# Appendix 6-9

# Invasive Species Report

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# Invasive Alien Species Report
# Proposed Carrownagowan Wind Farm

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| ISSUE FORM | |
|---|---|
| **Project number** | 19107 |
| **Document number** | 6034 |
| **Document revision** | Rev A |
| **Document title** | Alien Invasive Species Report |
| **Document status** | Final |
| **Document prepared by** | CoN - MWP (May 2020) |
| **Document checked by** | MKy-MWP [May 2020] |

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# 1 INTRODUCTION

This report details the presence of Alien Invasive Plant Species (IAS) at the study area and outlines a *preliminar*y Invasive Alien Species Management Plan to provide the Developer, and the Appointed Contractor with measures to ensure compliance by all parties with Planning and Environmental Requirements.

Multi-disciplinary walkover surveys were completed at the study area between July of 2018, and October 2019. IAS surveys were completed at the wind farm site, along the entire stretch of grid route, and along the haul route leading up to the site. During surveys the presence of any IAS was documented, including GPS location, and size and area of infestation. During surveys particular focus was given to species listed on the Third Schedule of the of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011, as amended).

Invasive species identified included Himalayan knotweed (*Persicaria wallichii*), Rhododendron (*Rhododendron ponticum*), within the wind farm site. Japanese Knotweed (*Fallopia japonica*), Himalayan Knotweed, and Rhododendron infestations occur at sites along the proposed grid connection. Rhododendron infestations along the haul route leading up to the site. One stand of Giant Rhubarb (*Gunnera tinctoria*) was observed at an entrance in the proximity of the proposed grid connection.

A pre construction IAS survey will be required to record and map any new infestations at the site. A Site specific Alien Invasive Species Management Plan will be prepared for the site, and will be incorporated into the Final Construction Environmental Management Plan (CEMP).

It is recommended that the IAS infestations occurring within the footprint of the proposed development eradicated prior construction phase of the development.

## 1.1 SCOPE OF ASSESSMENT AND OBJECTIVES

Ecological surveys were completed at the study area to identify any Invasive Alien Species (IAS).

The specific objectives of the study were to:

- Identify any IAS listed on the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).
- Map locations and descriptions of where invasive species occur; and
- Provide recommendations for IAS of concern.

## 1.2 PROJECT BACKGROUND

The proposed Carrownagowan Wind Farm is located within forested lands on the northern slopes of Slieve Bernagh Mountains (c.00-420m OD), approximately 4km northeast of the village of Broadford, and 7km north-west of Killaloe, in Co. Clare. The site covers an area of c.853 hectares, which principally consists of commercial conifer plantation (of different age profiles). A number of unplanted areas occur within the site, comprising mainly of sections of peatland and grassland habitats. The Slieve Bernagh Bog SAC (002312), occurs in sections bounding the site.

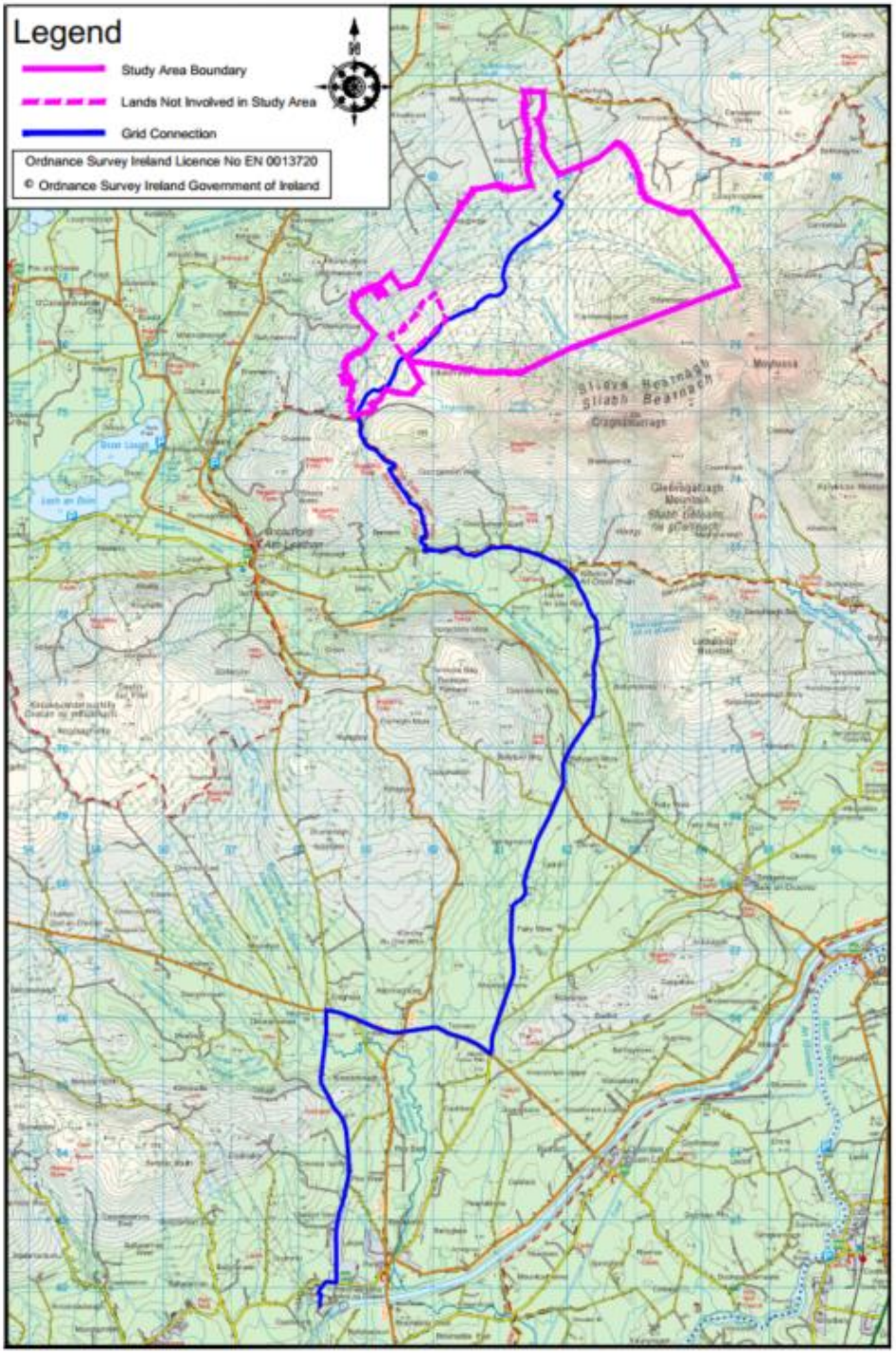


Figure 1. Proposed wind farm site and grid connection

# 2 LEGISLATIVE BACKGROUND

The legislative framework governing the control of IAS includes:

- Wildlife Acts, 1976 to 2012;
- European Communities (Birds and Natural Habitats) Regulations, 2011 to 2015; and
- Planning and Development Acts, 2000 to 2015

While the Planning and Development Acts, 2000 to 2015 do pertain to IAS, it is the provisions of the Wildlife Acts and the Birds and Natural Habitats Regulations that are most relevant; their pertinent provisions are summarised in Sections 2.1 and 2.2, hereunder.

