APPENDIX 6

INVASIVE SPECIES MANAGEMENT PLAN

OUTLINE INVASIVE SPECIES MANAGEMENT PLAN FOR PROPOSED AVIATION FUEL PIPELINE

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FEHILY TIMONEY & COMPANY

OUTLINE INVASIVE SPECIES PLAN FOR PROPOSED AVIATION FUEL PIPELINE

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Abstract: Fehily Timoney & Company (FTC) has been retained by Fingleton White to prepare an Invasive Species Management Plan for a proposed 14.4 km pipeline which will transport aviation fuel from an inlet station at Dublin Port to a reception station at Dublin Airport. The current outline plan has been prepared in respective of best practice guidance.

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1 INTRODUCTION

Fehily Timoney & Company (FTC) has been retained by Fingleton White to prepare an Invasive Species Management Plan for a proposed 14.4 km pipeline which will transport aviation fuel from an inlet station at Dublin Port to a reception station at Dublin Airport. The current outline plan has been prepared in respective of best practice guidance such as the manual '*The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'* by NRA (2010) (1) and '*The Best Practice Management Guidelines'* produced by Invasive Species Ireland (Maguire et al, 2008 (2)). A final plan to detail; personnel responsible for management and implementation, fine-scale mapped areas of locations of invasive, schedules for implementation of outlined control methods will be produced upon appointment of the works contractor and following consultation with the relevant competent authorities.

1.1 Description of the Site

1.1.1 Proposed Development

The 14.4 km proposed pipeline will transport aviation fuel from an inlet station at Dublin Port to a reception station at Dublin Airport. In summary the route is as follows:

- Dublin Port
- Tolka Quay Road
- East Wall Road to the junction with the John McCormack Bridge
- Tolka River crossing
- Alfie Byrne Road
- Clontarf Road, Howth Road
- Copeland Avenue, Malahide Road (R107)
- Malahide Road (R139)
- Clonshaugh Road North
- AUL/FAI Sports Grounds
- M1 Crossing
- DAA Long Term Car Park (Red)
- Eastlands Car Hire Compound
- ALSAA Sports Complex
- Corballis Road
- Dublin Airport.

The inlet and reception stations are existing facilities which will be modified to accommodate the proposed pipeline.

The proposed route traverses two local authority functional areas – namely Dublin City Council (DCC) and Fingal County Council (FCC).

The pipeline will be located predominantly within the road carriageway along its route. A short section of pipeline will be located off-road along the Athletic Union League- Football Association of Ireland (AUL- FAI) Sports Complex at Clonshaugh and through Dublin Airport Authority lands. There will also be seven crossing points of watercourses including the Tolka, Santry, Mayne, Wad and Naniken Rivers and the Cuckoo and Kilbarrack Streams.

Temporary construction compounds may be located at Dublin Port and in the Malahide Road area for the duration of the construction works which will take approximately 10 months to complete.

The application is for a 10 year permission within a planning corridor, to include road, footway and verges. Where the route passes through green areas and private amenity areas the planning corridor will be 8 m in width. This is to allow micrositing of the pipeline during construction.

A habitat survey was carried out for the EIS and a description of the habitats is provided in the EIS. For most of the 14.4 km pipeline corridor, the pipeline will be laid within the existing public road. The rest of the habitats are artificial or highly modified and include; improved agricultural grassland, improved amenity grassland, scattered trees and parkland, grassy verges, scrub, hedgerows, treelines and arable crops.

1.1.2 Existing Site

The pipeline route originates at the proposed inlet station located within Dublin Port. From here the route passes along Tolka Quay and East Wall Road. The route then crosses under the Tolka River to Alfie Byrne Road. At this point the Tolka River is contained within artificial embankments.

On the northern side of the river, the route passes along Alfie Byrne, with Fairview Park lying to the west and the Alfie Byrne Open Space to the east. Fairview Park contains amenity grassland and scattered trees. There are treelines and hedgerows along sections of the Alfie Byrne Road.

The route then follows Clontarf Road, Howth Road and Copeland Avenue before turning on to the Malahide Road (R109). The route continues along the Malahide Road (R109), with occasional stretches of the road containing treelines in central reservations.

