Appendix F

Glebe Bridge – Invasive Alien Species Management Plan

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Carlow & Wexford Bridges Rehabilitation Contract
Refurbishment of Glebe Bridge WX-N11-003.00

Invasive Species Management Plan

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Bonneagar Iompair Éireann Transport Infrastructure Ireland

Kildare County Council

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Refurbishment of Glebe Bridge

Invasive Species Management Plan

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Refurbishment of Glebe Bridge

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1. INTRODUCTION

1.1 Background

As part of the Carlow & Wexford Bridges Rehabilitation Contract, Roughan & O'Donovan-AECOM Alliance (ROD-AECOM) was appointed by Transport Infrastructure Ireland (TII) and the Kildare National Roads Office (KNRO) to undertake the design of the rehabilitation of Glebe Bridge, which is located on the N11 south of Enniscorthy in County Wexford, hereafter referred to as "the Site".

A key concern in relation to the proposed rehabilitation works, hereafter referred to as "the Works", is the risk arising from the presence of certain invasive alien plant species (IAPS) at the Site and the potential spread of these species as a result of works. This report provides an IAPS Management Plan for the Works.

1.2 Description of the Works

The following activities are proposed as part of the Works:

- Repairs/reshaping and provision of rock armour to the downstream embankments that have been eroded/scoured away;
- Repairs to cobbled riverbed where it has broken up *c*. 2 m downstream of the bridge, including the installation of a rock ramp system constructed from 4–5 rock bar bed check weirs in the river channel over a 2–3 m length at this location;
- Repointing/pressure-grouting of wide cracks in the arch barrel;
- Resin-injection of cracks in concrete section of structure;
- Installation of grouted tie-back anchors at the downstream end of the structure to prevent the outlet spandrel wall (headwall) from overturning (this will involve coring through the wall and inserting an anchor through which grout can be pumped); and,
- Vegetation clearance on the embankment above the masonry arch section of bridge.

The Works will commence in September 2016. Elements of the Works that do not require in-stream activities will be undertaken at this time. In-stream activities will be required as part of the Works in order to install the new rock ramp and bank erosion protection and to gain access underneath the bridge. The in-stream elements of the Works will commence in July 2017 and will conclude within 16 weeks. Drawings of the Works are included in Appendix A. Tracked coring plant may be required at the masonry end for the installation of tie rods and pattress plates.

Vegetation removal will be necessary for site access and construction at overgrown sections of the Works. Under Section 40 of the Wildlife Acts, 1976–2012, in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided, an exemption is granted from restrictions in regard to clearance of vegetation. However, if vegetation removal is required during the restricted period (1st March to 31st August), a site inspection by a suitably qualified ecologist prior to and during clearance is considered best practice to ensure reasonable efforts are made to comply with other requirements of the Wildlife Acts and allow works to proceed.

The area is confined by restricted access and contains both overhead and buried utilities/services. There are also trafficked roads and so traffic management or diversions will be required, depending on the exact location, timing and duration of the works involved.

1.3 Scope of the Management Plan

This report includes the findings of an IAPS Risk Assessment, undertaken to inform the IAPS Management Plan for the Works. The objectives of the Risk Assessment were:

- To review publicly available records on IAPS that may be present within the Site;
- To identify and map IAPS within the Site and broadly describe the associated habitats and environmental sensitivities in relation to IAPS;

- To evaluate the risks that IAPS may pose to the Works, including the risk of causing the spread of any such species and risks to the health and safety of site personnel.

This Management Plan, using the findings of the Risk Assessment, provides a programme of measures to effectively control IAPS the risks associated with these species at the Site for the duration of the Works.

1.4 Legislative Context

In devising the most effective control methods, the IAPS Management Plan must comply with all standards and legislation regulating the treatment and management of IAPS. The relevant standards and legislation that will dictate how management is undertaken include:

- European Communities (Plant Protection Products) Regulations, 2012;
- European Communities (Sustainable Use of Pesticides) Regulations, 2012;
- Waste Management Acts, 1996–2013 and related legislation;
- Safety, Health and Welfare at Work Act, 2005;
- Safety, Health and Welfare at Work (Construction) Regulations, 2013;
- Safety, Health and Welfare at Work (General Application) Regulations, 2007;
- Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001;
- European Communities (Birds and Natural Habitats) Regulations, 2011–2015; and,
- Wildlife Acts, 1976–2012.

