

ECOLOGICAL HEDGEROW APPRAISAL & EVALUATION OF PEDESTRIAN CONNECTION AREA ASSOCIATED WITH A PROPOSED RESIDENTIAL DEVELOPMENT SITE AT ARDAROSTIG, BISHOPSTOWN, CORK.



Prepared for:

HW Planning 

On behalf of Ardstone Homes Ltd.

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Executive Summary

This report presents the outcome of an ecological appraisal of existing hedgerows and evaluation of the pedestrian connection area at a proposed mixed use residential development at Ardarostig, Bishopstown, Cork.

Potentially relevant hedgerow features that are due for retention/removal relate to the outer boundary of the mixed use residential section of the development area that is associated with a large open agricultural field. Habitat/vegetation features present at the overall pedestrian connection area included the proposed cycle/pedestrian route and existing shared surface pathway area due to be upgraded/extended.

Potential impacts and associated effects are considered along with recommended mitigation measures where relevant.

1 Introduction

Kelleher Ecology Services Ltd. (KES) was commissioned by HW Planning, on behalf of Ardstone Homes Ltd., to undertake an ecological appraisal of existing hedgerows and evaluation of pedestrian connection area at a proposed mixed use residential development at Ardarostig, Bishopstown, Cork.

The hedgerow assessment was originally initiated in response to feedback received during the pre-application SHD consultation stage with An Board Pleanála (ABP) in 2018 under case reference ABP-302125-18, which stated the following (Item Number 3 after ABP Notice of Pre-Application Consultation Opinion dated 13.09.18); *“Ecological Survey of existing trees and hedgerows which clearly identifies all trees proposed for removal”*. In this case, potentially relevant hedgerow features relate to the outer boundary of the mixed use residential section of the development area that is associated with a large open agricultural field.

The current SHD planning application now proposes to provide a two-way cycle track and pedestrian footpath that will link to an existing shared surface pathway south of the N40. The route for this proposed cycle/pedestrian track is within a vegetated area dominated by scrub associated with woodland edge to the north-east of the study site. It is also proposed to upgrade the existing shared surface pathway to provide a two-way cycle track and pedestrian footpath, which will encroach upon an existing area of vegetation that seems to have been historically landscaped as part of former road construction. The existing pedestrian footpath along Waterfall Road will also be extended to complete pedestrian access to the main access point of the development from Waterfall Road. A proposed pedestrian crossing at Waterfall Road to the north-east of the primary development area (see Figure 1.2) is of no relevance to this assessment due to the dominance of existing buildings and artificial surfaces with an absence of any vegetation.

This report therefore addresses an ecological appraisal of:

- Existing hedgerow features bounding the agricultural field, which also includes trees present as part of hedgerows identified overall (see Methods Section 2 below). Please note that a tree survey has also been undertaken by South of Ireland Tree Surveys (2020) along with a Landscape Masterplan by Park Hood (Drawing No. 6824-PHL-00-ZZ-DR-L-1000) accompanying the planning application.
- Existing proposed cycle/pedestrian route and existing shared surface pathway area due to be upgraded/extended.

1.1 Ecological Definitions for Hedgerow in Ireland

The current standard national classification scheme for wildlife habitats in Ireland (Fossitt 2000) defines hedgerows as *‘Linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Most hedgerows originate from planting and many occur on raised banks of earth that are derived from the excavation of associated drainage ditches. Dimensions of hedgerows vary considerably, depending largely on management and composition, and are taken here as being mainly less than 5 m high and 4 m wide. When wider or taller than this, or dominated by trees, the habitat should be considered as a narrow strip of scrub or woodland, or as a treeline - WL2. Some hedgerows may be overgrown or fragmented if management has been neglected, but they should still be considered in this category unless*

they have changed beyond recognition. Linear strips of low scrub are included in this category if they occur as field boundaries.'

Since the publication of Fossitt (2000), a standard national hedgerow appraisal system (see Foulkes *et al.* 2013) has been developed for regional/county level assessment that defines hedgerows as '*Linear strips (4m wide or less) of woody plants with a shrubby growth form that cover more than 25% of the length of a field or property boundary that have been deliberately established or managed. They often have associated banks, walls, ditches (drains), or trees. Hedges that have developed into lines of trees which no longer display a shrubby growth form (remnant hedgerows) are also considered for recording purposes.'* The standard national hedgerow appraisal system also acknowledges the definition by Fossitt (2000), where it proposes that hedgerows classified under Fossitt (2000) are also included to allow consistency with such other habitat surveys nationally (see Foulkes *et al.* 2013).

1.2 Study Site

The proposed development site is located at Ardarostig townland that is on the south-western edge of Cork City at Bishopstown (see Figure 1.1). The application site encompasses approximately 9.95ha, where the residential part of the study site is currently greenfield in nature comprising of one large open agricultural crop field with largely native hedgerow/treeline habitat along its outer boundary while the pedestrian connection area of the study site is dominated by vegetated habitat (scrub, woodland, spoil and bare ground, amenity grassland, scattered trees & parkland, recolonising bareground) and non-vegetated habitat (buildings and artificial surfaces; see Figure 1.2).

The site is sloping from north to south c. 20-50m above sea level, where it adjoins some private residences at its north-western and north-eastern corners but is otherwise surrounded by farmland with some woodland along the eastern boundary (see Figure 1.2). There are no established watercourses or other water-features at the site, with the nearest known established watercourse being Two Pot (Cork City) River c. 180m to the west of the site. While a small¹ unregistered² water-feature was noted flowing into the western end of the proposed new cycle/pedestrian route from an off-site location associated with the adjoining willow-dominated woodland/scrub habitat that best classifies as eroding/upland stream³, it is not a typically well-established stream feature as such where it appears to be a water-feature that arises on occasion from peak rain events; it is proposed to manage the flow of this unregistered water-feature by incorporating a filter drain along the southern boundary of the proposed new cycle/pedestrian route (see Drawing Nos. 0420, 0421, 0422 & 0423 by DOSA accompanying the planning application). No Tree Preservation Order (TPO) is known for the study site.

1.3 Proposed Project

The proposed development will involve the construction of a mixed use residential development with commercial space, crèche, landscaping, road improvement, pedestrian/cycleway and site development

¹ Wetted width c. 30-40 cm & depth c. 5-10 cm

² Under EPA rivers database

³ After Fossitt (2000)

works. The proposed development will consist of 137 houses and 139 apartments over 5 apartment blocks (see Appendix A). The proposed development will provide for new vehicular and pedestrian entrances onto Waterfall Road, a two-way cycle track and pedestrian footpath linking to existing shared surface pathway south of the N40, upgrades to this shared surface path to provide two-way cycle track and pedestrian footpath, pedestrian crossings to the east of the site and on waterfall road, infrastructure development works comprising the relocation/undergrounding of ESB powerlines, wastewater treatment proposals, surface water attenuation, water utility services and all ancillary site development.

1.4 Objectives of this Assessment

- An ecological appraisal of relevant existing hedgerows associated with the field and habitats associated with the pedestrian connection area.
- Consideration of potential impacts on relevant existing hedgerows and pedestrian connection area habitats arising from the proposed residential development and recommendations where necessary.

