Invasive Species Management Plan
Walkers Lane, Annacotty, Limerick
26 March 2020
Executive Summary

Some patches of Japanese Knotweed and Giant Hogweed (restricted non-native plant species) have been identified within the boundary of a proposed development site at Annacotty in the east of Limerick City. Under the EC (Birds and Natural Habitats) Directive 2011 it is an offence to cause the spread of these species, including soil / spoil that may be contaminated with their rhizomes.

In recognition of these constraints, NM Ecology Ltd has developed this management plan on behalf of the applicant, which is based on current best practise in the treatment of Japanese Knotweed and Giant Hogweed. The objectives of this management plan are to:

1. Prevent the spread of invasive species during construction works
2. Eradicate them from the site over a period of 3 – 5 years
3. Monitor the site and control any re-growth

Detailed procedures are proposed for the management of construction works in the vicinity of the affected areas, including the demarcation of an exclusion zone, restrictions on certain activities, supervision of work by an ecologist, and the cleaning of contaminated vehicles and equipment. Invasive species will be treated with herbicide for a number of years until they have been eradicated. Monitoring will take place on an annual basis until both species are confirmed to be eradicated.

The measures outlined in this plan will avoid or minimise the spread of restricted invasive plant species during the construction of the development. This will ensure compliance with relevant legislation, the protection of the new development, and minimal disruption of the proposed construction works.
Table of Contents

1 Introduction .................................................................................................................. 3
   1.1 Background to the report ...................................................................................... 3
   1.2 Characteristics of Japanese Knotweed ................................................................. 3
   1.3 Characteristics of Giant Hogweed ........................................................................... 4
   1.4 Legislative status ..................................................................................................... 5

2 Distribution of Invasive Species in the development site .......................................... 6
   2.1 Initial site inspection (15th August 2018) .............................................................. 6
   2.2 Follow-up survey (28th June 2019) ..................................................................... 6

3 Management Strategy .................................................................................................. 10
   3.1 Review of treatment options .................................................................................. 10
   3.2 Management objectives ......................................................................................... 10

4 Details of management measures ................................................................................ 11
   4.1 Isolating the infested area and implementing bio-security measures ................. 11
   4.2 Treatment of remaining invasive plants ............................................................... 12
   4.3 Monitoring and spot-treatment of regrowth ......................................................... 13
   4.4 Management of the area following the completion of treatment ....................... 14

5 Conclusion .................................................................................................................... 14
1 Introduction

1.1 Background to the report

Two legally-restricted non-native plant species - Japanese Knotweed and Giant Hogweed - have been recorded within a proposed development site in Annacotty, Co. Limerick. In order to ensure compliance with relevant legislation, the applicant engaged NM Ecology Ltd to develop this management plan on their behalf. The plan outlines the measures that will be implemented by the contractor to avoid or minimise the spread of this species during construction works, and to eradicate it in the short to medium term. It is based on current best practise in the treatment of these species, and has been adapted to the development proposals and schedule.

1.2 Characteristics of Japanese Knotweed

Japanese knotweed *Fallopia japonica* is a herbaceous perennial plant that typically grows to heights of 2 - 3m. In summer it produces dense bushes of bamboo-like stems, with large shield-shaped leaves and strings of small white flowers. In winter the herbaceous material dies back, leaving standing dead canes.

As plants mature, rhizomes (underground creeping stems) spread laterally into the surrounding earth, usually up to 2.5 m from the above-ground stems, and occasionally up to 4 m. Root growth underneath the plant typically extends up to 1.5 m below ground level, but mature plants can occasionally extend up to 3.2 m (Fennell et al. 2018)\(^1\).

Japanese Knotweed is spread exclusively by fragmentation of its rhizomes, roots and stems. The rhizomes and stems are relatively fragile and can easily be spread during groundworks, and new plants can grow from rhizome fragments weighing less than one gram. Although the plant produces large numbers of flowers in the late summer period, its seeds are not viable in Ireland, so it does not spread by seed dispersal.

As a result of its highly-invasive characteristics and vigorous growth, Japanese Knotweed is recognised as a significant constraint on construction sites. It can easily be spread by the movement of earth, gravel or rocks, or by snagging on construction vehicles. Its rhizomes extend underground away from the main stems of the plant, so even works several metres from the stems can disturb its rhizomes. New seedlings are quite vigorous, and can cause superficial / cosmetic damage to some built surfaces (e.g. shallow tarmac, permeable paving) or exploit gaps between concrete surfaces. However, although there had been a widespread

\(^1\) Fennell et al. (2018), *Japanese knotweed (Fallopia japonica): an analysis of capacity to cause structural damage (compared to other plants) and typical rhizome extension*. PeerJ 6:e5246; DOI 10.7717/peerj.5246
belief that it posed a structural threat to solid concrete or other major structures, recent research has shown that this is not the case (Fennel et al., 2018).

