Planning and Environmental Consultants

Appropriate Assessment Screening Report and Natura Impact Statement

Proposed Residential Development at Golf Course Road, Strandhill, Co. Sligo

DOCUMENT DETAILS

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1. INTRODUCTION

1.1 Background

MKO has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment of a Proposed Development at Golf Course Road, Strandhill, Co. Sligo.

Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Where it cannot be excluded that a project or plan, either alone or in combination with other projects or plans, would have a significant effect on a European Site then same shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives. The current project is not directly connected with, or necessary for, the management of any European Site. Consequently, the project has been subject to the Appropriate Assessment Screening process.

This Natura Impact Statement (NIS) has been prepared in accordance with the following guidance:

- European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021)
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018)
- Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010)
- Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

1.2 Statement of Authority

A multidisciplinary ecological walkover survey of the proposed development site was conducted by Ellen Tuck on the 25/10/2023. Ellen is an Ecologist with MKO, holds a Bachelor of Science (B.Sc.) in Environmental Science and has two years' experience in ecological surveying. Wintering bird surveys were conducted between October 2022 and March 2023 by Eoghan Phelan (28/10/2022, 14/11/2022, 09/12/2022, 10/01/2023, 10/02/2023, 29/03/2023). Eoghan is an Ornithologist with MKO, holds a B.Sc. in Environmental Science and has over three years' experience in ornithology.

This report has been prepared by Ciara Hackett, an ecologist with MKO who holds a BSc in Zoology. The report has been reviewed by Sarah Mullen and Kate O'Donnell. Sarah is a Project Director with MKO and holds a B.Sc. in Botany, a M.Sc. in Biodiversity and Conservation, and Ph.D in Botany. She is a member of the Chartered Institute of Ecology and Environmental Management (ACIEEM) and has over 7 years ecological consultancy experience. Kate holds a B.Sc. in Ecology and is a member of the Chartered Institute of Ecology and Environmental Management (ACIEEM) with over 4 years ecological consultancy experience.

1.3 Structure and Format of this Document

- Section 2 provides a full description of all elements of the proposed development.
- In Section 3, the characteristics of the receiving environment are fully described.
- In Section 4, a Stage 1 Screening is undertaken to identify any European Sites upon which there is a potential for a likely significant effect to occur either individually or

in combination with other plans and projects as a result of the proposed development.

- Section 5, the Natura Impact Statement provides a detailed consideration of the Screened In European Sites and identifies the relevant qualifying features and how they may be affected in light of their conservation objectives.
- Section 6 provides an assessment of the potential for adverse effects on the identified European Sites as a result of the proposed development and in the absence of mitigation. This section also prescribes mitigation to robustly block any identified pathways for impact for effect.
- Section 7 provides an assessment of residual effects taking into consideration the proposed mitigation.
- In Section 8, the potential in combination effects of the proposed development on European Sites, when considered in combination with other plans and projects were assessed.
- A concluding statement is provided in Section 9.

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development is located on 3.9ha of green field lands situated in the Carrowbunnaun area of Strandhill, Co. Sligo. (Grid reference: G 60787 35324). Access to the site is via 'Golf Course Road', a cul-de-sac road which terminates at the Golf Club.

The location of the Proposed Development is shown in **Figure 2.1.**

2.2 Characteristics of the Proposed Development

Planning permission is being submitted for a Residential Development which will consist of:

1. Construction of 99 no. residential units consisting of:
   a. 30 No. – Type A – 2-storey, 2-Bed Semi Detached and Terraced Houses;
   b. 7 No. – Type B – 3 -storey, 3-Bed Semi Detached Houses;
   c. 42 No. – Type C – 2 -storey, 3-Bed Semi Detached Houses;
   d. 2 No. – Type D – 3 -storey, 4-Bed Semi Detached Houses;
   e. 2 No. – Type D1 – 3 -storey, 5-Bed Detached Houses;
   f. 7 No. – Type D2 – 3 -storey, 5-Bed Semi Detached Houses;
   g. 1 No. – Type D3 – 3 -storey, 5-Bed Semi Detached House;
   h. 8 No. – Type E – 3 -storey, 5-Bed Detached Houses;
2. Provision of 1 no. childcare facility (651 sq.m) including pedestrian access, with 550 sq.m of open play space, and associated car parking;
3. Provision of 4,950 sq.m of public open space;
4. Pedestrian, cycle and vehicular access to Golf Course Road;
5. Residential car parking, site landscaping, boundary treatments, public lighting, service connections and all associated site development works.

RECEIVED: 29/05/2024

Map Legend

Red Line Boundary

Drawing Title

Site Location

Project Title

Proposed Residential Development, Golf Course Road, Strandhill, Co. Sligo

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2.2.1 Site Drainage

An engineering services report detailing the site drainage for the Proposed Development has been prepared by ORS Engineering (ORS) and accompanies the planning application. The proposed site drainage plans are summarised in the following sections and the accompanying drainage layout drawings are shown in Appendix 1.

2.2.1.1 Wastewater Drainage

Wastewater from the proposed development will discharge to a proposed upgraded 225mm diameter foul pipe along Golf Course Road. A pre-connection enquiry was submitted to Uisce Eireann and a response letter was received on April 27, 2023. Uisce Eireann confirmed that feasibility of water and wastewater connections for the development could be facilitated. The letter is included as Appendix 2.

An updated pre-connection enquiry was submitted to Uisce Eireann on 19th March 2024 (Ref. CDS24002332). In line with Uisce Eireann 16 week response time an updated Confirmation of feasibility will follow in due course.

All wastewater infrastructure shall be designed and constructed in accordance with Irish Water documents “Code of Practice for Wastewater Infrastructure” and “Wastewater Infrastructure Standard Details”.

2.2.1.2 Stormwater Drainage

Surface water from the proposed development will discharge to the public surface water network on Golf Course Road via an outfall at the north-west corner of the site (refer to Appendix 1)). To reduce and attenuate the flow, the proposed development has been designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS) as expressed in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

The site will be served via below ground gravity pipework which will predominantly run below the proposed internal roads, landscape areas and carpark within the development. The surface water network will be fed via road gullies and rainwater from building roofs via guttering and downpipes. The surface water network will be attenuated, and flow controlled at greenfield runoff rates prior to outfall to the existing 525mm diameter surface water drainage sewer on Golf Course Road.

The site has been separated into three equal catchment areas for the surface water drainage design. Within each catchment, stormwater runoff will be directed to attenuation tanks (refer to Appendix 1). All attenuation tank systems have been sized to store the runoff from a 1:100 year storm of critical duration below ground.

All surface water will flow through one final attenuation tank prior to discharge. A Class 1 Petrol/Oil Bypass Interceptor will be installed on this final attenuation tank and a flow control device will be fitted to the outlet manhole from this attenuation tank. This will control outflow from the tank internally and offset discharge downstream within the network.

2.2.1.3 Flood Risk Assessment

The OPW website was consulted by ORS to inform the engineering services report. The site was searched for any high-level information on any potential flood risk on the site and no indication of any likely past or future flood incidences were identified in the vicinity of the site and the proposed development will present no significant increase in risk of flooding either within the site or downstream of the site.

2.2.2 Landscaping

A landscape plan was prepared by Vincent Hannon Architects and accompanies this planning application. The proposed landscape drawings are included within Appendix 3. The landscaping proposals include integrating Sustainable Urban Drainage Systems (SUDS) features, creating a seating area, implementing subtle landscape lighting, incorporating pollinator-friendly plants, play areas, and paving sections.

The landscape plan includes for the planting of 850m of native hedgerow which will be planted along the perimeter of the development. The native hedgerow will include species such as European hazelnut (*Corylus avellana*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), blackthorn (*Prunus spinosa*), dog rose (*Rosa canina*).

Ornamental hedges will be planted in front gardens of residentials houses and will include species such as common beech (*Fagus sylvatica*) and Portugal laurel (*Prunus lusitania*). Native shrubs will be planted around the development and will include species such as common beech (*Fagus sylvatica*), holly (*Ilex aquifolium*), dog rose (*Rosa canina*), European cranberry bush (*Viburnum opulus*), Hummingbird fuchsia (*Fuchsia 'Riccartonii'*), and beach rose (*Rosa rugosa*).

Ornamental herbaceous planting includes species such as Yarrow (*Aschillea moonshine*), African lily (*Agapanthus* 'Blue Giant', Mediterranean Spurge (*Euphorbia* c. 'Humpty Dumpty'), Cranesbill (*Geranium* 'Rozanne'), Mikoikoi (*Libertia grandiflora*), Fountain grass (*Pennisetum alopecuroides*), Jerusalem sage (*Phlomis russeliana*), Garden sage (*Salvia nemerosa 'Caradona'*) and Brazilian Vervain (*Verbena bonariensis* 'Lollipop).

3. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

The ecological survey that was undertaken to inform this NIS are fully described in this section. A general description of the ecology of the site of the proposed development is provided below. The specific surveys that were undertaken to assess the potential effects on the identified European Sites are described below.

3.1 Ecological Survey Methodologies

3.1.1 Ecological Multidisciplinary Walkover Surveys

A multi-disciplinary walkover survey of the Proposed Development site was undertaken by Ellen Tuck (B.Sc) on the 25/10/2023.

The walkover survey was undertaken in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (NRA, 2009b). This survey provided baseline data on the ecology of the site and assessed whether furthermore detailed habitat or species-specific ecological surveys were required. The multi-disciplinary ecological walkover survey comprehensively covered the entire site.

Habitats were classified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011).

The walkover survey was designed to detect the presence, or suitable habitat for a range of protected faunal species or protected habitats that may occur in the vicinity of the proposed development.

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS), with a focus on those listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011), was also conducted.

3.2 Additional Baseline Surveys

3.2.1 Wintering Bird Survey

Dedicated wintering bird surveys were undertaken at the development site (including the wider survey area) from October 2022 to March 2023 (28/10/2022, 14/11/2022, 09/12/2022, 10/01/2023, 10/02/2023, 29/03/2023) using a combination of short vantage point watches over the site, followed by walkover transects through the site. Surveys were carried out once a month from October to March with each visit lasting 3 hours during daylight hours. All bird species encountered on site and out to 500m of the site boundary were recorded.

3.3 Results of the Baseline Ecological Surveys

3.3.1 Habitats Present on the Site

The main habitats recorded within the boundary of the proposed development site are classified as **Improved Agricultural Grassland (GA1), Scrub (WS1 Hedgerow (WL1)** and **Stonewalls (BL1).**

The most dominant habitat recorded on the site of the proposed development was **Improved Agricultural Grassland (GA1).** The grassland was intensively managed, via grazing which was evident on the day of the site surveys **(Plate 3.1 and 3.2).** The sward was short, and uniform in appearance with low species diversity. This habitat was dominated by meadow grasses *(Poa spp*). Other species recorded within this habitat included Red Clover *(Trifolium pratense),* Ragwort (*Jacobaea vulgaris),* Daisy (*Bellis perennis*), Dandelion (*Taraxacum vulgaria*), Creeping Buttercup (*Ranunculus repens),* and Ribwort Plantain (*Plantago lanceolata*).

Hedgerows (WL1) were located along the southern and northern boundaries of the proposed development site, as well as through the centre of site **(Plate 3.3 and 3.4).** They were dominated by brambles (*Rubus fructicosus*). **Stonewalls (BL1)** were recorded bordering the hedgerows at the southern boundary of the site and bordering a small portion of the hedgerow in the centre of the site **(Plate 3.5). Scrub (WS1)** was present within the northern and eastern parcels of the site (**Plate 3.6 and 3.7**). The scrub habitat was dominated by bramble (*Rubus fructicosus).*

Buildings and Artificial Surfaces (BL3) were recorded in the form of a concrete covering for a sewer in the northern section of the field **(Plate 3.8).**

There were no invasive species listed under the Third schedule of the European Communities Regulations 2011 (S.I. 477 of 2011) recorded during the walkover survey.

Plate 3-1: Improved Agricultural Grassland (GA1) habitat dominates the site.

Plate 3-2: Improved Agricultural Grassland (GA1) habitat within the footprint of the Proposed Development.

Plate 3-3: Hedgerow (WL1) present along the southern boundary of the site.

Plate 3-4: Hedgerow (WL1) present along the southern and northern boundaries of the site.

Plate 3-5: Stonewall (BL1) present along the southern boundary of the site and in the centre of the site.

Plate 3-6: Scrub (WS1) dominated by bramble (Rubus spp.) present along the eastern boundary of the site.

Plate 3-7: Scrub (WS1) dominated by bramble (Rubus spp.) present along the northern boundary of the site.

Plate 3-8: Buildings and Artificial Surfaces (BL3) present near northern boundary of the site.

3.3.1.1 Potential for Qualifying Interest Species/Habitats

No evidence of QI species associated with any SAC or Special Conservation Interest (SCI) bird species associated with any SPA was recorded within the Proposed Development site. Furthermore, no Annex I habitats were recorded.

3.3.2 Fauna

No evidence of Annex II protected species associated with Ballysadare Bay SAC or Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC were recorded within or adjacent to the site boundary.

The site which is dominated by agricultural grassland does not provide suitable habitat for any of the Annex II species associated with these sites. There are no watercourses within the proposed development site. The optimal habitat type for the *Vertigo angustior* (Narrow-mouthed Whorl Snail) as described in the Conservation Objectives Document (NPWS 2013) is defined as fixed dune and species-rich grassland dominated with a vegetation height of 10-30cm. No dune habitat was present within the site. The other QI species of the above European Sites are aquatic/ marine and as such the terrestrial nature of the site doesn't provide suitable supporting habitat for Sea Lamprey (*Petromyzon marinus*), River Lamprey *(Lampetra fluviatilis)*, and Harbour Seal (*Phoca vitulina)*).

No QI's or SCIs associated with any other European site were recorded within or adjacent to the proposed development site boundary.

3.3.2.1 Wintering bird surveys

No species listed as a Special Conservation Interest species of Cummeen Strand SPA or Ballysadare Bay SPA were recorded utilising the site for foraging during the wintering bird surveys undertaken. No significant foraging or roosting habitat for the listed SCI bird species was recorded within the proposed development site boundary.Bird species recorded during the bird surveys are listed in Table 4-19 below. While brent goose (an SCI species for both Cummeen Strand SPA and Ballysadare Bay SPA) was recorded, the species was recorded flying over the site on one occasion only. It was not recorded foraging within the site.

Table 3-1: Targeted bird survey results.

Species	Number of Individuals	Notes	Date
Curlew (*Numenius arquata)*	2	Foraging within the site. Flying over the site.	28th October 2022
	4	Foraging within the site. Flying over the site.	9th December 2022
	6	Foraging within the site. Flying over the site.	10th February 2023
	7	Foraging within the site. Flying over the site.	29th March 2023
Kestrel (*Falco tinnunculus*)	1	Hunting, Flying over the site.	28th October 2022
	1	Hunting, Flying over the site.	14th November 2022
	1	Hunting, Flying over the site.	9th December 2022
	1	Hunting, Flying over the site.	10th February 2023
	1	Hunting, Flying over the site.	29th March 2023
Brent Geese (*Branta bernicla)*	3	Flying over the site.	29th March 2024
Snipe (*Gallinago gallinago*)	1	Droppings	10th January 2023
	1	Calling	29th March 2023
Herring Gull (*Larus argentatus*)	17	Flying over the site.	28th October 2022
	25	Flying over the site.	14th November 2022
	16	Flying over the site.	9th December 2022
	27	Flying over the site.	10th January 2023
	40	Flying over the site.	10th February 2023
	12	Flying over the site.	29th March 2023
Black-headed Gull (*Larus ridibundus*)	1	Flying over the site.	29th March 2023
Lesser Black-backed Gull (*Larus fuscus*)	5	Flying over the site.	28th October 2022
	7	Flying over the site.	14th November 2022
	2	Flying over the site.	9th December 2022
	3	Flying over the site.	10th January 2023
	3	Flying over the site.	10th February 2023
	1	Flying over the site.	29th March 2023
Meadow Pipit (*Anthus pratensis*)	3	Flying over the site.	10th January 2023

3.4 Hydrological Desk Study

The EPA web-mapper[1] was consulted on the 24/01/2024 regarding the water quality and status of waterbodies that are located downstream of the site of the proposed development. With respect to regional hydrology, the proposed development is in the Carrowgobaddagh_SC_010 WFD sub-catchment and the Knappagh (Sligo)_010 WFD River sub basin, within the Sligo Bay WFD Catchment. In terms of local hydrology, there are no watercourses within or adjacent to the site boundary. The nearest watercourse is located 1.1 km northwest of the proposed development. This watercourse has direct connectivity with Cummeen strand/ Drumcliff SAC [000627] and Cummeen strand SPA [004035].

The site of the proposed development is located within the Drumcliff- Strandhill groundwater catchment. These groundwater bodies have been identified as 'Not at risk' (as per the Water Framework Directive risk score), with the overall groundwater status assessed as 'Good'.

[1] *https://gis.epa.ie/EPAMaps/*

4. STAGE 1 – APPROPRIATE ASSESSMENT SCREENING

4.1 Data Sources Informing the Assessment

In preparation of the report, the below sources were consulted to inform the assessment. A multidisciplinary site survey was also carried out on the 25/10/2023. Six wintering bird surveys were carried out from October 2022 to March 2023.

- Review of NPWS Site Synopses, Conservation Objectives for the European Sites
- Review of 2019, 2013 and 2007 EU Habitats Directive (Article 17) Reports.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Teagasc, EPA, Water Framework Directive (WFD), Geological Survey of Ireland (GSI), Inland Fisheries Ireland (IFI), Irish Wetland Bird Survey I-WeBS & Geohive online Environmental Sensitivity Mapping tool
- Review of specially requested records from the NPWS Rare and Protected Species Database for the hectads which overlap with the study area.
- Review of Bird Atlases: (Sharrock, 1976; Lack, 1986; Gibbons *et al.,* 1993; Balmer *et al.*, 2013).
- Review of other plans and projects within the area.

4.2 Identification of Relevant European Sites

The following methodology was used to establish any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the proposed development:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 09/05/2024.
- All European Sites that could potentially be affected were identified using a source-pathway - receptor model. To provide context for the assessment, European Sites surrounding the development site are shown on Figure 4-1. Information on these sites according to the site-specific conservation objectives is provided in Table 4-1. Sites that were further away from the proposed development were also considered and no complete source-pathway-receptor chain for significant effect was identified for any other European site.
- The catchment mapping was used to establish or discount potential hydrological connectivity between the site of the proposed development and any European Sites. The hydrological catchments are shown in Figure 4-2.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, '*Assessing Connectivity with Special Protection Areas* (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed development and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.

- Table 4-1, provides details of all relevant European Sites as identified in the preceding steps and assesses the potential for likely significant effects on each.
- The assessment considers any likely direct or indirect impacts of the proposed development, both alone and in combination with other plans and projects, on European Sites by virtue of criteria including the following: size and scale, land-take, distance from the European Site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction, operation and decommissioning were considered in this assessment.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 09/05/2024.
- Where potential pathways for Likely Significant Effect are identified, the site is included within the Likely Zone of Influence and further assessment is required within the NIS.
- The potential for the proposed development to result in cumulative impacts on any European Sites in combination with other plans and projects was considered in the assessment that is presented in Table 4-1.

Map Legend

- Red Line Boundary
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

N

Drawing Title
European Designated Sites within the vicinity of the Proposed Development

Project Title
Proposed Residential Development, Golf Course Road, Strandhill, Co. Sligo

Drawn By	Checked By
CH	SM
Project No.	Drawing No.
221133	Figure 4.1
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Table 4-1 Identification of European Sites within the Likely Zone of Influence

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
Special Areas of Conservation (SAC)			
Ballysadare Bay SAC [000622] **Approx. Distance: 0.31 km**	• [1014] Narrow-mouthed whorl snail *Vertigo angustior* • [1130] Estuaries • [1140] Mudflats and sandflats not covered by seawater at low tide. • [1365] Harbour seal *Phoca vitulina* • [2110] Embryonic shifting dunes • [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) • [2190] Humid dune slacks	Detailed conservation objectives for this site, (Version 1, November 2013), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside of and > 300m from the SAC. There will be no direct loss of any Annex I habitat or supporting habitat for Annex II species associated with this SAC. There are no open drains or water courses within the proposed development site boundary which could act as conduits for pollution. The nearest mapped watercourse (Killaspugbrone, EPA code: 35K44) is located >1km north-east of the proposed development site. No potential for indirect effects on the SAC via surface water pathways was identified. The SAC is partially underlain by the same GWB (Drumcliff-Strandhill) as the proposed development site and is located approx. 300m from the site. During construction and operation of the Proposed Development there is potential for percolation of pollutants to groundwater. Therefore, taking a precautionary approach, a potential pathway for likely significant effects on the SAC due to deterioration of water quality via groundwater pathways, was identified.