Figure 1.1 Study Site Location

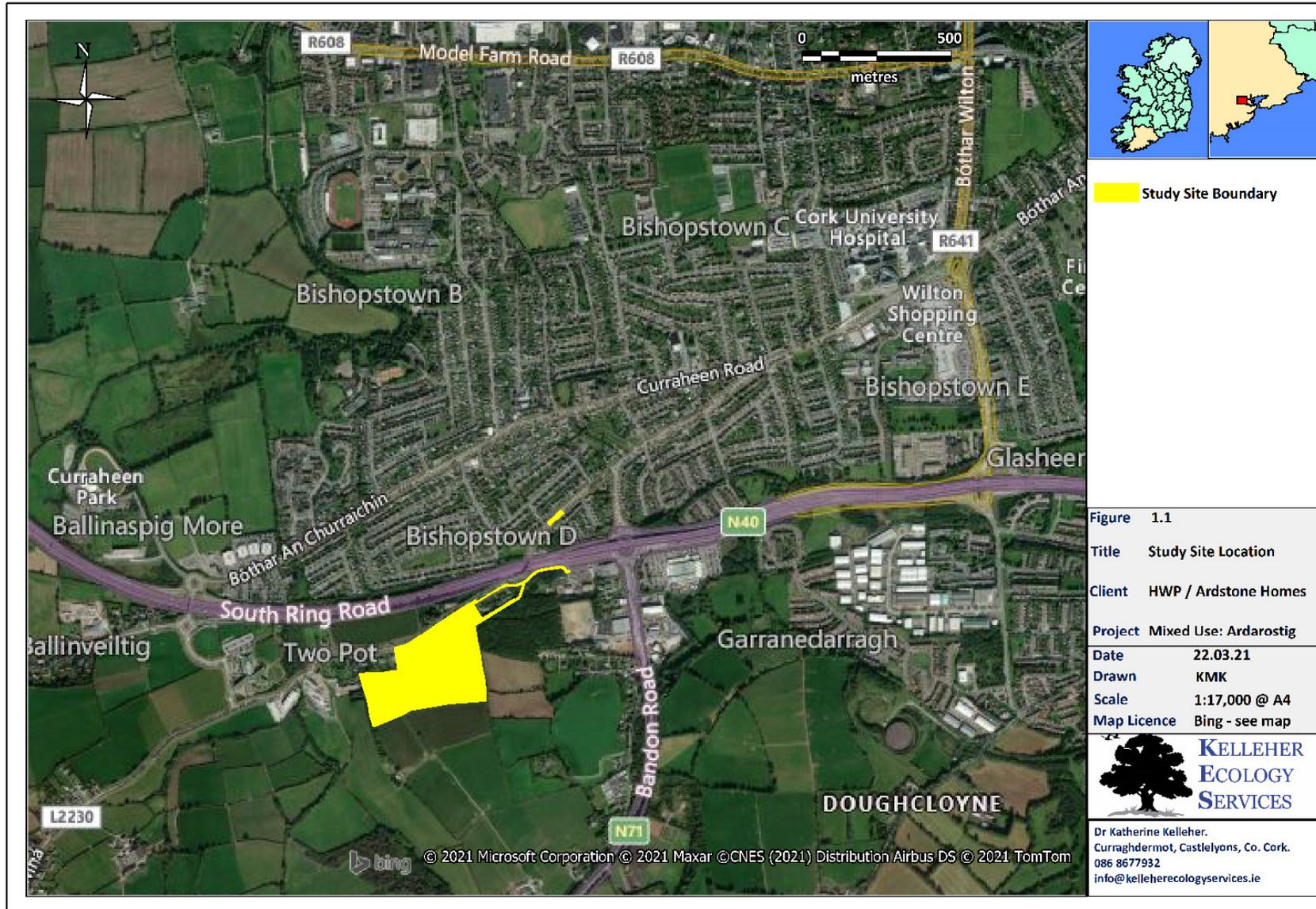
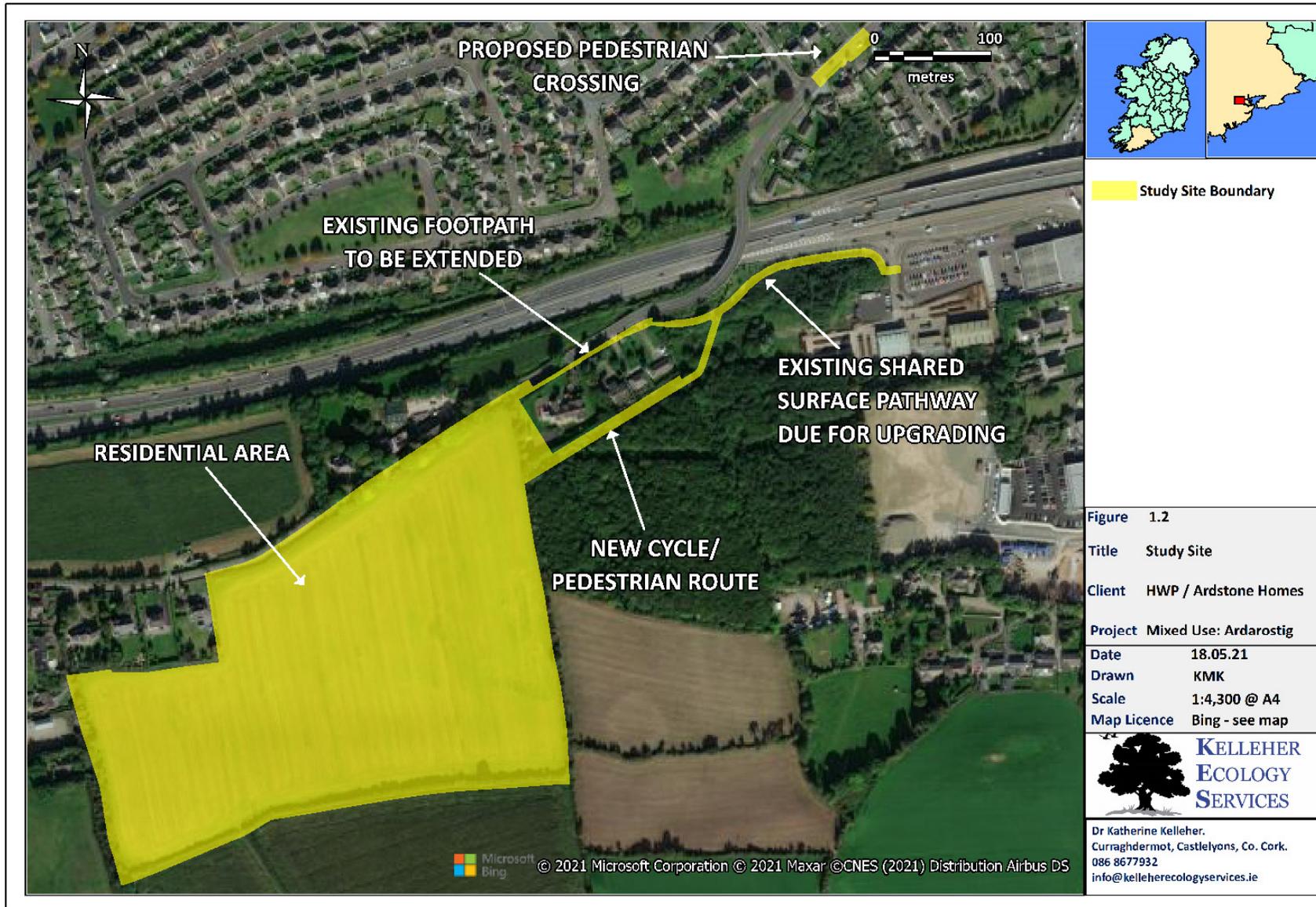


Figure 1.2 Study Site



2 Methods

This study involved undertaking baseline field assessments, which are detailed in the relevant sections below.

The appraisal of the field boundary hedgerow features was originally undertaken in October 2018 (see Table 2.1). A walkover was undertaken in January 2021 (see Table 2.1) to check for any significant changes (*e.g.* management, removal *etc.*) to the field boundary hedgerow features since 2018 by comparing the relevant hedgerow features with a photo catalogue from the 2018 study (see Appendix B). From this, the only change of significance noted since 2018 was the presence of a new *c.* 3m gap along Hedgerow 2 (to access the cycle/pedestrian route for site investigation activities); therefore, the outcome of the 2018 hedgerow appraisal is still largely valid, with amendments made in relation to ‘gap’ data for Hedgerow 2. No other new points of interest were noted (*e.g.* badger sett).

Ecological evaluation of the pedestrian connection area involved a baseline habitat and botanical survey of the area that was undertaken in February 2021 (see Table 2.1).

Table 2.1 Field survey details.

Date	Time	Survey	Weather	Ecologist
15.10.18	c. 09.30 - 13.00	Qualitative field survey of study site hedgerows	Dry; Cloud Cover 0/8 Okta; Wind F0; Good Visibility	David Rees
22.01.21	c. 11.20 – 12.20	Check for any significant changes to hedgerow boundary features since 2018 & note any other new points of interest since 2018	Dry; Cloud Cover 4/8 Okta; Wind F1; Good Visibility	Katherine Kelleher
03.02.21	c. 09.30 - 13.30	Habitat & botanical baseline survey of pedestrian connection area.	Dry, Sunny; Wind F1-3; Good Visibility	John Deasy

2.1 Hedgerow Appraisal

The methodology for the hedgerow appraisal at the Ardarostig study site is adapted from the current standard national hedgerow appraisal system (Foulkes *et al.* 2013). As previously mentioned, this national hedgerow appraisal system was developed for regional/county level assessment, where the Ardarostig study site is at a much smaller site-based scale. It is also important to remember that the national hedgerow appraisal system has been developed to allow surveys to be comparable and repeatable, as well as identifying hedgerows of historical, ecological and/or landscape significance and assessing hedgerow condition (see Foulkes *et al.* 2013).

Therefore, aspects adapted from the standard national hedgerow appraisal system in relation to the Ardarostig study site here included the recording of qualitative field survey hedgerow data and the overall appraisal of hedgerows in terms of historical significance criteria and condition assessment criteria as outlined by Foulkes *et al.* (2013) and summarised in Section 2.2 below. For the purposes of this appraisal, all study site hedgerows that conformed to the definition of hedgerow as per Foulkes *et al.* (2013; see Section 1.1 above) were subject to detailed qualitative field survey here. Hedgerow data were inputted into a standard hedgerow appraisal data recording form (after Foulkes *et al.* 2013; see Appendix C).

The qualitative field survey of hedgerows at the Ardarostig study site was undertaken on 15th October 2018 (see Table 2.1), which is outside of the optimum survey period when most plant species are growing (*i.e.* April to September; Smith *et al.* 2011). Although the main woody species components of the hedgerows can easily be identified outside of the flowering season. Also, in a mild Autumn season where the plant growing season can extend, it is possible to survey into November (see JNCC 2010). While the dominant species in the tree, shrub and ground flora layers were identified during the field survey, it is nonetheless acknowledged that some of the ground flora species may have been missed due to the timing of the survey in October.

Please note that reference to any other habitats in this report follows Fossitt (2000), while plant identification and nomenclature follows Rose & O'Reilly (2006) with grass and fern identification and nomenclature following Rose (1989).

2.1.1 Qualitative Field Survey

For each hedgerow identified at the study site, the qualitative field survey recorded data for the following attributes (in line with Foulkes *et al.* 2013);

- Context
- Construction
- Structure and condition
- Management
- Floristic data – from the three floristic layers of tree, shrub and ground flora

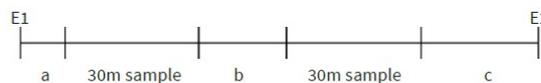
2.1.2 Floristic Data: Random 30m Sample Strips

In relation to the floristic data recording, two non-concurrent and randomly selected 30m strips along the length of each hedgerow in question are to be surveyed (see Foulkes *et al.* 2013). The initial identification of probable hedgerows at the study site was undertaken through desktop review of an aerial photograph, where probable hedgerow lengths were also calculated to assist with determining the random locations of each 30m sample strip per hedgerow after Foulkes *et al.* (2013).

In brief, determining the random locations of each 30m sample strip involved generating three random numbers between 0 and the total length of the hedgerow in question minus 60m (*i.e.* the two 30m sample strips) using the RANDBETWEEN random number function of MS Excel, where the random numbers generated refer to the length (in metres) along the hedgerow from where the 30m section locations are determined. As previously mentioned, the selection of the random locations for each 30m sample strip followed Foulkes *et al.* (2013), Appendix C of which details the selection method as follows;

Appendix C: Method for selecting 2 random, non-concurrent, 30m strips in a given length of hedgerow

The selected hedge of length (L) between the two end points E1 and E2 is subdivided as outlined below. E1 is the most northerly and westerly of the two points and is the datum.



$$L = a + 30 + b + 30 + c$$

$$L - 60 = a + b + c$$

If the respective percentage of the total length of each of a, b and c is generated at random, then two, non-concurrent sample lengths of 30m can be randomly selected.

