

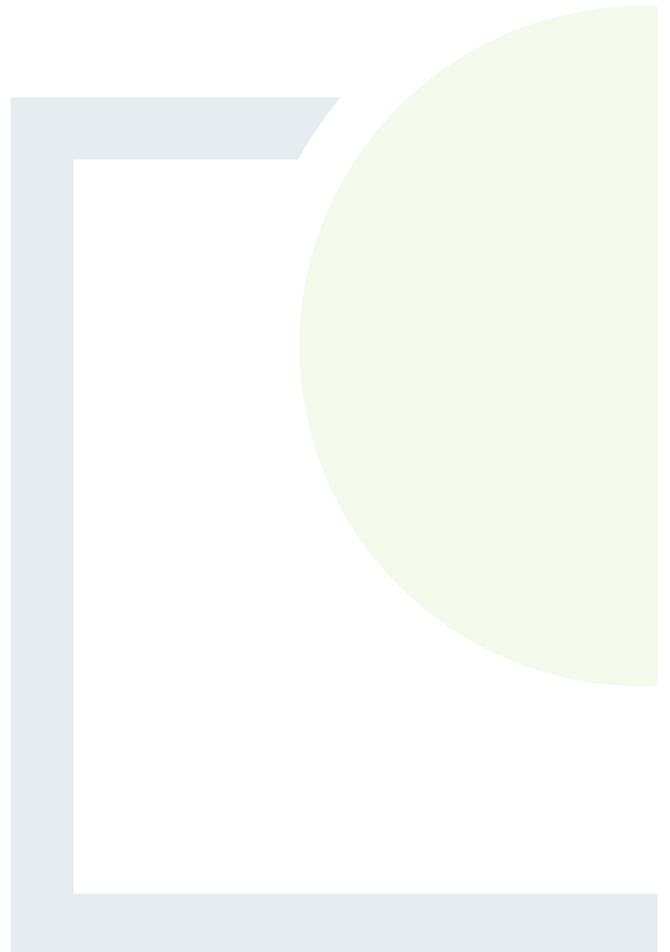


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**CONSULTANTS IN ENGINEERING,  
ENVIRONMENTAL SCIENCE  
& PLANNING**

# **APPENDIX 5.8**

Invasive Species  
Management Plan (ISMP)







CONSULTANTS IN ENGINEERING,  
ENVIRONMENTAL SCIENCE &  
PLANNING

# ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BARNADIVANE WIND FARM & SUBSTATION, CO. CORK

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## APPENDIX 5.8 - INVASIVE SPECIES MANAGEMENT PLAN

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**Prepared for:**

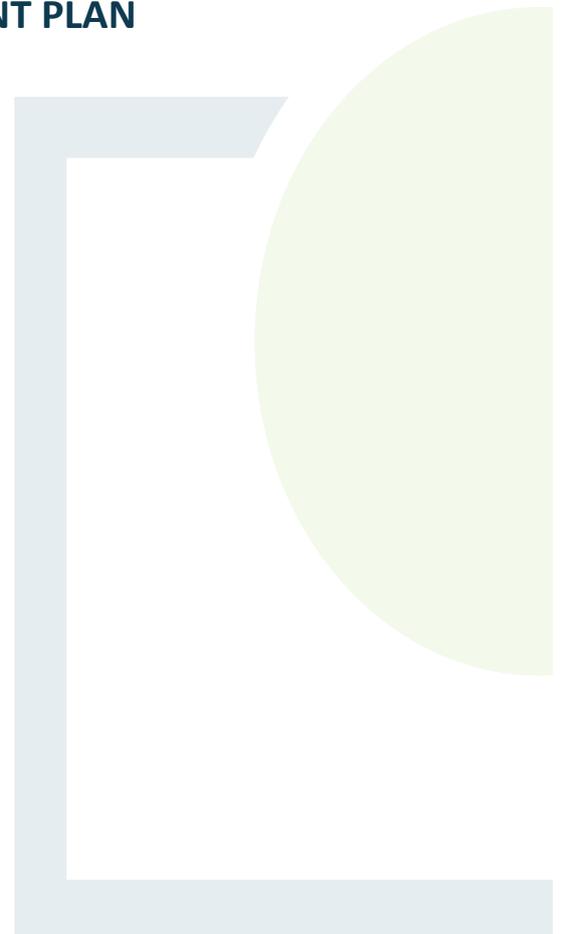
Barna Wind Energy (B.W.E.) Ltd. & Arran Windfarm Ltd.

**Date:** February 2023

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## 1. INTRODUCTION

Barna Wind Energy (B.W.E.) Ltd & Arran Windfarm Ltd (the Applicant) has commissioned Fehily Timoney & Company (FT) to prepare an Invasive Species Management Plan as part of the proposed Barnadivane Wind Farm & Substation (the Proposed Development). Fehily Timoney & Company (FT) has prepared this Invasive Species Management Plan (ISMP) to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 to 2021 (not to cause the spread of non-native invasive plant species listed in the Third Schedule), and to ensure non-native invasive plant species not listed in the Third Schedule are not spread to adjacent land or Natura 2000 (European) sites. The report details a programme for the monitoring and control of invasive species at landholdings of and adjacent to the site at the Proposed Development.

In total, six invasive/non-native species were recorded within the Proposed Development site. Of these, one species - Himalayan knotweed, is listed in the Third Schedule.

A further four additional species were recorded along the consented AGCR and TDR. Of these, one species - giant rhubarb, is listed in the Third Schedule.

### 1.1 Legislative Context

In Ireland, the spread and propagation of species listed in the Third Schedule of S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011 to 2021 is an offence. Under Regulation 49 (2) - save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence. Under Regulation 50 it is an offence to transport a vector material listed in Part 3 of the Third Schedule except under licence.

