



The Control, Management and Mitigation of Japanese Knotweed on Development Sites



The definitive guide to managing this invasive species for homeowners, developers and mortgage lenders.

Please note:

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While Japanese knotweed is undoubtedly an unwelcome headache for developers, it need not become a commercial crisis. In this no-nonsense paper, JP Associates (JPA) separates the facts from the fears about this invasive species and offers a clear and practical strategy for control, management and mitigation on development sites.

JPA has been involved in the management of Japanese knotweed for more than a decade and a half. We continually evolve our advice in response to regulatory changes, advances in the understanding of the plant's biology and the changing commercial realities of the development and environmental sectors. Director Jeremy Peirce is a BASIS-qualified amenity agronomist with a specialism in invasive and injurious weeds, giving him a comprehensive understanding of the application of herbicides and their use in controlling knotweed and other invasive species. As a result, JPA is a trusted advisor to a number of the UK's larger developers, as well as to campus managers, landowners and private homeowners.

Profile

Japanese knotweed (*Falopia japonica*) is a non-native, invasive weed that was introduced into the UK by Victorian landscape designers. In its native volcanic environment, it is a 'pioneer' species and, as such, is one of the first to become established after volcanic activity. In such a harsh environment it naturally forms a small shrub. However, when growing in less challenging lowland conditions, away from its indigenous pests and diseases, the plant commonly morphs into a rampant, blanketing infestation that can completely dominate its immediate environment.

Knotweed's heavy growth and dense and persistent canes may crowd out the natural flora and fauna and can cause damage to streams and rivers. Of even more concern to developers and urban landowners/managers is that it can also penetrate weaknesses in concrete, tarmac and brick, and this can damage the integrity of even large structures. Like many plants,

“ Knotweed material is often fly-tipped, and in urban areas it is often found around the margins of brownfield and unused 'waste' ground ”

knotweed rhizome (the plant's extensive underground root system) will also seek out and follow sources of moisture, so it can be associated with damage to drains and sewers. Thus, uncontrolled knotweed can be a potential issue to both the natural and built environments. Knotweed mostly spreads through movement of the rhizome material contained in soil excavated from ground contaminated with knotweed. Knotweed material is often fly-tipped, and in urban areas it is often found around the margins of brownfield and unused 'waste' ground.

Away from the built environment knotweed is commonly associated with river catchment areas where, once established in the upper reaches, it will then be naturally spread downstream and become established throughout the catchment.

There are several knotweed varieties, cultivars and hybrids. Although some of these are capable of breeding from seed, this is not the case with *Falopia japonica* (the most common Japanese knotweed) where all the plants are female and, therefore, do not produce viable seeds.

It is well accepted that knotweed has the ability to lie dormant for a decade or more after being sprayed off before re-emerging. Tests have shown that a new plant can generate from just a tiny piece of the parent rhizome – characteristics which makes it exceptionally difficult to eradicate.

Legislative controls

Waste regulations

In the UK, while it is not illegal to have knotweed on your property, any material that contains either the rhizome or live top growth is classed as controlled waste under the waste regulations.

The definition of waste, the details of how knotweed and its management fall under the waste regulations, and which elements of a management plan fall under the waste regulation framework (and the European Waste Framework Directive that the regulations seek to enforce) are all areas where there is 'room for debate' and 'interpretation'. It is likely that complete clarification of how the management of knotweed falls under the waste regulations will only become clear in time through case law.

The waste regulations come into play when knotweed



material is transported away from its original (continuous) site: the regulations dictate that knotweed material must be transported to a landfill facility that is licensed to receive knotweed material.

Statutes

It is contrary to both the Countryside and Wildlife Act and the Environmental Protection Act to cause knotweed 'to grow in the wild'. More specifically, knotweed is listed in Schedule 9 of the Countryside and Wildlife Act as an invasive plant that should be controlled. This listing places the onus on landowners to manage knotweed responsibly and not to allow it to spread.

Planning

It is our view that the waste regulations, the various statutes and the environmental protection regulations effectively form a regulatory framework that adequately controls the management and movement of knotweed. Consequently, while it would not be unreasonable for a Local Planning Authority (LPA) to mention the presence of knotweed as an advisory point on a planning certificate, knotweed should not be a planning issue per se and LPAs should not impose planning conditions requiring the production of a sanctioned method statement.

