

Code
of
Practice

Management
of Japanese
Knotweed



April 2018



Code of Practice for the Management of Japanese Knotweed

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1. Introduction

This Code of Practice is issued by the Property Care Association.

This Code is based on current “best practice” and aims to provide a concise and thorough guide to the management of Japanese Knotweed (scientific name: *Fallopia japonica*). Information is given on associated matters and, where appropriate, reference is made to other documents and legislation. Background information that may be useful when dealing with clients is also provided. All information conforms to or improves on recommendations provided by the Environment Agency^{1,2}, Invasive Species Ireland³, the Royal Institution of Chartered Surveyors⁴, the Scottish Environment Protection Agency (SEPA)⁵ and Natural Resources Wales⁶ for the survey and management of Japanese Knotweed. Improvements on recommendations are based on experiential data of PCA members with long-standing proven records in Japanese Knotweed control.

The aim of this Code of Practice is to provide guidelines that set the principles and standards to which PCA members work.

The Code of Practice is intended for use in England, Wales, Scotland and Ireland and provides information on much of the most important legislation that is relevant to Japanese Knotweed control in these geographic regions. Not all legislation is covered and legislation changes from time to time. It is the responsibility of individual members to ensure that they are aware of and follow all legislation relevant to work carried out and any changes to it.

Red exclamation marks are found next to sections of particular importance.



2. Definitions

Active Ingredient: The chemical component of a pesticide that kills or debilitates a plant.

Adjuvant: A substance or substances which when added to a pesticide increases the efficiency of the treatment.

Asiatic Knotweeds: Those species of *Fallopia* and their hybrids native to Japan and parts of eastern China that have been imported into Europe and North America, some of which have become naturalised and invasive.

Biodiversity: The number and variety of organisms found within a specified geographic region.

Bonsai Growth: Miniaturised and distorted appearance of the Japanese Knotweed growth, caused by significant stress to the plant. It is normally regarded as evidence that previous herbicide treatment has taken place; however, on very rare occasions it may be a symptom of bacterial infection (*Candidatus Phytoplasma aurantifolia*).

Cane: Tall, hollow, bamboo-like knotweed stems.

Crown: Visible part of the rhizome from which a bud or buds will emerge. Looks like a crown when the stems are cut.

Dormancy: Japanese Knotweed may readily enter a dormant state (total or partial). This is a defensive measure which is triggered by unfavourable growing conditions and occurs as part of the plant’s natural growing cycle each winter. Longer periods of dormancy may often be the result of various factors including inappropriate treatment, e.g. including the use of residual herbicides. Dormancy can persist for a number of years.

IBG: Insurance Backed Guarantee, an insurance policy that protects the client’s guarantee of treatment in the unlikely event of your company ceasing to trade.

Invasive non-native plant species: Those plant species that do not occur naturally in England, Wales, Scotland and Ireland; they have been introduced from other countries and have subsequently become established in natural or semi-natural habitats where they can cause economic and/or ecological damage.

Node: The point on a plant stem or rhizome from which the leaves or lateral branches grow.

Perennation: Survival from year to year, surviving inclement seasons by vegetative means, for example, rhizome.

Perennial: A plant lasting three or more seasons, continuing its growth from year to year.

Residual: (with respect to pesticides including herbicides): A quantity of pesticide remaining in the soil after the treatment has been completed. This chemical remains active for a period of time.

Rhizome: A rootlike underground stem, commonly horizontal in position, that usually produces roots below and sends up shoots from the upper surface.

Species: A fundamental category of taxonomic classification, ranking below a genus or subgenus and consisting of related organisms capable of interbreeding.

Stand: A growth of plants in a particular area.

Translocation: The transport of dissolved substances within a plant

Viable: Alive and capable of growing into a new plant. Even after repeated herbicide treatments, Japanese Knotweed rhizome can still be viable.

The Wild: Defra (Department of the Environment and Rural Affairs) defines ‘the wild’ as “The diverse range of natural and semi-natural habitats and their associated wild native flora and fauna in the rural and urban environments in general. This can also be broadly described as the general open environment.” Whether an introduction (release or escape) is into “the wild” may be dependent on the ecology of the species in question and the potentially affected environment and what constitutes the wild must be judged on a case-by-case basis. Residential back gardens or managed estates are typically not considered “the wild”⁷.

3. Training and accreditation requirements

Any person involved in the control of Japanese Knotweed must have training commensurate with their duties. Training in the safe and effective control of Japanese Knotweed should be given in accordance with the ‘PCA Certificated Surveyor for the identification and control of Japanese Knotweed’ (CSJK) course. This course is provided by the PCA and a certificate is awarded based on written, oral and practical examinations.

Any operator who uses herbicide must possess the appropriate safe use of pesticide certificates of competence (see Section 9). Operator training should be given in accordance with the ‘PCA Qualified

Technician – Japanese Knotweed’ (QTJK) course. This course is provided by the PCA and a qualification is awarded based on a multiple choice question exam.



Prior to work on any site, a surveyor should ensure that all necessary health and safety accreditation is possessed and all necessary training has been carried out.

General advice on training and training courses is available from the PCA.

4. Japanese Knotweed

4.1 Introduction to Japanese Knotweed

Japanese Knotweed is a tall, vigorous, hardy perennial plant. It is an invasive non-native plant pest and is considered one of the most problematic plant species in the UK and Ireland. The species was introduced to Britain in mid 19th century as an ornamental plant for large gardens, prized due to its imposing size and sprays of creamy white flowers. By 1886 it was established in the wild and now it is very widely distributed. As it is not native to the UK and Ireland, it is not exposed here to any of its natural enemies, such as the insects, bacteria and fungi that feed and grow on and in it in its countries of origin (Japan, Korea and North Western China). The absence of these checks in conjunction with its highly invasive and competitive nature has facilitated the invasive spread of Japanese Knotweed throughout England, Wales, Scotland and Ireland.

The plant's well documented rapid growth rate is in relation to upward growth of shoots at the beginning of the growing season. The rate of lateral growth, via extension of its rhizome (underground shoot) system, is not well understood. The rate of spread will be dependent on the density and composition of soil and the presence of built structures. Dense soil will usually limit the spread of the plant. New shoots can emerge from spreading rhizomes. Rhizome extension is generally limited to a 4m radius from visible above ground plants and a depth of 2m. However, extension beyond these limits is possible. A frequently used rule of thumb for estimating potential rhizome growth is 7m outwards and 3m down¹; however, this is not a statistically robust method for estimating likely rhizome extension. It does, however, provide a useful and reliable 'safe distance'.

