Japanese Knotweed Management & Treatment Plan Including Biosecurity Measures

Proposed Solar Farm at Clare, Claramorris, Co Mayo

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<tr><td rowspan="2">Management Plan
Doc. File Name: 089/JKM/20</td><td rowspan="2">Main Office – Meanus, Killorglin, Co
Kerry - 066 9796612
Dublin – 01 539 4189
Mayo – 096 54102</td><td>Client Information
Mayo County Council – Claremorris & Western District Energy Co-Op</td></tr>
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1.0 Introduction & Background to Japanese Knotweed

The optimum survey period for Japanese knotweed requires an understanding of the plant's complex life cycle. In order to provide details, and supporting information, with respect to the optimum survey period, it is important to first illustrate the origin, habitats, invasive qualities & dispersal mechanisms, life cycle and growth forms of this invasive species.

1.1 Origins of Plant

Native to Japan & northern China, Japanese knotweed (Fallopia japonica) is an invasive perennial herbaceous plant which was introduced to Europein the 1820's. The first record for Japanese knotweed in Europe appears to be from an artificial swamp habitat created in a garden of the UK Horticultural Society in Chiswick, London.

A second introduction to Europe is known from 1847, to a nursery in The Netherlands by the German physician and botanist Philippe von Siebold. Japanese knotweed plants were made available for sale by von Siebold at his nursery, as an ornamental species. Thereafter, in the same year Japanese knotweed was awarded a gold medal by the Society of Agriculture & Horticulture at Utrecht as "the most interesting new ornamental plant of the year".

In 1850, Japanese knotweed plants were sent to the Royal Botanical Gardens at Kew, UK, (Conolly, 1977) by Philippe von Siebold; in an unsolicited parcel of plants from his nursery. By 1854, the plant, had also arrived at the Royal Botanic Gardens in Edinburgh, from where it was further distributed across the UK. Japanese knotweed plants were sold by a large number of commercial nursery gardens around the UK (Bailey & Conolly 2000) and Europe and soon became one of the most popular garden plants of the 19th Century; the sharing of cuttings and the discarding of unwanted rhizomes became the primary pathway for dispersal. While it was originally planted for its foliage and "attractive" white flowers, in later years Japanese knotweed was also promoted as a potential source of forage or animal fodder.

Further dispersal occurred by vegetative means as Japanese knotweed spread naturally along watercourses, and in later years Japanese knotweed was dispersed by anthropogenic means in soil containing rhizome fragments; which was moved during road building and construction schemes. The first naturalised record of Japanese Knotweed in Ireland is dated 1905 from a garden in Dublin. Since its introduction to Ireland, it has spread across the island, particularly along watercourses, transport routes and in waste or disturbed ground. Of note is that the plant could still be found widely available for sale in garden centres in the 1930s and even up until the 1980s in the UK (Bailey & Connolly, 2000).

1.2 Habitats

Native Countries

In its native countries, Japanese knotweed is found growing along riverbanks, roadside verges, managed pastures and in sunny places on hills and high mountains. Over thousands of years, it has evolved to become one of the first species to colonise lands within 20 years of volcanic activity and is replaced by other herbaceous species after 50 years or so.
It typically reaches 0.3 - 1.5m tall and is attacked by a suite of 226 natural enemies, including insects and fungi, which keep it in check.

Ireland

In Ireland (and other countries to which it has been introduced worldwide), the absence of natural enemies, combined with its ability to colonise and penetrate volcanic landscapes, means that the plant can grow unchecked reaching heights of up to 3-4m, to form dense stands, and like a number of tree species has the capability of accessing existing weaknesses

or joints in bitumen, concrete, masonry and hard standing areas. No correlation between soil type, plant size or vigour has been identified, suggesting that it can grow on any substrate.
Its ability to penetrate existing weaknesses and joints comes from its underground network of stems known as rhizomes and its large central 'crown'.

1.3 Invasive Qualities
1.3.1 Growth Stages

Crown
In more mature Japanese Knotweed plants (typically 4 years old), a central rhizome 'crown', develops from which the main stems emerge above ground.

Underneath, the crown, the radial rhizomes twist together to form a sizeable and considerable upward penetrating force. As the plant matures the crown expands. Where Japanese knotweed is growing in close proximity to hard landscaping, the expanding crown can open up existing weaknesses in cracks or joints which may cause damage to footpaths and other infrastructure.
The crown also acts as the plants' carbohydrate food store during the winter months when the leaves die back and the plant goes into its natural winter dormancy period.

Rhizomes
When the rhizome network of a Japanese knotweed plant is spreading, it sends out new radial rhizomes (or underground stems) laterally underground from the central crown. The plant will then send up new shoots and adventitious roots along the length of these rhizomes. The new shoots are not only a sign that a rhizome network is spreading, they also provide an indication of the direction of new rhizome growth, and the overall pattern of growth of the plant.

While most of the plants' rhizomes are found in the top 1 metre of the soil, they can also go deep into the soil and extend up to several metres out from the plant, depending on ground conditions and disturbance regimes. The standard 7m rule or buffer zone described in Irish and UK government guideline documents, suggests that Japanese knotweed rhizomes may extend seven metres laterally from a crown or parent plant.

