

**DixonBrosnan**  
environmental consultants

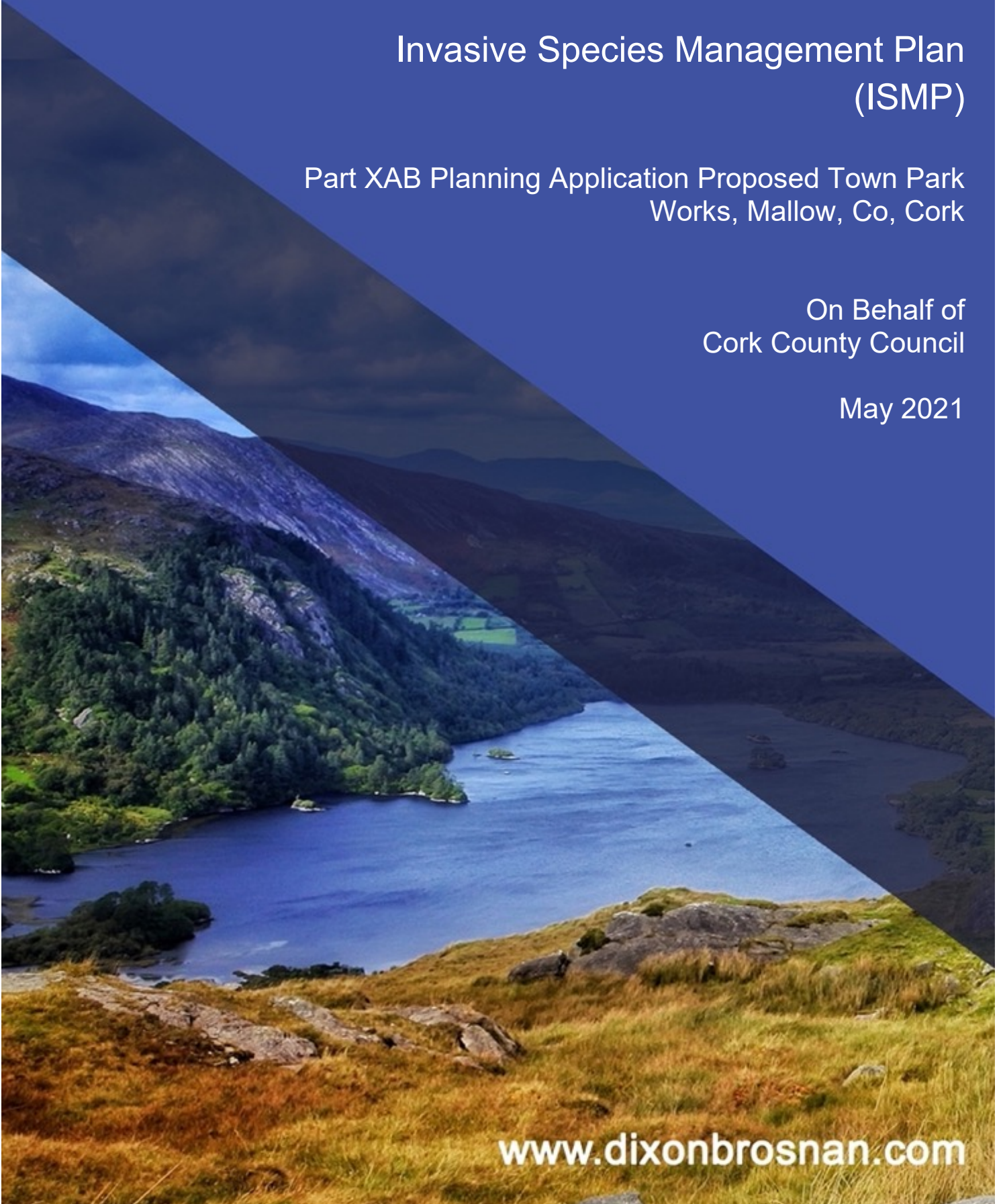
# Invasive Species Management Plan (ISMP)