In October 2017, Ireland's 3rd National Biodiversity Action Plan (NPWS, 2017), for the period 2017-2021 was launched. This Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity' and follows on from the work of the first and second National Biodiversity Action Plans. Target 4.4 states that 'Harmful invasive alien species are controlled and there is reduced risk of introduction and/or spread of new species.' This is supported by seven actions, those relevant to this management plan are:

*4.4.3. Continue and enhance measures for eradication, where feasible, control and containment of invasive species.*

*4.4.4. Encourage horticultural nurseries to produce native species, varieties and landraces from appropriate native sources for public and private sector plantings. Public bodies will endeavour to plant native species in order to reduce importation of non-native species, varieties and landraces.*

*4.4.6. Publish legislation to address required provisions under the EU Regulation on invasive alien species (No. 1143/2014) and on responsibilities and powers regarding invasive alien species, giving IFI responsibility for aquatic invasive species.*



The Cork County Development Plan 2022-2028 (Cork County Council, 2022) includes invasive species objectives. These objectives are as follows:

*BE 15-7: Implement best practice to minimise the risk of spread of invasive alien species, on Council owned or managed land, and require the development and implementation of Invasive Alien Species Management Plans for new developments where required.*

*BE 15-11a: In the case of development which requires the removal of soil, stones and invasive species, any removal requires the appropriate permits and disposal to authorised sites.*

## 1.2 Site Description

The Proposed Development site includes lands in the townlands of Lackareagh, Garranereagh and Barnadivane (Kneeves).

The habitat survey study area supports extensive areas of improved agricultural grassland (GA1) and wet grassland (GS4), with lesser areas of scrub (WS1), conifer plantation (WD4) and buildings and artificial surfaces (BL3). Linear features onsite include hedgerows (WL1), treelines (WL2), drainage ditches (FW4) and upland eroding rivers (FW1). The southernmost sections of the study area are drained by Moneygaff east river while the northern section of the study area is drained by the Cummer 19 river, both eroding upland rivers.



## 2. METHODOLOGY

### 2.1 Relevant Guidance

The methodology and guidance for this management plan has been devised in consideration of the following relevant guidance:

- NRA, (2010) Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. Revision 1, December 2010. National Roads Authority.
- Property Care Association, (2018). Practical Management of Invasive Non-Native Weeds in Britain and Ireland. Packard Publishing Ltd.
- Kelly et al., (2008). Best Practice Management Guidelines Japanese Knotweed *Fallopia japonica*. Prepared for NIEA and NPWS as part of Invasive Species Ireland.
- Tu, (2009) Assessing and Managing Species within Protected Areas. Protected Area Quick Guide Series. Editor J., Ervin, Arlington, VA. The Nature Conservancy, 40 pp.
- Stokes et al., (2004). Invasive Species in Ireland. Unpublished report to Environment and Heritage Service and National Parks and Wildlife Service. Quercus, Queens University Belfast, Belfast.
- AM-SOP-009 Information and Guidance Document on Japanese Knotweed
- RAPID, 2018. Good Practice Management- Japanese Knotweed (*Fallopia japonica*).
- INNSA, 2017. Code of Practice – Managing Japanese Knotweed

A desktop study was carried out to identify existing records of invasive flora species both within and adjacent to the Proposed Development, as well as habitat suitability of the footprint of the development for the invasive species. This study allows the surveyor to narrow down the source of the species introduction and its likelihood of spreading. The following open sources of information were consulted:

- Invasive Species Ireland website (Invasive Species Ireland, 2022);
- Invasive Alien Species in Ireland website (Invasives.ie, 2022);
- OSI Aerial photography and 1:50000 mapping;
- National Parks and Wildlife Service (NPWS) web mapping (NPWS, 2022);
- National Biodiversity Data Centre (NBDC) web mapping (National Biodiversity Data Centre, 2022);
- Environmental Protection Agency (EPA) web mapping (EPA, 2022).

### 2.2 Mapping

An invasive species survey was undertaken as part of the site walkover survey of the Proposed Development site on 12<sup>th</sup> July 2022. A visual inspection of the extent of the species was undertaken by an experienced ecologist at all sites. The location and extent of the invasive species of principle concern and one-off records were documented using a handheld GPS to allow for mapping.





### 3. EXISTING ENVIRONMENT

Historical records of invasive species plants from the relevant national datasets were assessed through the National Biodiversity Data Centre (11/11/2022). The invasive species listed in Table 3-1 have been recorded within the 10km grid square (W36) overlapping the Proposed Development site. A total of four invasive plant species have been recorded in these 10km grid squares, of which three are listed in Schedule III under Regulations 49 and 50 of the EC (Birds and Natural Habitats) Regulations 2011, which makes it an offence to cause the spread of plant species listed on the Schedule. Only one invasive species was found in the 2km grid squares overlapping the Proposed Development, a Schedule III, High Impact species (Japanese knotweed).

**Table 3-1: Invasive Species within 10km and 2km grid squares overlapping the Proposed Development**

Species	2km	10km	Invasive Impact*	Legal Status	Recorded in Study Area
Giant hogweed ( <i>Heracleum mantegazzianum</i> )	-	W36	High risk	Schedule III	No
Japanese knotweed ( <i>Fallopia japonica</i> )	W36G	W36	High risk	Schedule III	No
Nuttall's Waterweed ( <i>Elodea nuttallii</i> )	-	W36	High risk	Schedule III	No
Sycamore ( <i>Acer pseudoplatanus</i> )	-	W36	Medium	-	No

#### 3.1 Results of Field Survey and Mapping

The field survey detected six invasive/non-native species within the Proposed Development site. Of the species recorded; one is listed on the Third Schedule (Himalayan knotweed). Details of the impact of these species and their locations are included in Table 3 2. Sitka spruce onsite has been planted in small patches of forestry and as treelines onsite and is not considered to have a risk of spreading and is therefore not considered further.

**Table 3-2: Non-native invasive species at the Pproposed Development site**

Species	Invasive Impact	Location
Himalayan knotweed ( <i>Persicaria wallichii</i> )	High - Schedule III	Along unnamed local road to the northeast of the site
Cherry Laurel ( <i>Prunus laurocerasus</i> )	High	Along unnamed local road to the northeast of the site
Sycamore ( <i>Acer pseudoplatanus</i> )	Medium	Along unnamed local road to the northeast of the site
Sitka spruce ( <i>Picea sitchensis</i> )	Low	In tree lines and forestry blocks near T1 and T3
Fuchsia ( <i>Fuchsia magellanica</i> )	Not assessed	In tree line near T3
New Zealand holly ( <i>Olearia macrodonta</i> )	Not assessed	In tree line near T3

