



## Onshore Invasive Species Management Plan



## Onshore Invasive Species Management Plan for the Codling Wind Park Project



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Cover photo: General view of the knotweed infestation at the Uisce Éireann (Irish Water) site in July 2023.



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## **1. INTRODUCTION**

At the request of Codling Wind Park Ltd. (CWPL), INVAS Biosecurity Ltd. (INVAS) was commissioned to carry out an Invasive Alien Species (IAS) survey for the onshore development area boundary for the Codling Wind Park (CWP) Project, at Poolbeg County Dublin (53.336396, -6.202955). INVAS accessed the site on 21 July and again on 10 October 2023. The October visit coincided with access works for the initiation of a knotweed management programme by INVAS Staff.

#### 1.1. Project background

CWPL is proposing to develop the CWP Project, an offshore wind farm (OWF) located in the Irish sea approximately 13 - 22 km off the east coast of Ireland, at County Wicklow.

The onshore transmission infrastructure (OTI) for the CWP Project is situated within the Poolbeg Peninsula and includes the transition joint bays (TJBs), the onshore export cables, the onshore substation, and the Electricity Supply Board Networks (ESBN) network cables to connect the onshore substation to the Poolbeg 220 kV substation. This report also accounts for works at the landfall (landward of the high water mark), where the offshore export cables are brought onshore and connected to the onshore export cables at the TJBs.

The onshore development area boundary is shown in Figure 2.1.

As part of ecological surveying within the onshore development area boundary in 2022, knotweed (*Reynoutria japonica* and *Reynoutria x bohemica*) was detected at several locations in proximity to the landfall site. No recent ground works have taken place in proximity to these previously reported knotweed infestations. Additionally, there are several active sites (not associated with the CWP Project) currently located throughout the onshore development area boundary. These sites and their activities were not interfering with any infestations of regulated IAS at the time of these ecological surveys.

A full IAS survey of the onshore development area boundary was required to inform a suitable management plan for the infestations. The OTI are located adjacent to the South Dublin Bay Special Area of Conservation (SAC) IE000210, South Dublin Bay proposed Natural Heritage Area (pNHA) 000210, and South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) IE004024.



#### 1.2. Objectives

The aim of this report is to provide a record of all IAS identified within the footprint of the onshore development area boundary and to generate a site map for any IAS recorded using GPS locations.

This report also outlines control and management options, taking into account proposed site clearance and excavation works associated with the future construction phase of the CWP Project. These management options will prevent any accidental spread of known IAS infestations.

#### 1.3. National and European legislation concerning invasive alien species

Globally, IAS are regarded as one of the biggest causes of biodiversity loss next to climate change. The environmental impact of IAS was discussed at the groundbreaking international Convention on Biological Diversity in 1992, and since that time, targeted legislation to prevent introduction and spread of these harmful species has been introduced at a national and European level. The most relevant legislation that takes IAS into account in Ireland is summarised in Table 1.1.



**Table 1.1:** National and European legislation concerning invasive alien species.

Invasive Alien Species Regulation (EU) 1143/2014 <u>https://environment.ec.europa.eu/topi</u> <u>cs/nature-and-biodiversity/invasive-</u> <u>alien-species_en</u>	This EU Regulation entered into force on 1 January 2015. Central to the legislation is the establishment, and regular updating, of a list of IAS considered to be of Union concern ('the Union list'). The placing of a species on the Union list activates a number of obligations on Member States (MS) regarding those species, e.g. "Within 18 months of an IAS being included on the Union list, MS shall have in place effective management measures for those invasive alien species of Union concern". The 49 species included on the Union list are subject to restrictions on keeping, importing, selling, breeding and growing. Member States are required to take action on pathways of unintentional introduction, take
	species, and to manage species that are already widely spread in their territory.
Republic of Ireland: European Communities (Birds and Natural Habitats) Regulations 2011, S.I. 477 of 2011 https://www.irishstatutebook.ie/eli/20 11/si/477/	Regulation 49 on the 'Prohibition on introduction and dispersal of certain species' makes it an offence to knowingly disperse or allow to escape species that are listed in the Third Schedule, which is the list of high impact IAS that are subject to restrictions under the Regulations.
Republic of Ireland: River Basin Management Plan for Ireland 2018- 2021 and Draft River Basin Management Plan for Ireland 2022 – 2027 (Water Framework Directive) https://www.gov.ie/en/publication/429a7 9-river-basin-management-plan-2018- 2021/ https://www.gov.ie/pdf/?file=https://asse ts.gov.ie/199144/7f9320da-ff2e-4a7d- b238-2e179e3bd98a.pdf#page=null	For the first time, invasive species have been explicitly mentioned in this latest cycle of the River Basin Management Plan (RBMP) for Ireland. A list of Principal Actions on invasive species has been included, e.g. implement the EU (European Union) IAS Regulation, develop management plans for IAS, develop national guidelines for biosecurity.
Republic of Ireland: Sustainable Use of Pesticides Directive http://www.pcs.agriculture.gov.ie/sud/	The Sustainable Use of Pesticides Directive (SUD) establishes a framework for European Community action to achieve the sustainable use of pesticides by setting minimum rules to reduce the risks to human health and the environment that are associated with pesticide use. It also promotes the use of integrated pest management. The Directive is designed to



further enhance the high level of protection achieved through the entire regulatory system for pesticides.

## 2. SURVEY RESULTS

Survey points were recorded using a Garmin® GPSmap78 at a height of one metre. Points were recorded at 0.5 metre intervals around the perimeter of any infestation detected. In some cases, points may have been taken along the extremities of an infestation due to dangerous terrain, inaccessibility of sites located on neighbouring property or due to overgrowth of vegetation other than the IAS in question. Survey observations and photographs illustrating each IAS infestation have been provided in the following sections of this document and Appendix 1. A small unmanned aerial vehicle (sUAV) survey was not carried out as part of this survey.

#### 2.1. IAS recorded

Six IAS were recorded: Bohemian knotweed (*Reynoutria x bohemica*), buddleja (butterfly bush) (*Buddleja davidii*), Japanese knotweed (*Reynoutria japonica*), old man's beard (*Clematis vitalba*), sea buckthorn (*Hippophae rhamnoides*), Three-cornered leek<sup>1</sup> (Allium triquetrum) and winter heliotrope (*Petasites pyrenaicus*). These species are highly invasive and can be easily dispersed as a result of poor site biosecurity and poor management practices. A more detailed description of these IAS is provided in Appendix 2.

Bohemian knotweed, Japanese knotweed, Three-cornered leek and sea buckthorn are all regulated under Schedule 3 of S.I. 477 (Appendix 3), while Bohemian knotweed and Japanese knotweed are also included in Part 3 of the same regulation, restricting the movement of vector materials containing these species. No species were recorded that are contained on the EU IAS Regulation 1143/2014 (Appendix 4).

Buddleja and winter heliotrope were locally abundant in unmanaged sections of the site. One infestation of old man's beard was recorded outside of the survey area, adjacent to Irishtown Nature Park. None of these three species are contained in any regulatory list at present (a more detailed description of these IAS is provided in Appendix 2).

<sup>&</sup>lt;sup>1</sup> This IAS was identified separate to the 2023 surveys. It was identified in April 2024 by TOBIN Consulting Engineers.



#### 2.1.1. Bohemian knotweed and Japanese knotweed

There are three species of knotweed that are generally referred to by the public and nonspecialists as 'Japanese knotweed' and two of these were recorded growing in the survey area in July and October 2023. The principal knotweed species recorded throughout the survey area during the survey was Bohemian knotweed (a hybrid of Japanese knotweed and giant knotweed), with smaller populations of one of the parent species, Japanese knotweed, also recorded. Because the broad ecology of these two knotweed species is very similar and because they are all controlled/managed in the same manner, they will be referred to collectively as knotweed throughout this report.





**Figure 2.1:** Onshore development area boundary (yellow line), with the location of all infestations of regulated species, including knotweed and sea buckthorn, recorded in July 2023 outlined by red crosses.

![](_page_11_Picture_0.jpeg)

Knotweed was recorded in five main areas throughout the survey area (Figure 2.1-2.6). Infestations were recorded in an overgrown section to the north of the Uisce Éireann (formerly Irish Water) storm water ponds (53.341080, -6.194323) (Plate 2.1). There were two large areas of infestation, with two smaller outlier stands recorded between the storm water ponds and the north boundary fence (Figure 2.2). The infestations are recorded less than 7 metres from the Uisce Éireann site boundary, but at present they do not extend beyond the fenceline. The presence of dead canes in some areas close to the ponds indicate that herbicide treatment may have taken place in the past to prevent Knotweed rhizome growth from impacting on the adjacent structures.

Sporadic minor regrowth and evidence of previous Knotweed growth was recorded adjacent to a crash barrier on the verge of the Pigeon House Road (53.338360, -6.193027) (Figure 2.3, Plate 2.2). This area is located to the east of Ringsend Wastewater Treatment Plant.

![](_page_11_Picture_3.jpeg)

**Plate 2.1-2.2:** Knotweed growing in the north of the Uisce Éireann site (2.1) and adjacent to the Pigeon House Road (2.2) in July 2023.

