

APPENDIX 6.2 - INVASIVE SPECIES MANAGEMENT PLAN (ISMP)

1 INTRODUCTION

This appendix is the Invasive Species Management Plan (ISMP) for proposed housing developments at Kishoge, Dublin, hereafter referred to as the proposed project.

The ISMP will be updated by South Dublin County Council (SDCC) (the Employer for the construction works) prior to the commencement of the construction stage, to ensure that any additional measures required pursuant to conditions attached to any decision to grant approval are included in the plan. SDCC set out the Employer's Requirements in the construction contracts including all applicable mitigation measures identified in the accompanying Biodiversity Chapter, as well as additional measures required pursuant to conditions attached to any decision to grant approval.

The ISMP comprises the construction mitigation measures, which are set out in the Biodiversity Chapter and will be updated to include any additional measures required pursuant to conditions attached to An Bord Pleanála's decision.

Following appointment, the contractor(s) will be required to develop more specific Method Statements and submit an updated ISMP that is cognisant of the proposed construction activities, equipment and plant usage and environmental monitoring plan for the proposed developments sites. The appointed contractor(s) may only propose modifications to the ISMP which will not give rise to any impacts which are more significant than those already identified and assessed in the Biodiversity Chapter.

All of the measures set out in this ISMP will be implemented in full by the appointed contractor(s) and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in the EclA.

1.1.1 Legislative Context

The European Union (Invasive Alien Species) Regulations 2024 (S.I No. 374/2024) contain specific provisions that govern control of listed invasive non-native species (INNS). It is an offence to release or allow to disperse or escape, to breed, propagate, import, transport, sell or advertise species listed on the First Schedule of the European Union (Invasive Alien Species) Regulations 2024 without a Licence.

The two regulations that deal specifically with this scheduled list of species are:

- Regulation 17 & 18: Prohibition of introduction, dispersal, retention, breeding, importing, exporting, dealing or release certain species within or throughout the nation

Following on from that, the following are strictly prohibited:

- Dumping invasive species cuttings anywhere other than in facilities licensed to accept them;
- Planting or otherwise causing to grow in the wild - hence the landowner (in respect of the proposed Project, this being SDCC and the appointed contractor) should be careful not to cause further spread;
- Disposing of invasive species at a landfill site without first informing the landfill site (that is licensed under Number 10 of 1996 - Waste Management Act, 1996 (as amended) (hereafter referred to as the Waste Management Act, as amended) to take such First Schedule material (plant or soil) that the waste contains invasive species material (this action requires an appropriate licence);
- Moving soil which contains First Schedule-specific non-native invasive species in the Republic of Ireland, unless under licence from the National Parks and Wildlife Service (NPWS) (this licence is separate from and does not discharge any person being in receipt of other necessary waste permits/ licences etc.); and
- Regulation (EU) No. 374/2024 of the European Parliament and of the Council on the prevention and management of the introduction and spread of invasive alien species (hereafter referred to as the IAS Regulation) lists specific Species of Union Concern, some of which overlap with the First Schedule species.

The IAS Regulation conveys the rules to prevent, minimise and mitigate the adverse impacts of the introduction and spread (both with and without intention) of IAS on biodiversity and the related ecosystem services, as well as other adverse impacts on human health or the economy. Target 6 of Ireland's fourth National Biodiversity Action Plan 2023-2030 (Department of Housing, Local Government and Heritage, 2024) requires efforts to

‘Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species’.

1.1.2 Limitations

It should be noted that any decision on efficacy of chemical treatments can only be provided by a registered pesticides advisor. A suitably-qualified specialist will be engaged by the appointed contractor to monitor the treatment of non-native invasive species. This ISMP shall be updated as necessary by the specialist.

2 METHODOLOGY

2.1 GUIDANCE

The mitigation measures for invasive non-native species will utilise the below best practice management guidance documents, where relevant:

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020a);
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020b);
- Invasive Species Ireland (ISI) - Best Practice Management Guidelines for Japanese Knotweed (ISI, 2008a);
- Managing Invasive Non-Native Plants in or near Freshwater (EA, 2010);
- The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010)
- Inland Fisheries Ireland - Biosecurity Protocol for Field Survey Work (IFI, 2010);
- Managing Invasive Non-Native Plants in or near Freshwater (EA, 2010);
- The Environment Agency (EA) Managing Japanese knotweed on development sites - the Knotweed Code of Practice (Version 3, amended in 2013, withdrawn from online publication in 2016) (EA 2013). (This document, although no longer supported by the EA, is nonetheless a practical document in determining the approach and control mechanisms for Japanese Knotweed).

It is recognised that other INNS, not listed in the First Schedule, can and do occur within the footprint of the proposed Project and the wider metropolitan surrounds of Dublin. These are not ordinarily dealt with in an ISMP, and there is separate legislation and guidance for the control of noxious weeds e.g., Noxious Weeds Act 1936 – No. 38 of 1936 and Noxious Weeds (Thistle, Ragwort and Dock) Order 1937 – S.I. No. 103 of 1937. Species such as Butterfly bush *Buddleia davidii* can quickly become established and spread in suitable urban areas, including gaps in the built environment such as the sides of old buildings, pavements, and on derelict ground. Where large populations occur, it may be a requirement of some local authorities within the Greater Dublin Area that they be managed to ensure no excessive spread e.g., South Dublin City Council. The implementation of the general measures provided within this document will minimise the risk of any spread of these species as a result of the construction of the proposed developments sites.