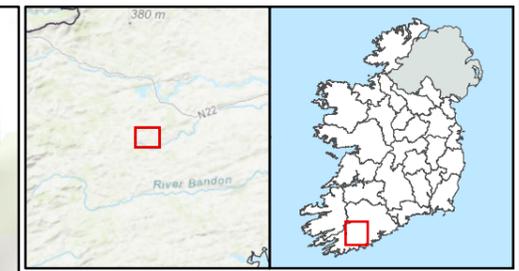
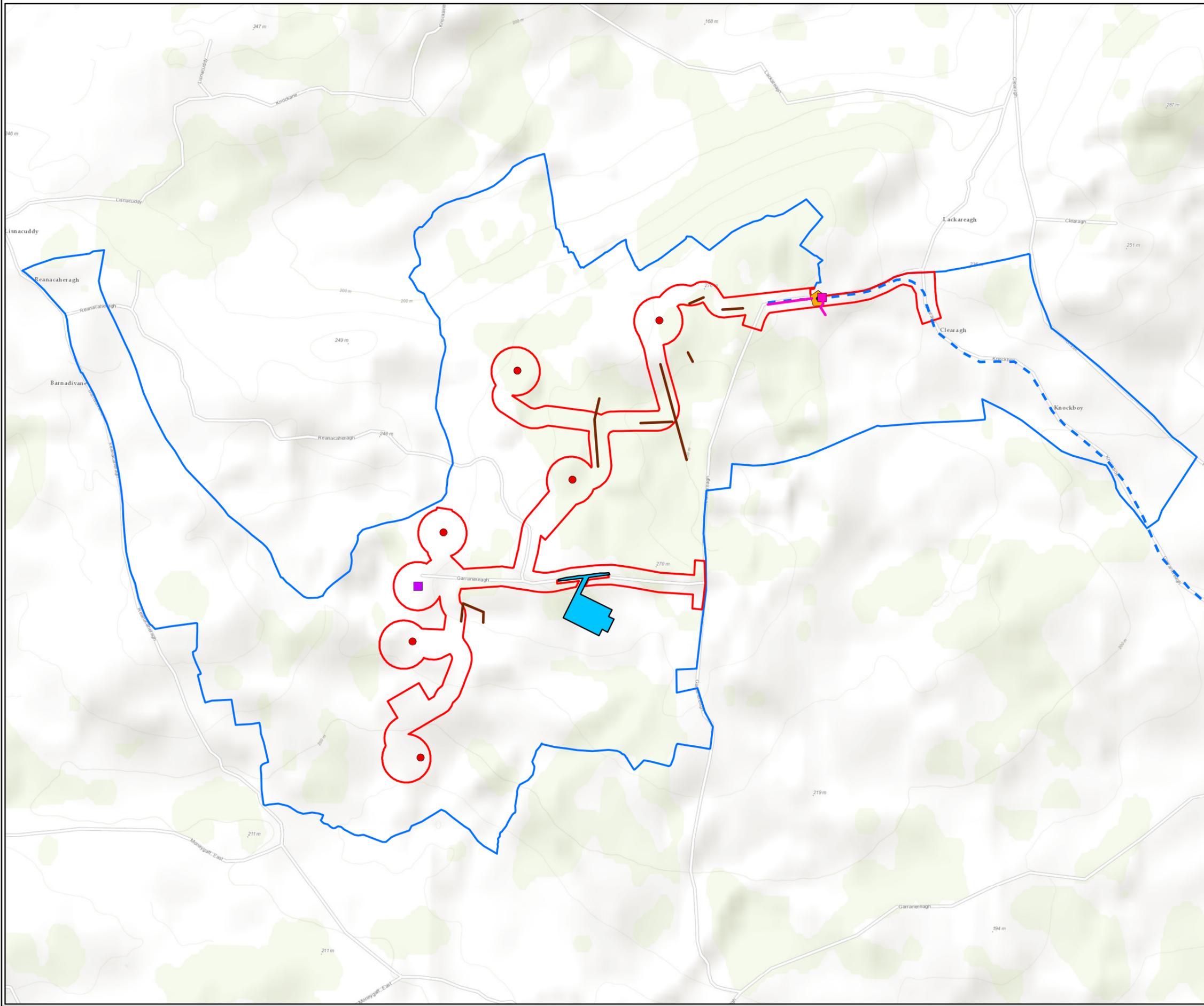


### 3.1.1 Alternative Grid Connection Route (AGCR) and Turbine Delivery Route (TDR)

The field survey identified 6 non-native/invasive species along the AGCR and TDR. Details of the impact of these species and their locations are included in Table 3-3:

**Table 3-3: Non-native invasive species recorded along the AGCR and TDR.**

Species	Invasive Impact	Location TDR	Location AGCR
Butterfly bush <i>Buddleja davidii</i>	Risk of Medium Impact	TDR Location 2 (but within garden)	Not recorded
Cherry laurel <i>Prunus lauroceracus</i>	Risk of High Impact	Not recorded	Crossing 12 within garden planting. Crossing 14. Crossing 15 (near the crossing)
Fuchsia <i>Fuchsia magellanica</i>	Not Assessed	Various locations along the TDR route	Not recorded
Giant Rhubarb <i>Gunnera manicata</i>	Third Schedule Risk of High Impact	Not recorded	On side of road along AGCR
Montbretia <i>Crocsmia x crocosmiiflora</i>	Low risk of Impact	TDR location 3 within treeline / hedgerow, location 8 along hedgerow lining road, location 11 along a stone wall / hedgerow	At crossing 2, upstream to the north but flagging in case spread occurs. Crossing 12. Crossing 14.
Sycamore <i>Acer pseudoplatanus</i>	Risk of Medium Impact	TDR Location 1., TDR Location 2 but in garden	Not recorded



- Legend**
- Development Planning Boundary
  - Lands in control of Applicant
  - Proposed Substation
  - Turbine Delivery Route
  - Proposed Met Mast
  - Proposed Turbine Layout

- Invasive Species**
- Species**
- Sitka spruce
  - Sycamore
  - Cherry laurel
  - Himalayan knotweed

<b>TITLE:</b>	Invasive Species recorded during surveys within the site
<b>PROJECT:</b>	Barnadivane Wind Farm and Substation, Co. Cork
<b>FIGURE NO:</b>	3.1
<b>CLIENT:</b>	Barna Wind Energy Ltd. & Arran Windfarm Ltd.
<b>SCALE:</b>	1:12500
<b>REVISION:</b>	0
<b>DATE:</b>	23/02/2023
<b>PAGE SIZE:</b>	A3







### 3.1.2 Invasive Species Accounts

The International Union for Conservation of Nature (IUCN) in their 'IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species' 2000 report describes non-native invasive species (referred to as an invasive species) as:

*“an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity”.*

The five invasive species below were recorded within the Proposed Development site and management is required. The species in bold are included in the Third Schedule, the remaining species are identified in Kelly et al., (2008). Accounts of these species, summaries of their ecology, distribution, growth, and management periods are included below:

- Cherry laurel *Prunus lauroceracus*;
- Fuchsia *Fuchsia magellanica*;
- **Himalayan knotweed *Persicaria wallichii***;
- New Zealand holly *Olearia macrodonta*;
- Sycamore *Acer pseudoplatanus*.