Just south of the Greencastle Road junction with the Malahide Road the route passes under the Santry River. The Santry River flows under a bridge at Coolock and the proposed pipeline corridor will cross under the open channel section of the River. The Santry River is highly modified at this point within an open concrete channel. The route will cross a small section of the roadside verge containing scattered trees and parkland at this location.

The proposed pipeline corridor continues along the Malahide Road (R109) to the junction with the R139 (Malahide Road). At this last section of the R109 there is a border of scrub along the western side of the road. The invasive species Winter Heliotrope (*Petasites fragrans*) is abundant in this area.

The proposed pipeline corridor runs along the R139 with Darndale Park to the south. The Mayne River runs through the fields here. Again the invasive Winter Heliotrope is found in places along the length of the R139, with Rhododendron (*Rhododendron ponticum*) close to the roundabout. The proposed pipeline corridor crosses the Mayne River on the R139 at the roundabout, at the junction with the Clonshaugh Road. The river is culverted at the point of the crossing.

The route turns north on to the Clonshaugh Road. As the route continues north, it leaves the urban habitats behind, with the habitats occurring on either side of the road now being arable crops, improved agricultural grassland, hedgerows and treelines. Along this section, the route crosses the Cuckoo Stream. At this point, the river is very narrow and overhung with dense vegetation and tall trees including Ash, Willow and Bramble.

The route continues along the Clonshaugh Road until it turns west into the Athletic Union Sports Ground, where it crosses amenity grassland habitat. The route then runs in parallel to a dry ditch with grassy verges and scrub. A patch of Japanese Knotweed (*Fallopia japonica*) is found within this area of rank grassland.

The route then crosses the M1 and continues along the edge of long term car parking area and car hire compounds within Dublin Airport. The route crosses a small patch of grass, bare ground and scrub before finally reaching the Dublin Airport Storage Facility.

Locations of recorded invasive species are illustrated in Figure 11.3 of Volume 2 of the EIS which illustrates both the main habitats along the proposed route and also the locations of invasive species of note.

Japanese Knotweed

A clump of Japanese Knotweed was noted in the patch of rank grassland along the northern edge of the UAL/FAI Athletic Union Sports Ground as well as at a location west of the ALSAA sports complex within Dublin Airport. Japanese Knotweed is a non-native invasive plant species. It is listed on the 'most unwanted' list by Invasive Species Ireland; a joint project between the Northern Ireland Environment Agency and the NPWS. Japanese Knotweed is a threat in open and streamside areas. It can spread rapidly to form dense stands, excluding native vegetation and reducing species diversity. Once stands become established, they are extremely persistent and difficult to remove. This plant has the ability to grow through tarmac and concrete (in some cases within dwellings).

Winter Heliotrope

Winter Heliotrope was found in various locations along the pipeline corridor. It was found on the northern side of the R139 opposite Belcamp Park. It was found close to the junction of the Malahide Road (R109) and Belcamp Lane and just west of the reception station at Dublin Airport. This species is listed by Invasive Species Ireland on the 'Amber List: Uncertain Risk'.

This category means the species is rated as medium risk, due to the score of the overall assessment. Its impact on conservation goals remains uncertain, due to a lack of data showing impact (or lack of impact).

Rhododendron

Rhododendron was found to the north of the R139 close to the roundabout with the Clonshaugh Road and near the reception station at Dublin Airport. It is also listed on the 'most unwanted' list by Invasive Species Ireland. This species can form very dense thickets and out-compete native plants for space and resources, especially for sunlight.

Other impacts from this plant on fish and invertebrate communities have been recorded. Rhododendron can also prevent access to sites by the shear mass of plant material blocking paths and right of way (Invasive Species Ireland).