Propagation by seed has not been observed in England, Wales, Scotland and Ireland. While viable seed can be produced when Japanese Knotweed hybridizes with other Asiatic Knotweeds and Russian Vine, these seeds rarely germinate and it is extremely unusual for seedlings to survive. The main method of distribution is the movement of infested soil and materials associated with earth-works. Fragments of rhizome weighing just a few grams can produce new plants. Lengths of shoot can also produce new plants; however, at least two nodes are usually required for this to take place and it will only take place in favourable conditions.

4.2 Impacts of Japanese Knotweed

The underground rhizomes of this species can penetrate loose aggregate and grow through existing small cracks, openings or voids in asphalt/concrete. Like many plant species, once established, the underground structures of Japanese Knotweed rhizome can slowly increase in volume over time and ultimately impact built structures (e.g. drains and patios), typically in the form of exacerbating existing weakness or damage. However, Japanese Knotweed is typically less likely to cause such damage than may commonly be encountered with woody plants.

The species' fast vertical growth rate allows it to outcompete much of the native vegetation in the UK and Ireland.

Other negative impacts include:

- Loss of biodiversity.
- Increased flooding risk by impeding river-water flow.
- Increased riverbank erosion.
- Economic loss, primarily associated with control costs in the construction sector.
- Delays to development.
- Aesthetic damage to gardens and landscaping.
- Loss of amenity and recreational space.
- Adverse publicity for landowners.

While acknowledged as disproportionate to the actual impacts caused by Japanese Knotweed, the presence of the species can also result in:

- Financial institutions refusing to provide a mortgage or building insurance.
- Impeding and, or preventing property sale.
- Diminution of property value.

- Loss of quiet enjoyment (as per common law).
- Neighbourly disputes and, on occasions legal fees.

Not all impacts are negative; Japanese Knotweed stands in urban environments can provide shelter amongst its dense stems and food for wildlife e.g. an attractive source of nectar late in the season.

4.3 Identification

Japanese Knotweed rarely exceeds a height of 3m. It has shield-shaped leaves which are flat at the base and are carried on zigzagged stems, which are sturdy, purple spotted, hollow and bamboo-like with regular spaced nodes. The flowers (only female in the UK and Ireland), which appear in late summer or early autumn, are creamy white-coloured and are formed in drooping clusters 8cm to 12cm in length. In spring, the emerging stems are green to red/purple with rolled leaves that unfurl as the shoots extend. At the end of the year, the stems persist and turn various shades of brown, sometimes with an orange tinge.

In external appearance, the rhizome is dark brown and slightly leathery. It is brittle when fresh and snaps like a carrot and has a musty 'antique store' like smell. The interior is an orange-yellow colour, generally darker towards the centre. Lines often radiate from the centre.

At the base of Japanese Knotweed stems, an enlarged crown develops from which shoots and rhizomes emerge. The crown is hard and lumpy in appearance and before the growth season it can possess pink/red smooth-shiny buds.

Guides for identification of Japanese Knotweed can be found in many guidance documents. See notes 1, 3, 4, 5, 6 in Reference Section.

4.4 Other Asiatic Knotweeds and Himalayan Knotweed

While currently much less common than Japanese Knotweed, the closely related Giant Knotweed (*F. sachalinensis*) and Hybrid (or Bohemian) Knotweed (*F. x bohemica*) are also invasive and share many common characteristics in terms of overall appearance, growth habit, and impacts. However, leaf size is approximately 2-3 x greater in the case of Giant Knotweed, which possess leaves with a heart shaped base (with lobes), with Hybrid Knotweed being intermediate in size and shape. The distribution of both species is increasing, in particular Hybrid Knotweed, which is spreading rapidly and becoming increasingly common in some areas. They are listed on the same legislation as Japanese Knotweed and are subject to the same restrictions with respect to facilitating spread and waste disposal. Himalayan Knotweed (*Persicaria wallichii*) has spear-shaped leaves and is again less common, though increasing in spread in parts of Scotland and Ireland. It bears many similarities to the Asiatic Knotweeds in terms of its invasiveness and tendency to spread via rhizome. It is also subject to much of the same legislation in Ireland and Scotland, but not currently in England and Wales. With regards to management, from a practical point-of-view, these species can to be treated similarly to Japanese Knotweed.

4.5 Similar species (mistaken identity)

Japanese Knotweed is commonly mistaken for other species (e.g. Dogwood species, certain Dock species, Lilac, Bindweed species and Himalayan Honeysuckle). A PCA approved specialist should be consulted for reliable identification.

5. Legislation

Control action should be carried out in conformity with any relevant legislation in a given geographic region, e.g. England or Scotland. Legislation is continually changing and it is the responsibility of individual members to remain up to date.



This Code of Practice does not attempt to provide an exhaustive list of all legislation that may be relevant to control action, but rather aims to provide a concise explanation of the most relevant aspects of key legislation directly relevant to Japanese Knotweed control (Table 1). All relevant health and safety regulations must be followed at all times.

Essentially, this legislation makes it an offence to plant, or otherwise cause to grow (including allowing to spread) listed species in the wild, and, if transported off site, there is a duty of care with regards to the disposal of any part

of the plant that may facilitate establishment in the wild and cause environmental harm.

If charged with committing an offence, it is a defence against prosecution to prove that all reasonable steps were taken and all due diligence exercised in attempting to avoid committing the offence. As such, landowners should be encouraged to have a management plan for the Japanese Knotweed on their property and be able to show that they are following it, e.g. they have hired a PCA approved specialist to manage the plants appropriately.

See Table 1 below and the PCA's Guidance Note on Legislation for additional information.