Fennell et al. (2018) demonstrated that even large stands of Japanese knotweed do not usually produce rhizomes that extend further than 4m. The study found that Japanese knotweed rhizomes rarely extend more than 4m from above ground plants and are typically found within 2m for small stands and 2.5m for large stands. Similarly, the mean vertical extent recorded averaged between 1.02m for the small stands and 1.64m for the large stands, (with a maximum of 3.2m recorded).

In terms of ecology, landscapes and amenities, Japanese knotweed is known to have potential significant negative ecological impacts on native habitats and species, on landscape character and quality, and on visual and recreational amenities. With regards to increased flood risk, built infrastructure and land-uses, Japanese knotweed once established can dominate watercourses where it may impede water flow through the obstruction of conveyance (or drainage) in ditches, streams and rivers particularly when water levels are high; thus, contributing to flooding. During winter dieback, Japanese knotweed may leave river banks exposed to erosion, leading to bank collapse. Land use and access to lands and infrastructure can also be impacted or impeded where large dense monospecific stands block access routes, invade landscaped areas such as gardens and urban parks/woodlands, impact on the quiet

enjoyment and use of domestic gardens, encroach on roadways and agricultural fields and occupy large swathes of lands. Signage and sightlines on roadways can also be impinged. In addition to these impacts as described above, Japanese knotweed, like certain tree species also has the ability to access existing weaknesses and joints, and may in certain situations cause damage to hard landscaping and infrastructure.

1.3.2 Reproduction

Sexual Reproduction

Japanese Knotweed is generally not considered capable of producing viable seed. In simplistic terms only female cloned (male sterile1) plants are considered to be present in Ireland (Bailey & Connolly, 2002). Reproduction is, therefore, almost entirely asexual with very little viable seed produced (0% to <2%) (Tiébré et al.2007).

Japanese knotweed, does however have the ability to hybridise with close relatives e.g. Giant Knotweed (Fallopia sachalinensis) to produce Bohemian Knotweed (Fallopia x bohemica) which is capable of producing viable seed. It can also hybridise with Russian Vine (Fallopia baldschuanica) to produce Connolly's Knotweed (Fallopia connollyana); and may backcross with Russian Vine to produce viable seeds (Bailey, 2001; Tiébré et al., 2007); although limited numbers survive beyond one year's growth.

Asexual Reproduction - vegetative

In Ireland (and other countries into which it has been introduced worldwide) the plant species displays an extraordinary ability to disperse and rapidly regenerate from rhizome or stem fragments to colonise and invade disturbed land. Less than 0.7g of a rhizome can produce roots and shoots in 10 days.

1.3.3 Dispersal

During landscaping and construction activities Japanese Knotweed can be disturbed by machinery, and spread within or be brought onto a site, in the form of plant fragments within the soil load or on the tyres of machinery and dumpsters, especially on machinery with tracks. The maintenance of Japanese Knotweed by mechanical methods such as cutting and strimming can distribute fragments, which can then be carried along road corridors by wind or on the tyres of vehicles including cars (see Wace, 1977; Wilcox, 1989). Fragments can also be carried on the footwear of pedestrians.

In relation to semi-natural habitats, the species out-competes native herbaceous and juvenile woody plants, reducing species diversity. Once established the height, dense canopy and aggressive nature of the plant essentially excludes other species. In addition, Japanese Knotweed has also been shown to have allelopathic effects on native vegetation; permitting germination but limiting biomass. Along riverbanks, new shoots have been observed developing primarily from floating stems from which fragments can be broken off by floods which lodge downstream to form new outlier populations; therefore, an upstream catchment wide management approach is required to achieve eradication of knotweed species along habitats where there is upstream surface water connectivity.

It is found primarily in open sites. Under favourable conditions the plant can grow up to 10cm a day and can rapidly invade disturbed ground in the absence of native vegetation. It tolerates semi-shaded but not fully shaded areas.

In the presence of dense native vegetation, it can in certain situations struggle for resources due to competition. Its growth and abundance are depressed in heavily shady sites (Beerling, 1991; Seiger, 1993); and it is consequently unable to successfully dominate the ground flora, shrub and tree layer in the understorey of dense woodland canopies; it rarely flowers beneath woodland canopies.

In Ireland, Japanese Knotweed is associated with roadsides, railways, car parks, quarries, maintenance depots, landfill sites, abandoned waste ground and in particular, disturbed areas where native vegetation is absent and where fly-tipping of spoil has occurred.

1.3.4 Plant Defence Mechanisms

In terms of undertaking surveys for Japanese knotweed, it is important to understand the plants' defence mechanisms. The use of chemical herbicide and the mowing of Japanese knotweed can result in the creation of bonsai regrowth which can go undetected unless surveys are undertaken by a specialist. In response to the use of chemical herbicide and burial at depth, the plant also has the ability to remain dormant or persist for long periods of time underground. In this regard the importance of completing a thorough forensic investigation including a detailed desktop study which examines existing records of Japanese knotweed (plant databases), and a review of available aerial imagery and Google Streetview to identify historic and ongoing sources and pathways for dispersal cannot be underestimated as part of a survey report.

Japanese Knotweed can respond to cutting or burial by deploying a number of plant defence mechanisms. Cutting, flailing, mowing, digging or burying the plant may result in:

- Dispersal of plant fragments which can regrow elsewhere
- Bonsai regrowth
- Rapid regrowth and increase in the height and extent of the plant
- Lateral growth of rhizomes and the development of new radial shoots
- Regrowth of buried rhizomes (buried rhizomes can survive for several years)

Knotweed also has the ability to execute a number of plant defence mechanisms in response to chemical herbicide including:

- Sub-lethal bonsai regrowth
- Lateral growth of rhizomes and development of new radial shoots
- Dormancy - rhizomes can lay dormant and viable for a number of years before regrowth
- Compartmentalisation

Given its complex reproductive capabilities, Japanese Knotweed has essentially two 'lifecycles' in the Irish context (in the absence of viable seed).

