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CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
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APPENDIX 5

Invasive Species Management Plan (ISMP)

4 Planning Phase Invasive Species Management Plan

4.1 Options for control and eradication of Invasive Species

The best available methods of control and eradication were compiled with reference to the NRA Guidelines (2010) and Fennell et al. (2018) and are summarised in this section of the report. It is recommended that a suitably experienced contractor is employed to undertake the invasive species eradication programme at the site. Methods of invasive species control are rapidly evolving, based on new research and the availability and use of chemical agents. It is important in the preparation of any invasive species management plan to highlight the need for the plan to be reviewed and adapted in the context of any changes that occur in guidance or legislation in the period between pre-planning surveys and the implementation of controls.

The approved contractor will finalise this management plan, based on contemporary experience and knowledge, and on the prevailing level of infestation of each invasive species. A pre-treatment survey will be carried out to ground-truth the extent of each invasive species and to confirm that the recommended approach herein remains appropriate. For example, manual control may only work for small, new infestations such as young Butterfly bush shrubs, but a combination of manual and chemical control may be required to ensure the complete eradication of more established shrubs. The specialist contractor will advise/finalise the best approach based on their knowledge of the species in question.

The successful eradication of invasive species from the development site may require some discussion and co-operation with neighbouring landholdings/landowners and as such the management plan will be discussed and (if possible) agreed with any relevant parties.

4.1.1 Management Options for Eradication of Invasive Species

Japanese Knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron pointicum*) were the only invasive plant species recorded within and outside of overall wind farm study area that are listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (*i.e.,* species of which it is an offense to disperse, spread or otherwise cause to grow in any place). Vector materials; soil and/or spoil taken from affected sites are also included under Regulations 49 and 50 for this species. While neither species was recorded within the construction footprint it is possible that these, or indeed other, invasive plant species could become established within the working area.

The developer will ensure through their appointed contractor that the Invasive Species Management plan is reviewed by suitably qualified and experienced specialist contractors ahead of any site mobilisation. Due to the high risk posed by this species, the location of Japanese Knotweed and Rhododendron stands will be clearly marked and cordoned off ahead of any site works. Any additional Third Schedule species present will also be recorded and mapped. The location and sensitivity of these locations will be covered in the initial induction with all site staff prior to construction works. All site staff will be made aware of the existence of this Management Plan and where it will be available for review on-site.

Where excavations or earth works associated with the construction phase are located within 7 metres of an identified Japanese knotweed stand, the excavation material will be treated as potentially contaminated material, by a licensed contractor to a suitably licensed waste facility. The potential for impacting upon any Rhododendron found within the planned working area will be assessed by a suitably qualified specialist. These locations will be marked and access to such areas will be restricted to necessary personnel (e.g., invasive species specialists). Excavations in these areas will be monitored by a suitably qualified ecologist with experience in invasive species control and management.

The specialist invasive species management contractor employed to undertake invasive plant eradication and removal will review and if necessary, update/amend the suggested management provided in this report. They will have responsibility for ensuring that the adopted approach follows the best contemporary guidance and is fully legally compliant.

Details of management options for invasive plant species noted during surveys of the wider area and which are therefore most likely to be encountered during the construction phase are provided in the following sections.

4.1.2 Management and Control Options for Japanese Knotweed

Management/Eradication options for Japanese Knotweed (after NRA 2010, Fennell *et al.* 2018) to include;

Management options for Japanese Knotweed (TBC by approved contractor) to include:	
Initial Site Staff Induction	An initial induction with all site staff will be undertaken prior to construction works starting, to inform them of the occurrence in the area of Japanese Knotweed, including issues caused by its spread, identification and site walkover of known location(s) – ensuring clearing of footwear, equipment etc. prior to leaving infested area – *i.e.,* **PLAN, CHECK, CLEAN & DRY** (Fennell *et al.* 2018) All site staff will be made aware of the existence of the Management Plan and where it will be available for review as required, the proposed management options appropriate for the site, and the name of the contractor appointed for invasive species management and removal where applicable.
Japanese Knotweed - Brief Description	Japanese Knotweed is a robust, herbaceous perennial with hollow, bamboo like stems which are green with red spots in summer before turning brown in winter. The plant has yellow/cream flowers in later June or August. Its leaves are arranged in a zig-zag pattern alongside shoots arising from the main stem (NRA 2010).
Pathways of spread	Only female plants have been recorded in Ireland and while seeds are sometimes produced, these are hybrid and rarely survive. Dispersal typically occurs through rhizome fragments, crown fragments, rhizomes, and in certain cases from the stem fragments, usually by being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments (NRA 2010, Fennell *et al.* 2018).
Prevention	**Immediate action**: Minimise or avoid contact with plants and infested substrate. Fence off and mark clearly where possible. **Plan, Check, Clean and Dry** - Always clean footwear, clothing and equipment immediately on leaving the infested area.
Note:	It is a requirement of this plan that only personnel with sufficient training, experience and knowledge in the control of non-native invasive species should be employed to assist in the planning and implementation of control measures in relation to Japanese knotweed which should be undertaken with reference to the current guidance (e.g., UK Environment Agency's (n.d.) *Managing Japanese knotweed on development sites - the knotweed code of practice* (NRA 2010). **The primary objective of control should be total eradication** by targeting the underground rhizome and not simply the aerial parts*. It should be noted that none of the methods outlined below* ***guarantee*** *eradication.* **Any removal from site must be in line with current waste regulations.** The methodology used may depend upon whether immediate removal is required or if it is enough to control/eradicate the stands over a period of time. In the event that immediate removal is deemed necessary (*i.e.,* prevent the risk of spread during construction works at the site) then actions 1 to 5 below will be considered. In the event that immediate removal is not required (*i.e.,* there is no risk of spread during construction and it is considered feasible to eradicate over time) action 8; herbicide applications will be scheduled. For more information on determining the best approach to take see Fennell *et al.* 2018.
	Personnel Responsible: TBC on appointment of contractor **Date to Undertake:** TBC on appointment of contractor