To comply with the European Communities (Sustainable Use of Pesticides) Regulations, 2012, the application of herbicide shall be undertaken by registered professional users. Only a Registered Pesticide Advisor (RPA) shall approve procedures prior to Works commencing. All professional users should demonstrate proper use, ensuring only authorised products are used and all treatments are catalogued and documented pursuant to the requirement of European Communities (Plant Protection Products) Regulations, 2012.

In scenarios where disturbance, movement and disposal of IAPS material is required, the RPA will review applications submitted to the relevant licensing authorities prior to Works.

The spread of IAPS to other locations during Works constitutes an offence under the provisions of Section 14 and Section 56(d) of the Wildlife Acts, 1976–2012. In addition, under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations, 2011–2015, it is an offence to spread, sell, transport or distribute any contaminated soil or spoil taken from areas infested with IAPS listed on the Third Schedule of these Regulations. Quality control procedures should include implementation of detailed biosecurity measures. In the unlikely event that IAPS material is inadvertently spread despite those quality controls within the Site during Works, the land agent 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).

2. METHODOLOGY

2.1 Consultation & Desk Study

The purpose of the desk study was to review information available and to obtain recent and historical information on IAPS in relation to the Site and surrounds. Records of IAPS within 2km of the Site were obtained from the National Biodiversity Data Centre (NBDC).

As with all desk studies, the data considered were only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide and these were considered when examining outputs of the desk study.

2.2 IAPS Survey

A survey for IAPS was conducted at the Site of proposed works on 1st April 2016, adhering to best practice guidance (NRA, 2010). The entire Site was walked at a slow pace to accurately establish the distribution and abundance of all IAPS. Where IAPS were identified, the precise locations were mapped in the field. Target notes were taken of any IAPS with 10 figure grid reference readings using a hand-held Garmin geographical positioning system (GPS) and then imported into a geospatially referenced Geodatabase in ArcGIS and integrated into CAD layout drawings. The survey was conducted using 1:1000 Ordnance Survey maps and cross referenced with publicly available topographical maps and orthophotography.

The assessment included:

- A walkover survey covering a 50 m radius around the bridge and 150 m upstream and downstream along the river;
- Detailed recording of the presence and extent of IAPS, i.e. plant height, condition and area of infestation;
- Recording of Site features that may affect any control action, e.g. proximity to other vegetation, services, built structures and waterbodies;
- Identification and mapping of IAPS and broad description of the associated habitats within the Site; and,
- Evaluation of the risks posed by IAPS in light of the Scope of Works and preliminary identification of appropriate control measures.

An additional IAPS survey, following the same procedures as the 1st April 2016 survey was conducted at the Site on 10th August 2016 in order to survey for any IAPS that would not have been detectable during the earlier survey.

2.3 Survey Limitations

Standard survey methods (NRA, 2010) were followed. However, any biases or limitations associated with these methods could potentially affect the results. While every effort was made to provide a full assessment and comprehensive description of the Site, it is unlikely that one survey can achieve full characterisation due to temporal variation. The pre-control assessment was carried out in August 2016 which falls within what is considered to be the optimal period for botanical surveys, *i.e*. May to September, inclusive. It is recognised that when a survey is carried out within this season, it is a compromise, suitable for the vast majority of species, but possibly too early or too late for some species.