Buddleia

Buddleia davidii (*Buddleja davidii*) was found in various locations along the R139 Malahide Road. It was found on the northern side of the road, opposite the junction with Northern Close Road, and again opposite the junction with Cara Park. It was found on the southern side of the R139 road near the Clonshaugh Road junction and west of the Eastlands Car Hire Compound in Dublin Airport. It is listed by Invasive Species Ireland on the 'Amber List: Uncertain Risk'. This species is a native of China but is common as a garden plant owing to its profusion of flowers which tend to attract a considerable diversity of butterflies (NRA, 2010 (1)). It is frequently found in waste ground in urban environments (common in Dublin and Cork), though it has a widespread distribution throughout the country (NRA, 2010 (1)).

In addition, invasive species are known to be a threat along the Tolka River (Ms. Maryann Harris DCC Conservation Officer pers. comm) however none were recorded at the crossing location during field surveys conducted on site.

1.2 Site Management Objectives

The primary site management objective is to prevent the spread of the identified invasive species as a result of the prosed during construction, operation or decommissioning works. The primary risk is perceived as during the construction period when the excavation of materials and transport requirements most easily can facilitate the spread of some of the high priority invasive species such as Japanese Knotweed or Rhododendron.

1.3 Limitations and Threats to Site Management Objectives

1.3.1 Japanese Knotweed

The presence of Japanese Knotweed in particular may result in limitations to overall site management objectives during the construction process in particular, through the following:

- Delays in scheduling of works, due to treatment of identified locations.
- 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 or from adjacent land in the case of extensive roots systems).

1.3.2 Rhododendron

The presence of Rhododendron in particular may result in limitations to overall site management objectives during the construction process in particular, through the following:

- Delays in scheduling of works, due to treatment of identified locations.
- Damage or potential damage caused by the plant.
- Potential for spread of Rhododendron from within and outside the site boundary E.g. within the site or from adjacent land in the case of extensive roots systems).

1.3.3 Buddleia

The presence of Buddleia in particular may result in limitations to overall site management objectives during the construction process in particular, through the following:

- Delays in scheduling of works, due to treatment of identified locations.
- Damage or potential damage caused by the plant.
- Potential for spread of Buddleia from within and outside the site boundary (e.g. within the site, from adjacent land in the case of extensive roots systems).

1.4 Inventory of the Site

Locations of records of Invasive species are described in sections 1.1.2 and illustrated in Figure 11.3 of Volume 2 of the EIS.

It is proposed that as part of the implementation of the final Invasive Species Management Plan, the entire route corridor is re-surveyed prior to final route proofing by a qualified ecologist as recorded species may have proliferated in the intervening time frame between initial assessment and planning consent. This is to enable fine scale mapping of the locations of invasives prior to the commencement of any construction works or implementation of control measures.

2 OVERVIEW OF MANAGEMENT PLAN

2.1 Brief Description of Management Plan

The following management plan outlines the priorities and measures to be undertaken in respect of the different invasive species identified on site. Following the appointment of main contractors, a suitably qualified ecologist to oversee management of invasive species shall be appointed.

2.2 Setting Priorities

The following priorities have been identified in respect of the different invasive species identified during route surveys:

2.2.1 Japanese Knotweed

Priorities:

- Areas of Japanese knotweed on site which require rapid treatment will be identified.
- Prevention of further infestation of the plant on the site will be a priority.
- Replacement vegetation/habitat will be considered rather than just eliminating Japanese knotweed at the FAI/UAL sports grounds.
- Control methods which suit the location and timescale will be adopted.
- Implementation will be based on the above information.

Each location of Japanese Knotweed within the pipeline corridor and directly impacted by the final pipeline route will be assigned a priority level in respect of the main management objectives for the project and prior to construction commencing.

2.2.2 Rhododendron

Priorities:

- Areas of Rhododendron on site which require rapid treatment will be verified.
- Prevention of further infestation of the plant on the site will be a priority.
- Control methods which suit the location and timescale will be adopted following best practice guidance.
- Implementation will be based on the above information.

Each location of Rhododendron within the pipeline corridor and directly impacted by the final pipeline route will be assigned a priority level in respect of the main management objectives for the project prior to construction.

2.2.3 Buddleia

Priorities:

- Areas of Buddleia on site which require rapid treatment will be verified.
- Prevention of further infestation of the plant on the site will be a priority.
- Control methods which suit the location and timescale will be adopted following best practice guidance.
- Implementation will be based on the above information.