Part XAB Planning Application Proposed Town Park  
Works, Mallow, Co, Cork

On Behalf of  
Cork County Council

May 2021

[www.dixonbrosnan.com](http://www.dixonbrosnan.com)



<b>Project</b>	<b>Invasive Species Management Plan for Part XAB Planning Application Proposed Town Park Works, Mallow, Co, Cork</b>	
Client	Cork County Council	
Project Ref.	2142	
Report No.	2142.03	
Client Ref.	-	
<b>Date</b>	<b>Revision</b>	<b>Prepared By</b>
18/05/21	Planning	Sorcha Sheehy BSc PhD
		Carl Dixon BSc MSc
DixonBrosnan Lios Ri Na hAoine, 1 Redemption Road, Cork. Tel 086 851 1437  <a href="mailto:carl@dixonbrosnan.com">carl@dixonbrosnan.com</a>   <a href="http://www.dixonbrosnan.com">www.dixonbrosnan.com</a>		
This report and its contents are copyright of DixonBrosnan. It may not be reproduced without permission. The report is to be used only for its intended purpose. The report is confidential to the client, and is personal and non-assignable. No liability is admitted to third parties. ©DixonBrosnan 2021.		

## 1. Introduction

The information in this report has been compiled by DixonBrosnan Environmental Consultants, on behalf of the applicant. It provides information on the control of invasive species during construction works.

Invasive plant species have been close to the construction works areas for the proposed improvement works at Mallow Town Park .

Two high-risk, non-native and invasive species Japanese Knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*) were recorded within the planning boundary. The medium impact listed species (NBDC) Old Man's Beard (*Clematis vitablia*) was also recorded.

This Invasive Species Management Plan (ISMP) describes the strategy that will be adopted during the construction and operation of the proposed development to manage the knotweed and other invasive species. This ISMP is a working document. Following the appointment of the contractor, and prior to commencing works on site, the ISMP will be further developed by the contractor.

The main objective of the ISMP is to control and prevent the spread of invasive species during the construction phase.

## 2. Methodology

This plan applies the most relevant and current guidance in relation to the treatment and management of invasive plant species in construction projects. The following guidance was referred to in preparation of this plan.

- NRA (2010) Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads. National Roads Authority, Dublin.
- IW-AMP-SOP-009 Information and Guidance Document on Japanese knotweed
- Asset Strategy and Sustainability and Invasive Species Ireland Best Practice Management Guidelines for Himalayan Balsam
- Chapter 7 and Appendix 3 of the TII Publication: *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA, 2010)
- *Best Practice Management Guidelines for Japanese Knotweed* (Invasive Species Ireland, 2015)
- *Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges* (National Parks and Wildlife Service 2008)

## 3. Legislation

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000, where it states that

*'Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, [refers only to exotic*

*species thereof’][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.’*

*The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed, as follows: “any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [...] shall be guilty of an offence.”*

Old Man’s Beard is not included in the Third Schedule. Therefore, its presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). However, the National Biodiversity Centre (NBDC) notes that under the right ecological conditions this species may have an impact on the conservation goals of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive (Directive 2000/60/EC). Old Man’s Beard is also included in the NRA *Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA 2010) as this species has been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and is likely to be encountered during road schemes.

#### **4. Invasive Species Within the Study Area**

The high risk invasive species Japanese Knotweed (*Fallopia japonica*) was recorded within riparian habitats at two locations (**Figure 1**). A drainage ditch downstream of the Spa Glen Stream is located to the east of the Mallow Bridge and drains into the River Blackwater. Small numbers of Japanese Knotweed plants, generally immature, were recorded both upstream and downstream of the footbridge over this drainage ditch. A dense stand of Japanese Knotweed was recorded on the bank of the Blackwater River at the proposed angling stand No. 4.

The medium impact listed species (NBDC) Old Man’s Beard (*Clematis vitiblia*) was also recorded within riparian vegetation along the Spa Glen Stream. This species is also listed in the NRA (2010) *Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*.