Table 1: Summary of legislation relevant to Japanese Knotweed

a If proposed amendments to Waste Management (Facility Permit and Registration) Regulations are adopted, this would allow for on-site disposal/ remediation options to be carried out without going through the authorisation process for these activities.

b In Wales approval is only required in high risk areas

Key legislation relevant to the management of Japanese Knotweed		
Legislation	Region	Relevance
Wildlife and Countryside Act 1981 (as amended)	England Wales	You must not facilitate the spread of Japanese Knotweed in the wild.
Wildlife and Natural Environment Act 2011	Scotland	
Wildlife Order 1985	Northern Ireland	
Statutory Instrument No.477		
European Communities (Birds and Natural Habitats) Regulations 2011	Republic of Ireland	
Environmental Protection Act 1990	England Wales Scotland	Waste containing Japanese Knotweed is classified as 'controlled waste'. As such, you must observe the appropriate duty of care for its proper handling and disposal. Also see Section 15.
The Duty of Care Regulations 1991		
Waste and Contaminated Land (NI) Order 1997	Northern Ireland	
Waste Management Licensing (NI) Regulations 2003		
Waste (Duty of Care) Regulations 2002		
Irish Waste Management Acts 1996-2003.	Republic of Ireland	The situation is evolving. The National Parks and Wildlife Service should be contacted. It is likely that you will require a licence for transport and disposal and authorisation for onsite ^a waste management.
Waste Management (Facility Permit and Registration) Regulations		
Control of Pesticides Regulations 1986	England Wales Scotland	Any person using pesticides must take all reasonable precautions to protect the health of people and wildlife, hold a certificate of competence, only apply pesticides to target areas and, in applicable locations, ensure the amount of pesticide used and the frequency of application are as low as reasonably practicable.
Control of Pesticides (Amendment) Regulations (Northern Ireland) 1997	Northern Ireland	
Statutory Instruments No. 155/2012 European Communities (Sustainable Use Of Pesticides) Regulations 2012	Republic of Ireland	
European Communities Plant Protection Products (Sustainable Use) Regulations 2012	EU	Approval from the relevant statutory agency must ^b be obtained prior to use of pesticides in or near water (see section 9.5 for further details).
Other legislation relevant to the management of invasive non-native species		
Legislation	Region	Relevance
EU Invasive Alien Species Regulation 1143/2014	EU	This regulation imposes additional Union wide restrictions on species of animals and plants listed as 'Invasive Alien Species of Union Concern'. Japanese Knotweed is not on this list.
Infrastructure Act 2015	England Wales	Environmental authorities may issue control orders under which landowners can be obligated to carry out species control operations for invasive non-native animal and plant species. It is highly unlikely that such an order would be issued with respect to Japanese Knotweed.
Wildlife and Natural Environment Act 2011	Scotland	

Anti-social Behaviour, Crime and Policing Act 2014	England Wales	The Anti-social Behaviour, Crime and Policing Act 2014 does not specifically mention invasive plants; however, guidance has been released by the Home Office providing information on how Community Protection Notices can be applied to Japanese Knotweed. In effect, the updated legislation means that if a neighbour 'fails to act' regarding controlling, or preventing the growth of Japanese Knotweed, then, providing certain criteria are met, a Community Protection Notice could be issued requiring action to be taken. Breach of any requirement of a Community Protection Notice, without reasonable excuse, would be a criminal offence, subject to a fixed penalty or prosecution.
Common Law	England Wales	Under common law, with respect to private nuisance, an offence may have been committed where the actions of a land owner are causing a substantial and unreasonable interference with another person's land or his/her use or enjoyment of that land. Where reasonable action is not being taken to remediate nuisance caused by Japanese Knotweed, common law may apply.

6. Site Inspection

Written reports will be necessary at various stages during the production and delivery of a Japanese Knotweed management plan (see Section 16).

The area that is contractually covered for inspection, monitoring and control should be agreed upon prior to the commencement of work and subsequently marked up on a scaled map. It is typically referred to as 'the Site'.



6.1 Site assessment/survey

When a site assessment takes place it should be carried out by a competent and appropriately qualified PCA member, who is an expert in the identification, assessment and management of Japanese Knotweed and related species (see Section 3).

Site assessment should include:

- A thorough walkover survey of as much area within the property boundary as can be inspected safely.
- An assessment of the status of each Japanese Knotweed stand (e.g. maturity, condition and the area of the infestation).
- An assessment of all apparent site features that may affect Japanese Knotweed control action (e.g. proximity to other vegetation, services, built structures and water bodies).
- An inspection of the immediate site surroundings where possible, e.g. neighbouring properties.

A concerted effort should be made to determine how well established the Japanese Knotweed on site is. Longstanding infestations with many years of rhizome growth are usually much more difficult to control.



A site history, including any previous control action, should be obtained.

Any current grounds maintenance of affected areas, e.g. if the area is mown, which might hinder treatment or increase the risk of spread, should be determined.

Any proposals for development, including the timing and the location of proposed structures, should be obtained.

Pathways that could facilitate the spread of Japanese Knotweed around/off/onto a site should be identified. Pre-purchase surveys allow value depreciation and control costs to be integrated into the purchase price.

6.2 Mapping

A scaled distribution map should be produced which includes:

- The location and extent of Japanese Knotweed;
- A buffer zone of a suitable radius (see below); and
- The site, or survey, boundary.

The radius of an appropriate buffer zone will depend on the site and the types of properties present and is intended to help identify areas with potential rhizome growth or the area within which precautions are warranted, e.g. erection of fencing.

The map should be used to coordinate management and to monitor spread. When possible, a detailed base map should be obtained from the property owner or tenant, to which information can be added. If such a map cannot be provided, a map, fit for purpose, should be obtained. The scale and degree of accuracy should be noted.

6.3 Japanese Knotweed risk assessment

The risks that Japanese Knotweed poses to a client and, or site should be determined on a site by site basis. The risk assessment should take into account:

- The intended use of the site and any plans for development.
- The location of Japanese Knotweed that has been identified on site and on adjacent properties.
- Japanese Knotweed in the context of the wider environment, e.g. the potential for fly tipping occurring or presence upstream.
- The potential to breach legislation that relates to Japanese Knotweed, its control and disposal.
- The potential for waste management issues.
- The RICS Risk Assessment Category⁴.
- Likelihood of Japanese Knotweed being spread onto, around and, or off the site.

The importance of having a management plan in place to mitigate risks should be made clear to clients (see Section 5).

6.4 Monitoring

Monitoring visits should be carried out following the same procedure as Section 6.1 and should cover all locations within the contracted area.

When plants are being treated with herbicide, incorporate monitoring of the site, or survey area, with each visit.