A further three invasive species below were recorded along the AGCR and TDR:

- Butterfly bush *Buddleja davidii*;
- **Giant Rhubarb *Gunnera tinctoria***;
- Montbretia *Crocsmia x crocosmiiflora*.

## 3.2 **Butterfly bush *Buddleja davidii***

### 3.2.1 Species Ecology

The butterfly bush is a multi-stemmed shrub that can reach 4m in height. From June to September, the arching branches bear conical panicles of lilac flowers, which may occasionally be white, pink, red or purple. Leaves are long and serrated along the edges. In the winter, flower heads and seed capsules remain despite the plant being deciduous. Up to 3 million seeds are produced per plant and can remain dormant in the soil for many years. Butterfly bush is common throughout Ireland. It spreads through abundant seed dispersal by wind and draught behind vehicles. While being a valuable source of nectar, especially for butterflies, it can cause structural damage to buildings by rooting in cracks in masonry. Butterfly bush has been assessed as having a risk of Medium Impact to native biodiversity by the National Biodiversity Data Centre.



"*Buddleja davidii*\_Budleja Davida 2015-08-30 01" by Agnieszka Kwiecień, Nova is licensed under CC BY-SA 4.0.(<https://commons.wikimedia.org/w/index.php?curid=64364967>)

**Figure 3-2: Flowers and leaves of butterfly bush**

### 3.2.2 Timeframe

Optimal time for treatment and/or movement of material is outside of flowering and seed-bearing periods and treatment should be undertaken in winter and spring.

## 3.3 **Cherry laurel**

### 3.3.1 Species Ecology

Cherry laurel is an evergreen shrub that forms dense thickets of either a single stem or multiple stems (especially if it has been trimmed). It has thick 5-15cm long oblong-ovate leaves, glossy green on surface and pale underneath. Leaves are arranged alternately on short leaf stalks and leaf edges are toothed with pointed tips. Small white fragrant flowers are held in clusters (racemes) and flowers are comprised of five petals and many yellow stamens. The clustered fruits are purple/black and cherry like. Cherry laurel has been assessed by the National Biodiversity Data Centre as having a risk of High Impact on native biodiversity.



Source: "Cherry Laurel" by edenpictures is licensed CC BY 2.0 (<https://www.flickr.com/photos/10485077@N06/49845235411>)

**Figure 3-3: Characteristic Features of Cherry Laurel**

### 3.3.2 Timeframe

Cherry laurel can be cut down at any time of year; the herbicide glyphosate can also be applied throughout the year, however May to October inclusive is a sub-optimal period. Of principle concern when cutting and/or moving vegetation or surrounding soil is the movement of viable seeds. As such the optimal time for cutting is outside the flowering and fruiting period.

## 3.4 Fuchsia

### 3.4.1 Species Ecology

These deciduous shrubs reach about 1.5m in height and favour coastal and rocky ground. They flower from July to October and flowers are roughly 2cm long, bell shaped and violet and pink in colour.

Particularly near the coast, it is widely used as a hedging plant, because it is a vigorous and fast grower. It produces flowers in great abundance from midsummer until the early winter. These flowers are pollinated by hummingbirds in their Chilean homeland, but by insects in Ireland. Sausage-shaped fruits are produced by some stands of the plant. There is evidence of some spread of the species by seed away from planted shrubs or hedges. Spread may also occur from fragments of plants thrown out with garden rubbish. Most plants, however, have been planted deliberately in gardens or hedgerows. The invasive impact of this plant has not been assessed.



"Chilco (Fuchsia magellanica)." by Andres Bertens is licensed under CC BY-NC-SA 2.0. <https://www.flickr.com/photos/146065760@N04/44757312840>

**Figure 3-4: Fuchsia leaves and flowers**

### 3.4.2 Timeframe

Fuchsia can be treated in spring by cutting and with the use of herbicide. Affected areas must be retreated if there is any regrowth.

## 3.5 Giant Rhubarb

### 3.5.1 Species Ecology

Giant Rhubarb is a clump-forming, herbaceous, perennial; that grows up to 2 m in height. It has inflorescences < 1 m, with stout branches < 8 cm; petiole  $\leq$  2 m, with pale-red bristles and weak spines; and leaves < 2 m across, cordate at base. Growth starts in early spring (March), prior to the emergence of native species. It can reproduce by both sexual (seed) and asexual (vegetative) means. Inflorescence development occurs early in the spring, with the fruits maturing in late summer/early autumn. Large numbers (up to 250 000 seeds per mature plant) of drupe like, red or orange seeds are produced. Small fragments of the rhizome have the potential to establish new plants Giant Rhubarb has been assessed by the National Biodiversity Data Centre as having a risk of High Impact on native biodiversity.



Source: "Gunnera" by Invas Biosecurity is licensed (<https://invasivespecies.ie/gunnera-tinctoria/>)

**Figure 3-5: Characteristic Features of Giant Rhubarb**

### 3.5.2 Timeframe

The timing of herbicide application is an important factor for any successful control measures. Plants treated early in the growing season (March-May) have little impact in preventing the growth of *G. tinctoria*. Initially plants can show evidence of leaf necrosis, but soon new healthy leaves can be produced and grow to the same proportions as untreated plants. Plants treated at the end of the growing season (Aug-Sept) show no re-growth after one year, but after two years re-growth was observed. The presence of a viable rhizome indicates a potential for regrowth and subsequent reapplications of herbicide will be required.