## 2.1 WILDLIFE ACTS, 1976 TO 2012;

Section 52(7)(c) of the Wildlife Act, 1976, as inserted by 56(d) of the Wildlife (Amendment) Act, 2000 reads as follows:

*'Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof']][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence*.'

## 2.2 EUROPEAN COMMUNITIES (BIRDS AND NATURAL HABITATS) REGULATIONS, 2011 TO 2015

Species such as Japanese Knotweed, *fallopia japonica,* Himalayan Balsam, *Impatiens glandulifera*, and Himalayan knotweed, *Persicaria wallichii*, are listed as Invasive Alien Plant Species in Part 1 of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011, as amended). Failure to comply with the legal requirements set down can result in either civil or criminal prosecution, with very severe penalties accruing. The relevant sections of the regulations are reproduced below.

49(2) *Save in accordance with a licence granted [by the Department of Arts, Heritage and the Gaeltacht], any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place [a restricted non-native plant], shall be guilty of an offence.*

49(3) … *it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.*

50(1) *Save in accordance with a licence, a person shall be guilty of an offence if he or she […] offers or exposes for sale, transportation, distribution, introduction or release—*

*a. [any restricted non-native animal or plant species],*

*b. anything from which an animal or plant referred to in subparagraph (a) can be reproduced or*
*propagated, or*

*c. a vector material listed in the Third Schedule, [which includes] soil or spoil taken from places infested*

### 2.2.1 Due diligence' Defence

*Regulation 49 (paragraph 3) states:*

*'[...] it shall be a defence to a charge of committing an offence under paragraph [...] (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.'*

### 2.2.2 Prohibition and Legal Sanction Pertaining to Target Species

Regulation 67(paragraph 2) states that a person who commits an offence, under Regulation 49, is liable:

*'(a) on summary conviction, to a Class A fine ['"class A fine" means a fine not exceeding €5,000'] or imprisonment for a term not exceeding six months, or both, or (b) on conviction on indictment, to a fine not exceeding €500,000, or imprisonment for a term not exceeding three years, or both.'*

## 3 METHODOLOGY

### 3.1 DESK STUDY

The majority of the proposed wind farm site occurs within Hectad R67, the most westerly part of the site occurs within R57. The southern part of the cable route is situated within Hectad R66 and R56. The proposed works required for the cable route are mainly confined to the public road network.

Searches of the NBDC[1] for invasive species was carried out for any documented records of non-native plants listed in the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015).

Documented records of High impact invasive species in R67 include curly waterweed (*Lagarosiphon major*), Canadian waterweed (*Elodea Canadensis*), Nuttall's waterweed (*Elodea nuttallii*) and Japanese knotweed (*Fallopia japonica*). Medium impact invasive species recorded were water fern (*Azolla filiculoides*) and Himalayan knotweed (*Persicaria Wallichii*).

Documented records of invasive species High Flora Impact species Regulation (Ireland) in R57 include Japanese knotweed (*Fallopia japonica*) and Indian balsam (*Impatiens glandulifera*). Records of medium impact invasive species listed in the Third Schedule include Himalayan knotweed (*Persicaria Wallichii*) and Rhododendron (*Rhododendron ponticum*).

[1] https://maps.biodiversityireland.ie/Map

### 3.2 FIELD SURVEY

Field surveys were undertaken by MWP ecologists in conjunction with the habitat surveys in the study area, which encompassed two growing seasons (2018 and 2019). Surveys were undertaken in every season. With regard to IAS, the surveys were based on Best Practice Guidance Methodology (Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (TII, 2010)).

## 4 RESULTS

Three species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011, (as amended) were recorded within the study area, namely Himalayan Knotweed (*Persicaria wallichii*), Rhododendron (*Rhododendron ponticum*), Japanese knotweed (*Fallopia japonica*), and Giant Rhubarb (*Gunnera tinctoria*).

Figure 2 below shows locations of infestations identified at the project site.

Table 1 below gives a description of the infestations.