Make notes on changes in plant distribution, height and health and record any new growth outside of the originally infested areas along with any evidence of interference or disturbance.

The final monitoring visit is the visit carried out after the completion of control action and after which there has been at least two full growing seasons with no evidence of Japanese Knotweed growth. In this context, growing season refers to the entire active growth period in a given year. Although two full growing seasons are usually sufficient to determine if regrowth will take place, if soil is disturbed after this period regrowth can sometimes occur due to exposing deeper rhizome that might be dormant.



7. Biosecurity

7.1 Prevention of spread offsite and around site

Measures should be taken to ensure that any soil (or other material) that could potentially contain Japanese Knotweed plant material is not moved around a site or offsite, unless as part of a specific control action.

Heavy plant or other vehicles should not be allowed to drive over areas that may be infested with Japanese Knotweed unless the operation is supervised by a PCA approved specialist and suitable precautions are taken to prevent spread of plant fragments (e.g. setting up wash-down areas).

Make sure all vehicles, equipment and footwear are free of plant fragments before leaving the site or a designated contaminated area within a site. If clothing is muddy it should also be inspected.

Where appropriate, records should be kept of such biosecurity inspections and/or measures.

To minimise the risk of spread, instruct landowners or site managers on the following:

- Relevant individuals should be notified of the presence of the plant on the site and (except in the case of deliberate disturbance as part of control action) advised that the ground should not be disturbed, and that no soil or associated material should be removed.
- An 'Exclusion Zone' with restricted access should include the ground in which the Japanese Knotweed has been found, along with a buffer extending to the distance that rhizome could reasonably have spread. Outside this "no disturbance zone", the site can be used and maintained as normal.
- If disturbance is likely, in order to further minimise risk, known stands should be indicated by erecting markers and/or barriers with an appropriate notice. This could take the form of coloured tape or some form of fencing, possibly with a notice such as "Japanese Knotweed Treatment Area – Do Not Enter".

7.2 Prevention of spread onto site

It is important to consider Japanese Knotweed in the wider environment around a site. If Japanese Knotweed is growing on an adjacent site, or upstream of a site on a riverbank, then no matter how good on-site control is, Japanese Knotweed may recolonise recently cleared sites.

If Japanese Knotweed is observed on an adjacent property:

- Work in partnership with neighbouring landowners to tackle the problem together.
- If the neighbouring landowner is unwilling to cooperate, it is often advisable and cost-effective to offer to pay for the treatment on their land.
- If the neighbouring landowner will not cooperate, take legal advice. In some cases it might be advisable to contact the relevant authority, e.g. Police Wildlife Crime Officer or Local Council.
- In certain cases it may be advisable to install a root barrier to help prevent spread (see Section 11 for further details).

One of the main ways that Japanese Knotweed spreads to new properties is by fly tipping. This is where material infested with Japanese Knotweed is illegally dumped across property boundaries.



Where this practice is suspected, landowners or site managers should be instructed to:

- Restrict vehicular access and keep gates and barriers locked.
- Watch out for any unusual activity, such as soil being dumped out of a truck. If such activity is observed, immediate action should be taken to inspect any dumped material for Japanese Knotweed and to report the incident to the appropriate authority.
- Watch out for freshly dumped soil on a property. If found, it should be treated with suspicion and inspected for the presence of Japanese Knotweed.

All necessary precautions should be taken to ensure that topsoil brought onsite is free of Japanese Knotweed material.

No vehicle should be allowed to enter a site if there is a risk that it might bring fragments of rhizomes into the site on its tyres or in its load.

8. Developing an optimal management plan for controlling Japanese Knotweed

8.1 Factors to consider when developing an optimal management plan

The following factors should be considered when developing a management plan:

- Timeframe in which the work needs to be completed.
- The suitability of different treatment options.
- Structural or environmental features that might affect control action, such as proximity to watercourses, desired vegetation and built structures.

- Future plans for the site, such as development or landscaping plans.
- Hazards or risks identified during the site inspection, such as underground services and chemical contamination.

Based on consideration of these factors, a management plan can be developed that is fit for purpose. The management plan needs to be outlined in detail in a suitable report (see Section 16), and be of sufficient quality that, if necessary, it can be backed by guarantee.

Management Plans should aim to minimise:

- Damage to the environment;
- Damage to existing built structures;
- Socioeconomic impacts; and
- The quantity of waste generated.

8.2 Control options

It is essential that all appropriate measures are taken to ensure a high quality service is provided to the client and the methods conform to the standards outlined in this document and the PCA Standard Guarantee.

All control options should be overseen or carried out by a PCA approved contractor/surveyor.

The choice of control option or options depends on site conditions and the nature and situation of individual stands. No two sites are ever exactly the same and management needs to be tailored to situation and conditions.

The Environment Agency, Natural Resource Wales, SEPA, and NPWS can be contacted for guidance on the disposal of waste containing Japanese Knotweed and the use of herbicides near water.

There are a number of recognised control options available for the management of Japanese Knotweed; the pros and cons associated with which are outlined in Table 2. Remediation works that use combinations of these methods can also be carried out for clients.

Clients cannot be provided with guarantees of management times less than those stated in this document. The use of control methods must be commensurate with the plans for site, e.g. development.




The most widely used treatment options are (also see Table 2):

- Herbicide treatment: applying herbicide to Japanese Knotweed in situ. See Section 9 for additional information.
- Stockpiling/bunding: excavation and movement of Japanese Knotweed material to an area of the site where it will not be disturbed. Creation of a bund and subsequent treatment with herbicide.
- Screening/sifting: excavation of Japanese Knotweed material and screening (sieving) the material through a mesh or other selective system to remove rhizome fragments, which are then disposed of correctly and safely (see Section 15). The soil that passed through the screener will still be classed as controlled waste and may be used on site but must be located where it will not be disturbed. This soil will then need to be monitored for at least two growing seasons and any regrowth treated with herbicide as per the stockpiling treatment above, or dug out (usually manually), before control can be considered complete.
- Rhizome fragmentation and cultivation: digging and breaking up rhizome material and soil with the aim of increasing the leaf surface area to rhizome volume ratio and to un-compact, disturb and aerate the soil. Crown removal can be integrated into such works, including prior to the commencement of herbicide treatment. The subsequent Japanese Knotweed growth is then treated with herbicide.
- Burial on site: excavation of Japanese Knotweed material with burial at another part of the site at an appropriate depth to prevent regrowth. Monitoring of the area will still be required and any regrowth

treated with herbicide.