## 3.6 Himalayan knotweed

### 3.6.1 Species Ecology

Himalayan knotweed was introduced to Ireland as an ornamental garden plant. Originating in the Indian subcontinent, this species is now widespread across Ireland and grows in similar conditions to Japanese knotweed. However it emerges later in the spring and flowers later, in comparison with Japanese knotweed. This species is perennial and rhizomatous, with bamboo like stems growing up to 1.8m in height. It has upright stems and thick, pointed leaves. It grows densely along roadsides, waste ground, river banks and damp grasslands, shading out native species.

Spread of this species in Ireland is vegetative. Fragments of rhizome or pieces of stem with nodes can be spread by machinery, water, traffic and dumping of waste. From fragments of the rhizome or pieces of stem containing nodes.



The National Biodiversity Data Centre has assessed Himalayan knotweed as having a risk of Medium Impact to native biodiversity.



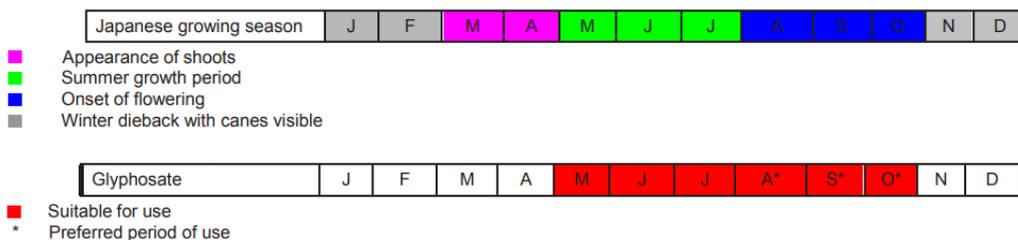
"Afghaanse duizendknoop - Persicaria wallichii" by gertjanvannoord is licensed under CC BY-ND 2.0.(  
<https://www.flickr.com/photos/145907835@N07/35833242560>)

**Figure 3-6: Himalayan knotweed leaves**

### 3.6.2 Timeframe

Himalayan Knotweed shoots typically appear between March and April. During this time energy stores from the root system are used to facilitate initial growth. The summer growth period commences in May and lasts until July, typical growth occurs during this time. Flowering begins in August and lasts until October. During this time the small white flowers can be seen.

Figure 3-7 indicates the suitable period which glyphosate herbicide is used to remove Himalyan Knotweed. It is suitable to use glyphosate herbicide on knotweed between the months of May and October, with August, September and October being the preferred months of use.



**Figure 3-7: Knotweed Growth season summary (Kelly et al., 2008).**



### 3.7 Montbretia *Crocasmia x crocosmiiflora*

#### 3.7.1 Species Ecology

Montbretia (*Crocasmia X crocosmiiflora*) is an invasive perennial that grows from underground corms. The X within its scientific name indicates it is a hybridised species. The species was developed in France for horticultural use and has since escaped and is naturalised throughout Ireland. Montbretia can survive in most open habitat types such as wet grassland, gardens and roadsides.

Due to fast growth rates, Montbretia outcompetes other species, dominating the habitats to which it is introduced. This dominance can impact native species and processes within these habitats. Dense tussocks of Montbretia can prevent the regeneration of seedlings and saplings, thus preventing natural re-generation of woodland (DAFM, 2016).

Montbretia flowers are reddish to orange in colour. They can be between 25 to 55mm long and are arranged loosely along two opposite sides of the flower stem, in a zig-zag formation. They have a hollow tubular corolla with six petals. The green leaves are 'grass-like', long, narrow, soft, and hairless. Leaves also have pointed tips and can reach 30-80cm long.

Montbretia spreads vegetatively using underground corms and rhizome fragments. The corm is bulb-like and stores energy for survival during the winter months. It is estimated that each Montbretia plant can produce 14 new corms annually. These corms are thought to break off from the parent plant, thus spreading further into the habitat. The corms, corm fragments and rhizomes can be spread unintentionally because of ground disturbance, dumping of garden waste and by attaching to machinery.



Source: "Montbretia (*Crocasmia x crocosmiiflora*)" by Andres Bertens is licensed CC BY-NC-SA 2.0 (<https://www.flickr.com/photos/146065760@N04/46722665512>)

**Figure 3-8: Montbretia flower**

#### 3.7.2 Timeframe

Montbretia growth begins in early spring with leaves sprouting from the ground in March. The plant flowers between July and September. The most effective time to remove Montbretia is just before full flowering occurs in summer (DAFM, 2016).



## 3.8 New Zealand holly

### 3.8.1 Species Ecology

New Zealand holly is a medium sized evergreen shrub, native to New Zealand. It has ovate, grey-green, spiny-toothed leaves, which are white-felted underneath and reach 9cm in length. The white flowers are small and fragrant and borne in large clusters during the summer.

The impact of this species on native Irish species has not been assessed by the National Biodiversity Data Centre.



""New Zealand Holly (Olearia macrodonta)" by Peter O'Connor aka anemoneprojectors is licensed under CC BY-SA 2.0.(<https://www.flickr.com/photos/58414938@N00/9212341853>).

**Figure 3-9: Flowers of New Zealand holly**

### 3.8.2 Timeframe

Removal of New Zealand holly should occur in spring before flowering to ensure seeds are not produced, leading to further dispersal.

## 3.9 Sycamore

### 3.9.1 Species Ecology

The sycamore tree can grow up to 35m tall and has a distinctive fruit with wings. Originally it was thought to be damaging to native woodlands and to support a much narrower range of diversity than native species. However, it has been shown to support a wide range of lichens and other species. The principal concern would be sycamore dominated woodlands, though sycamore seedlings are out competed by ash under sycamore canopy and vice versa, suggesting that there is a pattern of succession in mixed woodlands. Undisturbed woodlands have relatively few trees compared to disturbed sites, even when sycamore trees are present at nearby sites. Poor growth in dry conditions suggests that careful management of forests can mitigate any effects of sycamore invasion. Sycamore is of medium invasive impact when growing in native woodland areas.



" Source: "[Lobed leaf of Sycamore \(Acer pseudoplatanus\)](https://www.flickr.com/photos/71183136@N08/6981990192)" by [Science and Plants for Schools](https://www.flickr.com/photos/71183136@N08/6981990192) is licensed under [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/).  
(<https://www.flickr.com/photos/71183136@N08/6981990192>)

**Figure 3-10: Sycamore leaf**

### 3.9.2 Timeframe

Control and disposal of plant material is best carried out in spring before seeds are produced. As is common with invasive species, careful monitoring and follow-up applications of herbicides may be necessary.