Each location of Buddleia within the pipeline corridor and directly impacted by the final pipeline route will be assigned a priority level in respect of the main management objectives for the project prior to construction.

2.2.4 Winter Heliotrope

Each location containing Winter Heliotrope identified within the proposed pipeline corridor and directly impacted by the final pipeline route will be assigned a priority level in respect of the main management objectives for the project prior to construction.

Priorities:

- Areas of Winter Heliotrope on site which require rapid treatment will be verified. If present the following will be carried out.
- Prevention of further infestation of the plant on the site will be a priority.
- Replacement vegetation/habitat will be considered rather than just eliminating Winter Heliotrope where applicable.
- Control methods which suit the location and timescale will be adopted following best practice guidance.
- Implementation will be based on the above information.

2.3 Preventing Further Spread

The following methods will be employed to prevent further spread of invasive species:

- 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.
- Procedures to ensure that imported materials are free from Japanese knotweed.
- Identification of designated haul routes through the AUL/FAI site along the northern section of the route to avoid contamination.
- Training will be given to site operators and contractors during development via toolbox talks which will detail identification of the plant and education on site practices to prevent further spread.

3 SPECIFIC CONTROL PLANS FOR JAPANESE KNOTWEED

The following, specific control plan will be implemented for Japanese Knotweed. Japanese knotweed is a robust, herbaceous perennial plant with hollow, bamboo-like stems. It forms yellow cream flowers in late June or August. Its leaves are approximately the size of a human hand. Its hollow bamboo-like stems are green with red spots during summer, which turn brown during winter. It forms red side shoots off the main stem and its leaves are arranged in a zig-zag pattern.

3.1 Management Objectives

Objective 1. Elimination of Japanese knotweed on all relevant parts of the site / within the proposed route
Objective 2. Prevention of further spread of Japanese knotweed as a result of transport requirements.

3.2 Management Options

The Environment Agency (n.d., p. 18 (3)) indicates that combining digging and spraying is effective in reducing the time needed for chemical control. By digging and breaking up the rhizome, the aim is to stimulate leaf production leaving the plant more vulnerable to treatment with a plant protection product. It has been established (1) that the use of physical methods alone is unlikely to result in the eradication of this species.

Physical Control
The Japanese knotweed canes will first be cut using a cutter, hook or scythe. The cane will be carefully set aside on a suitable membrane surface until they have dried to a deep brown colour and are certain to be dead; or, can be double-bagged and disposed of at a licensed waste facility, where: (a) the facility have been informed in advance of the nature of the waste material; (b) the facility is licensed to accept this material; and, (c) the facility is prepared to accept the material. The canes may also be disposed of by 'deep burial' (see below). In this event, the Waste Management Acts, 1996-2013, will be complied with. These Acts will require, *inter alia*, that a waste haulier employed to haul waste material is authorised by a waste collection permit or is exempt from such a requirement.

A wheeled excavator will then be used to scrape the top 25cm of topsoil, containing the surface crown and rhizomes, into a pile. The exposed ground is then cultivated to a depth of at least 50cm and the piled material is then re-spread over the cultivated area. This process may be carried out during the winter months, if care is taken not to compact wet soil, which may increase runoff and spread Japanese knotweed across the site. **Note that effective site hygiene is essential and will be adhered to at all times.**

This process will stimulate the rhizome to produce a higher density of stems, leaving the plant more susceptible to treatment with a plant protection product (see chemical control methods outlined below).

Outline of chemical control

The current most widely recommended chemical for Japanese knotweed control is glyphosate which breaks down in the soil relatively quickly. Glyphosate does, however, because of its broad spectrum nature, have the disadvantage of being potentially damaging to non-target plants. Great care is, therefore, necessary in applying this herbicide. As with all plant protection products, it should be used in compliance with the product label and in accordance with Good Plant Protection Practice as prescribed in the European Communities (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003). Plant protection products containing glyphosate should be applied in late September or early October. However, it is further advised that the plants be treated early in the growing season (May) to stunt the growth of the plant, consequently reducing the amount of viable above-ground material and the height of the stand.