The standard approach to eradicate Japanese knotweed is to treat it with a systemic herbicide, applied either as a spray to the foliage, or injected into the stem. Systemic herbicides are the most effective option in this regard, because they are carried through the vascular system of the plant and can infiltrate significant proportions of the rhizome. However, it is rarely possible to kill the entire rhizome network with a single treatment, so it is usually necessary to carry out multiple years of treatment in order to successfully kill all of the rhizomes. Herbicide treatment typically takes 1 – 2 years for immature plants, 2 – 3 years for semi-mature plants, and 3 - 5 years for mature plants.

1.3 Characteristics of Giant Hogweed

Giant Hogweed *Heracleum mantegazzianum* is a biennial or perennial herbaceous plant. In the first year of germination it produces a rosette of soft, maple-like leaves, but in following years the leaves become much larger, rougher and/or more finely divided. When mature, it produces large umbels of white flowers on stalks of up to 5 m in height.

The sap of Giant Hogweed plants is harmful to human skin, causing severe blistering on exposure to sunlight. For this reason it is considered to be a significant danger to public
health. In addition, the plant’s large leaves can shade out less vigorous plants in its immediate vicinity, which can lead to negative impacts upon amenity planting. Giant Hogweed spreads primarily by seed, and can produce tens of thousands of viable seeds each year. They can disperse over short distances by wind, or longer distances by rivers or by anthropogenic activities (e.g. in soil adhering to shoes or machinery).

Individual plants can usually be killed using a single application of systemic herbicide. However, any seeds remaining in the area may emerge in subsequent years, so it is usually necessary to spot-treat regrowth for several years in order to ensure eradication.

1.4 Legislative status

Japanese Knotweed and Giant Hogweed are listed as restricted non-native plant species on the third schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011, as amended). Relevant extracts from the regulations are reproduced below.

49(2) Save in accordance with a licence granted [by the Department of Culture, Heritage and the Gaeltacht], any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place [a restricted non-native plant], shall be guilty of an offence.

49(3) … it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.

50(1) Save in accordance with a licence, a person shall be guilty of an offence if he or she […] offers or exposes for sale, transportation, distribution, introduction or release—

(a) [any restricted non-native animal or plant species],

(b) anything from which an animal or plant referred to in subparagraph (a) can be reproduced or propagated, or

(c) a vector material listed in the Third Schedule, [which includes] soil or spoil taken from places infested with Japanese Knotweed (Fallopia japonica)

In summary, it is an offence under regulations 49(2) and 50(1) to spread either species, including any soil that may contain Japanese knotweed rhizomes or roots. An offence may be avoided if a licence is obtained from the Department of Culture, Heritage and the Gaeltacht, and if reasonable steps and due diligence are put in place. In recognition of these regulations, this management plan outlines the reasonable steps and due diligence that will be implemented by the contractor to ensure compliance with the legislation.
2 Distribution of Invasive Species in the development site

2.1 Initial site inspection (15th August 2018)

Japanese Knotweed was recorded in the north-western corner of the site, including a large number of dead stems, and some live (but stunted) plants; their locations are shown in Figure 2. Giant hogweed was not recorded during this survey.

Four live Japanese knotweed plants were recorded. They were stunted and of less than 0.5m height, each with a surface area of approximately 1 m². The plants’ leaves were small and slightly inrolled; this is referred to as a ‘bonsai’ growth form, and is typical of plants that have previously been treated with herbicide.

Due to the presence of dead stems and the poor condition of live plants, it appeared that the knotweed had previously been treated with herbicide, presumably by the local authority, as there is a sign from Limerick City & County Council indicating that the area should not be cut. Most of the mature plants were dead, so it is likely that at least two years of herbicide treatment were carried out at the location before.

2.2 Follow-up survey (28th June 2019)

All of the Japanese knotweed plants described above were also present in June 2019. However, the plants were no longer in the ‘bonsai’ growth form, and were approx. 1 m in height. No new patches of Japanese knotweed were recorded.

A single Giant Hogweed plant was found on the edge of the public footpath just outside the north-western boundary of the proposed development site. It had mature leaves, and would have been expected to produce a flowering stem later in the summer.

