

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:

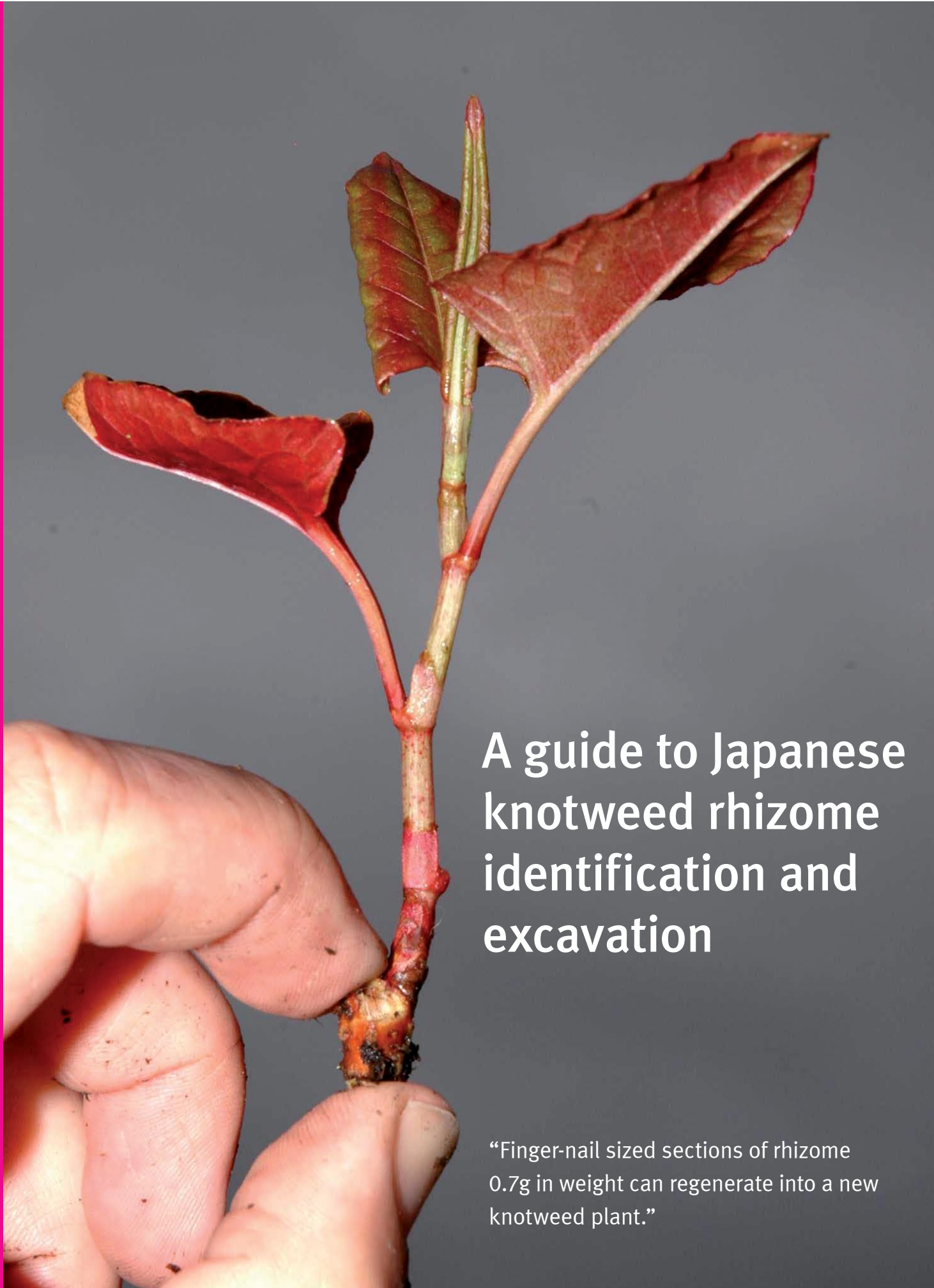
WMLR 1994 describe 'waste relevant objectives' in Paragraph 4 of Schedule 4. These objectives require that waste is recovered or disposed of "without endangering human health and without using processes or methods which could harm the environment and in particular without risk to water, air, soil, plants 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.

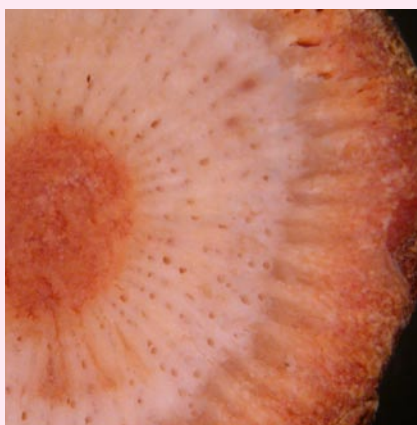
The matrix of the rhizome will vary in size and extent, depending on the nature and history of the site. Careful use of this guide will minimise the waste

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.

Appendices

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

Max. stem diameter at 30cm above ground

<1cm

1 - 2cm

>2.5cm

Vegetation composition

Japanese knotweed only

Mixture of knotweed & other vegetation

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

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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	£	£

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.