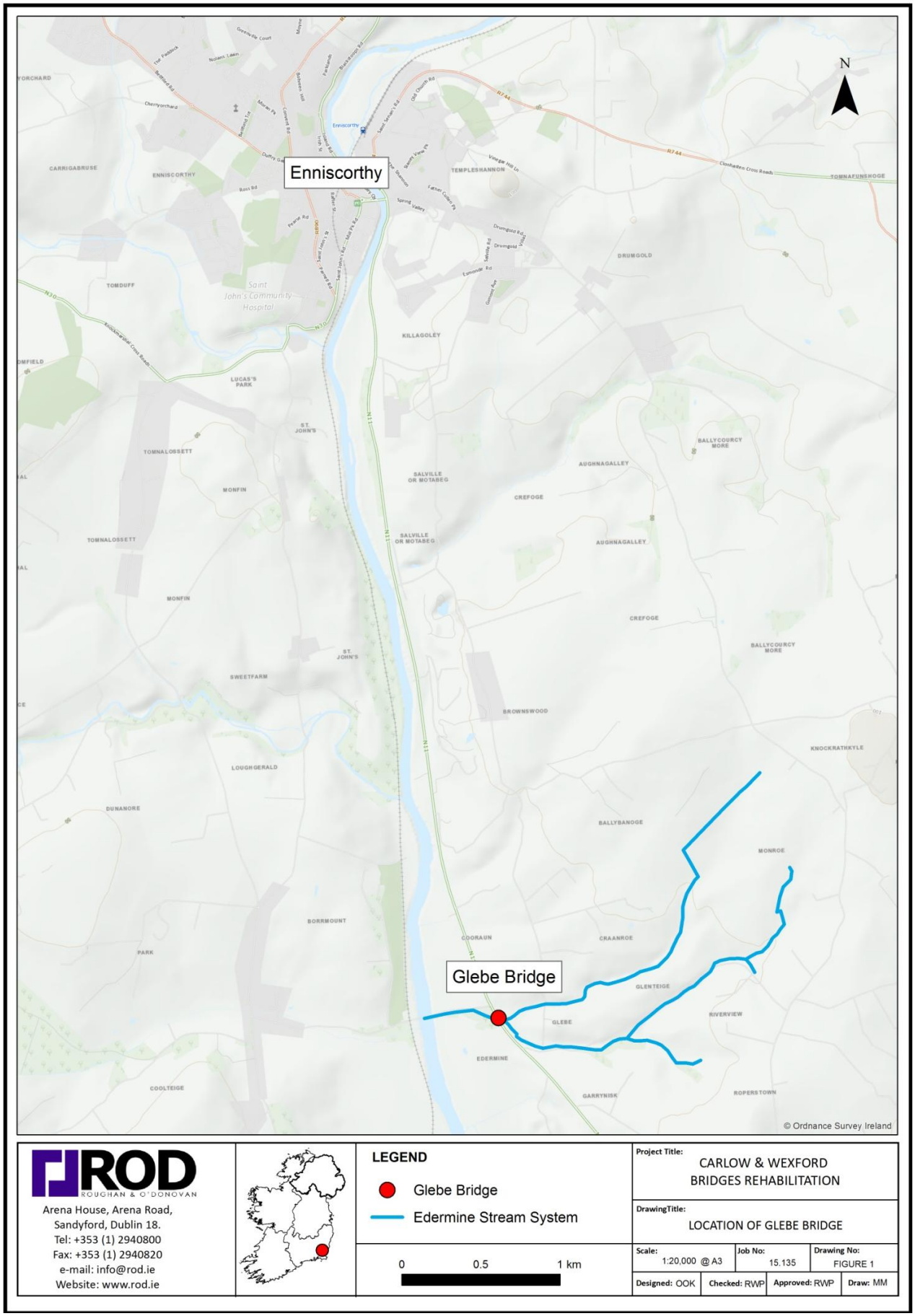

Figure 1. Location of the Site in relation to Enniscorthy.

3. RESULTS

Analysis of the aforementioned maps showed that there were existing records for Himalayan balsam *Impatiens glandulifera* and Canadian waterweed *Elodea canadensis* in the zone of influence of the proposed works. Himalayan balsam was recorded approximately 500 m downstream at the confluence with the River Slaney in 2007. Canadian waterweed had been recorded in the same hectad as the bridge in 1957.

IAPS surveys were carried out by ecologists from ROD-AECOM on 1st April and 10th August 2016. The surveys identified Japanese knotweed *Fallopia japonica*, Himalayan balsam, cherry laurel *Prunus laurocerasus*, montbretia *Crocosmia* × *crocosmiflora*, Rhododendron *Rhododendron* sp. and winter heliotrope *Petasites fragrans* within the study area. Only Japanese knotweed, Himalayan balsam and cherry laurel were recorded within or adjacent to the works area. Descriptions of the IAPS of most concern present at the Site are given in Sections 3.1 to 3.3 and the distribution of all IAPS within the Site is illustrated in Figure 2.

Following the surveys, an IAPS Risk Assessment report was prepared, recommending that an IAPS Management Plan be prepared for the Site in advance of the Works.

3.1 Japanese Knotweed

Japanese knotweed is a non-native, invasive, perennial plant with hollow, bamboo-like stems. Its leaves are approximately the size of a human hand and plants form yellow cream flowers in late June or August. The stems are green with red spots during summer and turn brown during winter. During growth, red side shoots form off the main stem and its leaves are arranged in a zigzag pattern. Japanese knotweed is listed on the "most unwanted" list by Invasive Species Ireland, a joint project between the Northern Ireland Environment Agency (NIEA) and the National Parks & Wildlife Service (NPWS). Japanese knotweed is a threat in open and streamside areas. It can spread rapidly through underground stems (rhizomes) and fragmentation to form dense stands, excluding native vegetation and reducing species diversity. Japanese knotweed does not produce viable seed in Ireland. Rhizomes may spread up to 7 m horizontally and 3 m deep from above ground plant. Once stands become established, they are extremely persistent and difficult to remove. This plant has the ability to grow through tarmac and concrete, even within dwellings in some cases. Failure to manage Japanese knotweed on a development site may result in eventual structural damage.

