Cork
County Council
Comhairle Contae Chorcaí

SOCIAL HOUSING DEVELOPMENT, BARRACK RD., BANTRY, CO. CORK

INVASIVE ALIEN PLANT SPECIES (IAPS) SPECIALIST SURVEY REPORT

O'DONOVAN AGRI GROUP
Ballincollig Commercial Park,
Ballincollig, Co. Cork.
Tel: 021 4873020
087 2433194 / 086 1758042
www.odonovanagri.com

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1.0 Introduction

O' Donovan Agri-Environmental Services Ltd. have been appointed by Buckley Construction Group to provide specialist Invasive Alien Plant Species (IAPS) advisory services with respect to the management of Japanese knotweed (*Fallopia japonica*) and Giant rhubarb (*Gunnera tinctoria*) within the footprint of a proposed social housing development at Old Barrack Rd., Bantry, Co. Cork on behalf of Cork County Council(see Figures 1.1-1.2).

Figure 1.1 Site Boundary (Source: Google Earth Pro)

Due to constraints regarding access (scrub overgrowth) the site walkover survey was carried out on the 29th August, 13th September and the 2nd October 2024 by John O' Donovan IAPS Specialist Contractor and Lisa M. J. Dolan an IAPS Specialist Ecological Consultant at the site of the proposed social housing development at Old Barrack Rd. Bantry.

Lisa M. J. Dolan is an IAPS Specialist Ecological Consultant with over 20 years' industry experience in the preparation of IAPS Management Plans and the onsite management and successful eradication of terrestrial invasive species, in particular, Japanese knotweed. Lisa is experienced in specialist targeted surveys and reporting, environmental impact assessments, design and deployment of specialist biosecurity protocols and equipment, and as a Clients Representative (for local authorities, state and semi-state bodies) the preparation of tender documents for the procurement of IAPS Specialist Contractors, site supervision and the management of IAPS Contracts for successful invasive species eradication programmes.

The main objective of the specialist survey is to determine the extent of Giant rhubarb and Japanese knotweed on site in order to inform a chemical herbicide treatment programme which is to be deployed under an Advanced Contract by O' Donovan Agri-Environmental Services Ltd.

Details of the definition, classification, risk assessments and legislative requirements in relation to Invasive Alien Plant Species (IAPS) are presented in Appendix I.

Figure 1.2 Location of the Proposed Social Housing Development Site at Old Barrack Rd., Bantry, Co. Cork (Source: Google Earth Pro)

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2.0 Methods

2.1 Study Site

The proposed social housing development encompasses a 0.28ha site at Old Barrack Rd., Bantry, Co. Cork at GPS coordinates ITM 499756, 548573 (see Figures 1.1-1.2; 2.1).

The site of the proposed social housing development is serviced by Old Barrack Rd. and the N71 National Secondary Road and is dominated by existing derelict two-storey dwellings, sheds, rear gardens and yards (to be demolished) and other hard landscaping areas categorised as Buildings and artificial surfaces (BL1), Scrub (WS1), Spoil and bare ground (ED2), former Amenity grassland (GA2) now rank grassland overgrown with Ornamental/non-native shrubs (WS3), and Recolonising bare ground (ED3) (see Photographs 2.1-2.2).

Figure 2.1: Location of the Study Site (Source: Google Earth Pro)

The low tree and high shrub canopy within the site is dominated by Rusty willow (Salix cinerea subsp. oleifolia), Gorse (*Ulex europaeus*), English elm (*Ulmus procera*), Bracken (*Pteridium aquilinum*) and Soft Shield-fern (*Polystichum setiferum*), with a climbing layer of Bramble (*Rubus fruticosus* agg.) and Atlantic ivy (*Hedera hibernica*), with a ground flora consisting of Creeping thistle (Cirsium arvense), Cock's-foot (*Dactylis glomerata*), Hoary willowherb (*Epilobium parviflorum*), Cat's-ear (*Hypochaeris radicata*), Ribwort plantain (*Plantago lanceolata*), Greater plantain (*Plantago major*), Creeping buttercup (*Ranunculus repens*), Water figwort (*Scrophularia auriculata*), Common nettle (*Urtica dioica*), Common ragwort (*Senecio jacobaea*), Dandelion (*Taraxacum* agg.) and White clover (*Trifolium repens*).

There is no surface watercourse or ponding water body within the site.

2.2 Wider Study Area

The site is located on an escarpment, approximately 0.46km northeast of Bantry town centre.

Photograph 2.1 Entrance to the Proposed Social Housing Development

Photograph 2.2 Yard within the Proposed Social Housing Development

2.3 Specialist Survey

The detailed specialist survey of the site of the proposed social housing development was undertaken on the 29th August, 13th September and 2nd October 2024. Survey limitations and constraints are discussed below in Sections 2.3.2-2.3.4.

Photograph 2.3 Two-storey Dwellings within the Proposed Social Housing Development Site

2.3.1 Characteristics of the Infestation

During the specialist survey, where required, I.D. numbers were allocated to each of the infestations for the purposes of reporting on any changes to the baseline going forward. The locations were recorded utilising a GPS (Garmin Oregon 650t). Details of the following baseline information was captured during the specialist survey:

- Accurate records including GPS coordinates and mapping of the extent of above ground plant material and location of outliers during the optimum survey period (where possible) using a trundle wheel and tape measures
- Photographic record of the infestations as a baseline for treatment and monitoring
- Confirmation that a hybrid knotweed species is not present on site
- Nature (maturity, growth patterns, extent of radial or lateral growth) and extent of the infestation including outliers on the site and adjacent lands

- Presence or absence of shade (Japanese knotweed plants under shade often do not flower/seed prior to senescence)
- Seasonal constraints *e.g.,* timing, flowering, senescence
- Variations in seasonal plant cycle due to local temperatures (day and night)
- Presence of flowering and seeds e.g., inflorescences, seed pods, *etc.*
- Details of plant growth stage *i.e.,* shoots, immature plants, mature plants, bonsais, or other sub-lethal growth
- Above and below ground soil conditions (*e.g.,* soil type, soil horizon layers, rocky outcrops, parent bedrock type and depth to water table)

Please refer to Section 4.0 for findings of the specialist survey

2.3.2 Suboptimum Survey Period

The timing of the specialist surveys in August and September were inside the optimum survey period for Japanese knotweed and Giant rhubarb. However, the timing of the surveys were outside of the survey period for species which die back during the summer months (e.g. Three-cornered leek and Spanish bluebell) and for annual species.

During walkovers in the suboptimum period, surveyors make every effort to minimise any seasonal survey constraints using their considerable previous field experience and expertise in carrying out surveys very late or early in the growing season. Typically, a second detailed specialist survey of a site would be undertaken during the optimum survey period; such that the preliminary survey findings can be validated in the absence of any seasonal constraints.

Spanish Bluebell & Three-cornered leek

Three-cornered leek (*Allium triquetrum*) is a spring/early summer flowering perennial plant which grows from small white bulbils (bulb-like structures). Its leaves emerge in autumn, and it flowers from March to June after which it starts to die back from July onwards. Spanish bluebell (*Hyacinthoides hispanica*) is a spring-flowering, bulbous perennial, which emerges in early winter, and flowers in April and May. Its leaves also die back at the end of the summer.

In respect of Three-cornered leek, new growth may start to appear within a site in September while Spanish bluebell clumps only start to appear in December each year. Where possible, targeted surveys should be undertaken at the time of year when such species are in leaf *i.e.* Three-cornered leek is in leaf from September to July, while Spanish bluebell is typically in leaf from December through to July each year. It should be noted that Spanish bluebells retain much of their seed in papery fruits until well into the winter which assists in the detection of this species outside of the optimum survey period.

Monitoring will be required in respect of these species during the Advanced Contract.

Annual Species

Annual invasive species such as Himalayan balsam (*Impatiens glandulifera*) start to die back for the winter months after the first hard frosts. Given that day and night temperatures have remained relatively mild for this time of year, the timing of the survey does not pose a limitation on the findings of this report in relation to the detection of annual species.

Giant Rhubarb

Apart from Chilean Giant rhubarb, the other large-leaved *Gunnera* species found in the UK and Ireland was thought to be the Brazilian Giant rhubarb (*G. manicata*). It is difficult to tell the Brazilian species apart from the invasive Chilean Giant rhubarb in the absence of certain diagnostic features which are only present once the plants are fully developed and flowering/fruiting. However, more resent research has shown that much of what is present in the UK and Ireland is actually a previously undescribed hybrid, *G.* × *cryptica*. The hybrid plant is a cross between *G. tinctoria* and *G. manicata* (Shaw, 2022). As distinguishing the presence of either the Brazilian Giant rhubarb or the hybrid species requires the presence of fully developed plants with flowering/fruiting bodies, monitoring will be required of emerging seedlings to confirm the presence/absence of Brazilian Giant Rhubarb and/or *G.* x *cryptica*.

2.3.3 Disturbance & Plant Defence Mechanisms

In addition to seasonal constraints, invasive species may go undetected on a site, if there has been recent disturbance, burial or soil importation.

It should also be noted that Japanese knotweed can survive for a number of years at considerable buried depths.

Japanese knotweed also exhibits a number of plant defence mechanisms including a response to inappropriate chemical herbicide treatment, known as chemical dormancy, where the plant can remain dormant beneath the ground for a number of years with very minimal or no above ground leafy green growth.

It also has the ability to produce a 'bonsai' growth form in response to inappropriate chemical herbicide treatment or cutting. This defence mechanism enables the plants to develop into a cryptic miniature growth form. As a result, it is possible, in the absence of a thorough systematic survey, for outliers to go undetected even if surveys are undertaken during the optimum survey period.

During walkover surveys, surveyors make every effort to detect the presence Japanese knotweed and other species, using their considerable previous field experience and expertise in carrying out such surveys. Monitoring will be undertaken for the duration of the Advanced Contract to determine the presence/absence of buried invasive species, bonsai growth forms and chemical dormancy.

2.3.4 Other Survey Limitations

Aside from the optimum survey period, disturbance and plant defence mechanisms the only other survey limitation of note was access to the rear yards of a number of dwelling units. While these yards were viewed on elevation from the northern end of the site it is possible that immature plants are growing within these areas. Full access will be acquired during the deployment of chemical herbicide treatment programme as part of the Advanced Contract to confirm presence/absence of invasive species.

2.3.5 Classification & Legal Obligations.

All non-native and potentially invasive species recorded within the site were subsequently checked for a 'listing' under the following risk assessments, classifications, guidance documents and websites (please refer to Appendix I for further details):

- European and Me3eeeeee2wwwediterranean Plant Protection Organisation (EPPO) - List of Invasive Alien Plants
- Invasive Species Ireland - risk assessment and classification
- National Biodiversity Data Centre - risk assessment and classification
- NRA (2010 revised) Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads

All non-native and potentially invasive species recorded were also checked for a listing under the following relevant legislation:

- EU Regulation 1143/2014 on Invasive Alien Species
- European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024)
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) to 2015, as amended

Please refer to Section 3.0 for findings in relation to the classification of the invasive species recorded within the site and relevant legislation.

3.0 Extent of Invasive Alien Plant Species

3.1 Classification & Legal Obligations of IAPS Recorded

Ornamental/non-native shrubs (WS3) and other plants recorded within the site of the proposed social housing development included Japanese knotweed, Giant Rhubarb, Travellers' joy (*Clematis vitalba*), Buddleia (*Buddleja davidii*), Montbretia (*Crocosmia* X *crocosmiiflora*), Himalayan Honeysuckle (*Leycesteria formosa*), Winter heliotrope (*Petasites fragrans*), Wilson's honeysuckle (*Lonicera nitida*), English elm (*Ulmus procera*), Leyland cypress (*C.* x *Leylandii*) and Bilbao's fleabane (*Conyza floribunda*).