Anti-social behaviour

The requirement for landowners to manage knotweed on their land to protect social and community interests is well accepted. The Government has stated that landowners who ignore their responsibilities to adequately control knotweed on their land may infringe the anti-social behaviour regulations and this could lead to an anti-social behaviour order (ASBO) being issued. While this is unlikely to be used in all but the most blatant of cases, it is a measure of how seriously the Government is treating the control of invasive non-native species.

Species control orders and European regulation

Following a review of various aspects of environmental regulation and in line with measures that the Scottish Government had already put in place, the 2015 Infrastructure Act introduced the concept of species control agreements and orders. While the knotweed management sector is still waiting for precise guidance on how the new regulations will be implemented, it seems likely that they will not be principally aimed at controlling knotweed (or any other commonly found non-native plants) so it seems likely that these will not feature significantly in knotweed management plans.

The EU has also recently brought in revised regulations (1143/2014) to control non-native species at a European level, though the list of 'Species of Union Concern' does not currently include knotweed.

It seems likely that both species control orders and the European regulations will be hotly debated and may change, though any significant change will likely take some time.

Information and other bodies

While there are numerous sources of information on the management of knotweed, the Environment Agency's (EA's) Code of Practice (CoP) 'Managing knotweed on Development Sites' (Version 3 2013) is the most significant, and most bodies, agencies and departments accept this as representing the model that should be followed.

The National House Building Council (NHBC) and many other bodies that may well have an influence on a development project, usually require that knotweed be controlled in line with the EA's CoP.

Now that the EA has been assumed under the general banner of DEFRA, the material they produce has to be brought in line with other Government information. This may mean that the EA's CoP will no longer be available in its current form. The EA's CoP does not – in itself – have any statutory or regulatory weight: it is simply a statement of best practice.

Best practice

It is our view that as long as knotweed is managed under accepted best horticultural or land management practices (for example as indicated in the EA's CoP), within the boundaries of its existing site and according to a comprehensive management plan or policy, there will be no actionable infringement of the waste regulations or other regulatory controls.

In any situation, best practice should:

- encompass current scientific understanding (of the particular issue)
- be compliant with all regulatory and statutory controls
- ensure best environmental protection standards
- seek to best protect community and social interests
- reflect current health and safety requirements
- implement a comprehensive management plan or policy.



Residential property market

As well as the development sector, the established residential property market is another sector that is particularly affected by knotweed. In recent years, mortgage lenders and insurers have been particularly worried about the impact that knotweed can have on buildings that they have lent against or insure. This has led to mortgage and insurance applications being refused solely because knotweed has been found (or even suspected) on or adjacent to residential properties (and in some cases even some distance from).

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As a way of providing some reassurance and stability to the residential property market, the Royal Institute of Chartered Surveyors (RICS) produced a professional information paper ‘Japanese Knotweed and residential property’ (ref: IP 27/2012) which suggests how knotweed should be managed in residential properties.

Management strategy

Knotweed is a form of contamination that can have severe implications for a development project both in terms of financial cost and timescale. A robust management strategy should be implemented to ensure that the issue is correctly addressed, and the risks properly considered.

According to the EA’s CoP, the contaminated area that surrounds any knotweed extends seven metres radially from the extent of the growth and down to a depth of three metres. Thus, even a small clump of knotweed will generate a significant volume of potentially contaminated material.

According to the guidelines, a single plant or small clump will potentially have a contaminated area of 154m² (area of circle with a radius of seven metres) that will potentially generate 462m³ of contaminated material. Using a conversion factor of 1.5 tonnes per m³, 462m³ will yield some 693 tonnes of material that has to be removed. A typical landfill price (quoted March 2015) of £135/tonne (including landfill tax) will mean a bill of £114,345 plus excavation and transportation costs.

This approach also requires transporting significant volumes of material around the country and the fuel and direct environmental impact cost of this approach should also be considered carefully.

Dig & dump

There are (or perhaps were) essentially two alternative approaches to controlling knotweed. Until fairly recently the ‘dig and dump’ option has been the preferred solution, where all potentially contaminated material is removed from site and deposited at a licensed landfill site. Although this can remove the problem – if carried out correctly - the cost of the operation is often prohibitive.

The EA’s CoP recommends that transporting knotweed material should be considered only as a ‘last resort’ and it is realistically no longer a viable management option, unless volumes are kept to a minimum.

On-site management

The second option is to treat the contamination on site (at its point of origin). As well as potentially costing considerably less, this option complies with current Government and planning policy, which encourages developers to mitigate issues encountered at source. It is also in line with accepted best horticultural/land management and environmental protection practice and is becoming the preferred option in the vast majority of cases.