3.2 Himalayan Balsam

Himalayan balsam is an invasive, terrestrial plant species that was first introduced in 1839 as an ornamental plant. It can grow up to 3 m tall and produces large purple/pink flowers from June to October. The seed pods can disperse seeds up to 6 m away. The red stems are hexagonal and hollow and the leaves are dark green, lance-shaped and have serrated edges. Since it was introduced, it has spread throughout Ireland. It is a tall annual plant which, due to its rapid growth, shades out most native species. It also competes with native riparian plants for pollinators. In the autumn, plants die back, leaving watercourse banks bare and vulnerable to erosion, leading to secondary effects including sedimentation of fish spawning grounds and heightened flood risk. Himalayan balsam is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011–2015.

3.3 Cherry Laurel

Cherry laurel is a perennial, thicket-forming, invasive, ever-green shrub of gardens, parks and woodlands. The leaves are thick and laurel-like, poisonous with cyanide. The white flowers are produced on upright spikes and are succeeded in autumn by blackish, cherry-like fruits which should not be eaten. The species is particularly invasive in the more humid, western parts of Ireland, forming dense impenetrable thickets. It is unpalatable and likely toxic to mammals and probably invertebrates due to the presence of cyanide. It is avoided by grazing animals, thus giving it significant advantages over native species. The deep shadow cast by cherry laurel and toxic leaf litter accumulating underneath produces a dark sterile environment, which suppresses regeneration of native species and supports little wildlife.