Of these species only Japanese knotweed, Giant rhubarb, Travellers' joy, Buddleia, Himalayan honeysuckle and Sycamore are considered to have relatively significant invasive qualities (see Table 3.1; Appendix II for further details) while the remaining species are considered low risk, to not pose a risk or have yet to be risk assessed.

In terms of EU legislation, Giant rhubarb is listed under the EU Regulation on Invasive Alien Species 1143/2014 – referred to as the "Union list" of 49 No. species. Some of the core provisions of EU Regulation 1143/2014 deal with, among other things, bringing into the territory of the Union, keeping, breeding, transporting, and placing on the market, species included on the list of invasive alien species of Union Concern (*i.e.,* the 'Union list'). Of note is that Japanese knotweed is not a regulated species under this legislation.

With respect to European IAPS 'watchdogs', Giant rhubarb, Japanese knotweed and Buddleia are listed on the European and Mediterranean Plant Protection Organisation (EPPO) List of Invasive Alien Plants. The EPPO strongly recommends that countries which are endangered by listed species take measures to prevent their introduction and spread or manage unwanted populations.

In terms of national legislation, both Giant rhubarb and Japanese knotweed are listed under the First Schedule: Part 1 of the European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024). Japanese knotweed is also listed under the Second Schedule: Vector Materials.

Plants listed under the First Schedule: Part 1 Plants and Second Schedule: Vector Materials are subject to restrictions under Regulations (17)1. Under Regulation 17(1) it is illegal to keep, permit to reproduce, grow or cultivate, release into the environment or place invasive species on the market. The Second Schedule refers to soil or spoil taken from places infested with Japanese knotweed *(Reynoutria japonica)*, Giant knotweed *(Reynoutria sachalinensis)* or their hybrid Bohemian knotweed (*Reynoutria x bohemica*). A 'Regulation 10 permit' is required from NPWS to carry out research on, or ex-situ conservation on invasive species.

Both Giant rhubarb and Japanese knotweed are also listed under the Third Schedule: Part 1 of the European Union (Birds and Natural Habitats) Regulations 2011 to 2015. Japanese knotweed is also listed under Part 3: Vector Materials.

Plants listed under the Third Schedule: Part 1: Plants and Part 3: Vector Materials are subject to restrictions under Regulations 49 & 50. Part 3: Vector Materials refers to soil or spoil taken from places infested with Japanese knotweed *(Reynoutria japonica)*, Giant

knotweed *(Reynoutria sachalinensis)* or their hybrid Bohemian knotweed (*Reynoutria x bohemica*). Regulation 49 deals with the 'Prohibition on introduction and dispersal' while Regulation 50 deals with the 'Prohibition on dealing with and keeping certain species'. Regulation 50 which prohibits the sale of invasive species has yet to be enacted into Irish law. A license is required from NPWS under Regulation 49(2) to transport vector material off a site (for the purposes of eradication via disposal at a receiving facility). A Waste License is also required under the Waste Management (Licensing) Regulations 2004 from the EPA to bury soil contaminated with vector material within a site.

Giant rhubarb and Japanese knotweed are classified by the National Biodiversity Data Centre (NBDC) as a "High Impact" invasive species, while Travellers' joy, Buddleia, Sycamore and Himalayan honeysuckle are deemed 'Medium Impact' species (https://www.invasive speciesireland.com/species-alerts).

Japanese knotweed, Giant rhubarb, Travellers' joy, Buddleia, Montbretia and Winter heliotrope are included in the NRA Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads (NRA, 2010), as these species have been shown to have an adverse impact on landscape quality, native biodiversity or road infrastructure (https://www.tii.ie/technical-services/environment/planning/).

3.2 Invasive Qualities

Description of and details of the invasive qualities of the various IAPS recorded within the site of the proposed social housing development are presented in Tables 3.2 and 3.3. As requested by Cork County Council, the main focus of the specialist survey and the chemical herbicide treatment programme are the regulated species Giant rhubarb and Japanese knotweed.

3.3 Extent

During the specialist walkover surveys Giant rhubarb and Japanese knotweed were recorded within the site of the proposed social housing development (see Table 3.2 and Figure 3.1).

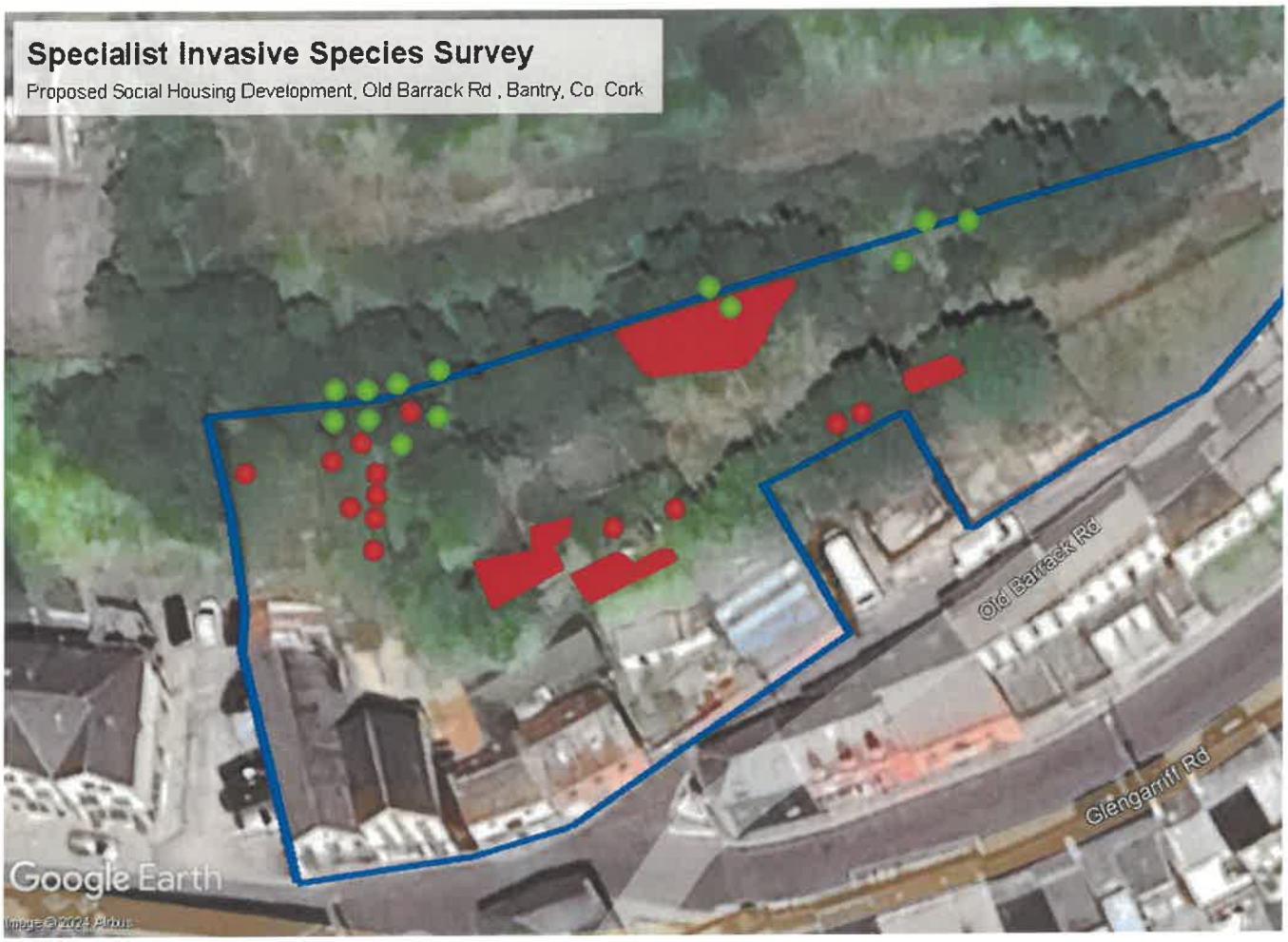


Figure 3.1 Extent of Giant Rhubarb and Japanese knotweed (Source: Google Earth F

Table 3.1 Invasive Alien Plant Species (IAPS) Recorded to Date

No.	Species Name	EU Regulation 1143/2014	EPPO List	Invasive Alien Species Regulations 2024	Habitats Regulations 2011 to 2015	NBDC L
1	Giant rhubarb	✓	✓	✓	✓	High
2	Japanese knotweed		✓	✓	✓	High
3	Traveller's joy					Mediu
4	Buddleia		✓			Mediu
5	Sycamore					Mediu
6	Himalayan honeysuckle					Mediu
7	Montbretia					Lo
8	Winter heliotrope					Lo

Table 3.2 IAPS Recorded at the Proposed Social Housing Development

Photographs	Details
Giant Rhubarb	
	During the specialist survey on the 2nd October 2024 both mature Giant rhubarb and seedlings were recorded predominantly in the centre and the western end of the site, while a small number of seedlings were recorded in on the eastern end of the site.
Japanese knotweed	
	Japanese knotweed was recorded along the northern boundary of the site on the 2nd October 2024.

Travellers' joy

During the specialist survey on the 2nd October 2024, Travellers' joy was recorded on the western end of the site.

Montbretia

During the specialist survey a 'carpet' of Montbretia along with a number of outliers was recorded along the northern boundary of the site.

Sycamore	
	During the specialist survey on the 2nd October 2024 semi-mature trees and saplings of Sycamore were recorded throughout the site.

Himalayan honeysuckle	
	During the specialist survey on the 2nd October 2024 mature Himalayan honeysuckle and seedlings were scattered throughout the site.

Buddleia

During the specialist survey on the 2nd October 2024 Buddleia was recorded at one location on the southwestern corner of a shed within towards the western end of the site.

Winter heliotrope

During the specialist survey on the 2nd October 2024 Winter heliotrope was recorded from a spoil heap on the northern boundary of the site.

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
 © Lisa Dolan ***Giant Rhubarb*** (*Gunnera tinctoria*)	Giant Rhu0barb (*Gunnera tinctoria*), also known as or Chilean Rhubarb, is native to southern Chile, Argentina, Bolivia, Brazil, Colombia, Ecuador and Peru. It is considered to be a huge herbaceous perennial plant growing up to 2m tall with large rhubarb like leaves that grow up to 2m across which are rough textured with jagged toothed lobes (Stace, 1997) and sit on stout leaf stocks which are up to 1.5m long with green bristles. The flowering spike is cone shaped up to 1m long with densely-packed short stubby branches (<5cm) with 1mm stalk-less reddish-green flowers. It flowers from June to August. Fruits are small orange-red berries. Rhizomes 6–25 cm in diameter, mainly horizontal and above-ground, up to 3.5m long. Plant dies-back in winter and regrows annuals in spring from a terminal bud.	Yes	Yes	Ye

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
 *© O' Donovan Agri Environmental Ltd.* ***Japanese Knotweed*** ***(****Fallopia japonica*) Native to Japan, northern China, Taiwan, and the Korea peninsula, Japanese Knotweed was introduced to Europe in the 1820's.	Grows up to 3m tall. Leaves are shield shaped up to 12cm long. Herbaceous/semi-woody perennial with annual bamboo like stems which displays a vigorous growth pattern. Stems grow from a central base, known as a crown. The plant can radiate rapidly via underground stems (rhizomes) to form large 'stands' up to 1-3 acres in area. Spreads by sending shoots up from the long radial rhizomes mostly found in the top 0.25m of the soil. Rhizomes are white when young, becoming dark brown/thick/woody/knotty as they mature. Small adventitious roots travel into the soil. Rhizomes have an orange-coloured center when broken open. Flowers are typically small, off white-cream to greenish white growing in plume-like, clusters along panicles. It does not produce viable seeds as all plants are thought to originate from a single female clone. Flowering period is typically July to September in Ireland.	No	Yes	Ye

