

Appendix 5.11. Invasive Alien Species Management Plan, 2021



Invasive Alien Species Management Plan

Mortarstown WWTP, Green Road, Co. Carlow



May 2021

Prepared by Envirico on behalf of Atkins Ireland Limited

www.envirico.com

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Action	Personnel	Company	Date
Report Prepared by:	Dr. Julie Larkin	Envirico	May, 2021
Report Reviewed by:	Dr. Amanda Greer	Envirico	May, 2021

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1. INTRODUCTION

Envirico have been engaged by Atkins Ireland Limited on behalf of Irish Water to carry out a Third Schedule invasive alien species survey and prepare an invasive species management plan for proposed works on the Mortarstown Waste Water Treatment Plant (hereafter the project). A walkover survey was conducted on the 22nd April, 2021. Two Third Schedule invasive alien species were recorded during the course of the survey – **Japanese Knotweed** (*Fallopia japonica*) and **Himalayan Balsam** (*Impatiens glandulifera*).

This invasive alien species management plan (IASMP) has been prepared in accordance with current Irish best practice guidelines such as ‘The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads’ – NRA (2010); Best Practice for Control of Japanese Knotweed *Fallopia japonica*/Rhododendron *Rhododendron ponticum* – Inland Fisheries Ireland; Best Practice Management Guidelines Japanese Knotweed *Fallopia japonica*/Rhododendron *Rhododendron ponticum* – Invasive Species Ireland (2008); Irish Water Report Information and Guidance Document on Japanese knotweed Asset Strategy and Sustainability.

1.1 Site Manager/Owner: Irish Water

1.2 Site Address: Green Road,
Carlow

1.3 Site GPS Co-ordinates: 52.819293, -6.940698

1.4 Site Description

The survey site is located on Green Road towards the southern extent of Carlow town. The survey area covered the Mortarstown Waste Water Treatment Plant on Green Road in Carlow including a section of a sheep pasture to the west of the plant and a section of woodland between the River Barrow and the R448 also to the west of the treatment plant (Drawing 1). The pumping station on the R448 opposite the junction with Green Road was also surveyed.

The planned works at the WWTP will involve the installation of an outflow water pipe through an open cut trench leading from the current location of the WWTP towards the River Barrow to the west of the plant. This trench is expected to be 10m wide and 7m deep. The proposed project will require a cofferdam and dry instream working area. This will require sheet piling in the river and on the banks of the River Barrow. The proposed outfall pipe construction methodology is trenching.



1.5 Survey Limitations

The Japanese Knotweed observed during the current survey has been treated previously. It is not known if this treatment was applied by personnel suitably certified and trained to treat Japanese Knotweed, therefore the risks associated with inappropriate treatment of Japanese Knotweed, e.g. dormancy, may apply.

1.6 Site Management Objectives and Threats to Objectives

The site management objectives, threats to achieving those objectives and the planned strategies for minimising these threats are outlined in Table 1.

Table 1. Site management objectives, threats and mitigation for these threats.

Objective	Threat(s)	Mitigation
1. To prevent the spread of invasive species as a result of these works.	Movement of equipment and personnel throughout areas contaminated with invasive species. Digging amongst invasive species or areas containing propagules Movement of contaminated clay	Before works begin, Invasive Species will be treated in accordance with the advice in this IASMP. All machinery that is working in infested areas must be thoroughly washed down and certified as clean before exiting the exclusion zone. All contaminated clay will be treated according to the procedures outlined in the IASMP All personnel and equipment that enter an exclusion zone will be certified as clean before exiting. Strict biosecurity protocols will be implemented, as outlined in the detailed Biosecurity Document. All Japanese knotweed related works will be supervised by an appropriately qualified person.
2. To eradicate all growth of Japanese Knotweed from the site	Japanese knotweed growth poses a threat to the integrity of built structures within 7m	All excavated Japanese knotweed and associated contaminated clay will be removed off-site to an authorised waste facility under licence from NPWS. All Japanese knotweed related works and works within 7m of Japanese knotweed will be supervised by an appropriately qualified person.



3. To enable works to go ahead in a timely fashion without compromising objectives 1 or 2.	Works may be delayed due to the implementation of biosecurity protocols, licence applications, uncovering of hidden invasive species material, waste classification, on-site treatment of or removal of contaminated spoil offsite.	Delays will be minimised by following the protocols laid out in this management plan.
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2. ABOUT THE RECORDED INVASIVE ALIEN SPECIES

2.1 Japanese Knotweed (*Fallopia japonica*)

Japanese Knotweed (*Fallopia japonica*) was introduced to Europe by the horticultural activities of Philippe von Siebold, who plucked the plant from the side of a Japanese volcano in the 1840s. It is a fast growing, perennial, herbaceous plant, native to East Asia (Japan, northern China, Taiwan and Korea). In its home range, the plant is not a threat because a host of native predators, fungi and herbivorous insects keep it in check. However, outside Japan it is classified as one of the World's Worst Invasive Species (World Conservation Union). The date of its first introduction to Ireland is not known, but is believed to be in the mid to late 19th century.