![](_page_12_Picture_0.jpeg)

![](_page_12_Picture_1.jpeg)

**Figure 2.2:** A view of knotweed (red) within the Uisce Éireann site and sea buckthorn (green) within the onshore development area boundary in July 2023.

![](_page_13_Picture_0.jpeg)

![](_page_13_Picture_1.jpeg)

Figure 2.3: A view of knotweed (red) adjacent to Pigeon House Road, adjacent to the onshore development area boundary in July 2023.

![](_page_14_Picture_0.jpeg)

Knotweed was recorded throughout the berm at the landfall location (53.336408, -6.202905) in the south of the survey area and east to the boundary with Irishtown Nature Park. These are dense infestations and form impenetrable stands in close proximity to brambles and buddleja (Figure 2.4, Plates 2.3-2.5). This area could not be accessed on foot in July due to site fencing and dense overgrowth, but was then extensively surveyed during manual clearance works in early October 2023. A large infestation was also recorded adjacent to the pedestrian path on the south sea wall, growing from the top of the berm down to the edge of the pathway (Figure 2.5, Plate 2.6).

![](_page_14_Figure_2.jpeg)

**Plate 2.3-2.6:** Knotweed growing in the south of the onshore development area throughout the berm and adjacent to the south sea wall pedestrian pathway in July 2023.

![](_page_15_Picture_0.jpeg)

![](_page_15_Figure_1.jpeg)

**Figure 2.4:** A view of knotweed (red) at the embankment, near landfall within the onshore development area boundary, and sea buckthorn (green) outside of the boundary in July 2023.

![](_page_16_Picture_0.jpeg)

![](_page_16_Figure_1.jpeg)

Figure 2.5: A view of knotweed (red) near South Bank Road and sea buckthorn (green) infestations in July 2023.

![](_page_17_Picture_0.jpeg)

Infestations were recorded on other adjacent active sites in the west of this area (Figure 2.5), near Bisset Engineering (Plate 2.7), Kilsaran Concrete (Plate 2.8) and to the north of the sites along the South Bank Road (53.338419, -6.207446) (Plate 2.9). The final area of infestation was on the west of the South Bank Road (53.339797, -6.201648), adjacent to the Dublin Waste to Energy Plant (Figure 2.6, Plate 2.10).

![](_page_17_Figure_2.jpeg)

**Plate 2.7-2.10:** Knotweed growing in the south of the onshore development area near Bisset (2.7) and Kilsaran Concrete (2.8) and along the South Bank Road (2.9-2.10) in July 2023.

![](_page_18_Picture_0.jpeg)

![](_page_18_Figure_1.jpeg)

**Figure 2.6:** A view of knotweed (red) and Three-cornered leek (light blue) adjacent to the Shellybanks Road within the onshore development area boundary in July 2023.

![](_page_19_Picture_0.jpeg)

#### 2.1.2. Sea buckthorn

Sea buckthorn was recorded in the north of the onshore development area boundary (Figure 2.2) (Plate 2.11 at the onshore substation site) and adjacent to the Kilsaran Concrete site (Figure 2.5) (Plate 2.12) in July 2023.

The infestation within the onshore substation site is located in an area that will be modified as part of the overall project works on the banks of the Liffey estuary (Plate 2.12).

Two other notable infestations were recorded in areas off site but in close proximity to the onshore development area boundary (see Figures 2.4-2.5).

![](_page_19_Figure_5.jpeg)

**Plate 2.11-2.12:** Sea buckthorn growing in the northeast corner of the onshore substation site (2.11) and in the berm (outside of the onshore development area) (2.12) in July 2023.

#### 2.1.3. Three-cornered leek

Three cornered leek was recorded as two small infestations (Figure 2.6) in April 2024 by TOBIN Consulting Engineers. The infestations were located in two places on the road verge of South Bank Road (Plate 2.13-2.14).

![](_page_20_Picture_0.jpeg)

![](_page_20_Picture_1.jpeg)

**Plate 2.13-2.14:** Three-cornered leek recorded in two places on the road verge of South Bank Road in April 2024.

#### 2.1.4. Winter heliotrope

Winter heliotrope was observed throughout the berm area in the south of the onshore development area and in small pockets throughout the rest of the survey site in July and October 2023 (Plate 2.15-2.16).

![](_page_20_Picture_5.jpeg)

**Plate 2.15-2.16:** Winter heliotrope throughout the onshore development area boundary in July 2023.

![](_page_21_Picture_0.jpeg)

#### 2.1.5. Buddleja

Buddleja was ubiquitous throughout the onshore development area boundary in July 2023, with notable dense infestations in the southern berm area and along the Shellybanks Road (Plate 2.17-2.22).

![](_page_21_Picture_3.jpeg)

**Plate 2.17-2.22:** Buddleja was detected throughout the onshore development area boundary in July 2023.

![](_page_22_Picture_0.jpeg)

#### 2.1.6. Old man's beard

A small infestation of old man's beard was recorded beside the sea buckthorn at the edge of the Irishtown Nature Park in July 2023. The infestation is currently beyond the onshore development area boundary, but can spread rapidly once established.

## 3. CONTROL, TREATMENT AND MANAGEMENT OPTIONS

#### 3.1. Introduction

Within the onshore development area boundary, construction activities will be required at the landfall where the offshore export cables are brought onshore, for the installation of the underground onshore export cables, the construction of the onshore substation and installation of the network cables to connect the onshore substation to the Poolbeg 220 kV substation. These activities will require soil clearance, excavation and management which has the potential to result in the spread of IAS.

Knotweed, Three-cornered leek and sea buckthorn are regulated under Schedule 3 of S.I. 477, while knotweed is also included in Part 3 of the same regulation, restricting the movement of vector materials containing these species. On this basis, control and management of these IAS is required by the CWP Project and suitable options are presented in the sections below. These management options will prevent any accidental spread of the IAS infestations.

Buddleja, old man's beard and winter heliotrope were locally abundant but are not contained in any regulatory list at present. Although there is no legal requirement to manage these species at present, general guidelines for the control and management of each of these IAS are included.

#### 3.1.1. Site Specific Management Plan for IAS

In advance of construction work commencing within the onshore development area, Site Specific Management Plans will be prepared for each IAS infestation where any ground works or access is required in these areas and their associated buffer zones. Buffer zones will be determined based on root or rhizome growth associated with visible plants within the groundworks areas. These plans will provide guidance on biosecurity, traffic management, excavation and disposal methods to be employed in each case.

The plans shall be designed, implemented and supervised by suitably qualified personnel in advance of any site access.

![](_page_23_Picture_0.jpeg)

#### 3.2. Management of knotweed in advance of construction activities

#### 3.2.1. Chemical management in October 2023

Due to the extent of underground rhizome growth and its highly invasive capacity, control of knotweed following herbicide treatment in a single season is rarely possible. It generally takes three to four seasons of herbicidal treatment to deplete the rhizome reserves and to effectively control the target vegetation. Treatment using a glyphosate-based herbicide has proved to be highly effective.

Herbicide application was carried out in October 2023 by INVAS staff on knotweed within the onshore development area, to the manufacturer's guidelines with staff wearing suitable PPE and in possession of the relevant qualifications.

Records of herbicide use have been kept by INVAS staff in accordance with relevant legislation and will be retained after any future treatment. Further details have been provided in a separate knotweed treatment report from December 2023.

#### 3.2.2. Monitoring post treatment

Following herbicide management, the treatment site and any other possible areas of infestation will be resurveyed for knotweed growth for the next three to four years (through to the proposed commencement of construction activities in 2026). This will be carried out in June/July each year, with any required follow-up herbicide treatment taking place between August and October of the same year. Herbicide treatment will follow the same process as outlined above. Strict biosecurity protocols will be adhered to in all follow-up surveys and treatments.

#### 3.2.3. Conclusion on management in advance of construction activities

Based on INVAS's considerable experience in dealing with the control of all three knotweed species countrywide, its preferred management option for knotweed within the onshore development area boundary, prior to the commencement of construction activities, is continued chemical treatment with an approved herbicide with monitoring post treatment. Refer to the proposed scheduled for treatment in Table 3.2.

Any infestations beyond the onshore development area boundary will be considered as part of any access requirements and will not be interfered with by the CWP Project.

![](_page_24_Picture_0.jpeg)

This will follow all manufacturer's guidelines and be applied by suitably qualified personnel wearing the correct PPE.

#### 3.2.4. Proposed schedule for herbicide treatment

**Table 3.2:** Proposed management schedule for knotweed within the onshore development area

 boundary.

Year	Timing	Description of works	Treatment
2023	August/October	Survey and treatment	Foliar or stem injection herbicide application (completed by the CWP Project)
2024	June/July	Survey	None
2024	August/October	Assessment of regrowth and retreatment	Foliar or stem injection herbicide application
2025	June/July	Survey	None
2025	August/October	Assessment of regrowth and retreatment	Foliar or stem injection herbicide application
2026*	June/July	Survey	None
2026*	August/October	Assessment of regrowth and retreatment	Foliar or stem injection herbicide application
2027+*	June/July	Survey and retreatment as necessary	Foliar or stem injection herbicide application

\* Treatment undertaken as required; any treatment requirements will be aligned with commencement of construction activities within the onshore development area.