This can be achieved by using the RANDBETWEEN random number function in a Microsoft Excel Spreadsheet.

e.g. Random 1 =RANDBETWEEN(0,(L-60))
 Random 2 =RANDBETWEEN(0,((L-60)-Random1))
 Random 3 =((L-60)-(Random1+Random2))

Total Length	L-60	Random 1	Random 2	Random 3
350	290	213	15	62

Each of the random numbers 1, 2, and 3 are randomly assigned to give values to a, b, and c.

While three hedgerows were appropriately identified through desktop review with associated two non-concurrent and randomly selected 30m sample strips (Hedgerows 2 – 4; see Figure 2.1), one hedgerow was subsequently separated into two distinct hedgerows that were found to be entirely different in nature during the field survey (Hedgerows 1a & 1b; see Figure 2.1). Consequently, Hedgerows 1a & 1b only had one randomly selected 30m sample strip each (as these were determined in advance of the field survey on the basis that Hedgerows 1a & 1b comprised of one overall hedgerow and not two). The distances along each hedgerow where the 30m sample strips were located are summarised in Table 2.2 below; as previously outlined above, these distances were derived by generating random numbers using the RANDBETWEEN random number function of MS Excel.

Table 2.2 Distances along each hedgerow where the 30m sample strips were located at the Ardarostig study site in 2018.

Hedgerow	Distances Along Each Hedgerow		
	Start point of hedgerow [^] to start of 1 st 30m strip	End of 1 st 30m strip to start of 2 nd 30m strip	End of 2 nd 30m strip to end point of hedgerow [^]
Hedgerow 1a	52m	n/a*	n/a*
Hedgerow 1b	128m	n/a*	n/a*
Hedgerow 2	73m	135m	47m
Hedgerow 3	4m	159m	172m
Hedgerow 4	7m	79m	34m

*Hedgerows 1a & 1b only had one 30m sample strip each.

[^]See Figure 2.1 for GPS start and end points of hedgerows.

2.1.3 Hedgerow Significance & Condition Assessment

The **significance** of each identified hedgerow was determined using the following criteria (in line with Foulkes *et al.* 2013):

- Historical Significance
- Species Diversity Significance (an ecological criterion)
- Ground Flora significance (an ecological criterion)
- Structure, Condition & Associated Features (an ecological criterion)
- Habitat Connectivity (an ecological criterion)
- Landscape Significance

Hedgerow significance is ranked on a scale of 0-4 (0 being lowest)⁴ for each of the above listed significance criteria, which includes criteria that relate to ecological significance. A hedge of high significance (or heritage hedgerow) is indicated by the following scores, where hedgerows of lower scores may still be of value depending on the context;

- A score of 4 in any criteria overall;
- A cumulative score of ≥ 6 in the Historical, Species Diversity or Structure criteria or;
- A cumulative score of ≥ 16 across all criteria overall.

The **condition** of each identified hedgerow was assessed using the following variables (in line with Foulkes *et al.* 2013):

- Structural variables
- Continuity
- Negative indicators/Degradation/Issues affecting long term viability

Hedgerow condition is ranked on a scale of 0-3 (0 being the lowest)⁵ for each of the above listed condition criteria, all of which relate to ecological significance. The higher the score, the more favourable the condition; a score of 0 in any category is indicative of a hedgerow that is in unfavourable condition overall.

2.2 Pedestrian Connection Area: Habitat & Flora

The habitat and flora assessment of the pedestrian connection area was carried out in accordance with best practice guidance (Smith *et al.* 2011). This involved a walkover of the proposed development area associated with the overall mixed use scheme where the habitats present were classified to level three using (Fossitt) 2000. The extent of habitats was recorded on a field map along with notes of species present and their relative abundance described using the DAFOR scale. In addition, any other observations of interest (*e.g.* invasive plant species *etc.*) were recorded using a Garmin eTrex10 GPS handheld unit. The botanical survey of the site was conducted in-parallel with the habitats survey, where botanical species were identified and recorded according to dominant habitat type. Taking seasonal constraints into account in relation to the plant growing season, it is felt that sufficient vegetative cover was still present within each of the habitats to identify the dominant flora present.

⁴ After Foulkes *et al.* 2013: 0 = low significance; 1 = slightly significant; 2 = moderately significant; 3 = significant; 4 = highly significant.

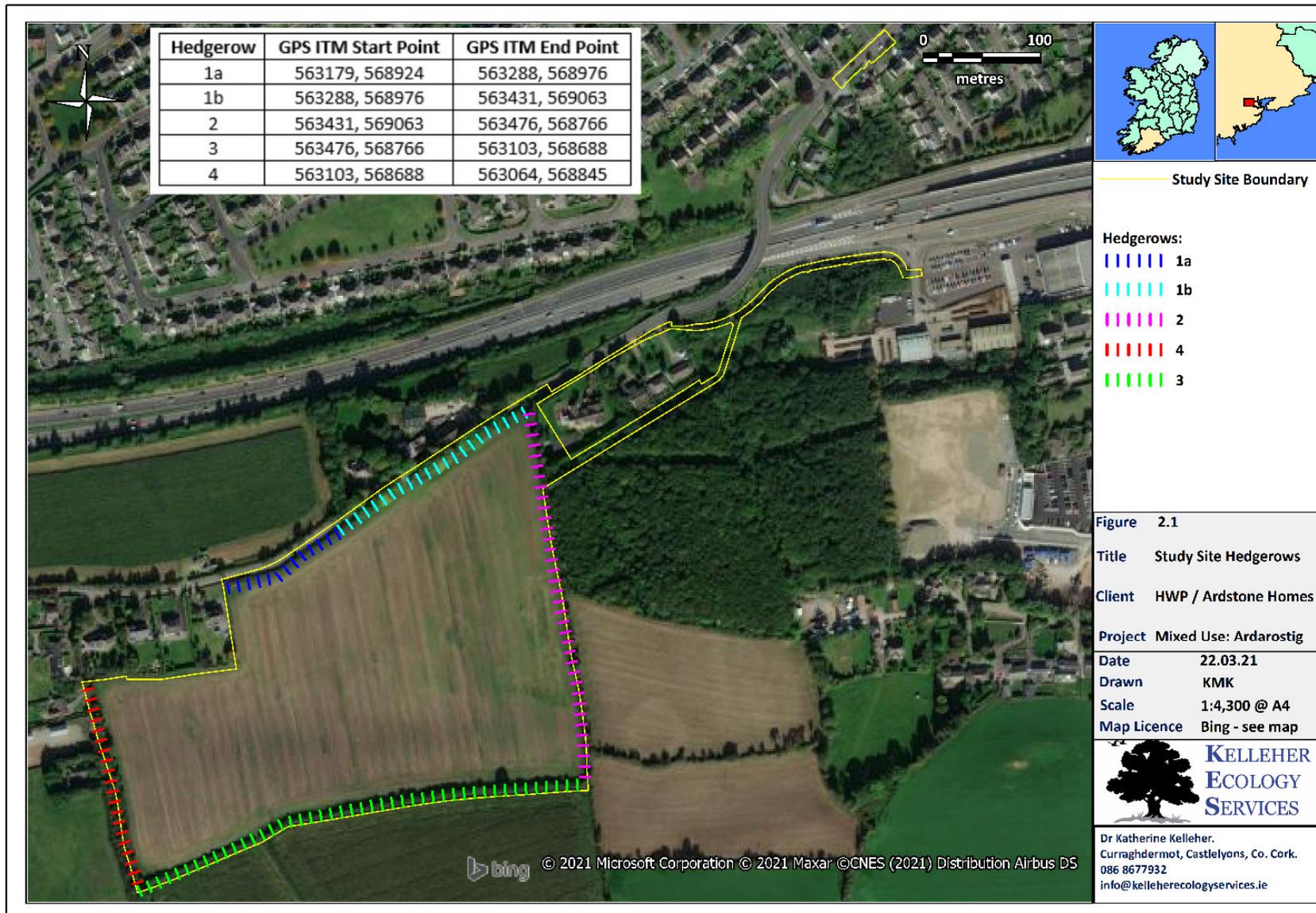
⁵ After Foulkes *et al.* 2013: 0 = unfavourable; 1 = adequate; 2 = favourable; 3 = highly favourable.

Evaluation of the habitats present at the pedestrian connection area in terms of their ecological value was assessed using criteria amended after NRA 2009 and Nairn & Fossitt 2004 (see Appendix D). The conservation status of habitats and flora was also considered in respect of the following: Red List for Vascular Plants (Wyse Jackson *et al.* 2016); Red List of Bryophytes (Lockhart *et al.* 2012); Flora (Protection) Order 2015; the EU Habitats Directive (92/43/EEC).

2.3 Impact Assessment

The description and evaluation of potential and residual effects or impacts associated with the proposed development on the existing hedgerows of the study site follows guidelines published by the EPA (2017; Appendix D).

Figure 2.1 Study Site Hedgerows



3 Results

3.1 Hedgerow: General Description

The site consists of a large single tillage field that that has already been cultivated with no crop evident (Tilled Land BC3 after Fossitt 2000) and is bounded by six field boundaries overall.

Two boundaries in the north-western corner of the site comprise of concrete block walls that border houses adjoining the field. These boundaries are entirely artificial in nature and with cultivated garden plants growing on or just inside the walls (*e.g.* climbing cotoneaster and a *Griselinia* hedge); these two boundaries are not native hedgerows and are therefore not considered any further in this appraisal. The remaining field boundaries essentially form the northern, eastern, southern and western boundaries of the study site (see Figure 2.1 above), where Hedgerow 1 was split into two distinct hedgerows (Hedgerow 1a & 1b) during the field survey (as outlined in Section 2.1.1 above).