For infestations, plant protection products containing 2,4-D Amine can be used. 2,4-D Amine has the advantage of being selective and specific to broadleaved plants. However, in general, it has a greater persistency when compared to Glyphosate. Plant protection products containing 2,4-D Amine should be applied in May with a follow up treatment in late September or early October. Care is required in the selection of the appropriate plant protection product and method of application.

In making this selection regard should be had to, *inter alia*: the abundance of the Japanese knotweed; the location of the stand; the proximity and nature of sensitive receptors; and, the season. Only certain plant protection products are approved for use in or near water. Not all plant protection products are selective in nature. And, the persistency of plant protection products varies. The method of application should be as targeted as possible, having regard to all other factors. Again, plant protection products should be used in compliance with the product label and in accordance with Good Plant Protection Practice. With all forms of chemical control in relation to Japanese knotweed follow-up treatment will be required in subsequent years.

Monitoring of excavation and burial sites will be undertaken as per best practice guidance (1) by an ecologist.

4 SPECIFIC CONTROL PLANS FOR RHODODENDRON

Rhododendron *(Rhododendron ponticum)* is an evergreen, acid loving shrub introduced to Ireland in the 18th Century. There are more than 900 species of Rhododendron, but only one, *Rhododendron ponticum* is invasive in Ireland. Since then, it has established itself as a major weed of acid woodlands in Wicklow, Kerry and Cork (1) where its control has been an ongoing battle for many decades.

4.1 Management Option

Physical Control

A range of physical control measures have been developed (1) for rhododendron in response to the general sensitivity of acid woodland sites where it frequently becomes established. Collateral damage by spray drift on non-target species is a prime concern in such sites. Physical control options include uprooting by hand, uprooting by winching (hand-operated or tractor mounted), chainsaw cutting of root-ball, mulch-matting and bud rubbing.

Cutting of stems by manual means has been used as a control in Ireland, the UK and Turkey, but on its own it has been proven not to be particularly effective (Esen *et al* 2005, cited in NRA 2010 (1)). The plants capacity for regeneration by suckers from remaining bits of root or stem render the cutting ineffective on its own unless applied in areas of limited infection where adequate follow-up can be made. The approach is labour-intensive and expensive.

Uprooting of plants provides a better result than simply cutting and is more cost effective in the long term. The roots of rhododendron are relatively shallow, being confined to the upper horizons (seldom deeper than 45cm) and typically extend uphill from the plant. This allows plants to be easily toppled using a hand operated turfer or mechanical winch. Younger plants in newly-established infestations can be readily hand-pulled. Winching is labour intensive and requires suitable anchor points or tractor access to the site.

Leaving stumps sufficiently high to provide anchor points can impede access during initial clearance operations. Resultant soil disturbance may be unacceptable on sensitive sites. Chainsaw cutting of the root-ball is effective on larger plants but is generally restricted to soft soil areas. This approach can be used in conjunction with winching methods to reduce the level of soil disturbance. It requires skilled operators to implement and results in considerable wear and tear on equipment.

The use of mechanical means (machinery to uproot or excavate plants) is generally only appropriate for sites of low ecological interest where damage to existing vegetation is not a concern. Heavy trafficking of woodland soils can result in puddling of soils; give rise to sediment run-off and nutrient leaching which can impact on watercourses.

In all the above instances, the accumulated material is typically windrowed or mounded and let break down naturally, or in some instances burnt. As vast amounts of material can be generated from quite small areas of infestation, the former option is preferable.

Follow-up is required to deal with re-growth and seedling germination irrespective of the control method employed. Mulch matting has been devised as an experimental means to prevent re-growth following initial clearance. Heavy-duty geotextile is laid either directly over the cleared ground or over removed stumps and other material to prevent re-sprouting and germination. While this system reduces soil disturbance it is labour intensive and material costs can be high.

Another experimental method currently being investigated is bud-rubbing on cut stumps (ibid). Following cutting back of the pant to a low stump, re-growth on the plant is removed by hand or using a thin metal rod (more practical for crevices) on a periodic basis. The timing of repeat visits is important in order to prevent the re-growth from establishing itself.