3 INVASIVE NON-NATIVE SPECIES RECORDED ON-SITE

3.1.1 Site 3

Table 3-1 below provides a list of invasive non-native species recorded during the invasive species surveys and incidentally during other summer-period surveys. It includes species, their level of impact, and whether they are listed the First and/or Second Schedule of S.I. No. 374/2024 - European Union (Invasive Alien Species) Regulations 2024. The locations of these invasive species within 3 are displayed in Figure 3-1.

Table 3-1: INNS recorded within or adjacent to Site 3's development's boundary

Invasive Non-Native Species	Impact	S.I. No. 374/2024
Brown Rat <i>Rattus norvegicus</i>	High	Yes (islands only)
Butterfly-bush <i>Buddleja davidii</i>	Medium	No

European Rabbit <i>Oryctolagus cuniculus</i>	Medium	No
Greater White Toothed Shrew <i>Crocidura russula</i>	Medium	No
Japanese Knotweed <i>Fallopia japonica</i>	High	Yes
Winter Heliotrope <i>Petasites pyrenaicus</i>	Low	No

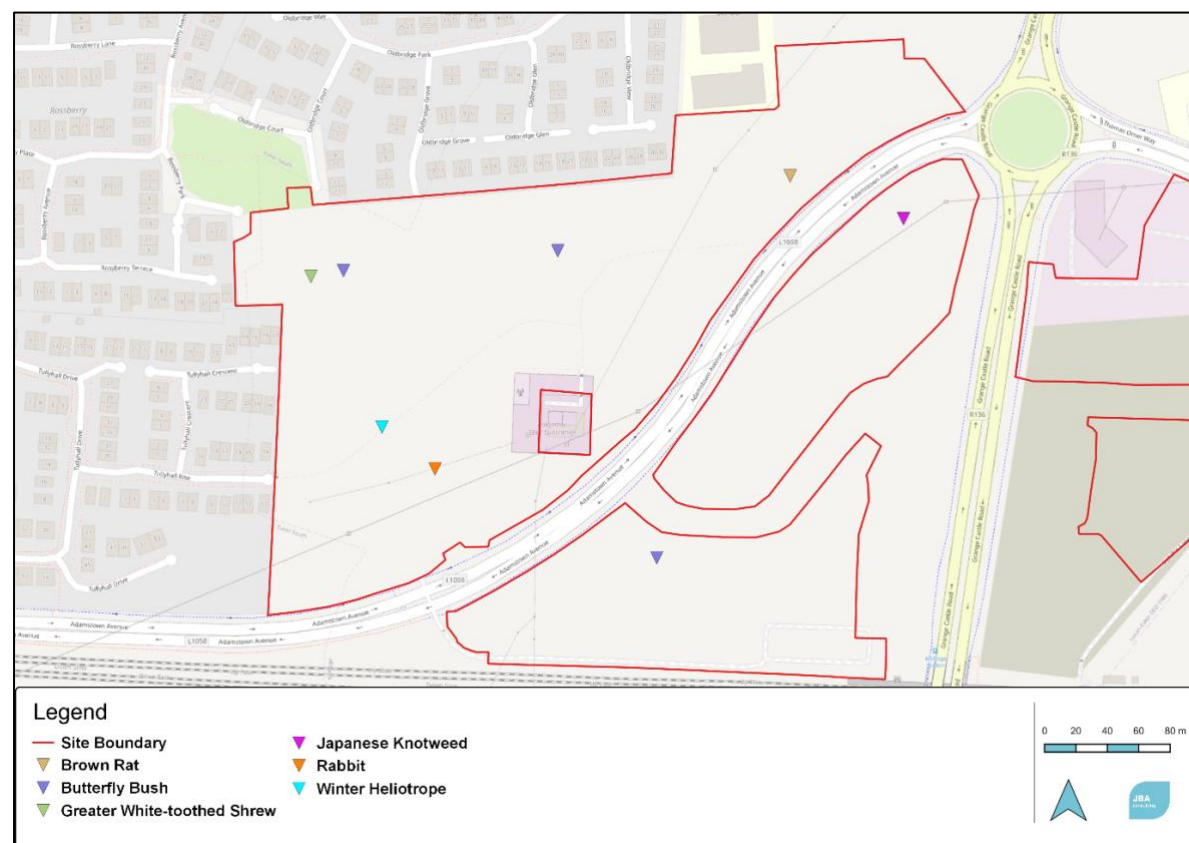


Figure 3-1: Invasive species recorded within Site 3

3.1.2 Site 4

Table 3-2 below provides a list of invasive non-native species recorded during the ecological surveys within Site 4. It includes species, their level of impact, and whether they are listed on the First and/or Second Schedule of S.I. No. 374/2024 - European Union (Invasive Alien Species) Regulations 2024. The locations of these invasive species are displayed in Figure 3-2.