Japanese Knotweed can grow >3m high, with young shoots in spring growing up to 10 - 30cm per day, quickly resulting in dense stands that shade out other species. The leaves are a distinctive shape with a tapered tip and a flat base (up to 18cm long) and the mature hollow stems have nodes and look somewhat like bamboo canes. The underground rhizome system can be vast, extending up to 3m deep and 7m horizontally from the nearest visible growth. Japanese Knotweed produces small cream or white flowers in late summer or early autumn. There are only female plants in the UK and Ireland so sexual reproduction is negligible; however, hybrids with related plants can be produced (e.g. Giant knotweed; Russian Vine) and are found occasionally.

Even without sexual reproduction, the plant spreads at a rapid rate by rhizome extension. New plants can also grow from tiny fragments of rhizome (as little as 0.7 grams) or stems, which means that traditional control methods such as cutting or strimming will actually further spread a knotweed infestation. Some of the most likely routes for knotweed spread are via our roads, rivers and railway lines as tiny fragments are dragged along these routes enabling them to quickly colonise new areas. Knotweed is also often spread by the movement of contaminated soils offsite and the improper disposal of the weed in garden clearings. It can grow on a wide range of soil types, pH and salinity; has the ability to withstand droughts, heat, cold, sulphurous soil; and is tolerant towards heavy metals. This hardiness ensures a wide distribution across habitat types.

Japanese Knotweed's massive rhizome system and vigorous growth can seriously damage walls, foundations, roads and buildings, including historic sites. The plant can also disrupt the integrity of man-made flood defense structures, increasing costs in repair and maintenance. Railway tracks, roads, pavements, and other constructions are also frequently affected.

In Ireland, Japanese Knotweed is classified as a High-Impact Invasive Species with a Risk Assessment Score of 20. It is listed in Part 1 of the Third Schedule of Statutory Instrument 477/2011 (Birds and Natural Habitats Regulations) and spoil contaminated with Japanese



Knotweed waste is classified as a vector material in Part 3 of the Third Schedule (see Section 3 for details of this legislation).

2.2 Himalayan Balsam (*Impatiens glandulifera*)

Himalayan Balsam (AKA Policeman's Helmet) was first introduced to the British Isles as an ornamental plant in 1839. It has since spread at an average rate of 645km² per year. It is a tall (up to 2m), shallow-rooted, annual plant that flourishes in the riparian habitat (e.g. along river banks). It has lance shaped leaves with heavily serrated edges, arranged opposite each other. From around June onwards it produces many pinkish/purple, bonnet shaped flowers. These flowers are very distinctive, making identification easy once they are evident. The stem is jointed, hollow and easily broken.

Reproduction is by seed only. From July onwards, the plant may produce many seed-pods/capsules. These are up to 3.5cm long and each may contain 4 – 16 seeds that are expelled from the pod through an explosive action when the pod is moved. A single plant can produce up to 4,000 seeds, which can be launched up to 7m away from the parent plant. Seeds also float in water, making dispersal down-stream a simple matter, with upstream colonisation of up to 7m in a growing season possible. Seeds can survive in the soil for up to 18 months.

Himalayan Balsam thrives in moist, nutrient rich soil and is a frequent invader of river banks and disturbed soils. In many parts of Ireland, a near monoculture of Himalayan balsam exists along riverbanks. This leads to significant problems, as the shallow roots of this species do not hold the banks together as well as the roots of native species. In winter, when the plant has died, the banks are particularly vulnerable to erosion, leading to increased siltation in the water; reduced water quality; and reduced carrying capacity of the stream so an increased likelihood of flooding. Himalayan Balsam outcompetes native species by growing more quickly early in the season and so out-shading them. It is also known as a 'pollinator robber'. Himalayan Balsam produces copious quantities of nectar, attracting bees and other pollinators away from native species that require their services to reproduce.

Control of Himalayan Balsam can be effectively achieved by cutting or pulling it before it sets seed. Every plant must be cleared as even small plants up to 0.5m are capable of seeding. This process must be repeated later in the year as once the initial plants are removed, dormant seeds in the seed bank will begin to grow, and these will manage to set seed within the same season if they are not cut or removed. Once the plant has set seeds, extreme care must be taken not to disturb the seed pods in anyway, and physical control must involve carefully bagging the seed heads first in order to avoid spread.

In Ireland, Himalayan Balsam is classified as a High-Impact Invasive Species with a Risk Assessment Score of 18. It is also listed as an Invasive Species of European Union Concern.