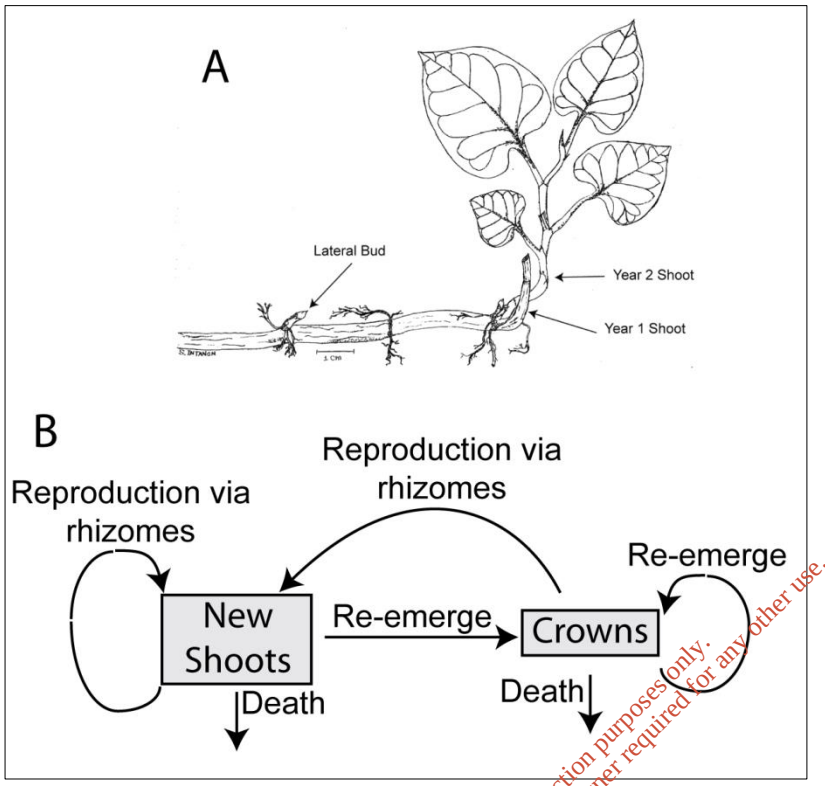
- The first is the lifecycle of Japanese knotweed which revolves around the 'crown' structure
- The second is the lifecycle of a rhizome fragment which has broken away from the crown as a result of disturbance e.g. soil movement

1.3.5 Lifecycle of a Japanese Knotweed Crown

A crown will typically produce shoots which are much 'stronger' than those produced from a rhizome fragment and will display the following characteristics

- Red/purple shoots appear early in spring which often resemble an 'asparagus' like appearance but, as the canes grow, the leaves unfurl and the plant takes on its more characteristic appearance.
- The mature canes are like bamboo, being hollow, and are light green with characteristic reddish-brown flecks. The plant can grow to over 3m in height.
- Flowering occurs in late summer/autumn (end July – typically August) and consists of small off-white- creamy to greenish flowers.