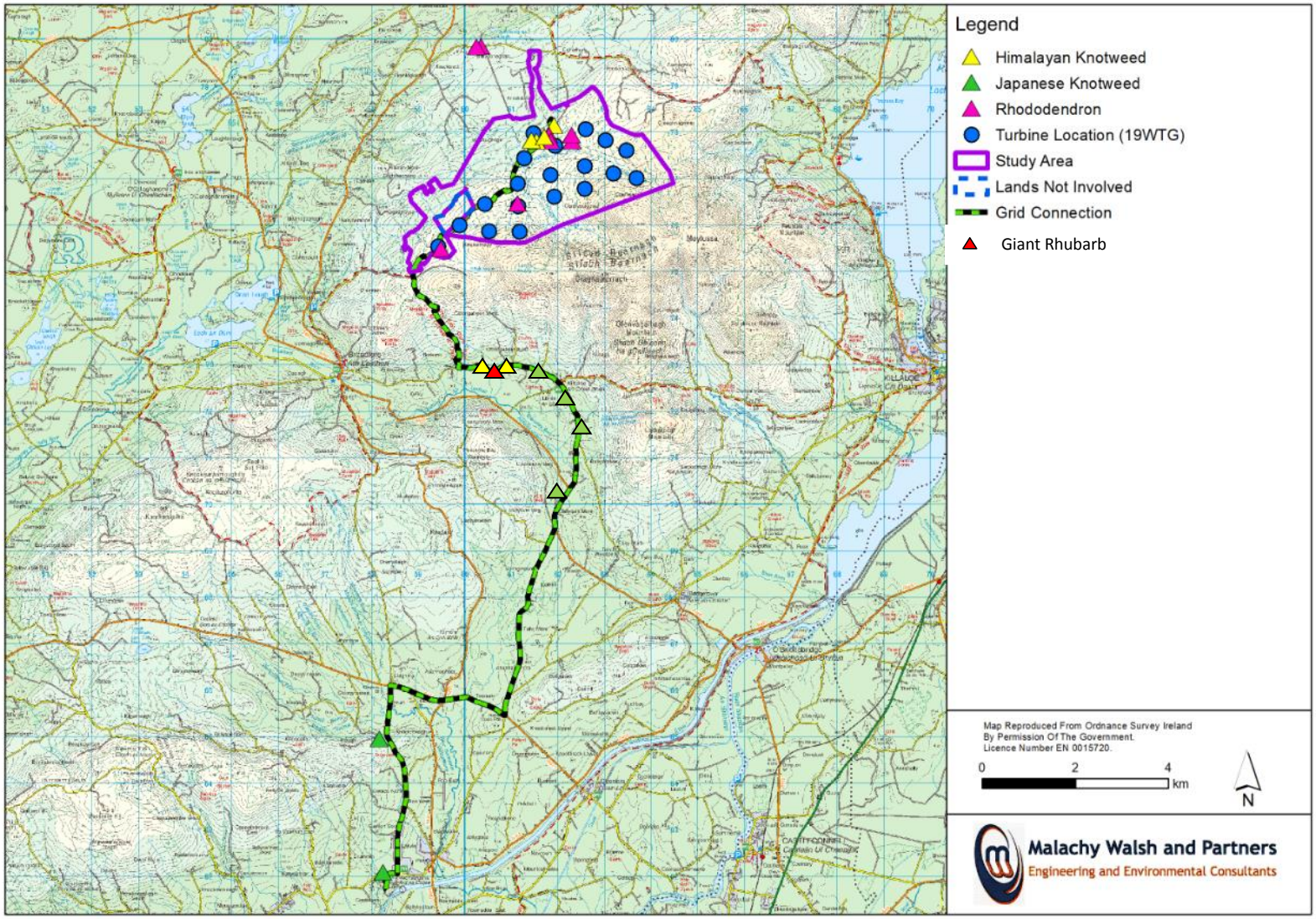


**Figure 2. IAS infestations**

**Table 1. Field Survey Results**

| Site | Species | X | Y | Comments |
|---|---|---|---|---|
| 1 | Himalayan Knotweed | 561881 | 678177 | Stand size is c.10mX15m, located at junction towards northern end of the site, in footprint of Sub Station. This stand is growing on a slightly raised mound. |
| 2 | Rhododendron | 561771 | 677972 | Infestation on both sides of access track. Mature dense stand going down into ravine on northern side of access track. 10mX20m 4 plants on southern side of road. |
| 3 | Rhododendron | 561813 | 677837 | A number of infestations in wet grassland and wet heath mix. Some small stands and a number of individuals spread across the field area. |
| 4 | Himalayan Knotweed | 561505 | 677842 | Stand along river bank extending to grassland margin (8mX10m). |
| 5 | Himalayan Knotweed | 561390 | 677863 | Linear stand along southern banks of river. 3mX20m. |
| 6 | Rhododendron | 561098 | 676499 | Individual plant adjacent to access track. |
| 7 | Rhododendron | 562266 | 677839 | 2 individual on open bogland. |
| 8 | Rhododendron | 562254 | 677971 | 1 individual on open bogland on western side of access track. |
| 9 | Himalayan Knotweed | 561670 | 677928 | Stand on river bank extending to wet grassland. |
| 10 | Rhododendron | 559451 | 675529 | 3 individual on cutover bog. |
| 11 | Rhododendron | 560312 | 679877 | 2 plants on southern side of road. |
| 12 | Rhododendron | 560214 | 679861 | Linear stretch (c.30m) of infestation on southern side of road. All the infestation in hedgerow. On opposite side of road to haul route widening |
| 13 | Japanese Knotweed | 558130 | 664989 | Stand in hedgerow at local road to west of Grid connection on east side of road, 3m downhill, growing on dumped material ED2/ED3. |
| 14 | Japanese Knotweed | 558203 | 662123 | Stand in hedgerow to west of Grid connection, on the right hand side before Meehans Allied. |
| 15 | Japanese Knotweed | 562003 | 670119 | River margin. |
| 16 | Japanese Knotweed | 562389 | 670692 | Large stands on both sides of the bridge along river banks. |
| 17 | Japanese Knotweed | 562090 | 672432 | A large stand of Japanese knotweed at bridge on one side of the bridge and both sides of river bank |
| 18 | Japanese Knotweed | 560978 | 673053 | Infestation. |
| 19 | Himalayan Knotweed | 560440 | 672939 | Stand of Himalayan knotweed in densely vegetated river margin. |
| 20 | Giant Rhubarb | 560326 | 672992 | Southern side at farm entrance, away from the road, however exclusion zone to prevent encroachment required. |
| 21 | Himalayan Knotweed | 560207 | 673028 | Individuals. |

## 4.1 CHARACTERISTICS OF IAS IDENTIFIED

### 4.1.1 Himalayan Knotweed

Himalayan Knotweed is a tall perennial herb and is a member of the buckwheat family (*Polygonaceae*) from Asia with hollow (not true for the Himalayan species) upright, bamboo like stems. This is a medium impact invasive species. It is spread via rhizomes or by vegetative propagation. Leaves are large lanceolate type often with a reddish mid-rib. Flowers are small and white appearing from a green-red stem. The stem is green becoming red nearer the flowering heads and similar to bamboo in appearance. It is in flower during August and September. Plants can grow up to 1.5 metre and roots are shallow making it easy to pull up.

Himalayan Knotweed can form dense stands that out compete native species because of its very persistent and rapid growth. It colonises roadsides, river banks, damp grasslands and waste ground. When these stands die back in the winter it can leave areas vulnerable to erosion. Usually, it is spread by cutting machinery, passing traffic, flowing water and the dumping of garden waste. Cutting of the plant without proper site management could cause the plant to spread further.

This species was found within the Carrownagowan site at four locations, mainly towards the north centre of the site, along the banks of the Owenoganey Stream (outside the footprint of the proposed development), and one stand was identified at the location of the proposed Sub Station (T Junction). Tow stands of this species awes identified at two river crossings towards northern end of proposed grid connection.

### 4.1.2 Rhododendron

Rhododendron is classified as a high impact invasive species. This is an evergreen plant that can grow to 8m forming very dense thickets and out-compete native species for space and light. It is spread by seed dispersal and from small plant fragments.

This species was the most commonly recorded IAS at the study. One dense stand was identified within the study area, at Site 2. This stand has spread down into a deep ravine, on the southern side of the access track taking over an area of poor conifer plantation. At site 3, located in open grassland and heathland, the infestation occurs across the field area, as a number of small linear stands, c.5mX20m, and a spread of individual plants across the field areas. The majority of the remaining infestations identified are of individual plants, or small number of plants, in unplanted areas, and adjacent to existing access track.