There was no sign that either plant had been treated with herbicide at the time of survey. However, herbicide treatment is usually applied in late-summer months, so it is possible that these plants were subsequently treated by the local authority later in the season.
Figure 2
Invasive species survey

Location
Walkers Lane, Annacotty

Applicant
Regal Park Developments

Date
26-03-2020

Invasive Species
- Live Japanese Knotweed
- Dead Japanese Knotweed

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Figure 3. Location of the stunted knotweed plants, and the local authority’s ‘Do Not Cut’ sign

Figure 4. Japanese knotweed plants in June 2019
Figure 5. Dead stems of Japanese knotweed and cleared areas indicative of herbicide application

Figure 6. A giant hogweed plant growing alongside the public footpath just outside the north-western boundary
3 Management Strategy

3.1 Review of treatment options

Some general guidance on the treatment options for invasive plant species is outlined in the Knotweed Code of Practice\(^2\), which was published by the Environment Agency of the United Kingdom. Some excerpts are reproduced below:

- “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.
- If in-situ treatment is not possible, soil containing Japanese knotweed may be buried on the site to ensure that you completely kill it. In this case, you must bury material at least 5m deep, or at 2m if enclosed in a root barrier membrane.
- Where local conditions mean you cannot use burial as an option, it may be possible to create a Japanese knotweed bund. The purpose of the bund is to move the Japanese knotweed to an area of the site that is not used. This gives extra time for treatment that would not be possible where the Japanese knotweed was originally located.
- Sometimes, due to shortage of time and location, off-site disposal (by incineration or landfill) is the only reliable option, but it should be treated as a last resort.”

Neither species is located within the footprint of new buildings, they will be in an area of public open space / landscaping in the north-west of the site. Therefore, it should be possible to isolate this area from the rest of the construction site until the invasive species can be eradicated by ongoing herbicide treatment, without having to excavate or move any knotweed plants.

3.2 Management objectives

The objectives of this management plan are to:

1. Prevent the spread of invasive species during construction works
2. Eradicate both species from the surrounding area over a period of 3 – 5 years
3. Monitor the site and control any re-growth

Detailed procedures for these objectives are outlined in Section 4.

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\(^2\) UK Environment Agency (2013) *The Knotweed Code of Practice: Managing Japanese Knotweed on development sites*, Version 3. It is noted that the code of practice was formally withdrawn by the Environment Agency in 2016 because the agency ceased to provide best practice guidance, but the methods outlined in the document are still considered to represent best practice.
4 Details of management measures

The measures outlined below will apply at all stages of construction works, and to both species. These measures require specialist knowledge, so the contractor must employ a suitably qualified and experienced ecologist for the duration of the construction works. The role of the ecologist is to assist the contractor with the interpretation and implementation of the management measures outlined in this document. The contractor will liaise with their ecologist prior to the commencement of construction works to ensure that these management measures can be incorporated into the construction schedule. The ecologist will review the method statements of all contractors in order to ensure that they are consistent with the management strategy. They will visit the site on a regular basis during construction works and will keep a written record of the measures that have been implemented. However, they will not need to have a permanent presence on site.

4.1 Isolating the infested area and implementing bio-security measures

4.1.1 Exclusion zone

The contractor is required to take precautions to prevent the spread of invasive species in advance of the excavation works. These precautions are referred to as ‘bio-security measures’, and will include the creation of an exclusion zone and restrictions on any work within the area.

An exclusion zone will be established around the invasive species and marked with a metal Heras-style construction fence or wooden hoarding, which will be fixed in position until the knotweed has been eradicated. In order to avoid or minimise the spread of invasive species from the infested area, the following bio-security measures must be implemented:

- No construction work will be undertaken within the exclusion zone, nor can it be used for the storage of construction materials or vehicles.
- If any work is necessary within the exclusion zone (e.g. laying of services) it will be carefully planned and supervised by the contractor’s ecologist.
- No soil, vegetation, rubbish or any other material will be removed from the exclusion zone. All material is considered to be contaminated with invasive plant species, unless explicitly signed-off by the ecologist.
- No vehicles will pass through the exclusion zone unless strictly required, because Japanese Knotweed or giant hogweed fragments could be become attached to vehicles (e.g. in tyre treads) and spread to other parts of the construction site, or outside the site. Any vehicles working in the exclusion zone will be cleaned of invasive plant material before leaving the zone (see procedures below).
4.1.2 Cleaning of contaminated vehicles and clothing

Invasive species can easily be snagged in construction vehicles (particularly in tracks), providing a high risk that they can be spread to other parts of the construction site. Therefore, if any vehicles are required to work within the exclusion zone, they will be thoroughly cleaned when leaving it, as outlined below:

- After completing excavation works, all plant material and soils will be removed from the vehicles using shovels and brushes, or by a mobile pressure-washer. Special attention will be paid to tracks and joints. All material will be removed, even if it does not look like Japanese Knotweed or giant hogweed.
- All removed plant fragments and soils will be returned to the exclusion zone.
- When vehicles have been cleaned, they can leave the site and be re-used for other construction work.
- Any personnel working within the contaminated area will check their shoes, clothes and equipment for invasive species material when leaving the site.