#### 3.3. Options for knotweed during the construction phase

Herbicide management will provide an adequate level of control to prevent the 'spread and dispersal' of knotweed on-site, provided no other interference takes place. If infested areas or their buffer zones must be accessed by personnel or machinery, additional measures will be required to prevent any unintentional movement of knotweed vector material. Below is a description of the subsequent control options for the knotweed infestations recorded on-site where development will take place, or additional access or interference with knotweed infestations is required.

For the client's preferred control option, a full Site Specific Management Plan outlining the specific actions for each stage of the operation will be provided, in advance of the works and when the specific works programme is known for each area within the onshore development area.

![](_page_25_Picture_0.jpeg)

#### 3.3.1. Excavation and disposal off-site option

This would require site operations to excavate all knotweed plants and associated contaminated soil. The soil and plant material would be carefully loaded onto biosecure trucks that would transport the contaminated material to the appropriately licenced landfill. Strict biosecurity protocols would be adhered to at all times during this process.

It is deemed prudent to remove soil in the infested areas to a depth of at least 1.8 metres and 7 metres from the last visible plant in order to be certain that no rhizomes remain in the soil following excavation operations. Where the site boundaries restrict the removal of a 7 metre buffer zone, vertical root barrier membrane must be put in place to remove the risk of regrowth from contaminated soil remaining on-site or on adjacent sites.

In the case of buildings and boundaries close to knotweed infestations, excavation depths and distances would be authorised by a suitably qualified engineer. The material would be disposed of at a licenced landfill subject to acquiring a licence for soil movement from the National Parks and Wildlife Service (NPWS).

Detailed records of all operations will be maintained throughout the CWP Project. These records will specifically focus on the exact areas excavated, the method of excavation, the depth of excavation, the volume of material (as numbers of truck loads) removed, an inventory of personnel and equipment entering and leaving the knotweed demarcated areas, and the operation of cleaning and disinfection facilities provided at each area.

#### 3.3.2. Excavation and disposal on-site option

Deep burial in an on-site containment cell can be used in certain scenarios e.g. in the event of a suitable green area being identified as part of the final specific works programme. Excavation must remove all knotweed rhizome material and would be carried out in the same manner as for the '*excavation and disposal off-site*' method. If the infested area and deep burial area are both contained within the onshore development area, no licence would be required.

The site selection would take into account services, landscaping, transport routes, possibility of erosion and the future use of the site. The distance for contaminated material to be transported through the site would be minimised, with the deep burial site located as close as possible to the site of infestation. If the burial site is located in a different area to the infestation, biosecurity measures would be put in place, including decontamination facilities and designated work and haulage areas.

![](_page_26_Picture_0.jpeg)

Prior to excavation, the invasive plant material would be treated with a non-persistent herbicide and left in situ for the herbicide's prescribed "active" period. The disposal site would require the construction of a containment cell made from root barrier membrane. The membrane used must carry a guarantee of integrity for 50 years. Once filled with knotweed-contaminated material, the cell will be sealed and then buried beneath 5 metres of inert backfill or uncontaminated soil. This method would map the location of the containment cell using GPS, and details would be retained in appropriate records to avoid accidental interference. This method would not require an ongoing management plan.

#### 3.3.3. Excavation and bunding option

Disposal of knotweed-contaminated waste using deep burial in a licenced landfill can be expensive. A preferred method may be to use a knotweed bund where suitable land is available. A bund is an area of ground that is cordoned off and where the contaminated soil is placed on top of a root barrier membrane, to a depth not exceeding 1 metre. The bund would be constructed using a proprietary root barrier membrane, which is a reinforced, impermeable polyethylene membrane and should have a life expectancy of at least 50 years. The aim of this disposal method is to isolate contaminated soil and encourage knotweed regrowth, which can then be treated with approved herbicides. A tracked excavator would be used to remove the soil and plant material from the infested areas to a depth of at least 1.8 metres below ground level. The soil and plant material would be carefully loaded onto bio secure trucks that would transport the material to the appropriate location on the bund site. Strict biosecurity protocols will be adhered to at all times during this process and a long-term herbicide management plan would be put in place. A protective fence would be placed around the bund and fitted with appropriate warning or information signage. This fence may be put in place before or after the bund construction operation. Access to the completed bund would be restricted to authorised persons. Any knotweed plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the NPWS.

#### 3.3.4. Excavation and soil screening option

Screening is a process that is offered by some companies in the United Kingdon (UK). This method involves excavating all of the contaminated soil before passing it through a screening machine that extracts the heavy rhizomes. The second phase of this process would pass the soil along a belt where the remaining fragments are extracted by hand. This method can greatly improve the site and is far less intrusive, as there is no transfer of soil from the infested site.

![](_page_27_Picture_0.jpeg)

However, this method does not carry a guarantee of eradication and can be a time consuming, expensive process.

An eradication guarantee cannot be provided with this method as not all minor rhizome fragments may be removed from the soil. This may result in the regrowth of rhizomes throughout the site which would necessitate further treatment. An ongoing management plan (herbicide/further screening) would also be required for this option.

#### 3.3.5. Currently recommended knotweed management option for the construction phase

Knotweed throughout the onshore development area will continue to be managed by foliar herbicide application to prevent any immediate 'spread or dispersal' of these species. This will follow all manufacturer's guidelines and be carried out by suitably qualified personnel wearing the correct PPE.

While ongoing herbicide control will deplete the underground rhizome reserves and reduce the risk of accidental spread, additional management options will be required in advance of any construction works. As the CWP project progresses and development of onshore infrastructure is required, the recommended management option for soils infested with knotweed is excavation for disposal off-site. Key areas, such as the open cut excavation at landfall, access ramp in the embankment and clearance works in the Uisce Éireann site will require all areas with knotweed-infested soils to be managed using this method.

A plan of targeted herbicidal treatment will then be implemented following the completion and reinstatement of any construction activities.

Whilst all the options are considered suitable for managing knotweed, excavation for disposal off-site is currently the most suitable option. This will be reviewed in advance of any construction activities and final site-specific requirements for each area will be confirmed, depending on the extent of infestation and proposed development in each area.

This management option for knotweed will also be aligned with any final landscape reinstatement plans for the onshore development area.

The final management option for knotweed will be reviewed and agreed upon with input from the relevant stakeholders, including Dublin City Council (DCC), Dublin Port Company (DPC) and the NPWS.

![](_page_28_Picture_0.jpeg)

#### 3.4. Options for the management of sea buckthorn

The distribution of sea buckthorn within the onshore development area is limited to two areas of infestation: at the location of the onshore substation in the north (Figure 2.2) and the infestation adjacent to the existing Kilsaran site (Figure 2.5).

#### 3.4.1. Herbicide management option

Chemical control can be highly successful in managing sea buckthorn, in combination with other mechanical methods. Prior to the site clearance works the sapling growth of the sea buckthorn would be targeted and spot sprayed with suitable glyphosate-based herbicide solution. Spraying is carried out at a rate of 5 l/ha using knapsacks fitted with low pressure drift beta nozzles. Treatment will be carried out when plants are in active growth. Extra care will be taken where infestations are located among or near non-target plant species. Where an infestation is located adjacent to a watercourse (within 5 metres), only one glyphosate-based product (Roundup Pro Biactive) is cleared for use.

#### 3.4.2. Manual / mechanical option

All mature growth would be uprooted (grubbed) with a mechanical digger or excavator and removed to a designated area, where it would be mulched and rendered suitable for removal to a licenced landfill or through deep burial on site. All material to be retained on site for deep burial must be at least three metres below finished ground level. No impermeable root barrier membranes would be required for this method, as Sea buckthorn spreads by seed and suckering and not by roots or rhizomes. The methodology would have the advantage of removing the entire root system of the plant thereby reducing the risk of cross-contamination with other soils.

#### 3.4.3. Combined mechanical and herbicide option

Herbicide application combined with manual methods has proven highly successful in the management of sea buckthorn. This method involves causing damage to the stem of the plant and directly applying herbicide solution. This can result in the complete death of the target plant without the need for foliar spraying. Control using herbicide application would be required at least four weeks prior to any mechanical control works.

#### 3.4.4. Monitoring post treatment

Monitoring will be required in the areas where works took place 12 months after the completion of mechanical removal works on-site. Any plants or sapling growth that are observed at this time will be recorded, mapped and scheduled for retreatment (Table 3.4).

![](_page_29_Picture_0.jpeg)

#### 3.4.5. Recommended management option for sea buckthorn

Sea buckthorn throughout the onshore development area will be managed by the combined manual and direct herbicide application method. The direct herbicide method in advance of the construction phase will prevent any immediate 'spread or dispersal' of this species. This will follow all manufacturer's guidelines and be carried out by suitably qualified personnel wearing the correct PPE.

While herbicide control may reduce the risk of accidental spread, additional management options will be required in advance of any construction works. As the CWP Project progresses and the development of onshore infrastructure is required, the recommended management option for soils infested with sea buckthorn is excavation for disposal on-site. At the onshore substation, the sea buckthorn will be excavated, mulched and disposed on-site within the area proposed for reclamation to the south-east of the site. In the event that direct interaction is required with the sea buckthorn at the boundary of the current Kilsaran site, this will be excavated, mulched and also considered for disposal on-site. Strict biosecurity procedures will be required throughout the management works, including the use of covered biosecure trucks during transport of any sea buckthorn plant material. Where disposal on-site is not deemed achievable, the material can be disposed off-site in an appropriately licensed landfill.