Table 3-2: INNS recorded within or adjacent to Site 4's development's boundary

Invasive Non-Native Species	Impact	S.I. No. 374/2024
Butterfly-bush <i>Buddleja davidii</i>	Medium	No
Cherry Laurel <i>Prunus laurocerasus</i>	High	No
Cotoneaster spp.	Medium	No
Eastern Grey Squirrel <i>Sciurus carolinensis</i>	High	Yes
European Rabbit <i>Oryctolagus cuniculus</i>	Medium	No
Japanese Knotweed <i>Reynoutria japonica</i>	High	Yes
Snowberry <i>Symphoricarpos albus</i>	Low	No

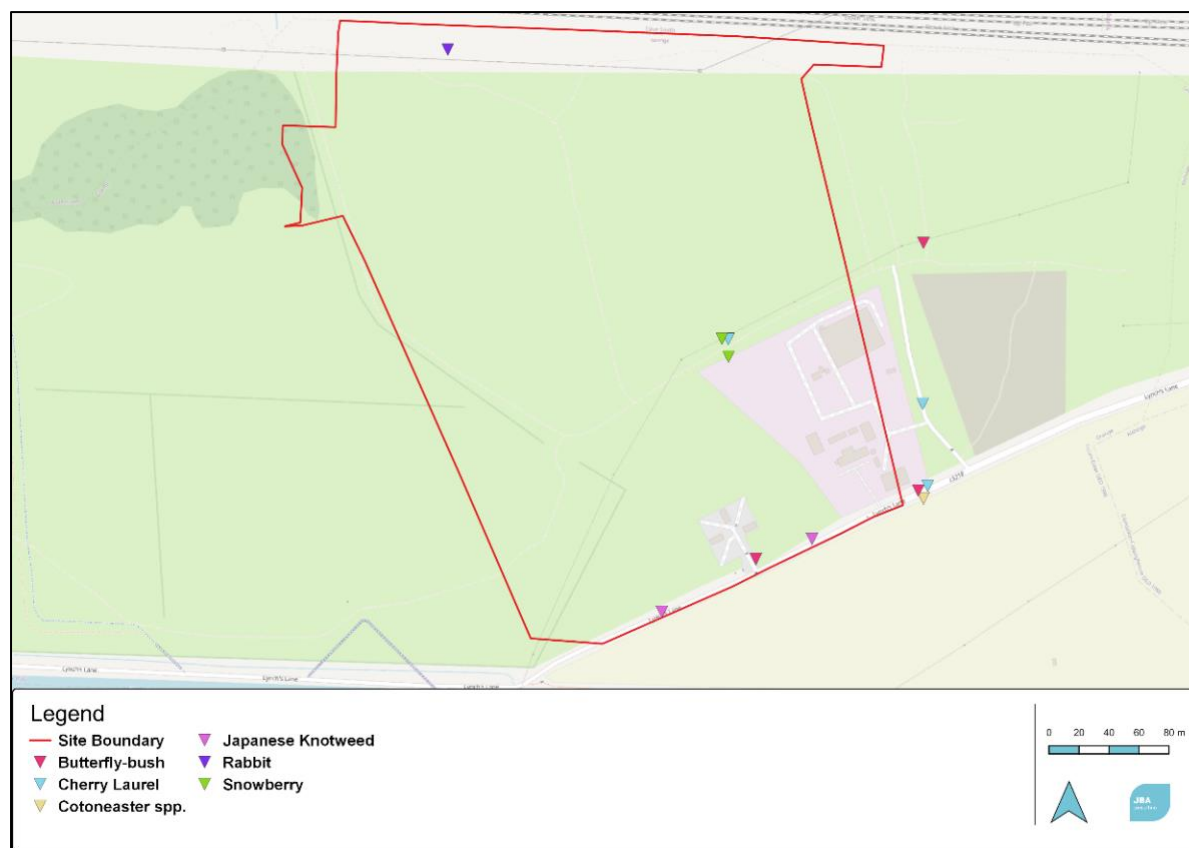


Figure 3-2: Invasive species recorded within and adjacent to Site 4

3.1.3 Site 5

Table 3-3 below provides a list of invasive non-native species recorded during the ecological surveys at Site 5. It includes species, their level of impact, and whether they are listed on the First and/or Second Schedule of S.I. No. 374/2024 - European Union (Invasive Alien Species) Regulations 2024. The locations of these invasive species within Site 5 are displayed in Figure 3-3.

Table 3-3: INNS recorded within or adjacent to Site 5's development's boundary

Invasive Non-native Species	Impact	S.I. No. 374/2024
European Rabbit <i>Oryctolagus cuniculus</i>	Medium	No
Butterfly-bush <i>Buddleja davidii</i>	Medium	No