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
 © Lisa Dolan ***Travellers' joy*** (*Clematis vitalba*)	Native to Europe, including parts of Britain, also parts of Asia, including Georgia, Iran and Syria. Deciduous, climbing, layering vine (up to 30m in length) with very long, woody stems, leaves pinnate & opposite, flowers in dense white clusters. Flowers from July-August.	No	No	N
 © Lisa Dolan ***Winter Heliotrope*** *(Petasites fragrans)*	Native to the Mediterranean region of Europe, including Italy, Sicily, Sardinia and north Africa. Short hairy herbaceous perennial, up to 30cm, heart shaped leaves 20-50cm wide persisting in winter (Booy et al., 2015). White to lilac flowers, smelling strongly of almonds or vanilla (Booy et al., 2015).	No	No	N

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
 © Lisa Dolan **Buddleia** (*Buddleja davidii*)	Native to China and Japan. A vigorous arching multi-stemmed deciduous shrub growing 1-4m tall with light brown deeply fissured peeling bark. The green-grey leaves are opposite, 10-20 cm long, and lanceolate with a slightly serrated edge and a felted-velvety whitish under surface. Conical panicles of dense tubular 4-petalled flowers appear from June to September. These flowers can be purple, white, or pink with an orange "eye". The flowers produce high quantities of nectar and are attractive to butterflies.	No	No	N
 © gardenerspath.com **Himalayan honeysuckle** (*Leycesteria formosa*)	Native to Temperate Asia including the Himalayas and southwestern China. A deciduous sometimes evergreen, half woody shrub-like plant (intermediate between a shrub and an herbaceous perennial) 1-3m tall, with young stems in shades of green, pink and purple, which may only last 2-5yrs before collapsing and replacement by new stems from the roots. Mature plants have woody rough grey bark. The leaves are opposite, dark green and usually cordate 6-	No	No	N

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
	18cm long and 4-9cm broad. Small flowers are produced on 5-10cm long pendulous racemes. Flowering from June to October, are small white, pale pink or rarely deep purplish pink, subtended by a purplish-pink bract, terminating - like the leaves - in a drip tip. The unripe deep pink berry is hard, and becomes fragile, soft and a deep purple-brown when ripe (1cm Ø).			
 © irelandswildlife.com **Sycamore** *(Acer pseudoplatanus)*	A large deciduous broad-leaved tree which can grow to 20-35m. Bark is grey smooth when young, becomes rough with age and breaks up into scales, exposing a pale brown to pink inner bark. Leaves are large leathery dark green in colour, with pale underside, and palmate with five radiating lobes. The petiole is tinged red. Flowers are yellowish-green pendulous panicles (10-20cm) with 60-100 flowers on each stock. The paired winged seeds (5-10mm) or samaras rotate to the ground enabling wind dispersal. Seeds germinate in Spring. Native to central and eastern Europe and western Asia.	No	No	N

Species Name	Description	EU Regulation 1143/2014	Invasive Alien Species Regulations 2024 (First Schedule)	R
 © Paul Green **Montbretia** (*Crocosmia* X *crocosmiiflora*)	Crocosmia's are perennial plants, that grow from underground corms, native to the grasslands of the Cape Region in South Africa. Montbretia (*Crocosmia* X *crocosmiiflora*) is an artificially produced horticultural hybrid, derived from two Crocosmia species native to South Africa. The trumpet-shaped flowers are usually orange-red with yellow centres produced in a loose terminal panicle forming two rows along each slender zig-zag stem or spike up to 600–1000mm in height. The leaves are soft, hairless and have pointed tips. The linear leaves are 300-800mm long, and 10-20mm wide and are mostly clustered near the base of the plant (DAFM, 2016). Montbretia flowers in July, August and September.	No	No	N

4.0 Eradication Programmes

4.1 Giant Rhubarb

The application of chemical herbicide to Giant rhubarb will be undertaken within the optimum treatment period as per Tables 4.1 and 4.2 where practically feasible (and within the confines of the preliminary design, planning stage, tender stage, the construction programme, maintenance defects/liability period and operational stage).

It should be noted that both mature plants and immature seedlings are present within the site. In terms of chemical herbicide treatment spraying is the only option for immature plants due to the limited extent of rhizome growth and leaf stalks.

Table 4.1 Optimum Periods for the Management of Giant Rhubarb

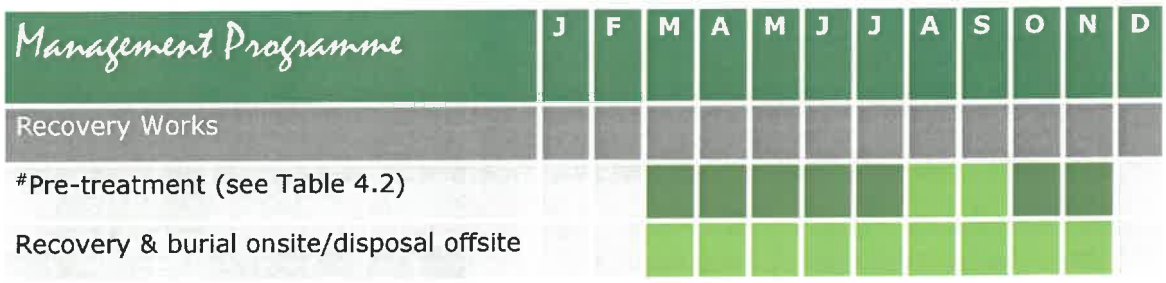
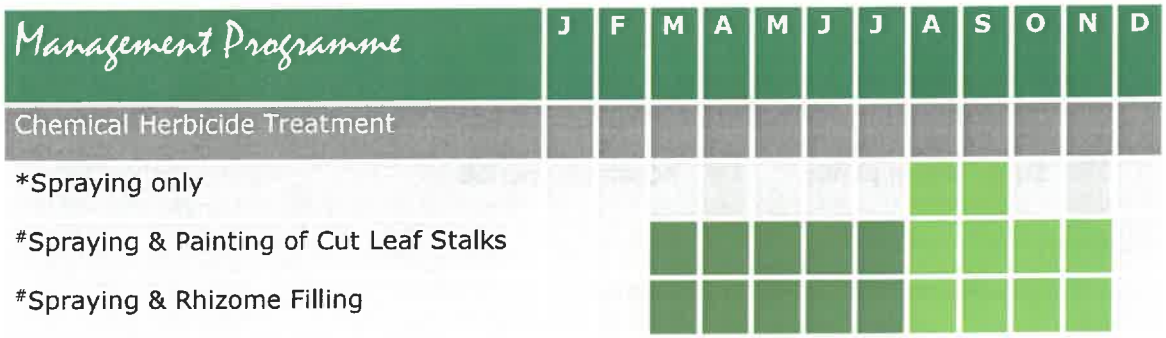


Table 4.2 Optimum Periods for Treating Giant Rhubarb



4.2 Japanese knotweed

The application of chemical herbicide to Japanese knotweed will be undertaken within the optimum treatment period as per Tables 4.3 and 4.4, where practically feasible (and within the confines of the preliminary design, planning stage, tender stage, the construction programme, maintenance defects/liability period and operational stage).

Table 4.3 Optimum Periods for the Management of Knotweed

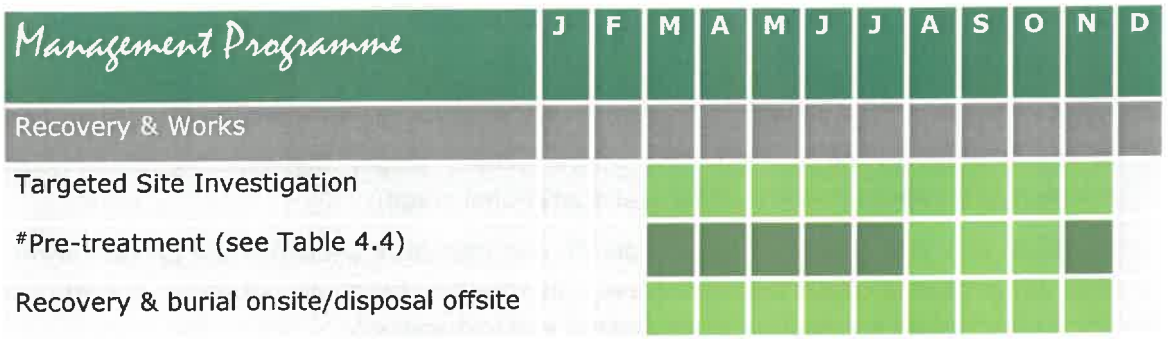
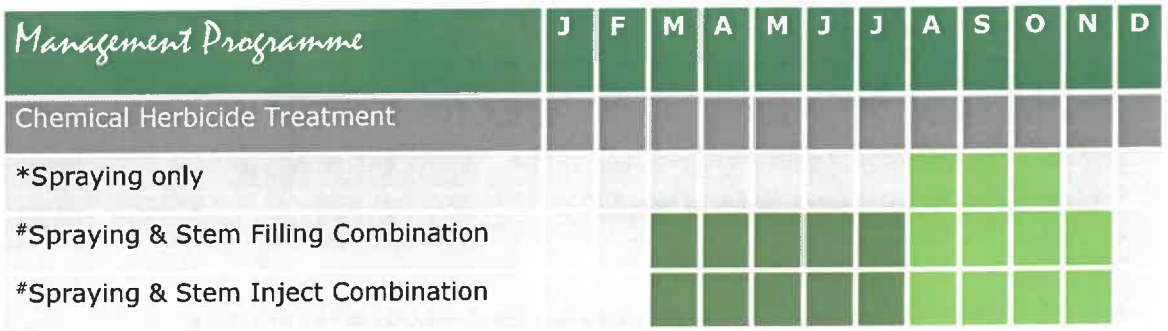


Table 4.4 Optimum Periods for Treating Knotweed



*Timing is dependent on seasonal factors *i.e.,* onset of flowering/seeding and before first frost (senescence)

#Ideally stem filling and stem injecting should also be undertaken during the optimum treatment period to achieve a maximum effective reduction in the viability of the underground rhizome network

Suboptimum period *Optimum period

4.3 Deployment of Chemical Herbicide

Where required, chemical herbicide treatment will be deployed under the supervision of the IAPS Specialist Site Ecologist.

- The operator must be a Registered Professional User (RPU).
- The chemical herbicide product Garlon Ultra will be utilised. There will be strict adherence to instructions on the Product Label for Garlon Ultra at all times.
- The RPU will avoid spraying during poor weather conditions i.e., in the rain and wind, and when rain is forecasted in accordance with the Product Label e.g. where rain is due within 6hrs, and preferably 24hrs.
- The RPU will avoid spraying where a covering of dew is present in early morning or late evening as this may may affect the efficacy of the treatment (see Product Label).

- The herbicide will be deployed using a non-telescopic hand lance and a power operated high pressurised 60psi trolley mounted sprayer. The actual applied pressure from the non-telescopic hand lance will be 45psi.
- Adjacent property owners will be notified in advance of treatment, where required.
- Warning signage will be erected in advance of the deployment of chemical herbicide.
- Temporary fencing will be erected around the treatment area, where deemed necessary.
- The timing of herbicide application will avoid peak pedestrian traffic times along any adjacent footpaths, car parks or other areas utilised by members of the general public including vulnerable groups.
- Spray drift will be minimised via the use of appropriate nozzles and adherence to the Product Label and best practice in relation to avoiding windy conditions.
- Treatment will cease where members of the public, in particular children or members of other vulnerable groups, and/or domestic pets gain access to the treatment area.
- The RPU will avoid damaging or trampling the knotweed during the treatment process.
- Bunded equipment, twin-lined or double hoses will be utilised to minimise leaks. Equipment will be checked regularly for defects and hoses, fittings, tank and nozzles will be checked for leaks to ensure the equipment is in good working order. Containers will be placed in drip trays at all times. A dedicated herbicide mixing area will be established at least 50m from any stormwater gully/watercourses. A drip or mixing tray will be in place when pouring (to measure) and pouring to mix herbicide.
- Herbicides will be stored on site in original labelled containers and in an appropriate and locked mobile chemical cabinet in the rear of a site vehicle. An herbicide spill kit will be available for use at all times on site in the event of a leak or spillage.
- An external source of water will be provided for mixing of herbicide (other than a local water body).
- The operator will avoid spraying and avoid spray drift onto non-target vegetation during foliar application (Circular Letter NPWS 2/08).
- Vegetation will be disturbed to ensure that pollinators, birds and small mammals take evasive action and move out of vegetation which is to be sprayed with chemical herbicide.
- The operator will utilise footwear wash facilities where required prior to leaving the treatment area and take steps to decontaminate all equipment utilised where required.