Although 'excavation for disposal on-site' is the most suitable option, this will be reviewed in advance of any construction activities and final site-specific requirements will be confirmed, depending on the extent of infestation and proposed development in each area.

This management option for sea buckthorn will also be aligned, as relevant, with any final landscape reinstatement plans for the onshore development area.

The final management option for sea buckthorn will be reviewed and agreed upon with input from the relevant stakeholders, including DCC, DPC and NPWS.

![](_page_30_Picture_0.jpeg)

#### 3.4.6. Schedule for herbicide treatment

Year	Timing	Description of works	Treatment
2024	All year round	Manual control with direct herbicide application	Combined manual and herbicide application
2025	All year round	Manual control with direct herbicide application	Combined manual and herbicide application
2026*	4 weeks prior to mechanical control	Manual control with direct herbicide application	Combined manual and herbicide application
2026*	4 weeks post herbicide application	Mechanical management	Grubbing out of plants and root systems before on-site chipping and disposal off- site or deep burial
2027*	12 months post mechanical control	Survey and herbicide retreatment as necessary	Herbicide treatment of sapling growth with follow- up mechanical control 4 weeks post treatment
2027*	4 weeks post herbicide application	Mechanical management (if required)	Grubbing out of plants and root systems before on-site chipping and disposal off- site or deep burial
2028*	12 months post mechanical control	Survey and retreatment as necessary if additional regrowth was recorded in 2027	Herbicide treatment and mechanical management if required

**Table 3.3:** Proposed management schedule for sea buckthorn at Poolbeg.

\* Treatment undertaken as required and any treatment requirements will be aligned with commencement of construction activities within the onshore development area.

#### 3.5. Management of Three-cornered leek in advance of construction activities

#### 3.5.1. Chemical management

Due to the extent of underground bulbs and its highly invasive capacity, control of Threecornered leek following herbicide treatment in a single season is rarely possible. It can take several seasons of herbicidal treatment to deplete the bulb reserves and to effectively control the target vegetation. Treatment using a glyphosate-based herbicide has proved to be highly effective. Herbicide application should be carried out on Three-cornered leek within the onshore development area to the manufacturer's guidelines and by staff wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide use should be kept in accordance with relevant legislation and will be retained after any future treatment.

#### 3.5.2. Monitoring post-treatment

Following herbicide management, the treatment site and any other possible areas of infestation will be resurveyed for Three-cornered leek growth for the next three to four years (through to

![](_page_31_Picture_0.jpeg)

the proposed commencement of construction activities in 2026). This will be carried out in February to April each year with any required follow up herbicide treatment taking place between at the time of survey. Herbicide treatment will follow the same process as outlined above. Strict biosecurity protocols will be adhered to in all follow up surveys and treatments.

#### 3.5.3. Conclusion on management in advance of construction activities

Based on INVAS's considerable experience dealing with the control of Three-cornered leek countrywide, its preferred management option for Three-cornered leek within the onshore development area boundary, prior to the commencement of construction activities is continued chemical treatment with an approved herbicide and also monitoring post treatment. Refer to the proposed scheduled for treatment in Table 3.4.

Any infestations beyond the onshore development area boundary will be considered as part of any access requirements and will not be interfered with by the CWP Project.

This shall follow all manufacturers guidelines and be applied by suitably qualified personnel wearing the correct PPE.

#### 3.5.4. Proposed schedule for herbicide treatment

 Table 3.4: Proposed management schedule for Three-cornered leek within the onshore development area boundary.

Year	Timing	Description of works	Treatment
2024	February/May	Survey and treatment	Foliar herbicide application
2025	February/April	Survey, assessment of regrowth and retreatment	Foliar herbicide application
2026	February/April	Survey, assessment of regrowth and retreatment	Foliar herbicide application
2027+*	February/April	Survey, assessment of regrowth and retreatment	Foliar herbicide application

\*: Treatment undertaken as required and any treatment requirements will be aligned with commencement of construction activities within the onshore development area

#### 3.6. Options for Three-cornered leek During the Construction Phase

Herbicide management will provide an adequate level of control to prevent the 'spread and dispersal' of Three-cornered leek on site provided no other interference takes place. If infested areas or their buffer zones must be accessed by personnel or machinery additional measures will be required to prevent any unintentional movement of Three-cornered leek vector material. Below is a description of the subsequent control options for the Three-cornered leek

![](_page_32_Picture_0.jpeg)

infestations recorded on site where development will take place or additional access or interference with Three-cornered leek infestations is required.

For the client's preferred control option, a full site-specific Management Plan outlining the specific actions for each stage of the operation will be provided, in advance of the works.

#### 3.6.1. Excavation and disposal off-site option

This would require site operations to excavate all Three-cornered leek plants and associated contaminated soil. The soil and plant material would be carefully loaded onto bio secure trucks that would transport the contaminated material to the appropriately licenced landfill. Strict biosecurity protocols would be adhered to at all times during this process.

It is deemed prudent to remove soil in the infested areas to a depth of at least 300mm and 1 metre from the last visible plant in order to be certain that no bulbs remain in the soil following excavation operations. Where the site boundaries restrict the removal of a 1 metre buffer zone, vertical root barrier membrane must be put in place to remove the risk of regrowth from contaminated soil remaining on site. In the case of buildings and boundaries close to Three-cornered leek infestations, excavation depths and distances would be authorised by a suitably qualified engineer. The material would be disposed of at a licenced landfill subject to acquiring a licence for soil movement from the NPWS.

Detailed records of all operations will be maintained throughout the CWP Project. These records will specifically focus on the exact areas excavated, the method of excavation, the depth of excavation, the volume of material (as numbers of truck loads) removed, an inventory of personnel and equipment entering and leaving the Three-cornered leek demarcated areas, and the operation of cleaning and disinfection facilities provided at each area.

#### 3.6.2. Excavation and disposal on-site option

Deep burial in an on-site containment cell can be used in certain scenarios. Excavation must remove all Three-cornered leek material and would be carried out in the same manner as for the '*Excavation and disposal off-site*' method.

The site selection would take into account services, landscaping, transport routes, possibility of erosion and the future use of the site. The distance for contaminated material to be transported throughout the site would be minimised with the deep burial site located as close as possible to the site of infestation. If the burial site is located in a different area to the

![](_page_33_Picture_0.jpeg)

infestation, biosecurity measures would be put in place including decontamination facilities and designated work and haulage areas.

Prior to excavation, the invasive plant material would be treated with a non-persistent herbicide and left in situ for the herbicide's prescribed "active" period. The disposal site would require the construction of a containment cell made from root barrier membrane. Once filled with Three-cornered leek contaminated material the cell shall be sealed and then buried beneath 5 metres of inert backfill or uncontaminated soil. This method would map the location of the containment cell but would not require an ongoing management plan.

# 3.6.3.Currently recommended Three-cornered leek management option for the construction phase

Three-cornered leek throughout the onshore development area will continue to be managed by foliar herbicide application to prevent any immediate 'spread or dispersal' of these species. This will follow all manufacturers guidelines and be carried out by suitably qualified personnel wearing the correct PPE.

While ongoing herbicide control will deplete the underground rhizome reserves and reduce the risk of accidental spread, additional management options will be required in advance of any construction works. As the CWP Project progresses and development of onshore infrastructure is required, the recommended management option for soils infested with Three-cornered leek, is excavation for disposal off-site. At present, it is possible that the area will not be disturbed by the works as they are up on the verge, however any possible interference will require a suitable Management and Biosecurity Plan.

Although 'excavation for disposal off-site' is currently the most suitable option, this will be reviewed in advance of any construction activities and final site-specific requirements for each area will be confirmed, depending on the extents of infestations and proposed development in each area. This management option for Three-cornered leek will also be aligned with any final landscape reinstatement plans for the onshore development area.

The final management option for Three-cornered leek will be reviewed and agreed upon with input from the relevant stakeholders including Dublin City Council (DCC), Dublin Port Company (DPC) and the National Parks and Wildlife Service (NPWS).

![](_page_34_Picture_0.jpeg)

# 3.7. Options for the management of other non-regulated IAS including buddleja, old man's beard and winter heliotrope

As noted previously, buddleja, old man's beard and winter heliotrope were locally abundant but are not contained in any regulatory list at present. Although there is no legal requirement to manage these species at present, general guidelines for the control and management of each of these IAS are included below.

#### 3.7.1. Options for the management of buddleja

#### 3.7.1.1. Mechanical removal for disposal on- or off-site

All mature growth will be uprooted (grubbed) with a mechanical digger or excavator and removed to a designated area where it will be mulched and rendered suitable for removal to a licenced landfill or through deep burial on-site. Buddleja is not included in the 'Third Schedule' of the EC (Birds and Natural Habitats) Regulations (S.I. 477) and, therefore, does not require a licence or specific landfill disposal procedures. No impermeable root barrier membranes will be required for this method. The methodology will have the advantage of removing the entire root system of the plant, thereby reducing the risk of cross-contamination with other soils. All cut plant material should be chipped and buried on-site or disposed of at a licenced green waste facility. During transport, trailers or other transport vehicles should be sealed or covered with a tarpaulin to prevent the loss of any plant material.