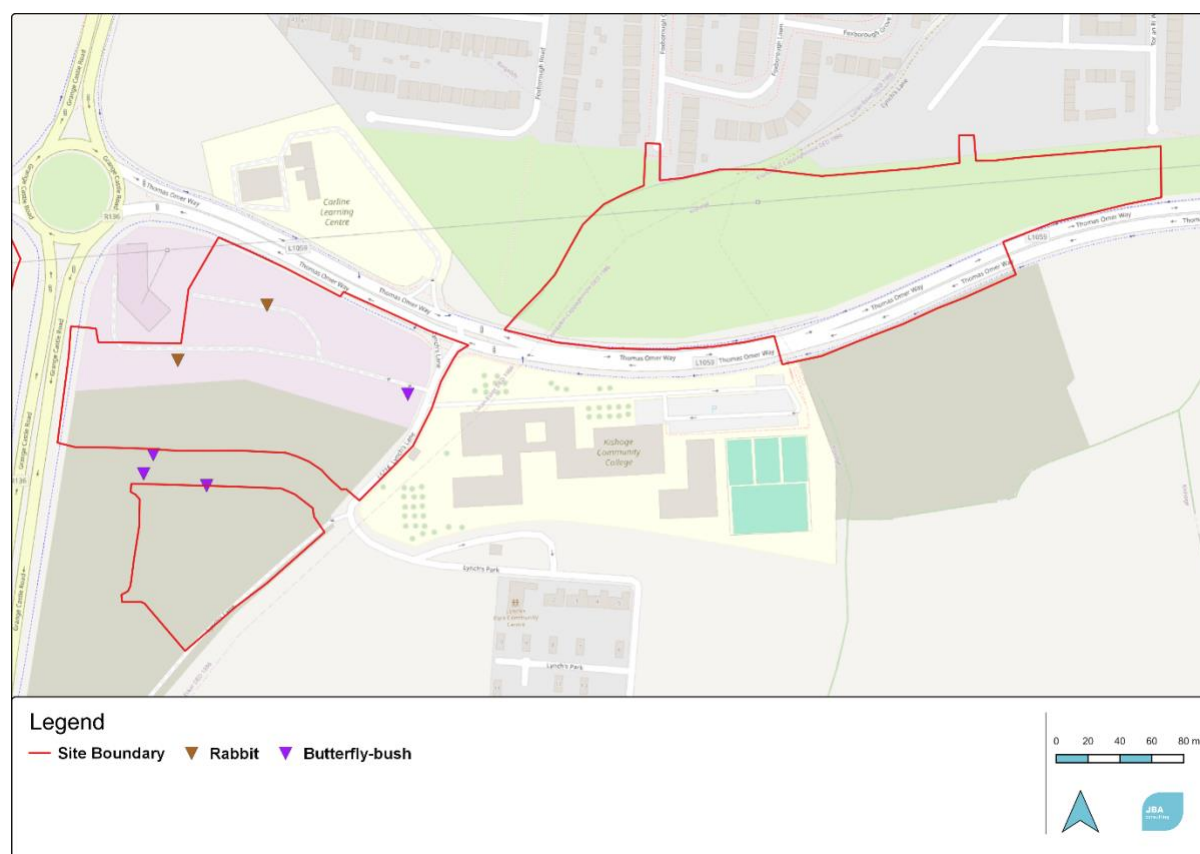


Figure 3-3: Invasive species recorded within and adjacent to Site 5

4 GENERAL MEASURES TO CONTROL AND PREVENT THE SPREAD OF INNS

4.1 PRE-CONSTRUCTION SURVEY

An updated invasive species baseline survey shall be conducted prior to the commencement of the proposed project's enabling works. This updated baseline is required as invasive species may have continued to spread within and adjacent to the proposed development sites since the last invasive species or habitat survey was conducted on-site.

As per TII guidance (TII, 2020a), this additional invasive species survey will include detailed maps of the precise location of each individual invasive species plant, as well as photos of these specific locations.

During the interim between the original invasive species surveys and the commencement of construction, it is possible that the existing stands of First Schedule invasive species may have expanded (if unmanaged) or decreased (if there is an active management regime in place), or that newly established First Schedule non-native invasive species may have become established within the footprint of the proposed development sites. A confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist, arranged by the principle contractor, to confirm the absence, presence and / or extent of all First Schedule invasive species within the footprint of the proposed development sites. Where an infestation is confirmed / identified within the footprint of the proposed development sites, this will require the implementation of the final ISMP.

4.2 FINAL INVASIVE SPECIES MANAGEMENT PLAN

Following appointment, the contractor(s) will be required to develop more specific Method Statements and submit an updated ISMP that is cognisant of the proposed construction activities, equipment and plant usage and environmental monitoring plan for the proposed development sites. The updated ISMP is referred to as the 'final ISMP' in this document. The contractor(s) may only propose modifications to the ISMP which will not give rise to any impacts which are more significant than those already identified within the Biodiversity Chapter.

All of the measures set out in this ISMP will be implemented in full by the appointed contractor(s) and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in the Biodiversity Chapter.

The ISMP will be updated following the pre-construction invasive species survey to detail the exact measures for any invasive species population present within the footprint of the proposed development sites. Depending on the extent and nature of the works, a number of approaches / treatments may be approved, all following the measures in the ISMP.

All control measures specified in the final ISMP shall be implemented by a suitably qualified and licenced specialist prior to the construction stage of the three proposed development sites to control the spread of any newly established INNS within the footprint of the proposed development sites. Furthermore, the contractor(s) will adhere to control measures specified within the final ISMP throughout the construction stage of the proposed development sites. The site will be monitored by the appointed contractor after control measures have been implemented. Any re-growth will be subsequently treated by the contractor. All measures that are prescribed in the final ISMP shall be equally applicable to advance works as to construction works. The contractor will be required to update the Final ISMP with a detailed Monitoring Plan and Programme which will require approval by NPWS.

4.3 GENERAL INNS SPREAD PREVENTION MEASURES

The unintentional spread of INNS during construction works (within the proposed developments sites, originating from outside the proposed developments sites, such as through the importation of materials, poor biosecurity practices regarding plant and machinery or natural processes) can be a significant issue, and if not managed properly, can result in the spread of INNS to non-infested areas (within or adjacent to works areas). This will potentially increase the future cost and effort required to control the species and has the potential to pose further public health and safety risks (e.g. Japanese Knotweed can cause damage to weaknesses in built environment).