This species is located in the proximity of the proposed Turbines: T1, T6, T17, and towards the western end of the haul route leading up to the site.

Rhododendron infestation occurs in the local roads to the northeast of the site, Regional Road extending away to the northwest of the site.

### 4.1.3 Japanese knotweed

Japanese knotweed is classified as a high impact invasive species. Japanese knotweed is a relatively large plant that can grow to 3m. This species can dominate an area by out-competing other native plants. It is spread by rhizomes and small pieces of plant fragments. The rhizomes are very extensive and can grow to 3m deep and up to spread 7m underground from the above ground growth. It can quickly establish and dominate in new areas. It dies back in winter and can therefore leave areas exposed to erosion. This species was recorded at three locations in hedgerow along the grid connection and three locations along river banks away from the road along the grid connection.

### 4.1.4 Giant Rhubarb

Giant rhubarb is classified as a high impact invasive species. It can grow to 2m tall, and can form dense stands and out shading native plants species. It is spread by seed dispersal and small fragments of the rhizome can establish new plants. In winter when the leaves die back the large rhizomes become exposed. Giant rhubarb was recorded at one location in the proximity of the proposed grid connection.

### 4.1.5 Invasive Alien Species Listed on Invasive Species Ireland National Biodiversity Data Centre Base

IAS not listed on the European Communities (Birds and Natural Habitats) Regulations, 2011, (as amended) were also recorded during surveys at the site. These species include high, medium, and low impact invasive species published by Invasive Species Ireland-National Biodiversity Database[2].

Cherry Laurel (*Prunus laurocerasus*) was the only High Impact species recorded. This species was mainly observed in hedgerows planted along boundary lines of residential properties to the west of the haul route leading up to the site.

Most commonly recorded species include mountbretia (*Crocosmia x crocosmiiflora*) (recorded within and outside the site), and winter heliotrope (*Petasites fragrans)* (outside the site, but located where works are required at the haul route (site 2), and along the road margins of the proposed grid connection. Winter heliotrope is listed on the Invasive Species Ireland 'Amber list (Uncertain Risk)[3] Butterfly-bush (*Buddleja davidii*) was recorded along the unpaved access track leading down to Clauses House. Snowberry (*Symphoricarpos albus*) was recorded along public road where no works are required.

The following IAS (Invasive Species Ireland/National Biodiversity Database) were recorded during surveys completed at the study area.

High impact invasive plant species

- Cherry Laurel (*Prunus laurocerasus*)

Medium impact invasive plant species

[2]http://www.biodiversityireland.ie/projects/invasive-species/ [accessed 10/05/2020]

[3]https://invasivespeciesireland.com/wp-content/uploads/wp-post-to-pdf-enhanced-cache/1/amber-list-recorded-species.pdf [accessed 10/05/2020]

- Butterfly-bush (*Buddleja davidii*)

Low impact invasive plant species

- Mountbretia (*Crocosmia x crocosmiiflora*)
- Winter Heliotrope (*Petasites fragrans*)
- Snowberry (*Symphoricarpos albus*)

# 5 MANAGEMENT MEASURES

An invasive plant species specialist and a project ecologist will oversee the specific objectives of the management plan. The objectives are as follows;

### 5.1.1 CONTAINMENT

Containment of spread should be the initial step and main priority of the management plan. The primary risk of spread is considered to be during the construction phase. Prior to finalising the Invasive Plant Species Management Plan and prior to the commencement of any development works, the footprint of the works should be re-surveyed to ensure that any proliferation of invasive plant species is noted and recorded. Containment of infested areas will be achieved by establishing 'Exclusion zones' around the stands of invasive plant species within or adjacent to the development area and by implementing the following bio-security measures;

- Re Survey to establish the extent of invasive plant species within the development area (time lapse),
- Installation of Exclusion Zones,
- Toolbox talks will be carried out to communicate measures to all personnel,
- Personnel will be informed of their legal obligations to prevent the spread of invasive species, and of the penalties that apply.
- Works inside the exclusion zones, not directly associated with the Invasive Plant Species Management Plan, will not be permitted.
- Removal of vegetation/soil from the exclusion zones will be carried out only by the appropriately qualified personnel, and will be supervised by the project ecologist to control the potential spread of infested soil/material from the exclusion zones to other areas.

The above will reduce the potential for spread IAS, during construction, ensuring compliance with legislation,

### 5.1.2 ERADICATION

It will be necessary to eradicate any stands of invasive plant species from the construction footprint effectively so as to prevent the spread and colonisation of invasive plant species to other areas. For all invasive plant species, the preferred and most effective method of control will depend on timing of works, cost, and duration of control process. The following sections discuss the species specific control options for the invasive plant species recorded in the study area. If required, arrangements will be made to work with the neighbouring landowners, to manage invasive plant species extending away from the development area.

- Either treat invasive plant species in-situ or remove invasive plant species from the footprint of the development area (to prevent any future re-growth/spread)
- Establish a monitoring and treatment programme for a period of at least three years post construction to control and eradicate any potential re-growth.

## 5.2 SITE SPECIFIC IAS MANAGEMENT PLAN

A Site Specific Invasive Alien Species Management Plan will be developed, and incorporated into the finalised Contractors CEMP. This will be in place for the duration of the construction phase of the development.

The following sub sections outline measures that can be incorporated into the Plan for the site. The Management Plan that will be prepared can remain a ''Live'' document, and as such will be reviewed on a regular basis, and updated where required (conditions on site may change between time of IAS Surveys completed at the study and construction phase of the project).

### 5.2.1 Management of Himalayan Knotweed

This species occurs at the location of the proposed Sub Station and at three identified locations along the Owenoganey Stream (no site infrastructure at these locations) within the wind farm site.

There are two infestations occurring along the northern end of the grid connection.

The infestation at the location of the proposed substation will have to be treated over time, or physically removed to allow works to proceed. It is considered that the infestations occurring along the stretch of grid route are not within the footprint of the proposed project. Exclusions zones will be installed at these locations.

#### *5.2.1.1 Physical Control (if insufficient time)*

There are several recognised physical control methods for invasive knotweeds (including Himalayan knotweed). These include manual cutting using a loppers or pruning shears to cut the stems down to the ground surface as often as possible, but at least every 2-3 weeks from April (or as soon as the plant appears) until August. Sprouting slows after August, so cutting frequency can be reduced, but plants should be prevented from ever exceeding 15 cm in height. This practice should be continued for at least two or three years if the patches are well established. All cut material should be collected and disposed of according to legislation.