#### 3.7.1.2. Foliar herbicidal treatment

Long-term plant control can be achieved by the application of herbicide (glyphosate) to the leaves of buddleja plants during the summer months, before seeding. Where large seedbanks are present, multiple applications may be required over 2 to 3 years. Herbicide application will always follow the manufacturer's guidelines and only be carried out by staff wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide use will be kept in accordance with all relevant legislation and must be retained after each treatment. Suitable PPE including boots, durable gloves and full-length overalls will be worn by all staff involved in herbicide management works.

#### 3.7.1.3. Recommendations for the management of buddleja

The foliar herbicidal treatment of buddleja is still undergoing research and on this basis, mechanical removal for disposal on- or off-site is the recommended approach. All

![](_page_35_Picture_0.jpeg)

management works will require post-treatment monitoring and follow-up treatment, where required.

#### 3.7.2. Options for the management of old man's beard

#### 3.7.2.1. Combined herbicide and mechanical removal with disposal on- or off-site

A combination of chemical and manual control methods can be highly successful in the management of old man's beard. This species is not included in the 'Third Schedule' of the EC (Birds and Natural Habitats) Regulations (S.I. 477) and, therefore, does not require a licence or specific landfill disposal procedures.

Seedlings will be manually removed once visible in May/June and disposed of at a licenced green waste facility. Old man's beard will be treated by the foliar application of a glyphosatebased herbicide. Treatment will be carried out in June, when foliage is present during the growth season and before flowering has begun. The vines will be cut back to ground level or waist height in winter or spring and the subsequent regrowth can be then foliar sprayed as outlined above. Following herbicide treatment, plant material will be manually removed in late July or when systemic herbicide application has effectively killed all foliage and stems have dried out. Plant material will be removed along with any further seedlings that have emerged and disposed of as outlined above. All clematis stumps will be drilled and treated with a 5:1 dilution of a glyphosate-based herbicide. Stump treatment should only be required in year one, but could be considered as a precautionary measure in year two. Herbicide application will always follow the manufacturer's guidelines, and only be carried out by staff wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide use will be kept in accordance with all relevant legislation and must be retained after each treatment. Suitable PPE including boots, durable gloves and full-length overalls should be worn by all staff involved in manual control works due to the potential toxicity of clematis.

3.7.2.2. Recommendations for the management of old man's beard Combined herbicide and mechanical removal with disposal on- or off-site.

![](_page_36_Picture_0.jpeg)

#### 3.7.3. Options for the management of winter heliotrope

#### 3.7.3.1. Mechanical removal for disposal on- or off-site

Research between INVAS and Atlantic Technological University (ATU) Sligo on the herbicidal management of winter heliotrope was inconclusive but did indicate that this species is not readily susceptible to herbicide management.

On this basis, all infested soil will be excavated with a mechanical digger or excavator and removed to a licenced landfill or a location for deep burial on site. It is noted that the rhizomes of winter heliotrope are far less deeply penetrating and also less vigorous in their growth. They also do not pose a risk to built structures.

The top 500 mm of infested soil will be removed when excavating this species, with a lateral buffer zone of 1 metre from the last visible plant. Winter heliotrope is not included in the 'Third Schedule' of the EC (Birds and Natural Habitats) Regulations (S.I. 477) and, therefore, does not require a licence or specific landfill disposal procedures. No impermeable root barrier membranes will be required for this method. This methodology will have the advantage of removing the entire rhizome system of the plant, thereby reducing the risk of cross-contamination with other soils. All infested soil will be buried on-site or disposed of at a licenced green waste facility. During transport, trailers or other transport vehicles will be sealed or covered with a tarpaulin to prevent the loss of any infested soil or plant material.

3.7.3.2. Recommendations for the management of winter heliotrope Mechanical removal for disposal on- or off-site.

![](_page_37_Picture_0.jpeg)

## 4. **BIOSECURITY**

The ecological effects of IAS are often irreversible and, once established, they are extremely difficult and costly to control and eradicate; hence, the urgent need to prevent their introduction and spread. Prevention is clearly more cost-effective and less environmentally damaging than long-term containment, control or eradication. The most effective measure to reduce introductions and halt spread of IAS is to promote and implement good biosecurity practice.

The sections below outline the biosecurity standard operating procedure (SOP) implemented during the herbicidal treatment of October 2023. These biosecurity measures will be implemented for any future herbicidal treatment within the onshore development area.

![](_page_37_Picture_4.jpeg)

Plate 4.1 & 4.2: On-site biosecurity during surveys by INVAS staff.

#### 4.1. Biosecurity standard operating procedure for personnel and equipment

This biosecurity SOP applies to all equipment (sampling devices, hand tools, buckets, boots and PPE) that are used during the control of IAS. The purpose of this SOP is to provide standardised practical methods for cleaning and disinfecting all equipment that comes into contact with IAS while carrying out control works. This biosecurity SOP will enhance the client's existing biosecurity activity to deliver an improved biosecurity system that will help stop the introduction and spread of IAS during operations conducted by the client or contractors.

![](_page_38_Picture_0.jpeg)

All staff that were involved in the survey had access to disinfection facilities (Appendix 3) that include but were not limited to:

- Detailed guide to proper cleaning and disinfection procedure and instructions for making the correct disinfection concentration
- A solution of clean water and Virkon Aquatic tablets or powder for the disinfection of equipment and PPE\*
- Hard-bristle brushes
- Disposable non-latex gloves for equipment and PPE
- Plastic bags and cable ties (for disposing of IAS material removed from equipment).

[\* Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. Disposable gloves should be worn when using the disinfectant solution.]

Before commencing operations, a 1% Virkon Aquatic disinfection solution (10 g Virkon Aquatic powder in 1 litre of clean water) was prepared for staff working in infested areas. The disinfectant solution will remain pink in colour while it is still active. Additional clean water was readily available for further disinfectant solution if required.

Best biosecurity practice will be achieved by ensuring that the following guidelines are adhered to when planning work activities:

- When preparing a works programme, check to see what IAS are present on the site. (View IAS distribution maps on <u>www.biodiversityireland.ie</u> and refer to the Onshore Invasive Species Management Plan). Use this website, local knowledge and prior reports to determine the locations and extent of the infestations.
- Where possible, schedule operations so that uncontaminated sites can be accessed before sites that are known or suspected to support IAS.
- Where multiple sites must be accessed and there is no opportunity to clean and disinfect the equipment, make sure to have alternative, clean equipment available.
- Clean and disinfect all equipment prior to arrival on site. If this is not possible, clean and disinfect the equipment before entering the site.
- Clean and disinfect all equipment when moving between sites.

![](_page_39_Picture_0.jpeg)

• Report suspected IAS to project stakeholders, including the future construction management team and Ecological Clerk of Works, accompanied by the location (grid reference) and good quality photographs.

It is important that all PPE and equipment used are cleaned and disinfected according to the procedures below. These biosecurity measures should be conducted before leaving each site.

- Put on disposable gloves before cleaning and disinfecting the equipment.
- Visually inspect all equipment that has come into contact with water for evidence of attached IAS material, or adherent mud or debris. Remove any such material before cleaning and disinfecting the equipment and leaving the site.
- Dispose of any IAS material taken from the equipment using the plastic bags provided.
- Spray equipment with the disinfection solution to the point of run-off. Do not rinse in clean water for at least 15 minutes.
- Use the hard-bristle brush to remove all mud and debris from boots and equipment. Then spray the prepared disinfectant solution onto the cleaned surfaces to the point of run-off. During inspection and cleaning, pay particular attention to places where IAS could be accidentally trapped, such as the treads of boots and attachment points on equipment.
- Visually inspect all PPE that has been in contact with vector material and remove any attached IAS material, or adherent mud or debris. Wipe down this PPE with an absorbent cloth soaked in the prepared disinfectant solution.
- Where time permits and it is practical, it is good biosecurity practice to air dry equipment following cleaning and disinfection.
- Remove disposable gloves and dispose of safely.

![](_page_40_Picture_0.jpeg)

## Appendices

![](_page_41_Picture_0.jpeg)

Appendix 1: Survey details for the site at Poolbeg in July/October 2023.

![](_page_42_Picture_0.jpeg)

Contactor name	INVAS Biosecurity
Surveyor name	William Earle
Survey date/time	21/07/2023 & 10/10/2023
County	Dublin
Area	Poolbeg
Site ID	JKO_Poolbeg_CodlingWindPark
Risk assessment (potential hazards)	Slips/trips/falls, isolation, disused land, steep slopes,
	animals, public
Health and safety (PPE required)	Safety boots, hi-viz
Species recorded	JKO, BKO, SBU, WHO, BUD, CLE
GPS details	53.336396, -6.202955 (897-1024)
Area located	Active compound, public path, overgrown site
Site details	Heavily overgrown in parts
Pervious treatment/interference	N/A
Infestation beyond fence line	Yes
Notes	No
	1020 1215
Photos	1030-1215
Is the site within or proximate to an	Yes, South Dublin Bay SAC (IE000210), South Dublin
ecologically sensitive area (SAC/SPA)	Bay pNHA (000210) and South Dublin Bay and River
	Tolka Estuary SPA (IE004024).

