

2013 addendum to the 2006 knotweed code of practice

Since the publication of the knotweed code of practice in 2006, there have been some changes to legislation which affect pages 6-7 and 36-37 of the code. These pages have been replaced with the pages below.

In addition, there are two technical areas that need to be clarified:

- **Use of Picloram**

Where the code refers to the use of Picloram, it is essential to ensure that groundwater quality is protected, as well as nearby watercourses. Groundwater Source Protection Zones (SPZ's) are areas of groundwater where there is a particular sensitivity to pollution risks due to the closeness of a drinking water source and how the groundwater flows. They are used to protect abstractions used for public water supply and other forms of distribution to the public such as mineral and bottled water plants, breweries, and food production plants. Generally the closer the activity is to a groundwater source, then the greater the risk. More information on Groundwater SPZ's is available on our [website](#). **Picloram should not be used within the inner zone of an SPZ, and a risk-based approach should be adopted when considering its use outside of the inner zone.**

- **Soil screening methods**

Since the publication of the code, various soil screening and sieving methods have become a popular method for rhizome removal. Where conditions are appropriate for this method, screening can provide an effective means of rhizome removal, **however, screened soil must still be regarded as potentially containing viable knotweed rhizome and must not be reused off-site, or sold for re-use.** If soil is taken off-site, it should be disposed of at an approved landfill, in accordance with section 6 of the code. If soil has been efficiently screened it can be reused on-site, in accordance with section 2.4 of the code.

These pages replace pages 6 and 7 of the knotweed code of practice, 2006:

Managing Japanese Knotweed - legislation

Legislation covering the handling and disposal of knotweed includes the following:

The Control of Pesticides Regulations 1986 require any person who uses a pesticide to take all reasonable precautions to protect the health of human beings, creatures and plants, safeguard the environment and in particular avoid the pollution of water.

For the application of pesticides in or near water, approval from the Environment Agency should be sought before use.

Section 14(2) of the **Wildlife and Countryside Act 1981 (WCA 1981)** states that *“...if any person plants or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence.”* Japanese knotweed is one of the plants listed in Schedule 9. Anyone convicted of an offence under Section 14 of the WCA 1981 may face a fine of £5,000 and/or 6 months imprisonment, or 2 years and/or an unlimited fine on indictment.

The **Environmental Protection Act 1990 (EPA 1990)** contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any soil or plant material contaminated with Japanese knotweed that you discard, intend to discard or are required to discard is likely to be classified as controlled waste. The most relevant provisions in the EPA are in section 33 (1) (a) and (1) (b). These create offences to do with the deposit, treating, keeping or disposing of controlled waste without a permit. Section 33 (1) (c) makes it an offence to keep, treat or dispose of controlled waste in a manner likely to cause pollution of the environment or harm to human health. Section 34 places duties on any person who imports, produces, carries, keeps, treats or disposes of controlled waste. Waste must be handled responsibly and in accordance with the law at all stages between its production and final recovery or disposal.

Waste must be transferred to an authorised person, in other words a person who is either a registered carrier or exempted from registration by the **Waste (England and Wales) Regulations 2011** (Waste Regulations). A waste transfer note must be completed and signed giving a written description of the waste as per regulation 35 of the Waste Regulations. This must be sufficient to enable the receiver of the waste to handle it in accordance with their own duty of care. Failure to comply with these provisions is an offence.

The **Hazardous Waste Regulations 2005 (HWR 2005)** contain provisions about the handling and movement of hazardous waste. Hazardous wastes are defined by reference to regulation 6 of the HWR 2005. A waste is a hazardous waste if it is listed as a hazardous waste in the List of Wastes Decision as well as the **List of Waste (England) Regulations 2005**. The Secretary of State is also able to decide if a particular batch of waste is to be determined as hazardous. Schedule 3 of the HWR 2005 includes a list of properties that render waste hazardous. Annex I, II and III of the **Hazardous Waste Directive** also provides further guidance on what constitutes hazardous waste.

Consignment notes must be completed when any hazardous waste is transferred. They must include details about the hazardous properties and any special handling requirements. If a consignment note is completed, a waste transfer note is not necessary. Untreated Japanese knotweed is not classed as hazardous waste, but material containing knotweed which has been treated with certain herbicides, may be classified as hazardous waste.

The **Environmental Permitting (England and Wales) Regulations 2010 (EPR)** includes reference to the 'Exercise of relevant functions' in Schedule 9, paragraph 4. These objectives are derived from Article 13 of the **European Waste Framework Directive**. These objectives states that necessary measures shall be taken to ensure that *"...waste management is carried out without endangering human health, without harming the environment and, in particular without risk to water, air, soil, plants or animals; without causing a nuisance through noise or odours; and without adversely affecting the countryside or places of special interest."*

Exemptions from the need for a permit are available in some circumstances, and are set out in Schedule 2 and 3 of the EPR. Exempt waste operations must comply with the general rules governing operations and must register with the relevant authority.

The above legal provisions have consequences for a range of people, including anybody involved in the management or disposal of knotweed. For example knotweed which is cut down or excavated and removed from a development site must be transferred to an authorised person, and correctly described. It must be disposed of appropriately, as set out below in this Code.

If you are going to bury knotweed on a development site you will need to consult the Environment Agency first to make sure that the material does not contain any other contaminant that may affect the quality of groundwater.

If you pollute the environment or cause harm to human health you may be prosecuted. Anyone who uses a herbicide must ensure that they do not

pollute the water environment and the use of herbicides in or near water requires approval from us. If any waste soil or knotweed is sent for landfill either before or after any treatment, it must go to a landfill that is authorised to receive it. It is not an offence to have Japanese knotweed on your land and it is not a notifiable weed. Allowing Japanese knotweed to grow onto other peoples property may be regarded as a private nuisance under common law, but this would be a civil matter.

Where you rely on the methods of on site knotweed management in paragraphs 4.1, 5.4 and 5.5 this would normally require you to have an environmental permit or a pollution prevention and control permit. However if you carry out these activities in full accordance with this code of practice, and the work meets the waste relevant objectives described above, then in accordance with our Enforcement and Prosecution Policy we would not normally prosecute for failure to have an environmental permit.

Our Role

The Environment Agency is responsible for regulating waste. We grant waste management permits, register exemptions and can take enforcement action including prosecution if the law is not complied with. We give approvals under the **Control of Pesticides Regulations 1986** for use of pesticides in or near water.

We may take enforcement action under WCA 1981, but there are also a number of other organisations that can do so. We would not normally use this legislation unless a waste offence had also been committed.

We are not responsible for controlling Japanese knotweed, other than that growing on our land. Managing knotweed is the responsibility of the owner/occupier of a site. We do not endorse Japanese knotweed management plans, or endorse companies that do this.

These pages replace pages 36 and 37 of the knotweed code of practice, 2006:

Environmental Permitting (England and Wales) Regulations 2010 (EPR)

The EPR includes reference to the 'Exercise of relevant functions' in Schedule 9, paragraph 4. These objectives are derived from Article 13 of the European Waste Framework Directive. These objectives states that necessary measures shall be taken to ensure that *"...waste management is carried out without endangering human health, without harming the environment and, in particular without risk to water, air, soil, plants or animals; without causing a nuisance through noise or odours; and without adversely affecting the countryside or places of special interest."*

Exercise of relevant functions:

See the Environmental Permitting (England and Wales) Regulations 2010, above.

Formulation:

A particular herbicide traded under a specific name. Different formulations of herbicide may share the same active ingredient, but are designed for use in different situations. For instance, only certain formulations of glyphosate are approved for use in or near water.

Green belt:

Area of undeveloped land in proximity to a community that has been preserved to conserve the aesthetic beauty of the location. These areas are referred to as 'green wedges' in Wales.

Hazardous Waste Regulations 2005 (HWR 2005):

HWR 2005 contains provisions about the handling and movement of hazardous waste. Consignment notes must be completed when any hazardous waste is transferred, which include details about the hazardous properties and any special handling requirements. If a consignment note is completed, a waste transfer note is not necessary. Material containing knotweed that has been treated with herbicide, may be classified as hazardous waste.

Hazardous waste:

Hazardous wastes are defined by reference to regulation 6 of the HWR 2005. A waste is a hazardous waste if it is listed as a hazardous waste in the List of Wastes Decision as well as the List of Waste (England) Regulations 2005. The Secretary of State is also able to decide if a particular batch of waste is to be determined as hazardous. Schedule 3 of the HWR includes a list of properties that render waste hazardous. Annex I, II and III of the Hazardous Waste Directive also provides further guidance on what constitutes hazardous waste.

Heave:

Physical disruption of a hard surface caused by an upward stress.

Hybrid:

A plant or animal that results from reproduction by two different species.

Membrane:

In this code, membrane describes a relatively low specification protective layer used for containing Japanese knotweed when it is being transported (sections 5.1, 6.1, 6.2, 7.2). Compare with 'root barrier membrane', below.

Perennial:

A plant that continues its growth from year to year.

Persistent herbicide:

A herbicide that contains an active ingredient that will not be swiftly degraded after it has been applied. This can sometimes limit the manner in which treated soil can be reused or disposed of.

Rhizome:

Underground stem. Enables Japanese knotweed to survive over-winter, when the canes die back. Small sections of rhizome, as little as 0.7g can regrow into a new plant.

Rhizomatous:

Of or pertaining to a rhizome.

Root barrier membrane:

High specification membrane used for highly stressed short-term protection, such as haulage routes (section 2.2, 7.1 and 7.3), or containing Japanese knotweed in the long term (sections 4, 5 and 8.5). Root barrier membranes must be made of a material that is fit for purpose. It should be made of a material that can be:

- a) used without damage;
- b) provided in large sizes, to minimise the need for seals;
- c) sealed securely;
- d) remain intact for at least 50 years (guaranteed by the manufacturer);
- e) resist UV damage if used where it is exposed to sunlight;
- f) buried without polluting groundwater from chemicals leached from it. Compare with 'membrane', above.

Sett:

The system of tunnels and chambers used by badgers and protected by law.

Tines:

Long pointed teeth attached to a digger bucket to rake out rhizome.

Viable:

Capable of growing into a new plant.

Waste exemption:

When the disposal of waste is deemed not to present a risk to public health or the environment. A waste operation, water discharge or groundwater activity must meet certain criteria in order to be exempt from the need for an Environmental Permit.

Wildlife and Countryside Act 1981 (WCA 1981):

Section 14(2) states that *“if any person plants or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence.”* Japanese knotweed is one of the plants listed in the Schedule.



Environment
Agency

Managing Japanese knotweed
on development sites

the knotweed code of practice



We are the Environment Agency. It's our job to look after your environment and make it **a better place** – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.

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Summary

Managing land infested by Japanese knotweed in a timely and appropriate way can avoid:

- excessive cost
- potential prosecution and/or compensation claims
- physical damage to buildings and hard surfaces
- harm to the environment.

Identifying Japanese knotweed on a site early lets developers assess and cost options for destroying, disposing of and managing it, as well as negotiating an appropriate change in the purchase price of the land.

You should keep the amount of Japanese knotweed-infested soil you excavate to a minimum.

Making sure your staff can identify Japanese knotweed rhizome can reduce waste costs and improve how you manage Japanese knotweed on site.

Do not accept topsoil until you have inspected it for Japanese knotweed rhizome.

Japanese knotweed-infested soil that has been treated can be reused for landscaping the site, but should not be taken off site, unless to landfill.

Designating a clerk of works to oversee the Japanese knotweed management plan is a good way of ensuring that contractors treat Japanese knotweed in an appropriate manner.

You have a choice of herbicides that are effective against Japanese knotweed, depending on your situation.

It is an offence to plant or cause Japanese knotweed to spread in the wild under the Wildlife and Countryside Act 1981 and all waste containing Japanese knotweed comes under the control of Part II of the Environmental Protection Act 1990.

You can get advice on managing waste from us on our customer services line; 08708 506 506

If you see anyone illegally moving or disposing of waste, call our incident hotline on; 0800 80 70 60.

Introduction

Purpose

This code has been written for anyone involved in the development and haulage industry who may encounter sites with Japanese knotweed, or soil containing it. It allows our staff to provide consistent advice.

This code replaces “The Environment Agency code of practice for the management, destruction and disposal of Japanese knotweed” May 2001.

This code of practice will help developers manage Japanese knotweed legally. It also gives you options for cost effectively managing Japanese knotweed on site. Architects, planners, designers, contractors, consultants and landscape gardeners can also use this code.

Japanese knotweed *Fallopia japonica var japonica* is a non-native invasive species of plant. Since it was introduced into the UK as an ornamental garden plant in the mid-nineteenth century it has spread across the UK, particularly along watercourses, transport routes and infested waste areas.

Plants within their native range are usually controlled by a variety of natural pests and diseases. When these plants are introduced into new areas that are free from these pests and diseases, they can become larger and more vigorous. They invade natural habitats and out-compete the native plants and animals that normally live there. Rivers, hedges, roadsides and railways form important corridors for native plants and animals to migrate, and large infestations of non-native weeds can block these routes for wildlife.

Japanese knotweed isn't just a problem for our native wildlife. The vigorous growth can damage buildings and hard surfaces. Once established underneath or around the built environment, it can be particularly hard to control. Riverside Japanese knotweed damages flood defence structures and reduces the capacity of channels to carry floodwater.

Footpaths become crowded with tall canes, making it difficult for pedestrians to see and making them feel less safe. In winter, the tall dead canes show



where litter has become caught up and rats can live there. Lawns and gardens become infested and the cost of maintaining buildings increases.

There are a number of ways in which we can manage the impact of Japanese knotweed. It is important that we find out the ways in which Japanese knotweed has been spread and try to tackle these. Disposing of soil from development sites is one way Japanese knotweed has spread.

Brownfield development is an important aspect of urban and rural regeneration and protecting green belt. Many of these sites support infestations of Japanese knotweed, which can live in poor soil quality and contamination common to these areas. These sites have often been used to receive waste, often fly-tipped by gardeners.

Managing Japanese knotweed - legislation

Legislation covering the handling and disposal of knotweed includes the following:

The Control of Pesticides Regulations 1986

require any person who uses a pesticide to take all reasonable precautions to protect the health of human beings, creatures and plants, safeguard the environment and in particular avoid the pollution of water. For application of pesticides in or near water approval from the Environment Agency should be sought before use.

Section 14(2) of the **Wildlife and Countryside Act 1981 (WCA 1981)** states that “if any person plants or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence.” Japanese knotweed is one of the plants listed in the Schedule. Anyone convicted of an offence under Section 14 of the WCA 1981 may face a fine of £5,000 and/or 6 months imprisonment, or 2 years and/or an unlimited fine on indictment.

The **Environmental Protection Act 1990 (EPA 1990)** contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any Japanese knotweed contaminated soil or plant material that you discard, intend to discard or are required to discard is likely to be classified as controlled waste. The most relevant provisions are in:

section 33 (1a) and (1b) which create offences to do with the deposit, treating, keeping or disposing of controlled waste without a licence. Exemptions from licensing are available in some circumstances, and are set out in Schedule 3 to the Waste Management Licensing Regulations 1994 as amended (the WMLR 1994) s.33 (1c) which makes it an offence to keep, treat or dispose of controlled waste in a manner likely to cause pollution of the environment or harm to human health.

section 34 places duties on any person who imports, produces, carries, keeps, treats or disposes of controlled waste. Waste must be handled responsibly and in accordance with the law at all stages between its production and final recovery or disposal. Waste must be transferred to an authorised person, in other words a person who is either a registered carrier or exempted from registration by the **Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991**. A waste transfer note must be completed and signed giving a written description of the waste, which is sufficient to enable the receiver of the waste to handle it in accordance with their own duty of care. The provisions concerning waste transfer notes are set out in the **Environmental Protection (Duty of Care) Regulations 1991** (as amended). Failure to comply with these provisions is an offence.