Mowing can also be carried out using a mower to cut as low as possible and as often as possible, but at least every 2-3 weeks through August. If the knotweed is growing in soft soil, the plant can be pulled out by the root crown, with removal of as much of the root system as possible. This will not kill the plant immediately, but it will reduce its root mass. New sprouts can appear at distances far from the original plant and should be searched for at least 6m away and uprooted immediately.

Tiling alone will not provide control, but instead will create many re-sprouts. However, tilling may be useful as part of an integrated strategy, since it will increase the shoot to root ratio and potentially increase the efficacy of chemical control.

There are no reports of successful long-term control using covering alone. However, covering is likely to work better if applied on isolated and smaller patches in open terrain. Stems should be cut down to ground level and the area covered with thick black plastic or multiple layers of cardboard. The area covered should extend beyond the plant base for at least 2m (preferably 7m). This should be carried out at the beginning of the year or after cutting the plant a couple of times in the spring. The covering material should be left in place throughout the growing season and well into the next. The site should be checked until at least September the following year and again the year after that.

#### *5.2.1.2 Chemical Control of Himalayan knotweed (if sufficient time)*

Management of Himalayan knotweed is recommended at a landscape level due to its extensive rhizome and sprouting ability. It re-sprouts vigorously following cutting, mowing, digging and herbicide treatments, especially early in the growing season, until at least August. Successful eradication of just one patch is likely to take more than one year and require multiple treatments in most cases. Landscape level projects and large sites require integrating herbicide use into the control strategy (Soll, 2004; CABI, 2019).

#### *5.2.1.3 Removal of Site another location (if sufficient time is not available)*

If there is not sufficient time to eradicate the species by either of the two methods outline above, then mechanical removal will be required where this species occurs at the location of the Sub Station.

The following will be carried out if this is the chosen option;

**Source site**

- Source landfill, or other location that will accept the waste, ensuring that the facility is licensed, and permitted to receive the waste.
- Landfill sites may require notice to prepare, and to accept the waste, and ensure there is the capacity to receive the waste.
- Site specific licensing required from the National Parks and Wildlife Service to permit the off-site movement of IAS listed on European Communities (Birds and Natural Habitats) Regulations, 2011, (as amended).
- A soil testing programme may be required, to ensure that there are no other hazardous waste materials/substances contained in the infested soil.
- Compliance requirements under the relevant Waste Management Acts.

**Excavations**

- All excavations should be supervised by experienced IAS Specialist.
- All material should be excavated and moved in a single, self-contained operation.
- A designated haul route should be established between the excavation site and landfill site or other location.
- Dumpers and trucks should not be overloaded, and the excavator will pack, and remove excess.
- Dumpers/trucks will be appropriately covered and sealed, to avoid spillage.
- Bio-security measures will be in place throughout these operations.

**Deep burial**

Excavated material may buried on-site at an appropriate depth (>2m), and encased in root membrane.

**Bund method**

Where local conditions mean that you cannot use deep burial as an option, it may be possible to create a bund. A bund is a shallow area of -contaminated soil. Typically the bund will be 0.5m deep. The bund can either be raised, or placed within an excavation, to make the surface flush with the surrounding area. The purpose of the bund is to move the infested material to an area of the site that is not used. The following should be carried out when using this method;

- Source the location of the bund(s). The area will have to be set aside for a minimum of three years to allow for the treatment of Giant rhubarb at this location.
- Apply for relevant licenses (NPWS and Waste Requirements.).
- Position away from any watercourses/trees/structures etc.
- Install root barrier membrane underneath infested material.
- Rhizome growth should placed be near the surface.
- Base of bund should be made up of subsoil layer/lowest amount of rhizome.
- Treat re-growth (herbicide).

### 5.2.2 Management of Rhododendron

This species occurs in the proximity of T1, T6, and T17, and along the haul route leading up to the site. Treatment of this species involves 3 main stages, which are; Initial removal, control of stems and roots, and follow up treatment. Uprooting of plants provides a better result than cutting, and is more cost effective in the long-term. The roots of Rhododendron and Cherry laurel are relatively shallow, seldom deeper than 45cm.

#### *5.2.2.1 Physical Control*

Physical removal of Rhododendron can be achieved by uprooting the plant by hand or chainsaw if the stand is small or recent, or uprooting larger plants/stands by winching (either hand operated or tractor mounted). The plant should be cut as close to the ground as possible. The removal of above ground growth will not prevent re-growth, as plants can regenerate from cut stems and stumps. Where feasible, stumps can be dug out and removed from the area. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with an excavator. Appropriate disposal to prevent spread is required. This method should be completed when the plant is not in seed. The following eradication techniques have been recommended by the NPWS in treating Rhododendron in nature conservation sites[4], and suit the infestations occurring across the site.

[4] https://www.npws.ie/sites/default/files/publications/pdf/IWM33.pdf Higgins, G.T. (2008) Rhododendron ponticum: A guide to management on nature conservation sites. Irish Wildlife Manuals, No. 33. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

**Young plants - single stemmed, typically < 10 years old & up to 1m tall**

- Plants may be cut off as close to the ground as possible (with secateurs or pruning saw) and the stem treated with herbicide.
- Plants may be pulled by hand, if necessary loosening the adjacent soil with a mattock or pick axe.
- Foliage may be sprayed with herbicide.

**Isolated plants, typically >10 years old**

- The plant may be cut down to the stump, as low to the ground as possible and the stump treated with herbicide.
- If access to the base of the main stems is possible, stem application of herbicide may be used.
- If low growing enough (usually less than 1.5m) foliage may be sprayed with herbicide.
- The plant may be cut to the ground/low stump and re-growth later treated with herbicide.
- The plants may be cut to c. 40cm above ground, each stem broken off from the root and the root treated with herbicide.
- If chemical treatments are not an option, the only alternative method of killing to rootstock is stump extraction. This may be done manually (using a mattock) or mechanically.

**Mature stands of dense rhododendron**

- The plant may be cut down to the stump, as low to the ground as possible and the stump may be treated with herbicide.
- If access to the base of the main stems is possible, stem application of herbicide may be used.
- The plant may be cut to the ground/low stump and re-growth later (after c. 18 months) treated with herbicide.
- The plant may be cut to the ground/low stump and re-growth later knocked off and the stump collar treated with herbicide.
- If chemical treatments are not an option, the only alternative method of killing the rootstock is stump extraction. This may be done manually (using a mattock) or mechanically.

#### *5.2.2.2 Chemical control*

Use of appropriate non persistent herbicides should be used. There are a number of options for herbicide control:

- Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after being cut. This can be undertaken throughout the year during suitable weather conditions i.e. dry weather. The direct treatment of stumps means that there is no standing dead re-growth to deal with. This treatment also results in a lower volume of herbicide being applied, compared with foliar treatments. The risk of damage to non-target

vegetation is very significantly reduced, and operators are not required to carry large volumes of herbicide around the worksite.