![](_page_43_Picture_0.jpeg)

Appendix 2: Detailed species description

![](_page_44_Picture_0.jpeg)

## Japanese knotweed

Distinguishing features	Japanese knotweed (Reynoutria japonica) (and the closely related
	Bohemian knotweed, <i>Reynoutria x bohemica</i> ) is a robust, vigorous
	herbaceous perennial that grows in dense and often continuous stands. It
	has branched, hollow, red or purple mottled bamboo-like shoots that grow
	to 3 m tall (Bohemian knotweed grows to 4 m and giant knotweed grows
	to 5 m tall) In winter stems remain on site as the tall dry red or straw-
	coloured hollow canes. All the leaves of Japanese knotweed plants are
	flattanad (truncata) at the base. (The leaves of Bohamian knotweed are
	Indicated (indicate) at the base. (The leaves of Bohemian Knotweed are
	harder and more variable than those of Japanese knotweed, supporting
	boin neart-snaped (indented/cordate at the base) and frattened (truncate at
	the base) forms, the former being more prominent lower down the stem.)
	Leaves are arranged in a zig-zag pattern on an arching stem.
	Flowers are small, creamy-white and hang in clusters from leaf axils; the
	clusters are longer than leaves in Japanese knotweed, while they are
	roughly the same length as the subtending leaf for Bohemian knotweed.
	Japanese knotweed has deeply penetrating, woody rhizomes - to 2 m
	deep and 7 m laterally from the last visible plant.
Habitat	Knotweeds are species of waste ground, roadsides, rail corridors and
	riparian habitats - alongside lakes, rivers, canals, ponds and ditches in
	rich to poor soil types.
Ecology	Knotweeds are non-native and invasive species (native to East Asia in
	Japan, China and Korea) and widespread in Ireland.
	Bohemian knotweed is a hybrid between the smaller Japanese and the
	larger giant knotweed species.
Impact	Knotweeds can impact on biodiversity by outcompeting native plants.
	Riparian habitats invaded by knotweeds have lower invertebrate
	abundance, species richness and biomass, and lower plant species richness
	compared to uninvaded sites, which is likely to impact on local fauna that
	use riparian habitats.
	Following dieback in winter, the ground surrounding infestations is left
	vulnerable to soil erosion and bankside subsidence due to the absence of
	a root weft that is normally produced by native grasses and herbs to bind
	the soils against winter floods.
	The presence of knotweed leaf litter in streams has also been shown to
	The presence of knowed real fitter in streams has also been shown to
	have adverse effects on the species composition of affected streams.
	The robust and extensive woody rhizomes of knotweed species are
	capable of penetrating asphalt, cracked foundations, walls, land drainage
	works and other built structures, causing significant structural damage.
Dispersal	The rhizomes are highly regenerative and even small rhizome fragments
	can produce new plants. Rhizome material can remain dormant in the soil
	for up to 20 years. Cut or discarded stems with nodes can also root and
	produce new plant stands. As only female plants have been recorded in
Logislation	Incland, no viable seeds are produced.
	Regulations 49 and 50 (the latter not currently commenced) of the
	European Communities (Birds and Natural Habitats) Regulations 2011
	(S.I. No. 477), being listed in the Third Schedule (Part 1) of this legislative

![](_page_45_Picture_0.jpeg)

Act. Soil taken from a place that is infested with knotweed (vector
material) is also restricted under Part 3 of this Third Schedule. The law
relating to knotweed is primarily contained in Regulation 49 (2), which
states that it is an offence to 'allow or cause to disperse' plants listed in
the Third Schedule, of which Japanese and Bohemian knotweed are
included. As such, any knotweed plant material or contaminated soil that
is to be removed from an infested site can only be done so under a licence
issued by the NPWS.

![](_page_45_Picture_2.jpeg)

Figure 1: Identification of Japanese knotweed throughout the year.

![](_page_46_Picture_0.jpeg)

![](_page_46_Picture_1.jpeg)

Figure 2: Japanese knotweed key identification features.

### **Bohemian knotweed**

Distinguishing features	Bohemian knotweed ( <i>Reynoutria x bohemica</i> ) is a robust, vigorous herbaceous perennial that grows in dense and often continuous stands. Bohemian knotweed has branched, hollow, red or purple mottled bamboo-like shoots that grow to 4 m tall. (Japanese knotweed grows to 3 m and giant knotweed grows to 5 m tall.) In winter, stems remain on site as the tall, dry, red or straw-coloured hollow canes.
	The leaves of Bohemian knotweed are larger and more variable than those of Japanese knotweed, supporting both heart-shaped (indented/cordate at the base) and flattened (truncate at the base) forms (Plate 3.6), the former being more prominent lower down the stem. Short hairs are present on the underside of the leaf, especially along the midvein. Leaves are arranged in a zig-zag pattern on an arching stem. The leaf texture can be somewhat rougher than in Japanese knotweed.
	Flowers are small, creamy-white and hang in clusters from leaf axils; the clusters are roughly the same length as the subtending leaf.
	This species has deeply penetrating, woody rhizomes - to 2 m deep and 7 m laterally from the last visible plant.
Habitat	This is a species of waste ground, roadsides, rail corridors and riparian habitats - alongside lakes, rivers, canals, ponds and ditches in rich to poor soil types.

![](_page_47_Picture_0.jpeg)

Ecology	Non-native and invasive species (native to East Asia in Japan, China and Korea) and widespread in Ireland
	Bohemian knotweed is a hybrid between the smaller Japanese and the larger giant knotweed species.
Impact	This species can impact on biodiversity by outcompeting native plants. Riparian habitats invaded by knotweeds have lower invertebrate abundance, species richness and biomass, and lower plant species richness compared to uninvaded sites, which is likely to impact on local fauna that use riparian habitats.
	Following dieback in winter, the ground surrounding infestations is left vulnerable to soil erosion and bankside subsidence due to the absence of a root weft that is normally produced by native grasses and herbs to bind the soils against winter floods.
	The presence of knotweed leaf litter in streams has also been shown to have adverse effects on the species composition of affected streams.
	The robust and extensive woody rhizomes of knotweed species are capable of penetrating asphalt, cracked foundations, walls, land drainage works and other built structures, causing significant structural damage.
Dispersal	The rhizomes of this species are highly regenerative and even small rhizome fragments can produce new plants. Rhizome material can remain dormant in the soil for many years. Cut or discarded stems with nodes can also root and produce new plant stands. As only female plants have been recorded in Ireland, no viable seeds are produced.
Legislation	Bohemian knotweed is subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477), being listed in the Third Schedule (Part 1) of this legislative Act. Soil taken from a place that is infested with Bohemian knotweed (vector material) is also restricted under Part 3 of this Third Schedule. The law relating to Bohemian knotweed is primarily contained in Regulation 49 (2), which states that it is an offence to 'allow or cause to disperse' plants listed in the Third Schedule, of which Bohemian knotweed is one. As such, any Bohemian knotweed plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the NPWS

![](_page_48_Picture_0.jpeg)

#### Sea buckthorn.

Distinguishing features	Sea buckthorn ( <i>Hippophae rhamnoides</i> ) is a dense and thorny deciduous woody shrub. It can grow up from 2 to 4 metres tall. It has small, petalless flowers each having 4 stamens and a 2-lobed calyx. Flowers bloom from March to April, with male and female flowers appearing on separate plants. Leaves are narrow, lanceolate and alternate and are covered with tiny silvery scales giving them a greyish appearance. The bush has stout spines and in autumn bright orange-yellow berries (7 mm across) are borne on the female plants.
Habitat	Seashores and cliffs, but also thrives in dry disturbed ground.
Ecology	Dioecious, wind pollinated, flowers in winter and fruits in autumn (Preston, 2002), it also spreads by suckering (shoots which grow from a bud at the base of the shrub) (Reynolds, 2002).
Impact	Because of the dense vegetation that the species produces, it can easily outcompete native species and become dominant. Sea buckthorn has a significant adverse impact on native floral (and associated faunal) biodiversity, as well as soil nutrient status.
Dispersal	Although wildlife may carry and distribute viable seed, the primary source of this species in coastal habitats was deliberate plantings. This species has been planted in the past in an effort to stabilise coastal land. Further dispersal now occurs through rhizome growth and layering.
Legislation	Sea buckthorn is subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477), being listed in the Third Schedule (Part 1) of this legislative Act. The law relating to sea buckthorn is primarily contained in Regulation 49 (2), which states that it is an offence to 'allow or cause to disperse' plants listed in the Third Schedule, of which sea buckthorn is one. As such, any sea buckthorn plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the NPWS.
Control options	Significant control can be achieved through the implementation of an annual combined mechanical/chemical management plan.