Additional Methodology for Treating Knotweed

- The entire plant canopy of the knotweed stand will be treated with herbicide. 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.

- Where required a second similar treatment will be required in the days following this initial treatment. The timing of the second treatment is dependent on weather and temperatures. It must take place before any significant leaf kill occurs from the first spray application as the leaves provide the surface area of absorption for systemic herbicides; otherwise, the internal vascular system of the plant will no longer be capable of translocating the herbicide down to the rhizome network. The timing of the second spray will be determined on site by the IAPS Specialist Site Ecologist.

5.0 Risk Assessment

Where found to be present on a development site the costs of eradicating IAPS species may increase with the maturity of an infestation which may be exacerbated by any delays experienced in commencing treatment, the deployment of an inappropriate treatment, accidental disturbance and dispersal or a combination of the aforementioned.

A chemical herbicide treatment programme should be deployed early in the preliminary design/planning stage to ensure eradication or reduced viability of vector material in advance of the commencement of site clearance and construction works.

Where insufficient time is available to achieve eradication via chemical herbicide treatment, prior to the commencement of construction works, the costs associated with the remaining options of burial onsite or disposal off site at the licenced waste facility can be significant depending on the volumes of vector material involved.

In addition any delays experienced in commencing treatment of certain invasive species may also pose a risk of spread or dispersal into adjacent lands (which may support domestic dwellings, commercial or industrial enterprises, or native habitats) depending on the invasive qualities of the species in question. In this regard, the management of IAPS may be necessary to address or to meet with:

- Planning requirements
- Environmental legislation
- Risk of dispersal during site clearance and construction works
- Risk of encroachment given proximity to a boundary and adjacent infrastructure
- Risk of diminished ability to use and enjoy lands within the infested area
- Risk of encroachment on impediment to access of green open spaces
- Risk to native habitats and species, and designated conservation areas
- Requirements to construct new infrastructure and complete hard and soft landscaping within the infested area
- Risk of encroachment on new infrastructure
- Risk of encroachment on sightlines and signage

5.1 Risk of Dispersal/Reintroduction

The walkover survey on the 2nd October 2024 also examined potential sources of vector material and the presence of site-specific disturbance regimes which could result in further pathways dispersal within or reintroduction of IAPS to the site.

It should be noted that there are several potential sources of vector material which could result in the reintroduction and further spread of IAPS within site boundary in the future (see Table 5.1). These include the importation of vector material within soil, stone, and other material and on machinery or equipment required for site investigation, vegetation removal, demolition, construction, and landscaping works, presence of chemical dormancy, fly-tipping

of garden waste, and spread or dispersal from adjacent gardens. In the absence of control measures, there is a risk that vector material could be reintroduced to the site.

5.1.1 Chemical Dormancy

With regards to the potential for chemical dormancy, invasive species within the eastern end of the proposed social housing development were previously treated in July/August 2022 by a third party. The details of the chemical herbicide treatment programme deployed are unknown. There was no chemical herbicide treatment subsequently applied in 2023. Aside from the treatment undertaken in 2022, there is no local knowledge of the previous deployment of any other chemical herbicide treatment programme at the site. Given that a treatment programme was previously undertaken at the site there is potential for chemical dormancy of Japanese knotweed plants. The presence of cryptic 'bonsai' growth of Japanese knotweed was not detected during the walkover survey. Monitoring will be undertaken for the duration of the Advanced Contract for any new outliers of Japanese knotweed.

Photograph 5.1 Spoil heap along the northern boundary

5.1.2 Soil Movement

Evidence of imported soil was noted inside the second interior gate on the northern boundary in the form of a large spoil heap. The spoil heap may have been a source of vector material in terms of the introduction of invasive species to the site and/or provided an area of disturbed soil for seedlings of Giant rhubarb to more readily propagate. The spoil heap would appear

to be *in situ* for a considerable amount of time based on the extent of vegetation cover. It is possible that this spoil heap was accidentally placed on top of a Japanese knotweed plant given that Japanese knotweed was noted growing immediately adjacent to the northern slope of the heap. If the spoil heap was placed on Japanese knotweed there is potential for a crown at ground level and rhizomes to be found to a depth of up to 2mbgl beneath the spoil heap. Monitoring of the spoil heap will be undertaken for the duration of the treatment programme. Targeted site investigation works will be required to determine the presence of Japanese knotweed beneath the spoil heap in order to ensure that Japanese knotweed has been completely eradicated from the site prior to the commencement of site clearance.

5.1.3 Fly-tipping

Fly-tipping of garden waste was also recorded along the northern boundary. The vegetation cuttings included those of Cherry laurel (*Prunus laurocerasus*) which was not recorded from the site during the survey and Montbretia. There is an ongoing risk of the introduction of invasive species to the site as a result of fly-tipping. Consultation with adjacent landowners should be undertaken where possible. Monitoring should be undertaken for the duration of the treatment programme to determine the presence of any new outliers or species.

Photograph 5.2 Example of Fly-tipping of Garden Waste near the northern boundary

5.1.4 Adjacent Sources

The presence of invasive species within the gardens of the existing adjacent or nearby dwellings is another potential source of reinfestation. In particular, where Japanese knotweed is growing adjacent to the boundary it's radial rhizomes could spread vegetatively into a site, while the presence of mature Giant rhubarb could provide a source of seeds for dispersal via anemochory (dispersed by wind) or zoochory (dispersed by birds).

5.2 Pathways for Dispersal

In the event that the IAPS within the site are not managed in a timely manner there is a high risk that vector material will be dispersed within the site given the requirement for Geotechnical Site Investigation, site clearance/vegetation removal, demolition, construction and landscaping works.

The risk of dispersing Giant rhubarb and Japanese knotweed within the site will arise where vector material becomes adhered to (1) the footwear of site personnel/staff, surveyors, and visitors to the site, (2) the tyres of construction related and domestic vehicles in the car park, (3) buckets, tyres, and tracks of plant machinery and on construction/landscaping equipment, or (4) is carried within soil loads.

Vector material could also be transferred to other sites within soil loads, waste arising from demolition and landscaping works, on domestic vehicles, plant machinery and on geotechnical site investigation/vegetation removal/demolition/construction and landscaping machinery and equipment.

There is also a risk to land-uses and habitats downstream of the site, if viable seeds, rhizome or stem fragments were to be dispersed by hydrochory (water) i.e. gained entry into watercourses or were washed into stormwater gullies, which are connected to the stormwater drainage network which outflow to Bantry Bay.

5.3 Hazards

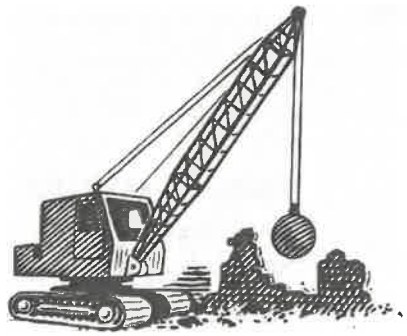
When generating a risk assessment for a site, the primary hazards (impacts) associated with the presence of IAPS include risks to infrastructure, legal obligations, recreational activities, amenity areas and ecology, as outlined below and in Table 5.1:

- Breaches of legislation (failure to observe duty of care), with exposure to prosecution (civil and/or criminal) and fines;
- Delays in completing the development (with associated financial implications), particularly if IAPS are encountered unexpectedly;
- Control and management costs, which can increase rapidly in the absence of appropriate mitigation;
- Potential significant disposal costs with respect to vector material;
- Ongoing risk or re-introduction of invasive species to the site from imported soil or stone; on footwear, plant machinery or equipment; fly-tipping; vegetative growth from adjacent properties; vegetative propagules; anemochory (windblown seeds), zoochory (animal droppings) and hydrochory (from upstream)
- Dispersal or spread within the site to other on-site land assets;

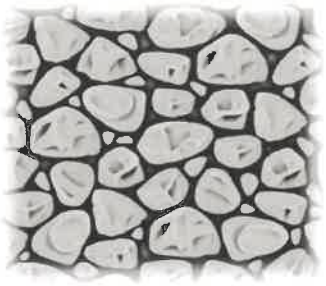
- Dispersal or spread to off-site adjacent properties or habitats (with potential liability, associated control costs and reputational risk);
- Loss of biodiversity;
- Loss of amenity;
- Potential damage to built infrastructure e.g. hard landscaping;
- Landscape management costs/delays;
- Reduction in property value or difficulty selling assets;
- Increased flood risk;
- Health and safety;
- Reputational risk.

It is recommended that a site-specific risk assessment is developed for the site to minimise the risk of further dispersal and spread of IAPS and to ensure that eradication is achieved.

Table 5.1 Site Specific Hazards/Risks & Disturbance Regimes

Hazards or Disturbance Regimes	Description	Control Measures
	**Soil movement** Risk of dispersing vector material in soil loads and on associated plant machinery, on footwear of site personnel within the site.	Soil movement within the site should not be undertaken unless authorised by the IAPS Specialist Ecologist.
	**Geotechnical Site Investigation & Demolition works**	Geotechnical Site Investigation & Demolition works should not be undertaken unless authorised and supervised by the IAPS Specialist Ecologist.

Hazards or Disturbance Regimes	Description	Control Measures
	**Vegetation clearance: mowing, strimming, cutting**	Mowing, strimming or cutting should not be undertaken unless authorised and supervised by the IAPS Specialist Ecologist.
	**Fly-tipping** Risk of introduction of vector material to the site through the fly-tipping of garden waste.	Monitoring and walkover surveys should be undertaken to identify any new outliers for incorporation into the management programme. Consultation should be undertaken with adjacent landowners where possible.
	**Site Clearance & Main Construction Stage** Risk of dispersing vector material in the form of plant fragments by site personnel, site vehicles, plant machinery and visitors to the site.	Biosecurity measures to be deployed under the supervision of the IAPS Specialist.
	**Wind** There is a risk of the dispersal of plant fragments by wind.	Monitoring and walkover surveys should be undertaken to identify any new outliers for incorporation into the management programme.

Hazards or Disturbance Regimes	Description	Control Measures
	**Animals** There is a risk of the dispersal of berries by birds and mammals	Monitoring and walkover surveys should be undertaken to identify any new outliers for incorporation into the management programme.
	**Importation of Topsoil, Subsoil, Stone, or Fill** There is a risk of introducing invasive species to the Residential development, No. 31-33 Centre Park Road.	Imported topsoil, subsoil and stone into the site should be certified to BS 3882:2015 and BS 8601:2013 to ensure that it is free from IAPS vector material.

Further hazards in relation to the management of IAPS, are associated within the use of chemical herbicide as part of the proposed treatment programme. Directive 2009/128/EC of the European Parliament and of the Council of 21st October 2009 more commonly referred to as the 'Sustainable Use Directive' or 'SUD', aims to establish a framework for Community action to achieve the sustainable use of pesticides (including chemical herbicides). It was transposed into Irish law by Statutory Instrument No. 155 of 2012, European Communities (Sustainable Use of Pesticides) Regulations 2012. The European Communities (Sustainable Use of Pesticides) Regulations 2012 places additional restrictions and, in some cases, prohibitions, on the use of pesticides in certain restricted and sensitive areas. Control measures should be deployed to ensure adherence to relevant legislation during the deployment of chemical herbicide.