[2] https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			The site does not support suitable habitat for narrow mouthed whorl snail or harbour seal. Furthermore, the proposed development site is buffered from the SAC by approximately 310m of golf course (Improved amenity grassland). No potential for significant indirect effects on the SAC due to disturbance or displacement of QI species was identified. **Potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. Therefore, further assessment is required.**
Cummeen Strand/ Drumcliff Bay SAC [000627] **Approx. Distance: 0.56 km**	• [1040]Marsh Snail *Vertigo angustior* • [1095] Sea Lamprey *Petromyzon marinus* • [1099] River Lamprey *Lampetra fluviatilis* • [1130] Estuaries • [1140] Mudflats and sandflats not covered by seawater at low tide • [1265] Harbour seal *Phoca vitulina* • [2110] Embryonic shifting dunes	Detailed conservation objectives for this European Site (10 September 2013) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside of and > 300m from the SAC. There will be no direct loss of any Annex I habitat or supporting habitat for Annex II species associated with this SAC. There are no open drains or water courses within the proposed development site boundary which could act as conduits for pollution. The nearest watercourse is >1km from the proposed development site. No potential for indirect effects on the SAC via surface water pathways was identified. The SAC is partially underlain by the same GWB (Drumcliff-Strandhill) as the proposed development site and is located approx. 560m from the site. During construction and operation of the Proposed Development there is potential for percolation of pollutants to groundwater. Therefore, taking a precautionary approach, a

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
	• [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) • [5130] *Juniperus communis* formations on heaths or calcareous grasslands • [7220] Petrifying springs with tufa formation (Cratoneurion)		potential pathway for likely significant effects on the SAC due to deterioration of water quality via groundwater pathways, was identified. The site does not support suitable habitat for narrow mouthed whorl snail or harbour seal. Furthermore, the proposed development site is buffered from the SAC by approximately 560m of golf course (Improved amenity grassland) and residential/ commercial developments (Buildings and Artificial Surfaces). No potential for significant indirect effects on the SAC due to disturbance or displacement of QI species was identified. **Potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. Therefore, further assessment is required.**
Unshin River SAC [001898] **Approx. distance: 7.98 km**	• [1106] Salmon *Salmo salar* • [1355] Otter *Lutra lutra* • [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation • [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	Detailed conservation objectives for this European Site (15 December 2021) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC. There are no open drains or watercourses within the proposed development site boundary which could act as conduits for pollution and the SAC is underlain by a different groundwater body as the proposed development. Given the absence of hydrological connectivity and the nature and scale of the works, no potential for indirect effects on the SAC due to habitat degradation as a result of deterioration in water quality was identified.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
	• [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) • [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)		The site does not provide suitable habitat for any of the QI species for which the SAC is designated. Given the absence of habitat and the distance between the proposed development and the SAC, no potential pathway for indirect effects on the SAC due to disturbance/displacement of QI species was identified. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Lough Gill SAC [001976] **Approx. distance: 8.21 km**	• [1092] White-clawed Crayfish *Austropotamobius pallipes* • [1095] Sea Lamprey *Petromyzon marinus* • [1096] Brook Lamprey *Lampetra planeri* • [1099] River Lamprey *Lampetra fluviatilis* • [1106] Salmon *Salmo salar* • [1355] Otter *Lutra lutra* • [3150] Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation • [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates	Detailed conservation objectives for this European Site (15 December 2021) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC. No hydrological connectivity between the proposed development site and the SAC was identified. There are no open drains or watercourses within the proposed development site boundary which could act as conduits for pollution and the SAC is underlain by a different groundwater body than the proposed development. No potential for indirect effects on the SAC due to deterioration of water quality was identified. The site does not provide suitable habitat for any of the QI species for which the SAC is designated. Given the absence of suitable habitat and the distance between the proposed development and the SAC, no potential for significant indirect effects via disturbance or displacement was identified.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
	(Festuco-Brometalia) (* important orchid sites) • [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles • [91E0] Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)		**No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Union Wood SAC [000638] **Approx. distance: 9.5 km**	• [91A0] Old sessile oak woods with Ilex and Blechnum in the British Isles	Detailed conservation objectives for this European Site (11 January 2021) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC. There is no connectivity between the proposed development site and this SAC and the habitat for which the SAC is designated is terrestrial in nature. No potential pathway for indirect effects on the SAC during construction or operation of the proposed development was identified. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Knockalongy and Knockachree Cliffs SAC	• [1421] Killarney Fern (*Trichomanes speciosum*)	Detailed conservation objectives for this European Site (11 December 2020) were reviewed as part of this	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
Approx. distance: 10.2 km		assessment and are available at www.npws.ie.	There is no connectivity between the proposed development site and this SAC and the species for which the SAC is designated is terrestrial in nature. No potential pathway for indirect effects on the SAC during construction or operation of the proposed development was identified. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Ben Bulben, Gleniff and Glenade Complex SAC [000623] **Approx. distance: 11.9 km**	• [1013] Geyer's Whorl Snail (Vertigo geyeri) • [1355] Otter (*Lutra lutra)* • [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • [4010] Northern Atlantic wet heaths with *Erica tetralix* • [4030] European dry heaths • [4060] Alpine and Boreal heaths • [5130] *Juniperus communis* formations on heaths or calcareous grasslands • [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates	Detailed conservation objectives for this European Site (21 December 2021) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC. No hydrological connectivity between the proposed development site and the SAC was identified. There are no open drains or watercourses within the proposed development site boundary which could act as conduits for pollution and the SAC is underlain by a different groundwater body than the proposed development. No potential for indirect effects on the SAC due to deterioration of water quality was identified. The site does not provide suitable habitat for any of the QI species for which the SAC is designated. Given the absence of suitable habitat and the distance between the proposed development and the SAC, no potential for significant indirect effects via disturbance or displacement was identified.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
	(*Festuco-Brometalia*) (* important orchid sites) • [6230] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) • [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels • [7130] Blanket bogs (* if active bog) • [7140] Transition mires and quaking bogs • [7220] Petrifying springs with tufa formation (*Cratoneurion*) • [7230] Alkaline fens • [8110] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) • [8120] Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) • [8210] Calcareous rocky slopes with chasmophytic vegetation		**No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
Ox Mountains Bogs SAC [002006] **Approx. distance: 12.8 km**	• [1013] Geyer's Whorl Snail (*Vertigo geyeri*) • [1528] Marsh Saxifrage (*Saxifraga hirculus*) • [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) • [3160] Natural dystrophic lakes and ponds • [4010] Northern Atlantic wet heaths with *Erica tetralix* • [4030] European dry heaths • [7130] Blanket bogs (* if active bog) • [7140] Transition mires and quaking bogs • [7150] Depressions on peat substrates of the Rhynchosporion	Detailed conservation objectives for this site, (Version 1, August 2016), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC. No hydrological connectivity between the proposed development site and the SAC was identified. There are no open drains or watercourses within the proposed development site boundary which could act as conduits for pollution and the SAC is underlain by a different groundwater body than the proposed development. No potential for indirect effects on the SAC due to deterioration of water quality was identified. The site does not provide suitable habitat for any of the QI species for which the SAC is designated. Given the absence of suitable habitat and the distance between the proposed development and the SAC, no potential for significant indirect effects via disturbance or displacement was identified. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Streedagh Point Dunes SAC [001680]	• [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*) • [1140] Mudflats and sandflats not covered by seawater at low tide	Detailed conservation objectives for this site, (Version 1, March 2015), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside the SAC. There will be no direct loss of any Annex I habitat associated with this SAC.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
Approx. distance: 14.2 km	• [1220] Perennial vegetation of stony banks • [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • [1410] Mediterranean salt meadows (*Juncetalia maritimi*) • [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)*		No hydrological connectivity between the proposed development site and the SAC was identified. There are no open drains or watercourses within the proposed development site boundary which could act as conduits for pollution and the SAC is underlain by a different groundwater body than the proposed development. No potential for indirect effects on the SAC due to deterioration of water quality was identified. The site does not provide suitable habitat for any of the QI species for which the SAC is designated. Given the absence of suitable habitat and the distance between the proposed development and the SAC, no potential for significant indirect effects via disturbance or displacement was identified. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Special Protection Area (SPA)			
Ballysadare Bay SPA [004129] **Approx. distance: 0.36 km**	• A046 Brent Goose *Branta bernicla hrota* • A141 Grey Plover *Pluvialis squatarola* • A149 Dunlin *Calidris alpina alpina*	Detailed conservation objectives for this European Site (19 March 2016) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for significant indirect effects due to habitat loss outside of the SPA.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
	• A157 Bar-tailed Godwit *Limosa lapponica* • A162 Redshank *Tringa tetanus* • A999 Wetlands		There are no open drains or water courses within the proposed development site boundary which could act as conduits for pollution. The nearest mapped watercourse (Killaspugbrone, EPA code: 35K44) is located >1km north-east of the proposed development site. No potential for indirect effects on the SPA via surface water pathways was identified. The SPA is partially underlain by the same GWB (Drumcliff-Strandhill) as the proposed development site and is located approx. 300m from the site. During construction and operation of the Proposed Development there is potential for percolation of pollutants to groundwater. Therefore, taking a precautionary approach, a potential pathway for likely significant effects on the SPA due to deterioration of water quality via groundwater pathways, was identified. While the site does not provide significant suitable habitat for any of the SCI species, given its proximity to the SPA and taking a precautionary approach, there is a potential for ex situ disturbance and displacement of SCI species which may use the site on occasion for foraging. **Potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. Therefore, further assessment required.**

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
Cummeen Strand SPA [004035] **Approx. Distance: 1.49 km**	• A046 Brent Goose *Branta bernicla hrota* • A130 Oystercatcher *Haematopus ostralegus* • A162 Redshank *Tringa tetanus* • A999 Wetlands	Detailed conservation objectives for this European Site (10 September 2013) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There are no open drains or water courses within the proposed development site boundary which could act as conduits for pollution. The nearest mapped watercourse (Killaspugbrone, EPA code: 35K44) is >1km north-east of the proposed development site. No potential for indirect effects on the SPA via surface water pathways was identified. The SPA is partially underlain by the same GWB (Drumcliff-Strandhill) as the proposed development site and is located approx. 300m from the site. During construction and operation of the Proposed Development there is potential for percolation of pollutants to groundwater. Therefore, taking a precautionary approach, a potential pathway for likely significant effects on the SPA due to deterioration of water quality via groundwater pathways, was identified. While the site does not provide significant suitable habitat for any of the SCI species, given its proximity to the SPA and taking a precautionary approach, there is a potential for ex situ disturbance and displacement of SCI species which may use the site on occasion for foraging.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			Potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. Therefore, further assessment required.
Drumcliff Bay SPA [004013] **Approx. Distance: 5.87 km**	• A144 Sanderling *Calidris alba* • A157 Bar-tailed Godwit *Limosa lapponica* • A999 Wetlands	Detailed conservation objectives for this European Site (04 September 2013) were reviewed as part of this assessment and are available at www.npws.ie.	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There is no connectivity between the proposed development and the SPA. There are no open drains or watercourses within the proposed development site which could act as conduits for pollution, Given the absence of connectivity and the distance between the proposed development site and the SPA, no potential pathway for indirect effects on supporting wetland habitat for the SCI species due to deterioration of water quality was identified. The potential for disturbance to SCI species in the area was considered. The site does not support any significant suitable habitat for any of the SCI species and these species were not recorded foraging within the site during the multidisciplinary walkover surveys or the dedicated bird surveys undertaken. Given the absence of significant habitat and the distance of >5km between the site and the SPA, there is no potential for significant effects on this SPA due to disturbance of SCI species.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.
Ballintemple and Ballygilgan SPA [004234] **Approx. distance: 8.06 km**	• A045 Barnacle Goose *Branta leucopsis*	Detailed conservation objectives for this European Site (12 October 2022) were reviewed as part of this assessment and are available at www.npws.ie. General Objectives: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There is no connectivity between the proposed development and the SPA. There are no open drains or watercourses within the proposed development site which could act as conduits for pollution, Given the absence of connectivity and the distance between the proposed development site and the SPA, no potential pathway for indirect effects on the SPA due to deterioration of water quality was identified. The potential for ex situ disturbance to the SCI species was considered. The site does not support any significant suitable habitat for barnacle goose and the species was not recorded within or adjacent to thesite during the multidisciplinary walkover surveys or the dedicated bird surveys undertaken. Furthermore, the proposed development is located over 8km from the SPA.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			Given the absence of significant habitat and the distance of >8km between the site and the SPA, there is no potential for significant effects on this SPA due to disturbance of SCI species. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Ardboline Island and Horse Island SPA [004135] **Approx. distance: 9.4 km**	• [A017] Cormorant *Phalacrocorax carbo* • [A045] Barnacle Goose *Branta leucopsis*	Detailed First Order Site-specific conservation objectives for this site, (Version 1, October 2022), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There is no connectivity between the proposed development and the SPA. There are no open drains or watercourses within the proposed development site which could act as conduits for pollution, Given the absence of connectivity and the distance between the proposed development site and the SPA, no potential pathway for indirect effects on the SPA due to deterioration of water quality was identified. The potential for ex situ disturbance to the SCI species was considered. The site does not support any significant suitable habitat for barnacle goose or cormorant and the species were not recorded within or adjacent to the site during the multidisciplinary walkover

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			surveys or the dedicated bird surveys undertaken. Furthermore, the proposed development is located over 9km from the SPA. Given the absence of significant habitat and the distance of >9km between the site and the SPA, there is no potential for significant effects on this SPA due to disturbance of SCI species. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Aughris Head SPA [004133] **Approx. distance: 10.6 km**	[A188] Kittiwake *Rissa tridactyla*	Detailed First Order Site-specific conservation objectives for this site, (Version 1, October 2022), were reviewed as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There is no connectivity between the proposed development and the SPA. There are no open drains or watercourses within the proposed development site which could act as conduits for pollution, Given the absence of connectivity and the distance between the proposed development site and the SPA, no potential pathway for indirect effects on the SPA due to deterioration of water quality was identified. The potential for ex situ disturbance to the SCI species was considered. The site does not support any significant suitable habitat

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			for kittiwake and the species was not recorded within or adjacent to the site during the multidisciplinary walkover surveys or the dedicated bird surveys undertaken. Furthermore, the proposed development is located over 10km from the SPA. Given the absence of significant habitat and the distance of >10km between the site and the SPA, there is no potential for significant effects on this SPA due to disturbance of SCI species. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**
Sligo/Leitrim Uplands SPA [004187] **Approx. distance: 11.9 km**	• [A103] Peregrine (*Falco peregrinus)* • [A346] Chough (*Pyrrhocorax pyrrhocorax)*	Detailed First Order Site- specific conservation objectives for this site (Version 1, October 2022), were revied as part of the assessment and are available at www.npws.ie	There will be no direct effects on this European Site as the proposed development is located entirely outside the SPA. The site does not support significant suitable habitat for the SCI species associated with the SPA and therefore there is no potential for indirect effects due to habitat loss outside of the SPA. There is no connectivity between the proposed development and the SPA. There are no open drains or watercourses within the proposed development site which could act as conduits for pollution, Given the absence of connectivity and the distance between the proposed development site and the SPA, no potential pathway for indirect effects on the SPA due to deterioration of water quality was identified.

European Sites and distance from proposed development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 09/05/2024.	Conservation Objectives[2]	Identification of Source-Pathway-Receptor chain and potential for Likely Significant Effects (LSE's).
			The potential for ex situ disturbance to the SCI species was considered. The site does not support any significant suitable habitat for peregrine and chough and the species were not recorded within or adjacent to the site during the multidisciplinary walkover surveys or the dedicated bird surveys undertaken. Furthermore, the proposed development is located over 11km from the SPA. Given the absence of significant habitat and the distance of >11km between the site and the SPA, there is no potential for significant effects on this SPA due to disturbance of SCI species. **No potential for likely significant effects on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects, and the site is not considered further.**

4.3 Stage 1 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the proposed development, individually or in combination with other plans and projects, would be likely to have a significant effect on

- **Ballysadare Bay SAC [000622]**
- **Cummeen Strand/ Drumcliff Bay SAC [000627]**
- **Ballysadare Bay SPA [004129]**
- **Cummeen Strand SPA [004035]**

As a result, an Appropriate Assessment is required, and a Natura Impact Statement shall be prepared in respect of the proposed development.

5. STAGE 2- NATURA IMPACT STATEMENT (NIS)

The potential for likely significant effects on the following European Sites in the absence of any mitigation, individually or cumulatively with other plans or projects, was identified in the preceding section:

- **Ballysadare Bay SAC [000622]**
- **Cummeen Strand/ Drumcliff Bay SAC [000627]**
- **Ballysadare Bay SPA [004129]**
- **Cummeen Strand SPA [004035]**

The following sections consider this European Site further to:

1. Determine which individual Qualifying Interests and Special Conservation Interest have the potential to be adversely affected by the Proposed Development.
2. Provide information with regard to the Conservation Objectives and site-specific pressures and threats for those Qualifying interests that have the potential to be adversely affected.

5.1 Identification of relevant Qualifying Features and Desk Study

5.1.1 Ballysadare Bay SAC

The potential for impacts on this SAC was identified in Section 4 above. The identified pathways for effect include the following:

- Degradation of habitat (including supporting habitat for QI species) due to deterioration of water quality via percolation of pollutants to groundwater during the construction and operation phases of the development.

Table 5.1 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.1.1 Identification of Individual Qualifying Features with the Potential to be Affected.

Table 5-1 Assessment of Qualifying interests potentially affected.

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• [1014] Narrow-mouthed whorl snail *Vertigo angustior*	To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Ballysadare Bay SAC.	According to the NPWS Conservation Objectives document for Ballysadare Bay SAC, there is one known location of this QI Species within this SAC as per Map 7, approx. 780m west of the proposed development site. In addition according to the NBDC maps there is a record from 1997 from a 1km grid square south-east of the site and the grid square itself is 235m from the site at its closest point. In addition there are numerous records approximately 873m from the south west of the site. The optimal habitat for this species is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra),* with sparse marram grass (*Ammophila arenaria*), lady's bedstraw (*Galium verum),* eyebright (*Euphrasia sp.),* mouse-ear hawkweed (*Pilosella officinarum*) and other low growing herbs, with a vegetation height of 10-30cm, as per CO document (NPWS 2013).	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
		The proposed development site is dominated by improved agricultural grassland, and as such, does not support suitable habitat for this QI species. In addition, a dedicated whorl snail assessment of the proposed development site was undertaken by Ecofact Environmental Consultants in 2022 (Refer to report in Appendix 4). This assessment concluded that there is no habitat on the site considered to be suitable for any Vertigo species. Therefore there will be no direct loss of Vertigo supporting habitat. However, taking a very precautionary approach, a potential pathway for adverse effects on the species due to deterioration of water quality and degradation of supporting habitat (where the species may occur in humid dune habitat), resulting from the percolation of pollutants to groundwater during the construction and operational phases of the proposed development was identified. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	
• [1130] Estuaries	To maintain the favourable conservation condition of Estuaries in Ballysadare Bay SAC.	Due to the proximity of the development site to Ballysadare Bay SAC, a potential pathway for indirect effects on the QI habitat: Estuaries was identified in the form of habitat degradation due to deterioration of water quality. In the absence of mitigation, there is potential for adverse effects on this habitat due to deterioration of water quality and resulting habitat degradation arising from the percolation of pollutants to groundwater during the construction and operation of the proposed development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes
• [1140] Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by	Due to the proximity of the development site to Ballysadare Bay SAC, a potential pathway for indirect effects on the following marine QI habitat: Mudflats and sandflats not covered by seawater at low tide was identified in the form of deterioration of water quality and supporting habitats for aquatic fauna.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
	seawater at low tide in Ballysadare Bay SAC	In the absence of mitigation, there is potential for adverse effects on this habitat due to deterioration of water quality and resulting habitat degradation arising from the percolation of pollutants to groundwater during the construction and operation of the proposed development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	
• [1365] Harbour seal *Phoca vitulina*	To maintain the favourable conservation condition of Harbour Seal in Ballysadare Bay SAC	There is potential for adverse effects on this aquatic QI species due to degradation of supporting habitat resulting from deterioration of water quality during the construction and operational phases of the proposed development. The site does not provide suitable habitat for this species and is buffered from the proposed development site by 310m of golf course (improved amenity grassland). There is no potential for adverse effects on this species due to disturbance or displacement. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes
• [2110] Embryonic shifting dunes	To maintain the favourable conservation condition of Embryonic shifting dunes in Ballysadare Bay SAC	There is no potential for indirect effects on this QI habitat: Embryonic shifting dunes due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 310m of golf course (improved amenity grassland). **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	To restore the favourable conservation condition of Shifting dunes along the shoreline with Ammophila arenaria ('white dunes') in Ballysadare Bay SAC	There is no potential for indirect effects on this QI habitat: Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 310m of golf course (improved amenity grassland). **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No
• [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)	To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in Ballysadare Bay SAC	There is no potential for indirect effects on this QI habitat: Fixed coastal dunes with herbaceous vegetation (grey dunes) due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 310m of golf course (improved amenity grassland). **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No
• [2190] Humid dune slacks	To restore the favourable conservation condition of Humid dune slacks in Ballysadare Bay SAC	Due to the proximity of the development site to Ballysadare Bay SAC, a potential pathway for indirect effects on the QI habitat: Humid Dune Slacks was identified in the form of habitat degradation due to deterioration of water quality. In the absence of mitigation, there is potential for adverse effects on this habitat due to deterioration of water quality ad resulting habitat degradation arising from the percolation of pollutants to groundwater during the construction and operation of the proposed development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes

5.1.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form[3] for the Ballysadare Bay SAC, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in **Table 5.2.**

Table 5-2: Site-specific threats, pressures and activities with potential to have effects on Ballysadare SPA.

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	A04.03	Abandonment of Pastoral systems, lack of grazing	Inside
Medium	E01.02	Discontinuous urbanisation	Outside
Medium	F02	Fishing and harvesting aquatic resources	Inside
Medium	G01.02	Walking, horseriding, and non-motorised vehicles	Inside
Medium	G05.01	Trampling, overuse	Inside
Medium	K01.01	Erosion	Inside
Low	F01.03	Bottom culture	Inside
Low	G02.01	Golf course	Both
Low	I01	Invasive non-native species	Inside
Low	J02.01.02	Reclamation of land from sea, estuary or marsh	Inside
Low	J02.12.01	Sea defense or coast protection works, tidal barrages	Inside

5.1.1.3 Qualifying Interests - Specific Information

5.1.1.3.1 *Narrow-mouthed Whorl Snail [1014]*

As per the detailed Site-Specific Conservation Objectives (SSCO) document (NPWS, 2013), optimal and sub-optimal habitat for narrow-mouthed whorl snail is located approx. 680m west of the Proposed Development. The optimal habitat for this species is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra),* with sparse marram grass (*Ammophila arenaria*), lady's bedstraw (*Galium verum),* eyebright (*Euphrasia sp.),* mouse-ear hawkweed (*Pilosella officinarum*) and other low growing herbs, with a vegetation height of 10-30cm.

A dedicated whorl snail assessment of the proposed development site was undertaken by Ecofact Environmental Consultants in 2022 (Refer to report in Appendix 4). This assessment concluded that there is no habitat on the site considered to be suitable for any Vertigo species.

The attributes and targets for Narrow-mouthed Whorl Snail (*Vertigo angustior)* [1014]] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.3 below.

[3] *https://natura2000.eea.europa.eu/expertviewer/*

Targets and Attributes[4]

Table 5-3: Targets and Attributes of Narrow-mouthed Whorl Snail [1014]

Attribute	Target
Distribution: occupied sites	No decline. There is one known location for this species in this SAC (which overlaps two 1km squares).
Presence on transect	Adult or sub-adult snails are present in all three of the habitat zones on the transect (minimum four samples)
Presence	Adult or sub-adult snails are present in at least six other places at the site with a wide geographical spread (minimum of eight sites sampled)
Transect habitat quality	At least 50m of habitat along the transect is classed as optimal and the remainder as at least suboptimal
Transect optimal wetness	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for at least 50m along the transect
Habitat extent	At least 45ha of the site in at least optimal/suboptimal condition. Optimal habitat is defined as fixed dune, species-rich grassland dominated by red fescue (Festuca rubra) and marram (Ammophila arenaria), with sparse oxeye daisy (Leucanthemum vulgare), dandelion (Taraxacum sp.), ribwort plantain (Plantago lanceolata) and other low growing herbs. Vegetation height 20- 50cm. Habitat growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is defined as above but either vegetation height is less than 10cm or above 50cm; or the soil is dry and sandy; or the thatch is wetter with a denser structure

5.1.1.3.2 Harbour Seal *Phoca vitulina* [1365]

As per the detailed Site-Specific Conservation Objectives (SSCO) document (NPWS, 2013), Harbour seals in Ballysadare Bay SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle. The species is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (May to July approx.), moulting (August to September approx.) and non-breeding foraging and resting phases (October to April). In acknowledging the limited understanding of aquatic habitat use by the species within the site it should be noted that all suitable aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by harbour seals.

Current information on locations selected by harbour seals in Ballysadare Bay SAC during the breeding season, and on resting locations selected by harbour seals in Ballysadare Bay SAC outside the breeding season are comparatively limited. Current sites are broadly in the following areas: sandbanks to the north of Rosses Point, south of Ballygilgan Strand and Lissadell Strand.

According to the Article 17 reporting (NPWS, 2019), based on the assessments for range, population, habitat and future prospects parameters, the conservation status of harbour seal in Ireland is considered favourable and stable in 2019. This overall result and the results for the three assessment parameters are the same as in the previous two Article 17 assessments (i.e., favourable). Further, evidence from population estimation surveys carried out since the Directive came into force indicates that the all-age population of harbour seals (within the Natura 2000 network designated for the species in Ireland) has remained relatively stable.

[4] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002298.pdf*

The attributes and targets for Harbour seal (*Phoca vitulina*) [1365] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.4 below.