The **Hazardous Waste Regulations 2005 (HWR 2005)** contain provisions about the handling and movement of hazardous waste. Consignment notes must be completed when any hazardous waste is transferred, which include details about the hazardous properties and any special handling requirements. If a consignment note is completed, a waste transfer note is not necessary. Untreated Japanese knotweed is not classed as hazardous waste, but material containing knotweed which has been treated with certain herbicides, may be classified as hazardous waste.

The **Waste Management Licensing Regulations 1994** describe ‘waste relevant objectives’ in Paragraph 4 of Schedule 4. These objectives require that waste is recovered or disposed of “without endangering human health and without using processes or methods which could harm the environment and in particular without – risk to water, air, soil, plants or animals; or causing nuisance through noise or odours; or adversely affecting the countryside or places of special interest”

The above legal provisions have consequences for a range of people, including anybody involved in the management or disposal of knotweed. For example knotweed which is cut down or excavated and removed from a development site must be transferred to an authorised person, and correctly described. It must be disposed of appropriately, as set out below in this Code. If you are going to bury knotweed on the development site you will need to consult us first to make sure that the material does not contain any other contaminant that may affect the quality of groundwater. If you pollute the environment or cause harm to human health you may be prosecuted. Anyone who uses a herbicide must ensure that they do not pollute the water environment and the use of herbicides in or near water requires approval from us.

If any waste soil or knotweed is sent for landfill either before or after any treatment, it must go to a landfill that is authorised to receive it.

It is not an offence to have Japanese knotweed on your land and it is not a notifiable weed. Allowing Japanese knotweed to grow onto other peoples property may be regarded as a private nuisance under common law, but this would be a civil matter.

Where you rely on the methods of on site knotweed management in paragraphs 4.1, 5.4 and 5.5 this would normally require you to have a waste management licence or a pollution prevention and control permit.

However if you carry out these activities in full accordance with this code of practice, and the work meets the waste relevant objectives described above, then in accordance with our Enforcement and Prosecution Policy we would not normally prosecute for failure to have a waste management licence or permit.

Our role

The Environment Agency is responsible for regulating waste. We grant waste management licences, register exemptions and can take enforcement action including prosecution if the law is not complied with. We give approvals under the Control of Pesticides Regulations 1986 for use of pesticides in or near water.

We may take enforcement action under WCA 1981, but there are also a number of other organisations that can do so. We would not normally use this legislation unless a waste offence had also been committed.

We are not responsible for controlling Japanese knotweed, other than that growing on our land. Managing knotweed is the responsibility of the owner/occupier of a site. We do not endorse Japanese knotweed management plans, or endorse companies that do this.

The status and use of this Code

Provided there is a suitable location, this code describes ways of managing Japanese knotweed that developers may wish to consider, which will avoid creating a waste disposal problem. We are keen to provide alternatives that allow developers to treat Japanese knotweed on site, so you don't have to use landfill. Landfill is very expensive for the development industry, it reduces valuable landfill capacity and needs haulage, which damages the environment and increases the risk of Japanese knotweed spreading. Sometimes, due to shortage of time and location, landfill is the only reliable option, but it should be treated as a last resort.

There are a number of ways of managing Japanese knotweed within a development site. Site managers need to be careful of claims made about products and methods on offer for controlling Japanese knotweed, particularly those that claim it can quickly destroy the problem completely.

We cannot guarantee that any of the methods we describe in this code will be successful. We believe the methods within this code are among the best that are currently available, but do not reflect the complete choice that is available. The contractor and client need to agree a contract for effectively treating the problem. Remember that Japanese knotweed can stay dormant for many years.

You may wish to use this code of practice to assist you in carrying out your legal duties concerning knotweed. However this code does not constitute legal advice and it does not aim to give a detailed or comprehensive account of the legislation that could apply to you. You should be aware that it is your responsibility to make sure that the law is complied with. Waste legislation is especially complex. You need to discuss these issues with us to make sure you act appropriately.

If you need advice, call our customer services line on 08708 506 506. If you see anyone illegally moving or disposing of waste, call our incident hotline on 0800 80 70 60.

Much of the information in this code concerning on-site treatment options is aimed at suggesting best practice rather than setting out legal obligations.

This code should be used in conjunction with other guidance or regulations concerning Japanese knotweed if relevant, such as the model specification and tender documents produced by the former Welsh Development Agency, now part of the Welsh Assembly Government.

Tips for developers

We hope that, by developing this code, we will help industry to avoid excessive costs, protect the environment and use natural resources in a sustainable way. We would encourage developers to consider the following particular points:

Check for Japanese knotweed before buying a site.

- a) The information and internet links within this code should be enough for you to find out about Japanese knotweed in its various forms. If there is Japanese knotweed on a site, this should not stop you buying it, but you will need to consider this when working out how profitable a development is likely to be.
- b) If a site has been skimmed or treated, look for evidence of Japanese knotweed material. Consider some form of legal protection from the potential subsequent cost of managing Japanese knotweed within the purchase agreement.
- c) If there is Japanese knotweed, consider whether you will be able to treat the material on site. Have you bought enough space to shift soil and create a bund, for instance?
- d) If you think there is no Japanese knotweed on the site, consider getting legal guarantees that say this before you buy the site.

Timetable for treatment and development.

- a) Plan to minimise the amount of Japanese knotweed that you have to excavate.
- b) Make sure you have allocated enough time within the project timescale to develop and apply a Japanese knotweed management plan.
- c) Treating Japanese knotweed early and effectively can significantly reduce the chance of it growing again. You should agree and implement a treatment plan as soon as possible.
- d) Consider phasing the development, to allow more time to treat the problem.
- e) Use the best methods, including the most effective herbicides for the site in question. This will be determined by factors such as how close the site is to controlled waters and desirable trees and other vegetation.

Managing treated material.

Just because soil has been treated, this does not mean Japanese knotweed cannot grow again. However, if soil is treated effectively, it can be clean enough to be used for landscaping within the development.

You should only use treated soil in localised areas, where Japanese knotweed control methods could easily be used, if material starts to grow again. We advise that you should not use treated soil within 50m of a watercourse.

Long-term management.

You need to consider the chance that Japanese knotweed could grow back when you are managing the site long-term.

Current owners of the site need to accurately record within the deeds of the property where any material is buried and make this available to all subsequent owners so the material is not disturbed.

A summary of the treatment should be included within the vendor statement declaration.



Development site for sale. Would you have spotted the telltale dead winter canes that indicated this site was infested with knotweed?

Ecological information on Japanese knotweed

1.1 What is Japanese knotweed?

Japanese knotweed is a tall, vigorous ornamental plant that escaped from cultivation in the late nineteenth century to become an aggressive invader in the urban and rural environment.

1.2 What does Japanese knotweed look like?

Japanese knotweed, scientific names *Fallopia japonica* (Houtt. Ronse Decraene), *Reynoutria japonica* (Houtt.) or *Polygonum cuspidatum* (Siebold & Zuccarini) is a member of the dock family (Polygonaceae). It is a rhizomatous (produces underground stems) perennial plant with distinctive, branching, hollow, bamboo-like stems, covered in purple speckles, often reaching 2-3 m high. The leaves of the mature plant are up to 120 mm in length with a flattened base and pointed tip and are arranged on arching stems in a zig-zag pattern. The plant flowers late in the season, August to October, with small creamy-white flowers hanging in clusters from the leaf axils (point at which the leaf joins with the stem). The underground rhizomes are thick and woody with a knotty appearance and when broken reveal a bright orange-coloured centre. The rhizome system may extend to, and beyond, a depth of at least 2m and extend 7m laterally from a parent plant.

During winter, the leaves die back to reveal orange/brown coloured woody stems which may stay erect for several years. Stem and leaf material decomposes slowly, leaving a deep layer of plant litter. During March to April, the plant sends up new shoots, red/purple in colour with rolled back leaves. These shoots grow rapidly due to stored nutrients in the extensive rhizome system. Growth rates of up to 40 mm a day have been recorded.

1.3 Regeneration

Only female Japanese knotweed (*F. japonica* var *japonica*) plants have been recorded to date in the UK. Although seeds are produced, they are not true Japanese knotweed seeds but hybrids, and rarely survive.



Spring Growth



2-3 metre high canes



August - October flowers



Alternate leaves



Zig-zag pattern



Purple speckles

Two species closely related to Japanese knotweed are also found in the UK. These are, giant knotweed (*Fallopia sachalinensis*), a much taller plant which reaches a height of 5m; and a smaller compact variety (*Fallopia japonica* var. *compacta*), which grows to a height of only 1m. The hybrid (*Fallopia x bohemica*) (a cross between Japanese knotweed and giant knotweed) is also found throughout the UK but is not as common as Japanese knotweed. Both giant knotweed and the hybrid should be managed in the same way as Japanese knotweed.

Japanese knotweed rarely produces viable seeds. In the UK the plant is mainly spread through rhizome fragments or cut stems. Greenhouse trials have shown that as little as 0.7 gram of rhizome material (10 mm in length) can produce a new plant within 10 days. Cut fresh stems have also been shown to produce shoots and roots from nodes when buried in soil or immersed in water. Once cut stem material has been allowed to dry out thoroughly and has reached the orange/brown 'woody' stage, there is no further regeneration. Rhizome material may take much longer to die and may remain dormant for long periods, possibly as long as 20 years.

1.4 Dispersal

The spread and high regeneration rates of the plant have serious implications for dispersal by both natural and human means. In river catchments, fragments of rhizomes or cut stems that are washed into watercourses under high water flows can form new plants downstream. Fly-tipping garden waste that contains stem or rhizome fragments, using contaminated topsoil and transporting soil from infested sites during construction works

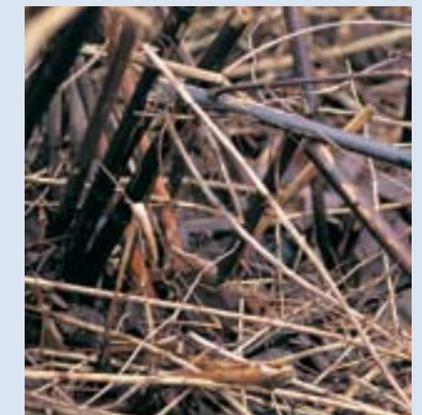
are the main ways that people spread the plant. Small fragments of stem and rhizome may also be transferred from an infested site to other sites on machinery, for example for building works or for maintaining road verges.

1.5 Why do I need to manage Japanese knotweed on my development site?

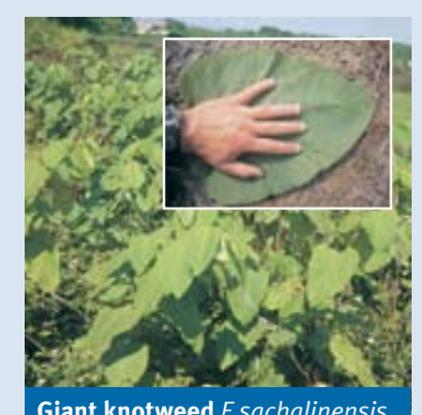
Habitats affected by Japanese knotweed include those in both urban and rural areas. In an urban environment, sites such as road verges, railway land and watercourse corridors may be affected. Waste ground, cemeteries and heavily disturbed ground are particularly vulnerable. In rural areas, the problems include disrupting sight lines on roads and railways and, in the riverside environment, disrupting flood defence structures. The plant damages the urban environment by pushing up through tarmac and paving, out-competing other species in planting programmes as part of landscaping schemes and causing aesthetic problems as litter accumulates in the dense thickets formed by the plant. This also encourages vermin.

Japanese knotweed is also invading continental Europe, particularly in the east. It is also causing problems on the western seaboard of the United States. Within its native range, Japanese knotweed rarely causes problems.

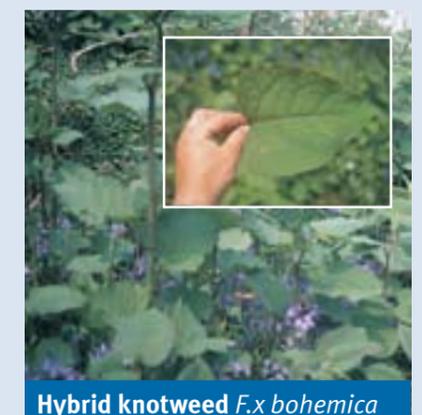
Japanese knotweed has been removed from the natural enemies that control it in its native range in Japan. It out-competes our native plants and animals. The spread of Japanese knotweed is a serious threat to our countryside, and the native plants and animals that rely upon it.



Dead winter canes

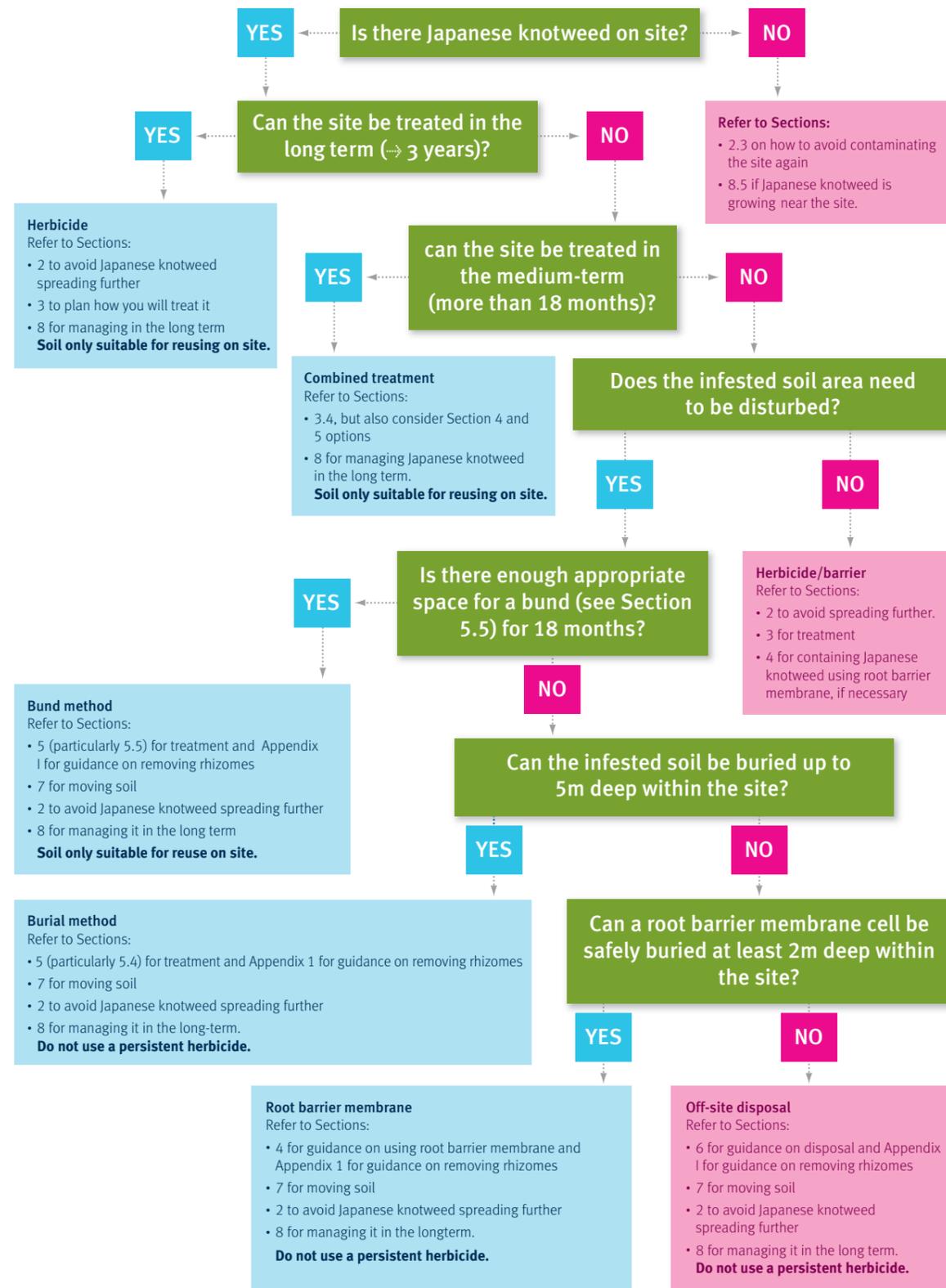


Giant knotweed *F.sachalinensis*



Hybrid knotweed *F.x bohemica*

Flowchart for treating Japanese knotweed



How do I prevent Japanese knotweed spreading?