3.1.1 Hedgerow 1a

This hedgerow is at the north-western corner of the study site running west to east and forming part of the roadside boundary with Waterfall Road (see Figure 2.1 & Plate 1). It is essentially a linear strip of scrub vegetation that is dominated by bramble (*Rubus fruticosus agg.*), with common nettle (*Urtica dioica*) also an abundant component. On the field side of this hedgerow, there is a wide grassy margin up-to 2m wide that is dominated by common couch (*Elytrigia repens*). There are no trees present in this hedgerow and only two individual specimens of grey willow (*Salix cinerea agg.*) that can be classed as shrubs. The hedgerow is very low, only 1.5m in height. There is evidence of herbicide spray drift hitting both the grassy margin and some of the plants in the hedgerow. On the roadside of the hedgerow is a stone wall that drops some 1.5m down to the level of the adjoining road surface. While this line of bramble may not be considered hedgerow under the definition of same in Foulkes *et al.* (2013), Fossitt (2000) includes *linear strips of low scrub* as hedgerow (WL1) where *they occur as field boundaries*; therefore, this hedgerow is included in this appraisal.



Plate 1: Hedgerow 1a.

3.1.2 Hedgerow 1b

This runs continuously with hedgerow 1a but is completely dominated by a line of tall, mature ash (*Fraxinus excelsior*) trees (see Figure 2.1 and Plate 2). The trees are shading out the shrub layer with only a small number of hawthorn (*Crataegus monogyna*) forming the shrub layer. The ground flora is again dominated by bramble with common nettle and ivy (*Hedera helix*). The ivy also found growing on the ash trees but it does not form a canopy in these trees. The existing entrance into the field from the adjacent Waterfall Road lies within this hedgerow and consists of a gap of approximately 4m wide. While this conforms to Treeline (WL2) under Fossitt (2000), Foulkes *et al.* (2013) include lines of trees that do not have any shrubby growth in their hedgerow appraisal scheme such that this hedgerow is therefore included in this appraisal.

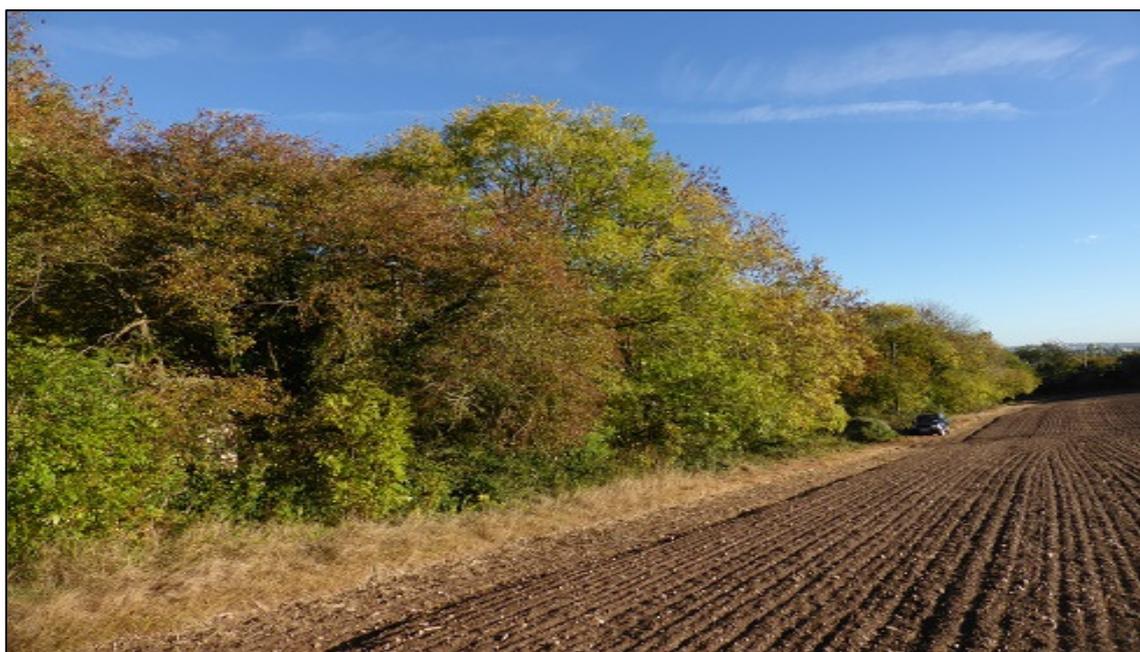


Plate 2: Hedgerow 1b.

3.1.3 Hedgerow 2

This hedgerow occurs along the eastern boundary of the study site and is approximately 315m long (see Figure 2.1 and Plate 3). At its northern end, it backs onto a neighbouring garden. Moving south, the adjoining land becomes an area of broad-leaved woodland (Fossitt code, WN) and then improved agricultural grassland (Fossitt code, GA1). For its entire length though, the hedgerow remains distinct from the adjoining land. It contains a number of trees, with hawthorn being the most common species with a mature holly (*Ilex aquifolium*) and a mature penduculate oak (*Quercus robur*). The shrub layer is the dominant layer though, with blackthorn (*Prunus spinosa*) and hawthorn dominating the shrubs with occasional elder (*Sambucus nigra*). Dog rose (*Rosa canina* agg.) also occurs as the most common woody climbing plant. This hedgerow is growing on an earth bank, approximately 1.5m high. There is one gap of c. 3m width that has been created relatively recently to allow access into the proposed cycle/pedestrian route for site investigation activities (see Plate 3). The dominance of the shrub layer suggests that this

hedgerow has been subject to management at some stage in the past, probably with a flail cutter but it does not appear to have been cut in recent years.



Plate 3: Hedgerow 2 (left), with relatively recent gap also shown (right).

3.1.4 Hedgerow 3

This hedgerow runs for approximately 395m and forms the southern boundary of the site (see Figure 2.1 and Plate 4). As with hedgerow 2, it contains some trees but the shrub layer is the dominant layer. Again, the shrubs are dominated by hawthorn and blackthorn, although there is a short section (approximately 10m) where elm (*Ulmus* sp.) is present. This is the only area on the site where elm was recorded. Towards the western end of the hedgerow, gorse (*Ulex europaeus*) is also present in the shrub layer. The ground flora is again dominated by bramble with nettle and common couch also present. Noticeable is a wide grassy margin that is 4m or more wide in places before the tilled land starts. This margin is dominated by grass species but also contains small clumps of grey willow and some areas where blackthorn suckers are growing into the margin. This hedgerow is again growing on a bank up to 1.5m high in places. There is some indication that the hedge has been managed in the past with some large, old stems lying horizontal within the hedge, suggesting that hedgerow became overgrown and was then managed by cutting the large stems. Management of this hedgerow does not appear to have taken place in recent years.



Plate 4: Hedgerow 3.

3.1.5 Hedgerow 4

This forms the western boundary of the site (see Figure 2.1 and Plate 5). It contains gaps, which have become infilled with bramble and a number of trees including some mature hawthorn and ash. This hedgerow grows on a low bank and borders a lane which has become overgrown in places. The shrub layer is dominated by hawthorn. It is the only hedgerow that contains the non-native shrub, pheasant berry (*Leycesteria formosa*), although only a single specimen of this plant was noted. The ground flora is again dominated by bramble but herb robert (*Geranium robertianum*) is a noticeable component of the ground flora.



Plate 5: Hedgerow 4.

3.2 Hedgerow: Significance & Condition Assessment

Qualitative data collected from the field survey here were inputted into the standard hedgerow appraisal data recording forms (after Foulkes *et al.* 2013) that comprise of the following four forms: *Structural Recording Form*; *Shrub Recording Form*; *Climber Trees Recording Form*; *Ground Flora etc. Recording Form*.

The forms relevant to the study site here are available in Appendix C, where the data was then used to assess the significance and condition of each hedgerow at the study site according to criteria and associated scores outlined in Foulkes *et al.* (2013) and as summarised in Section 2 above.

3.2.1 Hedgerow Significance

Hedgerow significance for each hedgerow assessed at the study site is summarised in Table 3.1 below, where scores are given in parentheses for each of the significance criteria in question (after Foulkes *et al.* 2013).

Hedgerows 1a and 1b both score 4 for historical significance, which under the Foulkes *et al.* (2013) scheme indicates that these hedgerows are of high significance overall. However, this indicative high significance is only due to their historic nature as they are present on the first edition OS maps and also form part of a townland boundary. Ecological significance criteria (*i.e.* species diversity; ground flora; structure,

construction & associated features; habitat connectivity) for both hedgerows have relatively low scores overall (combined score of 2 out of a possible 16 for these four criteria; see Table 3.1).

Hedgerows 2, 3, and 4 all score >6 in the combined scores for the three criteria related to historical, species diversity and structure; thereby indicating that these three hedgerows are of high significance overall. Again, this significance is due to the presence of all three hedgerows on the first edition OS maps. Hedgerows 2 and 3 also grow on a high bank, giving some structural significance. Hedgerow 2 adjoins an area of broad-leaved woodland, such that it has significant habitat connectivity. Hedgerow 4 grows on a much lower bank reducing its structural significance. Ecological significance criteria (*i.e.* species diversity; ground flora; structure, construction & associated features; habitat connectivity) for all three hedgerows have relatively moderate scores overall (combined score range of 6-8 out of a possible 16 for these four criteria; see Table 3.1).

Table 3.1 Hedgerow significance summary for each criteria and hedgerow at the Ardarostig study site.

Significance Criteria	Hedgerow Reference				
	Hedgerow 1a	Hedgerow 1b	Hedgerow 2	Hedgerow 3	Hedgerow 4
Historical	High (4)	High (4)	Significant (3)	Significant (3)	Significant (3)
Species Diversity	Low (0)	Low (0)	Moderate (2)	Moderate (2)	Moderate (2)
Ground Flora	Low (0)	Low (0)	Low (0)	Low (0)	Low (0)
Structure, Construction & Associated Features	Slightly (1)	Slightly (1)	Significant (3)	Significant (3)	Moderate (2)
Habitat Connectivity	Slightly (1)	Slightly (1)	Significant (3)	Moderate (2)	Moderate (2)
Landscape	Low (0)	Moderate (2)	Moderate (2)	Moderate (2)	Moderate (2)

3.2.2 Hedgerow Condition

Hedgerow condition for each hedgerow assessed at the study site is summarised in Table 3.2 below, where scores are given in parentheses for each of the condition criteria in question (after Foulkes et al. 2013).