3. INVASIVE ALIEN SPECIES LEGISLATION

The Invasive Species Ireland project identified Japanese Knotweed as one of the highest risk (most un-wanted) non-native invasive species in Ireland. There is strict legislation surrounding Japanese Knotweed in Ireland – namely under Irish Statutory Instrument 477/2011 and the Wildlife Acts (1976-2000). We have also ratified a number of international conventions that oblige the Government to address the issue of non-native invasive species, including the Convention on Biological Diversity, the Bern Convention and the International Plant Protection Convention.

Irish Statutory Instrument 477/2011

The EC Birds and Natural Habitats Regulations introduced important legislation concerning invasive species in the Republic of Ireland. There is a total of thirty-four terrestrial and aquatic alien plant species currently listed in Part 1 of the Third Schedule (as amended by S.I. No. 355/2015), which is included in Table 2 below;

Table 2. Third Schedule of S.I. 477/2011 as amended

Common Name	Scientific Name
American skunk-cabbage	<i>Lysichiton americanus</i>
A red alga	<i>Grateloupia doryphora</i>
Brazilian giant-rhubarb	<i>Gunnera manicata</i>
Broad-leaved rush	<i>Juncus planifolius</i>
Cape pondweed	<i>Aponogeton distachyos</i>
Cord-grasses	<i>Spartina</i> (all species and hybrids)
Curly waterweed	<i>Lagarosiphon major</i>
Dwarf eel-grass	<i>Zostera japonica</i>
Fanwort	<i>Cabomba caroliniana</i>
Floating pennywort	<i>Hydrocotyle ranunculoides</i>
Fringed water-lily	<i>Nymphoides peltata</i>
Giant hogweed	<i>Heracleum mantegazzianum</i>
Giant knotweed	<i>Fallopia sachalinensis</i>
Giant-rhubarb	<i>Gunnera tinctoria</i>
Giant salvinia	<i>Salvinia molesta</i>
Himalayan balsam	<i>Impatiens glandulifera</i>
Himalayan knotweed	<i>Persicaria wallichii</i>
Hottentot-fig	<i>Carpobrotus edulis</i>
Japanese knotweed	<i>Fallopia japonica</i>
Large-flowered waterweed	<i>Egeria densa</i>
Mile-a-minute weed	<i>Persicaria perfoliata</i>
New Zealand pigmyweed	<i>Crassula helmsii</i>
Parrot's feather	<i>Myriophyllum aquaticum</i>
Rhododendron	<i>Rhododendron ponticum</i>
Salmonberry	<i>Rubus spectabilis</i>
Sea-buckthorn	<i>Hippophae rhamnoides</i>



Spanish bluebell	<i>Hyacinthoides hispanica</i>
Three-cornered leek	<i>Allium triquetrum</i>
Wakame	<i>Undaria pinnatifida</i>
Water chestnut	<i>Trapa natans</i>
Water fern	<i>Azolla filiculoides</i>
Water-primrose	<i>Ludwigia</i> (all species)
Waterweeds	<i>Elodea</i> (all species except <i>E. canadensis</i>)
Wireweed	<i>Sargassum muticum</i>

Article 49 prohibits the introduction, breeding, release or dispersal of certain species; and Article 50 prohibits dealing in and keeping certain species.

Article 49 (2) “Save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence.”

Article 49 (3) states that you can defend against allegations that you committed an offence under Article 49 (1) or (2) by proving that you took all reasonable steps and exercised all due diligence to avoid committing the offence:

Article 49 (3) “Subject to paragraph (4), 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.

Article 50 (2) “Save in accordance with a licence granted under paragraph (7), a person shall be guilty of an offence if he or she imports or transports –

(a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule

(b) anything from which an animal or plant referred to in Part 2 of the Third Schedule can be reproduced or propagated, or

(c) a vector material listed in Part 3 of the Third Schedule,

into or in or to any place in the State specified in relation to such an animal or plant or vector material in relation to that animal or plant or vector material in the third column of the Third Schedule.”

The Wildlife Amendment Act (2000) of ***The Wildlife Act (1976)*** made it an offence to cause an exotic species of flora to grow in the wild anywhere in the state:



“Any person who plants or otherwise causes to grow in a wild state in any place in the State any (exotic) species of flora, or the flowers, roots, seeds or spores of flora, otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.”