It is important to make sure that the site is not contaminated by fresh Japanese knotweed, or that parts of the site previously unaffected by Japanese knotweed do not become contaminated. We recommend that:

- i) you have a Japanese knotweed management plan (see section 3.1);
- ii) all staff are aware of what Japanese knotweed looks like and what their responsibilities are;
- iii) you have a clerk of works responsible for the management of Japanese knotweed.
- f) vehicles used to transport infested soils must be thoroughly pressure-washed in a designated wash-down area before being used for other work;
- g) areas infested by Japanese knotweed that are not going to be excavated should be protected by root barrier membrane if they are likely to be disturbed by vehicles (see section 4). Root barrier membranes will need to be protected from damage by vehicles with a layer of sand above and below the root barrier membrane, topped with a layer of hardcore or other suitable material as specified by an architect or engineer (see section 7.1);
- h) the material left after the vehicles have been pressure washed must be contained, collected and disposed of along with the other Japanese knotweed material;
- i) a clerk of works should oversee the Japanese knotweed management plan (appendix V), including the provisions for avoiding contamination. Everyone working on site must clearly understand the role and authority of the clerk of works.

2.1 Avoiding contamination around the site

It is essential that you find out how much Japanese knotweed infestation there is on the site and that everyone working there clearly understands this. You should brief all contractors fully. You should record any areas that are contaminated with Japanese knotweed in the Japanese knotweed management plan (Appendix V and VI), isolate them with fencing and put up a restricted access sign (Appendix VII). Section 7 describes the precautions you need to take when moving soil infested with Japanese knotweed.

2.2 Good site hygiene

To maintain good site hygiene, we suggest:

- a) as a general rule, the area of infestation is 7m horizontally from the nearest growth of Japanese knotweed that can be seen. To determine exactly how far the rhizomes have spread, you would need to dig a series of test pits and examine them carefully;
- b) a fence that can clearly be seen should mark out the area of infestation. Signs should warn people working there that there is Japanese knotweed contamination (appendix VII);
- c) you should indicate stockpiles of soil contaminated with Japanese knotweed with appropriate signs and isolate them;
- d) you should not use vehicles with caterpillar tracks within the infested area;
- e) vehicles leaving the area should either be confined to haulage routes protected by root barrier membranes, or be pressure washed (see section 7.1);

How do I prevent Japanese knotweed spreading?

2.3 Avoiding new contamination to the site

This advice is particularly relevant to sites fortunate enough not to be infested by Japanese knotweed.

The three most common ways a site can become infested are:

Infested topsoil: There have been numerous incidences where site owners have paid to remove Japanese knotweed infested soil from their site, only to introduce it again with topsoil they have bought and not inspected.

Section N.6.4.5 of BS 3882:1994, the British Standard for topsoil clearly states that it is critical that material should be free from Japanese knotweed propagules, rhizome and vegetative fragments. You should always inspect topsoil brought into the site, using the guidance in appendix I-IV of this code. You can often get topsoil from different sources. Ideally, you should inspect these sources before you receive material on site. You should use topsoil from different sources within distinct areas of the site and keep a record of this. This may help you with compensation claims against the supplier, should Japanese knotweed subsequently grow. If you have any evidence that sub-standard topsoil is being sold, you should let the local Trading Standards Office know.

Contamination on vehicles: You should inspect vehicles before using them on site. You need to pay particular attention to caterpillar tracks and where trucks and dumpers are stowed.

Fly-tipping: Most Japanese knotweed infestations on development sites started as a result of fly-tipped waste and this often continues after the development has started.

You should report any fly-tipping incidences to us on the 24-hour freephone number 0800 80 70 60.

2.4 Reusing treated soils on site

If soil has been treated and is free from Japanese knotweed contamination and suitable for use, it can be reused on site without the need for a waste management licence or an exemption. **If taken off site, this material must be disposed of in a landfill.**

Developers reuse treated soils at their own risk, unless the agreement they have with their contractors states otherwise. To minimise the potential problems there could be if the soil was not treated adequately, you should only use soil again where there is little risk of spreading Japanese knotweed. The site should also facilitate herbicide treatment, if it is necessary. Suitable areas should be away from:

- watercourses (we advise, at least 50m) and ditches;
- being disturbed by people or livestock;
- existing amenity areas, lawns and gardens;
- boundaries with other properties;
- an area that could be disturbed in the future.

You should also use the soil in a restricted area, rather than spread out across the site. You should record this area in the Japanese knotweed management plan and keep a record of inspection. You must treat any regrowth appropriately.

How do I manage my Japanese knotweed problem?

3.1 Japanese knotweed management plans

Once you find Japanese knotweed on a site, it is essential that you set up some form of Japanese knotweed management plan (KMP). You need to identify a clerk of works to oversee the plan and you need to let all relevant contractors on the site know how important the plan is, for example through 'toolbox' briefings to staff operating on the site.

It is important to only disturb a minimum amount of Japanese knotweed. It is vital that you keep this contaminated material separate from other waste and surplus soil within the site. Soil free from Japanese knotweed and other waste may be disposed of relatively cheaply under exemptions from waste licence. Unless an area of Japanese knotweed is likely to have a direct impact on the development, you should control it in its original location with herbicide over a suitable period of time, usually two - five years.

Appendix V gives a template of a KMP for reference. You can change this according to your own needs. Appendix VI gives an example of a completed KMP.

The KMP is an important document and provides a valuable record of the treatment of the site for future owners. It may also provide evidence that the site has been appropriately managed if subsequent Japanese knotweed regrowth results in litigation against the contractor.

3.2 Herbicide treatment

It is essential that a competent and qualified person carries out the herbicide treatment. Contractors must have the appropriate National Proficiency Tests Council (NPTC) certification. They must carefully follow the instructions on the herbicide label. You can only use certain herbicides in or near water, and you need approval from us before you can use these.



First year regrowth after glyphosate

The most effective time to apply glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). Spring treatment is acceptable, but less effective. Triclopyr, picloram and 2,4-D amine can be used throughout the growing season. You should avoid the flowering period to protect bees and other pollinating insects. The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient. An exception to this rule is picloram, which can be applied as a soil treatment.



Sub-lethal glyphosate 'bonsai' regrowth

Rhizome can remain dormant for a considerable period after regrowth has apparently stopped, and so you need to check if rhizomes are still living before disturbing the site. **Unconfirmed observations suggest rhizome can stay alive for more than 20 years.** However, treating Japanese knotweed with an appropriate herbicide can reduce its growth, even if it were only treated a few weeks before it was disturbed. If the timescale of the development does not give you enough time to effectively eradicate Japanese knotweed using chemicals, you should still treat the plant, if it is in leaf, as soon as possible.

You should expect to use herbicide treatment for at least three years before Japanese knotweed stops growing back. It is important to remember that you cannot rely just on herbicide to get rid of Japanese knotweed. **You must not see the lack of regrowth as evidence that the Japanese knotweed is no longer alive.** Disrupting the rhizome by disturbing the soil is likely to result in substantial regrowth.

3.3 Which herbicide should I use?

Herbicide	Affects grasses?	Time of application	Approved for use in or near water?	Persistence
Glyphosate	Yes	May - October (late season preferable)	Yes (certain formulations)	Non-persistent
2,4-D Amine	No	May - October (early season preferable)	Yes (certain formulations)	Up to 1 month
Triclopyr	No	May - October (early season preferable)	No	Up to 6 weeks
Picloram	No	All year (soil treatment in winter)	No	Up to 2 years

There is increasing concern about using pesticides. It is important that suitably qualified operators use these chemicals appropriately. When you use a herbicide, always follow the information on the label. The most important questions to ask before deciding which herbicide to use are:

3.3.1: Is the site in or near water?

'In or near water' includes 'drainage channels, streams, rivers ponds, lakes, reservoirs, canals and dry ditches'. It also covers control of vegetation growing on banks or areas immediately adjacent to water bodies. If you intend to use a herbicide within 5m of water, or if your treatment may impact water quality, you should contact us beforehand.

Wherever there is a risk of contaminating a watercourse, choice of herbicides is limited to formulations of glyphosate and 2,4-D amine that are approved for use near water. Not all herbicides that contain these active ingredients are suitable to use in or near water. You must refer to the label to make sure that the product you intend to use is approved for use in or near water. You must consult us before you use a herbicide in or near water. You will need to discuss the treatment with a BASIS¹ qualified officer from the local Area office. You can get the telephone number of your local office by calling our national call centre on 08708 506 506. You may need to complete a WQM1 notification form. You should allow us two weeks to process this application.

3.3.2: Will the treatment damage trees or grass, which I wish to keep?

Glyphosate is a non-selective herbicide and therefore kills most plants, including grass. You can use it, with care, around mature trees and shrubs. Picloram and 2,4-D amine are selective and you can use them without harming grass. Picloram

is persistent in soil, prone to leaching and highly damaging to nearby trees.

3.3.3: If I want to reuse the soil from the treated area for replanting, how long before I am able to landscape it?

If you want to carry on using soil or you want to reuse it immediately for landscaping, it would be appropriate to use a non-residual herbicide, such as glyphosate. If replanting is likely to be delayed for at least six weeks, you may consider a formulation containing triclopyr. If you intend to cover the area in a hard surface, or delay replanting for at least two years, a persistent chemical, such as picloram, would be appropriate if you use it away from trees and watercourses. It is not acceptable to bury soil treated with a residual herbicide if it may contaminate groundwater. However, a hard surface can usually be laid over treated soil without causing pollution.

It is highly unlikely that a single treatment of herbicide would provide enough control to let you safely reuse the soil for landscaping purposes. Whenever you reuse soil, you should use it in a localised area rather than spread across the whole site. We advise that you should not use it within 50m of a watercourse. You should choose a site that can easily be inspected and subsequently treated, if Japanese knotweed regrows, as described in Section 2.4 (Reusing treated soils on site).

3.3.4: What should I use if I intend to bury the material or dispose of it off-site?

If you intend to bury the material or dispose of it off-site, you should only use glyphosate formulations. If there are persistent herbicides present, this will prevent you from using burial as a Japanese knotweed disposal option (see section 5.4). Refer to page 6-7 for details of the relevant waste regulation. If sent for disposal off-site, the requirements of the EPA 1990 s.34 and the Duty of Care Regulations will have to be complied with in relation to the transfer of the waste. Using certain types or quantities of pesticide could mean that soil or plant material is classified as 'hazardous waste', and then you would need to dispose of it at a hazardous waste landfill. It would also have to be consigned and suitably described under the HWR 2005, which would include giving a description of the pesticide.

We advise developers to seek the advice of a suitably qualified pesticide operator or BASIS registered pesticides advisor before they start a spraying programme.

There are some practices that you can follow to further reduce the chance of damaging engineered structures. Early results (currently unpublished) suggest that the residual herbicide Tordon 22K, containing picloram as an active ingredient, achieves a high level of Japanese knotweed control when applied direct to foliage or as a soil treatment (5.6 l/ha).

It is advisable to consider soil treatment, or an effective root barrier membrane method before creating an engineered surface over any area that could support living Japanese knotweed rhizome. This is particularly important under tarmac, which can be damaged considerably by Japanese knotweed.

It is important that you use herbicides as stated on the labels. It is not appropriate to use Tordon 22K near water or trees, where the extensive root system can take up the herbicide from the soil.

Only qualified operators should use herbicides and they must follow the instructions on the label when using them.

Further guidance is also available in the former Welsh Development Agency guidelines, now Welsh Assembly Government, detail of which is given in section 9.2. These guidelines should be used in conjunction with this code in Wales.



Post-treatment reaction to picloram



Regrowth after picloram treatment

BASIS¹ is an organisation committed to making sure people involved in handling and using pesticides are competent. BASIS maintain a register of trained advisors, who need to demonstrate an annual programme of continual professional development to maintain their qualification. Details on the BASIS Professional Register are available from 34, St John Street, Ashbourne, Derbyshire DE6 1GH. Tel: 01335 343945.

3.4 Combined treatment methods

Site trials have shown that combining digging and spraying treatment is effective in reducing the time needed for chemical control. You need to take great care with this method to avoid spreading plant material.

The aim of the treatment is to break up the rhizome, which stimulates leaf production and therefore makes the plant more vulnerable to herbicide treatment. Rhizome is also stimulated to produce green growth if it is near or on the surface. Therefore the success of the treatment will be determined by the amount of rhizome that is brought to the surface layer.

You should cut, dry and burn Japanese knotweed canes on-site if allowed (see Section 5.2). You can also burn crowns and surface rhizome raked from the surface with tines or take them to landfill. You cannot rely on burning to kill rhizome or crowns.

The majority of Japanese knotweed rhizome exists in the upper layers of topsoil. It has been estimated that in an infested area, 14,000 kg/ha dry weight of Japanese knotweed may exist in the top 25cm (Brock, 1994). You may use an excavator to scrape surface crowns and rhizomes into a pile. You can then cultivate the exposed ground to at least 50cm deep, depending on how deep the bulk of the rhizome is, and turn the piled material and re-spread it over the cultivated area.

This process stimulates the rhizome to produce a higher density of stems, which makes it more vulnerable to herbicide treatment. We have seen that subsequent herbicide treatment has achieved significantly better rates of control. Whilst this disturbance technique may have the potential to eradicate Japanese knotweed infestations, it cannot guarantee it. It would be inappropriate to dispose of treated material under a waste exemption. You could reuse soil on-site, in localised areas that would facilitate herbicide treatment if regrowth were to occur (see section 2.4).

You can dig the soil during the winter, if you take care not to compact wet soil, and you can treat regrowth during the spring and summer. Soil can become compacted if you drive over it or work it when it's wet. This reduces rainwater infiltration, which increases runoff and may spread Japanese knotweed across the site and into watercourses. Compacted soils are also less likely to encourage the regrowth needed for treatment.

You must take extreme care to make sure that all equipment used on site is free of Japanese knotweed material before leaving the site to avoid contravening the Wildlife & Countryside Act, 1981. To reduce the risk of contaminating vehicles, you should avoid excavators with caterpillar tracks and thoroughly pressure-wash vehicles after use or before leaving site (see sections 2 and 6.2).

How do I use root barrier membranes?

Various root barrier membranes are available which claim to prevent Japanese knotweed penetrating. A root barrier membrane is only as good as the way in which it has been laid. It is essential that there is expert supervision when the root barrier membrane is supplied.

A root barrier membrane physically protects a structure or clean soil. It must be made of a material that is fit for purpose. It should be made of a material that can be:

- a) used without damage;
- b) provided in large sizes, to minimise the need for seals;
- c) sealed securely;
- d) remain intact for at least 50 years;
- e) resist UV damage if it is exposed to sunlight.

Various root barrier membranes are available which claim to prevent Japanese knotweed penetrating. A root barrier membrane is only as good as the way in which it has been laid. It is essential that there is expert supervision when the root barrier membrane is supplied.

Japanese knotweed will tend to break through holes or joins in the fabric, so it is essential that the integrity of the root barrier membrane is maintained, and there is a minimum number of seams. Ideally, root barrier membrane material should consist of a single sheet.