- Root barrier membrane: prevention of horizontal and vertical growth of Japanese Knotweed by installing a vertical and/or horizontal membrane barrier. Monitoring of the area will still be required for at least two growing seasons and any regrowth treated with herbicide.
- Removal to landfill: excavation and transport of Japanese Knotweed material to a licensed landfill using haulage vehicles. Monitoring of the area will still be required and, although all rhizome material should have been removed, any regrowth treated with herbicide.
- Biological control: There are currently no approved methods for the biological control of Japanese Knotweed. Trials are being conducted by CABI for several biocontrol agents.

Table 2: Control options, pros and cons

Herbicide treatment	
Pros	Cons
<ul style="list-style-type: none"> • Cost effective • Treatment can be carried out in situ without risk of spreading the plant further. • Quickly reduces the capacity of the plant to spread on/off site. • Quickly eliminates the capacity of the plant to impact built structures. • Easy to administer 	<ul style="list-style-type: none"> • Can take many years to achieve acceptable results, especially where stands are mature. • Management plans that rely solely on herbicide treatment must include at least 2 years of monitoring after all evidence of growth has ceased. • Herbicide treatment alone should not be recommended on sites with future development plans that involve the soil being dug and disturbed. • Construction works cannot continue in areas still containing the plant and the risks associated with landscaping treated soils, e.g. stimulating regrowth, should be made clear to the client and mitigated for. • The use of some herbicides is restricted near waterbodies and desired vegetation. • Some herbicides can persist in the soil. • If soil is disturbed at a later date, regrowth can occur. • Effective control requires expert knowledge of herbicide treatment of Japanese Knotweed. • Soil which contains Japanese Knotweed that has been treated with herbicide is still classed as controlled waste if it enters the waste stream. • Herbicide treatment can induce temporary dormancy. 
Stockpiling	
Pros	Cons
<ul style="list-style-type: none"> • Cost effective • Site work can be undertaken while treatment takes place elsewhere on-site. 	<ul style="list-style-type: none"> • Requires an area that can be left undisturbed for several years. • Soil from a stockpile must remain on the site. • The same cons as herbicide treatment apply in the stockpile area. • Plant material can be accidentally spread e.g. after a change in ownership. • The depth of the stockpiled soil must be appropriate for the future use of the soil. • Rhizome buried deeper in a bund is less likely to express itself and may become dormant; as such, bunds should be created a shallow as is practical and should not exceed 0.5m. • If larger bunds are created, it may be necessary to apply for planning permission.

Screening	
Pros	Cons
<ul style="list-style-type: none"> • Can be cost effective but not always. • Less material needs to be disposed of to waste facility. • The treated soil can be re-introduced on site as fill or in soft landscaping areas. • Where soil needs to be imported, less is required from elsewhere to fill voids created by excavation. 	<ul style="list-style-type: none"> • All screened soil is still classed as controlled waste • Small fragments of Japanese Knotweed will still be present in the soil and could lead to re-infestation. • Area where screened soils are re-used must be monitored for regrowth. • Follow up herbicide treatment or manual removal may be required. • Plant material can be accidentally spread during movement. • Soil type and makeup dictate if it can be screened or not.
Rhizome fragmentation and cultivation, including crown removal	
Pros	Cons
<ul style="list-style-type: none"> • Increases the leaf surface area to rhizome volume ratio • Breaks up and aerates the soil. • Can increase the effectiveness of herbicides under certain scenarios. • Can improve the potential for eradication on sites where the Japanese Knotweed is persistent. • Crown removal removes a large amount of surface and underground biomass. 	<ul style="list-style-type: none"> • Most above ground vegetation must be cleared, even desirable plants. • Cleared vegetation would usually need to be disposed of. • A large area must be dug to ensure all rhizome containing soil has been included. • Rhizome located deeper in the soil may be missed and result in regrowth. • Soil should be compacted at the end of the treatment to help reduce the potential of deep soil rhizome regrowth. • Crown removal can be time consuming or impractical for large infestations and removed crown must be managed appropriately (Section 15).
Burial	
Pros	Cons
<ul style="list-style-type: none"> • Does not require a set-a-side area for control. • Work can continue immediately after burial. • Quickly removes the Japanese Knotweed from an undesirable area 	<ul style="list-style-type: none"> • Restrictions remain on the site, e.g. in some areas deep excavation would interfere with buried material. • The use of the area above burial site is limited. • Typically requires a large hole to receive material, so it may not be possible if soil is shallow or water table is high. • The appropriate environment agency must be notified. • Plant material can be accidentally spread during movement.
Root barrier	
Pros	Cons
<ul style="list-style-type: none"> • Can be installed to reduce the chance of horizontal and vertical rhizome spread. • Can be used to protect structures, hard surfaces and services. • Work can continue immediately after installation in areas protected by membranes. 	<ul style="list-style-type: none"> • Tears in the membrane or poorly sealed seams between sheets can be exploited by growing rhizome. • Can only be installed in favourable weather conditions. • Damp and/or wet conditions and/or work surfaces will reduce the robustness of heat welded seals. • Surface drainage and underground water can affect installation and ponding can occur, all of which must be taken into consideration. • Installation of root barrier is a form of control/prevention to be used in conjunction with other methodology, as it is not in itself a method of eradication.
Landfill	
Pros	Cons
<ul style="list-style-type: none"> • Quickly removes the Japanese Knotweed from an undesirable area • No restrictions left onsite. • Work can continue immediately after removal. • Fast and efficient 	<ul style="list-style-type: none"> • Relatively expensive • Disposal to landfill reduces valuable landfill capacity and needs haulage (which damages the environment and increases the risk of Japanese Knotweed spreading) and in the long term unsustainable¹. As such, disposal to landfill should only be considered as last resort¹ when Japanese Knotweed cannot be suitably disposed of on-site².

9. Herbicide use

It is the responsibility of the operator to ensure that all appropriate legislation is followed when using herbicides and that their training is commensurate with their duties.



9.1 Regulations

A herbicide must be used only in accordance with the directions on the product label and with all relevant legislation. There may be further permitted uses i.e. Extensions of Authorisations or Specific Off-Label Authorisations information on which can be obtained from the Chemical Safety Directorate. These are typically minor uses for commercial growers and will likely only apply to very specific situations and circumstances. The user assumes the risk to persons or property that arises from any such use of the herbicide product.

