



Code of Practice

for the Management of Japanese knotweed

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1	Introduction.....	3
2	Definitions.....	4
3	Training and accreditation requirements.....	4
4	Japanese Knotweed.....	4
4.1	Introduction to Japanese Knotweed....	4
4.2	Impacts of Japanese Knotweed	5
4.3	Identification	5
4.4	Similar species (mistaken identity)	6
5	Legislation	6
5.1	Important legislation relating to the control and disposal of Japanese Knotweed....	6
5.2	Explanation of legislation.....	7
6	Inspection	7
6.1	Site assessment.....	7
6.2	Japanese Knotweed risk assessment.	8
6.3	Mapping.....	8
6.4	Monitoring.....	8
7	Biosecurity.....	8
7.1	Prevention of spread offsite and around site	8
7.2	Prevention of spread onto site	9
8	Developing an optimal management plan for controlling Japanese Knotweed.....	9
8.1	Factors to consider when developing optimal management plans	9
8.2	Control options	9
9	Herbicide use	12
9.1	Regulations	12
9.2	Herbicide choice.....	12
9.3	Herbicide records	12
9.4	Herbicide treatment: optimal plant condition and timing	12
9.5	Herbicide use near water bodies.....	13
9.6	Herbicide: Stem injection.....	13
10	Excavation and transport of contaminated material	13
11	Geotextiles	14
12	Winter cane removal	14
13	Replanting disturbed soil.....	14
14	Rhizome viability testing.....	14
15	Waste management	14
15.1	Winter canes	14
15.2	Cleared vegetation	15
15.3	Incineration.....	15
15.4	Onsite waste burial.....	15
15.5	Offsite removal to landfill	15
16	Reports.....	15
16.1	Site assessment.....	16
16.2	Management plan.....	16
16.3	Update report	16
16.4	Completion report and certificate	16
17	Warranty.....	16
18	Costing	17
19	Insurance and bonds.....	17
19.1	Insured Guarantees(Remedial Work)	17
19.2	Insurance (Structural Cover)	17
19.3	Bondpay	17
20	Special consideration	17

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. 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 Agency¹, Invasive Species Ireland², the Royal Institution of Chartered Surveyors³ and the Scottish Environment Protection Agency (SEPA)⁴ 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

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

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

The wild. DEFRA 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.” However, whether an introduction (release or escape) is into “the wild” may well be dependent on the ecology of the species in question and the potentially affected environment: as such, what constitutes the wild must be judged on a case-by-case basis.

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, **rhizomes**.

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

Residual.

Rhizome. An underground stem, bearing buds and scale leaves, which lasts for more than one season and usually serves for both propagation and **perennation**.

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

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’ course. The course is provided by the PCA and a certificate is awarded based on both a written and practical examination.

Any operator who uses herbicide must possess the appropriate safe use of pesticide certificates of competence (see section 9.1).

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 (scientific name: *Fallopia japonica*) 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 British and Irish Isles. The species was introduced to Britain in 1825 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 British and Irish Isles, 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 extends laterally by extension of its rhizome (underground shoot) system. The rate of spread is dependent on the density and composition of soil and the presence of underground structures, such as drains; dense soil will usually limit the spread of the plant. New shoots can emerge from spreading rhizomes. As a rule of thumb, rhizome growth is generally limited to approximately a 7 m radius from the main group of stems (though generally less) and a depth of 2 m to 3 m.

Propagation by seed is not a problem 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 has been the movement of infested soil and materials associated with earth-works. Fragments of a few centimeters or smaller 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.

4.2 Impacts of Japanese Knotweed

The underground rhizomes of this species can penetrate loose aggregate and asphalt/concrete through small openings and voids. Once established, the rhizomes can expand with enough force to cause structural damage. The species also has a fast vertical growth rate, allowing it to outcompete much of the native vegetation in areas outside its natural range. Negative impacts include:

- Economic loss, primarily associated with control costs in the construction sector.