Details of permitted pesticides authorised for use by the Irish competent authority, the Pesticide Registration and Controls Divisions and the Pesticide Control Laboratory of the Department of Agriculture Food and the Marine (DAFM) can be found at http://www.pcs.agriculture.gov.ie/. Consultation should be undertaken with a Registered Pesticide Advisor and/or the Pesticides Control Service where there is any doubt in relation to the safe use of herbicides.

6.0 Conclusion

The main focus of the chemical treatment programme to be deployed under the Advanced Contract are the regulated species Giant rhubarb and Japanese knotweed which are listed or scheduled species under the following legislation:

- EU Regulation 1143/2014 on Invasive Alien Species
- European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024)
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) to 2015, as amended

Japanese knotweed spreads vegetatively by radial underground rhizomes and the dispersal of rhizome and stem fragments. It does not produce viable seeds in Ireland as all plants are thought to originate from a single female clone. While Giant rhubarb also spreads vegetatively by creeping overground rhizomes and the dispersal of rhizome fragments, it is a prolific re-seeder as it produces abundant viable seeds which are dispersed by wind and birds, amongst other vectors. Both of these species can be controlled through the deployment of chemical herbicide. Where insufficient time is present to achieve eradication or where the plants are showing resistance or a tolerance to chemical herbicide treatment, then recovery of rhizomatous and stem vector material (soil and stone containing rhizome and stem fragments) will be required. The vector material can be recovered and buried on site or disposed of offsite in accordance with the relevant legislation and licencing procedures. It should be noted that seeds of Giant rhubarb will remain within the soil seedbank post recovery of the rhizomatous material and will require follow up treatment as they emerge. The management of these regulated species should be supervised by an IAPS Specialist Ecologist.

A number of other invasive species are present within the site which are not currently listed under any 'invasive species' legislation. These include Montbretia, Winter heliotrope, Buddleia, Sycamore and Himalayan honeysuckle. Control and management of these species is not required under current legislation. Where deemed appropriate these species can be managed within a site in accordance with best practice.

Montbretia

Montbretia's primary mode of spreading is vegetatively, by producing strings of underground corms (bulb-like structure) and the dispersal of corms and rhizome fragments. There is conflicting information in the literature regarding the viability of its seed. It can be controlled by chemical herbicide or through the recovery and disposal of vector material (soil and stone containing corms and rhizome fragments) which can be buried on site.

Winter heliotrope

Winter heliotrope can only spread vegetatively by creeping underground rhizomes and the dispersal of rhizome fragments as seeds are non-viable (given that only male plants are present in Ireland). It can also be controlled in a similar manner to Montbretia.

Buddleia, Sycamore & Himalayan Honeysuckle

While Buddleia, Sycamore and Himalayan honeysuckle are all dispersed by seed, Buddleia and Sycamore are considered to be more prolific 're-seeders'. Under the right conditions, Buddleia and Sycamore can quickly establish pioneer scrub transitional communities requiring considerable inputs to maintain recently established landscaped areas and hard standing in urban environments. Himalayan honeysuckle can also spread vegetatively via stem layering, dispersal of stem and root fragments and possibly suckers, while broken Buddleia branches are capable of rooting.

The more mature Buddleia and Himalayan honeysuckle plants can be "grubbed out" or cut to stump level and treated with chemical herbicide. Despite displaying invasive qualities it is not recommended that Sycamore trees should be cut down within the site given that they do have some biodiversity value. The semi-mature Sycamore trees within the site should be "phased out" over time by replacing any trees, which require felling for health and safety reasons, with native tree species as part of the overall landscape maintenance plan for the proposed social housing development.

Soil Seedbank

In relation to the existing soil seed bank, the emergence of new outliers of Giant rhubarb, Buddleia, Sycamore and Himalayan honeysuckle from seed, is likely during the main construction stage and during the maintenance/defects liability period for the proposed social housing development (due to the fecundity of these species) until such time as the landscaped areas have matured and/or the soil seedbank has been exhausted.

As highlighted above, the targeted removal of emerging Giant rhubarb seedlings should be supervised by the IAPS Specialist Ecologist.

Buddleia, Himalayan honeysuckle, Montbretia, Winter heliotrope and Sycamore seedlings should be dealt with, as they emerge, through manual removal or as part of the chemical herbicide treatment to be deployed in preparation for the hard and soft landscaping works during the construction stage. And, indeed as part of the regular control of weeds, within the boundary of the proposed social housing development, which is required for the duration of the maintenance/defects liability period as specified in the Works Requirements (or similar contract document) for the project and thereafter as part of the overall landscape maintenance programme for the operational stage of the proposed social housing development. This is necessary to avoid any future encroachment by these species and to minimise long-term maintenance requirements.

7.0 References

Species I.D. Cards

- http://www.nonnativespecies.org/index.cfm?sectionid=47
- https://www.agriculture.gov.ie/farmingsectors/planthealthtrade/alieninvasiveplantspecies/
- http://www.biodiversityireland.ie/projects/invasive-species/id-guides/
- https://www.fisheriesireland.ie/Research/invasive-species.html
- https://invasivespeciesireland.com/species-accounts/
- http://staffweb.itsligo.ie/staff/dcotton/Alien_Species.html

CIRIA (2008) CIRIA C679 Invasive species management for infrastructure managers and the construction industry.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

Environmental Agency (2013) Managing Japanese Knotweed on Development Sites: The Knotweed Code of Practice. Noted withdrawal by EA in 2016.

Environmental Agency (2013) Managing Japanese Knotweed on Development Sites: The Knotweed Code of Practice (**please note that this guidance was withdrawn on the 11th July 2016).**

Environmental Agency (2016a) Guidance Note: Prevent Japanese knotweed from Spreading. Environment Agency, Natural England and Department for the Environment, Food and Rural Affairs. March, 2016

Environmental Agency (2016b) Treatment and Disposal of Invasive Non-Native Plants: RPS 178. November, 2016.

EPPO (2024) EPPO Global Database. https://gd.eppo.int [01.10.2024]

EPA website: http://www.epa.ie.

European Communities (Conservation of Wild Birds) Regulations – http://www.irishstatutebook.ie.

European Communities (Environmental Impact Assessment) Regulations, 1989 to 2001.

European Communities (Natural Habitats) Regulations – http://www.irishstatutebook.ie.

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. The Heritage Council.

Habitats Directive (92/43/EEC)

IEEM (2005) Institute of Ecology and Environmental Management Draft Guidelines for Ecological Impact Assessment.

Invasive Species Ireland. Best Practice Management Guidelines Japanese Knotweed Fallopia japonica.

Irish Water Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability.

NetRegs Environmental guidance for your business in Northern Ireland & Scotland http://www.netregs.org.uk/environmental-topics/land/japanese-knotweed-giant-hogweed-and-other-invasive-weeds/

Property Care Association (2014) Code of Practice for the Management of Japanese knotweed Version 2.7. Property Care Association.

SEPA (2016) Biosecurity and management of invasive non-native species for construction sites and Controlled Activities January 2016.

TII/NRA (2004) Environmental Impact Assessment of National Road Schemes – A Practical Guide, National Roads Authority.

TII/NRA (2006) A Guide to Landscape Treatments for National Road Schemes in Ireland. Dublin: National Roads Authority.

TII/NRA (2006) Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes. Dublin: National Roads Authority.

TII/NRA (2008) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.

TII/NRA (2008) Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.

TII/NRA (2008) The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads.

TII/NRA (2010) NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road Schemes

Welsh Government (2011) The Control of Japanese Knotweed (*Fallopia japonica*) in Construction and Landscape Contracts.

Appendix 1

DEFINITION, CLASSIFICATION, LEGISLATION & BEST PRACTICE

Definition of Invasive Alien Plant Species

Alien (or non-native) plants are defined as those plants which have been introduced into Ireland by humans and their activities, either purposefully or accidentally.

Alien (or non-native) **invasive** species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities, and is not managed appropriately, it can potentially: (1) outcompete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; (3) result in soil erosion; (4) have an adverse effect on landscape quality through a loss of naturalness, aesthetics and regional identity; and, (5) impact on road safety (Dolan, 2004).

The introduction of *Rhododendron ponticum,* to Glengarriff Nature Reserve and Killarney National Park was perhaps the most widely cited example of an invasion by a non-native invasive species which has had a significant effect on the Irish landscape and elements within it. However, Japanese knotweed has recently become the focus of much media attention given the rate at which it has spread.

Classification of Invasive Alien Plant Species

A number of Irish agencies are monitoring and classifying invasive alien species in an effort to focus research programs, further monitoring, risk assessments, management and action plans and to meet with statutory obligations associated with the introduction of recent and future legislation.

Invasive Species Ireland

Invasive Species Ireland (www.invasivespeciesireland.com) a joint initiative by the Northern Ireland Environment Agency and NPWS, previously classified invasive species under the following headings based on a risk assessment:

- Most Unwanted: Established Threat
- High Risk: Recorded Species
- Amber List: Recorded Species (which under the right conditions could represent a significant impact on native species or habitats)
- Amber List: Uncertain Risk (their ecological impact remains uncertain due to lack of data showing impact or lack of impact)

The classification was based on the publication Kelly *et al.* (2013) Risk Analysis and prioritisation for invasive and non-native invasive species in Ireland and Northern Ireland (http://invasivespeciesireland.com/wp-content/uploads/2013/03/Risk-analysis-andprioritization-29032012-FINAL.pdf). The Invasive Species Ireland website currently lists a number of species under 'Established' or 'Potential'.

National Biodiversity Data Centre

The National Biodiversity Data Centre (http://www.biodiversityireland.ie/projects/invasive-species/species-lists/) has prepared a catalogue of invasive alien plant species and has risk assessed and classified a number of species into the following headings

- High Impact (http://www.biodiversityireland.ie/wordpress/wp-content/uploads/ Invasives _taggedlist_HighImpact_2013RA-1.pdf)
- Medium Impact (http://www.biodiversityireland.ie/wordpress/wp-content/uploads/ Invasives_taggedMediumImpact_2013RA-2.pdf)
- Watch List Species (http://www.biodiversityireland.ie/wordpress/wp-content/uploads /Invasives_tagged_PotentialHighmpact_2013RA-1.pdf)

A detailed risk assessment for 41 of these species was undertaken in 2014 (http://nonnativespecies.ie.) using the **N**on-native species **AP**plication based **R**isk **A**nalysis (NAPRA) tool. The classification is also based on the publication Kelly *et al.* (2013).

National Roads Authority/Transport Infrastructure Ireland (NRA/TII)

In 2008, the NRA first prepared Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads (NRA, 2010 revised) and identified 9 No. invasive species which have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes as follows:

- Japanese knotweed
- Giant hogweed
- Himalayan balsam
- Giant rhubarb
- Montbretia
- Winter heliotrope
- Old man's beard
- Common or Pontic rhododendron
- Buddleia

Relevant legislation

There is a range of legislation under which statutory obligations directly or indirectly apply to invasive species, and indeed, conventions which underpin the requirement to survey for and manage IAPS where they occur:

- EU Regulation 1143/2014 on Invasive Alien Species
- European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024)
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) to 2015, as amended
- Wildlife Acts, 1976 to 2012, as amended
- European Conventions

The main pieces of legislation are discussed in this section.

EU Regulation 1143/2014 on Invasive Alien Species

The EU Regulation 1143/2014 on Invasive Alien Species came into force on the 1st January 2015. Some of the core provisions of EU Regulation 1143/2014 deal with, among other things, bringing into the territory of the Union, keeping, breeding, transporting and placing on the market, species included on the list of invasive alien species of Union Concern (the 'Union list').