The principle of treating knotweed on site immediately raises a significant issue, however: guaranteed eradication. Our experience suggests that it is never possible to guarantee total eradication of a knotweed infestation.

Combined approach

Without the ability to give credible guarantees, we strongly recommend that landowners and developers should always err on the side of caution and not rely on one single measure in any knotweed management strategy. Rather, the strategy should include a combination of the following measures:

- **Control** – a herbicide application programme to control the growth
- **Management** – measures necessary to ensure that any arisings are managed correctly
- **Mitigation** – a mitigation element to reduce the level of risk, should any re-growth occur and the steps needed to cover future knotweed regrowth after the completion of the current project.



Discussion and preparation of site-specific method statement

Even in the most straightforward cases, the presence of knotweed will likely raise issues that will affect all areas of a development project. As the knotweed management strategy and its implications may heavily influence how any affected development proceeds, it is essential that the issues are thoroughly discussed and explored at the earliest opportunity.

Following these discussions, a site-specific method statement should be drawn up that will detail how the strategy will be implemented. The method statement will describe how the knotweed growth will be controlled, how arisings from inside the contaminated area will be managed and will detail the measures needed to mitigate against any future knotweed regrowth.

In preparing the method statement the following issues should be considered and addressed as necessary:

Segregation

In order to ensure that there is no risk of accidental disturbance to the contaminated area, the first action must be to erect a fence at the extent of the contaminated area. Instructions should be issued that there must be no access into the area without specific instruction from the site management and/or supervision from the project knotweed consultant/clerk of works.

Control

a) Herbicide application

The EA's CoP states that the first part of any management strategy must be the instigation of a herbicide application regime to kill off and control any growth. Translocated herbicide – one that is circulated naturally by the plant – is best applied to a large, active and healthy leaf area.

At the beginning of a project (where there have been no previous applications) the growth is likely to reach a suitable size by late spring or early summer. However, the most effective time to apply herbicide is at the end of the summer when the plant is naturally moving resources into its rhizome network to act as an energy reserve for the following spring. If at all possible, the initial herbicide application should be programmed for this season.

The initial application is the most important as this will reduce the plants' levels of viability. Subsequent applications will be applied to less healthy plants which reduces the efficacy of the application.

“ Knotweed is a particularly tenacious plant and it will usually take several seasons to achieve a satisfactory level of control ”

The Chemical Regulation Directorate (CRD) (formerly Pesticide Safety Directorate) has sanctioned several chemical formulations as suitable for controlling knotweed. Full and informed consideration should be given to the selection of a suitable herbicide for any project. In some instances it may be possible to use a product that has a measure of residual effect. However, during the period of efficacy, it is likely that the treated ground will be 'contaminated' with the active agrochemical ingredient and this may result in further complications for contractors and other disciplines.

Rather, it is envisaged that in the majority of development situations a Glyphosate-based product would be most suitable. Glyphosate is a non-selective, translocated herbicide that is rendered inactive on contact with the ground and therefore has no residual effects that could result in further contamination issues. It is also rain-fast in a short period of time, has been classed as being suitable for sensitive environmental projects and is registered as being suitable for applications close to water courses.

There is much discussion at the moment on the long-term impacts of Glyphosate on health and the environment with numerous parties presenting data to support the different sides of the discussion. This report is not a suitable forum to further these discussions; suffice to say that Glyphosate is a useful part of the majority of knotweed management plans that would be difficult to replace, should the CRD decide to withdraw it from use.



Most herbicides can only be applied during the growing season, and any development within a contaminated area should normally be undertaken after a herbicide regime has been instigated. Thus, the control programme will need to be carefully planned and may have to be started up to a whole year (or more) before construction begins.

While a herbicide application regime should always remain the first element of any control programme, and while the early autumn is the best season to apply translocated herbicide, spraying can be undertaken at any time when there is an active leaf area. If commercial or project timescales dictate that spraying cannot be undertaken before the start of a project, the initial herbicide should still be applied even if this is only a short time before ground works begin in the vicinity of the knotweed.

Where construction is outside a contaminated area, the knotweed should remain segregated so that there is no accidental disturbance to the contaminated area. Once the initial herbicide application has been undertaken, the dead growth should be cleared and the area cultivated to encourage the knotweed to grow. Further herbicide should be applied when any re-growth develops an active leaf area. This pattern of herbicide application and cultivation should be continued until there is no further re-growth, or for the duration of the development.