Targets and Attributes

Table 5-4: Targets and Attributes of Harbour Seal Phoca vitulina [1365]

Attribute	Target
Access to suitable habitat	Species range within the site should not be restricted by artificial barriers to site use.
Breeding behaviour	Conserve the breeding sites in a natural condition.
Moulting behaviour	Conserve the moult haulout sites in a natural condition.
Resting behaviour	Conserve the resting haulout sites in a natural condition.
Disturbance	Human activities should occur at levels that do not adversely affect the harbour seal population at the site

5.1.1.3.3 Estuaries [1130]

According to the site-specific conservation objectives document (NPWS, 2013), the habitat area was estimated as 1703ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive. The community extent was sourced based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012) and subtidal survey in 2010 (ASU, 2007, 2011).

According to the Article 17 reporting (NPWS, 2019) most of the pressures on estuaries come from various sources of pollution, including domestic wastewater, agriculture, and marine aquaculture. Alien invasive species such as the naturalised Pacific oyster (*Magallana gigas*) are also recognised as a significant pressure. The overall status of the habitat in the most recent 2019 assessment is favourable and stable. The status in 2013 was also favourable, while in 2007 the overall status of the habitat was unfavourable. As such, the overall trend of the habitat has changed from unfavourable to favourable and stable in the most recent assessment (NPWS 2019).

The attributes and targets for Estuaries as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.5 below.

Targets and Attributes

Table 5-5: Targets and Attributes of Estuaries [1130]

Attribute	Target
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes.
Community extent	Maintain the extent of the *Zostera*-dominated community, subject to natural processes
Community structure: Zostera density	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes
Community distribution	Conserve the following community types in a natural condition: Intertidal sand with *Angulus tenuis* community complex; Muddy sand to sand with *Hediste diversicolor*, *Corophium volutator* and *Peringia ulvae* community complex; Fine sand with polychaetes community complex; Sand with bivalves, nematodes and crustaceans

Attribute	Target
	community complex; Intertidal reef community complex; Subtidal reef community complex.

5.1.1.3.4 Mudflats and Sandflats not covered by seawater at low tide [1140]

According to the site-specific conservation objectives document (NPWS, 2013), the habitat area within the SAC was estimated using OSi data as 1345ha. The community extent was sourced based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012).

According to the Article 17 reporting (NPWS, 2019), the overall status of the habitat in the most recent 2019 assessment is unfavourable and declining. In the 2013 assessment the habitat was assessed as inadequate, and improving, while in 2007 the habitat was assessed as inadequate. The change in trend from improving to deteriorating is due to a genuine decline in the habitat since 2013. This was caused partly by pollution from agricultural, forestry and wastewater sources, as well as impacts associated with marine aquaculture, particularly the Pacific oyster (*Magallana gigas*).

The attributes and targets for Mudflats [1140] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.6 below.

Targets and Attributes

Table 5-6: Targets and Attributes of Mudflats and Sandflats not covered by seawater at low tide [1140]

Attribute	Target
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes
Community extent	Maintain the extent of the *Zostera*-dominated community, subject to natural processes
Community structure: Zostera density	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes
Community distribution	Conserve the following community types in a natural condition: Intertidal sand with *Angulus tenuis* community complex; Muddy sand to sand with *Hediste diversicolor*, *Corophium volutator* and *Peringia ulvae* community complex.

5.1.1.3.5 Humid Dune Slacks [2190]

According to the site-specific conservation objectives document (NPWS, 2013), the habitat area within the SAC was based on data from the Sand Dunes Monitoring Project (SDM). One large slack from the southern part of Strandhill Dunes is located approx. 700m from the Proposed Development. According to the Article 17 reporting (NPWS, 2019), the overall status of the habitat in the most recent 2019 assessment is decreasing. The attributes and targets for this habitat are provided in Table 5.7 below.

Targets and Attributes

Table 5-7: Targets and Attributes of Humid dune slacks [2190]

Attribute	Target
Habitat area	Area stable or increasing, subject to natural processes including erosion and succession. For subsite mapped: Strandhill - 1.83ha.
Habitat distribution	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: functionality and sediment supply	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Physical structure: hydrological and flooding regime	Maintain natural hydrological regime
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: bare ground	Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground
Vegetation structure: vegetation height	Maintain structural variation within sward
Vegetation composition: typical species and subcommunities	Maintain range of subcommunities with typical species listed in Delaney et al. (2013)
Vegetation composition: cover of *Salix repens*	Maintain less than 40% cover of creeping willow (*Salix repens)*
Vegetation composition: negative indicator species	Negative indicator species (including non-natives) to represent less than 5% cover
Vegetation composition: scrub/trees	No more than 5% cover or under control

5.1.2 Cummeen Strand/ Drumcliff Bay SAC

The potential for impacts on this SAC was identified in Section 4 above. The identified pathways for effect include the following:

- Degradation of habitat (including supporting habitat for QI species) due to deterioration of water quality via percolation of pollutants to groundwater during the construction and operation phases of the development.

Table 5.1 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.2.1 Identification of Individual Qualifying Features with the Potential to be Affected.

Table 5-8 Assessment of Qualifying interests potentially affected.

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
• [1130] Estuaries	To maintain the favourable conservation condition of Estuaries in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	Due to the proximity of the development site to Cummeen Strand/ Drumcliff Bay SAC, a potential pathway for indirect effects on the QI habitat: Estuaries was identified in the form of habitat degradation due to deterioration of water quality. In the absence of mitigation, there is potential for adverse effects on this habitat due to deterioration of water quality ad resulting habitat degradation arising from the percolation of pollutants to groundwater during the construction and operation of the proposed development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes
• [1140] Mudflats and sandflats not	To maintain the favourable conservation condition of Mudflats and sandflats not covered by	Due to the proximity of the development site to Cummeen Strand/ Drumcliff Bay SAC, a potential pathway for indirect effects on the following marine QI habitat: Mudflats and sandflats not covered by seawater at low tide was identified in the form of deterioration of water quality and supporting habitats for aquatic fauna.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
covered by seawater at low tide	seawater at low tide in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	In the absence of mitigation, there is potential for adverse effects on this habitat due to deterioration of water quality ad resulting habitat degradation arising from the percolation of pollutants to groundwater during the construction and operation of the proposed development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	
• [2110] Embryonic shifting dunes	To maintain the favourable conservation condition of Embryonic shifting dunes in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	There is no potential for indirect effects on this QI habitat: Embryonic shifting dunes due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 560m of golf course (improved amenity grassland) and buildings and artificial surfaces. **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No
• [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	There is no potential for indirect effects on this QI habitat: Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 560m of golf course (improved amenity grassland) and buildings and artificial surfaces. **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
• [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)	To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	There is no potential for indirect effects on this QI habitat: Fixed coastal dunes with herbaceous vegetation (grey dunes) due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 560m of golf course (improved amenity grassland) and buildings and artificial surfaces. **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No
• [7220] Petrifying springs with tufa formation (*Cratoneurion)*	To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion)* in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	According to the NPWS Conservation Objectives document for Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, there is one known location of this QI Habitat: Petrifying springs with tufa formation (*Cratoneurion* within this SAC as per Map 7., approx. 6.8km north-east of the Proposed Development site. The area of this QI habitat at Ballincar is recorded as 150m² along 200m of cliff. However, further areas of this habitat may occur within this SAC. This QI habitat relies on permanent irrigation from upwelling groundwater sources. As such, taking an extremely precautionary approach, due to the potential for further areas of this habitat to occur within this SAC, the proximity of this QI habitat (6.8km) to the proposed development site, and this QI habitats reliance on groundwater irrigation sources, a potential pathway for indirect effects on was identified in the form of deterioration of water quality via pollution to groundwater via the percolation of polluting materials through the bedrock underlying the site, adversely impacting the water quality/ habitat quality during the construction and operational phase of the proposed development, in the absence of mitigation. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes
• [1095] Sea Lamprey *Petromyzon marinus*	To restore the favourable conservation condition of Sea	Due to the proximity of the development site to Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (560m), a potential pathway for indirect effects on the following aquatic migratory QI	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
	Lamprey in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	species: *Petromyzon marinus* (Sea Lamprey) were identified in the form of deterioration of water quality and supporting habitats for aquatic fauna. The construction and operational phase of the proposed development may result in pollution of groundwater via the percolation of polluting materials through the bedrock underlying the site, adversely impacting the water quality/ habitat quality, and supporting habitats for this aquatic migratory species*: Petromyzon marinus* (Sea Lamprey): within the SAC, in the absence of mitigation. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS**.	
• [1099] River Lamprey *Lampetra fluviatilis*	To maintain the favourable conservation condition of River Lamprey in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	Due to the proximity of the development site to Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (123m), a potential pathway for indirect effects on the following aquatic migratory species: *Lampetra fluviatilis* (River Lamprey) were identified in the form of deterioration of water quality and supporting habitats for aquatic fauna. The construction and operational phase of the proposed development may result in pollution of groundwater via the percolation of polluting materials through the bedrock underlying the site, adversely impacting the water quality/ habitat quality, and supporting habitats for this aquatic migratory species: *Lampetra fluviatilis* (River Lamprey), within the SAC, in the absence of mitigation. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS**.	Yes
• [1365] Harbour Seal *Phoca vitulina*	To maintain the favourable conservation condition of Harbour Seal in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	There is potential for adverse effects on this aquatic QI species due to degradation of supporting habitat resulting from deterioration of water quality during the construction and operational phases of the proposed development. The site does not provide suitable habitat for this species and is buffered from the proposed development site by 560m of golf course (improved amenity grassland) and buildings and	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
		artificial surfaces. There is no potential for adverse effects on this species due to disturbance or displacement. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	
• [5130] *Juniperus communis* formations on heaths or calcareous grasslands	To restore the favourable conservation condition of *Juniperus communis f*ormations on heaths or calcareous grasslands in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	There is no potential for indirect effects on this QI habitat: *Juniperus communis* formations on heaths or calcareous grasslands due to the terrestrial nature of the QI, and the absence of a complete source pathway receptor chain. This habitat is also buffered from the proposed development by 560m of golf course (improved amenity grassland) and buildings and artificial surfaces. **No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.**	No
• [1014] Narrow-mouthed whorl snail *Vertigo angustior*	To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	According to the NPWS Conservation Objectives document for Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, there is one known location of this QI Species within this SAC as per Map 7, approx. 502m north of the proposed development site. The optimal habitat for this species is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra),* with sparse marram grass (*Ammophila arenaria*), lady's bedstraw (*Galium verum),* eyebright (*Euphrasia sp.),* mouse-ear hawkweed (*Pilosella officinarum*) and other low growing herbs, with a vegetation height of 10-30cm, as per CO document (NPWS 2013). The proposed development site is dominated by improved agricultural grassland, and as such, does not support suitable habitat for this QI species. However, taking a very precautionary approach, a potential pathway for adverse effects on the species due to deterioration of water quality and degradation of supporting habitat (where the species may occur in humid dune habitat), resulting from the percolation of pollutants to groundwater during the construction and operational phases of the proposed development was identified.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2013)	Rationale	Potential for Adverse Effects Y/N
		A complete source-pathway-receptor chain for adverse effects on this species was identified and it is assessed further in this NIS.	

5.1.2.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form[5] for the Cummeen Strand/ Drumcliff Bay SAC, the site specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in Table 5.9

Table 5-9: Site-specific threats, pressures and activities with potential to have effects on Ballysadare SPA.

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
H	F01.01	intensive fish farming, intensification	Inside
L	E03.03	disposal of inert materials	Inside
L	G02.08	Camping and caravans	Inside
L	G05.01	Trampling, overuse,	Inside
L	J01.01	burning down	Inside
L	J02.11.01	Dumping, depositing of dredged deposits	Inside
L	J02.12.01	sea defence or coast protection works, tidal barrages	Inside
M	A02.01	agricultural intensification	Inside
M	D03	shipping lanes, ports, marine constructions	Inside
M	D03.01	port areas	Inside
M	E01.03	Dispersed habitation	Inside
M	G01.02	walking, horse-riding, and non-motorised vehicles	Inside
M	G01.03.02	off-road motorized driving	Inside
M	G02.01	Golf course	Inside
M	101	invasive non-native species	Inside

5.1.2.3 Qualifying Interests - Specific Information

5.1.2.3.1 Estuaries [1130]

According to the site-specific conservation objectives document (NPWS, 2013), the habitat area was estimated as 1703ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive. The community extent was sourced based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012) and subtidal survey in 2010 (ASU, 2007, 2011).

According to the Article 17 reporting (NPWS, 2019) most of the pressures on estuaries come from various sources of pollution, including domestic wastewater, agriculture, and marine aquaculture. Alien invasive species such as the naturalised Pacific oyster (*Magallana gigas*) are also recognised as a significant pressure. The overall status of the habitat in the most recent 2019 assessment is favourable

[5] *https://natura2000.eea.europa.eu/expertviewer/*

and stable. The status in 2013 was also favourable, while in 2007 the overall status of the habitat was unfavourable. As such, the overall trend of the habitat has changed from unfavourable to favourable and stable in the most recent assessment (NPWS 2019).
The attributes and targets for Estuaries as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.10 below.

Targets and Attributes

Table 5-10: Targets and Attributes of Estuaries [1130]

Attribute	Target
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes.
Community extent	Maintain the extent of the *Zostera*-dominated community and the Mytilidae-dominated community complex, subject to natural processes
Community structure: Zostera density	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes
Community Structure: *Mytilus edulis* density	Conserve the high quality of the Mytilidae-dominated community complex, subject to natural processes.

5.1.2.3.2 Mudflats and Sandflats not covered by seawater at low tide [1140]

According to the site-specific conservation objectives document (NPWS, 2013), the habitat area within the SAC was estimated using OSi data as 1345ha. The community extent was sourced based on intertidal surveys undertaken in 2007 and 2010 (ASU, 2007, 2012).

According to the Article 17 reporting (NPWS, 2019), the overall status of the habitat in the most recent 2019 assessment is unfavourable and declining. In the 2013 assessment the habitat was assessed as inadequate, and improving, while in 2007 the habitat was assessed as inadequate. The change in trend from improving to deteriorating is due to a genuine decline in the habitat since 2013. This was caused partly by pollution from agricultural, forestry and wastewater sources, as well as impacts associated with marine aquaculture, particularly the Pacific oyster (*Magallana gigas*).

The attributes and targets for Mudflats and Sandflats not covered by seawater at low tide [1140] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.11 below.

Targets and Attributes

Table 5-11: Targets and Attributes of Mudflats and Sandflats not covered by seawater at low tide [1140]

Attribute	Target
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes
Community extent	Maintain the extent of the *Zostera*-dominated community, subject to natural processes
Community structure: Zostera density	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes

Community distribution	Conserve the following community types in a natural condition: Intertidal sand with *Angulus tenuis* community complex; Muddy sand to sand with *Hediste diversicolor*, *Corophium volutator* and *Peringia ulvae* community complex.

5.1.2.3.3 Petrifying Springs with Tufa formation (Cratoneurion) [7220]

According to the site-specific conservation objectives document (NPWS, 2013), the area of this habitat at Ballincar is recorded as 150m2 along c.200m of cliff (internal NPWS files). The SSCO document states that further unsurveyed areas maybe present within this SAC.

This habitat occurs along a seepage line in low (generally less than 10m in height) clay sea cliffs near Ballincar (internal NPWS files). Lyons and Kelly (2013) recognise three main subtypes of spring. This site falls into the coastal springs subtype (the other two being woodland springs and inland non-wooded springs). The hydrological regime is currently unknown at this site. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources. This site appears to be fed from water seeping through clay sea cliffs.

According to the Article 17 reporting (NPWS, 2019), the overall status of this habitat in 2019 is assessed as inadequate and declining, which is a decline from inadequate and stable in the 2013 report. The trend is assessed as deteriorating (reported as stable in 2013,), which is due to improved knowledge, and decline is considered to have been on-going since before the last assessment.

The attributes and targets for Petrifying Springs with Tufa formation (Cratoneurion) [7220] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SAC are provided in Table 5.12 below.

Targets and Attributes

Table 5-12: Targets and attributes of Petrifying springs with tufa formation (Cratoneurion) [7220]

Attribute	Target
Habitat Area	Area stable or increasing, subject to natural processes
Habitat distribution	No decline
Hydrological regime: height of water table; water flow	Maintain appropriate hydrological regimes
Water quality	Maintain oligotrophic and calcareous conditions
Vegetation composition: typical species	Maintain typical species

5.1.2.3.4 Sea Lamprey [1095]

According to the site-specific conservation objectives document (NPWS, 2013), this SAC only covers marine/estuarine habitat, and it is not anticipated that it contains suitable spawning or nursery habitat. Migrating adult lamprey pass through the site en route to/from the Garavogue River, which flows out of Lough Gill. Lough Gill SAC (site code: 1976), which is adjacent to this SAC, encompasses the freshwater elements of sea lamprey habitat. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants.

According to the Article 17 reporting (NPWS, 2019), the overall conservation status of *P. marinus* has remained unchanged since the previous reporting period (2013) and is assessed as bad. The range is

assessed as bad as it is more than 10% below the favourable reference range. The population is assessed as bad as it is estimated to be more than 25% below the favourable reference population. The habitat is assessed as inadequate as the area is not considered large enough to ensure the future long--term viability of sea lamprey. This assessment has changed since the previous reporting period and is based on new data and best expert judgement.

The attributes and targets for Petrifying Springs with Tufa formation (Cratoneurion) [7220] as per the Site-Specific Conservation Objectives (SSCOs) for Cummeen Strand/ Drumcliff Bay SAC are provided in Table 5.13 below

Targets and Attributes

Table 5-13: Targets and attributes of Sea Lamprey (Petromyzon marinus) [1095]

Attribute	Target
Distribution: extent of anadromy	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa

5.1.2.3.5 *River Lamprey [1099]*

According to the site-specific conservation objectives document (NPWS, 2013), this SAC only covers marine/estuarine habitat, and it is not anticipated that it contains suitable spawning or nursery habitat. Migrating adult lamprey pass through the site en route to/from the Garavogue River, which flows out of Lough Gill. Lough Gill SAC (site code: 1976), which is adjacent to this SAC, encompasses the freshwater elements of river lamprey habitat. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants.

According to the Article 17 reporting (NPWS, 2019), '*Given the large area of habitat availability and the likelihood that, in certain flow conditions, river lamprey is able to ascend many of the significant weirs on Irish rivers, it is possible that, in reality, they have a favourable conservation status. The inability to distinguish between L. fluviatilis and L. planeri larvae, however, and the challenges associated with sampling for adult river lamprey, means that an evaluation of their actual range and population size cannot be undertaken and status is assessed as unknown for the current reporting period*'.

The attributes and targets for River Lamprey [1099] as per the Site-Specific Conservation Objectives (SSCOs) for Cummeen Strand/ Drumcliff Bay SAC are provided in Table 5.14 below.

Targets and Attributes

Table 5-14: Targets and attributes of River Lamprey (Lampetra fluviatilis) [1099]

Attribute	Target
Distribution: extent of anadromy	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa

5.1.2.3.6 Harbour Seal *Phoca vitulina* [1365]

As per the detailed Site-Specific Conservation Objectives (SSCO) document (NPWS, 2013), Harbour seals in Ballysadare Bay SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle. The species is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (May to July approx.), moulting (August to September approx.) and non-breeding foraging and resting phases (October to April). In acknowledging the limited understanding of aquatic habitat use by the species within the site it should be noted that all suitable aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by harbour seals.

Current information on locations selected by harbour seals in Ballysadare Bay SAC during the breeding season, and on resting locations selected by harbour seals in Ballysadare Bay SAC outside the breeding season are comparatively limited.

Current sites are broadly in the following areas: sandbanks to the north of Rosses Point, south of Ballygilgan Strand and Lissadell Strand.

According to the Article 17 reporting (NPWS, 2019), based on the assessments for range, population, habitat and future prospects parameters, the conservation status of harbour seal in Ireland is considered favourable and stable in 2019. This overall result and the results for the three assessment parameters are the same as in the previous two Article 17 assessments (i.e., favourable). Further, evidence from population estimation surveys carried out since the Directive came into force indicates that the all-age population of harbour seals (within the Natura 2000 network designated for the species in Ireland) has remained relatively stable.

The attributes and targets for Harbour seal (*Phoca vitulina*) [1365] as per the Site-Specific Conservation Objectives (SSCOs) for Cummeen Strand/ Drumcliff Bay SAC are provided in Table 5.15 below.

Targets and Attributes[6]

Table 5-15: Targets and Attributes of Harbour Seal Phoca vitulina [1365]

Attribute	Target
Access to suitable habitat	Species range within the site should not be restricted by artificial barriers to site use.
Breeding behaviour	Conserve the breeding sites in a natural condition.
Moulting behaviour	Conserve the moult haulout sites in a natural condition.
Resting behaviour	Conserve the resting haulout sites in a natural condition.
Disturbance	Human activities should occur at levels that do not adversely affect the harbour seal population at the site

5.1.2.3.7 *Narrow-mouthed Whorl Snail [1014]*

As per the detailed Site-Specific Conservation Objectives (SSCO) document (NPWS, 2013),, optimal and sub-optimal habitat for narrow-mouthed whorl snail is located approx. 520m west of the Proposed Development. The optimal habitat for this species is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra),* with sparse marram grass (*Ammophila arenaria*), lady's

[6] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002298.pdf*

bedstraw (*Galium verum),* eyebright (*Euphrasia sp.),* mouse-ear hawkweed (*Pilosella officinarum*) and other low growing herbs, with a vegetation height of 10-30cm.
The attributes and targets for Narrow-mouthed Whorl Snail (*Vertigo angustior)* [1014] as per the Site-Specific Conservation Objectives (SSCOs) for Cummeen Strand/ Drumcliff Bay SAC are provided in Table 5.16 below.

Targets and Attributes

Table 5-16: Targets and Attributes of Narrow-mouthed Whorl Snail [1014]

Attribute	Target
Distribution: occupied sites	No decline. There is one known location for this species in this SAC (which overlaps two 1km squares).
Presence on transect	Adult or sub-adult snails are present in all three of the habitat zones on the transect (minimum four samples)
Presence	Adult or sub-adult snails are present in at least six other places at the site with a wide geographical spread (minimum of eight sites sampled)
Transect habitat quality	At least 50m of habitat along the transect is classed as optimal and the remainder as at least suboptimal
Transect optimal wetness	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for at least 50m along the transect
Habitat extent	At least 45ha of the site in at least optimal/suboptimal condition. Optimal habitat is defined as fixed dune, species-rich grassland dominated by red fescue (Festuca rubra) and marram (Ammophila arenaria), with sparse oxeye daisy (Leucanthemum vulgare), dandelion (Taraxacum sp.), ribwort plantain (Plantago lanceolata) and other low growing herbs. Vegetation height 20- 50cm. Habitat growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is defined as above but either vegetation height is less than 10cm or above 50cm; or the soil is dry and sandy; or the thatch is wetter with a denser structure

5.1.3 Ballysadare Bay SPA

The potential for impacts on this SPA were identified in Section 4.1 above. The identified pathways for effect include the following:

- Deterioration of water quality arising from the percolation of pollutants to groundwater, during the construction and operational phases of the Proposed Development.
- Ex-situ disturbance and displacement related impacts to SCI species.

Table 5-17 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.3.1 Identification of Individual Qualifying Features with the Potential to be Affected.