You must ensure that root barrier membranes containing leachable chemicals do not pollute streams and groundwater.

Given that Japanese knotweed rhizome may remain dormant for at least 20 years, it is important that a root barrier membrane carries a guarantee well beyond that time. We advise a manufacturer's guarantee of at least 50 years.

Root barrier membranes are vulnerable to damage from burrowing mammals. Burying root barrier membrane cells 2m or deeper should provide some protection against smaller mammals, such as rats. If badgers and rabbits are present, you should consider deeper burial. Badgers and their setts are protected by law and should not be disturbed.

Root barrier membranes are currently used in a number of ways:

- Cell formation
- Protecting structures and hard surfaces
- Preventing horizontal spread
- Protecting services, etc.



The importance of intact root barrier membrane

4.1. Cell formation

In some situations where burial is the preferred disposal method but it is not possible to bury Japanese knotweed to 5m (see section 5.4), it may be completely encapsulated into a root barrier membrane cell. These cells may be placed under buildings, within cellar voids or in places that will not be disturbed. It is important that the deeds of the property show where these cells are located, to avoid damage in the future that could be caused, for example, by trenching to lay services. To avoid

damage after it has been installed, the upper ‘cell’ surface must be covered with a capping layer, at least 2m deep. Depending where it is located, the cell is quite often used in the landscape and trees planted within the capping layer.

You must use root barrier membranes in a way that will not increase the risk of subsidence to subsequent buildings.

Cell formation - putting the Dendro-Scott root barrier membrane in place



Stage 5: Fill the cell with the knotweed infested soil. No other material, contaminants, or wastes should be included.



Stage 6: Make sure that dedicated vehicles are used and cleaned properly after they have been used. Haulage routes must be protected.



Stage 7: Put the surface of the root barrier membrane in place and make sure the cell is adequately sealed.



Stage 8: Protect the surface of the cell with sand and bury deep enough to prevent disruption in the future.

Cell formation - putting the Dendro-Scott root barrier membrane in place



Stage 1: Calculate volume required and excavate site, allowing for 2m depth of burial



Stage 2: Protect the integrity of the root barrier membrane with a layer of sand and provide shutter ply supports for the edge of the cell.



Stage 3: Put root barrier membrane in place, allowing enough material along the edges to eventually provide a seal.



Stage 4: Protect the root barrier membrane from tyre damage with a layer of sand.

It is important that the suppliers of root barrier membranes can advise the designing architect of potential problems and supervise installation.

4.2 Protecting structures and hard surfaces

Where there is a chance that Japanese knotweed rhizome is still living within the soil and there are plans to construct buildings in these areas, there are a number of ways root barrier membranes are used:

1. Before development, infested areas are sealed horizontally with the root barrier membrane. Care must be taken that laying the root barrier membrane does not affect the condition of the building or structure, especially on sloping ground.
2. Root barrier membranes are built into the structures to prevent Japanese knotweed entering the building or laid horizontally underneath the paved surface, road or car park.

As Japanese knotweed could create 'heave' and cause initial fractures to concrete floors or a paved surface, it is important that a pliable surface is laid between the concrete and the root barrier membrane. This would allow the Japanese knotweed to grow without stressing the concrete. Care must also be taken to protect the services entering the building.

Surface sealing - peripheral protection



Make sure the root barrier membrane is sealed properly around pillars and other structures.



Surface sealing - putting the Dendro-Scott root barrier membrane in place



Stage 1: Protect the integrity of the root barrier membrane and prevent damage from 'heave' with a layer of sand.



Stage 2: Put the root barrier membrane in place.



Stage 3: Apply another layer of sand over the surface of the root barrier membrane.



Stage 4: Lay final floor surface.

4.3 Preventing horizontal spread

Carefully using a vertical root barrier membrane has been used to prevent the horizontal growth of Japanese knotweed. This is usually used against uncontrolled infestations from neighbouring properties. Vertical root barrier membranes are also often used around the edge of cuts, as a precaution

against regrowth from any residual rhizome. Vertical root barrier membranes can often be most conveniently used when reinforced by a plywood frame. If it is not known how deep the rhizome has spread, vertical root barrier membranes should be used to 3m deep as a standard.

Preventing horizontal spread by using a vertical root barrier membrane



Stage 1: Excavate a trench, making sure that all the knotweed is contained.



Stage 2: Put the root barrier membrane in place.



Stage 3: Support the root barrier membrane with shutter ply and backfill the trench.



Stage 4: Make sure that the presence of the root barrier membrane is recorded and is not disrupted by future developments and landscaping.

4.4 Protecting services, etc

If services or other small-scale structures need to be constructed in areas infested with Japanese knotweed, it is often more cost-effective to protect the integrity of the structure within a root barrier membrane rather than subject the entire area to a full-scale Japanese knotweed management plan. It is essential that any soil contained by the root barrier membrane, in proximity to the drain or structure, is free from knotweed. The surrounding infestation can then be controlled using herbicides over a period of time.



How do I treat or dispose of Japanese knotweed on site?

Wherever possible, you should keep the amount of Japanese knotweed excavated to a minimum and focus on treating the Japanese knotweed in its original location and protecting engineered surfaces and structures from being damaged. If you wish to treat Japanese knotweed in its original position, see Section 3, 4.2, 4.3 and 4.4.

5.1 Cutting Japanese knotweed canes

Pulled stems often have the highly invasive crown material attached to them, and must be disposed of in the same way as rhizome. Cut stems are less of a risk, and are safe once they have dried out and turned brown. If you intend to treat regrowth with a herbicide, you should remove cut material from the treatment area to allow the spray to effectively cover the new growth.

You should leave cut stems where they can dry out. Japanese knotweed can grow again from just small pieces of stem, so you should leave drying canes on an appropriate membrane surface, not on soil or grass. Once the stems have dried to a deep brown colour they are dead. This is not the case with crown or rhizome material. Japanese knotweed stems can be left on site after cutting if:

- the stem is big enough that it won't be blown away by wind or traffic;
- there is no risk they can get into a watercourse;
- the stem has been neatly cut near its base using a cutter, hook or scythe.

You should cut stems cleanly so that they don't create pieces of stem that may spread and regrow. You should not use flails. It is good practice to chemically treat Japanese knotweed, rather than continuously cut the regrowth.

5.2 Burning

You can use controlled burning of stem, rhizome and crown material as part of the programme to control Japanese knotweed. This means the material is less likely to survive and there is less material to bury or dispose of off-site. In its native area, Japanese knotweed grows on volcanic ash and around hot fumaroles, so don't rely on heat treatment to completely kill it. Burning must take into account any local by-laws and the potential to cause a nuisance or pollution. You should contact the Environmental

Health Office of the relevant local council before burning. You must inform our local Area office Environment Management Team (08708 506 506) at least one week before any burial or burning activity.

You may carry out burning in the open in accordance with a registered exemption as described in Paragraph 30 of Schedule 3 of the WMLR 1994. This exemption must be registered with the Environment Agency and covers "burning waste on land in the open if....[it] consists of plant tissue". To fall under Paragraph 30 the waste must be burned on the land where it was produced and the total quantity burned in any period of 24 hours does not exceed 10 tonnes. The exemption also covers associated storage, which will allow the material to dry, which it is likely to need before it can be burned.

You must inform our local Area office Environment Management Team (08708 506 506) at least one week before the burning.



5.3 Excavation

Wherever possible, you should treat Japanese knotweed in its original location. You should only consider excavating Japanese knotweed as a last resort, unless this is part of an on-site treatment method. If you use excavation for off-site disposal, you must take great care to avoid excess waste and make sure the excavated Japanese knotweed does not contaminate surplus soil that is currently free from infestation.

It is important to carefully identify rhizomes during the excavation process. Some excavations have been 6 metres deep because of mis-identified tree roots! A recent infestation may have a limited rhizome system that is shallow and only extends a short distance. If Japanese knotweed naturally spreads onto new ground, or is dumped on the surface, rhizome rarely penetrates deeper than 3m. However, if Japanese knotweed was dumped in the early stages of a long period of waste tipping it may have become buried by other deposited waste and be deeper than 3m. Appendices I-IV give guidance on recognising rhizomes, including comparisons with other plant material often found on development sites. Section v) of Appendix I also describes how to excavate Japanese knotweed before burying or bunding it. The guide is designed as a field reference during excavations.

Soil can become compacted if driven over or worked when wet. This reduces rainwater infiltration, which increases runoff and may spread Japanese knotweed across the site and into watercourses. Compacted bunds are also less likely to encourage the regrowth required for treatment (see section 5.5).

5.4 The burial method

Soil containing Japanese knotweed material and burnt remains of Japanese knotweed may be buried on the site where it is produced to ensure that you completely kill it. It is advisable to apply a non-persistent herbicide at least once to reduce the growth of infective material. It is important that a non-persistent herbicide is used, such as glyphosate, because persistent chemicals will contaminate the material for a while. The period of time during which the herbicide is 'active' is described on the product label. Material cannot be buried during that period of activity. Burying material treated with a persistent herbicide may contaminate groundwater. If you are in doubt whether the herbicide is still active, you should consult with the supplier of the product or the contractor who applied it.

You must bury material on-site at least 5m deep, unless you are doing this in accordance with section 4.1. You should then cover the Japanese knotweed material with a root barrier membrane layer (see section 4) before infilling it to 5m deep with inert fill or topsoil. Root barrier membranes that may have been used to protect clean ground from vehicles involved in excavating Japanese knotweed can also be buried. This method relies on the depth of burial as the main Japanese knotweed treatment, rather than the protection from the root barrier membrane. If material cannot be buried deep enough, the method described in paragraph 4.1. must be used.

Where you use on-site burial, we strongly advise that you accurately map and record the location of the burial site to prevent potential disturbance and re-infestation, and that you advise any future owners of its position. Japanese knotweed is likely to survive for many years, depending on how effective the treatment was before it was buried. It is essential that you do not bury it where landscaping, installing services, erosion from a watercourse or subsequent development will disturb it.

You must inform our local Area office Environment Management Team (08708 506 506) at least one week before the burial. We will then inspect and inform you whether we are satisfied that the material can be buried. It is only acceptable to bury Japanese knotweed material if the soil is otherwise uncontaminated. Any other waste, such as rubble or discarded household items, must be separated and removed during excavation. If contaminants cannot be separated, it cannot be buried. If burial results in pollution or harm to health you will not have complied with your waste 'relevant objectives' (see page 6-7) and may face prosecution.

5.4.1 Stockpiling Japanese knotweed infested soil prior to burial

If soil containing Japanese knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. You should clearly sign this area (appendix VII). You should regularly treat Japanese knotweed regrowth with herbicide to avoid re-infestation. As a precaution, you should lay the stockpiled material on a root barrier membrane to avoid contaminating the site further.

5.5 The bund method

Where local conditions mean you cannot use burial as an option, it may be possible to create a Japanese knotweed bund. A bund is a shallow area of Japanese knotweed-contaminated soil, typically 0.5m deep. The bund can either be raised, on top of the ground, or placed within an excavation to make the surface flush with the surrounding area. The purpose of the bund is to move the Japanese knotweed to an area of the site that is not used. This 'buys time' for treatment that would not be possible where the Japanese knotweed was originally located.

The way you construct the bund is critical, especially if it is likely to be deeper than 0.5m. The aim is to concentrate the rhizome into the upper surface of the bund, where it will grow and be controlled by herbicide. If rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site.

It is best to think about if you will need a bund when you are purchasing the site, and planning the building phases. A bund needs the following:

- a) an area set aside for at least 18 months -2 years for Japanese knotweed treatment. Deeper bunds may need longer;
- b) local planning authority approval, if necessary, before creating a bund. It is advisable to emphasise the purpose of the bund, and how long it is expected to take to build when discussing the proposal;
- c) an area within the perimeter of the original site. Removing Japanese knotweed contaminated soil from a site will need a waste licence and disposal will only be permitted at licensed landfill sites;
- d) positioned away from watercourses (we advise at least 50m) and trees. If the bund is to be created on a site previously free from Japanese knotweed, clean topsoil from the bund area may be removed and used for landscaping purposes, perhaps in restoring the site where Japanese knotweed was excavated;

- e) temporary bunds should have a root barrier membrane layer to protect the underlying site from Japanese knotweed infestation. Permanent bunds on previously Japanese knotweed-free areas should also use a root barrier membrane layer to contain the material. If the site was previously contaminated with Japanese knotweed, there is no need for the root barrier membrane layer;
- f) not more than 1m deep, and preferably no deeper than 0.5m. Clearly, a large area may be needed to provide enough space for a bund, especially if infestations are scattered around the site or dominate a large part of it.

Pre-excavation treatment

You should treat the Japanese knotweed infestation with a herbicide before removing it. Because material is not intended for burial or removal off-site, you can consider suitable persistent herbicides. But, it is important to consider what will happen to the material when you choose a product. It would not be appropriate to use a herbicide with a two-year residual activity if you intend to use the soil for landscaping after a one-year bunding process.

When you have allowed enough time for the herbicide to take effect (preferably at least a fortnight) you should cut and remove the canes. After it has dried out, you can burn this material, following the restrictions already described (see section 5.2). You should eventually place any unburned material, especially from the base of canes, on top of the bund.

You should rake the surface of the site with tines and collect the crowns and surface material. The majority of rhizome is shallow, and care at this stage can isolate much of the most infective material. If the soil is sandy and not heavily contaminated with stones or solid waste, you can use extended tines to rake rhizome to the surface. You can place this material on top of the dried canes before burning, or spread it on top of the completed bund. Burning this material before placing it on the surface of the bund destroys some rhizome and is the preferred option, but you must make sure that you clear the fire site of all rhizome and crown material and that fires are allowed at the site (see section 5.2).

Refer to section v) of the rhizome identification guide for guidance on excavating rhizome. The excavation should be inspected to make sure there are no living rhizome left. The aim of the excavation is to use the relatively clean subsoil as the base of the bund and concentrate the rhizome-rich material into the surface layer.

Bund construction

A well-constructed bund should have the majority of the rhizome near the surface, which will encourage regrowth. The base of the bund should be made up of the subsoil layer, which has the lowest amount of rhizome in it. When you have created the base of the bund, you can place the topsoil over it and spread the surface material, either burned or not, over the surface.

You can add fertiliser to the bund material to help subsequent regrowth. This will increase leaf area and improve herbicide uptake. You should not use fertiliser near watercourses.

Treating regrowth

The fragmented rhizomes in the surface layer are stimulated to produce new growth. After one or two herbicide treatments, further significant regrowth is unlikely. It is highly advisable to disturb the bund, raking potentially dormant rhizome to the surface and allowing this material to regrow before treating it with herbicide, so that you can be confident that the bund has been treated effectively.

It is particularly important with deeper bunds to concentrate rhizome-rich soil into the surface layer, and disturb the bund after treatment.

There is a choice of herbicide for treating regrowth on the bund. You must think about how you will eventually use the bund material. If you are going to use it for landscaping around the site, avoid herbicides with a protracted residual activity. You must reuse treated soil according to section 2.4.

It is important to remember that research has shown that as little as 0.7g of Japanese knotweed rhizome may grow into a new plant, and larger pieces of rhizome may remain dormant for at least twenty years. A carefully constructed and managed bund is an effective way of treating Japanese knotweed, but it is no guarantee of getting rid of the problem completely.

How do I dispose of Japanese knotweed off-site?

6.1 Arrangements for landfill

If Japanese knotweed cannot be killed by burying or bunding infested excavated soil on site, you must dispose of it at a suitably licensed or permitted disposal facility. You must inform the site operator that there is living Japanese knotweed within the material. **You should regard this method as a last resort.** Disposing of soil contaminated with Japanese knotweed to landfill uses up valuable landfill capacity, involves large-scale haulage and can be very expensive.