## 4. PROPOSED MEASURES FOR MANAGEMENT OF INVASIVE SPECIES

### 4.1 Recommended Measures

While it is important and more efficient to contain invasive species at the point of infestation, care shall also be taken to ensure the management plan (Section 5. ) shall also be adhered to ensure that the species is not spread outside the works area. Furthermore, none of these invasive species will be planted as part of landscaping the Proposed Development.

Invasive Species Ireland (ISI) notes that invasive non-native species are the second greatest threat (after habitat destruction) to worldwide biodiversity. Invasive species negatively impact Ireland's native species; changing habitats and ultimately threatening ecosystems which impacts on biodiversity as well as economics as they are costly to eradicate.

Through prevention, early detection, rapid response, eradication, and control measures, we can reduce the risk of their introduction, establishment, spread, and impact (Invasives.ie, 2022).

Specific consideration will be given to particular locations, due to their potential for disturbance during works. As a general rule, where invasive species are within the footprint of proposed works, they must be contained and disposed of correctly. Where they are outside the proposed footprint, avoidance can be relied on where feasible to prevent their spread. As such, options for avoidance, control and removal are detailed below.

#### 4.1.1 Prevention of spread within the works footprint

Prevention of the spread of invasive species will be achieved by:

- The full implementation of the invasive species management plan (Section 5. ) in conjunction with a competent and experienced Invasive Species Specialist Contractor.
- Supervision of control measures and treatment works by an appropriately qualified ecologist or invasive species specialist.
- Raising awareness to site workers via toolbox talks given by a suitably qualified person as part of site introduction; informing workers what to look out for and what procedure to follow if they observe an invasive species.
- Only planting or sowing native species within the Proposed Development site will be allowed.
- Where invasive species have been physically removed and soil disturbed, this soil will be seeded or replanted (including 5cm deep mulch) with native plant species. This will prevent erosion and the easy colonisation of bare soil by invasive species in the area.
- Unwanted material originating from the site (including soil, rhizomes and other material) will immediately be transported off site by an appropriately licensed waste contractor and disposed of properly at a suitably licenced facility, in accordance with the (NRA, 2010) guidelines, i.e., where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains rhizomes, flower heads or seeds will be disposed to licensed landfill. All disposals will be carried out in accordance with the Waste Management Acts.
- Signs will warn people working within the site that there is invasive species contamination.



- Ensure appropriate biosecurity measures are in place, these will include the Check Clean Dry method, along with those outlined below:
  - a) Remove the build-up of soil on equipment;
  - b) Keep equipment clean;
  - c) Do not move fouled equipment from one site to another;
  - d) Footwear and clothing of operatives working near invasive species should be checked for seeds, fruits, knotweed rhizomes or other viable material before exiting the site;
  - e) All vehicles exiting the site will be examined to prevent the transport of rhizomes, seeds and other plant material;
  - f) Follow instructions provided for containment of invasive species (Section 5.1).

## 4.2 Containment

The three most common ways a site can become infected are:

- Importation of infected soil;
- Contamination on vehicles and equipment;
- Illegal dumping.

Containment of invasive species will be achieved by:

- A pre-construction survey to reconfirm the findings of the EIAR during the growing season immediately prior to the construction phase. This will mark out the extent of invasive plant species. This survey shall inform the finalised draft of the invasive species management plan prior to the commencement of works. Prior to the construction phase, invasive species are to be treated (Section 4.3 for treatment methods).
- A licensed invasive species contractor shall be engaged to remove invasives prior to development.
- Cordoning of invasive species outside the works footprint shall include a buffer of 1m the area of infestation. When larger buffers are required this shall be specified in Section 4.3. This will prevent plants with underground rhizomes being transported to other sections of the site and it will also prevent contact with plants which could result in the transport of seed, fruit or vegetation to other parts of the site. No construction works will occur within exclusion zones prior to the eradication of invasive species.
- No contaminated soil (contamination from non-native species) or vegetation shall be removed from site unless proper biosecurity (Refer to Section 5.4) is observed and removal by an appropriately licensed waste contractor to a suitably licenced facility.
- New sightings of the invasive plant species identified within the Proposed Development shall be relayed to the contractor for invasive species control. These areas shall follow the same protocol as the current infected areas.
- It is possible, particularly in the first year of control, that new plants will sprout following the initial removal/treatment, either because shade suppression will be reduced or due to soil disturbance. As such, several additional visits will likely be required. Three visits, May/June, July/August and September/October should be sufficient to catch all regrowth, although, a cautionary approach is advisable.
- Plants that germinate after September/October are very unlikely to have sufficient time to complete their life cycle and produce seeds.



## 4.3 Species Specific Measures

### 4.3.1 Butterfly bush *Buddleja davidii*

Butterfly bush that is present adjacent to TDR Location 2 but within a private garden is likely to spread within the area regardless of potential transport by humans, due to its mode of spread by wind. Nonetheless, efforts will be taken to prevent the spread of this species as follows:

- Disturbing ripe seed heads will be avoided during the turbine delivery by implementing an exclusion zone;
- Bags will be placed over the flower spikes to avoid dislodging and spreading seeds during the turbine delivery;
- Machinery will be checked for the presence of seed to avoid accidental transportation.

If this species has spread into the proposed works zone prior to TDR/AGCR works and trimming/felling are required any reproductive plant material will be carefully disposed of following NRA (2010) Guidelines. Any equipment used will be inspected and thoroughly cleaned, as will the footwear and clothing of operatives removing invasive species material. Any material arising from cleaning of equipment and footwear will be disposed of in a manner which will not cause the spread of invasive species.

### 4.3.2 Cherry Laurel

Cherry laurel was found within the Proposed Development site along unnamed local road to the northeast of the site. The following option is proposed:

#### ***Option 1: Physical Control***

This method involves cutting the main stem of the plant near ground level and digging out the stump and any visible roots. This option is not usually practical in areas where there are other invasive plants present as the disturbed soil can allow for the setting of seeds or the spread of rhizomes of adjacent species.