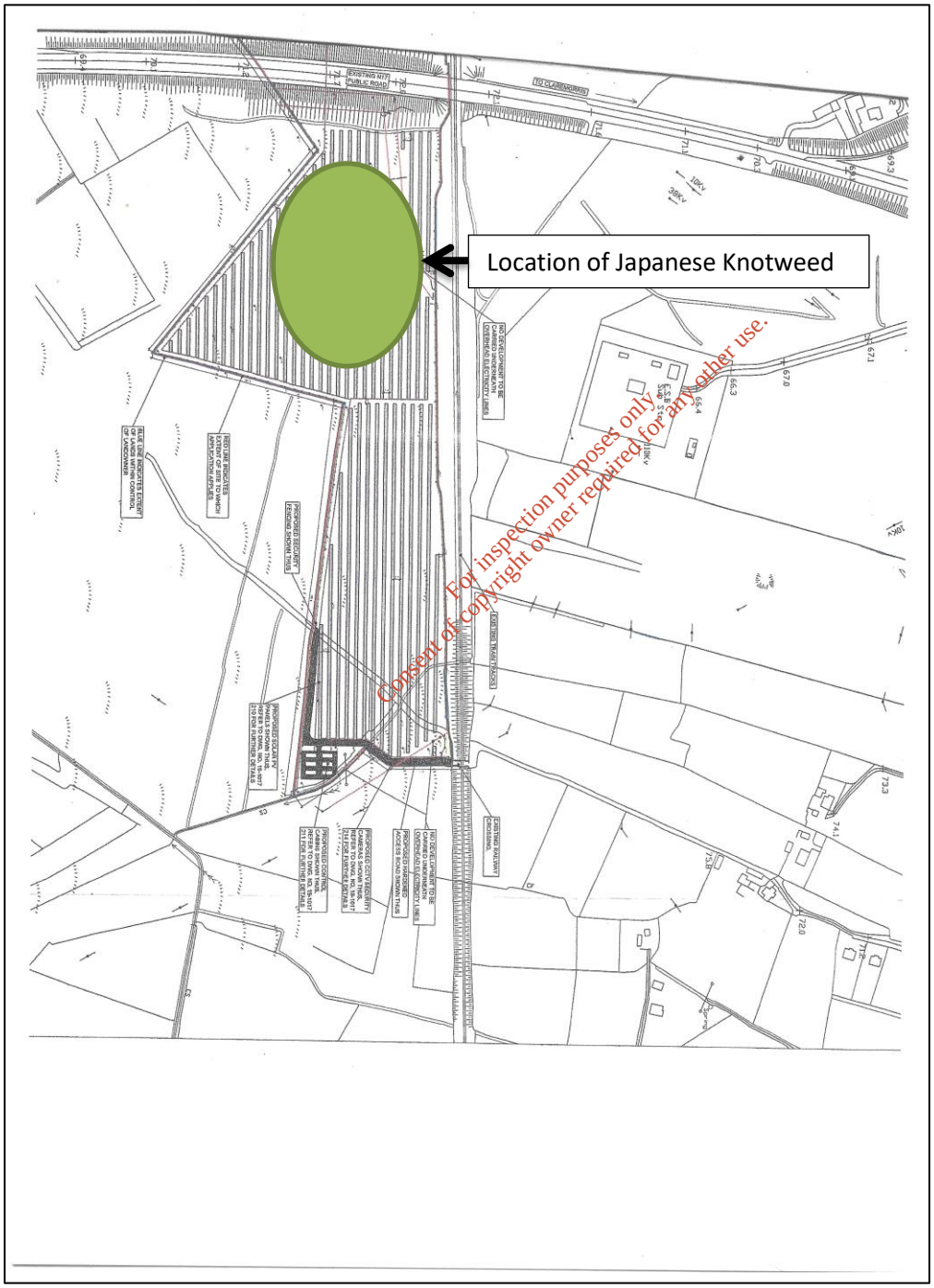
- In autumn, the leaves turn yellow as senescence (winter dieback) sets in.
- During the winter the canopy of leaves die back to reveal the crown and the orange/brown woody erect “zig-zag” stems - which later turn silver.



2.0 Introduction to Site

2.1 Description of the Site

This site is located to the east of the N17 highway in the townland of Clare, Claremorris, Co. Mayo, (Easting 532068 & Northing 776300). This site was previously used as a county council landfill, however, the landfill activity has ceased since a number of years. Native scrub and flora are present throughout this site, no protected plant species were present on this site during the site surveys that have been carried out to date. The non-native invasive plant Japanese knotweed is present at several locations throughout this site, the area of infestation is indicated on the map below.



2.2 Known Herbicide Treatment History at Site
Mayo county council employed contractors to carry out herbicide treatments at this site in September 2014 & 2015 and a non-persistent herbicide designed for aquatic use was administered to the Japanese knotweed infestations that are present on this site. There were no further treatments carried out on this site, however monitoring of the infestations was carried out in August 2018 & 2019. In September 2019, an updated report created by The Japanese Knotweed Company recommended that a further herbicide treatment be carried out at these lands for a minimum of 4 years going forward and this was to be followed by an ongoing monitoring programme.

2.3 Site Management Objectives
The site management objectives relevant to this management plan are to gain control and subsequent management of the infestations of Japanese Knotweed that are present, so that no further threat is posed to this site as a whole or to the biodiversity of the surrounding environments. The solar PV farm that is proposed for this site will afford an opportunity for access to be gained to all areas of these lands so that herbicide treatments and the aforementioned ongoing monitoring programme can be implemented in conjunction with the proposed works. All essential biosecurity measures as set out in this document must be strictly adhered to at all times, no proposed works should be carried out without the presence of a certified surveyor of non-native invasive plants.

2.4 Limitations and Threats to Management Objectives
Herbicide treatment that is administered correctly by qualified personnel at the correct time of year will achieve management and control of the Japanese Knotweed infestation present on this site over the 4 year herbicide treatment programme. This methodology gains control by forcing the growth of the plant into a state of consequential dormancy, however, re-emergence of the plant in the form of bonsai growth will occur, the ongoing monitoring programme will identify this regrowth and herbicide treatment of this regrowth will be necessary in order to keep control of the plant maintained throughout the site as a whole.

As machinery will be imported to site to carry out tree felling, site clearance & the creation of hard standings, the essential biosecurity measures as detailed throughout this document will need to be strictly adhered to in full. Machinery can act as a vector for the further spread of this non-native invasive plant throughout the site, thereby posing a threat to the management objectives.

2.5 Legislative Framework
At an international level Ireland has signed up to a number of treaties and conventions, including the **Convention on Biological Diversity.** Such treaties and conventions require the Irish Government to address issues of invasive alien species. This has been implemented through the **Wildlife Act 1976 and 2000** and further regulated through the **European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011)**

Regulation 49
'a person shall be guilty of an offence if they: plant; disperse; allow or cause to disperse; spread or cause to grow the plant in the Republic of Ireland'. The list of species in the Third Schedule includes Japanese Knotweed, Giant Knotweed and their hybrid Bohemian Knotweed.

Regulation 50
'an offence to or intend to; import; buy; sell; breed; reproduce or propagate; offer or expose for sale; advertise; publish a price list; transport; and distribute any plant species or vector material listed in the Third Schedule'.