Table 5-17: Assessment of Qualifying features of Ballysadare Bay SPA potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• A046 Brent Goose *Branta bernicla hrota*	To maintain the favourable conservation condition of Light-bellied Brent Goose in Ballysadare Bay SPA	The Proposed Development site does not provide significant suitable habitat for these SCIs of the Ballysadare Bay SPA [004129]. None of the SCI species were recorded within the proposed development site during the walkover survey or the wintering bird surveys undertaken. While brent goose was recorded flying over the site on a single occasion, it was not recorded utilising the site for foraging. Furthermore similar habitat to that in the proposed development site, i.e. agricultural grassland, is abundant in the wider area. There is no potential for adverse effects on the SCI species as a result of disturbance and no further assessment is required in this regard. Potential for adverse effects on supporting wetland habitat for these species is considered under the SCI wetlands [A999] in the column below.	No
• A141 Grey Plover *Pluvialis squatarola*	To maintain the favourable conservation condition of Grey Plover in Ballysadare Bay SPA		
• A149 Dunlin *Calidris alpina alpina*	To maintain the favourable conservation condition of Dunlin in Ballysadare Bay SPA		

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• A157 Bar-tailed Godwit *Limosa lapponica*	To maintain the favourable conservation condition of Bar-tailed Godwit in Ballysadare Bay SPA	**No complete source-pathway-receptor chain for adverse effects on these species via disturbance or displacement was identified and no further assessment is required in this regard.**	
• A162 Redshank *Tringa totanus*	To maintain the favourable conservation condition of Redshank in Ballysadare Bay SPA		
• A999 Wetlands	To maintain the favourable conservation condition of the wetland habitat in Ballysadare Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it	A potential pathway for indirect effects on supporting wetland habitat for SCI species was identified. In the absence of mitigation, there is potential for adverse effects on wetland habitat due to deterioration of water quality arising from potential percolation of pollutants to groundwater during the construction and operation of the Proposed Development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes

5.1.3.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in Table 5-18.

Table 5-18: Site-specific threats, pressures and activities with Potential to Have Effects on Ballysadare SPA.

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Medium	F03.01	Hunting	Inside
Medium	A08	Fertilisation	Outside
Medium	E01.01	Continuous urbanisation	Outside
Low	F01	Marine and freshwater aquaculture	Inside

5.1.3.3 Qualifying Interests – Specific Information

5.1.3.3.1 Wetlands A999

The wetland habitat area was estimated as 2129 ha using OSi data and relevant orthophotographs.

Targets and Attributes

The conservation objective for Wetlands within Ballysadare Bay SPA is:
'*To maintain the favourable conservation condition of the wetland habitat in Ballysadare Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.*'
The attributes and targets for the Wetlands [A999] as per the Site-Specific Conservation Objectives (SSCOs) for Ballysadare Bay SPA is provided in Table 5.19 below.

Table 5-19: Targets and attributes of Wetlands [A999]

Attribute	Target
Habitat Area	The permanent are occupied by the wetland habitat should be stable and not significantly less than the area of 2130 hectares, other than that occurring from natural patterns of variation.

5.1.4 Cummeen Strand SPA

The potential for impacts on this SPA were identified in Section 4.1 above. The identified pathways for effect include the following:

- Deterioration of water quality and supporting habitats for SCI species via pollution to groundwaters via the percolation of polluting materials through the bedrock underlying the site.
- Ex- situ disturbance and displacement related impacts to SCI species.

Table 5.20 below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

Table 5-20: Assessment of Qualifying features of Cummeen Strand potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• A046 Light-Bellied Brent Goose *Branta bernicla hrota*	To maintain the favourable conservation condition of Light-bellied Brent Goose in Cummeen Strand SPA	The Proposed Development site does not provide significant suitable habitat for these SCIs of the Cummeen Strand SPA [004035]. None of the SCI species were recorded within the proposed development site during the walkover survey or the wintering bird surveys undertaken. While brent goose was recorded flying over the site on one occasion, it was not recorded foraging within the site at any stage. Furthermore similar habitat to that within the development site, i.e. agricultural grassland, is abundant in the wider area. There is no potential for adverse effects on the SCI species as a result of disturbance and no further assessment is required in this regard. Potential for adverse effects on supporting wetland habitat for these species is considered under the SCI wetlands [A999] in the column below. **No complete source-pathway-receptor chain for adverse effects on these species due to disturbance/displacement was identified and no further assessment is required in this regard.**	No
• Oystercatcher *Haematopus ostralegus*	To maintain the favourable conservation condition of Oystercatcher in Cummeen Strand SPA		
• A162 Redshank *Tringa totanus*	To maintain the favourable conservation condition of Redshank in Cummeen Strand SPA		

Qualifying feature	Conservation Objective (NPWS, Version 1, 20 November 2013)	Rationale	Potential for Adverse Effects Y/N
• A999 Wetlands	To maintain the favourable conservation condition of wetland habitat in Cummeen Strand SPA as a resource for the regularly occurring migratory waterbirds that utilise it	A potential pathway for indirect effects on supporting wetland habitat for SCI species was identified. In the absence of mitigation, there is potential for adverse effects on wetland habitat due to deterioration of water quality arising from potential percolation of pollutants to groundwater during the construction and operation of the Proposed Development. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified and it is assessed further in this NIS.**	Yes

5.1.4.1 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in Table 5-21.

Table 5-21: Site-specific threats, pressures and activities with Potential to Have Effects on Cummeen Strand SPA.

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	J02.01.02	Reclamation of land from sea, estuary, or marsh	Inside
High	E02	Industrial or commercial areas	Inside
High	D03.02	Shipping lanes	Inside
High	F01	Marine and freshwater aquaculture	Inside
High	E02	Industrial or commercial areas	Outside
Medium	H	Pollution	Inside
Medium	E01	Urbanised areas, human habitation	Outside
Medium	D01.02	Roads, motorways	Outside
Medium	A08	Fertilisation	Outside
Low	F02.03	Biological resource other than agriculture and forestry- bottom culture	Inside

5.1.4.2 Species Specific Information

5.1.4.2.1 Wetlands A999

According to the NPWS Conservation Objectives Supporting document (NPWS, 2013), the wetland habitats contained within Cummeen Strand SPA are identified as of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore, the wetland habitats are considered to be an additional Special Conservation Interest.

According to the site synopsis (NPWS, 2014), '*Cummeen Strand is a large shallow bay stretching from Sligo Town westwards to Coney Island. It is one of three estuarine bays within Sligo Bay and is situated between Drumcliff Bay to the north and Ballysadare Bay to the south. The Garavogue River flows into the bay and forms a permanent channel. At low tide, extensive sand and mud flats are exposed. These support a diverse macro-invertebrate fauna which provides the main food supply for the wintering waterfowl. Invertebrate species such as Lugworm (Arenicola marina), Ragworm (Hediste diversicolor), Cockles (Cerastoderma edule), Sand Mason (Lanice conchilega), Baltic Tellin (Macoma balthica), Spire Shell (Hydrobia ulvae) and Mussels (Mytilus edulis) are frequent. Of particular note is the presence of eelgrass (Zosteranoltii and Z. angustifolia) beds, which provide a valuable food stock for herbivorous wildfowl. The estuarine and intertidal flat habitats are of conservation significance and are listed on Annex I of the E.U. Habitats Directive. Areas of salt marsh fringe the bay in places and provide roosting sites for birds during the high tide periods. Sand dunes occur at Killaspug Point and Coney Island, with a shingle spit at Standalone Point near Sligo Town*'.

The attributes and targets for the Wetlands [A999] as per the Site-Specific Conservation Objectives (SSCOs) for Cummeen Strand SPA is provided in Table 5.22 below.

Targets and Attributes

Table 5-22: Targets and attributes of Wetlands [A999]

Attribute	Target	Assessment
Habitat area	The permanent area occupied by the wetland habitat should be stable and not significantly less than 1732 hectares, other than that occurring from natural patterns of variation	There will be no decline in habitat area associated with the proposed development. Indirect pathways that would allow impacts to occur via water pollution were considered in the design of the proposed development and a range of measures, outlined in Section 5 of this report, are in place to avoid all water pollution during the construction and operational stage of the proposed development.

6. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

This section of the NIS assesses the potential effects of the proposed development on the identified relevant Qualifying Interests/Special Conservation Interests. This assessment is undertaken in the absence of any mitigation and in respect of the conservation objectives of the European Sites. The Conservation Objectives for each of the European Sites assessed were reviewed on the 13/05/2024. The Conservation Objectives for these sites are available at the following locations:

- Ballysadare Bay SAC [000622]
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000622.pdf

- Cummeen Strand/ Drumcliff Bay SAC [000627]
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000627.pdf

- Ballysadare Bay SPA [004129]
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004129.pdf

- Cummeen Strand SPA [004035]
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004035.pdf

Following the initial impact assessment, mitigation is prescribed where necessary to avoid adverse effects on the Conservation Objectives of the relevant QIs/SCIs. This is presented in a schedule of mitigation that is also listed underneath the effect that it mitigates.

6.1 Do Nothing Effect

The site of the Proposed Development consists predominantly of improved agricultural grassland. Should the Proposed Development not proceed, the existing site would likely remain under its current management and remain in its current state.

6.2 Potential for Direct Effects on the European Sites

The Proposed Development lies entirely outside the boundary of any European Site and is located approximately 310m from Ballysadare Bay SAC, 560m from Cummeen Strand/ Drumcliff Bay SAC, 360m from Ballysadare Bay SPA, and 1.49km from Cummeen Strand SPA. As such, there is no potential for direct effects on any European site. The proposed Development s comprised of Improved Agricultural Grassland (GA1), scrub (WS1), Hedgerows (WL1), and Stonewalls (BL1). There are no Annex I habitats recorded within or adjacent to the Proposed Development which could provide habitat connectivity with the SAC.

6.3 Potential for Indirect Effects on the European Sites

6.3.1 Deterioration in Water Quality

Taking a precautionary approach, a potential pathway for indirect effects on the following European Sites and relevant aquatic Qualifying Interests and Special Conservation Interests was identified in the form of deterioration of water quality and habitat degradation resulting from the potential percolation of pollutants to groundwater during the construction and operation phases of the Proposed Development:

Ballysadare Bay SAC [000622]

Relevant Qualifying Interests:

- [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior)*
- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide.
- [1365] Harbour seal (*Phoca vitulina)*
- [2190] Humid dune slacks

Cummeen Strand/ Drumcliff Bay SAC [000627]

Relevant Qualifying Interests:

- [1130] Estuaries
- [1140] Mudflats and Sandflats not covered by seawater at low tide
- [7220] Petrifying Springs with Tufa formation
- [1095] Sea Lamprey (*Petromyzon marinus*)
- [1099] River Lamprey (*Lampetra fluvialtis*)
- [1365] Harbour Sea (*Phoca vitulina*)
- [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior)*

Ballysadare Bay SPA [004129]

Relevant Qualifying Interests:

- [A999] Wetlands

Cummeen Strand SPA [004035]

Relevant Qualifying Interests:

- [A999] Wetlands

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6.3.1.1 Construction Phase

The construction of the Proposed Development will involve excavations and earth moving which could create the potential for pollution in various forms, i.e. the generation of suspended solids and the potential for spillage of fuels associated with the refuelling of excavation machinery. There is a risk that pollutants will percolate down into groundwater. Taking a precautionary approach and in the absence of mitigation, the works have potential to impact on water quality within the above European Sites.

6.3.1.1.1 *Mitigation*

A CEMP has been prepared for the proposed development and is included as Appendix 5. The CEMP will incorporate the mitigating principles to ensure that the work is carried out in a manner which blocks all potential pathways for adverse water quality impacts. The CEMP will be in place prior to the start of the construction phase of the project.

Best practice environmental control measures will be implemented during the construction phase of the development. These are described below:

Site Set-up

- Prior to the commencement of works, the site boundary will be clearly demarcated using temporary fencing and no works will take place outside the fenced area.
- A temporary construction compound is proposed for the construction phase of the proposed development, located along the northeastern portion of the site. All construction materials and substances will be stored in the site compound. All chemicals will be stored in suitable secure containers to avoid the potential for contamination.
- Access routes will be clearly marked/ identified. Access during construction will be restricted to land within the outlined works area.
- Prior to the commencement of earthworks, silt fencing will be down-gradient of the construction areas. Fences will be embedded into the local soils to ensure all site water (should any arise) is captured and filtered.

Pollution Prevention

- Site run-off will not discharge directly to the adjacent water bodies.
- Re-vegetation or reinstatement of the site as soon as possible to stabilise any bare soil and reduce the potential for silting and consequential suspended solids.
- Hydrocarbons and other toxic substances must not enter any waterbody. Should such substances be required to be stored on-site, they will be kept in secure bunded areas away from the adjacent watercourses. The bunded area will accommodate 110% of the total capacity of the containers within it.
- On-site refuelling will take place at a specifically designated refuelling area, to be located in the temporary compound (this will be decided by the appointed PSCS). This to be away from any site drains and out of the path of vehicle's. Refuelling equipment will be fitted with a "Dead Man's Handle2 which cuts off automatically and prevents overfilling This refuelling area will be bunded appropriately for the volume of fuel usage for the period of the construction.
- All machinery will be maintained in good working order, free from leakage of fuel or hydraulic fluid.
- Care will be taken to see that mud from the site does not become a hazard on the internal estate and public roads. Any debris will be cleaned up immediately by hand or with the aid of a road sweeper if excessive.
- A fuel interceptor will form part of the works to filter any surface water prior to discharge.
- Any groundwater encountered will be pumped to a localised settlement pond to allow sediment to settle out prior to natural discharge.
- Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the construction areas. Fences will be embedded into the local soils to ensure all site water (should any arise) is captured and filtered;
- Works will not take place during periods of heavy rainfall, and shall be scaled back or suspended if heavy rain is forecast.
- All excavated soil will be stored on site and reused for landscaping or transported off site to a designated waste facility.

Refuelling, Fuel and Hazardous Materials Storage

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site.
- Fuel absorbent material and pads will be available in the event of any accidental spillages. Only designated trained and competent operatives will be authorised to refuel plant on site and no refuelling operations shall be left unattended on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuel volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor.
- The plant used will be regularly inspected for leaks and fitness for purpose.
- All plant and machinery will be serviced before being mobilised to site.
- No plant maintenance will be completed on site, any broken-down plant will be removed from site to be fixed.
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water.
- Fuel containers will be stored within a secondary containment system, e.g., bunds for static tanks or a drip tray for mobile stores.
- Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored.
- Ancillary equipment such as hoses and pipes will be contained within the bund.
- Taps, nozzles or valves will be fitted with a lock system.
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage.
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills.
- A specific member of staff will be trained in the use of spill containment.

Spill Control Measures

In the event of minor spills and leaks from road vehicles and the onsite excavator, the following steps provide the procedure to be followed in the event of any significant spill or leak.

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains or watercourses.
- Clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action and further investigate the incident to ensure it has been contained adequately.
- External consultants will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Environmental Manager will notify the appropriate regulatory body such as Galway City Council, if deemed necessary.

Dust control

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route. The measures below will also prevent construction debris arising on the public road network.

- Any site roads/site entrances with the potential to give rise to dust will be regularly watered, as required, during very dry and/or windy conditions.
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by Site Management for cleanliness and cleaned as necessary.
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind.
- Water misting will be utilised on-site as required to mitigate dust in dry weather conditions.
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary.
- Daily inspection of the construction site will be carried out to examine dust measures and their effectiveness.

Earthworks

- Material that is not re-used will be transported off site to a designated waste facility.
- Suitable stone material will be imported to the site to be used as backfill.
- Excavation depths will be kept to a minimum.

Environmental Monitoring

The contractor will assign a member of the site staff as the environmental officer with the responsibility for ensuring the environmental measures prescribed in this document are adhered to. Any environmental incidents or non-compliance issues will immediately be reported to the project team.

6.3.1.2 Operational Phase

6.3.1.2.1 *Production of foul Sewage*

The operational phase of the proposed project will result in the production of foul sewage. If not adequately treated, there is potential for indirect impacts on water quality.

Wastewater from the proposed development will discharge to a proposed upgraded 225mm diameter foul pipe along Golf Course Road. There is full agreement with Uisce Eireann that there is adequate capacity and capability to fully treat all sewage generated by the proposed project in the public sewage treatment system. A pre-connection enquiry was submitted to Uisce Eireann and a Confirmation of Feasibility Letter was received on the 27th of April 2023 and is included as **Appendix 2.** An updated pre-connection enquiry was submitted to Uisce Eireann on 19th March 2024 (Ref. CDS24002332). In

line with Uisce Eireann 16 week response time an updated Confirmation of feasibility will follow in due course.

All wastewater infrastructure shall be designed and constructed in accordance with Uisce Eireann documents "Code of Practice for Wastewater Infrastructure" and "Wastewater Infrastructure Standard Details". No potential for adverse impact on water quality exists.

6.3.1.2.2 *Surface Water Runoff*

Surface water from the proposed development will discharge to the public surface water network on Golf Course Road via an outfall at the north-east corner of the site (refer to Appendix 1). To reduce and attenuate the flow, the proposed development has been designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS) as expressed in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

The site will be served via below ground gravity pipework which will predominantly run below the proposed internal roads, landscape areas and carpark within the development. The surface water network will be fed via road gullies and rainwater from building roofs via guttering and downpipes. The surface water network will be attenuated, and flow controlled at greenfield runoff rates prior to outfall to the existing 450mm diameter surface water drainage sewer on Golf Course Road.

The site has been separated into three equal catchment areas for the surface water drainage design. Within each catchment, stormwater runoff will be directed to attenuation tanks (refer to Appendix 1). All attenuation tank systems have been sized to store the runoff from a 1:100-year storm event (+105 for Climate Change) of critical duration below ground.

All surface water will flow through one main attenuation tank prior to discharge. A Class 1 Petrol/Oil Bypass Interceptor will be installed on all inlets into the proposed attenuation tank and a flow control device will be fitted to the outlet manhole from this attenuation tank. This will control outflow from the tank internally and offset discharge downstream within the network.

No potential for adverse impacts on water quality exists as a result of the storm water treatment proposal.

7. Assessment Of Residual Adverse Effects

The potential for residual adverse effects on each of the individual relevant Qualifying Features of the Screened In European Sites following the implementation of mitigation, is assessed in this section of the report.

Based on the above, in view of best scientific knowledge, on the basis of objective information, there is no potential for adverse effect on the identified QIs/SCIs and their associated targets and attributes, or on any European Site. Potential pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

Taking cognisance of measures to avoid impacts and best practice/mitigation measures incorporated into the project design which are considered in the preceding section, the Proposed Development will not have an adverse effect on the integrity of any European Site.

The proposed project will not prevent the QIs/SCIs of European Sites from achieving/maintaining favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

> *'conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The conservation status will be taken as 'favourable' when:*
>
> - *Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and*
> - *The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and*
> - *There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.'*

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Development will not adversely affect the Qualifying Interests/ Special Conservation Interests associated with the Ballysadare Bay SAC and Ballysadare SPA.

8. CUMULATIVE IMPACT ASSESSMENT

The Proposed Development was considered in combination with other plans and projects in the area that could result in cumulative impacts on the Qualifying Interest/ Special Conservation Interests identified in Section 5 of this report. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects.

8.1 Assessment of Plans

The following development plans have been reviewed and taken into consideration as part of this assessment:

- Sligo County Development Plan 2017-2023
- 4th National Biodiversity Action Plan 2023-2027
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2023

The review focused on policies and objectives that relate to designated sites for nature conservation, biodiversity and protected species. Policies and objectives relating to the conservation of Annex I habitats were also reviewed. An overview of the search results with regard to plans is provided in Table 8-1 below.

Table 8-1: Plans

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
Sligo County Development Plan 2017-2023	**P-NH-3** Protect and, where possible, enhance the plant and animal species and their habitats that have been identified under the EU Habitats Directive, EU Birds Directive, the Wildlife Act and the Flora Protection Order. **P-NCODS-3** Ensure that proposals for development protect and enhance biodiversity, wherever possible, by minimising adverse impacts on existing habitats and by including mitigation and/or compensation measures, as appropriate, which ensure that biodiversity is enhanced. **P-NCODS-4** Apply the precautionary principle in relation to development proposals with potential to impact on County Biodiversity Sites or on local nature conservation interest by requiring an ecological impact assessment (EcIA) to ensure that any proposed development will not affect the integrity and conservation value of the site. **P- INW-5** Ensure that proposed developments do not adversely affect groundwater resources and groundwater-dependent habitats and species.	The County Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to Natura 20000 network and other natural heritage interests. No potential for cumulative effects when considered in conjunction with the current proposed development were identified. There will be no significant effects on European Designated sites as a result of the Proposed Development. No potential for negative cumulative impacts when considered in conjunction with the Proposed Development were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.

4th National Biodiversity Action Plan 2023-2027	**Outcome 2A:** The protection of existing designated areas and species is strengthened and conservation and restoration within the existing protected are network are enhanced. **Outcome 2B:** Biodiversity and ecosystem services in the wider countryside are conserved. **Outcome 2C:** All freshwater bodies are of at least 'Good Ecological Status' as defined under the EU Water Framework Directive **Outcome 2D:** Genetic diversity of wild and domesticated species is safeguarded **Outcome 2E:** A National Restoration Plan is in place to meet EU Biodiversity Strategy 2030 nature restoration targets **Outcome 2F:** Biodiversity and ecosystem services in the marine environment are conserved and restored **Outcome 2G:** Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment **Outcome 4C:** Nature-based solutions that combine benefits for biodiversity, and climate change adaptation are being widely implemented at a national, regional, and local scale.	The objectives set out in the NBAP aim to protect and enhance and promote biodiversity, nature restoration on the Island of Ireland and also contribute to International biodiversity initiative. Mitigation measures as outlined in this NIS for the Proposed Development also aim to protect biodiversity as such **no potential for cumulative impacts were identified upon review of the Plan in conjunction with the Proposed Development.**
Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032	**Regional Policy Objective (RPO) 5.4:** Encourage the prioritisation of Site-Specific Conservation Objectives (SSCO) for all sites of Conservation Value, designated in EU Directive (i.e. SACs, SPAs) to integrate with the development objectives of this Strategy. **RPO 5.5:** Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity. **RPO 5.7:** Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate.	The spatial and economic strategy was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on designated sites as a result of the development. Best practice preventative measures will be implemented to avoid effects on designated sites as outlined in Section 6.3.1.1 of this report. There will be no adverse effects on receptors listed as QIs/SCIs of European Sites, as a result of the development.