Listed below is a brief detailing of necessary measures to be undertaken to ensure biosecurity within this section of the proposed developments sites, all of which will need to be included within the proposed developments sites ISMP:

- The adherence to a set of biosecurity measures, including:
 - the fencing off / demarcating of the individual invasive species;
 - identifying dedicated access points into and out of fenced-off areas;
 - the installation of designated decontamination facilities (where appropriate);
 - protocols around the removal of contaminated soils; and
 - seed and fragment checks on boot, tyres and tracks entering and leaving the work site.
- Best practice measures for the treatment of soils contaminated with invasive species (including potential seeds and fragments of mature plants) to prevent the accidental spread of INNS;
- As required by law, licences for the disposal of contaminated materials will be obtained, as well as the utilisation of licensed facilities;
- In regard to the importation of soil and other materials, the principal contractor will only utilise traceable topsoil for landscaping that has been cleared of any invasive species material;
- Measures to be implemented during the application of herbicides – Commitment to the appointment of a suitably qualified/registered/licensed pesticides advisor for any works requiring the use of pesticides, and safety precautions for consideration in the use of pesticides near watercourses; and
- Areas which contained invasives species, where invasives were treated on-site or removed, prior to the enabling and construction works will require an on-going post-construction monitoring programme to ensure that there is no reestablishment of any invasive species within these areas. The appointed INNS contractor will provide this detailed Monitoring Plan and Programme within the final ISMP.

4.4 BIOSECURITY

Unwashed construction equipment, plant and vehicles, and footwear can provide a vector for the spread of non-native invasive species within the proposed project and from areas outside the project where INNS are present or where vector material potentially containing seed / root material is attached to plant or personnel. The following hygiene measures shall be undertaken for the proposed development sites:

- Known or potentially infested areas within the working area of the proposed development sites shall be clearly demarcated and fenced off in advance of works and access restricted until such time that treatment has commenced and / or construction works are monitored in accordance with the ISMP in the area. In relation to Japanese Knotweed, the guidance recommends an exclusion buffer of 7m (metres) in all directions (within the works area and 3m vertically underground);
- The implementation of clear signage in accordance with TII IAPS standards will be erected at compounds, and at the boundary of the exclusion fencing. These signs will be briefed out at toolbox talks specific to each INNS to personnel on site;
- Identify and create access points into exclusion areas for INNS. These are only to be used by specialist personnel for the removal of INNS and are not to be used by general site workers until such a time as all contaminated material has been removed from site and it is safe to enter;
- Where it is practicable, a wheel wash and footwear washing facilities will be provided to ensure biosecurity measure are preventing the further potential spread of INNS. These locations are to be provided by the contractor. Where a dedicated / bespoke wheel wash cannot be installed owing to space limitations, the appointed contractor will ensure that no excavated loose material is allowed off site from within an exclusion zone;
- Where plant that is used to excavate soils, it shall be visually checked for loose soil before movement to another part of site (where possible, the movements of tracked machinery will be restricted within the invasive species exclusion zone). Loose soil shall be scraped off and disposed of, and a solution of Virkon® (or similar approved disinfectant) applied to machinery to ensure that no obscured seed / root material remains viable. Vehicular movements within the exclusion area shall be minimised as far as is practical;
- Unless in the exceptional circumstance that direction is given from a suitably qualified ecologist, no storage of contaminated soil on site. Instead, being disposed of in a licenced soil waste facility; and
- Where there are small volumes (e.g. volumes capable of being double bagged in quarantine bags such as cut plants, bulbs or loose soil occur), it may be practical to bag the material and bring it to a clearly demarcated and dedicated quarantine area within the construction compounds until such time that the material is disposed of to an authorised facility, similar to the process of disposing of bulk excavated contaminated soil.

4.5 SOIL EXCAVATION

No excavation or removal of soil within areas demarcated as having INNS present is to be permitted unless under strict supervision by a suitably qualified ecologist or INNS specialist. Buffer zones to be installed by the contractor(s) will be advised by a suitably qualified ecologist or INNS specialist and strictly adhered to. Guidance regarding Japanese Knotweed recommends a buffer of 7m from the plant due to its expansive rhizomes.

Where mechanical means of removal are required to dispose of INNS (treated or un-treated by chemicals) a suitably qualified ecologist or INNS specialist will be present to supervise and provide support to the contractor(s) for the duration of the operation.

There will be no temporary storage on-site of bulk excavated contaminated material. Where the final ISMP calls for shallow / deep burial, this material shall be removed from the excavated area and transported immediately to approved receptor area on-site. Furthermore, the temporary storage of non-contaminated material will not occur within a European or National designated site nor within 20m of any watercourse / wetland and any land within an identified flood zone.

Plant and machinery used in the control, excavation and transport of contaminated material shall also be subject to the recommendations described in the above Biosecurity sub-section. The installation of industry-rated invasive species-proof membrane before infilling construction of road / paths surface may be required. All waste

arising out of this process which has been in contact with the excavated ground shall be treated as contaminated waste and disposed of at a facility that is authorised to accept such waste.

Where the movement of any First Schedule invasive species is required off site, a licence will be required from NPWS in advance of any movement to a site / facility licensed to accept such waste, as per the Birds and Natural Habitats Regulation. This licence is separate to and does not negate the need for licences / permits / authorisations required under waste legislation.

4.6 DISPOSAL OF MATERIALS

Where any INNS related material is collected and is required to be disposed of, it is essential to dispose of said material in a manner that does not afford it the potential to spread further either within the proposed development sites, or in the nearby vicinity.

The movement of invasive plant material off-site, requires a licence from the NPWS, as per the Birds and Natural Habitats Regulations. Invasive species (particularly roots, flower heads or seeds) must be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation (e.g. Waste Management Act, as amended, Section 4 of Number 6 of 1987 – Air Pollution Act, 1987, relevant local authority bylaws and any other relevant legislation). All disposals must be carried out in accordance with the relevant waste management legislation, Guidelines for the Management of Waste from National Road Construction Projects (TII, 2017).