EU Regulation 1143/2014

EU Regulation 1143/2014 on invasive alien species entered into force on 1 January 2015. It provides for a set of measures to be taken across the EU in relation to invasive alien species included on a list of Invasive Alien Species of Union concern. The list of invasive alien plant species can be seen in Table 3 below;

Table 3. Plants listed as Invasive Alien Species of Union Concern (EU Regulation 1143/2014)

Scientific name	English name	Entered into List
<i>Acacia saligna</i>	Golden wreath wattle	2019
<i>Ailanthus altissima</i>	Tree of heaven	2019
<i>Alternanthera philoxeroides</i>	Alligator weed	2017
<i>Andropogon virginicus</i>	Broomsedge bluestem	2019
<i>Asclepias syriaca</i>	Milkweed	2017
<i>Baccharis halimifolia</i>	Eastern baccharis	2016
<i>Cabomba caroliniana</i>	Green cabomba	2016
<i>Cardiospermum grandiflorum</i>	Balloon vine	2019
<i>Cortaderia jubata</i>	Purple pampas grass	2019
<i>Ehrharta calycina</i>	Perennial veldtgrass	2019
<i>Eichhornia crassipes</i>	Water hyacinth	2016
<i>Elodea nuttallii</i>	Nuttall's waterweed	2017
<i>Gunnera tinctoria</i>	Chilean rhubarb	2017
<i>Gymnocoronis spilanthoides</i>	Spadeleaf plant	2019
<i>Heracleum mantegazzianum</i>	Giant hogweed	2017
<i>Heracleum persicum</i>	Persian hogweed	2016
<i>Heracleum sosnowskyi</i>	Sosnowski's hogweed	2016
<i>Humulus scandens</i>	Japanese hop	2019
<i>Hydrocotyle ranunculoides</i>	Floating pennywort	2016
<i>Impatiens glandulifera</i>	Himalayan balsam	2017
<i>Lagarosiphon major</i>	Curly waterweed	2016
<i>Lespedeza cuneata</i>	Chinese bushclover, sericea	2019
<i>Ludwigia grandiflora</i>	Water primrose	2016
<i>Ludwigia peploides</i>	Floating primrose	2016
<i>Lygodium japonicum</i>	Vine-like fern	2019
<i>Lysichiton americanus</i>	American skunk cabbage	2016
<i>Microstegium vimineum</i>	Japanese stiltgrass	2017
<i>Myriophyllum aquaticum</i>	Parrot's feather	2016
<i>Myriophyllum heterophyllum</i>	Broadleaf watermilfoil	2017
<i>Persicaria perfoliata</i>	Asiatic tearthumb	2016
<i>Parthenium hysterophorus</i>	Whitetop weed	2016



<i>Pennisetum setaceum</i>	Crimson fountaingrass	2017
<i>Prosopis juliflora</i>	Mesquite	2019
<i>Pueraria montana</i> var. <i>lobata</i>	Kudzu vine	2016
<i>Salvinia molesta</i>	Giant salvinia, kariba weed	2019
<i>Triadica sebifera</i>	Chinese tallowtree	2019

Table 4. Animals listed as Invasive Alien Species of Union Concern (EU Regulation 1143/2014)

Scientific name	English name	Entered into List
<i>Acridotheres tristis</i>	Common or Indian myna	2019
<i>Alopochen aegyptiaca</i>	Egyptian goose	2017
<i>Arthurdendyus triangulatus</i>	New Zealand flatworm	2019
<i>Callosciurus erythraeus</i>	Pallas's squirrel	2016
<i>Corvus splendens</i>	Indian house crow	2016
<i>Eriocheir sinensis</i>	Chinese mitten crab	2016
<i>Herpestes javanicus</i>	Small Asian mongoose	2016
<i>Lepomis gibbosus</i>	Pumpkinseed	2019
<i>Lithobates catesbeianus</i>	American bullfrog	2016
<i>Muntiacus reevesi</i>	Muntjac deer	2016
<i>Myocastor coypus</i>	Coypu	2016
<i>Nasua nasua</i>	South American coati	2016
<i>Nyctereutes procyonoides</i>	Raccoon dog	2017
<i>Ondatra zibethicus</i>	Muskrat	2017
<i>Orconectes limosus</i>	Spiny-cheek crayfish	2016
<i>Orconectes virilis</i>	Virile (northern) crayfish	2016
<i>Oxyura jamaicensis</i>	Ruddy duck	2016
<i>Pacifastacus leniusculus</i>	Signal crayfish	2016
<i>Perccottus glenii</i>	Amur sleeper	2016
<i>Plotosus lineatus</i>	Striped eel catfish	2019
<i>Procambarus clarkii</i>	Red swamp crayfish	2016
<i>Procambarus fallax</i> f. <i>virginialis</i>	Marbled crayfish	2016
<i>Procyon lotor</i>	Raccoon	2016
<i>Pseudorasbora parva</i>	Topmouth gudgeon	2016
<i>Sciurus carolinensis</i>	Grey squirrel	2016
<i>Sciurus niger</i>	Bryant's fox squirrel	2016
<i>Tamias sibiricus</i>	Siberian chipmunk	2016
<i>Threskiornis aethiopicus</i>	Sacred Ibis	2016
<i>Trachemys scripta</i>	Red eared slider	2016
<i>Vespa velutina nigrithorax</i>	Asian hornet	2016



Japanese Knotweed Disposal

In order to transport Japanese knotweed from one location to another, a licence must first be obtained from the National Parks and Wildlife Service.