Non-native species subject to restrictions under Regulations 49 and 50 are included in the third schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I 477 of 2011. The invasive species listed in the Third Schedule include: Japanese Knotweed, Giant Knotweed, Giant Rhubarb, Himalayan Balsam, Himalayan Knotweed, Bohemian Knotweed and Rhododendron.

The vector material (i.e. facilitates spread), referred to in the regulations (Third Schedule Part 3) which applies to Knotweed species is:

"Soil or spoil taken from places infested with Japanese Knotweed, Giant Knotweed or their hybrid Bohemian Knotweed"

The Waste Management Act 1996, as amended and associated regulations must be complied with if Japanese Knotweed contaminated material is to be moved off site.

It is a requirement to dispose of this material to a fully licenced wasted facility, capable of accepting such contaminated material. This disposal requirement applies to all Japanese Knotweed material including untreated and treated plant material. It also applies to soil containing the plant material, i.e. a 7m radius around the above ground stand and up to 3m deep below the stand, this is site specific.

If Japanese Knotweed contaminated material is removed off site it will require a **licence from the National Parks and Wildlife Service** in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477)

2.6 Guidance Documents

The following guidance documents and literature sources were consulted during the preparation of this report:

- National Roads Authority NRA (2010). *Guidelines on management of noxious weeds and non-native invasive plant species on national roads.*
- Crushell, P., Foss P., Hurley C. & O' Loughlin B. (2011). *County Kerry Invasive Species Survey 2011 – Pilot Mapping Study of the River Lee Catchment, Tralee.* Report prepared for Kerry County Council and The Heritage Council
- Environmental Agency (UK) (2013). *The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites (Version 3, amended in 2013*
- Stokes, K., O' Neill K., & McDonald R.A*. (2004) Invasive Species in Ireland* Unpublished Report
- NPWS (2011) *Actions for Biodiversity* 2011-2016, *Irelands second National Biodiversity Plan.* Department of Arts Heritage and the Gaeltacht.
- Department of Environment (2013). An invasive alien Species Strategy for Northern Ireland. www.doeni.gov.uk
- Irish Water Report. Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability

3.0 Overview of Management Plan

3.1 Prevention Measures Prior to Development Stage

The proposed access route that is located at the north eastern corner of the site will require a fenced in clean down zone to be created. This clean down zone will require a layer of high quality geotextile membrane to be laid over an area large enough to be able to accept incoming machinery and vehicles to be inspected and cleaned down where necessary prior to gaining access to the site.

A 150mm layer of 804 hardcore will need to be placed on top of the geotextile membrane to protect the membrane from being punctured and to ensure no cross contamination occurs.
It is recommended that a high quality geotextile membrane is laid prior to the hardcore being placed along this route that runs from north to south allowing access to be gained to the proposed control cabins.

Access to and from the proposed solar PV farm should be controlled at points along the access route, each access point will require a footbath and clean down station to be created as machinery and footwear can act as vectors for the spread of the non-native invasive plant Japanese Knotweed. Signage highlighting the presence of the non-native invasive plant Japanese Knotweed will need to be erected throughout the site and remain in place for the duration of these works.

Should the proposed works commence within the botanical growing season, from early March to September it is recommended that a herbicide treatment be administered to the Japanese Knotweed 21 days prior to the commencement of works. The herbicide administrator will be required to have a registered pesticide user number (PUN) and be trained in PA1, PA6, PA6AW & PA6ING (City & Guilds PTC) The Herbicide administrator must complete, sign & date a **Site Herbicide Recording Sheet (Appendix B)** identifying their individual PUN.

3.2 Works At Development Stage

All personnel involved in these works must attend a tool box talk on working in close proximity to non-native invasive plants and the ease with which these plants can be spread unwittingly or accidentally further on the site as a whole or indeed off site and onto another.
This tool box talk will be delivered by a certified surveyor of non-native invasive plants.
All machinery that gains access to the works area of this site must use the dedicated access routes and must not be allowed to leave identified infested areas without being inspected and cleaned down where necessary, by trained personnel.

It is understood at this stage that the solar panels will be placed on precast concrete bases, this will be dependent on ground conditions. It is inevitable that given the size of the planned solar PV farm that some ground disturbance will have to take place. It is therefore recommended that any ground disturbance or any movement of soils within this site is carried out under the supervision of a certified surveyor of non-native invasive plants.
All planned works must adhere to the biosecurity measures in full, as set out in **Section 4.3 Biosecurity Measures** of this document. It is recommended that these biosecurity measures are carried out under the supervision of a certified surveyor of non-native invasive plants, the individual that is tasked with the implementation of these biosecurity measures must complete, sign & date the **Daily Onsite Biosecurity & Management Forms (Appendix A)**

3.3 Four Year Herbicide Treatment Programme
It is recommended that a 4 year herbicide treatment programme be carried out on an annual basis from late August time to the middle of October. Foliar spray, weed wipe and stem injection are the treatment administration methods that will be utilised on the infestations that are present on this site, the condition of the plant on the day that the treatment is to be administered, will determine the method that is to be utilised for maximum effect.

A non-persistent herbicide application shall be delivered using an approved applicator by a trained operative equipped with suitable personal protective equipment (PPE). The operator must have completed relevant training including City & Guilds NPTC Pesticide Training PA1 – Safe use of pesticides in conjunction with PA2a and PA6 as a minimum qualification. The operator must be registered as a Professional User (with valid PU number) with the Department of Agriculture's Pesticides Registration & Control Divison.