8.2 Assessment of Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development and was verified on the 09/10/2023. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings was conducted, and served to identify past and future projects, their activities, and their environmental impacts. All relevant projects were considered in relation to the potential for cumulative effects. All relevant data was reviewed (e.g., individual EISs/EIARs, layouts, drawings etc.) for all relevant projects where available. The projects considered include extensions to houses, retention permission, change of use, small alterations and the following:

Relevant finalised projects identified in the wider area of the development from the last 5 years include:

- **Pl.Ref. 22160:** Permission for a development consisting of modifications to course, internal road and carparking, including grassing over existing carpark to front of clubhouse, construction of new practice area and bunker, modifications to 10th and 12th greens and 11th tee, realignment of private road and creation of replacement parking spaces to the side and rear of the clubhouse, together with all ancillary works.
- **Pl. Ref. 19198:** Permission for development consisting of the construction of 9 new dwelling units, comprising of: 5 no. 2 storey 4 bedroom detached houses, and 4 no. 3 storey 5 bedroom detached houses, together with creation of public open space, works to site boundaries, and all other associated site works and services.
- **Pl. Ref. 19228:** Permission for development consisting of the construction of a proposed community shelter (area 64sqm) along with a proposed rain water harvesting tank system, solar photovoltaic roof panels, a mother and baby changing table and all associated site works.
- **Pl. Ref. 22422**: Permission for development consisting of the installation of 'Dryloos' (toilet facilities) to the existing golf course, together with all ancillary works.
- **Pl. Ref. 21481:** Permission for development consisting of the proposed single storey extension to front providing retail space, new proposed second storey attic conversion with roof terrace and new stair core to rear.
- **PL 04/1466:** Extension of duration for demolition of the existing Neptune Stores buildings and their replacement with a new three storey building comprising of 2 retail units, 8 apartments with communal lobby and staircase, and in-curtilage parking, the demolition of the existing amusements arcade, retail outlets and ancillary buildings adjacent to the Strand Bar and their replacement with a new three storey building comprising of 4 retail units, a public entertainment complex, 2 restaurants, 18 apartments with communal lobbies and staircases, and in-curtilage parking, the extension of the existing seafront promenade with a new promenade extending to the north comprising of a one way road linking the promenade with the existing plaza apartments road, a new sea wall with coastal defence structure and rock armour, a hard landscaped beach side pedestrian area, an end-on parking zone, a delivery area, a shop-front pedestrian area with a public roadside terrace and landscaped seating areas and the repositioning of and connection to the existing sewage pumping station. Significant further information received including revised plans indicating the removal of 2 no proposed restaurant units to be replaced by 2 no additional retail and 2 no additional apartment units, revised elevations and sections, revised site and finished floor levels, revised site boundary and site map, revised foul and surface water proposals including revised wastewater pumping, compound, revised car parking, revised road layout and assessment of original Traffic Impact Assessment and Road Safety Audit based on proposed revisions, removal of existing slipway, revised landscaping, and revised proposals for compliance with Section 96 of the Planning and Development Act 2000 (as amended) has been submitted to the Planning Authority relating to Application No. PL 04/1466.
- **Pl. Ref. 19169**: Permission for development consisting of 19 no. residential units comprising 4 no. semi-detached 2 beds, 4 no. semi-detached 3 beds, 1 no. detached 3 bed, 6 no. semi-

detached 4 beds and 4 no. detached 4 beds. This development also includes the demolition of an existing derelict cottage, site development works and services.

- **Pl.Ref. 20181**: Permission for development consisting of (1) construct a two-storey office building (908m2), (2) construct access road with entrance onto the business park road, (3) construct a bicycle storage shelter, (4) construct a refuse storage compound, (5) construct a front boundary wall, (6) erect site signage on building, (7) provide car parking, (8) connect to services and (9) carry out all ancillary site works at Sligo Airport Business Park, Killaspugbrone Td, Strandhill, Co. Sligo. A Natura Impact Statement will be submitted to the planning authority with this application.
- **Pl.Ref. 19125:** Permission for development consisting of permission for (1) New single storey southwest side changing room extension and rear store room extension (2) Alterations to existing front facade and northeast side elevation. (3) New entrance canopy together with all associated site works, for Sligo Rugby Club.
- **Pl.Ref. 14344:** Permission for development consisting of alterations as follows to planning granted under PL 13/352: - (1) extension of existing 15msq store to rear of shop to 48.5msq store and (2) construction of new 10.5msq glazed lobby to front of shop, together with all associated site works at Keane's Centra.

8.3 Assessment of Cumulative Effects

Following the detailed assessment provided in the preceding sections, it is concluded that, the proposed development will not result in any residual adverse effects on any of the European Sites, their integrity or their conservation objectives when considered on its own. There is therefore no potential for the proposed development to contribute to any cumulative adverse effects on any European Site when considered in-combination with other plans and projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the proposed development.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified with regard to any European Site.

9. Concluding Statement

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the proposed development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

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APPENDIX 1

ENGINEERING SERVICES REPORT

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2024

Residential Development Strandhill, Co. Sligo
Engineering Planning Report

Document Control Sheet

Client:	Altitude Distribution Ltd
Document No:	231541-ORS-XX-XX-RP-CS-13a-005

Revision	Status	Author:	Reviewed by:	Approved By:	Issue Date
P01	**S3**	**DG**	**MH**	**DMC**	**28.03.24**
P02	**S2**	**DG**	**MH**	**DMC**	**22.04.24**

ORS

Table of Contents

1 Introduction

ORS have been instructed by Altitude Distribution Ltd and Vincent Hannon Architects to prepare an Engineering Planning Report for the proposed Residential Development at Strandhill, Co. Sligo.

1.1 Site Location

The site is located 8.0km to the west of Sligo city and is in close proximity to the coastline (Strandhill Beach). The proposed site is a greenfield site. The site is approximately 3.9 hectare.

The proposed development is bounded on the west side by Strandhill Golf Club carpark and entrance road (Golf Course Road), agriculture land to the north with planning permission recently being submitted for residential development (sub-sequentially withdrawn but expected to be resubmitted in the coming weeks), existing residential houses to the east and agriculture land to the south. Entrance/exit from the site will be off Golf Course Road on the western boundary.

This report should be read in conjunction with ORS drawings.

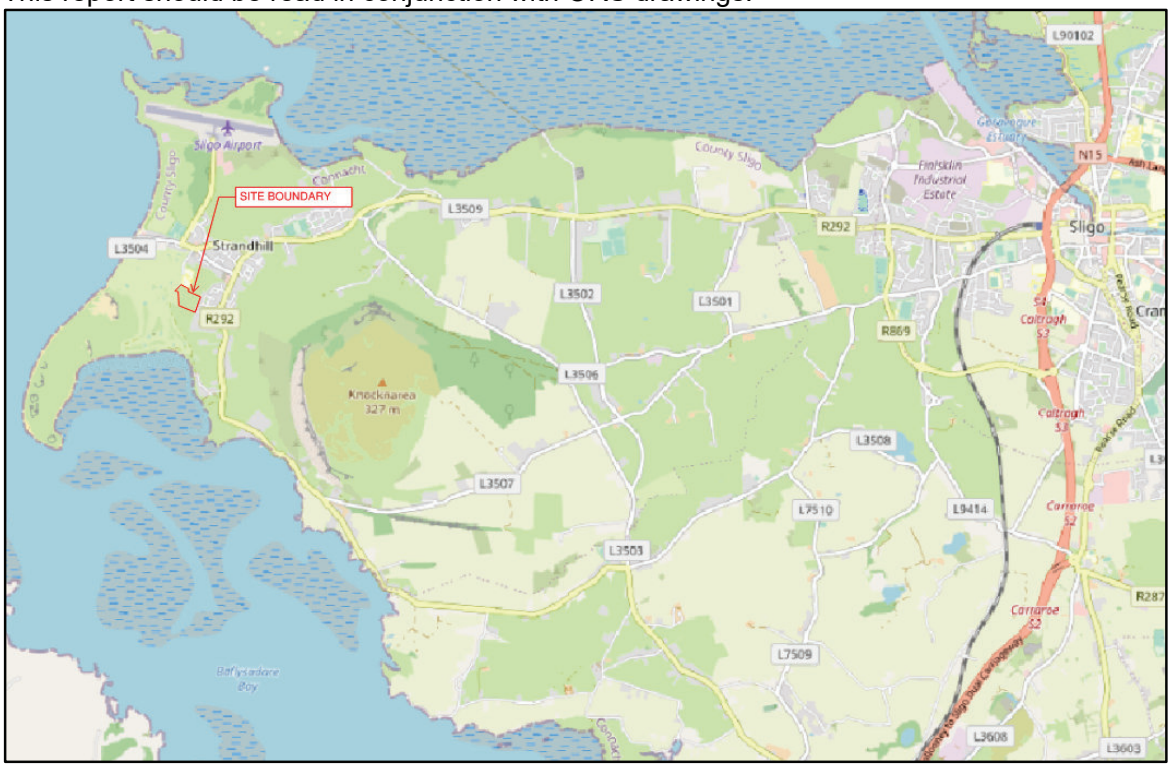


Figure 1: Site Location of Proposed Development (Google)

1.2 Proposed Development

The proposed development consists of the following.

Construction of 99 no. residential units consisting of:

30 No. – Type A – 2-storey, 2-Bed Semi Detached and Terraced Houses;
7 No. – Type B – 3 -storey, 3-Bed Semi Detached and Terraced Houses;
42 No. – Type C – 2 -storey, 3-Bed Semi Detached Houses;
2 No. – Type D – 3 -storey, 4-Bed Semi Detached Houses;
2 No. – Type D1 – 3 -storey, 5-Bed Detached Houses;
7 No. – Type D2 – 3 -storey, 5-Bed Semi Detached Houses;
1 No. - Type D3 - 3 -storey, 5-Bed Semi Detached Houses;
8 No. – Type E – 3 -storey, 5-Bed Detached Houses;

Provision of 1 No. Childcare Facility (651sq.m) including pedestrian access, with 550sq.m of open play space and associated car parking provision of 4,950sq.m of public open space.

Pedestrian, cycle and vehicular access to Golf Course Road.

Residential car parking, site landscaping, boundary treatments, public lighting, service connections and all associated site development works.

Figure 2: Site Layout Plan (VHA Architects)

2 Surveys

2.1 Topographical Survey

A topographical survey was carried out for the entire site. The survey includes contours, spot levels on the site (all to Malin Head datum), site boundary, edge of road, agriculture stone wall and fence. The subject site slopes continually from the south-east corner of the site (high point) at an elevation of approximately 34.30m OD to the north-west corner of the site at an elevation of 14.50m OD (low point). The site has an average slope of 1:16. There are a few localised high points on the site, however, other than localised areas of cut and fill, it is envisaged that largely existing ground levels will be retained for this development.

Refer to Roads layout drawing number **231541-ORS-ZZ-00-TR-700** for details of existing and proposed levels.

2.2 Site Investigation Survey

As part of the drainage design a number of infiltration tests were carried out on site to determine if the existing ground was suitable for stormwater infiltration. These tests were undertaken on January 17, 2024. For test results, refer to **Appendix B** for further details. A total of three infiltration tests were carried out in accordance with BRE 365: 2016 guidelines. The three tests were located within the public open spaces (POS) within the site development. The infiltration tests were done in POS to the south of site, POS to the north-east of site and the final test was carried out in an area fronting onto the existing road between the site boundary and the units fronting public road. From the three infiltration tests carried out, the ground had little or no infiltration and the tests did not provide any infiltration results. Therefore, infiltration on site will not be considered as part of the drainage design strategy for this site.

3 Scope of Services Report

The objective of this Engineering Services Planning Report is to design the following elements to accommodate the works as follows:

- Design a new stormwater network and attenuation tanks.
- Design a new foul water network.
- Design a new watermain network.
- Design a new internal roads, junction and parking facilities.

4 Design Codes & Standards

The civil engineering works presented in this report and the accompanying drawings have been designed in accordance with the following codes of practice and standards:

- "Irish Building Regulations Technical Guidance Documents" Department of the Environment and Local Government
- "Greater Dublin Strategic Drainage Study" published under the National Development Plan
- UK SuDS Manual - CIRIA Report "C753 – Sustainable Drainage Systems"
- EPA - Wastewater Treatment Manuals – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels
- Guidance on the Authorisation of Discharges to Groundwater (EPA, 2011)
- EPA – Groundwater Protection Responses for On-site Wastewater Systems for Single Houses
- EPA - Guidance on the Authorisation of Discharges to Groundwater
- European Communities Environmental Objectives (Surface Water) Regulations, 2009.

5 Water and Wastewater Services

5.1 Existing Utilities

There is existing utility services that run adjacent to the boundary of this proposed development. To the west and east of site boundary are existing foul pipes. Along the western boundary there is an existing 150mm diameter foul that serves the existing Strandhill Golf Course. To the east, there are existing foul pipes serving an existing residential development that is at a higher elevation than the proposed development. An existing 75mm diameter HDPE watermain pipe fronts onto this site, along the western boundary with the watermain pipe serving the existing Strandhill Golf Course. Refer to **Figures 3 and 4** below for further details of foul and watermain layouts.

Figure 3: Existing Public Foul Pipe Layout

Figure 4: Existing Public Watermain Pipe Layout

5.2 Irish Water Pre-Connection Enquiry

A pre-connection enquiry (PCE) was submitted to Irish Water and a response letter was received on April 27, 2023. Irish Water confirmed that feasibility of water and wastewater connections for the development could be facilitated. A copy of the response letter from Irish Water is attached in **Appendix A** of this report. A updated pre-connection enquiry was submitted to UE on 19th March 2024 (Ref. CDS24002332). Inline with UE 16 week response time a updated COF will follow in due course.The confirmation of feasibility (COF) noted the following:

- Watermain connection – upgrade of existing 75mm diameter watermain pipe that will run along Golf Course Road. Length of pipe to be upgraded is approximately 405m and pipe size required is to be 150mm based on proposed development.
- Wastewater connection – upgrade of existing 150mm diameter wastewater pipe that will run along Golf Course Road. Length of pipe to be upgrade is approximately 395m and pipe size required is to be 225mm based on proposed development.

5.3 Proposed Water Network

The proposed development will connect into the public watermain network via upgrade works to existing pipes. The proposal is for the a new length of 150mm diameter watermain pipe to be installed along Golf Course Road by Irish Waters Framework Contractor to connection at the junction of Burma Road (R277). These upgrade works will be undertaken by Irish Water led development works with the intention of servicing the Sligo County Council lands also. Once these new pipes are installed within the public road, it is proposed that this development will connect into the new watermain pipes.

The anticipated water demand for the development has been calculated in accordance with Irish Water – Code of Practice (IW COP) for Water Infrastructure. The proposed development is for residential housing and the water demand has been quantified on this basis. The water usage per person has been taken as 150 litres per day as per IW COP. The ultimate number of housing units is 99 along with a creche and as per IW COP, occupancy per dwelling is 2.7. As calculated in **Appendix C**, the anticipated maximum water demand for the development will be approximately 46.185m3/day.

All watermain infrastructure shall be designed and constructed in accordance with Irish Water documents "Code of Practice for Water Infrastructure" and Water Infrastructure Standard Details". Please refer to ORS drawing number **231541-ORS-XX-XX-DR-CE-400** for layout of the proposed water supply infrastructure.

5.4 Proposed Wastewater Network

Similar to the water network, the proposal is for a new length of 225mm diameter foul pipe along Golf Course Road up to the junction of Burma Road (R277) to be carried out by Irish Waters Framework Contractor.
When this new foul pipe is installed along the Access Road, it is proposed that this proposed development will then connect into this new foul pipe.

The anticipated wastewater volume generated from the development has been calculated in accordance with IW COP for Wastewater Infrastructure. The water usage per person has been taken as 150 litres per day. The proposed number of new units is 99 along with a creche and the average occupancy has been taken at 2.7 per dwelling as per IW COP. An allowance of 10% in addition to overall flow has also been accounted for from groundwater infiltration. Therefore, as calculated in **Appendix D**, the anticipated total daily flow for the development will be approximately 46.185m³/day. This translates to a Dry Weather Flow of 0.53l/s or Peak Dry Weather Flow (6.0DWF) of 3.21l/s.

The proposed internal wastewater sewer will consist of a series of 150mm – 225mm diameter sewer pipes falling in ranges of between 1:60 and 1:80. 100mm diameter pipes will be provided between access junctions enclosing dwellings and falling at a minimum grade of 1 in 60. All internal wastewater drainage pipe will be separate to surface water drainage infrastructure in accordance with IW COP. The proposed wastewater pipe calculations are attached in **Appendix E** of this report.

All wastewater infrastructure shall be designed and constructed in accordance with Irish Water documents "Code of Practice for Wastewater Infrastructure" and "Wastewater Infrastructure Standard Details". Please refer to ORS drawing number **231541-ORS-XX-XX-DR-CE-400** for layout of the proposed wastewater drainage infrastructure.

6 Surface Water Drainage

Guidance for the design of the Surface Water network has been taken from the Greater Dublin Strategic Drainage Study (GDSDS) and Sustainable Urban Drainage Systems (SUD's). Please refer to **Appendix D** for Surface Water Design Calculations.

6.1 Existing Stormwater Drainage

There is an existing 525mm diameter surface water drainage pipework along Golf Course Road that fronts onto the site. From the topographical survey carried out on site it is noted that this is also accessible via the adjoining council lands. While this is noted on Irish Water drawings as a 450mm pipe it is actually a 525mm pipe as surveyed.

This existing pipe flows by gravity towards the junction of Burma Road (R277). From this junction it heads west towards Strandhill beach where it discharges into the ocean.

Refer to **Figure 5** below for details.

Figure 5: Existing Public Stormwater Pipe Layout

6.2 Proposed Surface Water Drainage Strategy

The proposed site will be served via below ground gravity pipework which predominantly runs below the proposed internal roads, landscape areas and carpark within the development. The surface water network will be fed via road gullies and rainwater from building roofs via guttering and downpipes. The surface water network will be attenuated, and flow controlled at greenfield runoff rates prior to outfall into the existing 525mm diameter surface water drainage sewer in Golf Course Road. It is noted that **Figure 5** above indicates a 450mm diameter pipe, but from on site survey, it is confirmed that the existing stormwater pipe is actually a 525mm diameter pipe.

Sustainable Urban Drainage Systems (SuDS) will be utilised throughout the site where practical to help mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequencies and reducing pollutant concentrations in stormwater runoff. SuDS measures which have been incorporated in this scheme include the use of permeable paving to all car parking spaces.
All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/sec.

As noted in UK SUDS guidance document the soil run off rates for this area is deemed to be 0.30 (soil type 2). This value has been used to calculate the greenfield runoff rate for this development.

From reviewing Met Eireann SAAR values for this specific site location, it was determined that the SAAR value for this site is 1228mm. This value has been used to calculate the greenfield runoff rate for this development.

6.3 Catchment and Attenuation Systems

The site has been separated into three equal catchment areas for the surface water drainage design. Within each catchment, stormwater runoff will be directed to the attenuation tanks. The attenuation tanks have been located, where possible within the landscape areas. Attenuation tank number 3, that is located at main entrance to development, has been configured to allow other services be installed within the road network and to avoid services being located within private carparking spaces.

To minimise the works required out in the public road, the outfall from this development into the public stormwater network, is proposed to be located at the north-west corner of site.
This location will minimise the length of pipe and associated works required for this connection to be made in the public domain. A breakdown of the different land uses across the site is included below in **Table 5.1**, **Table 5.2** and **Table 5.3** below.

All attenuation tanks will be an “on-line” system with hydrobrakes controlling discharge rates fro m the attenuation tanks.

Description	Area (Ha)
Roads & Footpaths	0.3379
Carpark (permeable pavement)	0.1319
Green Areas – gardens and landscaping	0.5632
Roof	0.0507
Total	1.0837Ha

Table 5.1 Catchment Area No 1 (South-East) – Land Uses/Areas

Description	Area (Ha)
Roads & Footpaths	0.2877
Carpark (permeable pavement)	0.1319
Green Areas – gardens and landscaping	0.7928
Roof	0.1081
Total	1.3205Ha

Table 5.2 Catchment Area No 2 (North-East) – Land Uses/Areas

Description	Area (Ha)
Roads & Footpaths	0.2902
Carpark (permeable pavement)	0.1319
Green Areas – gardens and landscaping	0.5477
Roof	0.0836
Total	1.0534Ha

Table 5.3 Catchment Area No 3 (North-West) – Land Uses/Areas

This surface water catchment will have a gravity surface water drainage network which will outfall into dedicated attenuation tanks. All attenuation tank systems have been sized to store the runoff from a 1:100 year storm of critical duration below ground.

The proposed attenuation system will be a cellular block system such as Wavin Aquacell Plus-R or a similar approved product with a minimum voids ratio of 95% (typical details are provided in **Appendix E**). This system is a modular system, with individual modules stacked together to provide the overall storage volume required. It is then wrapped in a geotextile membrane to provide protection to the system, before being backfilled around and above with suitable granular fill material.

The attenuation storage calculations for a 1:100-year storm event of critical duration are attached in **Appendix D**. An additional storage allowance of 20% for climate change and an allowance of 10% urban creep has been incorporated into the overall drainage design.

As surface water is to be collected from the roads and car parking areas with a low risk of spillage, a Class 1 Petrol/Oil Bypass Interceptor will be installed on the final attenuation tank inlet. All surface water shall be drained from impermeable areas through precast lockable gully traps.
An assessment of the manhole cover levels was reviewed against top water level within the network to determine if any manholes lids would pop up. On review, we determined that based on the top water level within the network from a 1:100 year storm event that no manhole lids would pop up.

6.4 Permeable Paving

The private car parking bays on site are proposed as permeable pavement. Surface run-off in the trafficked areas will flow towards road gullies that will be separated from the permeable paving car parking bays. To note, disabled carparking spaces are not to have permeable paving given the linemarking/hatch requirements.

Permeable paving provides a pavement suitable for pedestrian and/or vehicular traffic, while

allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before controlled discharge downstream. Permeable paving falls under the source control category in the SuDS Management Train.

Permeable paving, together with its associated substructures, are an efficient means of managing surface water runoff close to its source – intercepting runoff, reducing the volume and frequency of runoff, and providing a treatment medium. Treatment processes that occur within the surface structure, the subsurface matrix and the geotextile layers include:

- Filtration
- Adsorption
- Biodegradation
- Sedimentation

The use of porous asphalt for car parks is proposed as an alternative to an oil separator for their specific areas. The use of porous asphalt for this purpose is supported by the treatment processes outlined above. CIRIA C753 (The SuDS Manual) notes that regarding interception design of pervious pavements, studies have shown that runoff typically does not occur from pervious pavements for rainfall events up to 5.0mm.

The porous asphalt car park bays will be connected to the surface water network using fin drains. Refer to ORS drawing **231541-ORS-Z0-00-DR-CE-400** for details of permeable pavement and fin drain layout.

6.5 Flow Control

A flow control device will be fitted to the outlet manhole from all attenuation tanks. This will control outflow from the tanks internally and offset discharge downstream within the network. The last flow control device, prior to discharge into public network, will discharge at greenfield runoff rates. All flow control manholes will be fitted with a pen/knife stock on the inlet to the flow control manhole to facilitate any future maintenance work. All flow control chambers are also to have slit traps installed.

6.6 Compliance with Sustainable Urban Drainage Systems

To reduce and attenuate the flow, the proposed development has been designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS) as expressed in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimise the impact of urbanisation by replicating the runoff characteristics of a greenfield site. The criteria provide a consistent approach to addressing both rate and volume of run-off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

The requirements of SUDS are typically addressed by provision of the following:

- Interception storage.
- Treatment storage (not required if interception storage is provided).
- Attenuation storage.
- Long term storage (not required if growth factors are not applied to Qbar when designing attenuation storage).

In the case of the subject site, interception storage will be provided, and growth factors will not

be applied to the allowable discharge for the 100-year event. This means that both treatment storage and long-term storage (neither of which would be practical on this site) are not required. Attenuation storage is provided and is outlined in **Section 6.3** above.

6.7 Catchpit Manholes

Catchpit manholes will be provided prior to discharge into the attenuation tank. The function of the catchpits is to collect silt and debris and prevent blockages thus reducing risk of flooding and maintenance of the system.

A maintenance programme for cleaning the silt traps and infiltration soakaways should be adhered to as per the engineering design to ensure ongoing effective operation. Please refer to **ORS drawing nos. 231541-ORS-Z0-00-DR-CE-400, 231541-ORS-XX-XX-DR-CE-410** and **231541-ORS-XX-XX-DR-CE-420** for details of the proposed surface water drainage network for the proposed development.