- Delays to development.
- Impeding/preventing property sale.
- Discouraging financial institutions from providing a mortgage or building insurance.
- Damage to underground structures, e.g. drains and buried services.
- Damage to hard surfaces, e.g. patios, paths and driveways.
- Damage to built structures, e.g. walls, outbuildings and conservatories.
- Loss of biodiversity.
- Aesthetic damage to gardens and landscaping.
- Loss of amenity/recreational space.
- Increased flooding risk by impeding river-water flow.
- Increased riverbank erosion.
- Adverse publicity for landowners.

The potential for Japanese Knotweed to cause structural damage has sometimes been exaggerated in the media. The plant is usually only a potential threat to underground services and other structures that have pre-existing structural weaknesses or where an affected property has been neglected for many years.

Not all impacts are negative; Japanese Knotweed stands in urban environments can provide shelter (amongst its dense stems) and food for wildlife (nectar from its flowers).

4.3 Identification

Japanese Knotweed (*Fallopia japonica*) rarely exceeds a height of 3 m. 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, which appear in late summer or early autumn, are creamy white-coloured and are formed in drooping clusters 8 cm to 12 cm 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. 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^{1, 2, 3, 4}.

4.4 Similar species (mistaken identity)

Japanese Knotweed is commonly mistaken for other species (e.g. Dogwood and certain dock species). A PCA approved expert 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. Legislation is continuously changing; 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 an explanation of some of the most relevant legislation directly related to Japanese Knotweed control. All relevant health and safety regulations must be followed at all times.



5.1 Important legislation relating to the control and disposal of Japanese Knotweed

In the UK and Ireland, it is an offence to facilitate the spread of Japanese Knotweed into the wild. There are approximately 40 other plant species that the legislation applies to equally. Offences are punishable by fines and/or imprisonment and can result in enforcement action being taken by statutory agencies (e.g. Environment Agency and SEPA), which can lead to unlimited fines. It is a defence to a charge of committing an offence that the accused took all reasonable steps, and exercised all due diligence to avoid spreading the plant.

The specific legislation relevant to the control of Japanese Knotweed includes, **Schedule 9 Part 2 of the Wildlife and Countryside Act 1981** (as amended) in England and Wales, the **Wildlife and Natural Environment Act 2011** in Scotland, the **Wildlife Order 1985** in Northern Ireland and **Statutory Instrument No.477, European Communities (Birds and Natural Habitats) Regulations 2011** in the Republic of Ireland.

Waste containing any part of a Schedule 9 plant that could facilitate the spread of the species is classified as controlled waste and should be disposed of in a suitable waste facility, accompanied by appropriate Waste Transfer documentation. Such waste includes the living rhizomes and stems of Japanese Knotweed and residual soil that is likely to contain incidental amounts of rhizome.

The specific legislation relevant to waste disposal includes **Section 34 of the Environmental Protection Act 1990** in England Wales and Scotland, **Controlled Waste (Duty of Care) Regulations (Northern Ireland) 2002** and **Waste Management Regulations (NI) 2006 (as amended)** in Northern Ireland. In the Republic of Ireland, there is no specific legislation relating to the disposal of waste containing invasive plant material; however, the National Parks and Wildlife Service (NPWS) in the area where disposal will take place should be contacted for guidance.

Any person using pesticides must take all reasonable precautions to protect the health of people and wildlife. Approval from the relevant statutory agency must be obtained prior to use of pesticides in or near water (see section 9.5 for further details).

The specific legislation relevant to pesticide use includes **Control of Pesticides Regulations 1986** in England Wales and Scotland, **Control of Pesticides (Amendment) Regulations (Northern Ireland) 1997** in Northern Ireland and **Statutory Instruments No. 155/2012 European Communities (Sustainable Use Of Pesticides) Regulations 2012** in the Republic of Ireland. **European Communities Plant**

Protection Products (Sustainable Use) Regulations 2012 will apply to the whole of the UK as from November 2013.