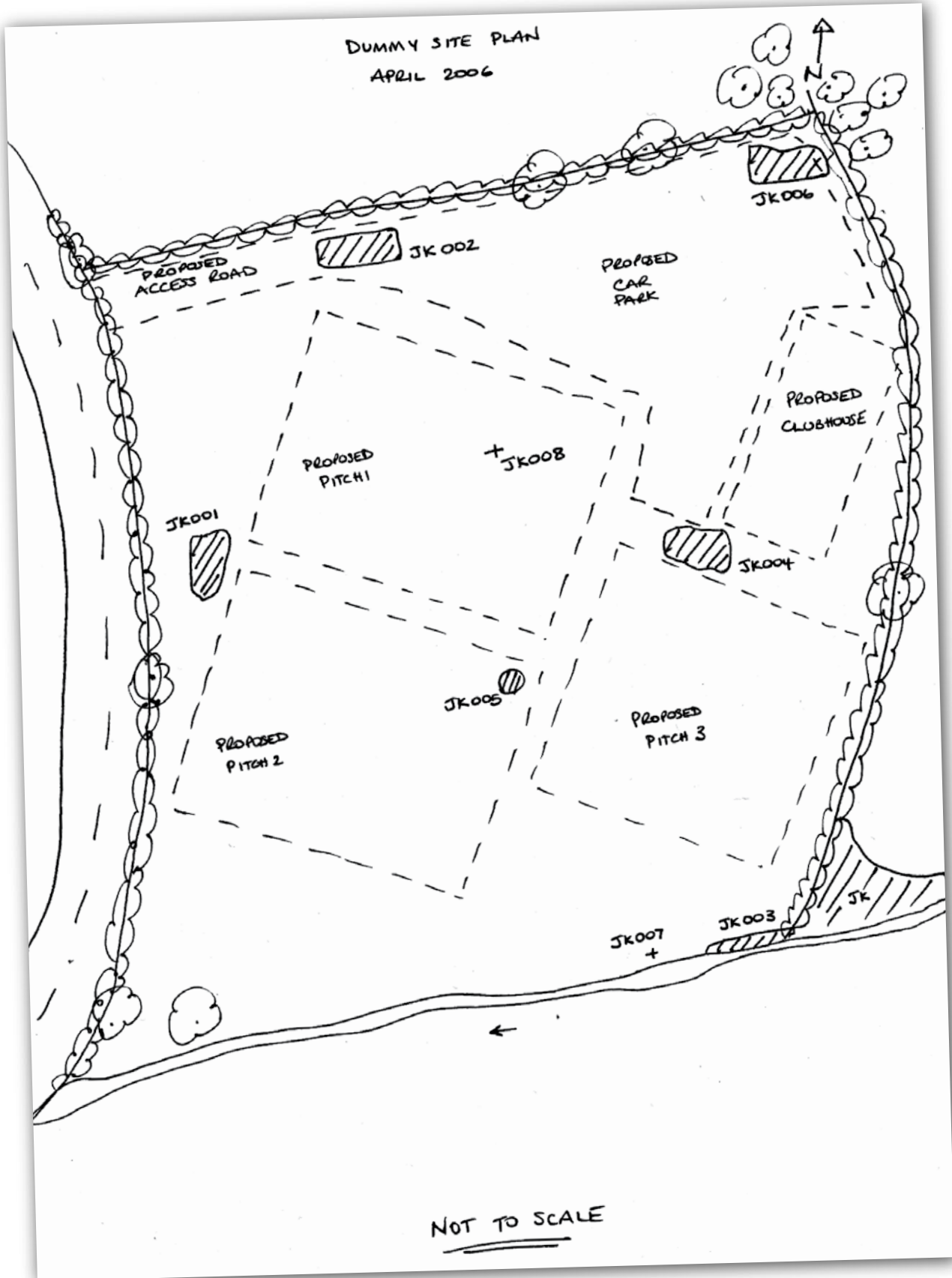
Former Welsh Development Agency, now part of the Welsh Assembly Government.

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	X	>2.5m	
Max. stem diameter at 30cm above ground	<1cm		1 - 2cm	X	>2.5cm	
Vegetation composition	Japanese knotweed only	X		Mixture of knotweed & other vegetation		
Proximity to water courses	Yes		No		X	
Slope	Flat	X	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

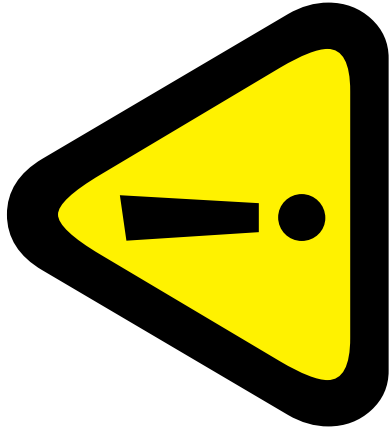
Attach details of herbicides used, dose rate and application rates and dates applied.

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.

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