Both Hedgerows 1a and 1b are of unfavourable condition (score range of 0-2 out of a possible 9). Hedgerow 1a is unfavourable due to its height and width profile coupled with the percentage of gaps occurring and the evidence of herbicide use. Hedgerow 1b is unfavourable as it is considered to be a remnant hedgerow that has not received any management such that all of the trees have grown to shade out the shrub and ground layers.

Hedgerows 2 and 3 both score 8 (out of a possible 9) and are in highly favourable condition overall, their height and width, low amount of gaps and no degradation to the bank contribute to its highly favourable status. The presence of a wide grass margin also protects the hedgerow vegetation from the effects of herbicide that is used in the tillage field, with signs of spray drift confined to the grass margin. Hedgerow 4 scores a total of 6 (out of a possible 9) where its condition assessment varies with criteria; generally it is considered to be favourable but it does have gaps where bramble now dominates and some trees that have been allowed to grow.

Table 3.2 Hedgerow condition summary for each criteria and hedgerow at the Ardarostig study site.

Condition Criteria	Hedgerow Reference				
	Hedgerow 1a	Hedgerow 1b	Hedgerow 2	Hedgerow 3	Hedgerow 4
Structural variables	Unfavourable (0)	Unfavourable (0)	Highly favourable (3)	Highly favourable (3)	Highly favourable (3)
Continuity	Unfavourable (0)	Unfavourable (0)	Favourable (2)	Favourable (2)	Adequate (1)
Negative indicators, Degradation, Issues affecting long-term viability	Unfavourable (0)	Favourable (2)	Highly favourable (3)	Highly favourable (3)	Favourable (2)

3.2.3 Hedgerow Significance & Condition: Overview

Hedgerow 1a is in unfavourable condition where it no longer contains a tree or shrub layer or any climbing plants and the ground flora is dominated by bramble and nettle, indicating nutrient rich conditions. While it is also considered to be of high significance, this is in relation to a historical significance criterion as it was present on the first edition OS maps and forms part of a townland boundary. Ecological criteria for this hedgerow are relatively low overall.

Hedgerow 1b is a line of mature ash trees that is of unfavourable condition but again is also considered to be of high significance. As with hedgerow 1b, its significance is due to a historical significance criterion where it was present on the first edition OS maps and forms part of a townland boundary. It is considered to be structurally unfavourable as it is a remnant hedge with a reduced shrub layer leading to gaps between the trees, where these gaps are largely infilled with bramble. Ecological criteria for this hedgerow are relatively low overall.

Hedgerow 2 is considered highly significant and in highly favourable condition. Its significance is partly due to its historical context and also that it adjoins an area of broad-leaved woodland. Structurally this hedgerow has no gaps, the bank it is growing on shows no degradation and the shrubs present show outgrowths at the base. Ecological criteria for this hedgerow are relatively moderate to high overall.

Hedgerow 3 is of high significance and in highly favourable condition. The shrub layer is well developed, with no gaps and showing outgrowth from the base. The wide grassy margin protects the woody vegetation from the effects of herbicide spray drift. Ecological criteria for this hedgerow are relatively moderate to high overall.

Hedgerow 4 is of high significance and is generally in favourable condition. However, it has not been managed for some considerable time and shows signs of gaps developing with some trees growing on and beginning to dominate the shrub layer. Bramble has infilled the gaps and dominates the ground flora. Ecological criteria for this hedgerow are relatively moderate overall.

3.3 Pedestrian Connection Area: Habitat & Flora

No habitats listed on Annex I of the EU Habitats Directive were recorded within the pedestrian connection area. Similarly, no botanical species protected under the Flora (Protection) Order 2015, listed in Annex II or

IV of the EU Habitats Directive (92/43/EEC), or Red listed in Ireland (Wyse Jackson *et al.* 2016) were recorded.

While no species listed on the Third Schedule of the 2011 European Communities (Birds and Natural Habitats) Regulations (*i.e.* species of which it is an offense to disperse, spread or otherwise cause to grow in any place) and no invasive alien plant species of European Union concern⁶ (IAS Regulation 1143/2014) were recorded, a number of non-native invasive plants were recorded overall. **Cherry laurel *Prunus laurocerasus*** was recorded within and immediately adjacent to the proposed development site in the form of garden boundary hedges. This species has been classified as a 'risk of high impact' invasive species (Kelly *et al.* 2013). **Butterfly bush *Buddleja davidii*** was recorded adjacent to the existing footpath, south of the boundary fencing. This species has been classified as a 'risk of medium impact' invasive species (Kelly *et al.* 2013). **Old man's beard/Travellers joy *Clematis vitalba*** was also recorded in this area. This species has been classified as a 'risk of medium impact' invasive species (Kelly *et al.* 2013). In addition, a small patch of Montbretia (*Crocsmia* sp.) was recorded within bare ground habitat, possibly a cast-off from an adjacent garden. **Winter heliotrope *Petasites pyrenaicus*** was recorded within and adjacent to bare ground habitat. This species has been assessed as 'low risk of impact'⁷. **Japanese rose *Rosa rugosa*** was recorded within the scrub habitat adjacent to the flyover of the Waterfall road over the N22. This species has been classified as a 'risk of medium impact' invasive species (Kelly *et al.* 2013). **Sycamore *Acer pseudoplatanus*** was recorded across the site; this species is naturalised throughout the Irish countryside and has been assessed as 'risk of medium impact' (Kelly *et al.* 2013). Although, there has been more recent discussion on whether Sycamore may now be considered as an archaeophyte here (*i.e.* ancient introductions; see Stolze & Monecke 2017).

The following habitats (with Fossitt codes) were recorded (see Figure 3.1):

- Scrub (WS1)
- Broadleaved woodland (WD1)
- Spoil and bare ground (ED2)
- Buildings and artificial surfaces (BL3)
- Amenity grassland (GA2)
- Amenity grassland GA2/Scattered trees and parkland (WD5)
- Amenity grassland GA2/Recolonising bare ground (ED3)
- Other habitats: Hedgerows (WL1); Treelines (WL2); Stone walls and other stonework (BL1); Flower beds and borders (BC4); Eroding/upland stream (FW1); Drainage ditches (FW4)

3.3.1 Scrub (WS1)

This habitat was recorded widely throughout the proposed pedestrian connection area. The scrub habitat was dominated by bramble with occasional hawthorn and willow bushes. Immature/sapling ash trees were recorded rarely.

⁶ <http://www.biodiversityireland.ie/projects/invasive-species/union-concern-ias/> (accessed 03/02/2021)

⁷ <https://species.biodiversityireland.ie/profile.php?taxonId=43895> (accessed 03/02/2021)

Scrub habitat was also recorded between the existing shared surface pathway and Waterfall Road. This area appears to have been part of landscaping associated with historic road construction. Bramble was abundant along with Japanese rose (*Rosa rugosa*), while ivy was recorded frequently and gorse (*Ulex europaeus*) was recorded occasionally. Immature and sapling ash and sycamore trees were recorded occasionally.

The ecological valuation of scrub habitat here is considered to be of higher local importance.

3.3.2 Broadleaved woodland (WD1)

This habitat was recorded in the form of immature/semi-mature willow (*Salix* sp.) dominated woodland. Ash, sycamore and hawthorn were recorded rarely in the form of immature trees and/or saplings on the woodland field layer. This habitat represents an intermediate succession stage between willow/bramble scrub and mature woodland. The habitat does not fit well with any of the seven semi-natural woodland types described in Fossitt (2000) and for this reason is included in the broadleaved woodland habitat type. An examination of historic aerial photography⁸ shows that the area south of the dwelling houses were open field habitats in 1995. By 2000 there is some evidence of scrub formation, where the 2005 aerial photograph shows that scrub habitat was well developed with bushes/trees present. The habitat has subsequently continued to mature with later photographs (2013 - 2018) showing the habitat similar to that as recorded in the current survey. Tree heights were c. 6-10m high and were closely spaced. The field layer was dominated by ivy and bramble was occasional. Soft shield fern, lords and ladies, harts-tongue fern and honeysuckle (*Lonicera periclymenum*) were rarely recorded.

The ecological valuation of the broadleaved woodland habitat here is considered to be of higher local importance.

3.3.3 Spoil and bare ground (ED2)

This habitat was recorded along the proposed cycle/pedestrian route that is south of existing dwellings, through scrub habitat and then towards the proposed connection to the existing shared surface pathway. Spoil and bare ground habitat consisted of former scrub vegetation that has been cleared using an excavator resulting in bare soil with small amounts of remaining vegetation, where the cleared corridor was c. 5m wide. Bramble stems were frequent in the west along with occasional ivy. Nettle was frequent in the east along with bramble, while common hogweed (*Heracleum sphondylium*) and cleavers were occasional.

The ecological valuation of the spoil and bare ground habitat here is considered to be of lower local importance.

3.3.4 Buildings and artificial surfaces (BL3)

The buildings and artificial surfaces habitat was recorded in the form of existing tar/chip/concrete as associated with the existing public shared surface pathway (that the new cycle/pedestrian track will link

⁸ <http://map.geohive.ie/> (accessed 03/02/2021)

into) as well as existing concrete footpath (that will be extended to the Waterfall Road access point of the proposed development) and Waterfall Road.

The ecological valuation of the buildings and artificial surfaces habitat is considered to be of negligible importance.