Landfills are classified as being for a) hazardous, b) non-hazardous and c) inert wastes and the **Landfill (England and Wales) Regulations 2002 as amended** set out waste acceptance criteria for each type of landfill. Waste soil containing Japanese knotweed is usually classed as controlled waste but may be hazardous if herbicide is present. Whenever material containing Japanese knotweed is removed to landfill, it must be taken to a site which is licensed or permitted to receive it. Not all landfill operators may agree to take Japanese knotweed, and they will need to have a suitable area to correctly bury it in.

It is good practice to treat Japanese knotweed with glyphosate at least two weeks before excavating it (see Sections 3.2 and 3.3). This will make any rhizome that may have been lost when it was moved, or left behind after it was excavated, less likely to survive. You should not use persistent herbicides. These are likely to be still active in the soil when it is disposed of, and may mean the soil is classified as 'hazardous waste' as noted above. This is likely to increase the cost of haulage and disposal.

If you use off-site disposal, take great care to avoid losing material en route. For small quantities, this may include 'double-bagging' the waste in heavy duty waste bags. For larger quantities that are being moved in skips or trailers, this will include lining and covering the skip etc. with membrane (See Section 7).

Landfill operators dealing with material contaminated with Japanese knotweed must make sure that:

- they are licensed/permitted to receive it;
- they have enough capacity to make sure they can deal with the material according to the following:

Material, including contaminated soils, rhizome and the crown at the base of the stem, must be buried:

- at least 5 metres deep, (immediately cover to 1-2 metres, final depth after 2-4 weeks);
- at least 7 metres from the margins of the site or any engineering features, for example drains or bunds, of the site;
- at least 3 metres above the base/liner of the landfill.

Because landfills need to deal with Japanese knotweed in this way, it is advisable to contact the landfill site several days before any of this material is taken there to allow a suitable area to be prepared for its disposal.

If you need information on the nearest appropriate landfill to your site, call us on 08708 506 506.

Additional information, including details of landfill tax exemptions can be obtained from the NetRegs website, www.netregs.gov.uk/netregs/processes

6.2 Duty of care for hauliers

Before accepting waste material for transfer off site you must inspect it for Japanese knotweed contamination unless you know it is present already. You must ensure that you comply fully with your waste duty of care and, if the material is hazardous, the requirements of the HWR 2005 must also be met (see page 6-7). If you take it to a landfill, that facility must be licensed or permitted to receive it. You must inform the landfill operator that the waste contains Japanese knotweed so that he can dispose of it appropriately within the site.

As a haulier, you should not accept infested waste unless you can guarantee that you can dispose of it appropriately. If you are aware of waste producers who are failing to inform their hauliers about Japanese knotweed, or you know hauliers who are knowingly disposing of Japanese knotweed infested material inappropriately, you should let us know by calling our incident hotline on 0800 80 70 60.

You must also make sure that when you are removing material off-site, your vehicles do not carry pieces of Japanese knotweed rhizome on them and that vehicles are suitably covered or enclosed to prevent Japanese knotweed escaping when it is being moved (see Section 7). You should brush vehicles down vigorously or jet-wash them and then inspect them for trapped pieces of rhizome.

Some waste disposal activities that we consider safe to the environment do not require a waste licence. These are classed as exempt from waste licensing. There are no waste licensing exemptions available for the use of Japanese knotweed-infested soils and we will treat any use of this material as a waste offence. You can only reuse knotweed-infested soils after treatment. **You can only dispose of Japanese knotweed-infested soil off-site at a suitably licensed or permitted landfill. You cannot dispose of it with other surplus soil and you must not sell it as topsoil.**

Anyone who does not dispose off-site of any material containing Japanese knotweed appropriately may be prosecuted under Sections 33 and 34 of the E P A 1990 and Section 14 of the Wildlife & Countryside Act 1981. If you need advice, call us on 08708 506 506.



How do I move soil containing Japanese knotweed?

You should try to move Japanese knotweed infested soil as little as possible. You need to thoroughly clean vehicles after you have used them. Avoid using vehicles that are likely to trap pieces of rhizome, particularly those with caterpillar tracks. Remember, just finger-nail sizes pieces of rhizome can lead to it spreading further.

7.1 Moving soil on-site

The Japanese knotweed management plan (Appendix V and VI) should reduce the need to move soil. You need to assess the haulage routes you plan to take for risks, avoiding watercourses, transport corridors and areas of high conservation and amenity value. If haulage routes cross areas free from Japanese knotweed, soil should be protected with a layer of root barrier membrane. This should be protected with a layer of sand above and below the root barrier membrane, and a surface layer of hardcore. This material can be buried within the Japanese knotweed cell, as described above.

You should clearly mark out your haulage routes with tape. You should limit access to these areas to vehicles involved in moving Japanese knotweed. You must decontaminate vehicles before they leave the area.

7.2 Moving soil off-site

When you transport soil infested with Japanese knotweed to landfill, it is essential to carry out strict hygiene measures. If you do not follow these standards, this may lead to Japanese knotweed spreading. Japanese knotweed is a particular problem along transport corridors, where it interferes with the line of vision and can cause accidents.

We recommend that you should only fill trucks up to a maximum of 20cm from the top. You must seal the void with a well-secured membrane. You should use enough membrane to let the soil be sealed into a temporary cell for transporting. It is very important that you contain the soil to prevent any material being lost when it is moved. To contain the soil in the short-term, you can use a lower specification of membrane (see glossary).

7.3 Decontaminating vehicles

You should decontaminate the outside of vehicles whenever they leave an area contaminated with Japanese knotweed. You should clean vehicles before using them to move Japanese knotweed. You should clean the rear of the truck after it has finished moving soil. You should use a pressure washer and stiff-haired brushes to clean the vehicle, making sure that you thoroughly scour any areas that might retain rhizome. You need to pay particular attention to tyre treads and wheel arches. Any material dislodged during this process must be included within the Japanese knotweed waste. You should only carry out this process over a root barrier membrane layer or hard surface that can contain and collect the material washed off. You must not let this material contaminate drains, ditches or watercourses.

People who know what rhizome look like should do the cleaning. You should carry out a thorough inspection before the vehicle is used for other duties.



How will Japanese knotweed affect using the site in the long term?

8.1 Managing buried Japanese knotweed in the long term

If Japanese knotweed material has been buried as described above, subsequent regrowth is highly unlikely. The likelihood of the material growing in the long term will depend on how it was treated before it was buried. If the infestation was effectively treated with herbicide and the rhizome stressed by being broken up and/or drying out, this will greatly reduce the chance of it surviving in the long term. Japanese knotweed rhizome has been known to survive for at least 20 years, so it is important to consider managing it over a long period of time. Site owners in the future must be able to see a record that gives details of the precise location and nature of the burial. It is important that the site is not disturbed. If it has to be disturbed, the contaminated material must be managed according to this code of practice.

8.2 Controlling potential regrowth around the site

When developing a Japanese knotweed management plan, you need to consider the potential for regrowth around the site. When you consider that 0.7 gram of rhizome is enough for it to regenerate, you may expect some regrowth and you will need to build that into any agreement between client and contractor. Regrowth tends to happen when not enough material has been excavated from the initial infestation, tracked vehicles or poor haulage has spread small fragments and when inadequately treated material has been reused for landscaping purposes. Regrowth from fragmented rhizome responds well to herbicide treatment, or careful digging. If regrowth occurs due to undisturbed rhizome that was overlooked during the survey, you will need a long-term control programme.

8.3 Advice to new owners

It is good practice to advise the new owners of the property that the site was subject to a Japanese knotweed management plan. You should include this within a vendor statement of declaration. It is possible for isolated regrowths to occur in the future, and good advice will help to prevent these from becoming established. Japanese knotweed from neighbouring land may also re-invade the site. The Cornwall Knotweed Forum website www.cornwallknotweed.org.uk gives advice to householders on managing Japanese knotweed.



8.4 What do I do if Japanese knotweed starts to grow through tarmac and other engineered surfaces and structures?

Once Japanese knotweed breaks through an engineered surface, there are limited ways of managing it. There is a restricted choice of herbicides, limited to those products that have been approved for treatment on hard surfaces. It is essential that you refer to the label conditions about using the herbicide before treatment. Some formulations of glyphosate are approved for treating hard surfaces, and these would be suitable. It is advisable to let the Japanese knotweed grow before treating it, to allow the maximum surface area of leaf for the herbicide to transfer to the rhizome. You should seriously consider removing the hard surface and treating the infestation, before relaying an intact surface after you have destroyed the infestation.

Prevention is, without doubt, better than cure. If we do not manage Japanese knotweed appropriately and allow it to damage new structures, there are limited ways of controlling it. Herbicides are licensed for specific kinds of treatment, and many chemicals that may have been used before a hard surface was laid cannot be used for treating Japanese knotweed that is growing through tarmac.

8.5 How do I stop Japanese knotweed from neighbouring properties from re-infesting the site?

Co-ordinated control programmes

Ideally, before starting any Japanese knotweed control programme, you should consider any areas of Japanese knotweed close to the boundary of the site within the programme and negotiate some sort of arrangement with the landowner. A site manager may consider including these areas within his treatment programme as an act of goodwill, if the additional costs are negligible. Other options including allowing the neighbouring landowner to pay for material costs, such as herbicide, or sharing the costs according to the area affected.

Root barrier membrane methods

Carefully using a good quality root barrier membrane should be an effective way of stopping Japanese knotweed from spreading from neighbouring infested sites. We discuss this method in section 4 above.

The law of nuisance

Common law recognises the civil wrongs of nuisance, both private and public. A private nuisance is defined as an “unlawful interference with a person’s enjoyment of land, or some right over, or in connection with it” (Read v Lyons & Co Ltd 1945) and only a person with a legal right to exclusive possession may sue. A public nuisance occurs where a large section of the public is affected. If there were a case of public nuisance, it is important for you to establish if the accused person could have ‘foreseen’ this. So, having evidence that you had let the owner of the neighbouring property know about the Japanese knotweed would be important.

8.6 How do I treat Japanese knotweed regrowth amongst valuable shrubs and planting schemes?

Japanese knotweed growth may occur in undisturbed areas of the site where the original vegetation is to be preserved. Regrowth may occur in newly landscaped areas as a result of inadequate treatment programmes or contaminated topsoil introduced to the site. Carefully selecting herbicide, as described in section 3, can avoid damaging grassed areas. Direct application techniques using weed-wipers, or the stem-injection technique can avoid non-target damage.

The stem injection technique involves cutting the cane near its base, just above a node. This leaves a hollow tube, down which a dose of herbicide can be applied. This methodology is described at www.projects.ex.ac.uk/knotweed/standardmethodology.pdf



Appropriate method of herbicide application can avoid non-target damage.

Sources of additional information

9.1 Additional information

You can find good practice on managing Japanese knotweed on the internet. The Cornwall Knotweed Forum (www.cornwallknotweed.org.uk/environment/knotweed) provides useful supporting information. This document updates the advice within that website for developers and hauliers. Devon Knotweed Forum advice can be obtained from: www.devon.gov.uk/index/environment/natural_environment/biodiversity/japanese_knotweed/advice_land_and_gardener.htm

Electronic versions of this code are available on: www.environment-agency.gov.uk/subjects/conservation

Additional information on Japanese knotweed management, including information on landfill tax credits can be obtained on: www.netregs.gov.uk/netregs/processes

There are various control methods available from companies specialising in Japanese knotweed management on development sites. You should be careful of products and methods that claim to quickly eradicate Japanese knotweed.

9.2 Some useful resources:

Child, L.E. and Wade, P.M. (2000) The Japanese Knotweed Manual. Packard Publishing Limited, Chichester. ISBN 1 85341 127 2

Cornwall Knotweed Forum (2001) Japanese knotweed. Guidance for householders and landowners.

Welsh Development Agency (1998) The control of Japanese knotweed in construction and landscape contracts: Model specification. (Former Welsh Development Agency), Welsh Assembly Government, Cardiff.

Welsh Development Agency (1998) The eradication of Japanese knotweed: Model tender document. (Former Welsh Development Agency), Welsh Assembly Government, Cardiff.

Glossary

Active ingredient:

The chemical component of a herbicide that actually kills or debilitates the plant.

Axil:

The angle between the leaf stalk of a plant and the stem.

BASIS:

A qualification of technical competence for people who use, store, sell or advise on the use of pesticides. BASIS is an organisation committed to making sure people involved in handling and using pesticides are competent. BASIS maintain a register of trained advisors, who need to demonstrate an annual programme of continual professional development to maintain their qualification. Details on the BASIS Professional Register are available from 34, St John Street, Ashbourne, Derbyshire DE6 1GH. Tel: 01335 343945.

Brownfield:

A site that has been previously used in a manner that requires remediation before it is used again. Such sites are often post-industrial sites or derelict buildings and often have contaminated land and other waste issues associated with them.

Bund:

Shallow pile of soil, spread out to achieve a depth no greater than 1m, preferably 0.5m. Bunds can either be on the surface, or occupy voids to create a level surface. Bunds should have the bulk of the Japanese knotweed rhizome concentrated on the surface, to facilitate regrowth suitable for herbicide treatment.

Canes:

Tall, hollow, bamboo-like stems.

Clerk of works:

Person responsible for managing all the Japanese knotweed on site. The clerk of works oversees the Japanese knotweed management plan and ensures all staff on site are aware of their role with regards Japanese knotweed management.

Control of Pesticides Regulations (CoPR) 1986:

CoPR 1986 require any person who uses a pesticide to take all reasonable precautions to protect the health of human beings, creatures and plants, safeguard the environment and in particular avoid the pollution of water. For application of pesticides in or near water approval from the Environment Agency should be sought before use.

Crown:

The visible part of the rhizome from which canes grow. Crowns can produce many new canes and, because of their size, can be resistant to burning or drying out.

Dormant:

The state in which an organism is still alive, but displays little evidence of life.

Duty of care:

Section 34 of the Environmental Protection Act 1990 (EPA90) imposes a duty of care on persons concerned with controlled waste. The duty applies to any person who produces, imports, carries, keeps, treats or disposes of controlled waste, or as a broker has control of such wastes. Breaching the duty of care is an offence, with a penalty of an unlimited fine if convicted on indictment.

Environmental Protection

Act 1990 (EPA 1990):

EPA 1990 contains a number of legal provisions concerning “controlled waste”, which are set out in Part II. Any Japanese knotweed contaminated soil or plant material that you discard, intend to discard or are required to discard is likely to be classified as controlled waste. The most relevant provisions are in sections 33 and 34.

Fly-tipping:

Illegal disposal of waste into the environment.

Formulation:

A particular herbicide traded under a specific name. Different formulations of herbicide may share the same active ingredient, but are designed for use in different situations. For instance, only certain formulations of glyphosate are approved for use in or near water.

Green belt:

Area of undeveloped land in proximity to a community that has been preserved to conserve the aesthetic beauty of the location. These areas are referred to as 'green wedges' in Wales.

Hazardous Waste Regulations 2005 (HWR 2005):

HWR 2005 contain provisions about the handling and movement of hazardous waste. Consignment notes must be completed when any hazardous waste is transferred, which include details about the hazardous properties and any special handling requirements. If a consignment note is completed, a waste transfer note is not necessary. Material containing knotweed that has been treated with herbicide, may be classified as hazardous waste.

Hazardous waste:

Hazardous Waste – waste which by virtue of its composition, carries the risk of death, injury or impairment of health, to humans or animals, the pollution of waters, or could have an unacceptable environmental impact if improperly handled, treated or disposed of, as controlled in the EC Directives on Hazardous Waste and defined by Special Waste Regulations 1996 (as amended) (schedule 2).

Heave:

Physical disruption of a hard surface caused by an upward stress.

Hybrid:

A plant or animal that results from reproduction by two different species.

Membrane:

In this code, membrane describes a relatively low specification protective layer used for containing Japanese knotweed when it is being transported (sections 5.1, 6.1, 6.2, 7.2). Compare with 'root barrier membrane', below.