![](_page_49_Picture_0.jpeg)

## Three-cornered leek.

Distinguishing	Three-cornered leek (Allium triquetrum) is an erect, perennial and that	
features	can form dense stands. Usually 3 to 5 leaves will grow per bulb and	
	they are light green in colour. They can grow up to 30cm long, are	
	sharply keeled and curled at the tip. Stems will grow up to 45cm long	
	and triangular in cross-section. The leaves have a strong garlic smell	
	when crushed and all parts of the plant are edible, when fresh.	
	Flowers will have six white and lobed tepals (like petals) in a drooping	
	one-sided umbel (like the Bluebell) of 3 to 15 flowers. There is also a	
	distinctive green stripe down the centre of each tepal. The underground	
	bulbs are white and round, usually up to 20mm in diameter.	
Habitat	It is a species of damp and shaded roadsides, waste grounds, forests	
	and riparian lowland rivers and canals habitats.	
Feelogy	It is a non-native species (native to Mediterranean basin) whose range	
Leology	is expanding in Ireland mostly in southern coastal counties	
	is expanding in netand, mostly in southern coustar countes.	
Impact	Because of the dense vegetation that the species produces, it can easily	
	outcompete native species and become locally dominant.	
Dispersal	Dispersed by long-lived bulbs and seeds. Its seeds are commonly	
	spread by ants.	
What to do if you	Do not dig or carry out ground works in or near infestations until a	
find this species	suitable biosecurity plan has been put in place.	
<b>Control options</b>	s Mechanical:	
-	Effective control can be achieved by excavating bulbs, rhizomes and all	
	above-ground vegetation. Excavated material must be carefully	
	disposed of off-site or retained on-site on top of root barrier membrane.	
	Bulbs that remain in the soil will re-sprout in spring.	
	Herbicide:	
	Chemical treatment can provide relatively effective control of Three-	
	cornered leek when carried out in the growing season. However,	
	because of probable reinfestation by bulbs, rhizomes and/or seeds, it	
	cannot be assumed that all plants in the treatment area will be	
	eradicated.	
	Monitoring:	
	It is important to monitor the treated areas annually and to schedule	
<b>x</b>	further treatment, as necessary.	
Legislation	Three-cornered leek is subject to restrictions under Regulations 49 and	
	50 (the latter not currently commenced) of the European Communities	
	(Birds and Natural Habitats) Regulations 2011 (SI No. 477), being listed	
	in the Third Schedule (Part 1) of this legislative Act. The law relating to	
	Three-cornered leek is primarily contained in Regulation 49 (2), which	
	states that it is an offence to 'allow or cause to disperse' plants listed in	
	the Third Schedule, of which Three-cornered leek is included. As such,	
	any plant material or contaminated soil that is to be removed from an	
	infested site can only be done so under a licence issued by the National	
	Parks and Wildlife Service (NPWS).	

![](_page_50_Picture_0.jpeg)

## Buddleja

Distinguishing features	Buddleja ( <i>Buddleja davidii</i> ) is a perennial shrub that can grow to	
	up 4 metres tall. Leaves are grey-green, lanceolate and oppositely	
	arranged. Stems are light brown and with a cracked appearance.	
	This species has an extensive network of large and fine roots.	
	Strongly scented lilac flowers are borne on a long conical spike.	
	Each plant produces large numbers of small seeds that can persist	
	for up to four years in the soil.	
Habitat	On waste ground, roadsides, rail corridors and along lakes, rivers,	
	canals, ponds and ditches in rich to poor soil types.	
Ecology	Introduced from China as an ornamental and butterfly attractant,	
	buddleja has now become widespread in urban environments	
	throughout Ireland. This species is highly adaptable and tolerant	
	of disturbed conditions.	
Impact	The penetrating roots can cause damage to buildings and hard	
	structures while the profusion of above-ground growth produced	
	each growing season can have an adverse impact on biodiversity.	
Dispersal	Buddleja reproduces by seeds that are spread primarily by wind.	
	It can also reproduce asexually via stem and root cuttings.	
Management	Manual (pulling saplings), mechanical (cutting) and herbicide	
	(stump treatment of cut plants) management options can achieve	
	effective control of buddleja. All management works will require	
	post-treatment monitoring and follow-up treatment.	
Legislation	N/A	

## Winter heliotrope

Distinguishing features	Winter heliotrope ( <i>Petasites fragrans</i> ) is a perennial, rhizomatous species that can form dense stands. The rounded-kidney shaped leaves of this species can be present throughout the year and grow to 20 cm in diameter, with large lobes where the leaf stalks attach. They have a conspicuous toothed margin with dull downy hair beneath that rubs off easily. Stems are up to 30 cm long. The rhizome network is extensive, but it is usually quite shallow (to 30 cm deep). Winter heliotrope flowers produce an inflorescence up to 15 mm long in short, loose, cone-like racemes. Individual florets are pink/lilac and tubular with sweet vanilla-scented flowers. Flowering stems are erect, D-shaped (don't roll freely between
Habitat	Riparian species on fertile soil adjacent to rivers and canals, but also in disturbed terrestrial habitats such as ditches, roadsides, railway embankments and waste places
Ecology	This is a non-native species (native to Mediterranean region) and is widespread in Ireland. It is one of the few plants that actively grow throughout winter, flowering from November to February. This species readily forms monocultures in suitable habitats.

![](_page_51_Picture_0.jpeg)

	Winter heliotrope may be confused with native Butterbur	
	(Petasites hybridus) and Coltsfoot (Tussilago farfara).	
	To date, only male plants have been recorded in Ireland. This plant	
	is favoured by beekeepers as it provides a rare source of nectar	
	during the winter months. Is becoming particularly prevalent along	
	river and canal banks in Ireland.	
Impact	Because of the dense vegetation that the species produces it can	
	easily outcompete native species and become locally dominant.	
Dispersal	It is dispersed via rhizome expansion and fragments. Rhizomes are	
	often transported accidentally during ground works via machinery,	
	equipment and soil movement.	
Legislation	N/A	
Control options	Control may be achieved through mechanical excavation and	
	deep burial of this species on- or off-site.	

### Old man's beard

Distinguishing	Old man's heard/Traveller's joy (Clematis vitalba) is a fast-growing
fasturas	vine with climbing woods store that are stored its
Icatures	vine with climbing woody stems that can extend its vertical or
	horizontal range by up to 10 m in one season. The plant can live for up
	to 40 years and has woody stems that can grow to 20 m long. This
	species is a deciduous, perennial plant and the leaves are pinnately
	compound (leaflets in opposite pairs with one terminal leaflet),
	consisting of usually 5 leaflets. Flowers are white and about 2 cm in
	diameter. Seeds are produced in autumn and often remain on the vines
	late into winter. Individual plants can produce up to 100,000 seeds per
	season. Where the plant produces dense canopy vegetation, it can
	produce up to 17,000 viable seeds per $0.5 \text{ m}^2$ . It rapidly forms dense
	vegetative canopies over host plants or structures, often totally
	obscuring them from view.
Habitat	Grows in hedgerows, roadsides, rail corridors, riverbanks and forest
	edges. Seedling growth is restricted in closed canopy woodlands.
Ecology	The growth form of the species is such that it uses its vines to climb
	over trees, shrubs, along fence lines and any other support structure that
	it can avail of. Old man's beard can self-pollinate or be pollinated by
	wind or insects. Plants in their third year of growth can produce viable
	seeds. Seeds can remain viable in the soil for up to 5 years and soil
	disturbance creates opportunities for germination from the soil seed
	reserve
Impact	The blanketing growth of this species can smother and even collapse
	large trees, while the dense canopy it produces restricts light to plants
	beneath, thus effectively suppressing them. Old man's beard can
	impede wind passage through this dense blanketing vegetation and

![](_page_52_Picture_0.jpeg)

	cause the collapse of man-made structures or already weakened trees.
	Old man's beard has a significant adverse impact on native floral (and
	associated faunal) biodiversity. Because of the large biomass of
	vegetation that the weed produces, it can readily impede access in
	infested locations to humans and animals. This reduced access can also
	make it difficult to implement control measures. Reputedly, sap from
	old man's beard plants can cause blistering to human skin.
Dispersal	This species is primarily dispersed by seed through the action of wind
	(roads/rail corridors), water (rivers), human and animal interaction.
	Hanging vines will set root at any node that touches the ground and
	produce new plants. Old man's beard can spread by fragmentation,
	where cut or detached stems (with nodes) come into contact with the
	ground.
Legislation	Not yet contained in any legislative lists.

![](_page_53_Picture_0.jpeg)

**Appendix 3: Non-native invasive plant species regulated by the European Union (Birds and Natural Habitats) Regulations 2011 to 2015.** (Since the inclusion of the knotweed species in this regulation the Genus name has been reclassified from Fallopia to Reynoutria. The Genus name (Fallopia) is used in this case when referring directly to the text of the Regulation).