Any person involved in the professional application of herbicides should possess the appropriate pesticides certificate of competence for the safe use of herbicide and hand-held herbicide applicators, e.g. NPTC Level 2 award in the safe use of pesticides PA1 and PA6 in England, Wales and Scotland. The list of accepted/compulsory accreditation will change in line with European Communities Plant Protection Products (Sustainable Use) Regulations 2012⁸ (also see Section 5).

9.2 Herbicide choice

The following factors must be considered when choosing an herbicide:

- Is it effective for controlling Japanese Knotweed?
- Is this a permitted activity, as stated on the herbicide label?
- Is it suitable for use on a given site, e.g. proximity to water or sensitive habitats?
- Is it suitable for the intended use of the site following treatment, e.g. is the herbicide persistent in soil, potentially preventing other species from being planted at a later date?
- Is it a selective or non-selective herbicide, e.g. what other species could be affected?
- Is the time of year and or plant condition suitable for the application of the chosen herbicide?
- Are weather conditions suitable?
- Should an adjuvant (sticker) be used?
- Are the correct nozzle and lance for that situation being used?

9.3 Herbicide records

Records of herbicide use must be kept in accordance with all relevant legislation, e.g. a record must be made of the type, concentration and quantity of herbicide used, the operative's name, weather conditions and date of application. Records must be retained after each treatment.

9.4 Herbicide treatment: optimal plant condition and timing

Different herbicides have different methods of action and are absorbed and transported by plants in different ways. As such the condition of a plant and/or timing of application impacts on the effectiveness of the herbicide. Prior to using herbicide on Japanese Knotweed an operator should be trained in the appropriate use of different types of herbicide for the species control.

Failing to allow plants to reach an appropriate condition prior to herbicide treatment can increase the amount of time required for treatment, along with associated costs. Water stress can reduce herbicide uptake by plants. The number of herbicide treatments required per year should be determined by the surveyor; however, always take the condition of the plant into consideration. Monitoring should continue for at least two growing seasons after there has been no sign of growth.



9.5 Herbicide use near water bodies

In England, for all herbicide applications near waterbodies (i.e. within 1 metre of the bank top when using a knapsack sprayer), there is a requirement to obtain written approval from the Environment Agency and only products approved for use in or near water can be used. The AqHerb01 application form should be sent to the Environment Agency, who can then assess whether there is any risk to drinking water supplies, water for spray irrigation, or wildlife. The process of approval takes approximately 2-4 weeks. Only some herbicides are approved for use in or near water, e.g. certain glyphosate formulations.

In Wales, the appropriate body is Natural Resource Wales (NRW) and for bankside applications you may not need to obtain written approval, i.e. in low risk areas. The NRW website should be consulted for additional details.

In Scotland, for operations near watercourses (<10m from the water's edge), there is a requirement to obtain written approval from SEPA. SEPA recommends making applications at least three weeks before the date of treatment.

In Ireland pesticides are banned for use from between 5m and 200m of a water course depending on the quantity of water from the source that is used for human consumption. Permission can be sought from the Environmental Protection Agency to make applications within these limits; however, it is unlikely to be granted.



9.6 Herbicide: Stem injection

This technique can be used at the discretion of a specialist, when appropriate. Stem injection is an alternative method for the application of herbicide to Japanese Knotweed. It is reported that this system can be very effective; however, this has not been validated by scientific scrutiny and there is conflicting evidence with respect to the long term effectiveness of this method.

10. Excavation and transport of infested material

Several of the control methods listed above involve the excavation and subsequent transport of infested soil. When undertaking excavation or transporting infested soil, the following must be considered:

- If the Japanese Knotweed is treated with herbicide, this should be with a non-residual herbicide, e.g. glyphosate.
- If infested material is being transported around or off a site, a haulage route should be set out in advance and precautions should be taken to prevent the spillage of infested soil and the spread of Japanese Knotweed material.
- Tracked vehicles are more likely to facilitate the spread of rhizome than tyred vehicles and extra precautions must be taken when they are used.
- Excavation should take place at a safe distance from built structures.
- A specialist should determine the extent of soil to be excavated to remove all rhizome on a site by site basis.
- All excavation should be supervised by a PCA specialist, who is responsible for all biosecurity with respect to the Japanese Knotweed on the site.
- Excavation on the site should continue to a depth and area determined by the specialist.
- Inspection of the area for rhizome that might persist in the soil should take place regularly at the face of the excavation.
- Excavation should continue, subject to ecological, physical, infrastructural, health and safety and other site-specific constraints, until all visible rhizome material is removed.
- Reduced depth excavation can be used if suitable precautions are taken to prevent regrowth, e.g.



lining the void with root barrier membrane.

- Upon completion of the remediation works, the excavated area should be made good.
- If any material is remaining on site, e.g. a bund or burial, the location should be mapped and the information passed to the relevant individual(s) and/or agencies.
- Bunds containing Japanese Knotweed material should remain fenced off for the entire remediation period, along with appropriate signage.
- If being taken offsite, infested soil should be disposed of following the appropriate duty of care (see Section 15).
- Trees and other ecological constraints, e.g. nesting birds, must be considered prior to control works.

11. Root Barrier Membranes

Several of the control methods listed above involve the use of root barrier membranes. When using such geomembrane, the following information must be taken into consideration:

- When being used to prevent horizontal spread, the vertical geomembrane should be buried to a depth not less than 1.5m. On its own, a vertical membrane is not a solution; it must be combined with herbicide treatment and monitoring.
- The barrier must not be damaged or punctured as Japanese Knotweed may penetrate such a weakness.
- Make sure that the presence of the root barrier membrane is recorded, the information passed to the relevant individual(s) and that the membrane is not disrupted by future developments, landscaping or services related works.
- High specification geomembrane sheeting should be used and it should be fit for purpose².
- The seams of the membrane should be sealed as per the manufacturer's specs.
- A large sheet size should be used to reduce the need for sealing overlapped sheets.

12. Winter cane removal

While it is not always essential to remove winter canes, they are aesthetically unappealing and can present a hazard to eyes (eye poke). The persistent stems of previous growth, when extremely dense, can impede access and impede herbicide application with respect to reaching new growth and herbicide landing on the canes.