The following general recommendations will also be adhered to as part of the plan:

- Construction works will only be allowed within exclusion zones once the species has been fully eradicated.
- No treatment measures are to take place in these areas without supervision and agreement by appointed cherry laurel eradication specialist.
- The cherry laurel plant contains cyanide and as per good practice will only be handled with gloves. This plant will be disposed of via an appropriately licensed waste facility.
- Equipment, clothing and footwear will be checked following treatment operations or work in the vicinity of the species and cleared of fruits/seeds as necessary.



#### 4.3.3 Fuchsia

Fuchsia was present within treelines within the Proposed Development site. The general measures (Section 5.1) will be employed to prevent the spread of this species. The following option is also proposed:

##### ***Option 1: Physical Control***

In the event of fuchsia being disturbed by construction, mechanical excavation will be used to treat this species.

#### 4.3.4 Giant Rhubarb

Giant Rhubarb was present on the side of road along the AGCR. The general measures (Section 5.1) will be employed to prevent the spread of this species. The following option is also proposed:

##### ***Option 1: Combination of Physical Control and Chemical Control***

In the event of giant rhubarb being disturbed by construction, invasive species management for this species will be required to treat this species.

Physical removal using spades is a viable option for small plants, or where a small number of plants are present, plant material missed in the first removal can be monitored and subsequently removed. With the appropriate machinery and manpower large areas can be cleared quickly. When physical removal is used on a large scale it will leave a “blank canvas” and this must be accounted for during treatment, as the area may become susceptible to reinvasion by the species again or a variety of other unwanted species. It may be necessary to implement a restoration protocol for the cleared site after physical removal. Managers should be aware of and compliant with relevant waste legislation.

Spraying to be carried out using a backpack sprayer and all leaves are thoroughly sprayed until the point of “run-off”, using the manufacturers recommended concentrations. Spraying must be carried out on still, cool, dry days. Rainfall soon after application may wash the herbicide off the leaves and reapplication would be necessary. Protective clothing and a mask must be used at all times when handling herbicides. The cut and paint method involves cutting the petiole (the leaf stalk) at the base and immediately applying the herbicide on to the cut surface using a brush or sponge. Injection of herbicides involves using a drill to make small wells in the rhizome that are then filled with herbicide. Several wells should be made along the rhizome as translocation can be slow and the herbicide may only penetrate small sections of the rhizome. This method is more labour intensive, but the effects on the neighbouring environment are minimised.

#### 4.3.5 Himalayan knotweed

Stands of Himalayan knotweed are present within the Proposed Development site along unnamed local road to the northeast of the site. The following site hygiene measures will be implemented during the proposed works:

- Himalayan knotweed root systems can extend up to 7m in a lateral direction (but usually only up to 5 m), and 2m deep from the over ground parent plant. This buffer zone and infested area will be fenced off prior to and during works where possible to avoid spreading seeds or plant fragments around or off-site.
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material as appropriate and to inform contractors of the risk.
- All staff shall be made aware of nature of threat via toolbox talks as part of site inductions.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Invasive Species Management Plan.



- Site works will only be allowed within exclusion zones following the removal of Himalayan knotweed and contaminated soil.
- All machinery vehicles, equipment, footwear, and clothing operating within area of infestation to be thoroughly checked and cleaned in appropriately contained area prior to leaving the area to protect against further spreading of Himalayan knotweed.
- Avoid if possible, using machinery with tracks in infested areas.
- No stockpiling of contaminated soil will occur on-site.
- For soil imported to the site for infilling, the contractor will gain documentation from suppliers stating that it is free from invasive species.

One option is proposed for the treatment of Himalayan knotweed, as described below:

### ***Option 1: Physical Control***

Himalayan Knotweed root systems can extend up to 7m in a lateral direction (but usually only up to 5 m), and 2m deep from the over ground parent plant. The Himalayan knotweed stands, in addition to this buffer area, will be excavated.

Material (soil, vegetation, etc.) contaminated with Himalayan knotweed can only be transported offsite under the conditions of a relevant licence from the National Parks and Wildlife Service (NPWS). The material can only be removed to a prearranged EPA licenced waste transfer facility by the licenced haulier. Excavation for off-site disposal, great care needs to be taken to avoid excess waste and ensure the excavated Himalayan knotweed does not contaminate surplus soil that is currently free from infestation during excavations. When transporting soil infested with Himalayan knotweed, it is essential to carry out strict hygiene measures. If proper standards are not followed, this may lead to Himalayan knotweed spreading. Himalayan knotweed is a particular problem along transport corridors, where it interferes with the line of vision and can cause accidents.

Trucks that transport the material should only be filled up to a maximum of 20cm from the top. The void must be sealed with a well-secured membrane.

There must be enough membrane to seal the soil into a temporary cell for transporting. It is very important that the soil is contained to prevent any material being lost when it is moved. To contain the soil in the short-term, you can use a lower specification of membrane.

The final fate of knotweed material transported off-site would be deep burial or incineration at an appropriately licensed facility.

### ***Additional Option (Chemical Treatment)***

Himalayan knotweed is invasive and physical methods undertaken together with chemical treatment can prevent re-infestation.

At least two weeks prior to excavation, Himalayan knotweed can be treated with a non-persistent herbicide e.g. glyphosate.

#### **4.3.6 *Montbretia Crocosmia x crocosmiiflora***

This species could be disturbed by works along the AGCR and TDR, due to close proximity.



One option for the treatment of Montbretia at the site has been proposed to avoid the spread of this species. The following general recommendations will be adhered to as part of the plan:

- No treatment measures of Montbretia are to be conducted without supervision and agreement by the appointed invasive species specialist.
- No material shall be taken from areas of infestation, unless for disposal. All material will be transported by an appropriately licensed waste contractor and received by an appropriately licensed facility.

#### ***Option 1: Physical control***

Digging by hand can be used to extract corms and additional root system from the site. This must be completed before seeds are produced, pre-July. If corms are damaged during excavation, it is likely that new growth would form from these. Tools and PPE must be cleaned before exit from the area of infestation. Subsequent excavated removed from the site, using appropriately licenced transport, to an appropriately licenced facility equipped to deal with such volumes (IWS, 2018). Any areas of disturbed soil will be seeded with native grass species and compacted to prevent sediment runoff. As such, digging must be carried out during spring/early summer to allow time for grass to establish.

#### **4.3.7 New Zealand holly**

New Zealand holly was present within treelines within the Proposed Development site. The following option is proposed:

#### ***Option 1: Physical control***

In the event of New Zealand holly being disturbed by construction, mechanical excavation will be used to treat this species.