The UK and Ireland are committed to encouraging the control of non-native pest plants under the EU Convention on Biological Diversity. An additional EU Directive is currently being drafted that will impose further restrictions aimed at helping reduce the impacts of these species. Restrictions and regulations are likely to increase in the coming years.

5.2 Explanation of legislation

It is not against the law for landowners to have Japanese Knotweed on their property. However, if it can be shown that the plant has spread from their property onto another property, then they could be considered responsible for any damage caused and the costs of control, these costs can be significant.

If landowners take all reasonable steps, and exercise all due diligence to avoid spreading the plant, then they will be better protected against prosecution. In order to reduce the potential of fines/prosecution, landowners should 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 consultant and/or contractor to manage the plants appropriately.

In England, Wales Scotland and Northern Ireland Japanese Knotweed and soil containing Japanese Knotweed can only be disposed of at waste facilities authorised to receive controlled waste specified to be Japanese Knotweed. No restrictions are currently in place in Ireland, however, the NPWS should be contacted before disposing of any waste containing Japanese Knotweed. (see section 15 for further details).

Care must be taken when using herbicides to treat Japanese Knotweed so that no collateral damage is caused to the environment. A certificate of competence is required to use herbicides in a professional context (see section 9 for further details).

6 Inspection

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

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 drawing. 

6.1 Site assessment

When a site assessment takes place it should be carried out by a PCA approved specialist who is expert in the identification and management of Japanese Knotweed and related species.

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. plant height, condition and area of 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.

An attempt 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 or eradicate.

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.

Pre-purchase surveys allow value depreciation and control costs to be integrated into the purchase price.

6.2 Japanese Knotweed risk assessment

The risks that Japanese Knotweed poses to a client/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.
- 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).
- The potential to breach legislation that relates to Japanese Knotweed, its control and disposal.

The importance of having a management plan in place to mitigate risks should be made clear to clients.

6.3 Mapping

A distribution map of Japanese Knotweed should be produced which includes a buffer zone of a suitable radius (e.g. 7 m) away from the above-ground material (to help identify areas with potential rhizome growth). This map can then 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.

6.4 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 with each visit.

Make notes on changes in plant distribution, height and health and record any new growth outside of the originally infested areas.

The final monitoring visit is the visit carried out after the completion of control action and after which there has been two full growing seasons with no evidence of Japanese Knotweed growth. Although two years is 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

Do not move or spread any soil (or other material) that could potentially contain Japanese Knotweed plant material 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 contaminated with Japanese Knotweed unless the operation is supervised by a PCA approved specialist and suitable precautions are taken to prevent spread of plant fragments.

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/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 plants on the property and (except in the case of deliberate disturbance as part of control action) advised that the ground should not be disturbed, and that none of the soil or associated material should be removed.
- A "no disturbance zone" should include the ground in which the Japanese Knotweed has been found, along with a buffer extending to the distance that rhizome could

reasonably spread. Outside the “no disturbance zone” the site can be used and maintained as normal.

- In order to further minimise risk, known stands should be indicated by erecting markers/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 Contaminated Area - Keep Out”.

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/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, Environment Agency, etc.).
- 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, i.e. where material contaminated 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.

- 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 should be 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 optimal management plans

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

- Timeframe in which the work needs to be completed.
- 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 must 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 it can be backed by guarantee.

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.

The choice of control option or options depend 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 or SEPA can be contacted for advice 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 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 development.

The most widely used treatment options are as follows (Also see Table 2):

- Herbicide treatment: applying herbicide to Japanese Knotweed *in situ*. See and Section 9 for additional information.
- Stockpiling: excavation and movement of Japanese Knotweed material to an area of the site where it will not be disturbed and where it can subsequently be treated 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 safely (see section 15). The soil that passed through screening is then reused on the site. This soil will then need to be monitored and any regrowth treated with herbicide.
- Rhizome fragmentation and cultivation; digging and breaking up of soil and rhizome material with the aim of increasing the leaf surface area to rhizome volume ratio and to uncompact, disturb and aerate the soil.