A licence application must include:

- As much information as possible on the removal, transportation and treatment of the species in question
- A detailed description of the biosecurity measures that will be in place
- A copy of the Knotweed Management plan
- Details of the timeframe for carrying out the work

Under the **Waste Management (Facility, Permit and Registration) Regulations 2007**, Japanese knotweed waste can only be stored or disposed of at a licenced waste facility. The waste must only be transported offsite by a licenced haulier, and the licenced waste facility must be notified in advance of the nature of the waste and have agreed to accept the waste material.



4. SURVEY FINDINGS

A walkover survey was conducted on 22nd April 2021. This survey confirmed the presence of two Third Schedule S.I. 477/2011 invasive alien species, Japanese Knotweed and Himalayan Balsam. Both of these species were recorded from the banks of the River Barrow, within a Special Area of Conservation (River Barrow and River Nore SAC (site code 002162)).

4.1 On-site findings

4.1.1 Japanese Knotweed

A single stand of Japanese Knotweed was recorded within the survey area (see Appendix I – Drawings). This infestation was given a unique identifier number (JK01). Details of this stand are given in Table 5.

JK01 is located within a woodland area between the River Barrow and the R448. This stand is showing signs of being treated in the past, with the majority of canes broken and degraded, however, there are numerous areas where new growth is visible. This stand is very extensive and well established with at least 60 old crowns observed within the area. These crowns have been treated in the past with very little new growth observed from them, however, the extensive rhizome systems associated with these crowns are still viable with new Japanese Knotweed shoots ascending a short distance from the crowns. This Japanese Knotweed infestation is also present at the boundary of the adjacent residential property.

Table 5. Details of each stand of Japanese Knotweed within the survey area

ID	GPS Co-ords	Length (m)	Width (m)	Growth Stage	Avg. Stem Height	Max. Stem Diameter	Notes
JK01	52.820473, -6.944361	49	30	Viable	<1m	1-2cm	Previously treated
Total above ground coverage of Japanese Knotweed: c. 1454m ² *							

*Areas may differ from length by width due to irregular polygon shapes

4.1.2 Himalayan balsam

A single stand of Himalayan balsam (**HB01**) was recorded from the survey area. This area was within the woodland between the R448 and the River Barrow and also in the footprint of JK01. It was located between the boundary of the adjacent residential property and the slope down towards the River. Numerous, small Himalayan Balsam plants were observed within the area with more plants likely to emerge as the growing season develops.



Table 6 Details of each stand of Himalayan Balsam within the survey area

ID	GPS Co-ordinate	Length (m)	Width (m)	Growth Stage	Height (m)	Notes
HB01	52.316373, -6.459283	14	16	In leaf	<0.5	N/A
Total above ground coverage of <i>Himalayan Balsam</i> : c. 190m ² *						

*Areas may differ from length by width due to irregular polygon shapes



5. MANAGEMENT PLAN

5.1 Japanese Knotweed

5.1.1. Summary

The Japanese Knotweed on-site will be disturbed as a result of the planned works. This disturbance will occur during excavations for the placement of the WWTP outflow pipe. A very large quantity of material contaminated with Japanese knotweed (between 3,960m³ and 8,316m³) will have to be excavated entirely and moved off-site as preparation for the laying of this pipe. Due to the quantity of contaminated material that would have to be excavated and removed off-site during the works, if it is possible at this planning stage to relocate the pipe to avoid disturbance of the Japanese knotweed, this would be the preferred solution. In the event that disturbance within 7m of the knotweed stands *can* be avoided, the recommendation will be to treat the knotweed in-situ with an aquatic-approved herbicide.

Below, we have provided details of the different options available if the pipe cannot be re-located. These options are listed in order of cost, from least expensive to most expensive.

5.1.2. Management Options for Japanese Knotweed

(A) In-Situ Herbicide Treatment

Summary: The knotweed is left in-situ and treated with an appropriate herbicide. This treatment is repeated in accordance with best-practice and the infestation monitored until there has been no regrowth observed for a minimum of two growing seasons. This is the preferred option for eradicating Japanese Knotweed as it is the most cost-effective and environmentally friendly control method.

Suitability for the Project: The current works plan does not allow for the knotweed to remain in-situ as JK01 will be directly disturbed as part of the works. In the event that the works plan changes i.e. the location of the pipe is moved to avoid disturbance of the Japanese knotweed, this would be the preferred control method.

(B) Excavation and Removal to Bund/Stockpile

Summary: Knotweed contaminated material is excavated from its current location and removed to a portion of the site where it is spread to a depth of ideally up to 0.5m but up to 1m is acceptable. Any regrowth that appears is treated with herbicide application over time and monitored until a minimum of two years without regrowth.