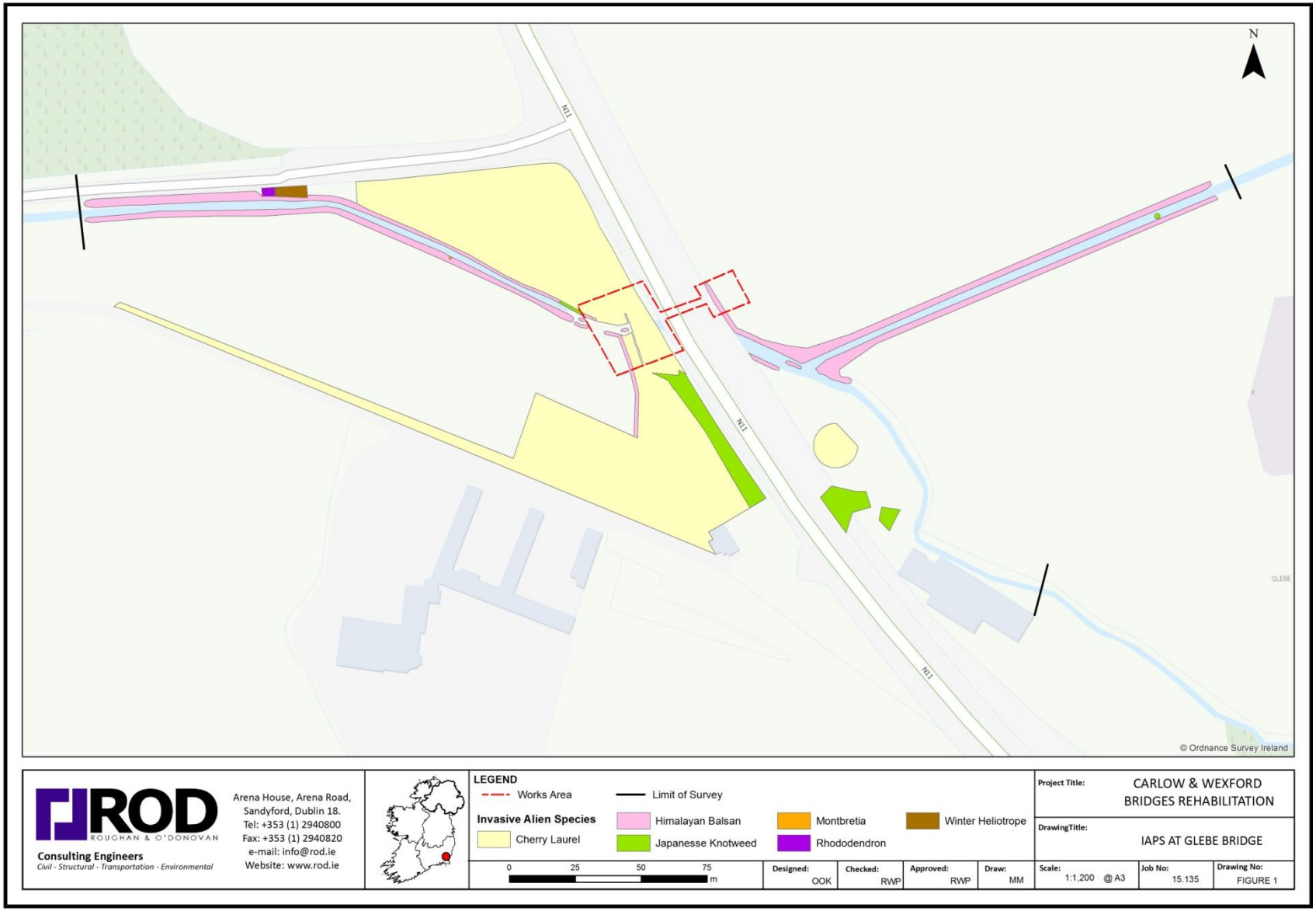

Figure 2. Distribution of IAPS at the Site.

4. OVERVIEW OF THE MANAGEMENT PLAN

The purpose of the Management Plan is to prevent further spread of IAPS within and outside of the Site. The measures outlined in this management plan are based on the following best practice guidelines:

- EA (2006) *The Knotweed Code of Practice: Managing Japanese knotweed on development Sites*. Environment Agency (England & Wales), Bristol;
- Kelly, J., Maguire, C.M. and Cosgrove, P.J. (2008) *Best Practice Management Guidelines Himalayan balsam* Impatiens glandulifera*.* Prepared by Invasive Species Ireland for the NIEA and the NPWS; and,
- Maguire, C.M., Kelly, J. and Cosgrove, P.J. (2008) *Best Practice Management Guidelines Rhododendron* Rhododendron ponticum *and cherry laurel* Prunus laurocerasus*.* Prepared by Invasive Species Ireland for the NIEA and the NPWS.

The Knotweed Code of Practice was published by the Environment Agency for the England & Wales. The code of practice has been developed by experts in the control of knotweeds, and has been informed by the successes and failures of hundreds of knotweed management plans. Therefore, it is widely accepted to represent the current best practice in the treatment of Japanese knotweed in the British Isles.

The *Best Practice Management Guidelines* for Himalayan balsam and cherry laurel were produced by Invasive Species Ireland for the NIEA and the NPWS and represent the most widely accepted guidance on the treatment and management of those species in Ireland.

5. CONTROL AND MANAGEMENT MEASURES FOR IAPS

As part of the Management Plan, different methods can be used for each species and the most appropriate available measures for each species are outlined below. This section contains a description of the most suitable control measures for Japanese knotweed, Himalayan balsam and cherry laurel.

5.1 Management of Japanese knotweed

The location of the Works means that the Japanese knotweed in the wider area will not be disturbed. In order to avoid inadvertent spread of Japanese knotweed on the Site, the areas containing Japanese knotweed shall be demarcated to include a buffer of 7 m from the above ground visible plant material. This buffer may be reduced with agreement of a supervising ecologist to allow access to the works area. A reduction in the buffer will not increase the likelihood of Japanese knotweed spreading.

5.2 Management of Himalayan balsam

Himalayan balsam is found almost continuously along the banks of Edermine Stream and in draining ditched and wet areas throughout the Site, including within the works area. The large extent of the infestation makes eradication of Himalayan balsam from the Site impractical.

As the Works are scheduled to take place during the period in which Himalayan balsam is in seed, removal of all Himalayan balsam from the works area before the plants go to seed is recommended as the most effective method to avoid dispersal of seeds within the Site. This will entail pulling by hand all Himalayan balsam in the works area and leaving them in a pile to rot. This work should be carried out in April or in early May (when shoots are visible but have not yet gone to seed). It is suggested that a suitable location to leave pulled stems is under the thickest part of the cherry laurel.

Movement of soil and equipment within the Site also poses a risk of spread Himalayan balsam seeds, which can survive in the seedbank for up to 18 months. All equipment shall be washed using a hard brush or power washer to ensure no soil leaves the works area.