If necessary, stems can be removed by cutting/mulching, but not pulling. Stems should only be cut once they have become brown and brittle (usually after the first frosts). They should be cut back to 10cm above ground level to remove the risk of picking up fragments of live rhizome and/or crown. Once cut stems have dried to a deep brown colour they are dead¹ and can be safely dealt with (see Section 15.1). If pulled, the highly fecund crown will likely be attached to the base of the cane and could result in the spread of the plant. Cut stems are still classed as controlled waste and must be disposed of following the appropriate duty of care if taken offsite. Cane removal should be supervised by a PCA approved specialist.

13. Replanting disturbed soil

Where possible and practical, following control action, soils should be revegetated. This will help stabilise disturbed soils and, when combined with appropriate vegetation management, reduce the probability of re-invasion.

Any works carried out within the treatment area must be supervised or carried out by a PCA approved specialist.

Where a guarantee has been issued, with respect to a treatment area, any potential impact of replanting works on the guarantees should be made clear to the client and, where necessary, appropriate mitigation should be put in place.

See the PCA guidance note on revegetation for additional information.

14. Rhizome viability testing

Rhizome viability testing may be carried out to confirm if Japanese Knotweed rhizome is still viable. This must be supervised or carried out by a PCA approved specialist.

Rhizome viability testing can only confirm that there is still living rhizome on site. It cannot confirm that all rhizome material has been destroyed and therefore it is of limited value.

15. Waste management

Detailed criteria with respect to invasive non-native species waste management are provided in Environment Agency Regulatory Position Statement 1782 which, although regulating management in England, would be useful across the UK and Ireland.

15.1 Winter canes

Once winter canes have been cut 10cm above ground level (never pulled) they should be either:

- Stamped down or mulched and retained in the area of infestation.
- Incinerated on site (Section 15.3).
- Disposed of as controlled waste at an appropriate waste management facility (Sections 15.5).

Cane removal should always be supervised by a PCA approved specialist.

The removal of winter canes can increase the risk of spreading Japanese Knotweed material, if not properly controlled. As a result, on many sites it is not necessary to remove the winter canes.



15.2 Cleared vegetation

Other vegetation cut down with Japanese Knotweed canes should be treated as controlled waste in the same way as in Section 15.1, unless it can be easily identified and separated by hand safely.

15.3 Incineration

Controlled burning of dried stems, rhizome and crown material, if approved (see below), can help reduce the amount of material for which disposal will be required.

Burning must take into account any local bye-laws and the potential to cause a nuisance or pollution. Burning cannot be used if a nuisance, such as odour, fumes or smoke, is caused. The relevant local authority must be contacted before burning. Approval for burning in built up areas is rarely granted.

Be aware that rhizome, especially crown material, can survive superficial burning and should ideally be reduced to ash.

Incineration should always be supervised by a PCA approved specialist.

15.4 On site waste burial

The depth of the void used to bury Japanese Knotweed contaminated material on site will vary depending on the plans for development, e.g. soft versus hard standing, and whether the material is to be sealed within a geomembrane. The appropriate regulator should be consulted for advice and/or their respective guidance documents should be consulted. See notes 1,2,3,5 and 6 in Reference Section.

The structure of the void and the potential for compaction of the waste within it should be verified by a structural engineer to minimise the risk of settlement within the void. All excavations must be done safely and in compliance with the current guidance as issued by the HSE 'Structural Stability during Excavations'.

The use of a marker layer in the form of coloured plastic sheeting can be useful to indicate the presence of a Japanese Knotweed burial area.

The location of the burial area, and detailed working restrictions on or near the burial area should be accurately recorded and relayed to the client to be included in relevant site documentation.

15.5 Offsite removal to landfill

If Japanese Knotweed material is to be disposed of offsite, the landfill site that is receiving the contaminated materials must be licenced to receive Japanese Knotweed waste. The landfill site should supply evidence of its licence.

Before any Japanese Knotweed waste is moved off site soil samples from the affected area may have to be tested by a suitable laboratory and the results sent to the receiving landfill site for their approval before they will accept the waste. There is a standard turnaround time of 2 weeks for laboratories to assess soil samples. The range of contaminants required to be tested for will depend on the existing and previous use of the site, and surrounding area. If the site contains hazardous waste then a Waste Acceptance Criteria (WAC) analysis will be required.

All waste material should be removed from site by a suitably licensed waste carrier.

All producers, carriers and waste facilities have a duty of care to ensure that the waste is handled and treated properly. All waste removed from site should be accompanied by a Waste Transfer Note, or, if hazardous, a Consignment Note, which clearly states the presence of knotweed and the waste's destination. A waste acceptance note must also be obtained from the waste facility that states the Japanese Knotweed containing material has been received.

All tickets should be checked by the PCA specialist overseeing the works before signing and copies of all transfer and consignment documentation should be filed and kept for the legally-required time.

16. Reports

It is important to provide detailed reports of Japanese Knotweed control work. The sections below outline the minimum information that should be provided at different stages. Additional information can be beneficial to the client and as a record for contractors.

16.1 Site assessment

Reports which include the findings of a site assessment should include:

- The site location.
- Details of the contracting organisation and/or client.
- A description of the site and the area immediately surrounding the site.
- An accurate record of the Japanese Knotweed infestation, including photographs.
- A scaled map with dimensions. The map should be marked with the location of Japanese Knotweed stands. An indication of the potential extent of the rhizome network can be beneficial.
- An outline of development plans for the site (if applicable).
- An outline of any remedial work that has been carried out to date (where applicable).
- An assessment of the risks associated with the Japanese Knotweed on site.
- An assessment of the risks associated with Japanese Knotweed present in the immediate surroundings and/or in the wider environment (if applicable).

16.2 Management plan

A management plan should cover the whole of a property (not just those areas with a Japanese Knotweed infestation) and if necessary, adjacent land and/or watercourses. It should include:

- The objectives of the management.
- An evaluation of control options (if applicable).
- A detailed description of the control actions to be taken.
- An assessment of the risks associated with any control action.
- A description of how the success of the control action will be evaluated.
- Advice on how to prevent spread around and off site.
- Advice on how to prevent additional Japanese Knotweed arriving on site.
- A treatment schedule.
- A full breakdown of the costs associated with the control action.