Given the width (10m), depth (7m) and length (approx. 75m) of the trench excavation a total of approx. 5,250m³ will have to be excavated from the proposed trench area and



stored elsewhere onsite. Much or all of this material may be contaminated with Japanese Knotweed rhizome.

Suitability for the Project: There is a possibility that this material could be stored within the green areas proposed for the Waste Water Treatment Plant site; however, there is a sizeable quantity of material which would require a very large area for it to be stored in. It is not known at this point if such an area would be available on-site. In addition, material cannot be stored within a flood plain or any area likely to flood. This option requires on-going herbicide treatment of the bund over a number of years.

(C) Excavation and On-Site Burial

Summary: Knotweed contaminated material is buried on the site either (a) with a minimum of 5m clean back fill placed on-top, or (b) encapsulated in a fully sealed root barrier membrane with a minimum of 2m clean back fill placed on-top. The burial location must be marked on the property deeds to prevent future accidental damage to the cell.

Given the width (10m), depth (7m) and length (approx. 75m) of the trench excavation a total of approx. 5,250m³ will have to be excavated from the proposed trench area. Much or all of this material may be contaminated with Japanese Knotweed rhizome.

Suitability for the Project: There is a possibility that this material could be stored within the green areas within the Waste Water Treatment Plant site, however, it is a sizeable quantity of material which would require a very large excavation for it to be buried in. It is not known at this point if such an area would be available on-site. In addition, material cannot be stored within a flood plain or any area likely to flood. This option carries the restrictions that excavations cannot happen in the area of the cell location in the future.

(D) Excavation and On-Site Screening

Summary: Knotweed contaminated material is excavated and passed through a screening plant where knotweed material is hand-picked out from a conveyor line. The resulting material is then spread to a depth of ideally up to 0.5m but up to 1m is acceptable. Any regrowth that appears is treated with herbicide application overtime and monitored until a minimum of two years without regrowth has been observed. Given the width (10m), depth (7m) and length (approx. 75m) of the trench excavation a total of approx. 5,250m³ will have to be excavated from the proposed trench area. Much or all of this material may be contaminated with Japanese Knotweed rhizome.

From PCA Code of Practice – Management of Japanese Knotweed, April 2018, regarding soil screening: *“This soil will then need to be monitored for at least two growing seasons and any regrowth treated with herbicide as per the stockpiling treatment above”*.



Suitability for the Project: There is a possibility that this material could be stored within the green areas within the Waste Water Treatment Plant site, however, it is quite a sizeable quantity of material which would require a very large area for it to be screened and stored. Note: material cannot be stored within a flood plain or any area likely to flood. This method still involves a minimum of two years of monitoring before the site is considered free of knotweed.

(E) Excavation and Off-Site Disposal

Summary: All knotweed contaminated material is excavated in full and loaded into suitably licenced haulage trucks. The trucks are filled to within no more than 300mm of the top and are securely covered before they leave the site. Any movement of knotweed contaminated material off-site is subject to a transport licence from the National Parks and Wildlife Service. Given the width (10m), depth (7m) and length (approx. 75m) of the trench excavation a total of approx. 5,250m³ will have to be excavated from the proposed trench area. Much or all of this material may be contaminated with Japanese Knotweed rhizome.

Suitability for the Project:

At this scoping stage of the project, due to the size of the area needed to either stockpile or bury the excavated material on-site, it is probable that off-site disposal will be the only viable method of handling excavated material contaminated with Japanese knotweed. A number of points, however, should be taken into account when considering this option:

- Removal off-site carries an additional biosecurity risk to the nation as the material has to be transported along Ireland's road network.
- Removing material off-site has further reaching environmental impacts as this material will be either placed into Irish landfill, using valuable landfill capacity, or loaded onto a ship and transported to the Netherlands for incineration.
- Removal off-site is considered the last resort option according to best-practice knotweed management guidelines, only to be undertaken when other options have been discounted as unsuitable.
- This option is extremely expensive.

From PCA Code of Practice – Management of Japanese Knotweed, April 2018: *“Disposal to landfill reduces valuable landfill capacity and needs haulage (which damages the environment and increases the risk of Japanese Knotweed spreading) and in the long term unsustainable. As such, disposal to landfill should only be considered as last resort when Japanese Knotweed cannot be suitably disposed of on-site”.*

Excavation and Off-Site Disposal Protocol

- An exclusion zone must be set up 7m around the knotweed.