Japanese knotweed is a highly invasive, non-native species which was originally introduced as an ornamental plant but has since spread along transport routes and rivers to become a serious problem. From an ecological viewpoint it out-competes native species by forming dense stands which suppresses growth of other species. It grows extremely vigorously and can penetrate through small faults in tarmac and concrete and thus can damage footpaths, roads and flood defence structures. As it can survive in poor quality soils, including spoil, it often thrives in brownfield sites and in urban areas.

Himalayan balsam (*Impatiens glandulifera*) is an invasive terrestrial plant species that was first introduced in the UK in 1839 as an ornamental garden plant. Since it was introduced, it has spread to most parts of Ireland. Due to the nutrient poor soil and cold temperatures in its home range, the Himalayas, it has adapted to develop thousands of seeds, which are dispersed widely as the ripe seedpods shoot their seeds up to 7m (22ft) away. Due to our warmer climate and nutrient rich soils it has thrived here and became highly invasive. In Ireland, the plant is spread by two principal means; The most widespread distribution tends to be by human means where individuals pass on seed to friends or Once established in the catchment of a river the



The contractor will employ a suitably qualified ecologist to update the plan prior to the commencement of construction. The updated plan will contain the following:

- Site background including proposed works
- Extent of the Japanese Knotweed and Himalayan Balsam infestation
- Specific control plan to be put in place
- Site hygiene protocols
- Responsible individuals
- Follow up requirements
- Any other relevant information

### **5.1 Management Options for Japanese Knotweed**

There are a number of suitable management options to control and prevent the spread of Japanese Knotweed. The methodology outlined in this document will be updated, if required, based on an up to date survey of the contaminated area. The proposed management plan will be agreed with Cork County Council prior to the works being carried out. It should be noted that:

- Where any infested material (soil containing Japanese Knotweed) is to be taken off site, a licence to transport the material will be required from National Parks and Wildlife Service (NPWS).
- A landfill, which is licensed to accept such material, will be identified to dispose of the excavated material. The landfill site operator will be informed of what the material contains.
- Where herbicide treatment will be used, consideration will be given to the proximity of the herbicide treatment to watercourses and other vegetation.

For all management plans, site hygiene protocols will be implemented. These protocols will apply to sites which are infested with Knotweed and those where Knotweed is not growing to prevent contaminated material being brought to site. Site hygiene protocols are outlined in **Section 5.4** below.

### **5.2 Himalayan Balsam**

Any Himalayan Balsam within the works will be hand-pulled and bagged prior to the commencement or site works. It will be then placed in a designated area of the site to decay. The seeds are not particularly robust but may survive for 18 months so a two-year programme of control, which will extend beyond the construction period, will be required. All machinery leaving the site will be washed down in a designated wash down area in proximity to the site exit to prevent seeds from being spread outside the site boundary.

If and where contaminated soil or heaps of high-risk invasive species (i.e. Himalayan Balsam) are to be stockpiled, the area will be clearly marked out on site. These areas will preferably not be within 20m of any watercourse or flood zone.

### **5.3 Pre-Construction Survey**

Since invasive species spread quickly, prior to the commencement of treatment, a pre-construction survey will be undertaken to identify the extent of invasive species at that time. The survey will be undertaken by a suitably qualified ecologist. This information will be utilised to update the ISMP.

### **5.4 Site Hygiene at Contaminated Areas**

Construction equipment, vehicles and footwear may provide a vector for the spread of invasive species. Maintaining site hygiene at all times in an area affected by invasive species is essential to prevent further spread.

The following site hygiene measures will be implemented for the contaminated area:

- Understand the potential extent of the rhizome (root) system underground – up to seven metres horizontally and three metres vertically.
- Where possible, the contaminated area will be avoided and fenced off, or the extent of the rhizomes clearly marked.
- If possible, the use of machinery with tracks will be avoid contaminated areas. Movement of machinery between contaminated and non-contaminated areas must be controlled and adequate power washing measures implemented.
- Areas where contaminated soil is to be stockpiled on site will be clearly identified and marked out.
- Designated entry and exit points will be identified for personnel on foot and for small mobile equipment. A delineated access track, to be maintained free of Japanese Knotweed, will be established through the site to minimise the spread of Knotweed species by permitted vehicles accessing the site.
- Vehicles, including footwear and tools, leaving the site will be inspected for any plant material and washed down (using a pressure washer) in a dedicated vehicular wheel wash down facility, which will drain into a contained area within the site. Particular care is required with tracked machines.
- Vehicles used in the transport of contaminated material will be visually checked and washed down into a contained area before being used for any other work, either in the same area or on a different site.
- Only vehicles required for essential works including site investigation works will be brought on site and the number of visits minimised as much as practicable.
- Material gathered in the dedicated wash down contained areas will be appropriately disposed of off-site.

- For any subsoil or topsoil entering the site, the supplier will be required to provide an assurance that it is free of Japanese Knotweed.
- All site personnel will be made aware of measures to be taken and will be informed of the requirements of the ISMP.
- Site hygiene signage, in relation to the management of invasive species, will be erected.

## 6. Management Options

In addition to the possible advance treatment works and pre-construction survey, areas identified as requiring specific invasive species treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed scheme or beyond the land take.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below.

Those involved in the application of herbicides/pesticides will be competent to do so and, consequently, will have sufficient training, experience and knowledge in the area of herbicides/pesticides application.

All staff involved in the application of herbicides/pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

It is likely that chemical treatment, as described in **Section 6.1** will be the most suitable method for the identified invasive species.

### 6.1 Chemical Treatment

The control of Japanese Knotweed will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, it is essential that a competent and qualified person carries out the herbicide treatment. A qualified and experienced contractor will be employed to carry out all treatment work.

The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010)
- Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015)
- Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (National Parks and Wildlife Service 2008)



These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of an herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine.

If herbicide is applied as the treatment option, it may need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective.

Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical and will impact all plant species) whereas 2,4-D Amine can be persistent for up to one month, and can also be used near water but is more selective on certain plants. The selection of chemical by the contractor and supervising ecologist will depend on seasonal factors, site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient.

Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be included in the updated ISMP.

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. Foliar treatment is an efficient way to treat large monocultures of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese Knotweed.

In the case of Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system.

While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as Knotweed possesses many stomata openings on the leaf under surface. Dead stems can be cut, removed and burned on/off site in accordance with the relevant legislation.

The stem injection method is sometimes used for Japanese Knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule).

Subsequently approximately 10 mL of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate-based products by injection is most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow

up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

In order to ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 *Use of Herbicide Spray on Vegetated Road Verges* from the National Parks and Wildlife Service dealing with the application on to non-target areas.

## **6.2 Excavation and Chemical Treatment On-Site**

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species, in particular Knotweed, is required to be completed in a relatively short timeframe. Generally, digging up the rhizomes and re-cultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary, this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth. Storage of cut material should not take place within flood risk zone of a river. The cut material should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the relevant legislation. The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur, allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then to cultivate the ground to stimulate rhizomes to produce a higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site-specific management plan.

## **6.3 Excavation and burial**

Excavated material containing Knotweed can also be buried on site. This will require burying the material at a depth of at least five metres. The contaminated material must be covered with a root barrier membrane before being backfilled with topsoil, or other, suitable fill material. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. An accurate map and record of the location of the burial site, to prevent any future accidental disturbance, is required, and future owners must be informed of its position. If soil containing Japanese Knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. The area should be clearly fenced and marked with warning signs, and the stockpile should be regularly treated with herbicide to prevent any regrowth or re-infestation.

As a precaution, the stockpiled material should be laid on a root barrier membrane and covered to avoid contaminating the site further. The contractor must also comply with all waste legislation.

#### **6.4 Excavation and root barrier membrane**

Excavated material containing Knotweed can also be buried on site within a root barrier membrane cell. The procedure is similar to that described in **Section 6.3** above.

This method will require burying the material at a depth of at least two metres. The contaminated material must be placed in a contained cell formed by a root barrier membrane before being backfilled with topsoil, or other, suitable fill material. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. The method for stockpiling prior to burial would be as described as above. The contractor must also comply with all waste legislation.