7 Flood Risk Assessment

The OPW website was consulted for high level information on any potential flood risk on the site. No indication of any likely past or future flood incidences were identified in the vicinity of the site. Refer to **Figure 7.1** below.

The development will present no significant increase in risk of flooding either within the site or downstream of the site. Surface water runoff will be limited to greenfield runoff rate via flow control measures.

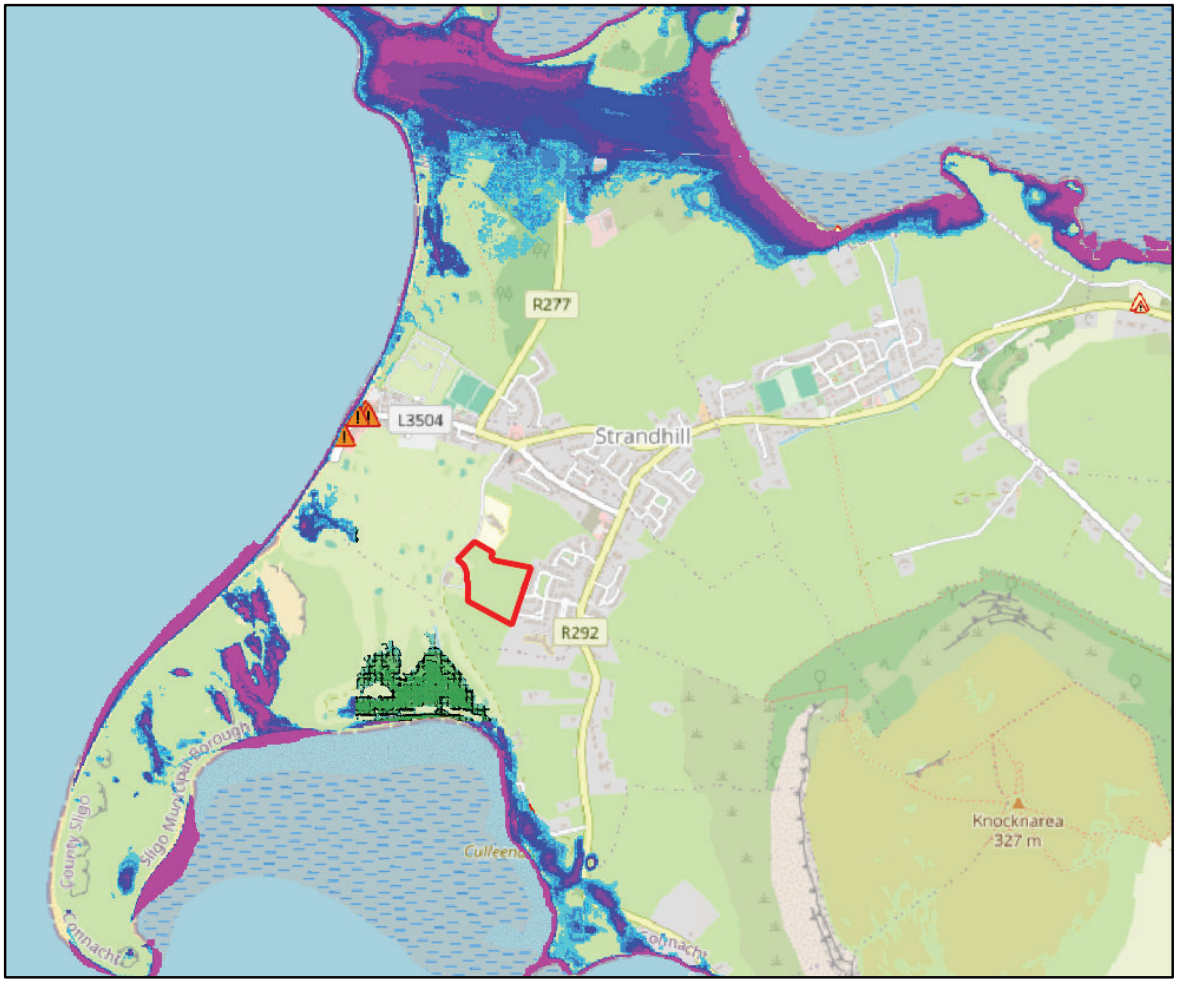


Figure 7.1: Flood Mapping (OPW)

8 DMURS Engineering Criteria

Guidance has been taken from DMURS for the engineering design of streets and footpaths in the development, the following criteria are addressed as follows.

8.1 Internal Road Widths

The minimum road width for a standard carriageway for local streets is defined by DMURS as 5.0-5.5m total. The proposed internal roads to be provided are designed as 5.5m to meet this requirement.

8.2 Internal Road Markings

Internal road markings are proposed to be limited to the approach to internal junctions and STOP lines. A STOP sign will be provided at each internal junction where a STOP line is proposed.

8.3 Pedestrian Linkages/ Crossing Points

Proposed internal pedestrian pathways will be linked via dropped kerbs and tactile paving. A number of raised uncontrolled, pedestrian crossings are proposed throughout the site also.

8.4 Internal Road Junctions

Internal junctions have been designed perpendicular to each other where possible.

8.5 Turning Areas for Vehicles

All turning areas have been checked by swept path analysis (Autotrack) to ensure sufficient space to allow for refuse and emergency vehicles.

8.6 Speed Restraint Measures

The site layout has been designed such that there are limited straight stretches of roadway without horizontal or vertical speed restraints. Raised tables and raised crossings are provided in a number of locations to aid with speed restraint.

8.7 Vehicle Parking Locations

All car parking spaces have been designed such that they have a minimum of 5.5m of space behind them to reverse safely from a parking space. All parking spaces have minimum dimensions of 2.5m x 5.0m. Generally, parking is provided perpendicular to roadways throughout with the exception being the drop off area fronting the creche.

8.8 Service Vehicle Access

ORS have carried out an Autotrack swept path analysis on the proposed site plan to confirm adequate access for service vehicles within the site. A refuse truck was modelled, and sufficient access is achieved. Please refer to **ORS drawing no. 2315410-ORS-Z0-00-DR-TR-730,731 & 732** for detail

Appendix A – Confirmation of Feasibility Letter from Irish Water

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Mark Kelly

Dublin Road
Ballisodare
Sligo

27 April 2023

Our Ref: CDS23001725 Pre-Connection Enquiry
Golf Course Road, Strandhill, Co. Sligo

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 104 unit(s) at Golf Course Road, Strandhill, Co. Sligo (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

Water Connection	Feasible Subject to upgrades
To facilitate the connection to your proposed development a 405m section of existing 75mm watermain which runs along Golf Course Road up to the entrance to your site will need to be upgraded to 150mm watermain.	

Wastewater Connection	Feasible Subject to upgrades
To facilitate the connection to your proposed development a 395m section of existing 150mm foul sewer which runs along Golf Course Road up to the entrance to your site will need to be upgraded to 225mm sewer.	

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

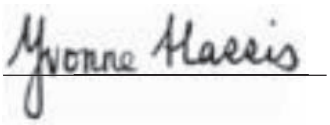
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections**, **email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

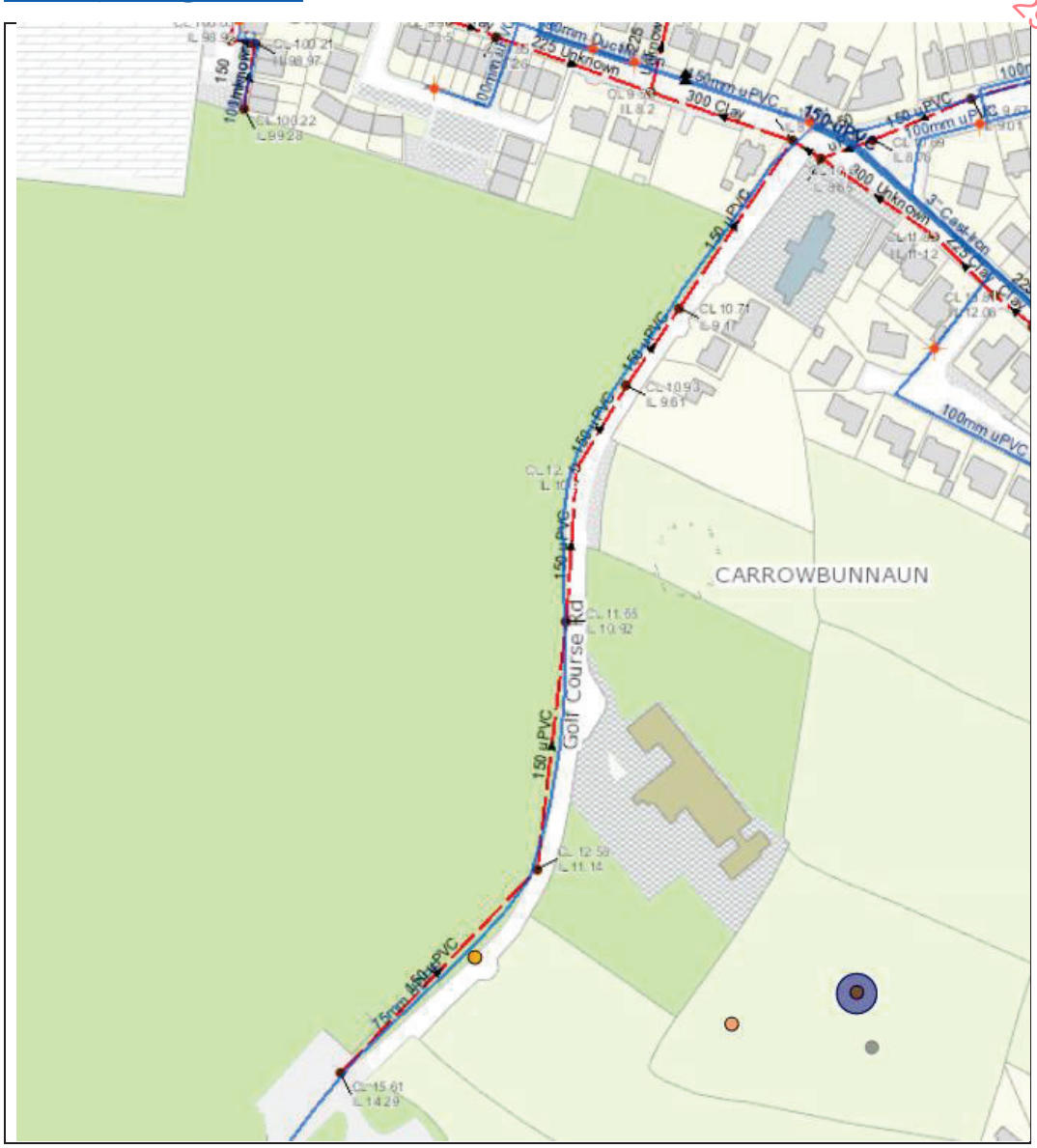
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Irish Water Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



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Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to

date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

Appendix B – Water Demand Calculations

PROPOSED WATER DEMAND CALCULATIONS

ORS Ref: 231541

CLIENT:	**Altitude Distribution**
PROJECT DESCRIPTION:	**Residential Development, Strandhill, Co. Sligo**
DRAWING REFERENCE:	231541-ORS-Z0-00-DR-C-400

Unit Type:	*Number of:*	*Flow (l/day/person):*	*Persons per Dwelling:*	*Total Flow (l/day)*
Residential	99	150	2.7	40095

Residential

	Total Flow (l/day):	40095	*Total Flow (m^3/day):*	40.095
	Average Hour Water Demand		**0.46**	*l/s*
	Peak Hour Water Demand (Average Hour Water Demand x 5)		**2.32**	*l/s*

Unit Type:	*Floor Space (m^2)*	*Flow (l/day/person):*	*Persons per Unit (Occupancy Rate = 4m^2 /person):*	*Total Flow (l/day)*
Creche	406	60	102	6090

Creche

	Total Flow (l/day):	6090	*Total Flow (m^3/day):*	6.09
	Average Hour Water Demand		**0.07**	*l/s*
	Peak Hour Water Demand (Average Hour Water Demand x 5)		**0.35**	*l/s*

Total

	Total Flow (l/day):	46185	*Total Flow (m^3/day):*	46.185
	Average Hour Water Demand		**0.53**	*l/s*
	Peak Hour Water Demand (Average Hour Water Demand x 5)		**2.67**	*l/s*

Appendix C – Wastewater Demand Calculations

PROPOSED FOUL SEWER DESIGN CALCULATIONS

ORS Ref: 231541

CLIENT: Altitude Distribution
PROJECT DESCRIPTION: Residential Development, Strandhill, Co. Sligo
DRAWING REFERENCE: 231541-ORS-Z0-00-DR-C-400

Unit Type:	Number of:	Flow (l/day/person):	BOD (g/day/person)	Persons	Total Flow (l/day)	BOD (g/day/person)	P.E.
Residential	99	150	60	267.3	40095	16038	267.3
			Total Residential		40095	16038	267.3

Residential Total Flow per day	40095.00	*litres/day*
Residential Dry Weather Flow (DWF)	0.46	*litres/second*
Peak Dry Weather Flow	2.78	*l/s @ 6 x DWF*

Unit Type:	Floor Space (m^2)	Flow (l/day/person):	BOD (g/day/person)	Persons	Total Flow (l/day)	BOD (g/day/person)	P.E.
Creche	406	60	60	102	6090	6090	101.5
			Total Creche		6090	6090	101.5

Creche Total Flow per day	6090.00	*litres/day*
Creche Dry Weather Flow (DWF)	0.07	*litres/second*
Peak Dry Weather Flow	0.42	*l/s @ 6 x DWF*

Total

Total Flow per day	46185.00	*litres/day*
Total Dry Weather Flow (DWF)	0.53	*litres/second*
Total Peak Dry Weather Flow	3.21	*l/s @ 6 x DWF*

Appendix D – Wastewater Network Design

Design Settings

Frequency of use (kDU)	0.00	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	446	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.000
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
F28	16.200	Adoptable	560670.786	835418.986	1.300
F27	30.770	Adoptable	560810.842	835213.548	2.412
F26	29.385	Adoptable	560819.302	835238.112	1.460
F25	27.400	Adoptable	560829.464	835285.251	1.320
F24	29.025	Adoptable	560813.980	835241.467	3.719
F23	26.250	Adoptable	560775.252	835265.257	1.777
F22	25.970	Adoptable	560760.866	835276.892	2.971
F21	24.000	Adoptable	560727.901	835294.546	3.467
F20	25.010	Adoptable	560790.120	835306.031	2.822
F19	23.500	Adoptable	560778.474	835324.981	1.992
F18	22.530	Adoptable	560752.944	835332.740	1.548
F17	22.030	Adoptable	560735.439	835347.343	1.428
F16	21.370	Adoptable	560722.015	835348.644	3.017
F15	18.800	Adoptable	560716.183	835397.840	1.876
F14	27.200	Adoptable	560830.472	835289.032	2.200
F13	26.950	Adoptable	560834.285	835298.079	3.200
F12	25.000	Adoptable	560835.424	835319.623	1.500
F11	25.000	Adoptable	560843.196	835335.388	2.995
F10	21.600	Adoptable	560862.917	835390.678	1.200
F9	23.180	Adoptable	560853.891	835365.373	3.228
F8	21.730	Adoptable	560783.588	835357.678	2.502
F7	20.455	Adoptable	560794.057	835386.441	2.493
F6	18.800	Adoptable	560756.928	835399.416	1.934
F5	18.020	Adoptable	560718.678	835413.179	2.312
F4	16.790	Adoptable	560722.776	835429.607	2.790
F3	15.175	Adoptable	560700.821	835451.086	1.863
F2	14.635	Adoptable	560720.519	835474.333	1.801
EX. F1	13.965	Adoptable	560715.012	835490.219	1.390
F3A	15.175	Adoptable	560703.207	835455.784	1.951

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F2-EX.F1	F2	EX. F1	16.813	1.500	12.834	12.575	0.259	65.0	225
F3A-F2	F3A	F2	25.373	1.500	13.224	12.834	0.390	65.0	225
F3-F29	F3	F3A	5.269	1.500	13.312	13.224	0.088	60.0	225
F28-F3	F28	F3	43.960	1.500	14.900	14.167	0.733	60.0	225
F4-F3	F4	F3	30.714	1.500	14.000	13.616	0.384	80.0	225
F5-F4	F5	F4	16.931	1.500	15.708	15.496	0.212	80.0	225
F15-F5	F15	F5	15.541	1.500	16.924	16.665	0.259	60.0	225
F6-F5	F6	F5	40.651	1.500	16.866	16.358	0.508	80.0	225
F7-F6	F7	F6	39.331	1.500	17.962	17.470	0.492	80.0	225
F9-F7	F9	F7	63.435	1.500	19.952	19.159	0.793	80.0	225
F8-F7	F8	F7	30.609	1.500	19.228	18.718	0.510	60.0	225
F11-F9	F11	F9	31.835	1.500	22.005	21.607	0.398	80.0	225
F10-F9	F10	F9	26.867	1.500	20.400	19.952	0.448	60.0	150
F12-F11	F12	F11	17.577	1.500	23.500	23.280	0.220	80.0	225
F13-F12	F13	F12	21.574	1.500	23.750	23.500	0.250	86.3	150
F14-F13	F14	F13	9.818	1.500	25.000	24.836	0.164	60.0	150
F16-F15	F16	F15	49.540	1.500	18.353	17.527	0.826	60.0	225
F21-F16	F21	F16	54.417	1.500	20.533	19.853	0.680	80.0	225
F17-F16	F17	F16	13.487	1.500	20.602	20.377	0.225	60.0	150
F18-F17	F18	F17	22.796	1.500	20.982	20.602	0.380	60.0	150
F19-F18	F19	F18	26.683	1.500	21.508	21.063	0.445	60.0	150
F20-F19	F20	F19	22.243	1.500	22.188	21.817	0.371	60.0	150
F22-F21	F22	F21	37.395	1.500	22.999	22.532	0.467	80.0	225
F23-F22	F23	F22	18.502	1.500	24.473	24.242	0.231	80.0	225

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	US Depth (m)	DS Depth (m)
F2-EX.F1	F2	EX. F1	1.425	56.7	1.576	1.165
F3A-F2	F3A	F2	1.425	56.7	1.726	1.576
F3-F29	F3	F3A	1.483	59.0	1.638	1.726
F28-F3	F28	F3	1.483	59.0	1.075	0.783
F4-F3	F4	F3	1.284	51.0	2.565	1.334
F5-F4	F5	F4	1.284	51.0	2.087	1.069
F15-F5	F15	F5	1.483	59.0	1.651	1.130
F6-F5	F6	F5	1.284	51.0	1.709	1.437
F7-F6	F7	F6	1.284	51.0	2.268	1.105
F9-F7	F9	F7	1.284	51.0	3.003	1.071
F8-F7	F8	F7	1.483	59.0	2.277	1.512
F11-F9	F11	F9	1.284	51.0	2.770	1.348
F10-F9	F10	F9	1.132	20.0	1.050	3.078
F12-F11	F12	F11	1.284	51.0	1.275	1.495
F13-F12	F13	F12	0.943	16.7	3.050	1.350
F14-F13	F14	F13	1.132	20.0	2.050	1.964
F16-F15	F16	F15	1.483	59.0	2.792	1.048
F21-F16	F21	F16	1.284	51.0	3.242	1.292
F17-F16	F17	F16	1.132	20.0	1.278	0.843
F18-F17	F18	F17	1.132	20.0	1.398	1.278
F19-F18	F19	F18	1.132	20.0	1.842	1.317
F20-F19	F20	F19	1.132	20.0	2.672	1.533
F22-F21	F22	F21	1.284	51.0	2.746	1.243
F23-F22	F23	F22	1.284	51.0	1.552	1.503

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
F24-F23	F24	F23	45.451	1.500	25.306	24.548	0.758	60.0	150
F26-F24	F26	F24	6.291	1.500	27.925	27.820	0.105	60.0	150
F25-F24	F25	F24	46.441	1.500	26.080	25.306	0.774	60.0	150
F27-F26	F27	F26	25.980	1.500	28.358	27.925	0.433	60.0	150

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	US Depth (m)	DS Depth (m)
F24-F23	F24	F23	1.132	20.0	3.569	1.552
F26-F24	F26	F24	1.132	20.0	1.310	1.055
F25-F24	F25	F24	1.132	20.0	1.170	3.569
F27-F26	F27	F26	1.132	20.0	2.262	1.310

Appendix E – Qbar Calculation and Rainfall Data

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	David Goaley
Site name:	Strandhill Housing
Site location:	Strandhill Sligo

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	54.26605° N
Longitude:	8.60219° W
Reference:	3473061675
Date:	Feb 23 2024 14:42

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 3.9364

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1295	1228
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	14.73	13.85
1 in 1 year (l/s):	12.52	11.77
1 in 30 years (l/s):	24.31	22.85
1 in 100 year (l/s):	28.73	27
1 in 200 years (l/s):	31.68	29.77

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 160835, Northing: 335035,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.7,	3.6,	4.0,	4.6,	5.0,	5.3,	6.3,	7.3,	8.0,	8.9,	9.7,	10.3,	11.2,	11.9,	12.5,	N/A ,
10 mins	3.8,	5.0,	5.6,	6.4,	7.0,	7.4,	8.8,	10.2,	11.2,	12.4,	13.6,	14.4,	15.7,	16.6,	17.4,	N/A ,
15 mins	4.5,	5.9,	6.6,	7.6,	8.2,	8.7,	10.3,	12.0,	13.1,	14.6,	15.9,	16.9,	18.4,	19.6,	20.5,	N/A ,
30 mins	5.9,	7.6,	8.5,	9.8,	10.6,	11.3,	13.3,	15.5,	16.9,	18.8,	20.4,	21.7,	23.5,	25.0,	26.1,	N/A ,
1 hours	7.6,	9.9,	11.0,	12.7,	13.8,	14.6,	17.1,	19.9,	21.7,	24.1,	26.2,	27.7,	30.1,	31.9,	33.4,	N/A ,
2 hours	10.0,	12.8,	14.3,	16.4,	17.8,	18.8,	22.1,	25.6,	27.8,	30.9,	33.5,	35.5,	38.5,	40.7,	42.6,	N/A ,
3 hours	11.6,	15.0,	16.7,	19.1,	20.7,	21.9,	25.6,	29.7,	32.2,	35.7,	38.7,	41.0,	44.4,	47.0,	49.1,	N/A ,
4 hours	13.0,	16.7,	18.6,	21.2,	23.0,	24.3,	28.5,	32.9,	35.8,	39.6,	42.9,	45.4,	49.2,	52.0,	54.3,	N/A ,
6 hours	15.2,	19.4,	21.6,	24.7,	26.7,	28.2,	33.0,	38.1,	41.4,	45.8,	49.6,	52.5,	56.8,	60.0,	62.7,	N/A ,
9 hours	17.7,	22.7,	25.2,	28.7,	31.0,	32.8,	38.3,	44.2,	47.9,	53.0,	57.3,	60.6,	65.5,	69.3,	72.3,	N/A ,
12 hours	19.8,	25.3,	28.0,	32.0,	34.5,	36.5,	42.5,	49.0,	53.2,	58.7,	63.5,	67.1,	72.6,	76.7,	80.0,	N/A ,
18 hours	23.1,	29.4,	32.6,	37.2,	40.1,	42.4,	49.4,	56.8,	61.5,	67.9,	73.4,	77.5,	83.8,	88.5,	92.3,	N/A ,
24 hours	25.8,	32.8,	36.3,	41.4,	44.6,	47.1,	54.8,	63.1,	68.3,	75.3,	81.3,	85.9,	92.7,	97.9,	102.1,	116.3,
2 days	33.3,	41.2,	45.1,	50.5,	54.0,	56.6,	64.7,	73.2,	78.5,	85.6,	91.6,	96.1,	102.8,	107.9,	111.9,	125.5,
3 days	39.8,	48.5,	52.6,	58.5,	62.2,	65.0,	73.5,	82.3,	87.7,	95.0,	101.2,	105.7,	112.5,	117.5,	121.6,	135.1,
4 days	45.8,	55.1,	59.5,	65.7,	69.6,	72.5,	81.4,	90.6,	96.2,	103.7,	109.9,	114.6,	121.5,	126.6,	130.7,	144.3,
6 days	56.9,	67.2,	72.2,	78.9,	83.2,	86.3,	95.9,	105.6,	111.6,	119.4,	126.0,	130.8,	137.9,	143.2,	147.4,	161.2,
8 days	67.2,	78.5,	83.8,	91.1,	95.6,	99.0,	109.1,	119.4,	125.6,	133.7,	140.5,	145.5,	152.9,	158.3,	162.6,	176.8,
10 days	77.1,	89.2,	94.8,	102.5,	107.3,	110.9,	121.5,	132.2,	138.7,	147.2,	154.2,	159.3,	166.8,	172.4,	176.8,	191.2,
12 days	86.6,	99.4,	105.4,	113.5,	118.5,	122.3,	133.3,	144.4,	151.1,	159.9,	167.1,	172.4,	180.1,	185.7,	190.3,	205.0,
16 days	105.0,	119.1,	125.7,	134.5,	139.9,	143.9,	155.8,	167.6,	174.6,	183.8,	191.4,	196.9,	205.0,	210.8,	215.5,	230.7,
20 days	122.9,	138.1,	145.1,	154.5,	160.3,	164.5,	177.1,	189.5,	196.8,	206.4,	214.3,	220.0,	228.3,	234.4,	239.2,	254.7,
25 days	144.8,	161.2,	168.7,	178.7,	184.8,	189.3,	202.6,	215.6,	223.3,	233.3,	241.5,	247.4,	256.0,	262.2,	267.2,	283.1,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Appendix F – Stormwater Drainage Design