- If it is necessary to gain a better approximation of the volumes of material to be removed off-site, a test trenching programme can be carried out by an invasive species specialist prior to the excavation works.
- A representative sample of the soil and stone material to be removed off-site must be sent to an appropriate laboratory for Waste Acceptance Criteria (WAC) analysis before works commence.
- A NPWS transport license and the results of the WAC analysis must be received and submitted to the receiving waste facility before excavation works commence.
- If there is a significant amount of above ground knotweed material to be removed, this will have to be disposed of separately as vegetation to an appropriately licensed waste facility that has been notified of the type of waste. This will require a separate NPWS license.
- All site personnel will receive biosecurity training before they begin work on the site, including instruction on Japanese knotweed identification (see **Appendix I – Japanese Knotweed Identification Sheet**).
- The knotweed vegetation will be cut back and placed into tonne bags to await collection. Other vegetation can be cut back and disposed of at any green waste facility.
- A loading area, and clean-down area must be set up before any trucks arrive on-site or any work takes place within 7m of the knotweed (see Biosecurity Protocols – Section 6).
- Designated haulage routes must be in place before trucks arrive on-site.
- All trucks that enter the site will be guided along the designated haulage route onto the loading area.
- Prior to excavation, consideration should be given to the possible ecological impacts and biosecurity risk of excavating the river bank. In order to avoid knotweed rhizome and silt from entering the watercourse during the excavation works, these will need to be dry works, and the river diverted away from the works for the duration.
- The knotweed will be carefully excavated and loaded into the awaiting truck.
- The haulage truck will be filled to no more than 20cm from the top.
- All haulage trucks will be covered, and will have their covers checked as in place before they are allowed to exit the site.
- All haulage trucks will be cleaned down in a designated clean down area, and certified as clean before they exit the site.
- All machinery, equipment and personnel that have been in contact with Japanese knotweed contaminated material, or have entered the exclusion zone, will be subject to strict biosecurity protocols as outlined in Section 6.
- These works will be supervised continuously by an Invasive Species Clerk of Works, in order to ensure strict adherence to biosecurity protocols. This is paramount, as any lapse in biosecurity could spread Japanese knotweed rhizome across the site.



- A daily sign-off sheet must be maintained that declares whether all works were completed in accordance with the IASMP, if biosecurity protocols were adhered to at all times, and any incidents or occurrences of note.
- Following completion of the knotweed removal works, the riverbank is likely to require reinstatement to protect against flooding and erosion.
- Following satisfactory completion of the works, a completion certificate should be issued to the client.
- Follow-up monitoring of the site for Japanese knotweed must be carried out for a minimum of two consecutive years with no regrowth.

5.2 Himalayan Balsam

5.2.1 Recommended Site Management – Himalayan Balsam

As HB01 is a small infestation with a low number of plants we recommend that Himalayan Balsam is pulled by hand prior to the plant setting seed and the stem severed to prevent regrowth. The Himalayan Balsam present on site can be controlled by hand-pulling twice annually commencing in May-June 2021. Plants that are pulled must be broken near the root in order to prevent re-rooting and can be left to compost on-site. This method will not impact on the sensitive habitats of the River Barrow and River Nore Special Area of Conservation and is highly effective when managed properly.

The control must be repeated in autumn as plants that grow from the seed bank during the summer may become capable of seeding before the end of the year if they are left in situ, thereby replenishing the seedbank. The Himalayan Balsam seedbank is viable for 18 months. Therefore, if control is carried out effectively there should be no plants left in the original seedbank following a two-year programme. However, because reintroduction is possible and indeed likely from plants further upstream, an ongoing annual monitoring should be introduced to keep the area clear.



6. BIOSECURITY PROTOCOLS

Persons/machinery entering or working within an area infested with an invasive alien species must take certain precautions to prevent the spread of that species. These guidelines must be strictly adhered to at all times.

6.1 Exclusion Zones

- Exclusion zones must be clearly marked or fenced off in order to prevent accidental incursion.

6.2 Machinery/Equipment/Haulage trucks

- All equipment and machinery to enter an exclusion zone must be thoroughly clean before entering.
- The number of machines that enter exclusion zones or come into contact with contaminated material should be kept to a minimum.
- A designated biosecurity area(s) lined with appropriate geo-textile will be set-up within the exclusion zone(s). A power washer and stiff bristled brushes will be made available at these locations.
- In the biosecurity area, all equipment and machinery must be thoroughly cleaned before exiting the exclusion zone, paying particular attention to any part of the machinery or equipment that may have come into contact with an invasive species or contaminated clay e.g. tracks/tyres, bucket, machine arm, wheel arches etc.
- All equipment and machinery must be certified as clean by the Invasive Species Clerk of Works before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the contaminated material to be managed appropriately.
- Personnel are at all times to be mindful of the threat posed by the spread of Japanese knotweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.

6.3 Ground Personnel

- All PPE to enter an exclusion zone must be thoroughly clean before entering.
- Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for rhizomes, or other plant fragments that may be stuck on.