#### **6.5 Excavation and bund method**

Where there is not sufficient depth on a site excavated material can be placed in a structured bund. The bund will comprise a raised area above ground level or a shallow excavation, no more than 0.5m deep, and lined with a root barrier membrane. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. This method of treatment can also be used where Knotweed material needs to be moved from a location and there is another area of the site available to contain it.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly marked by warning signs and protected from potential accidental damage. Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

The appointed contractor must comply with waste legislation if this method is to be considered.

## **6.6 Excavation and removal from site**

Where the above treatment options are not possible because the site is too small to contain excavated material, or too shallow for burial, or where there is a lack of space or where the infestation simply cannot be avoided by the construction works, removal of excavated material may be the only option. If any invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal will not lead to a risk of further spread. Where there are small amounts of Knotweed material to be removed it is possible to double bag the material and send to a licenced waste facility for disposal. Where the amount of material is larger in volume, it will be necessary to haul it from site to a suitably licenced waste facility.

Invasive species material, particularly roots, flower heads or seeds, must be disposed of at licensed waste facilities appropriately buried, or incinerated in compliance with the relevant legislation. Disposal must be carried out in accordance with the relevant waste management legislation. Invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. If the material has been treated with a persistent herbicide, the excavated material must be classified as hazardous waste and must be disposed of to a hazardous waste facility. Advice would need to be sought from a suitably qualified waste expert regarding the classification of the waste and the suitability of different disposal measures.

The movement of invasive plant material requires a licence from the NPWS under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

## **7. Preferred Treatment Option Advance Chemical Treatment and Continued Chemical Treatment of Regrowth**

The Knotweed within the proposed development boundary is located within an area zoned as Flood Zone A. As there is the potential for flooding to impact on the area currently contaminated with Knotweed species, there is the potential for fragments of Knotweed to be spread from the works area and inadvertently distributed off-site.

Having assessed the available management options and constraints associated with this particular site, it has been concluded that in-situ chemical treatment prior to construction, careful management of the works and continued in-situ chemical treatment post construction is the preferred option. This is primarily due to the following significant constraints.

The risk of fragments of Knotweed being spread outside of its current distribution is high as high flood levels could result in fragments of Knotweed, which are dislodged during site works, being carried downstream along the River Blackwater and thus impacts on off-site receptors could occur.

Given that flooding could impact on existing stands of Knotweed, large scale foliar spraying is not recommended and therefore only stem injection and spot treatment is practical as a first treatment method. For the re-growth material within the site or juvenile plants, a foliar spray application using a cowled knapsack sprayer will allow for efficient treatment when stems are too small and fragile to use stem injection.

Therefore, the following methodology is proposed:

1. Contractors will commence chemical treatment of the Knotweed species in this area, in order to avoid the continued spread of the species. The preferred method for initial treatment is stem injection and spot treatment. This will be carried out under the supervision of a qualified ecologist who will ensure that the correct methodology and appropriate site hygiene methods are utilised. This ISMP will be updated by the supervising ecologist if required. Early treatment will effectively reduce the length of time that chemical treatment will be required. It is noted that Knotweed can persist for long periods and the sooner treatment commences, the more rapidly this species will be eradicated from the works area.
2. Prior to the commencement of site works, the extent of contamination will be determined by site investigations including trial pits. This information will be used to determine the area of contamination taking into account that the roots of Knotweed can extend 7m from the parent plant. If it is determined by visual inspections/trial hole investigation that viable plants remain within the work area the spreading of this viable Knotweed plant material outside the current area of contamination is not permitted.
3. Following the above, the identified area of contamination will be clearly fenced and all works in relation to Knotweed will be carried out only within this fenced area.
4. Where possible, contaminated soil will remain on-site and be treated. The transport of any material that must be removed off site for disposal, as part of the construction works, will require a licence from the NPWS.
5. Any excavations that are carried out as part of the project, must be contained within this area and the spread of any fragments of viable plant material or contaminated soil outside of this area must be effectively prevented. All hygiene protocols as listed in this ISMP must be effectively implemented.
6. Any contaminated material including material from the wash down area must be contained within the identified and fenced contaminated area or removed to a suitably licenced facility offsite in line with standard hygiene measures.
7. Once works within the contaminated area is complete a follow-up programme of works will commence to treat any regrowth of Knotweed. This will consist of stem injection and spot treatment and it will continue until the supervising ecologist can certify that Knotweed has been effectively eradicated.
8. The application of herbicide (injection/spot treatment) must take into account the risk of flooding which must be assessed immediately prior to the use of herbicides. Treatment will not be carried out when heavy rain is forecast or in the winter period when there is a higher risk of flooding and adverse weather. It is noted that site hygiene is of particular importance in areas prone to flooding.