Approved methodologies to be implemented for this site (to be reviewed and if necessary, amended by approved specialist contractor):	**Methods to be Undertaken:** TBC on appointment of contractor with reference to 1 to 7 below and in line with most current guidelines and regulations). At present **our recommended approach** favours Measure 1.	**Date to be Undertaken:** TBC on appointment of contractor – specialist invasive species management specialists to have reviewed and finalised management measures and any necessary work (e.g., pre-works survey and isolation of areas with invasive plants) carried out ahead of any other site mobilisation.

1. **Avoidance**	**Advantages:** No risk of indirect disturbance or consequent spread as a result of excavations works or works with machinery in the vicinity of the Japanese knotweed stand.	**Disadvantages:** Potential for inadvertent disturbance of Japanese knotweed populations in proximity to proposed works, associated with the movement, storage or operation of machinery or construction activity.
2. **Hand Excavation: small stands**	**Advantages:** Can be effective for newly established plants.	**Disadvantages:** As the rhizome becomes more established hand excavation becomes impractical.
3. **Physical cutting:**	**Advantages**: Long term can weaken the plant rhizome, but this would take many years to achieve eradication.	**Disadvantages:** Labour intensive. Not effective as new stems will continually regrow. Unlikely to result in lasting control. Due to the potential to spread from small rhizome fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant.
4. **Excavation: larger stands**	Will achieve immediate results and with due care all rhizomes can be successfully removed	Can revive and regrow if any rhizome is overlooked. Process is expensive. Disposal of material should be undertaken with due caution to prevent accidental spread of the plant.
5. **Burial:**	Achieves immediate results without the need for landfill disposal	Contains rather than eradicates. Only suitable for certain sites. Location of burial site should be retained on land deeds to prevent risk of future disturbance. The number of years for material to become unviable is undocumented but has been suggested at 20 years
6. **Removal off-site:**	Achieves immediate removal and leaves no restrictions on site	Expensive and will result in the removal of viable site soil. Removal to approved licensed disposal facility only
7. **Chemical/Herbicide Treatment:**	Effective and efficient control can be achieved with the use of Glyphosate which is less labour intensive than methods outlined above. Requires ongoing/repeated treatments, which can have negative impact on the receiving environment and other non-target species. Treatment near a watercourse requires approval. Overdosing can lead to plant dormancy rather than eradication and as such care is required in applications. **NOTE: it is an offence to use Plant Protection Products in a manner other than specified on the label and in accordance with the product label and with Good Plant Protection Practice as prescribed in the EU - (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003).**	

Foliage application	Glyphosate	Autumn is the most effective time for treatment	Ongoing/several treatments will be required. Up to 5 years has been required in instances where plants are well established.
Weed-wiping	Glyphosate	Effective in some cases.	Ongoing/several treatments will be required. Up to 5 years has been required in instances where plants are well established.
Stem injection	Glyphosate	Late summer to autumn is most effective time for treatment of stems	Only one or two treatments may be feasible as stems need to be of required thickness (greater than 8mm). Where regrowth occurs additional foliage application will be required.