3.3.5 Amenity grassland (GA2)

This habitat was recorded adjacent to the existing shared surface pathway along Waterfall Road/N40 that contained a range of species including frequent rye grass (*Lolium* sp.) as well as occasional Yorkshire fog (*Holcus lanatus*), annual meadow grass (*Poa annua*), creeping bent grass (*Agrostis stolonifera*) and cocksfoot (*Dactylis glomerata*). Ribwort plantain (*Plantago lanceolata*) and daisy (*Bellis perennis*) were frequently recorded. Common mouse ear (*Cerastium fontanum*), creeping buttercup (*Ranunculus repens*), common ragwort (*Jacobaea vulgaris*), dandelion (*Taraxacum* agg.), common field speedwell (*Veronica persica*) and lesser celandine were occasionally recorded. The sward on the amenity grassland areas was short c. 5cm with evidence of recent mowing. Other areas were less intensively managed with longer sward of c. 10cm and lodged.

The ecological valuation of the amenity grassland habitat is considered to be of lower local importance.

3.3.6 Amenity grassland (GA2)/Scattered trees and parkland (WD5)

A mosaic of amenity grassland/scattered trees and parkland was recorded between the existing shared surface pathway and the N40 that appears to be part of landscaping associated with historical road construction. This habitat consisted of immature horse chestnut (*Aesculus hippocastanum*) trees of c. 4 - 6 m in height scattered within an amenity grassland area. This grassland area was poorly drained with soft ground underfoot. As a result, the amenity grassland contained some species typically associated with wet grassland. Yorkshire fog was frequent along with creeping buttercup, dandelion and soft rush (*Juncus effusus*). Cocksfoot, meadow grass (*Poa* sp.), meadow buttercup (*Ranunculus acris*), broad-leaved dock (*Rumex obtusifolius*), daisy and perennial rye grass (*Lolium perenne*) were recorded occasionally. Red clover (*Trifolium pratense*) was recorded rarely. The grassland habitat is being maintained by mowing and the sward height was c. 5-8cm.

The ecological valuation of the amenity grassland/scattered trees and parkland habitat is considered to be of lower local importance.

3.3.7 Amenity grassland (GA2)/Recolonising bare ground (ED3)

A mosaic of amenity grassland/recolonising bare ground was recorded at the margins of the existing shared surface pathway adjacent to the N40 and consisted of strips of amenity grassland mixed with areas of bare ground that have been treated with herbicide and from which a range of ruderal species has started to colonise. Red fescue (*Festuca rubra*), prickly sowthistle (*Sonchus asper*), false oat grass (*Arrhenatherum elatius*) and willowherb (*Epilobium* sp.) were frequently recorded. Annual meadow grass, common figwort (*Scrophularia nodosa*), rosebay willowherb (*Chamaenerion angustifolium*), common field speedwell, smooth sowthistle (*Sonchus oleraceus*), cleavers were recorded occasionally. Scarlett pimpernel (*Anagallis arvensis*), common whitlowgrass (*Erophila verna*), groundsel (*Senecio vulgaris*) were rarely recorded.

The ecological valuation of the amenity grassland/recolonising bare ground habitat here is considered to be of lower local importance.

3.3.8 Other Habitats

The following habitats were also noted in relation to the proposed pedestrian connection area but are relatively small in extent.

A remnant semi-natural hedgerow (WL1) was recorded close to the existing shared surface pathway, with non-native dominated hedges (cherry laurel *Prunus laurocerasus*, griselinia *Griselinia littoralis* and Leyland cypress *Cupressus × leylandii*) bordering the adjacent dwelling houses.

A short treeline (WL2) is present in association with a house garden boundary near the existing shared surface pathway that comprises of non-native species. A remnant treeline (WL2) is also present within the scrub/willow-dominated woodland habitats that corresponds to former field boundaries just outside of the study site boundary here; this treeline consisted of mature ash (*Fraxinus excelsior*) trees that were frequently recorded along with rarely occurring hawthorn with trees c. 10-15m high.

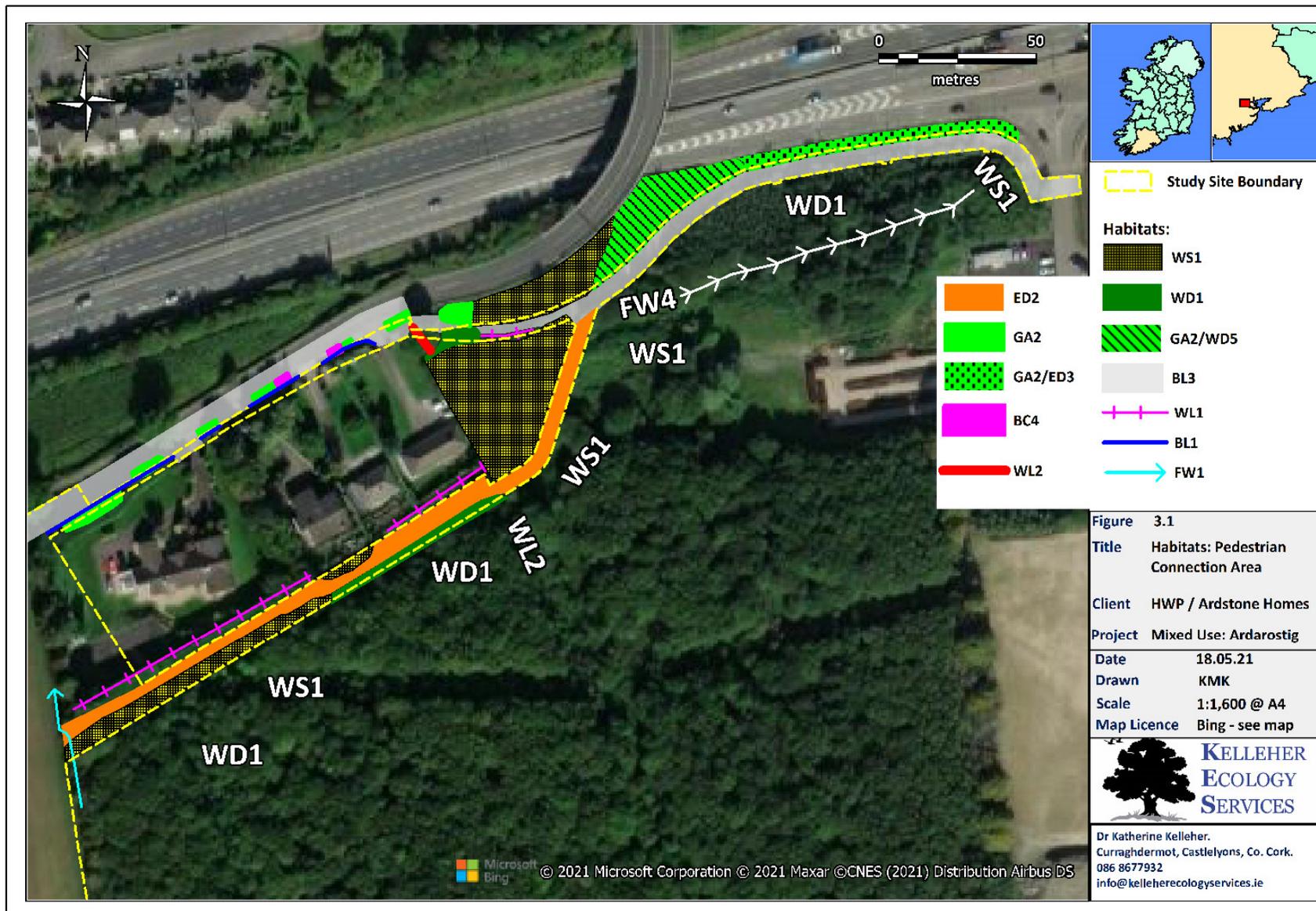
Stone walls and other stonework (BL1) was recorded along the boundary of the existing dwellings with the Waterfall road in the form of a c. 2 m high stone wall. Harts-tongue fern was recorded occasionally, with navelwort, rusty-back fern (*Asplenium ceterach*), ribwort plantain, selfheal (*Prunella vulgaris*) and creeping bent grass rarely recorded. Stone walls were also associated with remnant treeline habitats corresponding to old field boundaries within the scrub/willow-dominated woodland habitats.

Flower beds and borders (BC4) comprise of small ornamental planting beds adjacent to the existing footpath along Waterfall Road, where species present included cotoneaster (*Cotoneaster* sp.), New Zealand flax (*Phormium* sp.), Chilean iris (*Libertia formosa*), heath (*Erica* sp.), lady's mantle (*Alchemilla* sp.) and Bergenia (*Bergenia* sp.).

A small unregistered water-feature was noted on the western side of the study site running downhill (*i.e.* northwards) from within the adjoining willow-dominated woodland/scrub habitat. The closest classification for this water-feature corresponded to eroding/upland stream (FW1), where its wetted width was c. 30-40 cm and c. 5-10 cm deep and its bed consisted mainly of gravels and cobbles with some minor fine sediments. There was no in-stream vegetation due to its fast flow and surrounding heavy shading. The water-feature in question is not a typically well-established stream feature as such (*e.g.* does not support aquatic based biodiversity features) where there is no known information for the presence of a stream or spring in this woodland area (as verified through review of historical 25 inch & 6 inch mapping), it appears to be a water-feature that arises on occasion from peak rain events. This water-feature was noted flowing through the gap opened up on Hedgerow 2 (to allow access into the proposed cycle/pedestrian route for site investigation activities) and along the north-eastern boundary of the field. No drainage related infrastructure/channel is present within the relevant site area where this water-feature was noted flowing into (field or adjoining dwelling property) such that it is assumed that this water-feature percolated to ground within the woodland/scrub area prior to the gap being opened up on Hedgerow 2, which is now acting as a relatively new conduit for associated waterflow that coincides with the western end of the proposed cycle/pedestrian route.

A drainage ditch (FW4) is present within the wooded area east of where the new cycle/pedestrian track proposes to link into the existing shared surface pathway, just outside of the study site here. The drain contained slow flowing water that flowed easterly to a low lying area of standing/slow moving water which in turn flowed into a culvert adjacent to the eastern end of the study site. It is understood that this drain and culvert network is part of a public storm-water drainage system servicing the locality, where the culvert runs under the N40 and associated infrastructure before outfalling into the Glasheen (Cork City) River to the east-north-east.