It is important to note that some invasive species plant material or soil (vector material) containing residual herbicides may be classified as either ‘hazardous waste’ or ‘non-hazardous waste’ under the terms of the Waste Management Act, as amended, and both categories may require special disposal procedures or permissions. Advice will be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures.

4.7 MEASURES TO BE IMPLEMENTED DURING THE APPLICATION OF HERBICIDES

If the application of herbicides is the expert advice given and then implemented during the lifespan of the proposed developments sites then a suitably qualified pesticides advisor, registered with the Department of Agriculture, Food and the Marine must be employed.

The appointed contractor is required to refer to the appropriate guidance documents, including but not limited to those listed at the beginning of this ISMP sub-section, which provide detailed recommendations for the control of invasive species and noxious weeds. The appointed contractor (or specialist license holder) will update the final ISMP in accordance with current and relevant guidelines before commencing works; and

It is important to note that where a chemical treatment is to be used, there is a risk of contaminating a watercourse. The choice of herbicide is typically limited to formulations of Glyphosate or 2,4-D amine that are approved for use near water. Full details of any chemical used, where required and as advised by a registered pesticides advisor, will be included in the final ISMP prepared in advance of construction of the proposed developments sites.

4.8 POST-CONSTRUCTION MONITORING

Following the construction of the proposed developments sites, there may be ongoing treatment programmes which extend for a number of years (length of programme is dependent on the effectiveness of treatment) into the operational stage. In the operational stage, the management of the infrastructure will be the responsibility of the local authority and the control of invasive species will be as per their plans and procedures, and responsibilities under The Birds and Natural Habitats Regulations.

The above measures are important for all First Schedule non-native invasive species, and in particular Japanese Knotweed, where it occurs, as maintenance works associated with landscaping, such as mowing and hedge cutting have the potential to spread this plant via the dispersal of very small amounts of shredded plant material. If invasive plants are found, then they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

The appointed INNS contractor will provide a detailed post-construction section within the Monitoring Plan and Programme within the final ISMP.

4.9 ASSESSMENT OF MANAGEMENT OPTIONS FOR FIRST SCHEDULE INVASIVES SPECIES

The general measures included in the sections above are required to ensure good on-site practices in respect of known or potential First Schedule invasive species as per Regulations 2024 [S.I. 374/2024]. The following sections further identify practical management controls. It is acknowledged that more than one potential control measure exists and that a single or combination of measures may be required.

The recommendations presented in this ISMP provide the minimum requirements for the likely control measures and the measures outlined in this ISMP shall be developed (with further detail on methodology used at each location, timing, practical management etc.) by the appointed contractor(s) (or the specialist as appropriate) by way of producing and implementing the final ISMP.

The use of chemical treatments is recognised as a potential treatment option. However, the services of a registered herbicide advisor must be employed in the specifying of named chemicals including those rated for use adjacent to aquatic environments where required, treatment type, dosage, and timing etc., and / or use of pesticides in the management of potential First Schedule invasive species within the proposed development sites.

4.10 SELECTED MANAGEMENT CONTROLS

The selected management control to be defined for each invasive species stand within the three proposed developments sites will depend on:

- Results of the pre-construction survey;
- Construction requirements – timing of works at specific locations, level of infestation and practical considerations such as reducing disturbance to road users / homeowners; and
- Feasibility of control measure, where possible the most practicable method (with regards to the environmental impact and human health) will be used e.g.; if mechanical methods of removal are not feasible due to access. Then a step back and assess approach will be employed to remove INNS.

The ISMP, which will be updated (in the form of the final ISMP) following on from the pre-construction surveys, may require the utilisation of a number of controls that are described below.

The Site-specific Mitigation sub-section provide the specific invasive species mitigation measures required for the invasive species within and immediately adjacent to Sites 3, 4 and 5.

5 SPECIFIC SITE 3 INVASIVES MITIGATION

5.1 JAPANESE KNOTWEED

Japanese Knotweed is a high impact non-native invasive species that is particularly effective at colonising disturbed ground (e.g. construction sites) and can spread by the re-growth of cut fragments or root material. Therefore, if it is broken up during site clearance or other earthworks, it can readily re-grow in new areas to which contaminated soil is moved. Japanese Knotweed reproduces asexually (in Ireland insofar as only female plants have been recorded) and regrowth can occur from plant material weighing as little as 0.7g (grams) of viable material. It is acknowledged to be very difficult to effectively control and even more difficult to fully eradicate.

Given the nature of Japanese Knotweed, chemical treatments are often preferred over physical methods as they can, if implemented properly, reduce the disturbance of the plant / population, thus reducing the chances of its spread. If herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective or monitored for a minimum of two years during which no regrowth is recorded. However, physical removal may be necessitated when timely interventions are required.

Table 5-1 assessed the potential management methods for Japanese Knotweed with colour coding of the potential to implement on the proposed project. The methods to be used will be fully detailed in the principle contractor's ISMP after the recommended pre-construction survey of Site 3 has been undertaken.