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. It is often advisable to bury the contaminated material within a cell formed from rhizome barrier membrane. Monitoring of the area will still be required and any regrowth treated with herbicide.
- Root barrier membrane: prevention of horizontal growth of Japanese Knotweed by installing a vertical membrane barrier. Monitoring of the area will still be required 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 any regrowth treated with herbicide.
- Biological control: There are no approved methods for the biological control of Japanese Knotweed. There is a psyllid (*Aphalara itadori*) being used in trial being conducted by CABI. The release of this insect is unlikely to have a dramatic effect of Japanese Knotweed populations in the wild.

Table 1: Control options, pros and cons

Herbicide treatment	
Pros	Cons
<ul style="list-style-type: none"> • Cost effective • Treatment can be carried out <i>in situ</i> without risk of spreading the plant further. • Quickly reduces the capacity of the plant to spread on/off site. • Easy to administer. • Chemical barriers can be used to reduce rhizome spread through the soil. 	<ul style="list-style-type: none"> • Can take years to achieve acceptable results. • Management plans that rely solely on herbicide treatment must include at least 2 to 3 years of monitoring after all evidence of regrowth has ceased. • Herbicide treatment alone should not be recommended on sites with future development plans that involve the soil being dug and disturbed. • Construction or landscaping works cannot continue in



	<p>areas still containing the plant.</p> <ul style="list-style-type: none"> • Restricted use of some herbicides near waterbodies and desired vegetation. • Some herbicides can persist in the soil. • If soil is disturbed at a later date, regrowth can occur. • Requires expert knowledge to be effective on Japanese Knotweed. • Soil which contains Japanese Knotweed that has been treated with herbicide is still considered contaminated if taken off site.
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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 stockpile must remain onsite. • The same cons as herbicide treatment apply in the stockpile area. • Plant material can be accidentally spread e.g. after change in ownership. • The depth of the stockpiled soil must be appropriate for the future use of the soil.

Screening

Pros	Cons
<ul style="list-style-type: none"> • Cost effective. • Less material needs to be disposed of to waste facility. • The treated soil can be re-introduced on site 	<ul style="list-style-type: none"> • Small fragments of Japanese Knotweed will still be present in the soil and could lead to re-infestation. • Follow up herbicide treatment may be

<p>as fill or in soft landscaping areas.</p> <ul style="list-style-type: none"> • Consequently, less soil needs to be imported from elsewhere to fill voids created by excavation. 	<p>required.</p> <ul style="list-style-type: none"> • Plant material can be accidentally spread during movement.
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Rhizome fragmentation and cultivation

Pros	Cons
<ul style="list-style-type: none"> • Can increase the effectiveness of herbicides. • Increases the leaf surface area to rhizome volume ratio • Un-compacts and aerates the soil. • Can improve the potential for eradication on static sites. 	<ul style="list-style-type: none"> • Most above ground vegetation must be cleared, even desirable plants. • Cleared vegetation must 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 must be compacted at the end of the treatment to help reduce the potential of deep soil rhizome regrowth.

Burial

Pros	Cons
<ul style="list-style-type: none"> • Does not require a set-side area for control. • Work can continue immediately after burial. 	<ul style="list-style-type: none"> • Restrictions remain onsite. • Limits use of area above burial site. • Requires a large hole to receive material, so it may not be possible if soil is shallow. • The appropriate authority 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 rhizome spread. • Can be used in cell formation. 	<ul style="list-style-type: none"> • Tears in the membrane or poorly sealed seams between sheets can be exploited by

<ul style="list-style-type: none"> • Can be used to protect structures, hard surfaces and services. • Work can continue immediately in areas protected by membranes. 	<ul style="list-style-type: none"> • 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. • Underground water can also effect installation and must be taken into consideration.
Landfill	
Pros	Cons
<ul style="list-style-type: none"> • No restrictions left onsite. • Work can continue immediately after removal. 	<ul style="list-style-type: none"> • Relatively expensive • Plant material can be accidentally spread during movement.