Figure 3.1 Habitats: Pedestrian Connection Area



4 Potential Impacts

4.1 Hedgerow

The proposed development will lead to the permanent removal of both Hedgerows 1a and 1b (see Tree Survey & Vegetation Removals Drawing No. 6824-PHL-00-ZZ-DR-001 & Landscape Masterplan Drawing No. 6824-PHL-00-ZZ-DR-L-1000 by Park Hood accompanying the planning application). As outlined in Section 3 above, while both of these hedgerows are highly significant in terms of their historic presence on the first edition OS maps, both are also of unfavourable condition and of low significance in terms of ecological criteria. Hedgerow 2 will incur a loss of 140 linear metres, 120 linear metres of which will be compensated through new realigned native hedgerow planting at the same boundary as part of landscaping proposals. This will result in a net loss of 15 linear metres of existing hedgerow associated with Hedgerow 2, which is currently of high significance and in highly favourable condition with ecological criteria that are relatively moderate to high overall. Hedgerows 3 & 4 will be retained, where these are currently of high significance and in favourable to highly favourable condition with ecological criteria that are relatively moderate to high overall. Care will need to be taken to ensure that retained hedgerows are protected from construction related activities.

Landscaping proposals include for the creation of a relatively extensive area (c. 20,989m²) of native woodland tree/understorey planting mix with native wildflower meadow that will be partly bordered by a native defensive species mix at the south-western corner of the residential area (see Landscape Masterplan Drawing No. 6824-PHL-00-ZZ-DR-L-1000 by Park Hood accompanying the planning application; available in Appendix A). The permanent loss of trees associated with Hedgerows 1b & 2 will be fully compensated through the relatively extensive planting of native tree species associated with the proposed development of native woodland planting, where a net gain of native tree/shrub species should be achieved with the appropriate implementation of the Landscape Masterplan. While there will be a net loss of existing hedgerow features overall, 15 linear metres of this (as associated with Hedgerow 2) is currently of highly favourable condition with ecological criteria that are relatively moderate to high overall with Hedgerows 1a and 1b of unfavourable condition with ecological criteria that are relatively low overall. There is an opportunity to enhance the retained sections of Hedgerows 2, 3 & 4 through appropriate native supplementary planting and general management, such as the removal of all pheasant berry specimens and the infilling of gaps present in Hedgerow 4.

The permanent loss of Hedgerows 1a and 1b to facilitate the proposed development is considered a slight negative effect for hedgerow habitat during the construction phase due to their unfavourable condition and low significance in terms of ecological criteria. The residual effect arising from the permanent loss of Hedgerows 1a and 1b will remain as slight negative during the operational phase, although the permanent loss of trees associated with Hedgerow 1b will be fully compensated through the relatively extensive planting of native tree species associated with the appropriate development of native woodland planting proposed as part of the Landscape Masterplan (see Appendix A). The initial loss of 140 linear metres from Hedgerow 2 is considered moderate to significant negative during the construction phase due to its high significance and highly favourable condition with ecological criteria that are relatively moderate to high overall. The residual effect arising from landscaping proposals to successfully implement 120 linear metres of realigned compensatory native hedgerow planting for Hedgerow 2, that will ultimately result in a net loss of 15 linear metres of Hedgerow 2, will change the initial loss from moderate/significant negative to

non-significant during the operational phase. The full retention of Hedgerows 3 & 4 will result in a neutral effect during the construction stage assuming that appropriate measures are implemented to ensure their full protection from construction related activities. There is an opportunity to enhance the retained sections of Hedgerows 2, 3 & 4 through appropriate supplementary planting and general management that could result in moderate to significant positive residual effect during the operational phase. The planting and retention of pollinator friendly native species (including proposed new native woodland/meadow area) will also positively support pollinators (see NBDC 2016).

4.2 Pedestrian Connection Area

Vegetation clearance required to facilitate the construction of the proposed cycle/pedestrian track (south of the existing dwellings) will be limited to the removal of small areas of bramble dominated scrub with a small number of mainly immature trees and/or bushes requiring felling. The majority of the area required for the construction of the proposed cycle/pedestrian track is currently classified as bare ground such that any additional vegetation removal will be limited in extent. Tree felling and the removal of scrub vegetation will be required where the new cycle/pedestrian track proposes to link into the existing shared surface pathway (south of the N40).

Proposed upgrading of the existing shared surface pathway (south of the N40) to facilitate the installation of a cycle/pedestrian track will result in the loss of small areas of landscaped amenity grassland, scrub, scattered trees and parkland and recolonising bare ground.

Works will also be required along the southern margin of Waterfall Road to extend the existing pedestrian footpath to the west. This will require the removal of an existing stone boundary wall and small areas of amenity grassland.

A small unregistered water-feature was noted flowing from an off-site location associated with the adjoining willow-dominated woodland/scrub habitat. Even though this water-feature best classifies as eroding/upland stream after Fossitt (2000), it is not a typically well-established stream feature as such (*e.g.* does not support aquatic based biodiversity features) where it appears to be a water-feature that arises on occasion from peak rain events. It looks as if the gap opened up on Hedgerow 2 is now acting as a relatively new conduit for waterflow associated with this water-feature, which coincides with the western end of the proposed cycle/pedestrian route. It is proposed to manage the flow of this unregistered water-feature by incorporating a filter drain along the southern boundary of the proposed new cycle/pedestrian route (see Drawing Nos. 0420, 0421, 0422 & 0423 by DOSA accompanying the planning application). As the small water-feature in question is not a typically well-established stream feature as such and instead appears to be a water-feature that arises on occasion from peak rain events, the effect of managing its flow via a proposed filter drain is considered imperceptible.

The permanent loss of habitats of negligible or lower local biodiversity importance will have an imperceptible effect on habitats and flora associated with the study site. The permanent loss of habitats of higher local biodiversity importance (scrub, willow dominated broadleaved woodland) will be limited in extent and overall will result in a slight negative effect on habitats and flora associated with the study site during the construction phase. However, a relatively extensive area (*c.* 20,989m²) of native woodland tree/understorey planting mix with native wildflower meadow that will be partly bordered by a native defensive species mix (see Landscape Masterplan Drawing No. 6824-PHL-00-ZZ-DR-L-1000 by Park Hood

accompanying the planning application; available in Appendix A) is proposed as part of landscaping. The successful implementation of such native planting proposals will offset the permanent loss of natural habitats associated with the pedestrian connection area, where the residual effects are considered to be at least slight positive overall as such landscaping matures.

The spread of non-native invasive plants should not be facilitated in accordance with current guidelines (e.g. Maguire *et al.* 2008, NRA 2010), where the management of same should be integrated into site development works where necessary.

5 Recommendations: Mitigation

The following measures are recommended in relation to impacts on hedgerow and vegetation associated with the pedestrian connection area arising from the proposed residential development and associated landscaping.

5.1 Hedgerow & Vegetated Pedestrian Connection Area

1. The proposed 120 linear metres of realigned compensatory planting for Hedgerow 2 will comprise of native hedgerow, tree and shrub species under the advice of a suitably qualified/experienced expert (*e.g.* ecologist, landscaper).
2. Hedgerows/trees being retained at/near the construction site/works area will be protected in line with current guidelines (*e.g.* NRA 2006).
3. As per the landscaping proposals (see Landscape Masterplan Drawing No. 6824-PHL-00-ZZ-DR-L-1000 by Park Hood accompanying the planning application; available in Appendix A), the final landscape plan will take native tree/shrub/understorey species as well as non-native pollinator friendly species into account (see NBDC 2016), and also ensure that new planting connects to other woody habitat/other vegetation in order to maintain and provide connectivity via wildlife corridors.
4. The ongoing maintenance/management of existing/new hedgerows and landscaped areas associated with the study site for wildlife (including pollinators) will be implemented through a Hedgerow & Landscape Wildlife Management Plan under the advice/supervision of a suitably qualified/experienced expert (*e.g.* ecologist, landscaper). The Hedgerow & Landscape Wildlife Management Plan will address the following at a minimum in line with current guidelines (*e.g.* NBDC 2016):
 - a. use of native species for supplementary hedgerow planting along retained hedgerows including the infilling of gaps along Hedgerow 4
 - b. management of maturing trees along Hedgerow 4
 - c. removal of all pheasant berry specimens along Hedgerow 4
 - d. hedgerow cutting regime (in terms of frequency, extent, structure)
 - e. seasonal timing (*e.g.* hedgerow cutting not to be undertaken during the bird nesting season as currently defined by the Irish Wildlife Acts 1976 – 2012 as between 1st March to 31st August inclusive)
 - f. reduced grass/lawn mowing frequency
 - g. reduced use of pesticides/herbicides *etc.*
5. Invasive plants will be managed and controlled where relevant in line with current guidelines where available (*e.g.* Maguire *et al.* 2008, NRA 2010) under the advice/supervision of a suitably qualified/experienced expert (*e.g.* ecologist, invasive plant expert) with a site assessment by a suitably qualified/experienced ecologist prior to enabling/construction activities to assess the most up-to-date status of invasive plants at the study site relative to the works area.