## 8. Old Man's Beard Management During Construction Phase

As noted in **Section 3** of this report, there is no statutory obligation to remove Old Man's Beard. However, should it be concluded that Old Man's Beard at the proposed development site should be removed, the following treatment methods are recommended.

Old Man's Beard is straightforward to control using a mixture of mechanical removal and herbicide treatment.

Old Man's Beard is easily spread by fragmentation. This plant recovers quickly from physical damage with the ability to re-sprout; and prolific seed production with wind dispersal. Site hygiene measures outlined in **Section 5.4** should be implemented where relevant.

As mature plants occur within the proposed works area, the preferred method of treatment is cutting back to a basal stump or grubbing out followed by chemical treatment. Herbicide applications will take into account sensitive receptors such as watercourses and locally important habitats such as woodland and must only be applied in line with manufacturers recommendations.

A number of chemicals have been used effectively against Old Man's Beard, including glyphosate, though control invariably takes more than one year (New Zealand Department of Conservation 2005). Control should be undertaken during active growth. For mature plants, the vines should be cut back to ground level or waist height in winter or spring and the subsequent re-growth can be then foliar sprayed. This method will avoid impacting on the host plant the vine may be covering.

For larger specimens, the plant can be cut at the base with a straight horizontal cut. Herbicide is then applied immediately to the wound with a paint brush, eye dropper or small squeeze bottle. On larger stems it is only necessary to wipe herbicide around the outer rim of the cut. The plants should be left in situ until they are dead. Where plants are not killed in a single application, wait until re-growth before re-spraying.

## 9. Conclusion

Japanese Knotweed and Himalayan Balsam are high risk invasive plant species and will be treated in accordance with this ISMP.

The primary concern is the presence of Knotweed species along the banks of the River Blackwater and the drainage ditch downstream of the Spa Glen Stream. In particular the presence of JKW at angling stand 4 may be problematic and detailed site investigations will be required to ensure the angling stand can be put in place without impacting on the root system.

Herbicide treatment of Knotweed via stem injection and spot treatment will commence as soon as practically possible under the supervision of a qualified ecologist. Site investigations will be carried out prior to the commencement of works to determine if Knotweed species are still present and the degree of contamination.

Any Himalayan Balsam within the works will be hand-pulled and bagged prior to the commencement of site works.

This information will be utilised to determine the extent of the contaminated area and will be utilised to update this ISMP. Detailed fencing and hygiene protocols will ensure that viable plant material will not be spread outside of its current distribution area. Following completion of works, monitoring and treatment protocols will be implemented to ensure any regrowth is effectively treated.

Old Man's Beard is considered a lower risk species and will be treated via cutting back to a basal stump or grubbing out followed by chemical treatment. Treatment will continue until the supervising ecologist certifies that this species has been effectively removed from the works area.

## References

Asset Strategy and Sustainability and Invasive Species Ireland Best Practice Management Guidelines for Himalayan Balsam

Invasive Species Ireland (2015) Best Practice Management Guidelines for Japanese Knotweed

IW-AMP-SOP-009 Information and Guidance Document on Japanese knotweed

National Parks and Wildlife Service (2008) Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges

National Roads Authority (2010) The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads

NRA, 2010 Chapter 7 and Appendix 3 of the TII Publication: *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*