Perennial:

A plant that continues its growth from year to year.

Persistent herbicide:

A herbicide that contains an active ingredient that will not be swiftly degraded after it has been applied. This can sometimes limit the manner in which treated soil can be reused or disposed of.

Rhizome:

Underground stem. Enables Japanese knotweed to survive over-winter, when the canes die back. Small sections of rhizome, as little as 0.7g can regrow into a new plant.

Rhizomatous:

Of or pertaining to a rhizome.

Root barrier membrane:

High specification membrane used for highly stressed short-term protection, such as haulage routes (section 2.2, 7.1 and 7.3), or containing Japanese knotweed in the long term (sections 4, 5 and 8.5). Root barrier membranes must be made of a material that is fit for purpose. It should be made of a material that can be:

- a) used without damage;
- b) provided in large sizes, to minimise the need for seals;
- c) sealed securely;
- d) remain intact for at least 50 years (guaranteed by the manufacturer);
- e) resist UV damage if used where it is exposed to sunlight;
- f) buried without polluting groundwater from chemicals leached from it. Compare with 'membrane', above.

Sett:

The system of tunnels and chambers used by badgers and protected by law.

Tines:

Long pointed teeth attached to a digger bucket to rake out rhizome.

Viable:

Capable of growing into a new plant.

Waste exemption:

When the disposal of waste is deemed not to present a risk to public health or the environment.

Waste Management Licensing Regulations (WMLR) 1994:

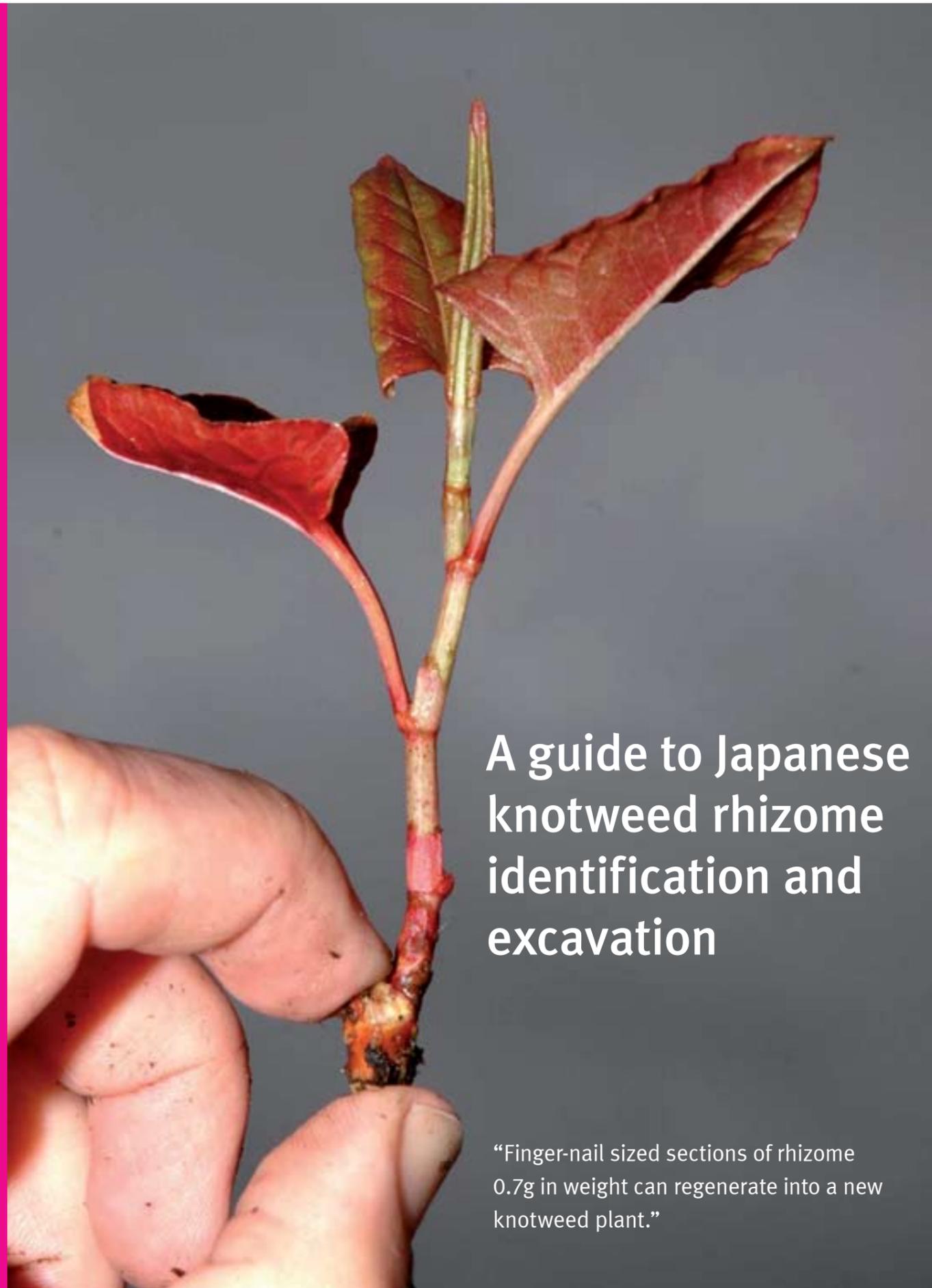
WMLR 1994 describe 'waste relevant objectives' in Paragraph 4 of Schedule 4. These objectives require that waste is recovered or disposed of "without endangering human health and without using processes or methods which could harm the environment and in particular without risk to water, air, soil, plants or animals; or causing nuisance through noise or odours; or adversely affecting the countryside or places of special interest"

Waste relevant objectives:

See Waste Management Licensing Regulations (WMLR) 1994, above.

Wildlife and Countryside**Act 1981 (WCA 1981):**

Section 14(2) states that "if any person plants or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence." Japanese knotweed is one of the plants listed in the Schedule.



A guide to Japanese knotweed rhizome identification and excavation

“Finger-nail sized sections of rhizome 0.7g in weight can regenerate into a new knotweed plant.”

A guide to Japanese knotweed rhizome identification and excavation



This guide should be used in conjunction with the Environment Agency code of practice, ‘managing Japanese knotweed on development sites’. It has been produced as a separate guide to facilitate use during excavations.

i) What is Japanese knotweed?

Japanese knotweed *Fallopia japonica* was introduced into the UK during the mid-nineteenth century as an ornamental plant. It has since become one of the most problematic invasive weeds in Europe (see Section 1 of Code)

Japanese knotweed is a perennial weed, producing tall canes, up to 3m (10 feet) in height during the summer. The canes have characteristic purple flecks, and produce branches from nodes along its length. These branches support shovel-shaped leaves and clusters of white flowers in autumn. The canes die off in winter, turning brown and shedding their leaves. This produces dense mulch that precludes the growth of native plants.



ii) What is Japanese knotweed rhizome?

Japanese knotweed canes grow from dense crowns that also produce extensive underground stems, called rhizomes. These rhizomes also produce fine, white, hair-like roots. It is hard to state with certainty the likely extent of rhizome spread from the parent plant. Research has shown that rhizome can grow a distance of at least 7m (23 feet) and achieve a depth of at least 2m (6 feet) from the parent crown. However, the actual extent of the rhizome can vary considerably depending on the soil type and the history of the site. Many knotweed infestations start life as a result of fly-tipped waste, and repeated applications of waste on top of the initial infestation can result in a deep matrix of rhizome.



iii) Why is it important to be able to identify Japanese knotweed rhizome?

Whilst knotweed can regenerate from small sections of cane, most knotweed in the UK arises from rhizome and crown material. Finger-nail sized sections of rhizome 0.7 g in weight can regenerate into a new knotweed plant. It appears that the regenerative potential of rhizome varies. Thick, old woody tissue appears to be less able to produce new growth than crown material or thinner succulent rhizome. This has implications for those excavating knotweed rhizomes, where there is a risk of thin terminal rhizome from the edge of the cut being overlooked, which would have a high regenerative potential.

There are often situations in which it is necessary to be able to identify rhizome without the benefit of intact knotweed canes for assistance. If a site is undisturbed it is fairly easy to recognise characteristic summer growth, or the dead winter canes. If the site has already been scraped, it is necessary to inspect the waste material for evidence of knotweed; dead canes, leaves and rhizome, to establish if the weed is present on site. Knowledge of rhizome identification is then required to identify the location and extent of the infestation.

The cost of knotweed management can be significantly reduced if knotweed and non-knotweed waste streams can be kept separate. If poor initial management of a site has already precluded this option, this should be of great concern to any subsequent developer.

Waste hauliers also need to take care to inspect waste material prior to accepting it (See Section 6.2 of Code). Soil containing viable knotweed material is not suitable for disposal under an exemption from Section 34 of the Environmental Protection Act 1990. Section 34 imposes a duty of care on a person who produces, imports, carries, keeps, treats or disposes of controlled waste, or acts as a broker for such wastes.

iv) How do I recognise rhizome?

An identification chart for knotweed rhizome, and a comparison with other commonly encountered roots, is provided within Appendix II. The former Welsh Development Agency, now part of the Welsh Assembly Government, has produced a tabular guide to the identification of knotweed rhizome that is reproduced in Appendix III with their kind permission.



In addition to the rhizome described within the identification chart, very new rhizome growth, delicate and white in appearance, can be found during the growing season.

v) How do I remove rhizome?

Put simply, remove the rhizome with extreme care. It is important to read the code of practice before starting excavation. The majority of knotweed rhizome is confined to the top 0.5m of soil. Remove the soil by first scraping off the crowns and surface rhizome and putting to one side. Crowns and rhizome can be dried and burned (see Section 5.2 of Code) prior to treatment with the remaining soil. Crown material in particular is resistant to burning; therefore it is important to regard this material as still potentially infectious.

The next 0.5-1m of soil can then be removed and put aside, and then the remaining soil to a depth of approximately 3m can be excavated. This material should form the base of a bund (See Section 5.5 of Code), or the top layer of buried material (See Sections 5.4 and 4.1 of Code). This process of excavation can be proportioned to any depth of excavation, rather than adopting the 3m generalised depth.

Guidance on the containment and movement of knotweed-infested soil is provided within Sections 2, 6 and 7 of the Code of Practice.

Careful use of the information within this guide should enable operators to effectively inspect the edge of their excavation for remaining rhizome. Depending on the history of the site, the depth to which knotweed rhizome extends can vary between 0.5m – 10m. The history of the infestation, soil type and the water table can all have a profound impact on the extent of rhizome. Situations in which rhizome is greater than 3m tends to be associated with situations in which additional waste has been regularly dumped on an established knotweed stand, or wind-blown sand has created a dune system.

Careful excavation of rhizome has the potential to significantly reduce the volume of waste removed instead of simply excavating a 7m x 3m volume of soil. It also ensures effective removal in situations where a 7m x 3m excavation is an under-estimate. In all cases the precautionary approach must be adopted rather than risk leaving rhizome behind.



Not all rhizome regenerates in the same manner and the factors that determine rhizome regeneration are the subject of research. It appears that older rhizome becomes woody, and tends to be utilised by the plant for food storage, whereas the fresh young rhizome is more carrot-like and much more infectious. Therefore, the small pieces at the extreme edge of the rhizome ring are potentially the most infectious, and therefore require the greatest of care. It is good practice to excavate another 0.5m around the perimeter of the cut after all rhizome has been apparently removed as a further precaution.



Rhizome is an underground stem, rather than a root, and will tend to spread laterally. The rhizome at the periphery of the matrix will tend to be shallow, therefore the excavation usually describes a saucer-shaped profile.

Having excavated the rhizome it is essential that waste streams are kept separate and that rhizome is not allowed to contaminate spoil that has been removed from areas free from rhizome.

Remember:

Do not excavate rhizome unless you have to, especially if you do not have the capacity to treat the material on site.

A 0.7g piece of rhizome is approximately the size of your little fingernail, and this may be capable of growing into a new plant.

The matrix of the rhizome will vary in size and extent, depending on the nature and history of the site. Careful use of this guide will minimise the waste

you produce and significantly reduce your costs.

Rhizome may remain dormant for at least 20 years. Dormant rhizome may regrow if it is disturbed. Lack of regrowth is not evidence of eradication.

Avoid spreading rhizome by following the guidance given within the knotweed code of practice.

If you spread rhizome into the environment you may be liable to prosecution under the Wildlife & Countryside Act 1981.



Root / rhizome identification chart - Japanese knotweed

Plants commonly found on development sites



Japanese knotweed *Fallopia japonica* (and other Asiatic invasive knotweeds).

Japanese knotweed is commonly encountered on brownfield sites, where soil disturbance and fly-tipping are common. Close proximity to rivers, roads and railways may also provide a source of invasion.

External appearance of root or rhizome



Colour:

Dark brown, lighter when dried.

Texture:

Smooth skin, becoming rough when desiccated.

Features:

often forming long knotty lengths. May support small red buds, particularly on crowns (base of stem). Fine hair-like roots common, particularly on thinner sections.

Snap Test



Snapability:

Easy. Very carrot-like in structure and colour when fresh. More woody when dry. Older material, particularly near the crown, can be very woody. Colour can vary from deep red to pale yellow, with orange the most common. Younger fresh material usually has a different coloured core.

Scrape Test



Outer layer:

Thin skin, easily removed when fresh.

Inner layer:

Pale threads often run through darker fibrous flesh, particularly in larger rhizome. Often variations in colour through rhizome when split lengthways. Crown material is often caked with soil and can be hard to recognise. Cleaning should reveal red buds and characteristic flesh.

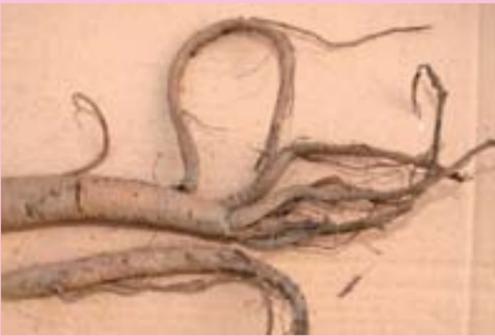
Root / Rhizome identification chart - other common plants

Plants commonly found on development sites



Dock:
Common on disturbed ground and in topsoil. Agricultural weed and covered by the Weeds Act 1959. Closest native plant to knotweed, so similar root appearance.

External appearance of root or rhizome



Colour:
pale red/brown.
Texture:
Fleshy skin.
Features:
Tapering, with branches clustered near the tip. Lacking the knotty appearance of knotweed.

Snap Test



Snapability:
Easy. Rubbery, but lacks the carrot-like snappiness of knotweed. Core is similar colour to the rest of the root, lacking the colour variation of knotweed rhizome.

Scrape Test



Outer layer:
Thin skin, similar to knotweed.
Inner layer:
fleshy, with a distinct core. Orange/yellow in colour, but usually paler than knotweed.

Plants commonly found on development sites



Buddleja (Butterfly bush):
Introduced shrub (intro: 1890), colonising waste ground and masonry. Spread by seed. Pink, purple or white flowers. Corky bark. Silver underside to leaves.

External appearance of root or rhizome



Colour:
Pale brown.
Texture:
Bark-like.
Features:
Bark easily damaged and revealing the woody core. Tough.

Snap Test



Snapability:
Very poor. Tends to rip rather than break cleanly. Distinct core.

Scrape Test



Outer layer:
Thin wrinkled bark.
Inner layer:
White wood.

Root / Rhizome identification chart - other common plants

Plants commonly found on development sites

**Elder:**

Native shrub, typical of disturbed ground and wasteland. White clusters of flowers in spring, black berries in autumn.

External appearance of root or rhizome

**Colour:**

Pale brown/yellow

Texture:

Fleshy and smooth. Wrinkled if desiccated.