This first "Union List" of 37 No. species consisting of 23 animals and 14 plants came into force, following the publication of the Commission Implementing Regulation (2016/1141), in the Official Journal of the Union on the 14th July 2016. The 'Union list' comprises species whose potential adverse impacts across the European Union are such that concerted action across Member States is required (https://www.npws.ie/sites/default /files/files/Union%20 list%20of%20IAS.pdf).

On the 13th July 2017, Giant rhubarb along with a further 11 other species were added to the 'Union List' under EU Regulation 1143/2014 as per the Commission Implementing Regulation 2017/1263.

The second update of the Union list which added a further 17 species (13 plants and 4 animals) was adopted on 25th July 2019 and entered into force on 15th August 2019.

And the most recent and third update on the 13th July 2022, added a further 22 species to the list of species of Union concern in the EU. For most of these species the associated restrictions and obligations came into force on 2 August 2022. The final inclusion of three of these species has been deferred to 2024, and one to 2027.

Currently 88 species are listed as IAS of EU Concern.

European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024)

On the 26th July 2024, comprehensive regulations which address deficiencies in Irish law in terms of implementing the EU Invasive Alien Species Regulation were signed into law. The new European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374 of 2024) contain important provisions to address invasive species. The Regulations address the Invasive Alien Species of Union Concern and also sets out two schedules of Invasive Alien Species of national concern. The First Schedule, Part 1 lists the invasive alien plant species which are considered to be of national concern while the Second Schedule refers to soil or spoil taken from places infested with Japanese knotweed *(Reynoutria japonica)*, Giant knotweed *(Reynoutria sachalinensis)* or their hybrid Bohemian knotweed (*Reynoutria x bohemica*).

Plants listed under the First Schedule: Part 1 Plants and Second Schedule: Vector Materials are subject to restrictions under Regulations (17)1. Under Regulation 17(1) it is illegal to keep, permit to reproduce, grow or cultivate, release into the environment or place invasive species on the market. A 'Regulation 10 permit' is required from NPWS to carry out research on, or ex-situ conservation on invasive species.

European Communities (Birds and Natural Habitats) Regulations 2011 to 2015

There are statutory obligations under S.I. 477 of 2011 of the European Communities (Birds and Natural Habitats) Regulations 2011 to 2015 to address invasive species in Ireland. There

are a number of plant species including Japanese knotweed listed under the Third Schedule: Part 1 – Plants and Part 3: Vector Materials which are subject to restrictions under Regulations 49 & 50. Part 3: Vector Materials refers to soil or spoil taken from places infested with Japanese knotweed (*Fallopia japonica*), Giant knotweed (*Fallopia sachalinensis*) or their hybrid Bohemian knotweed (*Fallopia* x *bohemica*). Regulation 49 deals with the 'Prohibition on introduction and dispersal' while Regulation 50 deals with the 'Prohibition on dealing with and keeping certain species'. Regulation 50 has yet to be brought into Irish law (http://www.irishstatutebook.ie/eli/2011/si/477/made/en/print and http://www.Irishstatutebook.ie/eli/2015/si/355/made/en/print). A license application to NPWS is required under Regulation 49(2) in order to transport soil or spoil *i.e.,* vector material containing Japanese knotweed, Giant knotweed and Bohemian knotweed off site.

Further to consultation with Gerry Lecky of the Wildlife Licensing Unit of NPWS, an invasive species management plan, a method statement, a letter of acceptance from the receiving waste facility and the Waste Collection Permit Number from the National Waste Collection Permit Office (NWCPO) for the haulage company is required as part of the license submission.

Where treatment of an IAPS which poses a threat to the Conservation Objectives of a Natura 2000 site (European Site), is required, a licence pursuant to 49(14) [an amendment to the 2011 Regulations under Regulation 12 of the European Communities (Birds and Natural Habitats) (Amendment) Regulations 2015] may be required. Where it is determined that an invasive species poses a threat to the conservation status of a habitat or species, and it is necessary to treat an invasive species during the overwintering period, a licence under Regulation 49(13) may be required.

The treatment of an invasive species within a Natura 2000 site may also require Ministerial Consent under Regulation 30.

The Wildlife Acts

The Wildlife Acts, 1976 to 2012, contain a number of provisions relating to invasive species covering several sections and subsections of the Acts. With regard to exotic species, it is prohibited without a licence to plant or otherwise cause 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.

In relation to the management of invasive species, the Wildlife Amendment Act 2000 (S.46.1) provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided.

European Conventions

Ireland has also ratified a number of European conventions including

- Convention on Biological Diversity
- Bern Convention
- International Plant Protection Convention

The ratification of these conventions obliges the Irish government to address the issue of invasive alien plant species.

SUD Directive and PPP Regulations

In addition to the statutory obligations discussed above the following legislation is relevant to the management of invasive species through the use of chemical herbicides:

- Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides *i.e.* the 'Sustainable Use of Pesticides Directive' or 'SUD'
- European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012)
- Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC- 'Plant Protection Products Regulation'
- European Communities (Plant Protection Products) Regulations, 2012 (S.I. No. 159 of 2012)
- Waste Management Acts, 1996 to 2013, and related legislation.

Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 more commonly referred to as "the Sustainable Use Directive" or "SUD", aims to establish a framework for Community action to achieve the sustainable use of pesticides. It was transposed into Irish law by Statutory Instrument No. 155 of 2012, European Communities (Sustainable Use of Pesticides) Regulations 2012. The European Communities Sustainable Use of Pesticides Regulations 2012 (S.I. 155 of 2012) places additional restrictions and, in some cases, prohibitions, on the use of pesticides in certain restricted and sensitive areas (referred to herein as SUD restrictions and restricted/sensitive areas). These SUD restrictions and restricted/sensitive areas include transport routes (such as railway lines); areas used by the general public or defined vulnerable groups (*e.g.* public parks, hospitals, public schools and public playgrounds); and Natura 2000 sites.

There are also safeguard zones or exclusion zones (see Table 1.1) where no plant protection products can be applied in order to protect surface water abstraction sources (*e.g.* areas for the abstraction of drinking water such as surface waters, springs, wells or boreholes) and groundwater vulnerable landscape features (*e.g.* karst areas, sinkholes, collapse features).

It should be noted that the gathering of data on SUDS Restrictions and Restricted/Sensitive Areas is essential to the preparation of an IAPS management plan, as the presence of any such constraints will underpin the ability to deploy chemical herbicides, the selection of chemical herbicide, timing and application methods. In this regard, pesticides selected for use on any site should be fit for the purpose for which they are intended. Details of permitted pesticides authorised for use by the Irish competent authority, the Pesticide Registration and Controls Divisions and the Pesticide Control Laboratory of the Department of Agriculture Food and the Marine (DAFM) can be found at http://www.pcs.agriculture.gov.ie/.

Table 1.1 Safeguard Zones for Open Wells, Boreholes and water abstraction points

Water Source	Distance
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 100 m^3 or more of water per day or serving 500 or more persons	200 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 10 m^3 or more of water per day or serving 50 – 500 persons	100 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1-10 m^3 of water per day or serving 10-50 persons	25 m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1m^3 or less of water per day or serving 10 or less persons	5 m

Only a Registered Professional User (RPU) with the Department of Agriculture, Food and Marine can apply herbicides authorised for professional use from the 26th November 2015. A risk assessment and method statement for the management of IAPS should be prepared by an IAPS Specialist Ecologist in conjunction with an IAPS Specialist Contractor to take into account the various constraints/disturbance regimes/SUDS restrictions identified in an IAPS management plan and should propose and detail site specific control measures to avoid or minimise these risks including adherence to Regulation 12 of SUD Directive which identifies the requirement to complete specific site records as part of pre- and post-treatment reporting.

Waste Management

Post treatment with chemical herbicide, the main methods of managing IAPS are through the recovery of vector material for onsite burial or disposal offsite at a licenced receiving facility.

Specific obligations under the Waste Management Acts, 1996 to 2013, and related legislation pertaining to the waste categorisation of spoil and burial onsite or offsite are unclear in the absence of specific guidance from the Environmental Protection Agency (EPA) for soil and stone containing vector material of regulated species.

The EPA has clarified that a Waste License is required under the Waste Management (Licensing) Regulations 2004 to bury soil contaminated with vector material within a site.

As discussed above a license application to NPWS is required under Regulation 49(2) European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) in order to transport soil or spoil *i.e.* vector material containing regulated species off site.

Appendix II

INVASIVE SPECIES

Japanese Knotweed

Species Description & Ecology

Native to Japan, Taiwan, Korea and northern China, Japanese Knotweed (*Fallopia japonica*) is a perennial herbaceous plant which was introduced to the Kew Gardens (UK) in 1825 and to Ireland later in the 19th Century. The first record of Japanese Knotweed in Ireland is dated 1905 from a garden in Dublin. It was originally planted in the gardens of demesne estates for its foliage and "attractive" white flowers and also trialled as an animal fodder plant.

In its native countries, it is found growing along riverbanks, roadside verges, managed pastures and in sunny places on hills and high mountains. Over thousands of years, it has evolved to become one of the first species to colonise lands within 20 years of volcanic activity and is replaced by other herbaceous species after 50 years or so. Within its native range, it typically reaches 0.3 - 1.5m tall and is attacked by a suite of 226 natural enemies, including insects and fungi, which keep it in check.

Photograph 1.1 Japanese Knotweed breaking through a bituminous surface in Cork City (Source: John O' Donovan, O' Donovan Agri-Environmental Services)

In Ireland (and other countries to which it has been introduced worldwide), the absence of natural enemies combined with its ability to colonise volcanic landscapes and penetrate volcanic geological features means that the plant can grow unchecked reaching heights of up to 3-4m, to form dense colonies, and like a number of tree species is capable of accessing existing weaknesses or joints in bitumen, concrete, masonry and hard standing areas; thus, causing impacts to infrastructure (see Photographs 1.1, 1.2 and 1.4).

The ability to penetrate existing weaknesses and joints comes from its underground network of stems known as rhizomes. In more mature Japanese Knotweed plants, a central rhizome 'crown', develops from which the main stems emerge above ground. Underneath, the central crown, the radial rhizomes twist together to form a sizeable and considerable upward penetrating force. As the plant matures the crown expands thus opening up existing weaknesses in cracks or joints which may cause damage to infrastructure. However, while Japanese knotweed has the ability to cause damage, it rarely does so, as rhizomes will typically grow around any objects and structures which they encounter.

Photograph 1.2 Japanese Knotweed having broken through a weakness in the structure and gained internal access to a private dwelling in Co. Cork
(Source: John O' Donovan, O' Donovan Agri-Environmental Services)

The crown also acts as the plants' carbohydrate food store during the winter months when the leaves die back. While most of the plants' rhizomes are found in the top 0.25m of the

soil, they can also go deep into the soil (up to 3m) and extend up to several metres out from the plant, depending on ground conditions and disturbance regimes.

Under favourable conditions it can grow up to 10cm a day and can rapidly invade disturbed ground in the absence of native vegetation. No correlation between soil type, plant size or vigour has been identified, suggesting that it can grow on any substrate.

While Japanese Knotweed is generally not considered capable of producing viable seeds in Ireland (in simplistic terms only female cloned plants are considered to be present), the species displays an extraordinary ability to disperse and rapidly regenerate from rhizome or stem fragments to colonise and invade disturbed land. Less than 0.7g of a rhizome can produce roots and shoots in 10 days.