The herbicide shall be applied at a rate and in a manner that is in accordance with the manufacturer's specification. Application of the herbicide shall not occur during periods of rainfall or during windy conditions. The application of herbicide shall also not occur at any stage where rainfall is predicted or expected within 1 hour of the chemical application. Extreme care shall be exercised during application of the herbicide to ensure pedestrians or passing vehicular traffic are not affected or contaminated by the herbicide application.

The herbicide application shall be conducted in a manner to ensure the following are not affected:

- Domestic Water Supply contamination
- Rivers, streams, ditches and other natural sources of water
- Neighbouring crops, pets and livestock
- Wildlife and beneficial insects
- Hedgerows, surrounding vegetation and gardens
- SAC's, SPA's, NHA's etc.

The Herbicide administrator must complete, sign & date a **Site Herbicide Recording Sheet (Appendix B)** identifying their individual PU number.

It is recommended that on completion of year 1 herbicide that a site walkover survey be carried out in May of the following year to evaluate the regrowth, this action should occur after each treatment has been administered throughout the 4 year programme.

3.4 Ongoing Monitoring
On the completion of the 4 year herbicide treatment programme a twice yearly monitoring programme should commence, the initial monitoring should commence in the middle of May of the following year and any minute regrowth should be marked on a map and identified on the ground with a precaution sign erected in the regrowth area. A further monitoring should take place in middle of August and all identified regrowth subjected to a further herbicide treatment as required.

All monitoring should be documented photographically and this documentation attached to the management plan, all further herbicide treatment that maybe required must be carried out as detailed in **Section 3.3 Four Year Herbicide Treatment Programme** of this document.

4.0 Specific Control Plans for Japanese Knotweed

4.1 Management Objectives

The objectives of this management plan are to gain control of the infestations of Japanese Knotweed that are present on this site in a sustainable and environmentally sensitive manner. Once control of the Japanese Knotweed has been achieved, the management and ongoing monitoring of this site in conjunction with the planned solar PV farm, will ensure that this non-native invasive plant poses no further threat to the surrounding biodiversity and environment of the site as a whole.

4.2 Management Options Rationale

The 4 year herbicide treatment programme with subsequent ongoing monitoring was the preferred management options for this site both environmentally and economically. Other options that were explored proved to be unsustainable and non-viable for a site such as this.

4.3 Biosecurity

- A clean down zone is to be identified and created at the entrance to the access road prior to the commencement of any works, this clean down zone must be clearly identified with signage
- Footbaths and clean down stations must be placed at all entry and exit locations to the site prior to the commencement of any works, these clean down stations must be clearly identified by signage
- All clean down areas must be clearly identified and a suitable membrane put in place to protect the soils beneath from further infestation, this membrane must be protected with a 150mm layer of 804 hardcore
- Tool box talks on invasive plant material to be provided to all relevant personnel involved in the works being undertaken prior to access to site being permitted
- A 3 metre buffer zone should be erected outside of the identified infested areas, no unauthorised personnel to be admitted within this 3 metre buffer zone, all works carried out within this buffer zone should be done so under the supervision of a certified surveyor in non-native invasive plants
- All machinery being brought to site must be inspected at the clean down zone for any soils that may contain invasive plant material before being allowed to enter the work zone
- At no time should the excavators or vehicles involved in the works breach the 3 metre buffer zone – should it be necessary for an excavator to work within the 3 metre zone, a certified surveyor in invasive plants should be present
- Excavators or machinery used within the 3 metre buffer zone must not be allowed to leave this area without being thoroughly inspected and cleaned down by the certified surveyor
- No delivery vehicles are to be allowed entry or exit to this site without being thoroughly inspected and cleaned to ensure that no non-native invasive material is unwittingly or accidently imported to site or escapes off site onto another
- On completion of these works all machinery must be thoroughly inspected and cleaned down before being allowed to leave this site
- As materials / aggregates will be imported to this site, it is vital that these materials be inspected at source to ensure that no non-native invasive plant material is imported to site
- All debris that is collected at the clean down areas and footbath stations needs to be deposited back into the already infested areas of the site
- At no time should any soils be removed from this site without this management plan being updated and a licence being obtained from the National Parks & Wildlife Services

On completion of the planned works for the solar PV farm, all footbath and clean down stations must remain on site and continue to be utilised for maintenance staff and the ongoing treatment of the Japanese Knotweed that is present.

4.4 Actions Planned on site

All works will be carried out in accordance with this management plan, should this management plan need to be amended due to any unforeseen constraints, these changes must be documented, dated and signed by a certified surveyor of invasive plants.

Records of all inductions and biosecurity checks must be documented and attached to this management plan for transparency. Clear signage must be erected throughout the site highlighting the dangers associated with cross contamination of the non-native invasive plant Japanese Knotweed.

4.5 How Actions will be Evaluated

The certified surveyor will conduct monitoring prior to any works being carried out to act as a baseline for future monitoring. Recording sheets will document any further visits and action taken.

4.6 Resources Required to Design & Create Management Plan

- Liaise with Mayo county council – Parks department
- Site surveyed
- Desk top study
- Design & create management plan

4.7 Results of evaluations

Site inspection forms contained within the appendix, this activity is carried out during the process. An audit trail shall be part of the completion package.

5.0. Summary of Information

The Japanese Knotweed that is present at this site can be controlled and managed successfully to allow the proposed solar PV farm to proceed. This management plan and the site specific biosecurity details are based on the condition of the site and data that was collected at the initial site survey.