Table 5-1: Assessment of Management Methods for Japanese Knotweed

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Developments sites
Physical	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. In addition to waste permits / authorizations, a wildlife licence issued by NPWS is required for the transport of First Schedule non-native invasive species offsite. Depending on the nature of the excavation the proximity of services etc, the use of root barrier membrane may be required.	Likely – given the nature of the development sites, there may be a need to excavate soil and plant material to enable construction works to go ahead in timely manner.
	Dig and dispose onsite. - Shallow burial - Deep burial	Wildlife licence from NPWS is not ordinarily required if the burial of collected material is proposed for within the consented proposed project. Shallow burial in a constructed pit such as a dedicated sealed cell within a constructed berm will allow for periodic monitoring and of easy chemical treatment of any regrowth. Deep burial entails a dedicated sealed cell within a constructed excavation, that is at least 2m below the surface of the ground. The landscaping regime will not specify trees or scrub to be planted above. Either shallow or deep options may require the use of root barrier membrane. The use of chemical pretreatment of deep / shallow cells may also be required	Unlikely – given the lack of suitable lands within the largely developed metropolitan area.
	Screen on site – remove fragments offsite and reuse soil.	A control option that can be used to reduce the volume of soil / sediment to be moved elsewhere for burial, this option requires suitable plant, adequate space and volumes of soil to make the operation at a location cost effective. This option often requires the use of root barrier membrane owing to reuse of screened soil. The use of chemical pretreatment of deep / shallow cells may also be required.	Possible but unlikely given the space requirements for a screener (unless a bespoke small-scale screener is available).
	Cutting and / or strimming	Not recommended and does not apparently diminish vigour of plants over time. Largely cosmetic and can result in considerable spread of viable vegetative material that can readily regenerate on suitable conditions.	Not Recommended
Chemical	Spot	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water will be rated for use near aquatic locations.	Chemical treatments are often a preferred option for treating Japanese Knotweed, but the process can take between 3 to 5 years before eradication can be guaranteed and requires at least 2-year post implementation monitoring. However, given the nature of the
	Spray / Stem injections	Used for isolated plants or large populations using knapsack or weep sprayers. In accessible areas including along riverbanks, lance sprayers can be used. Chemical treatments for infestations near water will be rated for use at or near aquatic locations. Can result in chemical drift.	

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Developments sites
		Stem Injection is considered very effective, if the injection is timed appropriately for growth phase. However, it is labour-intensive (sometimes) requiring some cutting and is usually only carried out on small / isolated populations. Chemical treatments for infestations near water will be rated for use at or near aquatic locations.	proposed Site 3 development, the use of chemical treatment alone is unlikely to be adequate unless treatment regime begins a number of years before construction commencement.

5.1.1 Root Barrier Membrane

Following the excavation of Japanese Knotweed, there may be a need to install a root barrier membrane. These are specialised products that can provide protection to structures / services etc. from regrowth from within or outside a site, if suitably rated and properly installed. Thereafter, any small adjacent infestation can be more readily treated with chemical treatment for example. This durable material can be used to line spoil pits and prevent rhizome lateral root spread or effective growth in the plant and can keep it contained to an area where suitable chemical treatment can be undertaken.

5.1.2 Reseeding Following Eradication

This is not strictly a control method. However, where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post-control management of affected sites. A grass sward established in autumn will compete with germinating Japanese Knotweed seedlings in the following spring.

5.2 NON-SCHEDULED INVASIVE SPECIES

5.2.1 Montbretia

Montbretia can be controlled following the guidelines outlined in NRA (2010) whereby mechanical chemical methods can be employed to remove Montbretia. For physical control, hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedlings, in addition to the requirement to effectively remove all the rhizomes or corms that would otherwise allow the plant to regenerate. For larger stands, mechanical excavation/ cutting may be employed. The optimum time to remove Montbretia is just before the full flowering occurrence in summer, with regular monitoring for at least subsequent years.

5.2.2 Winter Heliotrope

As with other plants that have the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Winter Heliotrope can be treated using a Glyphosate-based weedkiller or may be excavated and buried on site. Herbicide is best applied in mid to late summer (NRA, 2010) before foliage dies back. Methods of foliar spray, wiper applicator, or spot treatment may be employed. The treated area should be monitored for regrowth in subsequent years.

5.2.3 Butterfly-bush

Butterfly-bush was recorded within Site 3, this invasive species may also be mechanically removed from the site prior to clearance of the site. This species can spread via construction vehicles and activities, removal of this species prior to the clearance will limit the spread of this species within the site and externally. An ECoW will be required to identify the plants of Butterfly-bush within the site and direct those who will remove it to ensure that all the Butterfly-bush within the site is removed.

6 SPECIFIC SITE 4 INAVISE MITIGATIONS

6.1.1 Japanese Knotweed

Japanese Knotweed can spread by the re-growth of cut fragments or root material. Therefore, if it is broken up during site clearance or other earthworks, it can readily re-grow in new areas to which contaminated soil is moved. Given the nature of Japanese Knotweed, chemical treatments are often preferred over physical methods as they can, if implemented properly, reduce the disturbance of the plant / population, thus reducing the chances of its spread. If herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective or monitored for a minimum of two years during which no regrowth is recorded. However, physical removal may be necessitated when timely interventions are required.

Table 5-1 assessed the potential management methods for Japanese Knotweed with colour coding of the potential to implement on the proposed project. The methods to be used will be fully detailed in the principle contractor ISMP after the recommended pre-construction survey of Site 4 has been undertaken.