Photograph 1.3 Bonsais of Japanese Knotweed within amenity grassland in Cork City (Source: Lisa M. J. Dolan, Ecosystem Services)

Japanese Knotweed can also respond to cutting or burial by deploying a number of plant defence mechanisms. Therefore, to cut, flail, mow, dig or bury the plant will only result in:

- Dispersal of plant fragments which can regrow elsewhere
- Bonsai regrowth
- Rapid regrowth and increase in the height and extent of the plant
- Lateral growth of rhizomes and the development of new radial shoots
- Regrowth from buried depths of <5m

- Buried rhizomes can survive for up to 20 years

Knotweed also has the ability to execute a number of plant defence mechanisms in response to herbicide (see Appendix V) including:

- Sub-lethal bonsai regrowth (see Photograph 1.3)
- Lateral growth of rhizomes and development of new radial shoots
- Dormancy - rhizomes can lay dormant and viable for a number of years before regrowth
- Compartmentalisation
- Resistance or tolerance to standard chemical herbicide-based programmes

Given the plant defence mechanisms displayed by this species, herbicides should only be applied by those who are qualified and have knowledge and understanding of the ecology of the plant and industry best practice treatment options to eradicate the species.

While Japanese Knotweed is generally not considered capable of producing viable seed, it does however have the ability to hybridise with close relatives e.g. Giant Knotweed to produce Bohemian Knotweed which is capable of producing viable seed.

Photograph 1.4 Japanese Knotweed breaking through cavity blocks resulting in a structural crack in the wall of a garden in Co. Cork (Source: Lisa M. J. Dolan, Ecosystem Services)

During landscaping and construction activities Japanese Knotweed can be disturbed by machinery, and spread within or be brought onto a site, in the form of plant fragments within the soil load or on the tyres of machinery and dumpsters, especially on machinery with tracks. The maintenance of Japanese Knotweed by mechanical methods such as cutting and strimming can distribute fragments, which can then be carried along road corridors by wind or on the tyres of vehicles including cars (see Wace, 1977; Wilcox, 1989). Fragments can

also be carried on the footwear of pedestrians. Cutting and mowing results in the creation of bonsai regrowth which can go undetected.

In relation to semi-natural habitats, the species out-competes native herbaceous and juvenile woody plants, reducing species diversity (see Photograph 1.5). Once established the height, dense canopy and aggressive nature of the plant essentially excludes other species. In addition, Japanese Knotweed has also been shown to have allelopathic effects on native vegetation; permitting germination but limiting biomass. Along riverbanks, new shoots have been observed developing primarily from floating stems from which fragments can be broken off by floods which lodge downstream to form new outlier populations; therefore, an upstream catchment wide management approach is required to achieve eradication of knotweed species along habitats where there is upstream surface water connectivity.

In Ireland, Japanese Knotweed is associated with roadsides, railways, car parks, car wash facilities, quarries, maintenance depots, abandoned/waste ground; in particular, disturbed areas where native vegetation is absent and where fly-tipping of spoil has occurred.

Photograph 1.5 Japanese Knotweed dominating the riverbanks of a stream in Co. Kerry (Source: Lisa Dolan, Ecosystem Services)

Giant Rhubarb

Species Description & Ecology

Giant Rhubarb (*Gunnera tinctoria*), also known as or Chilean Rhubarb, is a large leaved herbaceous flowering plant species native to southern Chile and neighbouring zones in Argentina. Giant Rhubarb is reported as native on both sides of the Andes from Colombia to Chile (Williams et al., 2005) including Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador and Peru.

In its native range in Giant Rhubarb grows on forest margins adjacent to wetland areas, stream-sides and, particularly, on bluffs and talus slopes (Williams et al., 2005).

Giant Rhubarb became a very popular ornamental species in temperate areas in the 1850s. Because of its size and striking exotic appearance, it was widely introduced and planted by lakes and streams in parks and gardens, initially in North America and Europe but later in New Zealand and Australia. From these areas it has become naturalised as a garden escape.

Photograph 1.1 Giant Rhubarb on Achill Island (Source: www.tela-botanica.org)

In Ireland the species was introduced into cultivation around 1850, but was not recorded in the wild until 1939, at Killary Harbour, County Mayo indicating an establishment phase of 60 years, although it is likely that it may have naturalised prior to this. Since then, it has escaped

into the wild and is now particularly invasive along the western coast. Significant records of this species in the wild were not, however, found until the 1950s indicating a further lag phase of 40 years before any significant spread (Osborne and Gioria, 2005).

By 1960s, the species had formed extensive dense monospecific stands on the west coast of Ireland, southwest England, the west coast of Scotland, the Azores, the coast of California and New Zealand.

Giant Rhubarb is currently considered invasive on the west coast of Ireland where the most extensive colonies are found in the west of County Mayo and County Galway (Hickey and Osborne, 2001) and more recently in Co. Kerry. In particular, Giant Rhubarb has had devastating effects on Achill Island and has also colonised Valentia Island, Clare Island and Whiddy Island (see Photograph 1.1).

Invasive Qualities

Giant Rhubarb can grow to 2m tall and flowers after 4-5 years. It has large leaves and stems that forms dense colonies and shades out other plants. The large inflorescences or flowering spikes produced in July and August can reach up to c. 1m long and can produce 12,000 - 83,000 seeds (Williams et al. 2005) and as much as 100,000 (Bergman et al. 1992) per spike. Seed production is therefore high and an individual plant may produce up to 700g of dried seed or potentially 700,000 individual seedlings (Osborne et al. 1991). The seeds may be dispersed by wind, water movement, birds or livestock (Palkovic 1974; Reynolds 2002).

Hymenopterous insects, particularly bees, are probably the main pollinators. Birds and small mammals find the tiny red fruit nutritious and are vectors for seed dispersal (Williams et al., 2005). Germination tests in New Zealand yielded 100% germination in 30 days for both fresh seeds and seeds from bird faeces (Williams et al. 2005). Observations by the authors during walkover surveys at Bantry noted Blackbird (*Terdus merula*), Robins (*Erithacus rubecula*) and the Grey Crow (*Corvus cornix*) feeding on the fruit of Giant Rhubarb.

Soils sampled from Achill Island for seed bank analysis has shown a very high number of seeds, some germinating even after twelve months, with many germinating from below the top 5cm, indicating relative persistence of Giant Rhubarb in the soil (Gioria and Osborne 2008; 2010).

The species can also propagate vegetatively from fragmented rhizomes, spreading widely if beside flowing water or unstable cliffs (Williams et al. 2005) and dispersed through the disposal and transportation of soil (Reynolds 2002), or with earthworks and quarrying, which create a similar unstable habitat to that in its native regions.

Mature plants are extremely large, with stems up to 1.5m long and the leaves up to 2m long and 2m wide (Grant 2004; Stace 2010). Where it becomes established, its large size shades out and suppresses smaller native plants growing beneath and may reduce the seed rain from adjacent species, as the soil seed bank diversity is reduced under Giant Rhubarb (Gioria and Osborne 2010).

In its introduced range, habitats with moderate to heavy rainfall and frost-free conditions for most of the year and relatively small variations in temperature are ideal for plants to naturalise. In Ireland, Giant Rhubarb has become naturalised along the milder and wetter western seaboard because the climatic conditions are similar to that of its former range due

to the fact that freezing temperatures are uncommon in the west of Ireland because of the Gulf Stream current. It can be found on coastal cliffs and heath, waterways, roadsides, wet meadows, derelict gardens, fields and hillsides. Giant Rhubarb grows well in constantly damp soil. The plant is also shade tolerant so it may colonise in a variety of landscapes. The lack of expansion of its range on the east coast of Ireland appears to be related to intolerance of low temperatures, therefore it is currently not considered invasive there (Invasive Species Ireland, 2008).

Mature stands of Giant Rhubarb can impede water flow through the obstruction of drainage in adjacent streams and rivers particularly when water levels are high. Giant Rhubarb can also impact on land-use and access to lands and built infrastructure when it forms dense monospecific stands.

Control & Management Programmes

In New Zealand, the first action in the treatment of Giant Rhubarb is to remove the flowering spikes were present. As the seed has little dormancy this approach has been found to reduce re-infestation from the seed bank after two years. Follow-up monitoring and further cutting back of plants, however, is needed (Williams et al., 2005).

Law (2003) reported that Taranaki Regional Council utilised glyphosate with a suitable wetting agent with respect to an eradication programme for Giant Rhubarb. Plants were cut and the exposed cut surface was immediately treated with Glyphosate. After treatment, it was noted that some rhizomes take up to 18 months to decay. Sub-lethal doses of herbicide have also been noted to result in multi-headed re-growth. Trials in Ireland to date, suggest that the application of herbicide is most effective late in the growing season (late August to early September) by direct application to cuts made on the stems or on leaf stalks following cutting back of leaves (National Botanic Gardens, 2008). The trials carried out at Dooega, Achill Island used Glyphosate and Triclopyr. NRA (2010) recommends the use of Glyphosate, Triclopyr or 2,4-D amine.

According to NRA (2010) small or recently established infestations may be dealt with by removing the plants physically. It is important to uproot the entire rhizome network. Where all rhizomes are not removed regular follows will be required to deal with regrowth from rhizomes. Recovery should be undertaken pre-flowering (which commences in July) and following recent rain. NRA (2010) recommended deep burial (more than 2m deep) of recovered material. Follow-up control is required on sites where rhizomatous material remains or where a seedbank has already established.

Montbretia

Species Description & Ecology

Photograph Montbretia
(Source: Paul Green)

Crocosmia's are members of the iris family (Iridaceae) which are perennial plants, that grow from underground corms, and which are native to the grasslands of the Cape Region in South Africa.

Montbretia (*Crocosmia* X *crocosmiiflora*) is an artificially produced horticultural hybrid, derived from two Crocosmia species native to South Africa, which was developed in France in 1880 by Victor Lemoine for ornamental purposes (Govaerts and Barker, 2016; (Weeds of Australia, 2016; NRA, 2010; DAFM, 2016). The Montbretia hybrid is derived from the species *Crocosmia aurea* and *Crocosmia pottsii.*

Montbretia has been widely cultivated as an ornamental. More than seven cultivars of *Crocosmia* × *crocosmiiflora* (with flowers varying from yellow to orange and red colours) have been developed and are widely commercialized in tropical and subtropical regions of the world (The Royal Horticultural Society, 2016; https://www.cabi.org/isc/datasheet/107826/aqb) and can now be found naturalised in tropical and subtropical areas of Asia, the Americas, Australia, and Hawaii (Wagner et al., 1999; Govaerts and Barker, 2016; USDA-ARS, 2016; Weeds of Australia, 2016), as well as in more temperate regions in northern Europe and New Zealand (https://www.cabi.org/isc/datasheet/ 107826/aqb).

Growth begins in early spring with leaves sprouting vigorously in March. The grass-like leaves are bright green, flat, sword-shaped and may be slightly pleated at the base. The leaves are soft, hairless and have pointed tips. The linear leaves are 300-800mm long, and 10-20mm wide and are mostly clustered near the base of the plant (DAFM, 2016).

Flowering takes place between July and September. Montbretia is easily recognised when in flower by the distinct shape and colour of its flower heads. The trumpet-shaped flowers are usually orange-red with yellow centres produced in a loose terminal panicle forming two rows along each slender zig-zag stem or spike up to 600–1000mm in height. Spikes are slightly flexuous, arching horizontally, with several branches, bracts 6-10mm long; sepals orange, lanceolate, 15-25 mm long, 6-9 mm wide, sub-equal, spreading, the perianth tube slightly curved, 10-15 mm long; filaments 15-22 mm long; anthers 6-8 mm long. The petals are 30-40mm long and 20-50mm wide (NRA, 2010; DAFM, 2016; https://www.cabi.org/isc/datasheet/107826/aqb).

The fruit are capsules are up to 7 mm long, ca. 9 mm wide and turn from green to brown and become shrivelled and wrinkled as they mature (DAFM, 2016). According to Wagner et al.

(1999) the seeds are brown, wrinkled, usually not viable (Wagner et al., 1999) https://www.cabi.org/isc/datasheet/107826/aqb, while the NRA (2010) states that the flowers are capable of producing viable seed which further aids the spread of the plant. There is no information available in the literature regarding the persistence of the soil seed bank.