#### **4.3.8 Sycamore**

Sycamore is present within the Proposed Development site along unnamed local road to the northeast of the site. Control will focus on the correct disposal of cut material in areas where sycamore felling and trimming is required. Sycamore reproductive plant material is required to be carefully disposed of.

The contractor must appropriately dispose of Sycamore plant material in accordance with the NRA (2010) guidelines, where cut, pulled or mown non-native invasive plant material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of to licensed landfill in the case of non-native invasive species. All disposals will be carried out in accordance with the Waste Management Acts.



## 5. MANAGEMENT PLAN

The management of any invasive species is achieved by the assessment and mapping of the invasive species, containment once found, continual monitoring and record keeping as well as the safe disposal of invasive species material. It is recommended that surveys be carried out periodically at the site to monitor the extent of invasive flora and the success of the control and management measures. These can be carried out by FT, or a contractor specialised in invasive flora treatment. Monitoring should continue during the construction works and as part of the post construction monitoring to make sure successful control has been achieved. All invasive species which occur within the area utilised by people and machinery during the proposed construction works will be controlled/removed from the works area before commencement of works.

### 5.1 Containment

For the efficient use of resources namely, financial, and physical effort, it is important to prevent the further spread of invasive species. Containment will be achieved using measure outlined in Section 4 and those presented below:

- Landholder to be informed of location of the invasive species and the management plan.
- Ensure anyone treating the infestation is a suitably qualified trained professional who follows the management plan.

The site will be re-surveyed prior to treatment/construction works to confirm the findings of the original survey.

### 5.2 Schedule

Periodic re-surveying for all invasive species will be required, to ensure that treatment measures were effective, and to trigger further treatment if necessary. Refer to Table 5-1.

Please note that the schedule may require amendment following any given site visit.

**Table 5-1: Schedule for Management of Invasive Species**

Time	Details of Measures
<i>Pre-construction (isolation of invasive)</i>	<ul style="list-style-type: none"> <li>• A pre-construction survey (to reconfirm the findings of the EIAR) will be undertaken during the growing season to mark out the extent of invasive species within the footprint of the project prior to any works commencing on-site.</li> <li>• All invasive species observed shall include a suitable buffer surrounding the area of infestation. This will prevent plants with underground rhizomes being transported to other sections of the site and it will also prevent contact with plants, which could result in the transport of seed, fruit or vegetation.</li> <li>• Treatment of invasive species using one or more of the treatment options proposed in Section 4.3</li> <li>• Only once treatment has been completed and invasive species have been removed from within the area of works will works commence.</li> <li>• Toolbox talk shall be given to all personnel accessing the site.</li> </ul>



Time	Details of Measures
	<ul style="list-style-type: none"> <li>Site to be monitored continually for signs of regrowth of all invasive species during operation. Disposal of all cut and excavated plant matter, if chosen to be processed off-site, must be done so through a licenced waste processor. Adequate licences may also need to be obtained for the transportation of such matter.</li> </ul>
<i>During Construction</i>	<ul style="list-style-type: none"> <li>Following treatment, site to be monitored for signs of regrowth/spread to new areas.</li> <li>Toolbox talks shall be given to all personnel accessing the site, informing them of the locations of the invasive species and instructing them not to enter these areas (unless they are licensed invasive species contractors or ecologists).</li> <li>Designated curtailment areas will be demarcated for the transport of invasive species offsite.</li> <li>Machinery to be used in the control of invasive species will be itemised, and only those machinery will be used for excavation.</li> <li>The build-up of soil on equipment will be removed and fouled equipment will not be moved between sites, or between the curtailment area (demarcated areas with invasive species and for transport of invasives)/clean down area and the rest of the site.</li> <li>Footwear and clothing of operatives working near invasive species should be checked for rhizomes, seeds, fruits, or other viable material before exiting the site. Boot brushes will also be utilised.</li> <li>All vehicles exiting the site will be examined to prevent the transport of seeds/rhizomes/plant material.</li> <li>If re-growth of invasive species is discovered, further treatment/control will be completed using the treatment methods in Section 4.</li> <li>Site to be monitored during remediation works for signs of regrowth of all invasive species.</li> </ul>
<i>Post Construction</i>	For 5 years following construction, site to be monitored annually for signs of regrowth of invasive species.

### 5.3 Mapping, Evaluating and Record Keeping

During the pre-remediation and remediation phase the following will take place before control measures:

- Check that the area of infestation is still cordoned off and a warning/information sign is still in place;
- Photographs of the area(s) of invasive species infestation;
- Map the extent via recording GPS coordinates and measure the length and width of infestation (including above and below ground rhizome growth) and plot on map;
- Evaluate the status/condition of the infestation;
- Make sure the above steps are recorded.

At the end of each site visit the recorded data should be compared with the findings of this report. Preparation of a short report on the progress of treatment following treatment works, and any subsequent monitoring.



## 5.4 Appropriate Disposal

### 5.4.1 Storage

As described in Section 4.3, all cut and excavated plant matter will be stored securely in line with the relevant treatment methodology.

### 5.4.2 Disposal

Disposal of plant matter and soil off-site will be complete through an appropriately licenced haulier and waste facility.





## 6. DISCUSSION AND CONCLUSION

There is a legal obligation not to spread plants listed on the Third Schedule of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 to 2021; the relevant species at the Proposed Development site and therefore those of principal concern, is Himalayan knotweed. Additionally, of concern for the invasive species management plan are a number of invasive species present within the works area, within the site. Liaison with landholders of adjacent lands may be necessary to effectively control invasive species in the area and to prevent re-infestation.

It is required that a competent and experienced invasive species management contractor is appointed to treat and control invasive species. A dedicated invasive species survey is recommended to be undertaken by the appointed contractor prior to commencement of construction to re-confirm the findings of the previous survey and to identify any new areas/species of infestation.

It is recommended that infested and cleared areas will be appropriately demarcated and signed to prevent access to unauthorised personnel. Additionally, appropriate biosecurity to prevent spread of invasive species is recommended.

### 6.1 Conclusion

The report details a programme for the mapping and control of invasive species at the Proposed Development site.

The plan will prevent the spread of identified non-native invasive species within and from any works areas and reduce the potential risk for the introduction and/or spread of new invasive species within the site pre, during and post construction.





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