All access routes and entry points referred to throughout this management plan were identified on the site layout maps supplied to The Japanese Knotweed Company by Claremorris & Western District Co-Op

Table 1	Priority Areas	Risk
Japanese Knotweed	The site as a whole	Medium Risk

Table 2	Control Methods	Risk
Japanese Knotweed	Implementation of biosecurity measures	Medium Risk
Japanese Knotweed	4 year herbicide treatment	Medium Risk
Japanese Knotweed	Ongoing monitoring programme	Medium Risk

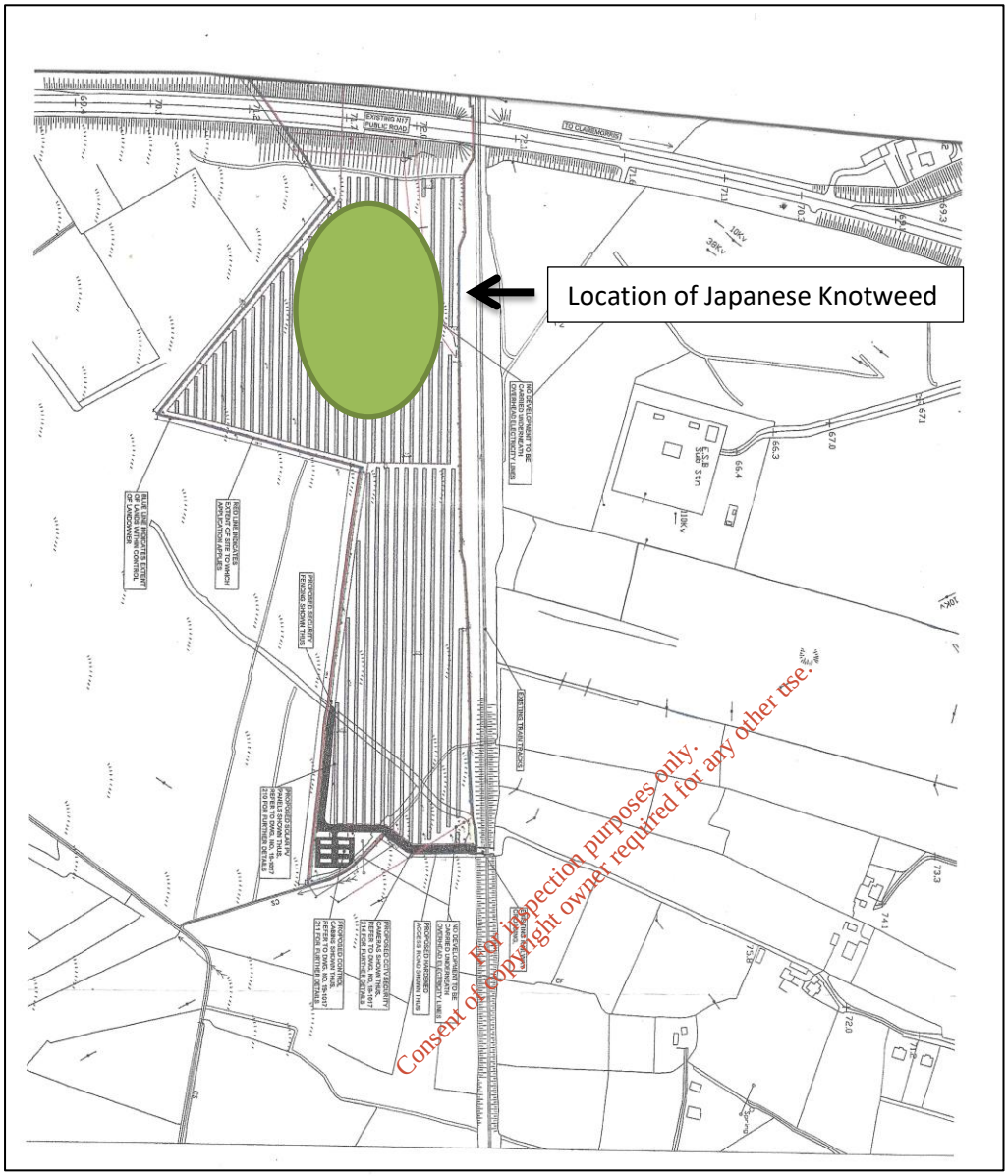
Table 3	Implementation Schedule
Phase 1: Initial site survey	Completed 06th & 07th January 2020
Phase 2: Management Plan	Completed 27th Januaray 2020
Phase 3: Enabling works / Tool box talks/fencing & signage	To be Confirmed
Phase 4: Implementation of pre-works biosecurity measures	To be Confirmed
Phase 5: Initial herbicide treatment prior to the commencement of works (21 days)	To be Confirmed
Phase 6: Development stage	To be Confirmed
Phase 7: Implementation of 4 year herbicide treatment programme	To be Confirmed
Phase 8: Implementation of ongoing monitoring on completion of 4 year herbicide treatment programme	To be Confirmed
Phase 9: All recording sheets & documentation to be attached to this management plan	All attachments to be added on an ongoing basis

6.0 Tier 3 Capping Option

A tier 3 treatment option for the historic landfill at Claremorris, Co Mayo is being discussed for this site. Should an application for a tier 3 capping be successful this management plan will be updated to include and reflect same.