4.1.3 Toolbox talk

If any work is required within the exclusion zone, relevant construction personnel will be given a ‘toolbox talk’ by the ecologist regarding the procedures to be followed. This will include the following items:

- Introduction to Japanese knotweed and giant hogweed, and their legal status.
- How to identify both species, including both above-ground stems / leaves and underground rhizomes / roots.
- The locations of invasive species within the exclusion zone.
- Discussion of procedures and restrictions for work in these areas, as outlined above.
- Demonstration of the procedures for entering and leaving the exclusion zone, and for cleaning vehicles, equipment and footwear.

The ecologist will also supervise the excavation work, in order to assist with the implementation of the management plan and method statements.

4.2 Treatment of remaining invasive plants

Mature infestations of Japanese knotweed typically require three consecutive years of herbicide treatment, and occasionally up to five years for long-established populations. It appears that the knotweed near the Annacotty Roundabout has already been treated on two occasions, and that most of the mature plants have been killed, leaving only a few stunted plants. Therefore, it is likely that only one or two further years of treatment will be required in order to permanently eradicate the knotweed from the site.

Giant hogweed plants can usually be killed with a single application of herbicide. However, if there are any seeds remaining in the area, they may emerge in subsequent years.
Therefore, at least two years of spot-treatment should be carried out to ensure that the seedbank has been exhausted.

The following measures would apply for any herbicide applications:

- Herbicide treatments will be applied by a competent and licensed operator;
- Herbicide operators must ensure that they comply with the *European Communities (Sustainable Use of Pesticides) Regulations, 2012* regarding the environmental and safety risks associated with herbicide usage. This should include an assessment of groundwater abstraction points, groundwater vulnerability, areas of public use, and Natura 2000 sites, and should include maps of their locations. The assessment process should be documented and available for third-party review;
- Herbicides should be applied as a foliar application. As there are trees and shrubs adjacent to the invasive species, the herbicide should be applied using a knapsack and spot sprayer rather than a broadcast sprayer or mister.
- It is strongly recommended that glyphosate-based herbicides are used, because the active ingredient has the lowest environmental and safety risks, and is the most widely-used species for the control of invasive species. Appropriate sticking agents should be used to improve uptake of the herbicide.
- Glyphosate-based herbicides are most effective against Japanese Knotweed if applied at the very end of the growing season (ideally mid to late September). An initial pre-treatment in May / June can be used to stunt growth, but for this site it is not recommended, as the plants are already quite stunted.
- Giant hogweed should be treated at the start of the growing season (usually June) before they flower.
- Herbicide operators should take appropriate measures to avoid or minimise risks to themselves, construction personnel, members of the public and the surrounding environment. Details of any health or environmental hazards will be provided on the manufacturer’s label or in accompanying documentation.

4.3 Monitoring and spot-treatment of regrowth

The site will be re-surveyed in June / July each year, in order to monitor the effectiveness of the herbicide treatment programme. If any new invasive species are identified in this area, they will be treated with herbicide using the methods outlined above.

As part of the monitoring process, it is recommended that some trial pits are dug within the footprint of former knotweed plants in order to ensure that no dormant rhizomes are present. All bio-security measures outlined in Section 4.1 would apply during this work.
If no growth is detected within the exclusion zone for at least two consecutive years, then the invasive species can be considered eradicated, and annual monitoring / treatment will no longer be required. Eradication can only be confirmed by the an ecologist.

4.4 Management of the area following the completion of treatment

When the ecologist has confirmed that invasive species have been eradicated from the exclusion zone, it can be incorporated into the landscaping scheme for the development, albeit with some restrictions. There will always be a residual risk that treated soils may contain some small fragments of dormant knotweed, so soil should only be used in locations that would allow any future regrowth to be identified and spot-treated. Treated soils cannot be moved off-site.

To minimise potential problems from the re-use of soil from the exclusion zone elsewhere in the site, soils should only be re-used where there is little risk of spreading invasive species:

- In general, re-used material is most suitable for landscaping purposes (e.g. lawns, berms, flower beds, capping for earth embankments), as this facilitates future monitoring and spot-treatment;
- Re-used soil should not be placed in areas that are likely to be developed in the future;
- All material should be kept within a discrete area rather than spread around the site. Relevant areas should be marked in the management plan and monitored.

5 Conclusion

In recognition of their obligations under the EC (Birds and Natural Habitats) Regulations, the applicant has commissioned NM Ecology Ltd to prepare this management plan on their behalf. It includes a series of ‘bio-security’ measures to avoid or minimise the spread of Japanese knotweed and giant hogweed during construction works, for ongoing herbicide treatment over a number of years, and for the monitoring of the site. The methods are consistent with best practice and are regularly undertaken at construction projects around Ireland.

Subject to the successful implementation of these measures, the contractor would not be in contravention of Regulation 49(2) of the EC (Birds and Natural Habitats) Regulations. Even if some material is accidentally spread within the site, the contractor would have demonstrated that they “took all reasonable steps and exercised all due diligence to avoid committing the offence”, as outlined in Regulation 49(3).