- A variation on the stump treatment method is stem injection, using a 'drill and drop' methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of appropriate herbicide. This method requires that herbicide is applied in such a way that it can get into the plant's transport system. As with other herbicide applications to rhododendron, each stem requires separate treatment, thus in multi-stemmed plants several points of application will be required. The main drawback is that the dead Rhododendron may persist in situ for 10-15 years.
- General broadcast foliar spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. This method is suitable for plants that are < 1.3 metres tall, and for treatment of re-growth from cut stumps. For herbicide treatment to be effective each individual leaf needs be thoroughly wetted with herbicide to kill the plant. This treatment if carried out thoroughly and in good weather conditions can achieve effective kill at any time of the year, once the plant is actively growing. It should not be used in very cold weather or in frosty conditions.

### 5.2.3 Management of Japanese knotweed

The desired option to treat Japanese knotweed generally is to control the infestation in-situ with herbicide over a period of time (typically 3-5 years). As this is not always a feasible option, excavations may be necessary to prevent the spread of Japanese knotweed. Excavated material may be either buried on-site at an appropriate depth (at least 5m) or removed from site to an appropriately licensed facility. It is possible to treat the excavated knotweed and infested soil in a bund on-site.

During time of survey this species was identified at a number of locations in hedgerow bounding public road, or in road side vegetation along the proposed grid connection. Prior to any works on site, the locations of this species will be excluded for the proposed project. It is considered that the over-ground growth of this species is not within the footprint of the proposed project. However, underground infestation may extend to trenching excavations.

Any works relating to IAS at the site, will be carried out, and overseen by a Japanese Knotweed Specialist. Any excavations required will be supervised by the same, to ensure rhizome identification, and all contaminated material is removed.

#### *5.2.3.1 Site Investigations*

The proposed grid connection will be confined to trenching works within the public road. There will be no requirement for removal, or cutting of hedgerows. Following exclusion of infestations, trial trenching will be undertaken to establish if the extent of the rhizome network (Underground Growth) extends to the cable trench sites. A programme of trial pits/test trenching will be carried out.

**Trial Pits-Test Trenching**

Japanese Knotweed underground growth can extend 7m horizontally beyond the parent plant, or over-ground growth. A programme of Trial Pits and Test trenching will be carried out along a stretch of the cable route at locations of infestation. The results of these investigations will inform if the trenching location is free from Japanese Knotweed underground growth. The trial pits, and test trench programme will follow the following methodology:

- All machinery, equipment, tools, materials and work-wear to be cleaned down prior to works being carried out.
- Excavate trial holes - trenches at each site.
- Excavated material will be placed in dumper, or on a solid surface such as metal sleeting or plywood boards.
- The trial holes - trenches will be carefully inspected along the faces and bases for evidence of Japanese Knotweed rhizome. If Japanese Knotweed rhizomes are encountered the investigation will proceed with further vertical excavation to establish their overall depth/extent.
- If Japanese Knotweed rhizome is encountered, all details of the Japanese Knotweed rhizome present in each test trench and trial pit will be recorded.
- The excavated material will be carefully replaced back into the pit, or trench on completion, marking the limits of each trench, and treating the entire trench as being clean, or infested (if Japanese Knotweed underground growth present).
- Wash down all machinery, equipment, tools, materials and work-wear at each trench and pit location, on completion, ensuring run off is contained within the infested area (if Japanese Knotweed Rhizome encountered).
- If Japanese Knotweed encountered mark extent, and record with GPS etc.
- If Japanese Knotweed is encountered at any of the locations, and the rhizome spread cannot be established it will be assumed that the spread is 7m.
- Compile the results of the trial pit and test trench programme into report form, and circulate to the relevant personnel.

Exclusions zones and Bio-security measures will be in place throughout these operations. (see Section 5.1.1 above and 5.2.5 below).

#### *5.2.3.2 Physical control*

If the underground growth extends to the trenching excavations then the following will be carried out;

- Option 1: Deep burial to at least 5m
- Option 2: Burial in containment cell, to at least 2m
- Option 3: Bund method
- Option 3: Removal off site

If infestations extend to the trench, the main principles to be followed for excavation and transfer of infested soils are:

- Bio-security measures in place.

- Supervision
- All material will be excavated and moved in a single, self-contained operation.
- A designated haul route will be established between the excavation site and receiving site
- Dumpers/trucks will not be overloaded, and the excavator will pack, and remove excess.

**Deep Burial**

- Identify site and ensure that the location of burial site will have sufficient area to accommodate the Japanese Knotweed infested material.
- Apply for relevant licenses (NPWS, Waste.).
- Install Japanese Knotweed Bio-security measures at excavation, and burial site.
- Carry out investigation checking for services, ducting, water etc.
- The Japanese Knotweed contaminated material must be buried with at least 5m cover or inert material.
- Dig excavations will be designed by engineer
- The material must be covered with root barrier membrane, before backfilling it to 5m deep with inert fill, clean topsoil, or appropriate backfill.
- If required, to protect the root barrier membrane either side of the cell membrane will be levelled off, and a layer of sand/other suitable material be installed.
- A GIS survey of the footprint of the top of the cell should be carried out, digitally mapped and recorded, and provided to the client for incorporation into the deeds of the lands.
- Following best practice guidelines, the cell location will be accurately mapped, recorded and incorporated into the property's documents. Permanent signs can be erected to inform of the nature and quantities of the buried waste.

**Cell Method**

In some situations where burial is the preferred disposal method but it is not possible to bury Japanese knotweed to 5m, it may be completely encapsulated into a root barrier membrane cell. The following are the requirements for this method;

- Source suitable location of cell. The cell should be;
  - Be located in a level area, having well drained and stable ground conditions, good soil depth and a low water table.
  - Be in a location which will have no underground services.
  - Be in an area of the site where no future disturbance or development is anticipated.
  - Be in a position where any long term settlement of the material within the cell will not have an adverse impact on any surfaces, formations or structures.
- Apply for relevant licenses (NPWS, Waste).
- The final size of the cell will be dictated by the results test trenching programme, which can be carried out prior to any excavations at the site. All contaminated material within the site boundary will be removed to the cell.
- Cell construction;
  - Designed by engineer and Japanese Knotweed specialist.