Features:

Fleshy rootlets.

Snap Test

**Snapability:**

Reasonable. Thin sections snap, but larger sections are too woody. Tends to tear.

Scrape Test

**Outer layer:**

Skin easily removed.

Inner layer:

White fleshy layer with a pale woody core.

Plants commonly found on development sites

**Sycamore (and most other trees):**

Trees are common colonisers of waste ground. Their roots are occasionally mistaken for rhizome.

External appearance of root or rhizome

**Colour:**

Mid-brown.

Texture:

Fairly smooth and even.

Features:

Does not fragment as easily as knotweed. Tend to remain in tapered sections. Fine rootlets.

Snap Test

**Snapability:**

Very poor. Very woody, tending to break and tear rather than snap. Fairly uniform in colour and structure.

Scrape Test

**Outer layer:**

Tough bark.

Inner layer:

Pale coloured wood.

Table for the identification of Japanese knotweed rhizome

General characteristics	Yes	No
Twig-like appearance		
Fleshy with hardness like carrot		
Brittle when fresh, break easily like carrot		
Young rhizome is white and very soft		
Exterior of rhizome	Yes	No
Colour dark brown, like coffee granules		
Texture of the outer bark leathery		
When bark is removed, tissue is pale orange/yellow		
Nodes at 1-2cm spacing		
Nodes slightly enlarged and 'knotty'		
At nodes white fibrous roots are common		
If present, fresh buds at nodes are red/pink		
Interior of rhizome		
Longitudinal view	Yes	No
Colour: pale orange and light yellow, similar to a carrot		
Central core is usually dark orange/brown, like rust, and sometimes hollow		
Cross section	Yes	No
Cortex with rays coming from centre, like spokes from a wheel		
TOTAL		

If the 'yes score is greater than the 'no' score, then treat the identified rhizome as Japanese knotweed.

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Management plan for Japanese knotweed at:

Period covered: _____

Prepared by: _____ Date: _____

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1.1 Description of the Site

Brief description of the existing site (prior to any development): Include presence of any nature conservation features – e.g. protected species; vegetation to be retained; water courses (include proximity of streams or rivers if adjacent to the site); buildings to be retained; drainage on site; other relevant features.

Brief description of the proposed development: Include any proposed import or export of soils.

Brief description of the site post-development: Include any parts of the site designated for landscaping, conservation areas etc.

1.2 Site Management Objectives

Brief description of site management objectives: Include proposed timescale and plans for restoration/re-planting.

1.3 Limitations and Threats to Site Management Objectives

Description of how the presence of Japanese knotweed poses a threat to, or limits management objectives. Include for example:

- Increasing costs of development
- Delays in scheduling of works
- Damage or potential damage caused by the plant
- Potential for spread of Japanese knotweed from within and outside the site boundary (e.g. within the site, from adjacent land or via watercourses)
- Potential for import of Japanese knotweed on materials

1.4 Inventory of the Site

Description of the site boundaries, topography, access, special features: Include maps of site pre and post development in Appendix 1.

Description of the Japanese knotweed distribution on site and adjacent to the site:

Include detailed maps showing location of Japanese knotweed and exact area covered (allocate a unique identification number to each location of Japanese knotweed on site e.g. JK001, JK002 etc).
Complete a recording sheet for each location (see Appendix 2) If Japanese knotweed is present on adjacent land, record distribution and details of land use and land ownership.

2.1 Brief Description of Management Plan

Allocate personnel to oversee Japanese knotweed management and to be responsible for sign –off at the end of the treatment period:

2.2 Setting Priorities

Examples:

- Areas of Japanese knotweed on site which require rapid treatment will be identified.
- Prevention of further infestation of the plant on the site is a priority.
- Replacement vegetation/habitat will be considered rather than just eliminating Japanese knotweed.
- Control methods which suit the location and timescale will be adopted.
- Implementation will be based on the above information.
- Regular monitoring will be carried out.
- Management will be revised in response to feedback from the above.

Assign priority to each management objective: (e.g. High, Medium Low) - Record priorities for each location of the plant in Table 1.

2.3 Preventing Further Spread

Description of methods to be employed to prevent further spread:

Include for example:

- Isolation of Japanese knotweed on site by fencing to avoid disturbance during treatment.
- Assessment of risk of re-invasion of Japanese knotweed from adjacent land.
- Liaison with adjacent landowners to treat Japanese knotweed which poses a risk to the site.
- Procedures to ensure that imported materials are free from Japanese knotweed.
- Identification of designated haul routes through site to avoid contamination.

Description of training to be given to site operators and contractors during development:

Include for example identification of the plant (both above and below ground parts) and training on site practices to prevent further spread.

Site name:

Responsible manager:

Date plan last updated:

3.1 Management objectives (measurable)

Establish measurable objectives for the planned control activities. Include:

- the impact on density, cover, etc. that you want to achieve;
- the size of the area in which you hope to achieve this;
- the period in which you hope to achieve it.

Examples:

- Objective 1. Elimination of Japanese knotweed on all parts of the site within 5 years.
- Objective 2. Reduce percentage cover by 50% on 1 ha of the site within 2 years.
- Objective 3. Prevention of further spread of Japanese knotweed on site.
- Objective 4. Co-ordination with adjacent landowners to commence active treatment of Japanese knotweed in adjacent areas within 1 year.

3.2 Management options

Viable control options are:

- No treatment;
- Treatment alternative 1
- Treatment alternative 2 etc.

Briefly discuss the alternatives, indicate which are preferred and the conditions (size of area treated, location, timing, total anticipated cost, etc.) under which they may be used.

Build in restricted flexibility to allow conditions on site to be taken into consideration. State who the site operatives should contact when none of the listed alternatives can be carried out.

3.3 Actions planned (treatments and monitoring)

Briefly describe the locations to be treated, materials and methods to be used, and an approximate schedule for control and monitoring activities. Record details in Table 2.

3.4 How actions will be evaluated (criteria for success)

Outline the methods that will be used to monitor control activities and the criteria that will be used to evaluate success or failure of the program. The criteria for success should be based on the program’s objectives and goals. (Data sheets to be used when collecting monitoring data should be included in Appendix 3).

3.5 Resource needs

Estimate the amount of time for staff, materials, contractors etc. and money that will be required to carry out the planned control, monitoring and evaluation. Record in Table 4.

3.6 Results of evaluation

This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated. The evaluation should be used to determine whether any of the sections 3.1-3.5 above should be modified.

Table 1 - Priority areas

Area	Description and justifications of priority	Priority level

Table 2 - Control Methods

Area	Control Method	Carried out by

Table 3 - Implementation Schedule

Schedule the planning, surveying, and treatment for Japanese knotweed for at least the next year.

Treatment Schedule	Date

Table 4 - Projected resources and costs

Revise this table annually after comparing estimated to actual costs.

Item	Description	Projected resources	Projected costs	Actual Costs

List references cited or used. For example:

Child, L.E. and Wade, P.M. (2000) The Japanese Knotweed Manual. Packard Publishing Limited, Chichester. ISBN 1 85341 127 2

Environment Agency and Cornwall County Council (1998) Japanese knotweed. How to control it and prevent its spread. Environment Agency, Bodmin.

Environment Agency and Cornwall County Council (2001) Japanese knotweed. Guidance for householders and landowners. Cornwall County Council.

Welsh Development Agency (1998) The control of Japanese knotweed in construction and landscape contracts: Model specification. Former Welsh Development Agency, now part of the Welsh Assembly Government.

Welsh Development Agency (1998) The eradication of Japanese knotweed: Model tender document. Former Welsh Development Agency, now part of the Welsh Assembly Government.

Appendix 1 - Distribution maps

Attach copies of the map(s) of the site, and of maps depicting the extent of the Japanese knotweed on the site.

Appendix 2 - Japanese knotweed recording sheet

Example of Japanese knotweed Recording Sheet (complete a new sheet for each area of Japanese knotweed).

Recorded by:	Date:
--------------	-------

Site name:

Grid ref:	Site ref:
-----------	-----------

Area of Japanese knotweed - NB. Mark outline of area of Japanese knotweed on site map and annotate with site ref. no. If patch measures <1.0m², mark as + on map and annotate with site ref. no.

m	m
---	---

Average height of stems	<1m	1 - 2.5m	>2.5m
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Max. stem diameter at 30cm above ground	<1cm	1 - 2cm	>2.5cm
---	------	---------	--------

Vegetation composition	Japanese knotweed only	Mixture of knotweed & other vegetation
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Proximity to water courses	Yes	No
----------------------------	-----	----

Slope	Flat	Moderate	Steep
-------	------	----------	-------

Land use - Record primary land use as 1 and secondary use as 2 etc. e.g. landscaped area adjacent to riverbank record as Riverbank 1; Landscaped area 2.

Housing	Shops	Public buildings	Business/Industrial
Garden	Park	Recreation ground	Landscaped area
Farmland	Woodland	Waste ground	Graveyard
Car Park	Road verge	Railway embankment	Roundabout
River bank	Stream side	Dock	Canal
Pond	Sea front	hedgerow	Other, specify

Remarks:

Appendix 3 - Forms used in collecting monitoring data

Attach copies of data collection sheets.

Appendix 4 - Herbicide records

Attach details of herbicides used, dose rate and application rates and dates applied.

Appendix 5 - Waste records

Attach details of waste records for any material containing Japanese knotweed taken off site.

Appendix 6 - Useful contacts

Attach details of Contractors, Local Authority contact, Environment Agency contact, adjacent landowners etc.

Management plan for Japanese knotweed at:

Period covered: 2006-2010

Prepared by: N.E. Body

Date: April 2006

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1.1 Description of the Site

Brief description of the existing site (prior to any development): Include presence of any nature conservation features – e.g. protected species; vegetation to be retained; water courses (include proximity of streams or rivers if adjacent to the site); buildings to be retained; drainage on site; other relevant features.

The site is a brown-field industrial site formerly a textiles factory which has been vacant for 10 years. Buildings were demolished some 8 years ago. The site covers an area of approximately 6.5 ha. and is surrounded by mature hedgerows with some mature trees. A watercourse runs along the southern boundary of the site in an westerly direction. Existing vegetation cover is rough ruderal vegetation with several patches of Japanese knotweed within the site and adjacent to the watercourse.

Brief description of the proposed development: Include any proposed import or export of soils.

The development will require site levelling, construction of a service road, installation of drainage and services and the construction of a building. Some material will be exported and the remaining inert material will be used on-site in construction works. Import of top soils for landscaping around car parking and communal areas will be required.

Brief description of the site post-development: Include any parts of the site designated for landscaping, conservation areas etc.

The proposed development will incorporate 3 sports pitches and a car parking area with a club house and facilities to the north eastern corner. A service road will provide access onto the site. Hedgerows to be retained and landscaping to be carried out in the vicinity of the clubhouse. A conservation area to the southern boundary is proposed alongside the watercourse.

1.2 Site Management Objectives

Brief description of site management objectives: Include proposed timescale and plans for restoration/re-planting.

The site is expected to be operational 24 months after works commence. Landscape planting and restoration of the boundary hedgerows and riparian vegetation will be carried out during the construction period.

1.3 Limitations and Threats to Site Management Objectives

Description of how the presence of Japanese knotweed poses a threat to, or limits management objectives. Include for example:

- Increasing costs of development
- Delays in scheduling of works
- Damage or potential damage caused by the plant
- Potential for spread of Japanese knotweed from within and outside the site boundary (e.g. within the site, from adjacent land or via watercourses)
- Potential for import of Japanese knotweed on materials

The presence of Japanese knotweed on site will increase the financial burden on this project both in terms of treatment costs and in delays in scheduling construction works. Any Japanese knotweed left untreated has the potential to damage hard surfaces and sports pitches and to delay the landscaping. A large area of Japanese knotweed exists outside the site to the eastern boundary and there is potential for further spread into the site along the watercourse. The development will necessitate the export of some material and the import of top soils for landscaping and for sports pitches. Materials leaving or brought onto site should be checked to ensure that Japanese knotweed does not leave or enter the site via this route.

1.4 Inventory of the Site

Description of the site boundaries, topography, access, special features: Include maps of site pre and post development in Appendix 1.

The site is reasonably level with access from the B4452 on the western boundary. The site slopes down steeply towards the watercourse on the southern boundary and there is potential in this area to accommodate a conservation area. Two mature Willow trees are located in the south western corner of the site.

Boundaries to the northern, western and eastern edges of the site are composed of mature hedgerow species including Hawthorn, Field maple, Blackthorn with some mature Ash and Oak trees.

Description of the Japanese knotweed distribution on site and adjacent to the site:

Include detailed maps showing location of Japanese knotweed and exact area covered (allocate a unique identification number to each location of Japanese knotweed on site e.g. JK001, JK002 etc).

Complete a recording sheet for each location (see Appendix 2) If Japanese knotweed is present on adjacent land, record distribution and details of land use and land ownership.

There are 6 distinct patches of well established Japanese knotweed on the site in addition to 2 areas where a few stems have become established. These are described in the accompanying maps and recording sheets. On adjacent land to the east of the site, a large area of Japanese knotweed is present adjacent to the watercourse. Total area of Japanese knotweed on site is estimated at 1,900m². Total area of Japanese knotweed on adjacent land is estimated at 500 m².

2.1 Brief Description of Management Plan

Allocate personnel to oversee Japanese knotweed management and to be responsible for sign –off at the end of the treatment period:

The Management of Japanese knotweed on site shall be overseen by the site foreman and in his absence, his deputy. This Management Plan and appendices and revisions of this plan shall be kept for future site owners. This Management Plan should be read in conjunction with the Environment Agency Code of Practice.

2.2 Setting Priorities

Examples:

- Areas of Japanese knotweed on site which require rapid treatment will be identified.
- Prevention of further infestation of the plant on the site is a priority.
- Replacement vegetation/habitat will be considered rather than just eliminating Japanese knotweed.
- Control methods which suit the location and timescale will be adopted.
- Implementation will be based on the above information.
- Regular monitoring will be carried out.
- Management will be revised in response to feedback from the above.

Assign priority to each management objective: (e.g. High, Medium Low) - Record priorities for each location of the plant in Table 1.

High Priority

- Areas of Japanese knotweed which require rapid treatment -
JK002 on site access route
JK004 overlying site drainage route
JK005 and JK008 on land proposed for sports pitches.
- Prevention of further spread. All Japanese knotweed areas to be isolated prior to any work being carried out on site. This to include an area of at least 7 m laterally from above ground stems to ensure that any underground parts are also isolated.
- All personnel on site to receive training on identification of Japanese knotweed both above and below ground parts.

Medium Priority

- Control Methods for remaining areas of Japanese knotweed. A range of control methods will be adopted to include excavation and stock piling for future treatment (bund method), in-situ herbicide treatment and a combination of digging and subsequent herbicide application (combination method). Herbicides will be selected which are suitable for site use e.g. restrictions on herbicides which can be used in or near water.
- Monitoring -
A scheme for monitoring will be agreed with the site foreman who will be ultimately responsible for overseeing the control of Japanese knotweed on site.
- Management -
This management plan will be reviewed on a regular basis and in any case every 6 months from site acquisition to site completion.

Low Priority

- Replacement vegetation. JK003 adjacent to watercourse once eliminated should be replaced with grass cover to prevent bankside erosion.

2.3 Preventing Further Spread

Description of methods to be employed to prevent further spread:

Include for example:

- Isolation of Japanese knotweed on site by fencing to avoid disturbance during treatment.
- Assessment of risk of re-invasion of Japanese knotweed from adjacent land.
- Liaison with adjacent landowners to treat Japanese knotweed which poses a risk to the site.
- Procedures to ensure that imported materials are free from Japanese knotweed.
- Identification of designated haul routes through site to avoid contamination.