With the exception of herbicide treatment (which should be carried out by a PCA approved specialist), all control options should be overseen by a PCA approved Clerk of Works.

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

An herbicide must be used only in accordance with the directions on the product label in accordance with all relevant legislation. Exemptions for off label use must be obtained from relevant bodies, e.g. the Health and Safety Executive. The user assumes the risk to persons or property that arises from any such use of this 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 2012**. See Ref 5 for further details.

See section 5.1 for the UK/Irish law that governs herbicide use.

9.2 Herbicide choice

The following factors must be considered when choosing an herbicide:

- Is it effective on Japanese Knotweed?
- Is it suitable for use on a given site, e.g. proximity to water?
- 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?

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 operatives 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 herbicides 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. 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 to three year after there has been no sign of regrowth.

9.5 Herbicide use near water bodies

In England and Wales, for operations near watercourses (<5 m from the water's edge), there is a requirement to obtain written approval from the Environment Agency. Contact your local office for an application form (AqHerb01). The Environment Agency can then assess whether there is any risk to drinking water supplies, water for spray irrigation, or wildlife. The process of approval takes approximately two weeks. Only some herbicides are approved for use in or near water, e.g. certain glyphosate formulations. Subject to LERAP, other herbicides may be permitted for use near water.

In Scotland, for operations near watercourses (<10 m 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 5 m and 200 m of a water course depending on the quantity of water from the source that used for human consumption.

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 not all reports indicate the method is as effective as advertised. The highly concentrated herbicide used in this method can potentially be damaging to the environment, using more concentrate

for lower efficacy than foliar applications. Precautions must be taken not to breach the maximum permitted dose per hectare per application.

10 Excavation and transport of contaminated material

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

- If the Japanese Knotweed is going to be treated with herbicide this should be with a non-residual herbicide (for example glyphosate).
- If contaminated 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 contaminated 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.
- The guidelines provided by a number of authorities^{1,2,3,4} recommend that an area of soil extending 7 m from the above-ground stems of Japanese Knotweed should be excavated to a depth of up to 3 m in order to remove the plant's entire rhizome network. Excavation to these limits is rarely necessary; an expert should demine the extent on a site by site basis.
- All excavation should be supervised by a PCA approved Clerk of Works who is responsible for all biosecurity with respect to the Japanese Knotweed on the site.
- Excavation onsite should continue to a depth and area determined by the Clerk of Works.
- Inspection of the area for rhizome that might persist in the soil should take place regularly at the face of the excavation activities.
- 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 geotextile.
- Upon completion of the remediation works, the excavated area should be backfilled with soil or other material free from Japanese Knotweed.
- If any material is staying on site (bund, burial, etc), the location should be mapped and the information passed to the relevant individual(s).
- Bunds containing Japanese Knotweed material should remain fenced off for the entire remediation period.
- If being taken offsite, contaminated soil should be disposed of safely (Section 15).
- If needed, backfill should be used.

11 Geotextiles

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

- When being used to prevent horizontal spread, the vertical geotextile should be buried to a depth not less than 2 m. 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 of services related works.
- High specification geotextile sheeting should be used and it should be fit for purpose.
- The seams of the membrane should be sealed as per the manufacturers specs.
- A large sheet size should be used to reduce the need for sealing overlapped sheets.

12 Winter cane removal

While it is not necessary 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 reduce the quantity of herbicide that reaches new growth.

If necessary, stems can be removed by cutting, not pulling. Stems should be cut back 10 cm above ground level to remove the risk of picking up fragments of live rhizome and/or crown. 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. Stems are safe to dispose of once they have completely dried out and turned brown. Stems left on site should only be left in areas where Japanese Knotweed is present. Cane removal should be supervised by a PCA approved Clerk of Works.

