477).

## 3 SPECIFIC METHOD STATEMENT FOR JAPANESE KNOTWEED ON FASSAROE PHASE ONE LANDS

### 3.1 Method Statement

The four stands of Japanese Knotweed in the north of the site and the stand of Japanese Knotweed at the north-east of Fassaroe Phase 1 development lands are all located on historic landfill sites (Knotweed locations illustrated in **Figure 1-4**). The historic landfill sites will be remediated as part of the proposed works.

As detailed in **Section 2**, a number of methods have been developed to deal with and control Japanese Knotweed on development sites. Where feasible, preference should be given to treating Japanese Knotweed in its original location (Environmental Agency, 2013). Excavation should only be considered where construction requires it (NRA, 2010). However, the Fassaroe Phase 1 Development Lands will be subject to disturbance during construction, therefore medium to long-term options such as herbicide applications are unsuitable at this site. There is no space within the site for bund treatment. There is insufficient depth available for deep burial of the Japanese Knotweed, however there is sufficient depth available for burial in a cell membrane. As noted previously, the proposed development includes for the remediation of the historic landfill sites upon which the Japanese Knotweed is located. In view of these factors, excavation and burial within a cell membrane is the preferred option for Japanese Knotweed management on the Fassaroe Phase 1 lands.

#### 3.1.1 General Control Measures for Japanese Knotweed Management on Fassaroe Phase One Lands

Great care is needed to ensure that plant material (i.e. fragments of stems, leaves and roots) is not spread whilst performing the eradication measures detailed below. Effective site hygiene is essential, particularly during construction. This includes the following measures:

- Understand the possible extent of the rhizome system underground – up to 7 metres horizontally and 3 meters vertically.
- Fence off or clearly mark infested area including the extent of the rhizome system underground.
- Do not use machinery with tracks within an infested area, if possible.
- Clearly identify and mark out areas where contaminated soil is to be stockpiled on site; stockpiles cannot be within 50m of any watercourse or within a flood zone.
- Creation of entry and exit points for operators on foot and for small mobile equipment. A delineated access track to be maintained free of Japanese Knotweed should be established through the site to minimise the spread of Japanese Knotweed by permitted vehicles accessing the site.
- Installation of a dedicated footwear & vehicular wheel brush/ wash down facility into a contained area within the site.
- Vehicles leaving the site should be inspected for any plant material and dry brushed on to a geotextile membrane and cleaned immediately prior to leaving the contaminated area. Where dry brushing is not practicable, all machinery and vehicles on site will be washed down on to a geotextile membrane and cleaned immediately prior to leaving the contaminated area. However, due to the risk of uncontrolled run-off of water potentially containing small pieces of Knotweed, the use of a dry brush is preferred and water should be used only where necessary. Where the use of water is unavoidable, it shall be filtered before disposal.
- For any material entering the site, the supplier must provide an assurance that it is free of Japanese Knotweed.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Japanese knotweed Site Management plan.
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material.



### 3.1.2 Proposed Root Barrier Membrane Methodology

1. Map the underground rhizomes (roots) by digging test pits in order to determine the extent of underground infestation or alternatively it can be assumed that underground infestation extends for 7m in all directions from the nearest stem and to 3m depth (NRA, 2010).
2. Calculate the volume required and excavate site, allowing for 2m depth of burial.
3. Protect the integrity of the root barrier membrane with a layer of sand and provide shutter ply supports for the edge of the cell.
4. Put approved Japanese Knotweed root barrier membrane in place, allowing enough material along the edges to eventually provide a seal.
5. Protect the root barrier membrane from tyre damage with a layer of sand.
6. Excavate the infested area (as defined above).
7. Fill the cell with the Knotweed infested soil. No other material, contaminants, or wastes should be included.
8. Make sure that dedicated vehicles are used and cleaned properly after they have been used. Haulage routes must be protected.
9. Put the surface of the root barrier membrane in place and make sure the cell is adequately sealed.
10. Protect the surface of the cell with sand and bury deep enough to prevent disruption in the future.
11. Following completion of works, monitor re-growth throughout the growing season over the next 4 years (May-September 2023-2027, every 4-6 weeks) or until no further re-growth appears.

The JKMP will be regularly reviewed during the lifetime of this project and updated to reflect changing conditions on site. Changes will be made subject to review and monitoring of conditions on site. Any changes will be agreed with the Planning Authority, Resident Engineer and Ecologist/ Japanese Knotweed specialist in advance through the normal communication channels.

## 4 REFERENCES

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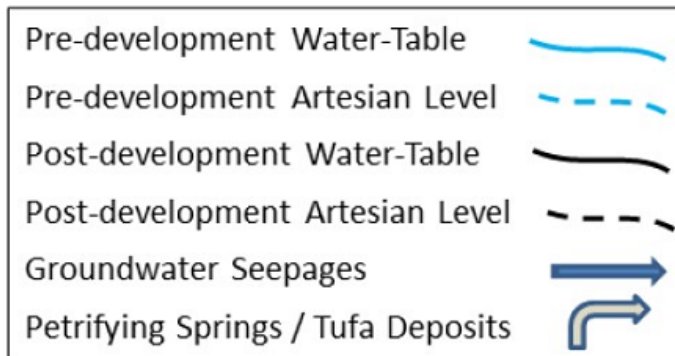


**Appendix B**  
**Illustration of Seepage  
Face Elevation**

# Conceptual Site Model - Impact of Development

20m - Valley Depth

0.3m - Predicted Water Level Drop



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Seepage Face

High Permeability Gravels

Tufa Deposits

Lower Permeability Strata: Bedrock or Boulder Clay