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	10	Minimum Velocity (m/s)	0.75
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	14.600	Minimum Backdrop Height (m)	0.600
Ratio-R	0.258	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S28-3 (Hydro Brk)	0.002	5.00	14.635	1500	560713.624	835477.676	2.635
S24-3	0.086	5.00	16.200	1200	560670.556	835421.652	1.200
ATT. TANK #2			18.975		560774.978	835387.855	1.600
S15-2	0.044	5.00	21.730	1200	560784.728	835354.997	1.460
S16-2	0.155	5.00	20.455	1350	560795.129	835384.473	2.955
S20-3 (Hydro Brk)	0.021	5.00	18.900	1350	560758.311	835397.437	1.795
S8-1A	0.026	5.00	25.010	1200	560790.907	835300.718	1.510
S9-1	0.046	5.00	23.500	1200	560775.550	835324.921	2.567
S10-1	0.069	5.00	22.530	1200	560750.410	835331.893	1.450
S18-3 (Hydro Brk)			21.600	1350	560733.215	835340.275	1.685
S1-1	0.051	5.00	30.770	1200	560808.170	835210.495	1.500
S8-1	0.046	5.00	24.150	1200	560782.365	835315.970	1.720
S14-2	0.091	5.00	23.180	1200	560852.102	835364.413	2.780
S12B-2	0.083	5.00	25.980	1200	560834.755	835322.337	1.945
S4-1	0.104	5.00	29.025	1200	560813.172	835244.153	2.825
S5-1	0.127	5.00	25.970	1200	560765.026	835276.277	3.170
S12A-2	0.099	5.00	25.000	1200	560841.783	835335.892	2.000
S6-1	0.077	5.00	24.850	1200	560743.116	835288.137	2.295
S19-3	0.084	5.00	21.370	1350	560724.447	835346.128	2.525
S22-3	0.116	5.00	18.020	1350	560719.874	835411.141	2.405
S23-3	0.043	5.00	16.790	1350	560724.310	835430.573	2.715
S12-2	0.062	5.00	24.090	1200	560847.851	835351.252	2.240
S27-3	0.014	5.00	14.200	1500	560698.822	835456.028	2.105
S12C-2	0.067	5.00	26.960	1200	560832.903	835298.662	1.500
S13-2	0.066	5.00	21.600	1200	560864.534	835399.677	0.850
S21-3	0.110	5.00	18.800	1350	560718.557	835398.368	2.050
ATT. TANK #1	0.006	5.00	21.600		560736.743	835316.988	1.600
S7-1	0.044	5.00	24.000	1350	560750.721	835302.182	3.180
S3-1	0.045	5.00	27.450	1200	560825.162	835280.297	0.820
S2-1	0.039	5.00	29.385	1200	560818.910	835240.834	2.888
ATT. TANK #3			14.635		560707.235	835468.534	2.600
S26-3	0.041	5.00	14.450	1200	560718.642	835473.791	0.650
S25-3	0.034	5.00	14.795	1500	560700.522	835454.394	1.535
S17A-3	0.045	5.00	23.800	1200	560730.000	835298.201	1.880
EX MH			13.965	1350	560711.533	835496.612	2.965
S29-3			14.050	1350	560712.505	835487.699	2.950
S17-3	0.057	5.00	22.485	1200	560727.352	835321.597	2.125
S21A-3	0.050	5.00	20.085	1350	560721.893	835369.316	2.285
S2A-1			30.080	1200	560813.346	835225.209	2.235
IC13-3	0.002	5.00	23.630	600	560725.520	835299.527	0.450

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
IC1-1	0.000	5.00	30.190	600	560813.244	835213.287	0.390
IC2-1	0.002	5.00	29.490	600	560818.486	835228.935	0.450
IC5-1	0.002	5.00	28.330	600	560820.636	835253.416	0.450
IC4-1	0.002	5.00	27.860	600	560825.379	835266.230	0.450
IC3-1	0.002	5.00	27.380	600	560829.887	835279.840	0.450
IC28-2	0.002	5.00	26.770	600	560834.684	835290.119	0.450
IC29-2	0.002	5.00	26.840	600	560826.290	835292.089	0.450
IC6-1	0.002	5.00	28.160	600	560801.791	835246.005	0.450
IC7-1	0.002	5.00	27.460	600	560787.549	835255.032	1.960
IC8-1	0.002	5.00	26.250	600	560778.682	835260.600	0.850
IC9-1	0.002	5.00	26.060	600	560766.465	835268.455	0.450
IC30-2	0.002	5.00	26.070	600	560836.651	835307.415	0.450
IC31-2	0.002	5.00	26.120	600	560830.845	835309.783	0.450
IC34-2	0.002	5.00	24.700	600	560845.210	835334.968	0.700
IC33-2	0.003	5.00	25.200	600	560835.167	835327.754	0.450
IC35-2	0.002	5.00	24.380	600	560840.982	835350.863	0.450
IC36-2	0.002	5.00	24.010	600	560851.428	835349.397	0.450
IC17-1	0.001	5.00	24.800	600	560793.071	835306.431	0.450
IC18-1	0.002	5.00	23.700	600	560787.436	835317.422	0.450
IC19-1	0.002	5.00	22.550	600	560763.922	835331.610	0.450
IC20-1	0.002	5.00	22.030	600	560751.261	835337.876	0.450
IC10-1	0.002	5.00	25.350	600	560749.831	835278.366	1.550
IC11-1	0.002	5.00	24.640	600	560741.294	835283.444	0.450
IC12-1	0.002	5.00	23.950	600	560729.241	835291.746	0.450
IC32-2	0.003	5.00	25.400	600	560839.149	835324.259	0.450
IC14-3	0.004	5.00	22.940	600	560724.853	835311.776	0.940
IC15-3	0.002	5.00	22.240	600	560722.740	835325.748	0.450
IC16-3	0.002	5.00	21.540	600	560721.409	835337.947	0.450
IC21-1	0.001	5.00	22.030	600	560739.375	835346.376	0.450
IC22-3	0.002	5.00	20.840	600	560720.189	835353.362	0.450
IC23-1	0.003	5.00	20.160	600	560718.315	835365.562	0.450
IC24-3	0.002	5.00	19.460	600	560716.562	835379.535	0.450
IC25-3	0.002	5.00	19.490	600	560721.603	835389.660	1.190
IC26-3	0.002	5.00	18.760	600	560714.865	835392.733	0.450
IC47-3	0.007	5.00	16.490	600	560725.637	835405.638	0.450
IC48-3	0.006	5.00	16.490	600	560735.028	835412.959	0.450
IC27-3	0.001	5.00	18.880	600	560723.640	835398.656	0.450
IC37-2		5.00	23.330	600	560855.574	835359.808	0.450
IC38-2	0.003	5.00	22.630	600	560858.963	835375.676	0.450
IC40-2	0.002	5.00	21.870	600	560836.035	835376.409	0.450
IC39-2	0.002	5.00	21.920	600	560864.007	835388.416	0.450
IC41-2	0.002	5.00	20.940	600	560816.219	835378.727	0.450
IC44-2	0.002	5.00	21.130	600	560783.883	835366.379	0.450
IC42-2	0.001	5.00	20.650	600	560804.648	835384.677	0.450
IC43-2	0.001	5.00	20.350	600	560796.485	835388.224	0.450
IC45-2	0.001	5.00	19.650	600	560783.700	835391.734	0.450
IC46-2	0.001	5.00	18.960	600	560769.488	835397.124	0.450
IC49-3	0.002	5.00	15.790	600	560673.824	835422.702	0.450
IC50-3	0.002	5.00	16.100	600	560685.348	835435.428	0.950
IC51-3	0.001	5.00	14.890	600	560695.057	835446.781	0.450
IC53-3	0.002	5.00	14.440	600	560717.406	835468.413	0.450
IC52-3	0.001	5.00	14.540	600	560707.735	835457.620	0.450

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S29-3	S29-3	EX MH	8.966	0.600	11.100	11.000	0.100	89.7	450	8.58	42.6
S28-3 (Hydro Brk)	S28-3 (Hydro Brk)	S29-3	10.085	0.600	12.000	11.863	0.137	73.6	450	8.51	42.8
ATT. TANK #3	ATT. TANK #3	S28-3 (Hydro Brk)	11.153	0.600	12.035	12.000	0.035	318.7	600	8.44	42.9
S27-3	S27-3	ATT. TANK #3	15.072	0.600	12.095	12.035	0.060	251.2	525	8.31	43.2
S25-3	S25-3	S27-3	2.358	0.600	13.260	13.195	0.065	36.3	500	8.13	43.6
IC52-3	IC52-3	S25-3	7.902	0.600	14.090	13.575	0.515	15.3	100	5.07	50.0
IC51-3	IC51-3	S25-3	9.371	0.600	14.440	13.625	0.815	11.5	100	5.07	50.0
S24-3	S24-3	S25-3	44.385	0.600	15.000	13.750	1.250	35.5	225	5.85	49.9
S26-3	S26-3	S25-3	26.544	0.600	13.800	13.260	0.540	49.2	225	5.30	50.0
S23-3	S23-3	S25-3	33.665	0.600	14.075	13.750	0.325	103.6	450	8.12	43.7
S22-3	S22-3	S23-3	19.932	0.600	15.615	15.365	0.250	79.7	450	7.84	44.3
IC48-3	IC48-3	S22-3	15.263	0.600	16.040	15.755	0.285	53.6	100	5.24	50.0
IC47-3	IC47-3	S22-3	7.968	0.600	16.040	15.850	0.190	41.9	100	5.11	50.0
S20-3 (Hydro Brk)	S20-3 (Hydro Brk)	S22-3	40.807	0.600	17.105	16.595	0.510	80.0	375	6.88	46.8
S21-3	S21-3	S22-3	12.841	0.600	16.750	16.595	0.155	82.8	375	7.69	44.7
IC25-3	IC25-3	S21-3	9.225	0.600	18.300	18.088	0.212	43.5	100	5.13	50.0
IC27-3	IC27-3	S21-3	5.091	0.600	18.430	17.802	0.628	8.1	100	5.03	50.0
IC26-3	IC26-3	S21-3	6.737	0.600	18.310	17.802	0.508	13.3	100	5.05	50.0
S21A-3	S21A-3	S21-3	29.243	0.600	17.800	17.375	0.425	68.8	375	7.58	44.9
IC24-3	IC24-3	S21A-3	11.526	0.600	19.010	18.075	0.935	12.3	100	5.09	50.0
IC23-1	IC23-1	S21A-3	5.186	0.600	19.710	19.624	0.086	60.3	100	5.09	50.0
S19-3	S19-3	S21A-3	23.328	0.600	18.845	18.435	0.410	56.9	375	7.36	45.5
IC22-3	IC22-3	S19-3	8.394	0.600	20.390	19.120	1.270	6.6	100	5.05	50.0
IC16-3	IC16-3	S19-3	8.727	0.600	21.090	20.943	0.147	59.4	100	5.15	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
S29-3	S29-3	EX MH	2.147	341.5	276.0	2.500	2.515	2.171
S28-3 (Hydro Brk)	S28-3 (Hydro Brk)	S29-3	2.371	377.1	276.9	2.185	1.737	2.171
ATT. TANK #3	ATT. TANK #3	S28-3 (Hydro Brk)	1.358	384.1	277.7	2.000	2.035	2.169
S27-3	S27-3	ATT. TANK #3	1.408	304.9	279.7	1.580	2.075	2.169
S25-3	S25-3	S27-3	3.615	709.8	280.5	1.035	0.505	2.155
IC52-3	IC52-3	S25-3	1.982	15.6	0.2	0.350	1.120	0.001
IC51-3	IC51-3	S25-3	2.291	18.0	0.2	0.350	1.070	0.001
S24-3	S24-3	S25-3	2.202	87.6	13.5	0.975	0.820	0.091
S26-3	S26-3	S25-3	1.870	74.3	6.4	0.425	1.310	0.043
S23-3	S23-3	S25-3	1.997	317.6	258.5	2.265	0.595	1.985
S22-3	S22-3	S23-3	2.278	362.3	256.7	1.955	0.975	1.942
IC48-3	IC48-3	S22-3	1.055	8.3	0.9	0.350	2.165	0.006
IC47-3	IC47-3	S22-3	1.194	9.4	1.1	0.350	2.070	0.007
S20-3 (Hydro Brk)	S20-3 (Hydro Brk)	S22-3	2.027	223.8	101.5	1.420	1.050	0.728
S21-3	S21-3	S22-3	1.992	220.0	144.6	1.675	1.050	1.086
IC25-3	IC25-3	S21-3	1.172	9.2	0.3	1.090	0.612	0.002
IC27-3	IC27-3	S21-3	2.731	21.5	0.2	0.350	0.898	0.001
IC26-3	IC26-3	S21-3	2.133	16.8	0.4	0.350	0.898	0.002
S21A-3	S21A-3	S21-3	2.187	241.5	130.0	1.910	1.050	0.970
IC24-3	IC24-3	S21A-3	2.213	17.4	0.4	0.350	1.910	0.002
IC23-1	IC23-1	S21A-3	0.993	7.8	0.5	0.350	0.361	0.003
S19-3	S19-3	S21A-3	2.406	265.7	124.1	2.150	1.275	0.915
IC22-3	IC22-3	S19-3	3.026	23.8	0.3	0.350	2.150	0.002
IC16-3	IC16-3	S19-3	1.001	7.9	0.4	0.350	0.327	0.002

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S17-3	S17-3	S19-3	24.702	0.600	20.360	19.845	0.515	48.0	225	5.49	50.0
S18-3 (Hydro Brk)	S18-3 (Hydro Brk)	S19-3	10.542	0.600	19.930	19.845	0.085	124.0	375	7.20	45.9
ATT. TANK #1	ATT. TANK #1	S18-3 (Hydro Brk)	23.553	0.600	20.000	19.915	0.085	277.1	375	7.09	46.2
S7-1	S7-1	ATT. TANK #1	20.362	0.600	21.000	20.850	0.150	135.7	375	6.73	47.2
S9-1	S9-1	S7-1	33.673	0.600	20.933	20.820	0.113	298.0	225	6.46	47.9
S6-1	S6-1	S7-1	15.972	0.600	22.555	22.400	0.155	103.0	300	6.51	47.8
IC11-1	IC11-1	S6-1	5.034	0.600	24.190	23.605	0.585	8.6	100	5.03	50.0
IC10-1	IC10-1	S6-1	11.856	0.600	23.800	23.456	0.344	34.5	100	5.15	50.0
IC12-1	IC12-1	S6-1	14.337	0.600	23.500	23.423	0.077	186.2	100	5.43	50.0
S5-1	S5-1	S6-1	24.914	0.600	22.800	22.555	0.245	101.7	300	6.34	48.3
IC9-1	IC9-1	S5-1	7.953	0.600	25.610	24.725	0.885	9.0	100	5.05	50.0
IC8-1	IC8-1	S5-1	20.791	0.600	25.400	24.725	0.675	30.8	100	5.25	50.0
IC7-1	IC7-1	S5-1	30.962	0.600	25.500	24.725	0.775	40.0	100	5.42	50.0
S4-1	S4-1	S5-1	57.879	0.600	26.200	24.845	1.355	42.7	225	6.07	49.1
IC6-1	IC6-1	S4-1	11.531	0.600	27.710	27.531	0.179	64.4	100	5.20	50.0
IC5-1	IC5-1	S4-1	11.896	0.600	27.880	27.656	0.224	53.1	100	5.19	50.0
S3-1	S3-1	S4-1	38.081	0.600	26.630	26.200	0.430	88.6	225	5.59	50.0
S2-1	S2-1	S4-1	6.629	0.600	26.497	26.200	0.297	22.3	225	5.31	50.0
S2A-1	S2A-1	S2-1	16.586	0.600	27.845	27.345	0.500	33.2	225	5.27	50.0
IC2-1	IC2-1	S2A-1	6.348	0.600	29.040	27.970	1.070	5.9	100	5.03	50.0
S1-1	S1-1	S2A-1	15.598	0.600	29.270	28.695	0.575	27.1	225	5.14	50.0
IC1-1	IC1-1	S1-1	5.791	0.600	29.800	29.270	0.530	10.9	100	5.04	50.0
IC4-1	IC4-1	S3-1	14.069	0.600	27.410	26.680	0.730	19.3	100	5.13	50.0
IC3-1	IC3-1	S3-1	4.747	0.600	26.930	26.680	0.250	19.0	100	5.04	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
S17-3	S17-3	S19-3	1.893	75.3	16.3	1.900	1.300	0.110
S18-3 (Hydro Brk)	S18-3 (Hydro Brk)	S19-3	1.625	179.5	98.0	1.295	1.150	0.716
ATT. TANK #1	ATT. TANK #1	S18-3 (Hydro Brk)	1.083	119.6	98.7	1.225	1.310	0.716
S7-1	S7-1	ATT. TANK #1	1.553	171.5	99.9	2.625	0.375	0.710
S9-1	S9-1	S7-1	0.752	29.9	28.0	2.342	2.955	0.196
S6-1	S6-1	S7-1	1.548	109.4	67.1	1.995	1.300	0.471
IC11-1	IC11-1	S6-1	2.651	20.8	0.4	0.350	1.145	0.002
IC10-1	IC10-1	S6-1	1.318	10.4	0.4	1.450	1.294	0.002
IC12-1	IC12-1	S6-1	0.560	4.4	0.3	0.350	1.327	0.002
S5-1	S5-1	S6-1	1.559	110.2	55.7	2.870	1.995	0.387
IC9-1	IC9-1	S5-1	2.594	20.4	0.4	0.350	1.145	0.002
IC8-1	IC8-1	S5-1	1.395	11.0	0.4	0.750	1.145	0.002
IC7-1	IC7-1	S5-1	1.223	9.6	0.4	1.860	1.145	0.002
S4-1	S4-1	S5-1	2.007	79.8	37.0	2.600	0.900	0.252
IC6-1	IC6-1	S4-1	0.961	7.5	0.4	0.350	1.394	0.002
IC5-1	IC5-1	S4-1	1.059	8.3	0.4	0.350	1.269	0.002
S3-1	S3-1	S4-1	1.390	55.3	7.5	0.595	2.600	0.050
S2-1	S2-1	S4-1	2.781	110.6	13.8	2.663	2.600	0.093
S2A-1	S2A-1	S2-1	2.279	90.6	8.0	2.010	1.815	0.054
IC2-1	IC2-1	S2A-1	3.195	25.1	0.4	0.350	2.010	0.002
S1-1	S1-1	S2A-1	2.522	100.3	7.6	1.275	1.160	0.051
IC1-1	IC1-1	S1-1	2.351	18.5	0.0	0.290	1.400	0.000
IC4-1	IC4-1	S3-1	1.767	13.9	0.4	0.350	0.670	0.002
IC3-1	IC3-1	S3-1	1.780	14.0	0.4	0.350	0.670	0.002