Ongoing Monitoring and Evaluation Of success of eradication programme	Personnel Responsible: TBC on appointment of contractor	Dates to be undertaken by: TBC on appointment of contractor	Reporting To: TBC on appointment of contractor	Status / Are Additional Treatments Required (if so give dates): TBC on appointment of contractor

4.1.3 Management and Control Options for Rhododendron

Management/Eradication options for *Rhododendron ponticum* (after NRA 2010, Fennell *et al.* 2018) to include;

Management options for Rhododendron (TBC by approved contractor) to include:		
Initial Site Staff Induction	An initial induction with all site staff will be undertaken prior to construction works starting, to inform them of the occurrence in the area of Rhododendron, including issues caused by its spread, identification and site walkover of known location(s) – ensuring clearing of footwear, equipment etc. prior to leaving infested area – *i.e.,* **PLAN, CHECK, CLEAN & DRY** (Fennell *et al.* 2018) All site staff will be made aware of the existence of the Management Plan and where it will be available for review as required, the proposed management options appropriate for the site, and the name of the contractor appointed for invasive species management and removal where applicable.	
***Rhododendron ponticum* - Brief Description**	Rhododendron ponticum is an evergreen shallow-rooted shrub often reach 4-5m in height – even taller in some cases. The stems are light brown and woody and become trunk-like with age. Early summer prouces lilac, pink, or purple flowers. Seed pods disperse thousands of seed in late winter. Forms dense 'forest' spreading rapidly and shading the understorey.	
Pathways of spread	Primarily reproduces by seeds, distributed by wind, water, animals and in topsoil. Can also regenerate from small rhizome fragments and stem layering. Seeds are produced when the plant reaches maturity – 10-12 years.	
Prevention	**Immediate action**: Minimise or avoid contact with plants and infested substrate. Fence off and mark clearly where possible. **Plan, Check, Clean and Dry** - Always clean footwear, clothing and equipment immediately on leaving the infested area.	
Note:	It is a requirement of this plan that only personnel with sufficient training, experience and knowledge in the control of non-native invasive species should be employed to assist in the planning and implementation of control measures in relation to Rhododendron which should be undertaken with reference to the current guidance. **The primary objective of control should be total eradication** by targeting the underground rhizome and not simply the aerial parts. Labour intensive to remove but easier to achieve eradication than with (say) Japanese Knotweed. Young plants should be removed wherever possible before they reach maturity and can produce seed. **Any removal from site must be in line with current waste regulations.** The methodology used may depend upon whether immediate removal is required or if it is enough to control/eradicate the stands of Rhododendron over a period of time. For small shrubs or seedlings hand-pulling is effective but for medium and large shrubs the control options include mechanical flail cutting/mulching, excavation and herbicide application. For more information on determining the best approach to take see Fennell *et al.* 2018.	
	Personnel Responsible: TBC on appointment of contractor	**Date to Undertake:** TBC on appointment of contractor

Approved methodologies to be implemented for this site (to be reviewed and if necessary, amended by approved specialist contractor):	**Methods to be Undertaken:** TBC on appointment of contractor with reference to 1 to 3 below and in line with most current guidelines and regulations). At present **our <u>recommended approach</u>** favours Measure 1 for small shrubs and seedlings. For areas that can be disturbed Method 2 (& 3) is preferred and in areas that cannot be disturbed method 3 is the preferred control option.	**Date to be Undertaken:** TBC on appointment of contractor – specialist invasive species management specialists to have reviewed and finalised management measures and any necessary work (e.g., pre-works survey and isolation of areas with invasive plants) carried out ahead of any other site mobilisation.
1. **Manual – hand pulling, uprooting**	**Advantages:** Recently established plants can be easily uprooted. Small shrub bushes are shallow rooted and can be uprooted using a Lever and Mulch technique. The method has minimal effect on the environment and it effectively prevents flowering and seed dispersal.	**Disadvantages:** Labour intensive and plant material needs to be disposed of appropriately. Does not remove the seed bank or mature specimens. Can regrow from remaining root fragments.
2. **Physical cutting: flailing/mulching/excavation (specialised equipment)**	**Advantages**: Highly effective if carried out in conjunction with herbicide treatment to stumps and regrowth. Relatively quick. Works can be undertaken in the growing season (subject to other ecological constraints).	**Disadvantages:** Can be expensive and specialist work. Arisings need to be disposed of appropriately. Cut material can obscure stumps. Mulched roots can regrow if not treated with herbicide. Plant/leaf vegetation can be toxic and hostile for revegetation by native plants.
3. **Herbicide application**	**Advantages:** Cost effective. Foliar spray appropriate for seedlings and small/cut shrubs. Stem treatment effective on larger specimens. **NOTE: it is an offence to use Plant Protection Products in a manner other than specified on the label and in accordance with the product label and with Good Plant Protection Practice as prescribed in the EU - (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (S.I. No. 83 of 2003).**	**Disadvantages:** Can have a negative environmental effect and impact non-target species. Cut stump treatment has less potential for environmental impact.
Foliage application	Glyphosate with Topfilm or Mixture B	Best applied during the growing season.

Cut-stump	Glyphosate	Highly effective year round.	One treatment often sufficient.
Ongoing Monitoring and Evaluation of success of eradication programme	**Personnel Responsible:** TBC on appointment of contractor	**Dates to be undertaken by:** TBC on appointment of contractor	Where regrowth occurs additional intervention may be required.

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