- A designated biosecurity area(s) lined with appropriate geo-textile will be set-up within each exclusion zone. A bucket with soapy water, a hoofpick and a stiff bristled brush will be situated at these locations.
- In the biosecurity area, all PPE and equipment must be thoroughly cleaned before personnel leave the exclusion zone.
- All personnel should use a hoofpick to thoroughly clean the treads of their footwear. All footwear must be thoroughly cleaned before leaving the exclusion zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush before leaving an infested zone.
- PPE (incl. boots) and equipment should be certified as clean by the Invasive Species Clerk of Works before they are removed from the exclusion zone.
- Any material that is washed off equipment and machinery will be added to the contaminated material to be managed appropriately.
- Personnel are at all times to be mindful of the threat posed by the spread of Japanese knotweed and to take all possible precautions to ensure that their actions do not result in the accidental movement of contaminated material.



7. CODES OF PRACTICE/SOURCES OF INFORMATION FOR INVASIVE KNOTWEED SPECIES

Ireland

- Invasive Species Ireland Horticultural Code of Good Practice (<http://invasivespeciesireland.com/wp-content/uploads/2010/07/Horticulture-Code-Final.pdf>)
- National Roads Authority – The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (<http://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>)
- Invasive Species Ireland Japanese Knotweed Best Practice Management Guidelines (withdrawn since 1st Nov, 2016).
- Inland Fisheries Ireland – Best Practice Guidelines for the Control of Japanese Knotweed (<http://invasivespeciesireland.com/wp-content/uploads/2012/01/Best-practice-control-measures-for-Japanese-knotweed.pdf>)
- National Biodiversity Data Centre Invasive Species (<http://www.biodiversityireland.ie/projects/invasive-species/>)
- Invasive Species Ireland Website (<http://invasivespeciesireland.com/>)
- Sligo Institute of Technology Alien Species (http://staffweb.itsligo.ie/staff/dcotton/Alien_Species.html)
- Online Atlas of the British and Irish Flora (<http://www.brc.ac.uk/plantatlas/>) – UK also

UK

- Property Care Association Code of Practice for the Management of Japanese Knotweed (http://www.property-care.org/wp-content/uploads/2015/04/Code-of-Practice-for-the-Management-of-Japanese-knotweed_v2.7.pdf)
- Environment Agency – The Knotweed Code of Practice Version 3 (withdrawn since 11th Jul, 2016).
- Royal Institute of Chartered Surveyors – Japanese Knotweed and Residential Property (<http://www.rics.org/uk/knowledge/professional-guidance/information-papers/japanese-knotweed-and-residential-property-1st-edition/>)
- Department for Environment, Food and Rural Affairs Horticultural Code of Practice (<http://www.botanicgardens.ie/gspc/pdfs/defra%20code%20of%20practice.pdf>)
- GB Non-Native Species Secretariat (<http://www.nonnativespecies.org>)



8. ABOUT ENVIRICO



Envirico are an Irish ecological company that specialise in invasive species monitoring and control. We tackle invasive alien species found in domestic, commercial and amenity sites in terrestrial, riparian and freshwater habitats.

Our qualifications include:

- Ph.D. Ecology/Microbiology
- MSc Aquatic Ecology
- PCA Certified Surveyor of Japanese Knotweed
- PA1 – Safe use of chemicals
- PA6A – Operating hand-held pesticide equipment
- PA6AW – Operating hand-held applicators to apply pesticides near water
- PA6INJ – Operating hand-held pesticide injection equipment
- PA6MC – Operating other hand-held applicators
- Registered Professional Pesticide User of Pesticides
- SOLAS Safe Pass Certified
- CSCS Personnel
- PTS Certified
- Traffic Management
- HSE Commercial Divers
- National Powerboat Certificate (Level 2)
- LANTRA Certified Trainers

Our services include:

- Site-Specific, Best-Practice Management Plans
- Site Excavation and Management
- Chemical Control
- Post-Treatment Monitoring
- Completion Certificate
- Habitat Restoration
- LANTRA Certified Training in Biosecurity and Identification









Figure 1 New growth within JK01



Figure 2 Dead canes within JK01



Figure 3 One of the numerous Japanese Knotweed crowns within JK01



Figure 4 New growth of Japanese Knotweed within JK01 near the slope down towards the river

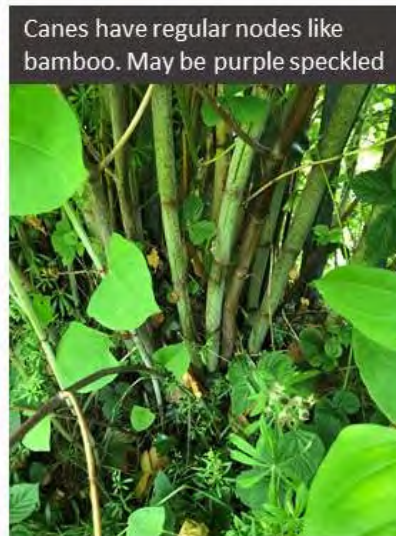




Figure 5 Himalayan balsam plants within HB01



JAPANESE KNOTWEED IDENTIFICATION SHEET



Himalayan Balsam Identification Sheet