Knotweed is a particularly tenacious plant and it will usually take several seasons to achieve a satisfactory level of control. Any herbicide programme will need to include provision for several repeat applications and in a development project these will need to include post-construction applications.

While JPA is firmly of the opinion that eradication cannot be guaranteed, there are several specialist contractors who guarantee the efficacy of their herbicide programmes. As long as these guarantees are backed by a suitably robust insurance policy, engaging such a contractor may represent a viable option as, at least in theory, any future re-growth that occurs would be controlled at the contractor's expense.

However, it must be stressed that any spray guarantee should not replace suggested management procedures or potential risk mitigation measures.

The RICS information paper states that it is 'impractical' to guarantee that knotweed will not return after the completion of a treatment programme and states that insurance covers should instead be restricted to ensuring that recommended treatment is completed.

b) Off-site infestation

Japanese knotweed's rhizome growth will frequently extend several metres beyond the current extent of the top growth – and this defines the extent of the contaminated zone. As with any plant, knotweed will often extend beyond the boundaries of a site. Indeed the natural extension of the rhizome network is one of the ways for knotweed to spread.

If knotweed is to be effectively controlled, any adjacent off-site growth will also need to be treated. If any off-site growth remains uncontrolled it can, in a short space of time, simply re-infect the on-site areas that have been controlled.

Management

Working within contaminated areas

Any site operations that are undertaken within contaminated areas will need to be strictly controlled to ensure that there is no accidental movement of potentially contaminated material. If work has to be undertaken inside contaminated areas, wherever possible excavators should be located outside the area, entering only as necessary to complete operations. If it is not possible to keep machinery outside the contaminated area, the machine(s) should not be removed from the area until they have been cleaned (and preferably washed) to ensure that there can be no accidental movement of rhizome material.

Any spoil generated from excavations inside the contaminated area should be stored within that area. Arisings can be used as back-fill inside the contaminated area. All work operations inside the contaminated area and the management of any potentially contaminated arisings should be undertaken according to the site-specific method statement and supervised by the knotweed consultant/clerk of works.

Just as with new structures inside the contaminated area (discussed below), the integrity of any new services located inside contaminated areas should be protected by using specialist barriers. The location, specification and installation methods of the barrier should be covered in the method statement.

Movement of contaminated material

Under certain circumstances it may be necessary to remove material from the contaminated area. Movement of viable rhizome material from the original (continuous) site is strictly controlled under the waste regulations. Under the waste regulations all waste transfer notes must clearly indicate that knotweed material is being



transported. As it is illegal to allow knotweed to 'escape into the wild', viable material will need to be transported in covered wagons in order to ensure that there can be no accidental loss or movement of controlled material.

Not all landfill sites will be able to accept knotweed material, which has to be buried at a certain depth and a certain distance from the sides of a landfill.

In the past, management of knotweed material may not have been so closely regulated and some landfill operators were happy to accept controlled knotweed material as being suitable for use as 'intermediate cover' which attracts a far lower fee. However, in recent years there has been less room for interpretation of the waste regulations and it is now generally accepted that all knotweed material - whether or not it has been sprayed with herbicide - should be regarded as controlled waste.

It remains the sole responsibility of the landfill operators as to how they class and charge for material being deposited at their facility. If there is room for negotiation, providing the landfill operators with all available information and reports in an open and transparent way may encourage a favourable decision on pricing.

Making the management strategy available to interested parties will also demonstrate adherence to the EA's code of practice, the waste regulations and best practice.

As it is not illegal to have knotweed on your land, landowners are within their rights to move either controlled or viable material to other areas of a site. While knotweed material can be moved within a continuous site for further management, the waste regulations prevent movement of controlled waste beyond the immediate site.

If the timing of a development dictates that the project must be started before completion of the herbicide regime it may be possible to move the contaminated material to an alternative location to complete the herbicide application. As there will be a high risk of further spreading the knotweed to other presently clean areas of the site, any movement of contaminated material must be strictly controlled by adhering to the site-specific method statement.

“...applying herbicide will frequently cause the rhizome to enter a period of dormancy that can last up to a decade or more”

On-site burial and bunding

The EA regards knotweed as a waste regulation issue - at least in terms of statutory control, if not in terms of impact. As a way of reducing the volume of material transported to landfill sites the EA's waste regulations allow knotweed material to be buried on site.

The waste regulations and the EA's code of practice stipulate that any material buried must be buried to a depth of five metres. Because of the volumes of material involved and the depth to which material must be buried, the scale of the operation involved will, in most cases, be prohibitive.