Appendix A – Location Map

Appendix B – Location of JK



Appendix C

Daily Onsite Biosecurity & Management Forms

Date:		
Inspected by:	Initial:	Sign:
Site:		
Client:		

Transport routes free of soils/debris	**Yes**	**No**	**Comment**
Fencing	**Still in place**	**Damaged/Removed**	**Comment**
Clear Signage	**Still in place**	**Damaged/Removed**	**Comment**
Clean Zones Inspected	**Yes**	**No**	**Comment**
All Machinery/Plant inspected			
Have any vehicles left or entered the site ?			
Is the site secure?			
Notes/Comments			

A new form is to be used on each working day – it must be signed and dated by the appointed certified surveyor – it must be attached to the management plan at all times for transparency

Appendix D: Site Herbicide Record Sheet

Date:		
Inspected by:	Initial:	Sign:
Site:		
Client:		

Dose of Product	Volume Applied	Product	Total area Treated	Start Time	Finish Time

Names / Certificate Nos of Other Operators	

PPE		WORN
Gloves		
Boots		
Coverall		
Apron		
Face Shield		
Hard Hat		
Respirator		

Notes: Harvest interval, exclusion period, problems, equipment faults/repairs, notification of neighbour	**Wind Direction**	N	NE	E	SE	S	SW	W	NW
Technicians need to be fully qualified in PA1, PA6, PA6 AW & PA6 ING – Must also be a registered pesticide user Registered Pesticide Number Signed By:	**Wind Speed**	**Nil**		**Light**		**Moderate**		**Strong**	
	Temperature	**Cold**		**Cool**		**Warm**		**Hot**	
	COSHH Sheets Present	Yes				No			
	Warning signs in place	Yes				No			

This form is to be used on each separate site visit and herbicide treatment – it must be attached to the management plan at all times for transparency

Appendix E: Environmental Risk Assessment **Classifications – Extreme – High – Medium – Low Risk – No Risk**

Hazard	Source	Pathway	Receptor	Risk	Abatement Measures
Hybrid Knotweed & Infested soils	Excavation of soils	Ground	Cross contamination onsite		All infested areas on infestation are to be fenced off 7 m from the nearest stems using high visibility fencing; signs will be displayed notifying all workers on site of the presence of invasive weeds. All infested soils to be contained within identified holding area. All machinery to be cleaned before moving to a different area.
Particulates	Plant & Machinery	Air	Residents - site staff		Ensure vehicles and plant in good operating condition.
Spillage's of oils & fuels	Plant & Machinery	Ground	Ground Water		Bulk Fuels to be contained within a bunded fuel tank. Vehicles to be inspected for leaks. Ensure vehicles & plant in good operation condition. Provide spillage control equipment.
Noise	Plant & Machinery	Air	Residents – site staff		Ensure vehicles and plant in good operation with silencers. Locate plant to minimise effect. Use plant at appropriate time.
Mud & Debris	Plant & Machinery	Ground	Public roadway - residents		All machinery shall be cleaned before leaving site. If required provide wheel wash facilities. If required provide road sweeper.
Dust	Plant Movement	Air	Adjoining land Residents Site staff		Spray water during dry spells. Deploy water bowser. Employ road sweeper to damp down roads.
Dated:			**Signed:**		

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Appendix F: Control of Substances Hazardous to Health Assessment

Substance/Contaminant/Chemical : Herbicides

Activity / Element	Hazards in contact with	Who / What Risk	Initial Rating L	C	R	Control Measures Specified	Residual Risk Rating L	C	RRR
Decanting	**Eyes**	**Operatives**				Training/ Awareness of the task, the equipment and the chemicals involved must be given to anyone about to use this system. Attention must be drawn and information must be given and readily available for refresher reasons on the effects of this chemical; • How to store it safely. • How to decant it safely. • How to use it. • What to do in case someone has been affected by it. First Aid Eyes – flush immediately with water for about 15 mins. If the irritation persists seek medical advice Skin – Remove affected clothing and wash the underlying skin with copious amounts of soap and water. If the irritation persists seek medical advice Swallowing – Seek medical aid immediately and take the chemicals information (Material Safety Data Sheet) with you			
Spraying	**Skin**	**Other site personnel**							
Storage	**Air passage ways**	**Members of the public**							
Transport	**Digestive System**	**Other**							
Other	**Other**								
Notes:	**Notes**	**Notes**							

L = Likelihood	1 = Improbable, 2 = Unlikely, 3 = Likely, 4 = Very Likely, 5 = Certain
C = Consequence	1 = Injury no lost time, 2 = Minor injury less than 3 days, 3 = Injury more than 3 lost days, 4 = Major Injury, 5 = Fatality
R = Risk Rating	The risk rating is the value given to the Risk when the likelihood is multiplied by the Consequence
RRR = Residual Risk	The residual risk rating is the value of the risk once all the control measures have been put into place and practise

In the case of an environmental affect the Consequences rating should reflect the severity of that effect

Date of Assessment:		**Name of Assessor:**	
Review Date:		**Reviewed By:**	

This form is to be used on each separate site visit and herbicide treatment – it must be attached to the management plan at all times for transparency

All information relevant to this management plan will be attached on an ongoing basis for the duration of the proposed works identified within this document. All monitoring and results of evaluations to be fully documented and recorded with photographic evidence to be attached to this management plan

Kieren O' Shea 27/01/2020

Certified Surveyor

The Japanese Knotweed Company