It is envisaged, that given the location of the recorded Rhododendron in relation to the proposed route corridor, no control may be necessary as following final route proofing no works may occur proximal to the recorded plants.

Chemical Control

Rhododendron is hard to kill even with herbicides and repeated application at low rates may be required to control it (Esen et al 2005, cited in NRA (1)). Due to the scale of infestation typical of rhododendron, foliar spraying with herbicides is not recommended, as considerable quantities of spray will be required which can have effects beyond the target species. However, foliar spray may be an option in areas where there are either young populations or in tall dense, monotypic stands. A variety of herbicides have proven effective for control including 2,4-D, glyphosate, dicamba and triclopyr.

The cut-stump method involves cutting back of the aerial growth and application of herbicide directly to the cut stem or stump ideally within minutes but not later than 48 hours of cutting. A vegetable dye should be added to the herbicide to enable treated stumps to be clearly identified. Re-growth may occur following treatment which should be dealt with by a follow-up foliar spray (using glyphosate, triclopyr, etc.) when the growth reaches about 1m in height.

Stem injection control involves herbicide application directly into the stems of large plants. This method enables precise application of the herbicide and uses less product thereby proving more cost effective than foliar spraying. Holes of 11–16mm diameter are drilled every 7.5cm around the trunk just above ground level as vertically as possible in order to hold the herbicide. 2ml of herbicide should be applied per stem immediately after drilling with a spot-gun. A 25% solution of glyphosate (i.e. 1:3 mixture with water) has been used successfully for complete control of target bushes (ibid).

Triclopyr has also been used as a stem injection in an undiluted or 1:1 mixture. Application during March, April or October been found to be most effective. At this point it must be stressed that all Plant Protection Products must be used in accordance with the product label and with Good Plant Protection Practice as prescribed in the European Communities (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003). Again, it should be noted that it is an offence to use Plant Protection Products in a manner other than that specified on the label. The methods just outlined are not in accordance with the product label and so it will be necessary to discuss the use of such methods with the Pesticides Control Service with a view to seeking approval under the derogation procedures provided under the Plant Protection Regulations.

5 SPECIFIC CONTROL PLAN FOR WINTER HELIOTROPE

Winter heliotrope *(Petasites fragrans)*, a member of the Asteraceae family, is a low-growing herbaceous plant originating in North Africa. It is established widely in Ireland being frequent along roadsides, hedgerows, woodland edges and waste ground. As apparently only the male plant that is present in Ireland, its spread is confined to vegetative means. Where the species is directly impacted by the final route, the following management options are proposed.

5.1 Management Option

Physical Control

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale (1). Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant.

Other means of disposal include burial of material at a depth of at least 2 m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

Chemical Control

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008)(cited in NRA 2010 (1)), though the Royal Horticultural Society (2008b) (also cited in NRA 2010 (1))recommends spraying in midsummer or later but before the foliage begins to die back.

6 SPECIFIC CONTROL PLAN FOR BUDDLEIA

Buddleia (also known as the butterfly bush) is a member of the *Buddlejaceae* family. It is very fast growing and can reach 2 m in its first year, producing flowers and setting seed. Buddleia is a native of China but is common as a garden plant owing to its profusion of flowers which tend to attract a considerable diversity of butterflies (hence it's other common name). It is frequently found in waste ground in urban environments (common in Dublin and Cork), though has a widespread distribution throughout the country (1) . It colonises bare ground very rapidly and can quickly form mono-typic stands.

6.1 Management Options

Physical Control

Management methods such as digging it out are applicable only to minor infestations at the initial stage of invasion. Hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedling. Grubbing of mature stands as a sole attempt at control is not recommended for the same reason. After uprooting, it is essential to plant the ground in order to prevent a flush of new seedling growth. When it is cut, Buddleia grows back from the stump very vigorously. Mowing of young plants does not provide control as they re-sprout with vigour. Where removal of mature plants is not feasible in the short term, the flower heads should be cut off in June before seed set.

Chemical Control

Recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr et al, 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants, but should be followed up at 6 monthly intervals.

7 REFERENCES

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