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S8-1	S8-1	S9-1	11.250	0.600	22.430	22.115	0.315	35.7	225	5.26	50.0
S10-1	S10-1	S9-1	26.089	0.600	21.080	20.933	0.147	177.5	225	5.72	50.0
IC21-1	IC21-1	S10-1	18.208	0.600	21.580	21.205	0.375	48.6	100	5.27	50.0
IC19-1	IC19-1	S10-1	13.515	0.600	22.100	21.811	0.289	46.8	100	5.20	50.0
IC20-1	IC20-1	S10-1	6.043	0.600	21.580	21.205	0.375	16.1	100	5.05	50.0
IC18-1	IC18-1	S8-1	5.275	0.600	23.250	22.555	0.695	7.6	100	5.03	50.0
S8-1A	S8-1A	S8-1	17.481	0.600	23.500	23.025	0.475	36.8	225	5.17	50.0
IC17-1	IC17-1	S8-1A	6.109	0.600	24.350	23.625	0.725	8.4	100	5.04	50.0
IC15-3	IC15-3	S17-3	6.205	0.600	21.790	21.699	0.091	68.2	100	5.11	50.0
IC14-3	IC14-3	S17-3	10.134	0.600	22.000	21.836	0.164	61.8	100	5.17	50.0
S17A-3	S17A-3	S17-3	23.545	0.600	21.920	21.360	0.560	42.0	225	5.27	50.0
IC13-3	IC13-3	S17A-3	4.672	0.600	23.180	23.099	0.081	57.7	100	5.08	50.0
IC46-2	IC46-2	S20-3 (Hydro Brk)	11.181	0.600	18.510	18.049	0.461	24.3	100	5.12	50.0
ATT. TANK #2	ATT. TANK #2	S20-3 (Hydro Brk)	19.225	0.600	17.375	17.150	0.225	85.4	375	6.54	47.7
S16-2	S16-2	ATT. TANK #2	20.433	0.600	17.500	17.375	0.125	163.5	375	6.38	48.2
IC45-2	IC45-2	S16-2	13.540	0.600	19.200	18.700	0.500	27.1	100	5.15	50.0
IC42-2	IC42-2	S16-2	9.521	0.600	20.200	19.550	0.650	14.6	100	5.08	50.0
IC43-2	IC43-2	S16-2	3.989	0.600	19.900	19.550	0.350	11.4	100	5.03	50.0
IC41-2	IC41-2	S16-2	21.859	0.600	20.490	19.550	0.940	23.3	100	5.23	50.0
S15-2	S15-2	S16-2	31.257	0.600	20.270	19.255	1.015	30.8	225	5.38	50.0
S14-2	S14-2	S16-2	60.401	0.600	20.400	19.255	1.145	52.8	300	6.14	48.9
IC40-2	IC40-2	S14-2	20.051	0.600	21.420	20.600	0.820	24.5	100	5.21	50.0
IC38-2	IC38-2	S14-2	13.188	0.600	22.180	22.019	0.161	81.9	100	5.26	50.0
IC37-2	IC37-2	S14-2	5.767	0.600	22.880	22.746	0.134	43.0	100	5.08	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
S8-1	S8-1	S9-1	2.196	87.3	11.2	1.495	1.160	0.075
S10-1	S10-1	S9-1	0.978	38.9	11.1	1.225	2.342	0.074
IC21-1	IC21-1	S10-1	1.109	8.7	0.2	0.350	1.225	0.001
IC19-1	IC19-1	S10-1	1.130	8.9	0.4	0.350	0.619	0.002
IC20-1	IC20-1	S10-1	1.933	15.2	0.3	0.350	1.225	0.002
IC18-1	IC18-1	S8-1	2.823	22.2	0.3	0.350	1.495	0.002
S8-1A	S8-1A	S8-1	2.163	86.0	4.0	1.285	0.900	0.027
IC17-1	IC17-1	S8-1A	2.679	21.0	0.2	0.350	1.285	0.001
IC15-3	IC15-3	S17-3	0.933	7.3	0.4	0.350	0.686	0.002
IC14-3	IC14-3	S17-3	0.981	7.7	0.6	0.840	0.549	0.004
S17A-3	S17A-3	S17-3	2.023	80.4	7.0	1.655	0.900	0.047
IC13-3	IC13-3	S17A-3	1.016	8.0	0.3	0.350	0.601	0.002
IC46-2	IC46-2	S20-3 (Hydro Brk)	1.574	12.4	0.2	0.350	0.751	0.001
ATT. TANK #2	ATT. TANK #2	S20-3 (Hydro Brk)	1.961	216.6	100.4	1.225	1.375	0.706
S16-2	S16-2	ATT. TANK #2	1.414	156.2	101.4	2.580	1.225	0.706
IC45-2	IC45-2	S16-2	1.489	11.7	0.2	0.350	1.655	0.001
IC42-2	IC42-2	S16-2	2.029	15.9	0.2	0.350	0.805	0.001
IC43-2	IC43-2	S16-2	2.302	18.1	0.2	0.350	0.805	0.001
IC41-2	IC41-2	S16-2	1.607	12.6	0.4	0.350	0.805	0.002
S15-2	S15-2	S16-2	2.366	94.1	6.9	1.235	0.975	0.046
S14-2	S14-2	S16-2	2.169	153.3	72.6	2.480	0.900	0.498
IC40-2	IC40-2	S14-2	1.567	12.3	0.4	0.350	2.480	0.002
IC38-2	IC38-2	S14-2	0.851	6.7	0.4	0.350	1.061	0.003
IC37-2	IC37-2	S14-2	1.178	9.3	0.0	0.350	0.334	0.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S12-2	S12-2	S14-2	13.831	0.600	21.850	21.750	0.100	138.3	300	5.67	50.0
S13-2	S13-2	S14-2	37.391	0.600	20.850	20.400	0.450	83.1	225	5.53	50.0
IC39-2	IC39-2	S13-2	11.273	0.600	21.470	20.750	0.720	15.7	100	5.10	50.0
IC35-2	IC35-2	S12-2	6.880	0.600	23.930	23.840	0.090	76.4	100	5.13	50.0
IC36-2	IC36-2	S12-2	4.029	0.600	23.560	23.465	0.095	42.4	100	5.06	50.0
IC34-2	IC34-2	S12-2	16.497	0.600	24.000	23.686	0.314	52.5	100	5.26	50.0
S12A-2	S12A-2	S12-2	16.515	0.600	23.000	22.590	0.410	40.3	225	5.50	50.0
IC32-2	IC32-2	S12A-2	11.927	0.600	24.950	24.774	0.176	67.8	100	5.21	50.0
IC33-2	IC33-2	S12A-2	10.488	0.600	24.750	24.683	0.067	156.5	100	5.29	50.0
S12B-2	S12B-2	S12A-2	15.269	0.600	24.035	23.500	0.535	28.5	225	5.37	50.0
IC31-2	IC31-2	S12B-2	13.149	0.600	25.670	24.995	0.675	19.5	100	5.12	50.0
IC30-2	IC30-2	S12B-2	15.042	0.600	25.620	24.995	0.625	24.1	100	5.16	50.0
S12C-2	S12C-2	S12B-2	23.747	0.600	25.460	24.900	0.560	42.4	225	5.26	50.0
IC29-2	IC29-2	S12C-2	9.324	0.600	26.390	25.585	0.805	11.6	100	5.07	50.0
IC28-2	IC28-2	S12C-2	8.727	0.600	26.320	25.585	0.735	11.9	100	5.06	50.0
IC44-2	IC44-2	S15-2	11.413	0.600	20.680	20.395	0.285	40.0	100	5.16	50.0
IC53-3	IC53-3	S26-3	5.518	0.600	13.990	13.800	0.190	29.0	100	5.06	50.0
IC49-3	IC49-3	S24-3	3.433	0.600	15.340	15.000	0.340	10.1	100	5.02	50.0
IC50-3	IC50-3	S24-3	20.213	0.600	15.150	15.000	0.150	134.8	100	5.51	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)
S12-2	S12-2	S14-2	1.335	94.3	49.7	1.940	1.130	0.333
S13-2	S13-2	S14-2	1.435	57.1	10.3	0.525	2.555	0.069
IC39-2	IC39-2	S13-2	1.962	15.4	0.4	0.350	0.750	0.002
IC35-2	IC35-2	S12-2	0.881	6.9	0.4	0.350	0.150	0.002
IC36-2	IC36-2	S12-2	1.187	9.3	0.4	0.350	0.525	0.002
IC34-2	IC34-2	S12-2	1.065	8.4	0.4	0.600	0.304	0.002
S12A-2	S12A-2	S12-2	2.067	82.2	39.4	1.775	1.275	0.264
IC32-2	IC32-2	S12A-2	0.936	7.4	0.4	0.350	0.126	0.003
IC33-2	IC33-2	S12A-2	0.612	4.8	0.5	0.350	0.217	0.003
S12B-2	S12B-2	S12A-2	2.458	97.7	23.8	1.720	1.275	0.160
IC31-2	IC31-2	S12B-2	1.757	13.8	0.3	0.350	0.885	0.002
IC30-2	IC30-2	S12B-2	1.580	12.4	0.3	0.350	0.885	0.002
S12C-2	S12C-2	S12B-2	2.014	80.1	10.7	1.275	0.855	0.072
IC29-2	IC29-2	S12C-2	2.283	17.9	0.4	0.350	1.275	0.002
IC28-2	IC28-2	S12C-2	2.255	17.7	0.4	0.350	1.275	0.002
IC44-2	IC44-2	S15-2	1.222	9.6	0.4	0.350	1.235	0.002
IC53-3	IC53-3	S26-3	1.437	11.3	0.3	0.350	0.550	0.002
IC49-3	IC49-3	S24-3	2.446	19.2	0.3	0.350	1.100	0.002
IC50-3	IC50-3	S24-3	0.661	5.2	0.3	0.850	1.100	0.002

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	14.600	Additional Storage (m³/ha)	20.0
Ratio-R	0.258	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
5	0	0	0
30	20	10	0
100	20	10	0

Node S28-3 (Hydro Brk) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	12.000	Product Number	CTL-SHE-0158-1470-2000-1470
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	14.7	Min Node Diameter (mm)	1500

Node S20-3 (Hydro Brk) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	17.105	Product Number	CTL-SHE-0097-5000-1600-5000
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node S18-3 (Hydro Brk) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	19.930	Product Number	CTL-SHE-0092-5000-2000-5000
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node IC1-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC1-1	Invert Level (m)	29.800	Discharge Coefficient	0.600

Node IC2-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC2-1	Invert Level (m)	29.040	Discharge Coefficient	0.600

Node IC5-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC5-1	Invert Level (m)	27.880	Discharge Coefficient	0.600

Node IC4-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC4-1	Invert Level (m)	27.410	Discharge Coefficient	0.600

Node IC3-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC3-1	Invert Level (m)	26.930	Discharge Coefficient	0.600

Node IC28-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC28-2	Invert Level (m)	26.320	Discharge Coefficient	0.600

Node IC6-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC6-1	Invert Level (m)	27.710	Discharge Coefficient	0.600

Node IC7-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC7-1	Invert Level (m)	25.500	Discharge Coefficient	0.600

Node IC8-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC8-1	Invert Level (m)	25.400	Discharge Coefficient	0.600

Node IC9-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC9-1	Invert Level (m)	25.610	Discharge Coefficient	0.600

Node IC11-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC11-1	Invert Level (m)	24.190	Discharge Coefficient	0.600

Node IC10-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC10-1	Invert Level (m)	23.800	Discharge Coefficient	0.600

Node IC12-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC12-1	Invert Level (m)	23.500	Discharge Coefficient	0.600

Node IC13-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC13-3	Invert Level (m)	23.180	Discharge Coefficient	0.600

Node IC14-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC14-3	Invert Level (m)	22.000	Discharge Coefficient	0.600

Node IC15-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC15-3	Invert Level (m)	21.790	Discharge Coefficient	0.600

Node IC16-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC16-3	Invert Level (m)	21.090	Discharge Coefficient	0.600

Node IC22-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC22-3	Invert Level (m)	20.390	Discharge Coefficient	0.600

Node IC21-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC21-1	Invert Level (m)	21.580	Discharge Coefficient	0.600

Node IC20-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC20-1	Invert Level (m)	21.580	Discharge Coefficient	0.600

Node IC19-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC19-1	Invert Level (m)	22.100	Discharge Coefficient	0.600

Node IC23-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC23-1	Invert Level (m)	19.710	Discharge Coefficient	0.600

Node IC24-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC24-3	Invert Level (m)	19.010	Discharge Coefficient	0.600

Node IC25-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC25-3	Invert Level (m)	18.300	Discharge Coefficient	0.600

Node IC26-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC26-3	Invert Level (m)	18.310	Discharge Coefficient	0.600

Node IC27-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC27-3	Invert Level (m)	18.430	Discharge Coefficient	0.600

Node IC17-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC17-1	Invert Level (m)	24.350	Discharge Coefficient	0.600

Node IC18-1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC18-1	Invert Level (m)	23.250	Discharge Coefficient	0.600

Node IC29-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC29-2	Invert Level (m)	26.390	Discharge Coefficient	0.600

Node IC30-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC30-2	Invert Level (m)	25.620	Discharge Coefficient	0.600

Node IC31-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC31-2	Invert Level (m)	25.670	Discharge Coefficient	0.600

Node IC32-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC32-2	Invert Level (m)	24.950	Discharge Coefficient	0.600

Node IC33-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC33-2	Invert Level (m)	24.750	Discharge Coefficient	0.600

Node IC34-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC34-2	Invert Level (m)	24.000	Discharge Coefficient	0.600

Node IC35-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC35-2	Invert Level (m)	23.930	Discharge Coefficient	0.600

Node IC36-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC36-2	Invert Level (m)	23.560	Discharge Coefficient	0.600

Node IC39-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC39-2	Invert Level (m)	21.470	Discharge Coefficient	0.600

Node IC38-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC38-2	Invert Level (m)	22.180	Discharge Coefficient	0.600

Node IC40-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC40-2	Invert Level (m)	21.420	Discharge Coefficient	0.600

Node IC37-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC37-2	Invert Level (m)	22.880	Discharge Coefficient	0.600

Node IC46-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC46-2	Invert Level (m)	18.510	Discharge Coefficient	0.600

Node IC45-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC45-2	Invert Level (m)	19.200	Discharge Coefficient	0.600

Node IC42-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC42-2	Invert Level (m)	20.200	Discharge Coefficient	0.600

Node IC41-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC41-2	Invert Level (m)	20.490	Discharge Coefficient	0.600

Node IC44-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC44-2	Invert Level (m)	20.680	Discharge Coefficient	0.600

Node IC43-2 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC43-2	Invert Level (m)	19.900	Discharge Coefficient	0.600

Node IC48-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC48-3	Invert Level (m)	16.040	Discharge Coefficient	0.600

Node IC47-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC47-3	Invert Level (m)	16.040	Discharge Coefficient	0.600

Node IC49-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC49-3	Invert Level (m)	15.340	Discharge Coefficient	0.600

Node IC50-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC50-3	Invert Level (m)	15.150	Discharge Coefficient	0.600

Node IC51-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC51-3	Invert Level (m)	14.440	Discharge Coefficient	0.600

Node IC52-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC52-3	Invert Level (m)	14.090	Discharge Coefficient	0.600

Node IC53-3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.050
Downstream Link	IC53-3	Invert Level (m)	13.990	Discharge Coefficient	0.600

Node ATT. TANK #1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	20.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	320.0	0.0	1.000	320.0	0.0	1.001	0.0	0.0

Node ATT. TANK #3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	12.035
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	150.0	0.0	2.000	150.0	0.0	2.001	0.0	0.0

Node ATT. TANK #2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	17.375
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	300.0	0.0	1.000	300.0	0.0	1.001	0.0	0.0

Node IC13-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.180	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC1-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.800	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.400	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC2-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.040	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.400	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC5-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	27.880	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC4-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	27.410	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.400	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC3-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.930	Slope (1:X)	4000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC28-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.320	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC29-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.390	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC6-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	27.710	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC7-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	25.500	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC8-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	25.400	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC9-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	25.610	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC30-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	25.620	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC31-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	25.670	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC34-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	24.000	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC33-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	24.750	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC35-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.930	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC36-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.560	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC17-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	24.350	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC18-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.250	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC19-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.100	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC20-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.580	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	6.000		

Node IC10-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.800	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC11-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	24.190	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC12-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.500	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC32-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	24.950	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC14-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.000	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC15-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.790	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC16-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.090	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC21-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.580	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC22-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.390	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC23-1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	19.710	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC24-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	19.010	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC25-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.300	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC26-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.310	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC47-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.040	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	28.600		

Node IC48-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	16.040	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	18.200		

Node IC27-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.430	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC37-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.880	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC38-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.180	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC40-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.420	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC39-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.470	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC41-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.490	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC44-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.680	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC42-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.200	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC43-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	19.900	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC45-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	19.200	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC46-2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.510	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.830		

Node IC49-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	15.340	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC50-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	15.150	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC51-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.440	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

Node IC53-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	13.990	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	10.400		

Node IC52-3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	14.090	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.33	Length (m)	4.800		

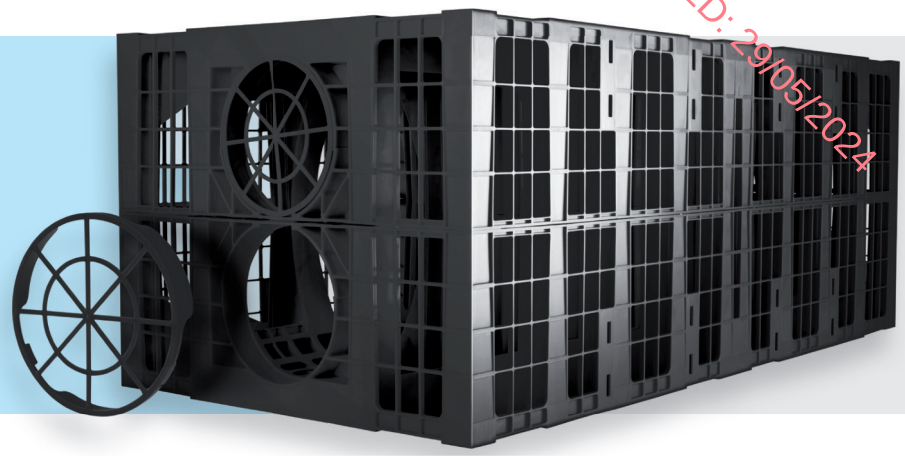
Appendix G – Typical Attenuation Tank System

Product Datasheet

AquaCell Plus-R

Product description

AquaCell Plus-R has been designed primarily for use in applications where inspectability is required, and is suitable for use in all applications from landscaped areas to heavily trafficked areas.



Technical specification

Cat code	6LB250	**Void ratio**	95%
Colour	Black	**Material**	Recycled PP
Dimensions	1m x 0.5m x 0.4m	**Vertical loading**	70.2 tonnes/m^2 (702 kN/m^2)
Weight	12.7kg	**Lateral loading**	15.1 tonnes/m^2 (151 kN/m^2)
Storage volume	190 litres		

Maximum installation depths

Typical soil type	**Maximum depth of installation – to base of units (m)[1]**				
	Soil weight kN/m^3	**Angle of internal friction φ (degrees)[2, 3]**	**Landscaped areas**	**Vehicle mass <9 tonnes[4, 5]**	**Vehicle mass <44 tonnes**
Over consolidated stiff clay	20	24	4.67	4.42	4.17
Silty sandy clay	19	26	5.03	4.78	4.53
Loose sand and gravel	18	30	5.86	5.61	5.36
Medium dense sand and gravel	19	34	6.87	6.62	6.37
Dense sand and gravel	20	38	7.82	7.57	7.30

Minimum cover depths

	Landscaped areas	**Car parks with vehicle mass <3 tonnes[5]**	**Car parks with vehicle mass <9 tonnes**	**Car parks with vehicle mass <12 tonnes**	**Low speed roads with vehicle mass <60 tonnes**
Minimum cover depth (m)	0.30	0.50	0.69	0.81	1.30

1. Without groundwater present below base of units – AquaCell Plus-R may be used where groundwater is present, contact Wavin for technical advice.
2. Loosening of dense sand or softening of clay by water can occur during installation. The designer should allow for any such likely effects when choosing an appropriate value of φ.
3. The design is very sensitive to small changes in the assumed value of φ, therefore, it should be confirmed by a chartered geotechnical engineer. In clay soils, it may be possible to utilise cohesion in some cases.
4. Applicable for car parks or other areas trafficked only by cars or occasional refuse collection trucks or similar vehicles (typically one per week).
5. This category should be used when considering landscaped areas that may be trafficked by ride on mowers.

Assumptions made:

- Ground surface is horizontal
- Shear planes or other weaknesses are not present within the structure of the soil

Wavin Limited | Edlington Lane | Edlington | Doncaster | DN12 1BY
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August 2020

ORS

Appendix H – Infiltration Test Results

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 1

Overall Pit Depth	2.4	m	
Pit Width	0.7	m	
Pit Length	2.4	m	

	Fill 1	**Fill 2**	**Fill 3**
Time Filled 100% (to within 200mm of surface, ie. 2.2m depth of water)	11:40	n/a	n/a
Time @75%	14:50	n/a	n/a
Time @50%	n/a	n/a	n/a
Time @25%	n/a	n/a	n/a
Time Empty	n/a	n/a	n/a

Water level at 60% full at 17:30. Hole backfilled at this point.

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 1

Overall Pit Depth	2.4	m	
Effective Depth	2.2	m	
Pit Width	0.7	m	
Pit Length	2.4	m	

Total Pit Volume	4.032	m3	
Effective Volume (to 200mm below surface)	3.70	m3	
Effective Storage Volume 75% to 25%, Vef	1.85	m3	
a =	15.32	m2	
Time 75% to 25%, tp	n/a		
Infiltration Rate, f =	Vef / a x tp		
f =	n/a		
Comments: No infiltration results can be obtained from test.			

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 2

Overall Pit Depth	2.4	m
Pit Width	0.8	m
Pit Length	2.2	m

	Fill 1	**Fill 2**	**Fill 3**
Time Filled 100% (to within 200mm of surface, ie. 2.0m depth of water)	11:26	n/a	n/a
Time @75%	14:15	n/a	n/a
Time @50%	17:20	n/a	n/a
Time @25%	n/a	n/a	n/a
Time Empty	n/a	n/a	n/a

Water level at 50% full at 17:30. Hole backfilled at this point.

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 2

Overall Pit Depth	2.4
Effective Depth	2.2
Pit Width	0.8
Pit Length	2.2

Total Pit Volume	4.224	m3	
Effective Volume (to 200mm below surface)	3.87	m3	
Effective Storage Volume 75% to 25%, Vef	1.94	m3	
a =	14.96	m2	
Time 75% to 25%, tp	n/a		
Infiltration Rate, f =	Vef / a x tp		
f =	n/a		
Comments: No infiltration results can be obtained from test.			

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 3

Overall Pit Depth	2.4
Pit Width	0.6
Pit Length	2.2

	Fill 1	**Fill 2**	**Fill 3**
Time Filled 100% (to within 200mm of surface, ie. 2.0m depth of water)	11:18	n/a	n/a
Time @75%	15:40	n/a	n/a
Time @50%	n/a	n/a	n/a
Time @25%	n/a	n/a	n/a
Time Empty	n/a	n/a	n/a

Water level at 65% full at 17:30. Hole backfilled at this point.

BRE DIGEST 365 - SOAKAWAY TEST

Site	Strandhill
Date	17/01/2024
Weather	Snow
Test No.	BRE 3

Overall Pit Depth	2.4	m	
Effective Depth	2.2	m	
Pit Width	0.6	m	
Pit Length	2.2	m	

Total Pit Volume	3.168	m3	
Effective Volume (to 200mm below surface)	2.90	m3	
Effective Storage Volume 75% to 25%, Vef	1.45	m3	
a =	13.64	m2	
Time 75% to 25%, tp	n/a		
Infiltration Rate, f =	Vef / a x tp		
f =	n/a		
Comments: No infiltration results can be obtained from test.			

SITE SUMMARY:

Total Site Area - Approx. 3.9 Ha

Developable Area 3.3 Ha - 30 Units per ha (Total 99 Units)

Public Open Space - 15% = 4,950m2 (Required)
15% = 5,000 m2(Proposed)

LEGEND:

House Type		no. of Beds	Description	Storeys	Floor Area (m²)	Total units	Total Area (m²)
A		2	Semi / Terraced	2	92m^2	30	
B		3	Semi Detached	3	117m^2	7	
C		3	Semi Detached	2	113m^2	42	
D		5	Semi / Detached	3	159m^2	11	
D1		5	Detached	3	172m^2	2	
D2		5	Semi / Detached	3	171m^2	7	
					TOTAL:	99	

Housing Mix:3 Bed Units - 50 = ~50% , 4+ Bed units - 20 = ~20% / 1+/ 2+ Bed units - 29 =~30%

LEGEND:

SN POSITION OF SITE NOTICE
OVERALL LAND OWNERSHIP OF APPLICANT IN BLUE
SUBJECT SITE OUTLINED IN RED

Rev	Description	By	Date

VINCENT HANNON ARCHITECTS
E: info@vha.ie
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Suite 4 Cloch Mhile, Dublin Road, Galway, H91 V97E
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2nd Floor Hanson Building, Doorly Park Road, Sligo, F91 P7N2
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Dublin
81 Amiens Street Dublin 1, D01 N275
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Client:
Project: GOLF COURSE ROAD, STRANDHILL
Drawing Description: SITE LAYOUT PLAN
Scale: 1:500@A1
Status: SKETCH
Drawing No: 230402-1-101
Rev: A
Date: 19/04/2023
Drawn by: JC
Checked by: VHA