Typically dead brown leaves, flowering stems and seed heads remain throughout winter, however, in localised milder areas the leaves may not die back completely (NRA, 2010; DAFM, 2016).

Montbretia's primary mode of spreading is vegetatively, through underground corms and rhizome fragments (Wagner et al., 1999). The corm is a bulb-like organ 2-3cm in diameter with slender scaly stolons. Each plant can produce a string of flattened corms underground (up to 14 new corms annually) which form linear chains with the youngest at the top and the oldest corm buried the deepest in the soil.

The chains are fragile, and corms readily break off from the parent plant to produce their own root network giving the plant a ready means of spread (NRA, 2010; DAFM, 2016).

Small fragments of rhizomes can also easily separate from the parent plant and produce new plants in the wild (DAFM, 2016; Ensbey et al., 2011; Weeds of Australia, 2016, Weeds of New Zealand, 2016 cited in https://www.cabi.org/isc/datasheet/107826/aqb).

Invasive Qualities

Montbretia escaped from cultivation into the wild and spread rapidly across Europe during the latter part of the 20th Century to become invasive in parts of Europe and New Zealand (Govaerts and Barker, 2016; NRA, 2010; DAFM, 2016). It has naturalised itself in many parts of Ireland, especially in the west and south-west where it is very common along road banks and hedgerows due to the mild and damp conditions. It is also frequent along watercourses and lakeshores. Montbretia can invade most low-growing habitats such as wet grasslands, gardens, hedgerows, pastures, waste areas and roadsides (NRA, 2010; DAFM, 2016). This species is well adapted to grow in a wide range of environmental conditions and soil types (it may grow in any soil, wet or dry, poor or rich).

The biodiversity of ecosystems can be significantly affected by an infestation of Montbretia. Once established, it out-competes the local flora and forms large low-lying dense stands. Montbretia displaces native vegetation by smothering ground cover plants and small shrubs and inhibits the establishment of indigenous seedlings.

Montbretia tolerates frost, heat, moderate shade and grazing so is capable of colonising a variety of habitats. It consumes fertiliser and water intended for crops (DAFM, 2016). The weight of the mass of corms can cause the collapse of stream banks leading to erosion and sedimentation of natural riparian areas (Ensbey et al., 2011; Weeds of the Blue Mountains, 2016 cited in https://www.cabi.org/isc/datasheet /107826/aqb).

The linear chains of corms and rhizomes facilitate increases in the size and density of an infestation as the corms, corm fragments and rhizomes can be spread unintentionally as a result of ground disturbance, dumping of garden waste and by attaching to machinery (https://www.cabi.org/isc/datasheet/107826/aqb; DAFM, 2016). Rhizomes and corms are dispersed by the movement of contaminated soil, as dumped garden waste, and by

watercourses (Ensbey et al., 2011; Weeds of Australia, 2016, Weeds of New Zealand, 2016 cited in https://www.cabi.org/isc/datasheet/107826/aqb).

There is conflicting information available regarding the viability of the seed.

Control & Management Programmes

Non-chemical treatment, chemical treatment, or a combination of both can be employed to remove this species.

Physical control of Montbretia is difficult as the corms break up from their chains very readily and cause re-infestation or further spread. Where infestations are limited in extent, the entire stand of Montbretia can be controlled by removing the plants and corms (NRA, 2010; Weeds of New Zealand, 2016) and burying them to a depth of at least 2m, alternatively they can be incinerated or disposed of to a licensed landfill. Corms should be disposed properly in order to avoid re-sprouts. It should be noted that the corms are very hardy and are not suitable for composting.

As Montbretia is capable of regeneration from corms and small fragments of rhizome, all material must be handled and disposed of in a way which does not result in the potential for further spread. Small pieces of plant material may be spread unintentionally on shoes, clothes, and agricultural equipment; therefore, biosecurity protocols should be strictly adhered to at all times.

According to DAFM, the most effective time to excavate Montbretia is just before full flowering occurs in summer, while NRA (2010) states that excavation can take place at any time of the year, when the soil is suitably dry.

Due to the potential for reinfestation from corms and fragments of rhizomes, regular follow-up with chemical herbicide may be required for a number of years to deal with any regrowth (NRA, 2010;(https://www.agriculture.gov.ie/media/migration/farmingschemesandpayments/glastraining/MontbretiaFinalDraft230616.pdf).

Chemical control can be achieved using glyphosate or Metsulfuron during active growth in late spring or summer with foliar spray, wiper applicator or spot treatment (NRA, 2010). In Australia and New Zealand, herbicides such as glyphosate and Metsulfuron-methyl have been used to control infestations of Montbretia (Ensbey *et al.*, 2011; Weeds of New Zealand, 2016; https://www.cabi.org/isc/datasheet/107826/aqb).

Small fragments of plant material may be spread unintentionally on shoes, clothes, and construction equipment and plant machinery and in soil loads.

Due to the potential for reinfestation from corms, regular follow-up will be required over a period of at least 2 years to deal with any regrowth.

Buddleia

Species Description & Ecology

Buddleia (*Buddleja davidii*) is a deciduous shrub native to China, that grows 1-4m tall with arching stems. The leaves are opposite, 10-20 cm long, and lanced-shaped with a slightly serrated edge and a felted-velvety whitish under surface.

It typically flowers during the period June to September, when dense clusters of tubular flowers develop. These flowers have 4 petals and can be purple, white, or pink. The flowers produce high quantities of nectar and are attractive to butterflies, hence the common name – Butterfly Bush.

The desiccated flower heads and seed capsules may remain on the shrub over winter. The developing seed pods are small upright and ovate and may not be readily visible through the remnants of the flower. When mature, the pods area a dark brown and opened at the tip. The seeds produced are extremely small and numerous with up to 3 million produced per plant. The seeds are dust-like particles which can easily be distributed by the wind. They can also remain viable in soils and gravels for many years (https://www.invasiveplantatlas.org/subject. html?sub=11608; NRA, 2010).

Although butterflies use Buddleia as a nectar source, their larvae cannot survive on it. By replacing native larval food source plants, Buddleia can have a negative impact on wildlife (https://www.invasiveplantatlas.org/subject.html?sub=11608).

Invasive Qualities

Buddleia as a prolific reseeder can quickly establish scrub transitional communities, in particular disturbed sites. Like many invasives, it can rapidly colonise bare ground forming mono-typic stands.

As buddleia can tolerate nutrient poor soils, it is capable of growing on walls, rocky outcrops or sub-soils. Buddleia can also readily establish on very dry hard standing areas constructed from gravel, and other similar compacted loose materials, and in cracks and crevices in old concrete and bituminous finished surfaces.

In particular, Buddleia creates issues on road schemes where features are being left to re-colonise naturally as in rock cuttings, eskers, *etc*. (NRA, 2010) for wildlife conservation purposes.

It can result in considerable maintenance of landscaped areas and hard standing, in particular car parks, yards, brownfield sites, building sites, quarries and road schemes.

Control & Management Programmes

According to Ream (2006) formulations of glyphosate effectively control Buddleia up to two years old; where required it should be followed up at 6 monthly intervals.

For more mature plants a combination of spraying the entire plant and painting herbicide concentrate on recently cut stumps is effective in controlling Buddleia (Ream, 2006), thus preventing the dispersal of seeds within a site and into the surrounding landscape.

According to NRA (2010) recommended practice for the application of herbicides requires the cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr *et al.*, 2003).

Even after the Buddleia shrub has been cut down, a new sprout may grow from the stump. In order to completely eradicate the shrub, it may be necessary to remove the stump using a stump grinder or similar to grind the stump down to ground level, followed by digging out major connecting roots.

It is also possible to kill the stump using accelerated decay to rot the stump before removing it. To use this method, a series of holes are drilled into the top and sides of the stump. The holes are then filled with slow-release fertilizer and watered well before the stump is covered with a mound of soil to begin the process of decay. After a few weeks, the stump will have rotted from the inside out and ready for removal.

Management methods such as digging it out (grubbing) are applicable only to minor infestations at the initial stage of invasion. 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 seedling. Grubbing of mature stands as a sole attempt at control is not recommended for the same reason.

After uprooting, it is essential to monitor for regrowth and treat with chemical herbicide or to plant the ground in order to prevent a flush of new seedling growth. Mowing of young plants does not provide control as they re-sprout with vigour.

Where removal of mature plants is not feasible in the short term, the flower heads should be cut off in June before seeds are released. Where desiccated flower heads and seed capsules remain on the tree over winter these can also carefully be removed to minimise further dispersal.

Sycamore

Species Description & Ecology

Sycamore is a large deciduous broadleaved tree which can grow to 20-35m. Bark is grey smooth when young, later flaking in patches. Leaves are large and palmate with five radiating lobes. Flowers are yellowish-green panicles. The winged seeds are borne in pairs and twirl to the ground germinating in Spring.

Invasive Qualities

Sycamore seeds can be dispersed up to 200m and persist for a number of years, however, very few seeds remain in the seedbank as they germinate en masse annually.

Control & Management Programmes

Sycamore trees can be felled and with herbicide applied immediately to the stump with a brush. Even after the sycamore tree has been cut down, a new sprout may grow from the stump. In order to completely eradicate the tree, the stump should be removed using a stump grinder to grind the stump down to ground level, followed by digging out major connecting roots. It is also possible to kill the stump using accelerated decay to rot the stump before removing it. To use this method, a series of holes are drilled into the top and sides of the stump. The holes are then filled with slow-release fertilizer and watered well before the stump is covered with a mound of soil to begin the process of decay. After a few weeks, the stump will have rotted from the inside out and ready for removal (https://homeguides.sfgate.com/methods-killing-sycamore-trees-27914.html).

Travellers' Joy

Species Description & Ecology

Travellers Joy (Clematis vitalba), also known as Old Man's Beard, is a vigorous, deciduous climber which produced characteristic feathery seed heads in the late summer from which it derives its common name.

Invasive Qualities

The vine can form dense thickets blanketing trees and shrubs, ultimately depriving them of light. It can break limbs or cause their collapse from its sheer weight and mass. It also prevents regeneration of native understorey vegetation by blocking light and physically oppressing young plants.

In Ireland it is found in hedgerows, roadsides, riverbanks and along forest edges.

Control & Management Programmes

Glyphosate can be used as a foliar spray or as a spot treatment for Traveller's Joy and should be applied in summer during active growth before senescence, when it is not very hot or during drought. Following control, regular monitoring will be required with appropriate follow up to deal with regrowth or new seedling germination over a period of 2–3 years.

For mature plants, they can be physically removed from the ground, or the vines can be cut back to ground level or waist height in winter or spring with a straight horizontal cut. Herbicide is then applied immediately to the wound with a brush and the subsequent regrowth can be then foliar sprayed. This method will avoid impacting on the host plant the vine may be covering. 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.

Winter Heliotrope

The recommended optimum treatment period for the deployment of Glyphosate to Winter Heliotrope is February and March after flowering or in mid to late summer according to the NRA (2010). New foliage begins to appear after flowering later in spring (though last years' foliage may not dieback completely). Winter Heliotrope flowers between January and March and in certain climatic conditions the plants flower between November and March (http://www.irishwildflowers.ie/pages/200a.html;(http://www.irishwildflowers.ie/pages/200a.html; http://www.irishwildflowers.ie/pages/433a.html). The seeds are sterile as only male plants are present in Ireland.

According to NRA (2010) the recovery of Winter Heliotrope vector material can be undertaken at any time of year. It is important to ensure to uproot the entire rhizome network. Where all rhizomes are not removed regular follow-ups will be required to deal with regrowth from rhizomes. Deep burial (more than 2m deep) of recovered material is recommended (NRA, 2010).

It is understood that the control of Winter Heliotrope is currently the subject of an EPA funded project led by CERIS, Institute of Technology, Sligo which is targeting the Prevention, Control and Eradication of Invasive Alien Species (IAS) on the Island of Ireland.