

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?	Persistency
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).

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.

3.3.4: 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

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.

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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.

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 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.

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.

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 - putting the Dendro-Scott root barrier membrane in place



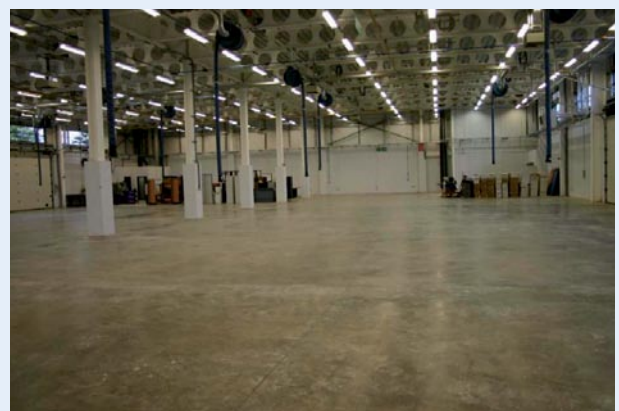
Stage 1: Protect the integrity of the root barrier membrane and prevent damage from 'heave' with a layer of sand.



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.

Surface sealing - peripheral protection



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



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:

- a) they are licensed/permitted to receive it;
- b) 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

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.