- Excavate to desired levels, a minimum of 2m of backfill must be installed over the surface of the cell. Cell depth/size will be developed by engineer, with a 2m capping layer of inert soil or material over.
- Proprietary root-barrier membrane as the enclosing material of the proposed underground infested soil containment cell.
- The ground at the cell will be levelled using fine sand, to provide a soft surface for the protection of the underside of the membrane.
- A continuous layer of root barrier membrane, in the largest practical sheet sizes, will be placed across the full extent of area to be protected, in a single operation.
- Ensure that there are no holes or gaps in the membrane, and that any dressing around, objects or surfaces are carried out in compliance with the manufacturer's instructions.
- All seams will be sealed in compliance with the manufacturer's instructions
- On vertical and sloping surfaces the membrane will be held in position, and protected from damage, by a continuous heavy gauge geotextile membrane, plywood sheeting/other, fitted to both sides of the root barrier membrane.
- For optimum membrane protection a sand layer can be placed above the membrane across the base of the cell, to protect it from damage from machinery and plant movements into and within the cell.

All material transferred to the cell should be spread evenly across the cell footprint and compacted, in layers of 300 – 500mm, with the material height raised evenly throughout the filling process.
Vegetation should be deposited in the deepest part of cell. Infested material/layers rolled in. As described, all materials will be deposited in cell. However, if it the case that debris and boulders will not be deposited in the cell, these will be subject to hygiene treatment (washed/screened with enclosed area).

Bio-security requirements and site set up will be installed prior to transfer of infested material to the cell. On completion of the transfer operations the wash down area at that location will be decommissioned, and all material within it transferred to the containment cell.

Following best practice guidelines, the cell location will be accurately mapped, recorded and incorporated into the property's documents. Permanent signs can be erected to inform of the nature and quantities of the buried waste.

**Bund Method**

Where local conditions mean that you cannot use deep burial/cell method as an option, it may be possible to create a Japanese knotweed bund. A bund is a shallow area of Japanese knotweed contaminated soil. Typically the bund will be between 0.5m and 1m deep. The bund can either be raised, or placed within an excavation, to make the surface flush with the surrounding area. The purpose of the bund is to move the Japanese knotweed to an area of the site that is not used. The following should be carried out when using this method;

- Source the location of the bund(s). The area will have to be set aside for a minimum of three to five years to allow for the treatment of Japanese Knotweed at this location.
- Apply for relevant licenses (NPWS, Waste.).
- Position away from any watercourses/trees/structures etc.
- Install root barrier membrane underneath infested material (if the site is clean/Japanese Knotweed free).
- Rhizome growth should placed be near the surface.
- Base of bund should be made up of subsoil layer/lowest amount of rhizome.
- Treat re-growth (herbicide)

**Removal to land fill**

- Source landfill that that will accept the waste, ensuring that the facility is licensed/permitted to receive the waste (e.g. Drehid waste facility in Kildare (Bord na Móna)).
- The landfill will require sufficient notice to prepare/to accept the waste/have the capacity to receive the waste.
- Site specific licensing required from the National Parks and Wildlife Service to permit the off-site movement of the Japanese Knotweed.
- A soil testing programme will have to be carried out (Waste Acceptance Criteria WAC analysis), to ensure that there is no other hazardous waste material contained in the infested soil.
- Compliance requirements under the relevant Waste Management Acts

**Haulage**

Great care must be taken to avoid losing material en route to the landfill site, or other location. The following will be adhered to during transport of Japanese Knotweed material to land fill site;

- Only a licensed waste carrier can legally transport the waste to the landfill.
- Limit access areas to vehicles involved in moving the Japanese Knotweed.
- The vehicles must be de contaminated before they leave the site.
- If the quantities are small include (which is likely the case in this instance) 'double-bagging' the waste in heavy duty waste bags.
- Larger quantities that are being moved in skips or trailers, this will include lining and covering the skip etc. with suitable membrane.
- Fill trucks up to a maximum of 20cm below the top.
- Clean vehicles before using them to move Japanese knotweed.
- Clean the trucks/containers after it has finished moving soil (use a pressure washer and stiff haired brushes to clean the vehicle, thoroughly scouring any areas that might retain rhizome material. Particular attention to tyre treads and wheel arches. Any material dislodged during this process must be included within the Japanese knotweed waste. This method will be carried out in wash out area/over a root barrier membrane layer or hard surface that can contain and collect the material washed off. This material/washout must not let be allowed to enter/contaminate drains, ditches or watercourses.

#### *5.2.3.3 Chemical control (herbicide)*

Chemical control of Japanese Knotweed is considered suitable if there is sufficient time to implement effective measures. In this case chemical control would be required if Japanese knotweed material is bunded on site. The herbicide method generally takes three to five years (as per Kelly et al., 2008a), but this can vary. In-situ herbicide treatment can be carried out via;

- foliar spray
- stem injection

Optimum treatment time for stem injection and foliar spray is late summer/autumn, avoiding flowering, to protect pollinators. Plants can be treated early in the growing season (May) to stunt the growth of the plant, therefore reducing the amount of viable above ground material and the height of the stand. As with all forms of chemical control in relation to Japanese knotweed, follow-up treatments over a number of years will be required.

As stated, this method will have to be carried out over approximately 3 to 5 years, checking/treating re-growth. It must be noted that rhizome growth can remain dormant for a considerable amount of time, after re-growth has apparently stopped. Therefore, following the herbicide treatment programme for the site, there will be the requirement to check for living rhizomes, prior to disturbing the site.

### 5.2.4 Giant rhubarb

It is considered that the infestation currently occurring is not within the footprint of the proposed project. This location would have to be excluded from the proposed project, to ensure that there is no parking of plant, and no materials are temporarily stored at this location, that could possible result in the spread of this species.

The infestation at this location will be excluded from the proposed project.

Preconstruction survey will inform if conditions will have changed at this location, and the requirement of any additional controls to be included in the finalised Management Plan.

Controls options would likely be physical removal to suitable location within the site, and treatment over time (bund method), or removal to licensed land fill can is licensed to receive this species. This would require approval from NPWS, and any waste permits that may be required.

### 5.2.5 Bio-security Measures During Construction

If works are required within the exclusion zones (infested area(s), i.e. during the removal or treatment of areas that are within the footprint of the proposed development) the following bio-security measures will be implemented:

- All work within the exclusion zones will be carefully planned, in co-ordination with, and under the strict supervision of, an IAS Specialist.
- All unnecessary work within the exclusion zone will be avoided.

- The exclusion zone cannot be used for access, or parking area for vehicles or personnel.
- No soil, vegetation, rubbish or any other material will be removed from the exclusion zone, unless under the strict supervision of IAS Specialist.
- Any vehicles operating within the exclusion zones will be cleaned thoroughly when entering and/leaving the exclusion zone(s):
    - A designated wash-down area will be set up at a suitable access point/location within the exclusion zone(s).
    - The cleaning area(s) will be positioned, so that run-off will drain back into the exclusion zone(s).
    - Vehicles will be cleaned of all earth and loose sediments, with particular attention paid to tyre treads, tracks, wheel arches and hinged joints.
    - All tools, materials and work wear will be inspected, and cleaned as necessary, with particular attention paid to footwear and hand tools.
    - All removed or disturbed plant material will remain within the exclusion zone, and will be removed from site/treated as contaminated material.