Table 6-1: Assessment of Management Methods for Japanese Knotweed

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Developments sites
Physical	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. In addition to waste permits / authorizations, a wildlife licence issued by NPWS is required for the transport of First Schedule non-native invasive species offsite. Depending on the nature of the excavation the proximity of services etc, the use of root barrier membrane may be required.	Likely – given the nature of the developments sites, there may be a need to excavate soil and plant material to enable construction works to go ahead in timely manner.
	Dig and dispose onsite. - Shallow burial - Deep burial	Wildlife licence from NPWS is not ordinarily required if the burial of collected material is proposed for within the consented proposed project. Shallow burial in a constructed pit such as a dedicated sealed cell within a constructed berm will allow for periodic monitoring and of easy chemical treatment of any regrowth. Deep burial entails a dedicated sealed cell within a constructed excavation, that is at least 2m below the surface of the ground. The landscaping regime will not specify trees or scrub to be planted above. Either shallow or deep options may require the use of root barrier membrane. The use of chemical pretreatment of deep / shallow cells may also be required	Unlikely – given the lack of suitable lands within the largely developed metropolitan area.
	Screen on site – remove fragments offsite and reuse soil.	A control option that can be used to reduce the volume of soil / sediment to be moved elsewhere for burial, this option requires suitable plant, adequate space and volumes of soil to make the operation at a location cost effective. This option often requires the use of root barrier membrane owing to reuse of screened soil. The use of chemical pre-treatment of deep / shallow cells may also be required.	Possible but unlikely given the space requirements for a screener (unless a bespoke small-scale screener is available).

Approach	Treatment Options	Comment	Potential for Implementation on the proposed Developments sites
	Cutting and / or strimming	Not recommended and does not apparently diminish vigour of plants over time. Largely cosmetic and can result in considerable spread of viable vegetative material that can readily regenerate on suitable conditions.	Not Recommended
Chemical	Spot	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water will be rated for use near aquatic locations.	Chemical treatments are often a preferred option for treating Japanese Knotweed, but the process can take between 3 to 5 years before eradication can be guaranteed and requires at least 2-year post implementation monitoring. However, given the nature of the proposed Site 4 development, the use of chemical treatment alone is unlikely to be adequate unless treatment regime begins a number of years before construction commencement.
	Spray / Stem injections	Used for isolated plants or large populations using knapsack or weep sprayers. In accessible areas including along riverbanks, lance sprayers can be used. Chemical treatments for infestations near water will be rated for use at or near aquatic locations. Can result in chemical drift. Stem Injection is considered very effective, if the injection is timed appropriately for growth phase. However, it is labour-intensive (sometimes) requiring some cutting and is usually only carried out on small / isolated populations. Chemical treatments for infestations near water will be rated for use at or near aquatic locations.	

6.1.2 Root Barrier Membrane

Following the excavation of Japanese Knotweed, there may be a need to install a root barrier membrane. These are specialised products that can provide protection to structures / services etc. from regrowth from within or outside a site, if suitably rated and properly installed. Thereafter, any small adjacent infestation can be more readily treated with chemical treatment for example. This durable material can be used to line spoil pits and prevent rhizome lateral root spread or effective growth in the plant and can keep it contained to an area where suitable chemical treatment can be undertaken.

6.1.3 Reseeding Following Eradication

Where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post-control management of affected sites. A grass sward established in autumn will compete with germinating Japanese knotweed seedlings in the following spring.

6.2 NON-SCHEDULED INVASIVE SPECIES

6.2.1 Snowberry

Snowberry, being a low-impact invasive species, lacks any species-specific guidelines for management and control. The management of Snowberry within the site should follow the guidelines of Butterfly-bush outlined in NRA (2010). Under these management guidelines, physical control, hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedlings (NRA, 2010). For larger stands, mechanical excavation/ cutting may be employed. Deadhead specimens should be handled with great care as seeds can rapidly germinate and grow in different habitats.

6.2.2 Butterfly-bush

For physical control, hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedlings (NRA, 2010). For larger stands, mechanical

excavation/ cutting may be employed. Deadhead specimens will be handled with great care as seeds can rapidly germinate and grow in different habitats.

7 SPECIFIC SITE 5 INVASIVE MITIGATIONS

7.1 NON-SCHEDULED INVASIVE SPECIES

7.1.1 Butterfly-bush

For physical control, hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedlings (NRA, 2010). For larger stands, mechanical excavation/ cutting may be employed. Deadhead specimens should be handled with great care as seeds can rapidly germinate and grow in different habitats.

8 MONITORING

A qualified invasive species specialist shall be engaged to verify if the invasive species recorded in this report are still present following construction works. This will be carried out for five years (minimum) post-construction and a copy of any records of the invasive flora shall be lodged with the NBDC, NPWS and SDCC. If invasive floral species are recorded, they shall be treated as per the measures outlined in the ISMP and any species-specific guidelines.

REFERENCES

- EA, 2010. Managing Invasive Non-Native Plants in or near Freshwater. Environmental Agency
- EA, 2013. *The Environment Agency (EA) Managing Japanese knotweed on development sites - the Knotweed Code of Practice* (Version 3)
- IFI, 2010. Inland Fisheries Ireland - Biosecurity Protocol for Field Survey Work. Inland Fisheries Ireland
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- NRA, 2010. The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority
- TII, 2017. Guidelines for the Management of Waste from National Road Construction Projects. Transport Infrastructure Ireland
- TII, 2020a. The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. Transport Infrastructure Ireland
- TII, 2020b. The Management of Invasive Alien Plant Species on National Roads – Standard. Transport Infrastructure Ireland