The EA's code of practice and the waste regulations also allow material to be buried at a reduced depth, providing that it is encapsulated in a knotweed (root) barrier to prevent the knotweed from spreading. However, the encapsulating barrier could easily become breached by animal activity or subsequent ground works, which could allow the knotweed to become re-established.

“If new buildings have to be located within a contaminated area, they will need to be made impervious to any future knotweed incursion”

While this option might be a solution in some circumstances, the scale and cost of this operation, along with its inherent vulnerability, may make it an unsuitable solution for most cases.

If these options are pursued, you need to carefully record the details and locations of any burial to ensure that any future projects or work do not disturb the buried material or breach the barriers. The EA recommends that the records are then kept with the property deeds.

Surface bunding

The EA's code of practice allows that knotweed can also be placed in a surface bund for further management.

Surface bunds should be placed in previously contaminated areas though they can be located elsewhere but will then need to be protected with barriers. The big advantage of surface bunds is that they allow the knotweed to re-grow and so it can then be controlled with further herbicide applications rather than just burying the problem underground and below barriers.



As best practice dictates that any knotweed management plan or policy should include provision for future management, surface bunds may often be the best option as they allow future control measures to be implemented.

Viability tests

If the development design calls for a net loss of material from within the contaminated area, it may be possible to undertake a viability test on undisturbed, potentially contaminated material to determine the precise location of both the remaining viable material and the controlled material.

One of the features of knotweed is that applying herbicide will frequently cause the rhizome to enter a period of dormancy that can last up to a decade or more. During this time, the rhizome will still be viable and will sprout under test conditions but will not produce any new top growth, effectively preventing further herbicide application.

While the theory of undertaking viability tests is sound, it is a difficult process to replicate on a site scale; it is time-consuming and can deliver unreliable results. For these reasons, it is not often a realistic management option.

Mitigation

Development layout design

Altering the design of development proposals to ensure that new buildings are sited away from the knotweed contaminated area means that any re-growth can easily be treated with herbicide.

Building integrity

If new buildings have to be located within a contaminated area, they will need to be made impervious to any future knotweed incursion.

Options for protecting their integrity include incorporating a specialist protection barrier in the building design and commissioning engineers to design a foundation/floor detail that is impervious to knotweed incursion.

Protection barriers work in two different ways: they can either form a physical barrier through which the roots/rhizomes cannot penetrate, or they can incorporate a material (copper) that acts as an ionic barrier that will repel root growth. There are pros and cons of both systems and the particular circumstances of each project will determine the most appropriate choice.

Whichever option is used, it may be possible to seek a guarantee from either the barrier manufacturer the foundation engineer. The EA's guidance suggests that a guaranteed barrier system may, in many situations, be viewed as the preferred mitigation solution.

Just as with new structures inside the contaminated area, the integrity of any new services located inside contaminated areas should be protected by using specialist barriers. The location, specification and installation methods of the barrier should be covered in the method statement.

Barrier installation

The EA's code of practice states that vertical barriers can be installed to provide a physical deterrent against rhizome encroachment. The code suggests that this might be appropriate in situations such as site boundaries where there is a risk that knotweed might move into areas that are currently knotweed free. However, as with the use of barriers in the creation of a buried cell, the barrier can easily become damaged over time and, if not properly installed and maintained, the rhizome could easily find its way around the barrier.

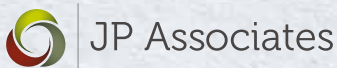
In most situations vertical barriers will provide little more than an additional level of reassurance, rather than representing a significant element in any control or mitigation programme.

Process and project documentation

The knotweed strategy should be documented and implemented through a comprehensive process that should include the following:

- the production of an initial report that sets out the results of a site survey and outlines the scope of the issues
- the production of a site-specific method statement
- the implementation of the method statement through the project
- production of a final report confirming the steps that have been taken to date and stating the steps that need to be carried out after project completion.

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About JP Associates

JP Associates provides impartial, quality-assured consultancy to clients involved in development projects, or the management of woodland, open land or urban spaces across the south of the UK. Founded in 2000, the company is known for its friendly, responsive service and for delivering pragmatic solutions. Its three units are:

JPA Arboriculture Independent consultants helping clients assess, plan, develop and manage sites with trees and hedgerows

JPA Trees & Development Expert arboricultural partners for residential or commercial development projects

JPA Land & Habitat Trusted advisors helping clients balance commercial, aesthetic and regulatory requirements, and manage invasive species such as Japanese knotweed.