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APPENDIX A:
Proposed Landscape Masterplan



LEGEND

HARDSCAPE

- PERMEABLE PAVEMENT (PERMEABLE PAVEMENT PUBLIC PLAZA)
- PC CONCRETE FLAG PAVING (MIXED & PATIO)
- PC CONCRETE SETT PAVING (PERIMETER AREAS)
- PC CONCRETE PERMEABLE PAVING (OFF ROAD PARKING)
- SHIMMER CONCRETE (FOOTPATH & ASPHALT CYCLEWAY WITH COLLECTIVE WALKING) (BY PHASED AREA DETAIL)
- ASPHALT ROAD TO ENGINEER'S SPECIFICATION
- REIN FORCING APPROPRIATE SURFACE FINISH
- SAFETY PLAY SURFACING

FURNITURE

- BENCH
- WALL & RETAINING WALL VARIOUS HEIGHT (STONE BLOCK) (PROOF)
- SCULPTURE
- CYCLE RACKS
- LIGHTS

SOFTSCAPE

- PROTECTED TREES
- EXISTING TREES TO BE RETAINED
- MEDIUM TOBEE SHRUB & HERBACEOUS PLANTING
- LOW SHRUB & HERBACEOUS PLANTING
- NATIVE SPECIES DEFENSIVE PLANTING
- LAWN
- BALD GRASS
- MEADOW & REGENERATIVE SCRUB PLANTING

Revision Details	By	Date	Rev
	Check		

Status: **PLANNING**

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Client: **Ardstone Homes**

Project: Ardstone
Bishopscove, Co. Cork

Title: Landscape Masterplan

Scale: A1: 1:1000 Date: Jan 2021

Dwg. no: 6824-PH-00-ZZ-DR-1-1000

APPENDIX B:

Hedgerow Photo Catalogue Comparison: 2018 & 2021

Hedgerow 1a: 2018 (left) & 2021 (right)



Hedgerow 1b: 2018 (left) & 2021 (right)



Hedgerow 2: 2018 (left) & 2021 (right)



Hedgerow 3: 2018 (left) & 2021 (right)



Hedgerow 4: 2018 (left) & 2021 (right)



APPENDIX C:
Hedgerow Field Data Recording Forms

Structural Recording Form:

Hedge Reference	1a	1b	2	3	4
Date of Recording	15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Length of Hedge (m)	110	190	315	395	180
Surveyors	D Rees				
GPS Start Point	0563179 0568924	0563288 0568976	0563431 0569063	0563476 0568766	0563103 0568688
GPS End Point	0563288 0568976	0563431 0569063	0563476 0568766	0563103 0568688	0563064 0568845
Start Point to start of 1st 30m strip	52	128	73	4	7
End of 1st 30m to start of 2nd 30m strip			135	159	79
End of 2nd 30m to End Point			47	172	34
Corine					
Soil Type					
a1. Altitude min. (m)					
a2. Altitude max.(m)					
b1. Aspect Side 1	S	S	W	N	E
b2. Aspect Side 2	N	N	E	S	W
A1. Adjct Land Use Side 1	a	a	a	a	a
A2. Adjct Land Use Side 2	h	h	h	h/a	h
B. History					
B1. History Road / Stream					
B1a. Road Class	L	L			
B2 History Ordnance Survey					
B3 Sites and Monuments Record					
B4 Old Woodland Link					
C1. Adjacent Land Class Side 1	BC3	BC3	BC3	BC3	BC3
C2. Adjacent Land Class Side 2	BL3	BL3	GA1/WN	BC3	?
D1. Habitat Link Class End 1					
D2. Habitat Link Class End 2					
D3. Designated Site	No	No	No	No	No
E. Boundary Function	1	1	2	2	2
F. Outline	1		1	1	1
G1. Linearity of Shrubs	n/a	1	3	2	3
G2. Bank, Wall, Shelf	0	2	1	1	1
G3. Drain	0	0	0	0	0
G4. Fossit Class	WL1	WL2	WL1	WL1	WL1
H. Bank,Wall,Shelf size	d	a	c	c	a
I. Drain Size	1	1	1	1	1
J. Profile	n/a	b	d	d	d
J1. Profile base suffix	n/a	a	b	b	a
K. Height	1	5	4	4	4/5
K1. Height o/head cables					
L. Width	b	d	d	d	d
M. % of Gaps	6	4	2	2	4
M1. Specific or general	a	b	a	a	b
N. Base Structure	b	b	d	d	b/c
N1. Base - Vegetation	a	a	a	a	a
O. Bank Degradation Degree	0	4	2	2	2
O1. Bank Degradation Extent					
P. Trees Quantity	a	e	d	b	c
Q. Tree Age Composition	5	1	3	3	4

Q1. Tree Height (max)		20+	10	10	15
Q2. Tree Height (min)		5	5	5	5
R. Verge / Margin Width Side 1	c	c	c	d	a
R2. Verge / Margin Side 1 Degradation	3	3	3	3	3
R3. Verge / Margin Width Side 2	0	0			
R4. Verge / Margin Side 2 Degradation					
S. Vigour	a	n/a	c	c	b
U. Management	n	k	j	j	j
U1. Management - out of season					
U2. Management Stage		10	6/7	6/7	6/7
V. Management Method			7	7	7
W. Evidence of Rejuvenation - Past			a	b	a
W1. Evidence of Laying - Recent					
X. Fencing Side 1	1	1	1	1	1
X1. Fencing Side 2					
X3. Fencing wire to stems					
Y. Ground Flora					

Populus_nigra BLACK POPLAR								
Populus_tremula ASPEN								
Prunus_Padus BIRD CHERRY								
Rhamnus_cathartica BUCKTHORN								
Ribes_nigrum BLACKCURRANT								
Ribes_uva-crispa GOOSEBERRY								
Rubus_idaeus RASPBERRY								
Sorbus_aria WHITEBEAM								
Taxus_baccata YEW								
Other 1								
Other 2								
Other 3								

Corylus_avelana HAZEL								
Euonymus_europaeus SPINDLE								
Malus_sylvestris CRAB APPLE								
Other 1								
Other 2								
Other 3								

Stellaria_holostea GREATER STITCHWORT								
Veronica_spp. SPEEDWELL								
Viola_spp. DOG VIOLETS								
Other								
FERNS AND ALLIES								
Athyrium filix-femina LADY FERN								
Blechnum spicant HARD FERN								
Dryopteris_spp. BUCKLER FERNS	P		P		P		P	
Phyllitis scolopendrium_ HART'S TONGUE FERN			P		P			
Polystichum_setiferum SOFT SHIELD FERN								
Polypodium_spp. POLYPODY FERN								
Equisetum telmateia GREAT HORSETAIL								
Equisetum sylvaticum WOOD HORSETAIL								
Other 1								
Other 2								
Other 3								
Other 4								
Other 5								
Other 6								
Other 7								
Other 8								
Other 9								

APPENDIX D: Biodiversity Evaluation Scheme⁹

⁹ amended after NRA 2009 and Nairn & Fossitt 2004

Biodiversity Evaluation Criteria

International Importance:

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

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level*) of the following:
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing 'viable areas'*** of the habitat types listed in Annex I of the Habitats Directive.
- Major trout river fisheries.
- Commercially important coarse fisheries.
- Waterbodies with major amenity fishery value.

County Importance:

- Area of Special Amenity^.
- Area subject to a Tree Preservation Order^.
- Area of High Amenity^, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level*) of the following:

Biodiversity Evaluation Criteria
<ul style="list-style-type: none"> - Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; - Species protected under the Wildlife Acts; and/or - Species listed on the relevant Red Data list. <ul style="list-style-type: none"> ▪ Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. ▪ County important populations of species, or viable areas** of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared. ▪ Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. ▪ Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level. ▪ Small waterbodies with known salmonid populations or with good potential salmonid habitat. ▪ Large waterbodies with some coarse fisheries value.
<p>Local Importance (higher value):</p> <ul style="list-style-type: none"> ▪ Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP if this has been prepared. ▪ Resident or regularly occurring populations (assessed to be important at the Local level*) of the following: <ul style="list-style-type: none"> - Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; - Species protected under the Wildlife Acts; and/or - Species listed on the relevant Red Data list. ▪ Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality. ▪ Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value. ▪ Small waterbodies with some coarse fisheries value or some potential salmonid habitat. ▪ Waterbodies with unpolluted 'High' water quality status (Q4-5, Q5).
<p>Local Importance (lower value):</p> <ul style="list-style-type: none"> ▪ Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. ▪ Sites or features containing non-native species that are of some importance in maintaining habitat links. ▪ Waterbodies with no current fisheries value, no significant potential fisheries value, poor fisheries habitat.

* A general suggestion is that 1% of the national population of such species qualifies as an internationally or nationally or county or locally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

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

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

APPENDIX E:

Impact Assessment Criteria¹⁰

¹⁰ After EPA 2017.

<p>Quality of Effects</p> <p>It is important to inform the non-specialist reader whether an effect is positive, negative or neutral</p>	<p>Positive Effects</p> <p>A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).</p> <p>Neutral Effects</p> <p>No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.</p> <p>Negative/adverse Effects</p> <p>A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).</p>
<p>Describing the Significance of Effects</p> <p>‘Significance’ is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see <i>Determining Significance</i> below.).</p>	<p>Imperceptible</p> <p>An effect capable of measurement but without significant consequences.</p> <p>Not significant</p> <p>An effect which causes noticeable² changes in the character of the environment but without significant consequences.</p> <p>Slight Effects</p> <p>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.</p> <p>Moderate Effects</p> <p>An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.</p> <p>Significant Effects</p> <p>An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.</p> <p>Very Significant</p> <p>An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.</p> <p>Profound Effects</p> <p>An effect which obliterates sensitive characteristics</p>
<p>Describing the Extent and Context of Effects</p> <p>Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.</p>	<p>Extent</p> <p>Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.</p> <p>Context</p> <p>Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)</p>

<p>Describing the Probability of Effects</p> <p>Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.</p>	<p>Likely Effects</p> <p>The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.</p> <p>Unlikely Effects</p> <p>The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.</p>
<p>Describing the Duration and Frequency of Effects</p> <p>'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.</p>	<p>Momentary Effects</p> <p>Effects lasting from seconds to minutes</p> <p>Brief Effects</p> <p>Effects lasting less than a day</p> <p>Temporary Effects</p> <p>Effects lasting less than a year</p> <p>Short-term Effects</p> <p>Effects lasting one to seven years.</p> <p>Medium-term Effects</p> <p>Effects lasting seven to fifteen years.</p> <p>Long-term Effects</p> <p>Effects lasting fifteen to sixty years.</p> <p>Permanent Effects</p> <p>Effects lasting over sixty years</p> <p>Reversible Effects</p> <p>Effects that can be undone, for example through remediation or restoration</p> <p>Frequency of Effects</p> <p>Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)</p>