Habitat restoration should be achieved as soon as possible after the construction phase to prevent the encroachment of invasive species. Exposed areas that are slow to recolonise should be planted with native species.

### 5.2.6 Bio-security Measures to Prevent Spread of Invasive Species from Elsewhere

The proposed development and associate construction activities will aim at preventing an IAS from arriving on site or preventing the spread of an IAS as the most effective management measures with regard to IAS that can be taken.

Prevention measures that will be included in the project range from raising awareness, to ensuring that good site hygiene practices are employed for the movement of materials into, out of and around the site.

The following outlines the Construction Best Practice that will be in place for the duration of the construction phase of the proposed development;

- To reduce the likelihood of invasive species being introduced to the site from quarries, the aggregate will be crushed stone which will be biologically inert and would not be expected to have a seed bank. Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.
- Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Himalayan Knotweed, Himalayan Balsam, Japanese Knotweed etc.) by thoroughly washing vehicles prior to leaving/entering any site;
- All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site/leaving site to prevent the spread of invasive plant species;
- All washings must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement;

- Any reinstatement associated with the proposed works shall avoid the use on invasive plant species.

The measures followed to avoid the spread of IAS will follow guidelines issued by the National Roads Authority –The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010).

Non-native species control will be practised according to the following IFI documents, noting that some works components are located in the proximity of rivers and stream draining the site, or drains that feed these watercourses:

- IFI Bio-security Protocol for Field Survey Work (IFI, 2010);
- Disinfection of scuba diving equipment (IFI, 2011)
- Invasive species bio-security guidelines for boaters (IFI, 2013)

### 5.2.7 Monitoring and Treatment

#### *5.2.7.1 Other re-growth*

The aims of the management plan for the site seeks to ensure that all infested areas are dealt with in a manner that ensures that there is no re-growth, there remains a risk that some viable material will avoid detection and will be left within the works areas. In such an instance it is essential that the material is identified and treated appropriately, as soon as possible. It is therefore recommended that monitoring and treatment control programmes are put in place for both the construction and post-construction stages of the development.

#### *5.2.7.2 Construction stage monitoring and treatment*

Construction activity can pose a high risk of disturbing and dispersing infested soil. Notwithstanding the Bio-Security measures that will be in place, no procedure can be deemed as completely bio-secure, and there is always a possibility that viable invasive plant material can be spread elsewhere, either inadvertently or by outside interventions. Therefore strict site management procedures and regular inspections of the works site should be deployed throughout the construction stage of the site development programme. The contractor should prepare bio-security procedures and a works inspection programme, for the approval of, and monitoring by, an invasive plant species specialist prior to any construction commencing on site.

#### *5.2.7.3 Post construction stage monitoring and treatment*

The following measures should be incorporated into the plan:

- Monitor site checking for re-growth.
- If invasive plants are detected then treat appropriately.
- The site to be surveyed in the early and late growing season of each year for three consecutive years during operational phase. A review should be carried out following each year of survey. If no invasive plant species are detected in April / May of each year, then a second survey should be carried out in July / August, to look for late season growth.

### 5.2.8 Invasive Alien Species Listed on Invasive Species Ireland National-Biodiversity Data Centre Base

As discussed in Section in5.1.4 above a number of species were recorded during surveys that are included as high, medium, and low impact invasive species published by Invasive Species Ireland and

the National Biodiversity Database. These include; Cherry Laurel (*Prunus laurocerasus*), Butterfly-bush (*Buddleja davidii)*, Mountbretia (*Crocosmia x crocosmiiflora*), Winter Heliotrope (*Petasites fragrans*), and Snowberry (*Symphoricarpos albus*)

With regard to IAS, Best Practice and mitigation measures should be incorporated into the overall project design.

The measures followed to avoid the spread of invasive alien species, will use BAT, and can follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010).

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## 6 CONCLUSION

During ecological surveys undertaken in 2018 and 2019, IAS identified included Himalayan Knotweed, Rhododendron, Japanese Knotweed and Giant Rhubarb. These species are listed on the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), namely, Himalayan Knotweed, (*Persicaria Wallichii*) Rhododendron (*Rhododendron ponticum*), Japanese Knotweed (*Fallopia japonica*), and Giant Rhubarb (*Gunnera tinctoria*) were observed at an entrance in the proximity of the proposed grid connection.

A number of infestations of Himalayan Knotweed and Rhododendron occur within the footprint of the proposed wind farm development. Rhododendron occurs along the proposed haul route leading up to the site, and Himalayan Knotweed and Japanese Knotweed infestations were identified along the proposed grid connection route.

It is an offence under regulations 49 and 50 to spread, or cause to spread, of the Himalayan Knotweed present, Rhododendron, and Japanese Knotweed. A preliminary Management Plan has been prepared. Best Practice includes the removal of IAS from the footprint of the development prior to the commencement of the construction phase.

A preliminary Management Plan has been prepared. This plan will be updated and included in the finalised CEMP.

## 7 REFERENCES

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# Appendix 1
## Chemical Control Guidelines

**Chemical Control Guidelines**

For herbicide treatment, the following general guidelines should be observed (it is noted that the infestation, occurs in proximity of stream):

- Herbicide treatments should always be applied by a competent and licensed operator.
- Herbicide operators should take appropriate measures to avoid or minimise risks to themselves, construction personnel, members of the public and the surrounding environment. Details of any health or environmental hazards will be provided on the manufacturer's label or in accompanying documentation.
    - Most herbicides are harmful to humans, and some are toxic or carcinogenic. They may also harm domestic pets and wild animals that enter the site.
    - If herbicides enter water they can kill aquatic plants and organisms. Care should be taken when working in proximity of streams, and drains.
    - Broad-spectrum systemic herbicides such can be toxic to non-target organisms, including trees and native vegetation.
    - Herbicides should be applied using spot spray, or leaf wiping application
- Where appropriate, ecological screening of both the infested site(s) and the proposed treatment methodology should be assessed in advance of treatment works
- Targeted, treatment methodology should be deployed
- Where relevant, prior to any herbicide applications a temporary construction fence should be placed around the treatment areas, in order to prevent access by members of the public
- Advisory / warning signage should be kept in place across the full treatment programme, to mitigate the risk of third party interference or damage