Cut canes that have not dried out should be disposed of safely (see Section 15.1).

13 Replanting disturbed soil

Vegetating disturbed soils, if they are not to be covered by a hard surface, can help reduce erosion (e.g. on riverbanks) and decrease the potential of re-establishment by Japanese Knotweed and other non-native pest plants

14 Rhizome viability testing

Rhizome viability testing may be carried out to confirm if Japanese Knotweed rhizome is still viable.

Rhizome viability testing can only confirm that there is still living rhizome on site; it cannot confirm that all rhizome material has been destroyed.

15 Waste management

15.1 Winter canes

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

- Chipped and spread over the area of infestation.
- Incinerated on site (Section 15.3).
- Disposed of at an appropriate waste management facility (Sections 15.5).

Cane removal should always be supervised by a PCA approved Clerk of Works.

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 in the same way as in section (15.1).

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 rare.

Incineration should always be supervised by a PCA approved Clerk of Works

15.4 Onsite 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 geotextile. The Environment Agency or SEPA should be consulted for advice.

The structure of the void and the potential for compaction of the waste within it should be verified by a structural engineer to remove the risk of settlement within the void.

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

15.5 Offsite removal to landfill

If Japanese Knotweed material is to be disposed of offsite at a landfill, the landfill site that is receiving the contaminated materials must be licenced to receive 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 two 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 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 Clerk of 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

A site assessment report should include:

- The site location.
- Full details of the contracting organisation/client.
- A description of the site and the area immediately surrounding the site.
- An accurate record of the Japanese Knotweed infestation.
- 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 (if 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 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 Warranty

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, warranties, guarantees and insurance may be available. These provide additional levels of protection to the client in respect to any failure of the specified controls.

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 species control group entitles members to provide access to several exclusive insurance services. Information about these products are available from the contractor or directly from the insurance providers.

19.1 Insured Guarantees (Remedial Work)

In the event that a member wishes to issue a guarantee against the regrowth of Japanese knotweed following treatments this (in most circumstances) can be protected by purchasing an insured guarantee. This insurance product can be claimed upon if the contractor who has issued its own guarantee is unable to respond to a claim for any reason. The certificate of insurance can only be issued by the insurer when all works to eradicate Japanese knotweed are complete and a completion certificate has been issued by the contractor

19.2 Insurance (Structural Cover)

PCA members can provide clients with access to insurance products that protect against structural damage to buildings caused by Japanese Knotweed after the specified eradication work has been completed. At the time of publication, cover for 25 years is normally available.

19.3 Bondpay

PCA members have exclusive access to a FSA regulated service to securely hold money in a secure account until all parties are satisfied that work has been carried out satisfactorily.

20 Special consideration

Where short duration or high intensity treatments using herbicides are undertaken, there is always potential for regrowth and monitoring is required. 

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 one year.

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

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. 

Ground containing herbicide treated Japanese knotweed is still classified as controlled waste if removed from site and must be disposed of at a specially licensed landfill facility. 

21 References

- 1: Royal Institution of Chartered Surveyors (2012) Japanese Knotweed and residential development. 1st edition. RICS Information Paper.
- 2: Environment Agency (2006) Managing Japanese knotweed on development sites: the knotweed code of practice. EA.

3: Kelly, J., Maguire, C.M. and Cosgrove, P.J. (2008). Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*. Prepared for NIEA and NPWS as part of Invasive Species Ireland (ISI).

4: Scottish Environment Protection Agency (xx) Control of invasive non-native species - Japanese knotweed. <http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities/Options/Controlofinvasivenon-nati/Japaneseknotwood>

5: <http://www.pesticides.gov.uk/guidance/industries/pesticides/News/Collected-Updates/Regulatory-Updates-2012/July/Sustainable-Use-PPP-Regulations-2012>