16.3 Update report

Where work or monitoring is ongoing over an extended timeframe, reports should be provided to clients periodically, e.g. at the end of each year. Update reports should include:

- An assessment of the effectiveness of control action to date.
- The location and extent of any Japanese Knotweed found beyond the distribution determined during site assessment.
- An assessment of any new/changed site features that might impact on the effectiveness of the management plan or increase the risk of spread or re-infestation.
- A description of any newly identified Japanese Knotweed in the local/wider environment and an assessment as to any risk.

16.4 Completion report and certificate

Once control action has been completed successfully, as determined by the criteria outlined in the management plan, a final report should be provided that includes:

- An outline of all control action that was carried out.
- A completion certificate that confirms that the treatment is complete and that the Japanese Knotweed at the property has been remediated.

17. Guarantee

Contractors should be able to provide clients with assurances that the work specified and subsequently undertaken will be effective in controlling the growth of Japanese Knotweed.

Control action and site inspection will continue until the treatment schedule has been completed or it is deemed that the Japanese Knotweed infestation is no longer capable of any further growth.

Where appropriate, and at the discretion of the contractor, guarantees and insurance may be provided to clients. These provide additional levels of protection to the client in respect to any failure of the specified controls. Guarantees are most commonly cover 5 or 10 years.

18. Costing

All costs to the client should be provided upfront with a breakdown of what is included in the costing. There should be no hidden costs.

Any potential risks that could increase costs at a later date should be detailed and fully explained to the client.

When, as a result of site investigations or following the commencement of work it is found that additional work is needed, the client should be made aware of the full implications of these extras before additional work is undertaken or additional costs are incurred.

19. Insurance and bonds

Membership of the PCA Invasive Weed Control Group entitles members to provide access to several exclusive insurance services. Basic information about these products is available from the member contractor and more detailed information is available directly from the respective insurance providers.

19.1 Insurance Backed Guarantees (Remedial Work)

In the event that a member contractor wishes to issue a guarantee against the regrowth of invasive weeds (in this case Japanese Knotweed) following control, in most circumstances this offering can be supplemented by offering the Property Owner the opportunity to purchase an insurance backed guarantee. When purchased, insurance backed guarantee can be claimed upon by the Policyholder to meet the cost of the retreatment of




Japanese Knotweed which would have been covered by the written guarantee originally provided by the member contractor, where the member contractor has ceased trading and is unable to honour the terms of their own written guarantee.

The insurance backed guarantee (certificate of insurance) can only be issued by the insurer when all works to eradicate invasive weeds (Japanese Knotweed) are complete and a completion certification has been issued by the member contractor. Insurance backed guarantees are generally up to 10 years.


20. Special consideration


Short duration or high intensity treatments using herbicides are often ineffective in the long term.


In all situations it will be necessary to observe a minimum of two full growing seasons without regrowth before it is possible to consider that herbicide treatment has been effective or that the site is clear of Japanese Knotweed. 

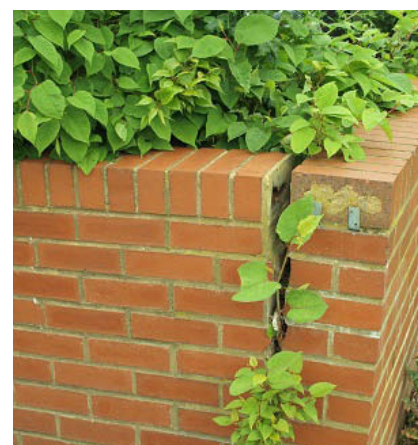
Contractors who recommend the use of herbicides only cannot therefore provide undertakings, guarantees, or infer that they will complete works to eradicate Japanese Knotweed in less than 3 years.

It can take an extended period to successfully control mature stands of Japanese Knotweed. As such, it is important to manage expectations with respect to likely treatment duration.



Herbicide treatment alone should not be recommended on sites where there is the potential that the soil will be transported off site, disturbed or dug at a later date, thereby risking spread and/or regrowth. It should be considered and conveyed to clients that deep and/or buried rhizome can remain dormant, but viable, for many years, even after above ground material has been successfully treated with herbicide. 

Any soil, or other material, containing Japanese Knotweed, treated or not, is still classified as controlled waste. If removed from site it must be disposed of at an appropriately licensed landfill facility. 



21. References

- 1: Environment Agency (2013, revision 3); Managing Japanese knotweed on development sites: the knotweed code of practice.*
- 2: Environment Agency (2016) Regulatory Position Statement 178 - The treatment and disposal of invasive non-native plants. <https://www.gov.uk/government/publications/treatment-and-disposal-of-invasive-non-native-plants-rps-178>
- 3: Kelly, J., Maguire, C.M. and Cosgrove, P.J. (2008) Best Practice Management Guidelines Japanese knotweed Fallopija japonica. Prepared for NIEA and NPWS as part of Invasive Species Ireland (ISI).*
- 4: Royal Institution of Chartered Surveyors (2012) Japanese Knotweed and residential development. 1st edition. RICS Information Paper IP 27/2012. <http://www.rics.org/uk/knowledge/professional-guidance/information-papers/japanese-knotweed-and-residential-property-1st-edition/>
- 5: Scottish Environment Protection Agency (SEPA) Control of invasive non-native species - Japanese knotweed. <http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities/Options/Controlofinvasivenon-nati/Japaneseknotwood>
- 6: Public information on invasive species in Wales - Japanese knotweed <http://gov.wales/docs/drah/publications/151214-japanese-knotweed-en.pdf>
- 7: Defra (2010) Guidance on section 14 of the Wildlife and Countryside Act, 1981 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69205/wildlife-countryside-act.pdf
- 8: Health and Safety Executive - Pesticides <http://www.hse.gov.uk/pesticides>

**This document is no longer available to download from the Environment Agency, but is accessible via various internet search engines.*



The information contained in this booklet is given in good faith and is believed to be correct. However, it must be stressed that of necessity it is of a general nature. The precise condition may alter in each individual case and the Association is therefore unable to accept responsibility for any loss howsoever arising from the use of the information contained therein.



**11 Ramsay Court,
Kingfisher Way,
Hinchingsbrooke Business Park,
Huntingdon,
Cams,
PE29 6FY**



+44 (0)1480 400000



pca@property-care.org



property-care.org

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