All areas affected by Japanese knotweed to be fenced and isolated from activities on site immediately to avoid potential for spread on-site. An area including a perimeter of at least 7m from the above ground stems should be isolated. See Environment Agency Code of Practice 2.1, 2.2

There is a high risk of invasion from neighbouring land. Contact the landowner and agree on a co-ordinated treatment programme.

No material to leave the site from the isolated Japanese knotweed areas.

All topsoil and materials brought onto site to be checked prior to accepting. See Environment Agency Code of Practice 2.3

No new materials to be stored adjacent to Japanese knotweed isolated areas.

No movement of Japanese knotweed contaminated material across site unless on designated haul routes, avoiding Japanese knotweed isolated areas.

Description of training to be given to site operators and contractors during development:

Include for example identification of the plant (both above and below ground parts) and training on site practices to prevent further spread.

All contractors and site operatives on site to receive training in Japanese knotweed identification and site practices. Training to be given on day 1. Posters highlighting the key features of the plant to be displayed in all communal areas (see Environment Agency Code of Practice Appendices I-IV).

Site name: **Dummy Site**

Responsible manager: **Site Foreman**

Date plan last updated: **May 2006**

3.1 Management objectives (measurable)

Establish measurable objectives for the planned control activities. Include:

- the impact on density, cover, etc. that you want to achieve;
- the size of the area in which you hope to achieve this;
- the period in which you hope to achieve it.

Examples:

- Objective 1. Elimination of Japanese knotweed on all parts of the site within 5 years.
- Objective 2. Reduce percentage cover by 50% on 1 ha of the site within 2 years.
- Objective 3. Prevention of further spread of Japanese knotweed on site.
- Objective 4. Co-ordination with adjacent landowners to commence active treatment of Japanese knotweed in adjacent areas within 1 year.

Objective 1

- Immediately contain existing Japanese knotweed on site and prevent further spread.

Objective 2

- Reduce the percentage cover of Japanese knotweed on site by 50% within 1 year.

Objective 3

- Liaise with adjacent landowner to commence active treatment of Japanese knotweed within 1 year.

Objective 4

- Eliminate Japanese knotweed on site within 4 years.

3.2 Management options - (continue on next page)

Viable control options are:

- No treatment;
- Treatment alternative 1
- Treatment alternative 2 etc.

Briefly discuss the alternatives, indicate which are preferred and the conditions (size of area treated, location, timing, total anticipated cost, etc.) under which they may be used.

Build in restricted flexibility to allow conditions on site to be taken into consideration. State who the site operatives should contact when none of the listed alternatives can be carried out.

The various options for the control of Japanese knotweed include in situ herbicide treatment, combined treatment of digging and herbicide, excavation and stock-piling for future treatment (the bund method), excavation and burial on site or excavation and removal off site. It is not an acceptable option to consider doing nothing.

3.2 Management options - (continued)

Excavation and removal off site is a rapid method of removal but is costly, and in the long term unsustainable. The particular site conditions do not allow for excavation and burial on site to the required depth of 5m (see Environment Agency Code of Practice). As there is sufficient space on site, excavation and stock-piling on site for subsequent herbicide treatment (the bund method) is a viable option particularly for those areas of site which are required to have immediate availability (e.g. access road). The remaining areas of Japanese knotweed could be treated by a combined digging and herbicide treatment or by in-situ herbicide treatment. The range of herbicides available are limited in the case of the affected areas adjacent to the watercourse, but other herbicides could be considered in more open areas away from water and mature trees. It may be necessary to vary the herbicide used or the mode of application once treatment has commenced. This should be discussed and agreed with the approved contractor.

3.3 Actions planned (treatments and monitoring) - (continue on next page)

Briefly describe the locations to be treated, materials and methods to be used, and an approximate schedule for control and monitoring activities. Record details in Table 2.

JK002, JK004, JK005, JK008

Control Method:

The Bund Method (See Environment Agency Code of Practice 5.4)

- Treat affected area with an appropriate non-persistent herbicide and leave for at least 1 week.
- Cut and remove canes and leave to dry on site for subsequent burning.
- Rake the surface of the affected area with tines to remove crowns and surface material – either leave to dry with canes for burning or spread on top of completed bund.
- Excavate affected area until all rhizome material has been removed.
- Create bund on a layer of geotextile starting with least infected soil and build up to 0.5 m to 1 m in height laying crown material and/or stems on top.
- Treat regrowth with appropriate herbicide.
- Disturb bund after one or two treatments and treat regrowth with appropriate herbicide.
- Continue to treat and disturb until no further regrowth appears.
- Soil from the bund may not be used off-site.

3.3 Actions planned (treatments and monitoring) - (continued)

Briefly describe the locations to be treated, materials and methods to be used, and an approximate schedule for control and monitoring activities. Record details in Table 2.

JK001, JK006 - Control Method:

Combined Treatment Method (See Environment Agency Code of Practice 3.4)

- Cut and remove canes and leave to dry on site for subsequent burning.
- Rake the surface of the affected area with tines to remove crowns and surface material and burn with canes.
- Cultivate affected area to a depth of at least 50 cm depending on the depth to which the bulk of rhizome material exists.
- Re-spread the excavated material over the cultivated area
- Apply appropriate herbicide to regrowth.
- Check for new growth at 4 - 6 weeks intervals after treatment and re-treat accordingly.
- Repeat cultivation and herbicide application until no further regrowth appears.

JK003, JK007 - Control Method:

Application of herbicide to above ground stems in situ using a herbicide approved for use in or near water e.g. glyphosate (See Environment Agency Code of Practice 3.2, 3.3)

- Cut and remove dead canes during winter for subsequent burning.
- Apply herbicide according to the manufacturers guidelines.
- Check for new growth at 4 - 6 week intervals after treatment and re-treat accordingly.

3.4 How actions will be evaluated (criteria for success)

Outline the methods that will be used to monitor control activities and the criteria that will be used to evaluate success or failure of the program. The criteria for success should be based on the program's objectives and goals. (Data sheets to be used when collecting monitoring data should be included in Appendix 3).

Monitoring will be carried out by the contractor and the site foreman prior to any treatment being carried out to act as a baseline for future monitoring and every 4 - 6 weeks throughout the growth season. The contractor and site foreman will agree the level of control achieved and the future treatment schedule. Recording sheets will be used to document the percentage cover of Japanese knotweed at each affected area on site over at least 3 representative samples of 1 m2.

3.5 Resource needs

Estimate the amount of time for staff, materials, contractors etc. and money that will be required to carry out the planned control, monitoring and evaluation. Record in Table 4.

3.6 Results of evaluation

This section is to be filled in later, preferably within 1 year, when monitoring data has been taken and evaluated. The evaluation should be used to determine whether any of the sections 3.1-3.5 above should be modified.

Table 1 - Priority areas

Area	Description and justifications of priority	Priority level
JK002, JK004, JK005, JK008	JK002 on proposed access road, JK004 overlying site drainage route. JK005 and JK008 on land proposed for sports pitches. Rapid treatment required	High
JK001, JK003, JK006, JK007	Stands on or adjacent to site boundaries can be treated in-situ	Medium

Table 2 - Control Methods

Area	Control Method	Carried out by
JK001	Combination treatment	Site operatives and contractor
JK002	Bund method	Site operatives and contractor
JK003	Herbicide application	Contractor
JK004	Bund method	Site operatives and contractor
JK005	Bund method	Site operatives and contractor
JK006	Combination treatment	Site operatives and contractor
JK007	Herbicide application	Contractor
JK008	Bund method	Site operatives and contractor

Table 3 - Implementation Schedule

Schedule the planning, surveying, and treatment for Japanese knotweed for at least the next year.

Treatment Schedule - Bund Me	Date
Chemical treatment to be carried out prior to excavation if plants are in leaf.	day.month.year
Excavate Japanese knotweed and surrounding area until all traces of rhizome are removed. Stockpile excavated material on protective membrane for treatment.	day.month.year
Chemical treatment to be carried out during growing season (March to September).	day.month.year
Apply disturbance to stockpile.	day.month.year
Monitor for new growth.	day.month.year
Chemical treatment to be carried out during growing season (March to September).	day.month.year

Table 4 - Projected resources and costs

Revise this table annually after comparing estimated to actual costs.

Item	Description	Projected resources	Projected costs	Actual Costs
Chemical treatment	Contractor to apply herbicide	Materials	£	£
		Labour	£	£

References

DRAFT TEMPLATE

List references cited or used. For example:

Child, L.E. and Wade, P.M. (2000) *The Japanese Knotweed Manual*.

Packard Publishing Limited, Chichester. ISBN 1 85341 127 2

Environment Agency and Cornwall County Council (1998) *Japanese knotweed.*

How to control it and prevent its spread. Environment Agency, Bodmin.

Environment Agency and Cornwall County Council (2001) *Japanese knotweed.*

Guidance for householders and landowners. Cornwall County Council.

Welsh Development Agency (1998) *The control of Japanese knotweed in construction and landscape contracts: Model specification.*

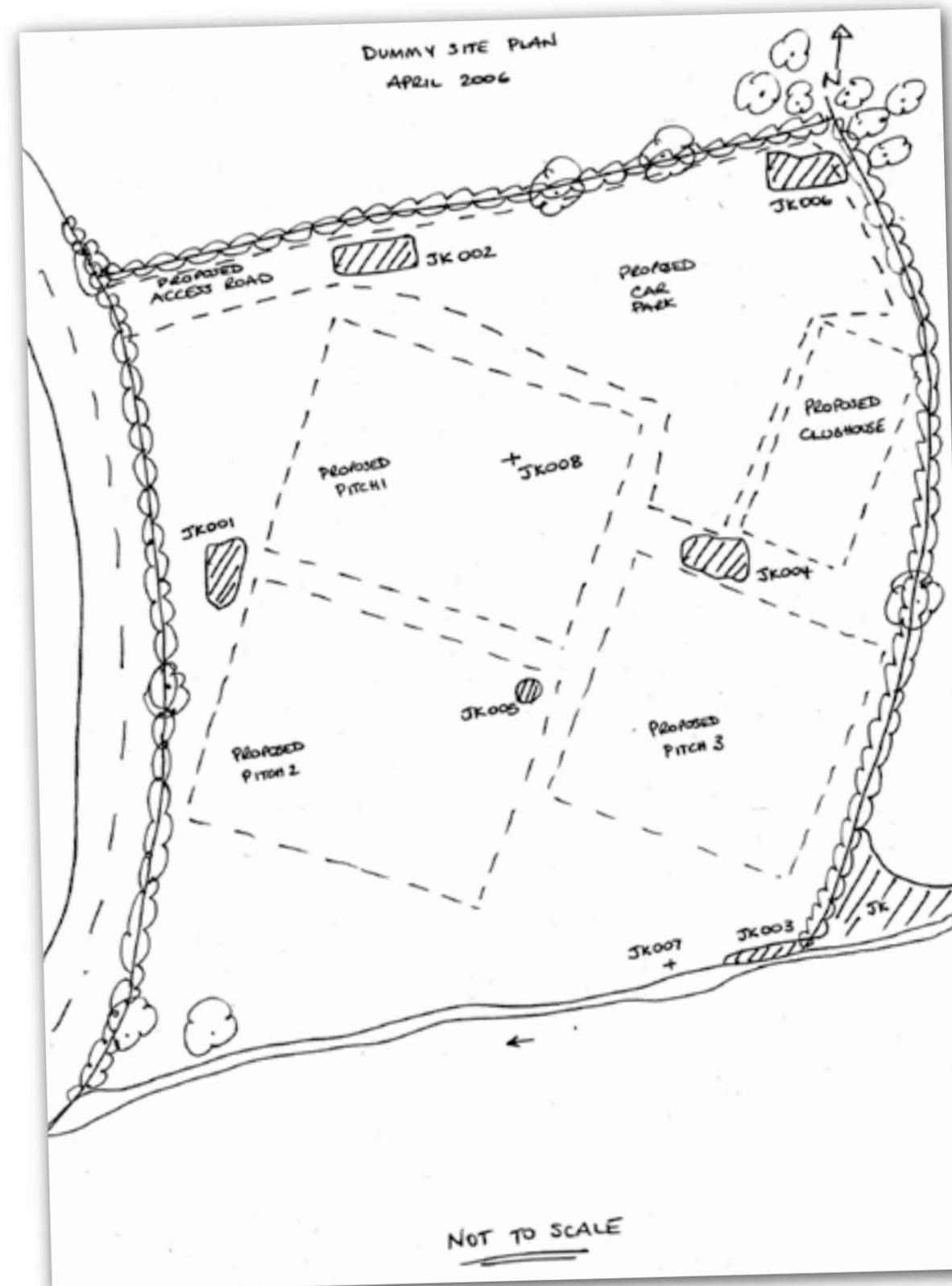
Former Welsh Development Agency, now part of the Welsh Assembly Government.

Welsh Development Agency (1998) *The eradication of Japanese knotweed: Model tender document.*

Former Welsh Development Agency, now part of the Welsh Assembly Government.

Appendix 1 - Distribution maps

Attach copies of the map(s) of the site, and of maps depicting the extent of the Japanese knotweed on the site.



Appendix 2 - Japanese knotweed recording sheet

Example of Japanese knotweed Recording Sheet (complete a new sheet for each area of Japanese knotweed).

Recorded by: **MMM** Date: **5 April 2006**

Site name: **Dummy Site**

Grid ref: **XX 032 033** Site ref: **JK001**

Area of Japanese knotweed - NB. Mark outline of area of Japanese knotweed on site map and annotate with site ref. no. If patch measures <1.0m², mark as + on map and annotate with site ref. no.

25 m 18 m

Average height of stems	<1m	1 - 2.5m	<input checked="" type="checkbox"/>	>2.5m
Max. stem diameter at 30cm above ground	<1cm	1 - 2cm	<input checked="" type="checkbox"/>	>2.5cm
Vegetation composition	Japanese knotweed only	<input checked="" type="checkbox"/>	Mixture of knotweed & other vegetation	
Proximity to water courses	Yes		No	<input checked="" type="checkbox"/>
Slope	Flat	<input checked="" type="checkbox"/>	Moderate	Steep

Land use - Record primary land use as 1 and secondary use as 2 etc. e.g. landscaped area adjacent to riverbank record as Riverbank 1; Landscaped area 2.

Housing	Shops	Public buildings	Business/Industrial
Garden	Park	Recreation ground	Landscaped area
Farmland	Woodland	Waste ground	1 Graveyard
Car Park	Road verge	Railway embankment	Roundabout
River bank	Stream side	Dock	Canal
Pond	Sea front	hedgerow	2 Other, specify

Remarks: **large well established stand**

Appendix 3 - Forms used in collecting monitoring data

Attach copies of data collection sheets.

Appendix 4 - Herbicide records

Attach details of herbicides used, dose rate and application rates and dates applied.

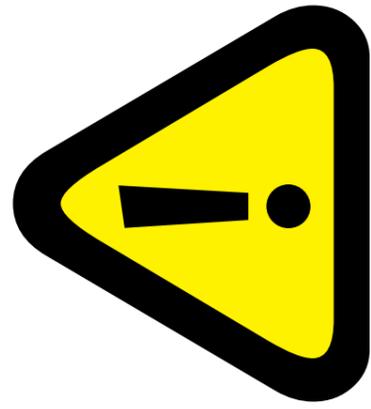
Appendix 5 - Waste records

Attach details of waste records for any material containing Japanese knotweed taken off site.

Appendix 6 - Useful contacts

Attach details of Contractors, Local Authority contact, Environment Agency contact, adjacent landowners etc.

Restricted Access



The soil in this area contains Japanese knotweed and is being treated. Do not enter unless authorised. Do not remove soil from this area without authorisation.

**Would you like to find out more about us,
or about your environment?**

Then call us on

08708 506 506 (Mon-Fri 8-6)

email

enquiries@environment-agency.gov.uk

or visit our website

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