![](_page_54_Picture_0.jpeg)

Common name	Scientific name	Geographical application
American skunk- cabbage	Lysichiton americanus	Throughout the State
A red alga	Grateloupia doryphora	Throughout the State
Bohemian knotweed	Fallopia x bohemica	Throughout the State
Brazilian giant-rhubarb	Gunnera manicata	Throughout the State
Broad-leaved rush	Juncus planifolius	Throughout the State
Cape pondweed	Aponogeton distachyos	Throughout the State
Cord-grasses	Spartina (all species and hybrids)	Throughout the State
Curly waterweed	Lagarosiphon major	Throughout the State
Dwarf eelgrass	Zostera japonica	Throughout the State
Fanwort	Cabomba caroliniana	Throughout the State
Floating pennywort	Hydrocotyle ranunculoides	Throughout the State
Fringed water-lily	Nymphoides peltata	Throughout the State
Giant hogweed	Heracleum mantegazzianum	Throughout the State
Giant knotweed	Fallopia sachalinensis	Throughout the State
Giant-rhubarb (Chilean rhubarb)	Gunnera tinctoria	Throughout the State
Giant salvinia	Salvinia molesta	Throughout the State
Himalayan balsam	Impatiens glandulifera	Throughout the State
Himalayan knotweed	Persicaria wallichii	Throughout the State
Hottentot-fig	Carpobrotus edulis	Throughout the State
Japanese knotweed	Fallopia japonica	Throughout the State
Large-flowered waterweed	Egeria densa	Throughout the State
Mile-a-minute weed (Asiatic tearthumb)	Persicaria perfoliata	Throughout the State
New Zealand pigmy weed	Crassula helmsii	Throughout the State
Parrot's feather	Myriophyllum aquaticum	Throughout the State

![](_page_55_Picture_0.jpeg)

Common name	Scientific name	Geographical application
Rhododendron	Rhododendron ponticum	Throughout the State
Salmonberry	Rubus spectabilis	Throughout the State
Sea-buckthorn	Hippophae rhamnoides	Throughout the State
Spanish bluebell	Hyacinthoides hispanica	Throughout the State
Three-cornered leek	Allium triquetrum	Throughout the State
Wakame	Undaria pinnatifida	Throughout the State
Water chestnut	Trapa natans	Throughout the State
Water fern	Azolla filiculoides	Throughout the State
Water lettuce	Pistia stratiotes	Throughout the State
Water-primrose	Ludwigia (all species)	Throughout the State
Waterweeds	Elodea (all species)	Throughout the State
Wireweed	Sargassum muticum	Throughout the State

## Part 3: Vector Materials

Vector material	Species referred to	Geographical application
Blue mussel ( <i>Mytilus edulis</i> ) seed for aquaculture taken from places (including places outside the State) where there are established populations of the slipper limpet ( <i>Crepidula fornicata</i> ) or from places within 50 km of such places	Mussel ( <i>Mytilus edulis</i> ) Slipper limpet ( <i>Crepidula fornicata</i> )	Throughout the State
Soil or spoil taken from places infested with Japanese knotweed ( <i>Fallopia</i> <i>japonica</i> ), giant knotweed ( <i>Fallopia</i> <i>sachalinensis</i> ) or their hybrid Bohemian knotweed ( <i>Fallopia</i> x <i>bohemica</i> )	Japanese knotweed ( <i>Fallopia japonica</i> ) Giant knotweed ( <i>Fallopia sachalinensis</i> ) Bohemian knotweed ( <i>Fallopia x bohemica</i> )	Throughout the State

![](_page_56_Picture_0.jpeg)

Appendix 4. Non-native invasive alien species of European concern (Regulation (EU) 1143/2014).

![](_page_57_Picture_0.jpeg)

## PLANTS

LATIN NAME	ENGLISH
Alternanthera philoxeroides	Alligator weed
Cabomba caroliniana	Fanwort
Pontederia crassipes	Water hyacinth
Elodea nuttallii	Nuttall's waterweed
Gymnocoronis spilanthoides	Senegal tea plant
Hydrocotyle ranunculoides	Floating pennywort
Lagarosiphon major	Curly waterweed
Ludwigia grandiflora	Water-primrose
Ludwigia peploides	Floating primrose-willow
Lysichiton americanus	American skunk cabbage
Myriophyllum aquaticum	Parrot's feather
Myriophyllum heterophyllum	Broadleaf watermilfoil
<i>Pistia stratiotes</i> (will be added to the Union List after a two years' transition period on 2 August 2024)	Water lettuce
Rugulopteryx okamurae	Marine algae
Salvinia molesta	Kariba weed
Acacia saligna	Coojong
Ailanthus altissima	Tree of heaven
Baccharis halimifolia	Eastern baccharis
Hakea sericea	Needlebush
Prosopis juliflora	Mesquite
Triadica sebifera	Chinese tallow tree
Andropogon virginicus	Broomsedge bluestem
Cortaderia jubata	Purple pampas grass
Ehrharta calycina	Perennial veldtgrass
Microstegium vimineum	Nepalese browntop
Pennisetum setaceum	Crimson fountaingrass
Cardiospermum grandiflorum	Balloon vine

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<i>Celastrus orbiculatus</i> (will be added to the Union List after a five years' transition period on 2 August 2027)	Staff vine			
Humulus scandens	Japanese hop			
Lygodium japonicum	Japanese climbing fern			
Persicaria perfoliata	Asiatic tearthumb			
Pueraria montana (var lobata)	Kudzu vine			
Asclepias syriaca	Common milkweed			
Gunnera tinctoria	Chilean rhubarb			
Heracleum mantegazzianum	Giant hogweed			
Heracleum persicum	Persian hogweed			
Heracleum sosnowskyi	Sosnowsky's hogweed			
Impatiens glandulifera	Himalayan balsam			
Koenigia polystachya	Himalayan knotweed			
Lespedeza cuneata	Chinese bushclover			
Parthenium hysterophorus	Whitetop weed			

#### ANIMALS

LATIN NAME	ENGLISH				
Axis axis	Chital				
Callosciurus erythraeus	Pallas' squirrel				
Callosciurus finlaysonii	Finlayson's squirrel				
Herpestes javanicus	Small Asian mongoose				
Muntiacus reevesi	Muntjac deer				
Myocastor coypus	Соури				
Nasua nasua	Coati				
Nyctereutes procyonoides	Racoon dog				
Ondatra zibethicus	Muskrat				
Procyon lotor	Raccoon				
Sciurus carolinensis	Grey squirrel				
Sciurus niger	Fox squirrel				
Tamias sibiricus	Siberian chipmunk				

![](_page_59_Picture_0.jpeg)

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Acridotheres tristis	Common myna				
Alopochen aegyptiacus	Egyptian goose				
Corvus splendens	Indian house crow				
Oxyura jamaicensis	Ruddy duck				
Pycnonotus cafer	Red-vented bulbul				
Threskiornis aethiopicus	Sacred ibis				
Lampropeltis getula	Common kingsnake				
Lithobates catesbeianus	American bullfrog				
Trachemys scripta	Red-eared, yellow-bellied and Cumberland sliders				
<i>Xenopus laevis</i> (will be added to the Union List after a two years' transition period on 2 August 2024)	African clawed frog				
Ameiurus melas	Black bullhead				
Channa argus	Northern snakehead				
<i>Fundulus heteroclitus</i> (will be added to the Union List after a two years' transition period on 2 August 2024)	Mummichog				
Gambusia affinis	Western mosquitofish				
Gambusia holbrookii	Eastern mosquitofish				
Lepomis gibbosus	Pumpkinseed				
Morone americana	White perch				
Perccottus glenii	Amur sleeper				
Plotosus lineatus	Striped eel catfish				
Pseudorasbora parva	Topmouth gudgeon				
Arthurdendyus triangulatus	New Zealand flatworm				
Eriocheir sinensis	Chinese mittencrab				
Faxonius rusticus	Rusty crayfish				
Faxonius limosus	Spiny-cheek crayfish				
Faxonius virilis	Virile crayfish				
Limnoperna fortunei	Golden mussel				
Pacifastacus leniusculus	Signal crayfish				
Procambarus clarkii	Red swamp crayfish				

![](_page_60_Picture_0.jpeg)

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Procambarus virginalis	Marbled crayfish				
Solenopsis geminata	Tropical fire ant				
Solenopsis invicta	Red imported fire ant				
Solenopsis richteri	Black imported fire ant				
Vespa velutina nigrithorax	Asian hornet				
Wasmannia auropunctata	Electric ant/Little fire ant				

![](_page_61_Picture_0.jpeg)

**Appendix 5: Decontamination record sheet for the survey at the Poolbeg in July/October 2023**.

![](_page_62_Picture_0.jpeg)

INVAS BIOSECURITY		Da	ily Biosecu	ity Rec	ord Sheet		INVAS
Site ID		JKO_l	JKO_Poolbeg_CodlingWindPark				
Project details	IAS survey						
Biosecurity super-	WE	WE					
Date		10/10/	10/10/2023				
Infestation/works boundary in place (Yes/No)		No	0		Vehicle access demarcated (Yes/No)		No
Staff access/egress N decontamination in place (Yes/No)		No	D Vehi deco (Yes		cle/equipment ntamination in place No)		No
					,	1	
Vehicle (description/reg)	A	ctivity	Time decontam	e inated	Picture	I	Driver signature
Hilux	Gene	eral decon	l decon 1600		1600	WE	
Notes/Comments:					1	1	
Signed: <u>WE</u>	1				Date:	<u>1</u>	0/10/2023

![](_page_63_Picture_0.jpeg)

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Company Registration Number: 509929 VAT Number: le 98205960

![](_page_64_Picture_0.jpeg)