5.3 Management of cherry laurel

Cherry laurel is not subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations, 2011–2015 and is listed as an Amber Risk species. As such, the IAPS Risk Assessment found that it does not pose any risk to the Works. Therefore, no specific management measures are proposed for this species.

6. SITE MANAGEMENT MEASURES

6.1 Limitations and Threats to Site Management

The primary Site management objective is to prevent the spread of the IAPS as a result of the Works. The risk is highest during Site preparation and construction, when the excavation of materials and movement of vehicles potentially transporting contaminated material can facilitate the spread of IAPS. The presence of Japanese knotweed and Himalayan balsam limit overall Site management objectives during the construction process, in particular through the following:

- Delays in scheduling of works due to treatment of identified infestations;
- Structural damage or future potential damage caused by the plants; and,
- Potential for spread of those species from within and outside the Site boundary.

6.2 General Site Management Measures

The following general control measures should be employed in the case of all identified stands to prevent the further spread of Japanese knotweed and other IAPS:

- Signs shall be erected to alert all personnel that the area is contaminated with IAPS;
- All areas affected by Japanese knotweed shall be demarcated and isolated from activities to avoid potential for further spread within the Site. An area including a 7 m buffer zone from the above ground visible stems should be isolated where possible, taking into account limitations of existing walls and structures;
- No material should be stored adjacent to Japanese knotweed isolated areas;
- All personnel on the Site should receive a briefing on the identification of Japanese knotweed (both above and below ground parts) and Himalayan balsam; and,
- All vehicles and equipment must be brushed down and cleaned by power hose before leaving the works area.

In addition, wet soil can become compacted if driven over, reducing rainwater infiltration, which can increase surface water run-off and facilitate the spread IAPS on the Site or into watercourses. Therefore, compaction of soils should be kept to a minimum.

6.3 Measures to Avoid the Spread of Japanese Knotweed During Soil Movement

Japanese knotweed is highly invasive, and can easily spread to new areas. It is particularly effective at colonising disturbed ground, *e.g*. construction sites. The unintentional spread of IAPS during construction works is a significant issue and, if not managed correctly, could result in the spread of Japanese knotweed to un-infested parts of the Site. This would increase the future cost and effort required to control the species.

The most common ways that this species can be spread is:

- Spread of plant fragments or infected soil during the movement of contaminated soil around the site;
- Mowing, hedge-cutting or other landscaping activities;
- Contamination of vehicles or equipment with plant fragments or infected soil; and,
- Importation of contaminated soil from off-site sources.

All areas of Japanese knotweed should be fenced off during site works, using a buffer as previously described. Signs should be erected to inform personnel of the risks. If soil is imported to the site for landscaping or in-fill purposes, it is recommended that the Contractor should gain assurances from suppliers that the material is free from IAPS.

7. TRAINING AND OPERATIVE COMPETENCY

7.1 Health & Safety

An appropriate risk assessment, including health and safety considerations, should be carried out before any IAPS survey or management work is undertaken. Protective clothing must be worn when attempting management. All works shall be compliant with the Safety, Health and Welfare at Work Act, 2005, as well as the Safety, Health and Welfare at Work (General Application) Regulations, 2007.

Chainsaws should only be used by personnel with appropriate training. The use of chainsaws should adhere to the Guide to Safe Working with Timber and Chainsaws (HSA, 2010).

Chainsaws and equipment should be maintained and correct protective equipment should be used at all times.

To ensure that IAPS management is carried out to a high standard, all such activities shall be supervised by a suitably qualified ecologist, who shall also visit treated areas on a regular basis to ensure that treatment has been successful.

8. REFERENCES

EA (2006) *The Knotweed Code of Practice: Managing Japanese knotweed on development Sites*. Environment Agency (England & Wales), Bristol.

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APPENDIX A
Site Photographs

Plate 1. Himalayan balsam on Edermine stream upstream of Glebe Bridge.

Plate 2. Japanese knotweed on Edermine stream upstream of Glebe Bridge.

Plate 3. Himalayan balsam on Edermine stream upstream of Glebe Bridge.

Plate 4. Himalayan balsam on Edermine stream upstream of Glebe Bridge.

Plate 5. Himalayan balsam growing out of the rock riverbed on Edermine stream immediately downstream of Glebe Bridge.

Plate 6. Himalayan balsam on Edermine stream downstream of Glebe Bridge.