


25m SCALE 1:1250

Key to Plan



Trees to be Removed

Channel Centreline,
Reference (C06) and
Chainage (300m)


- Notes:
1. Do not scale from drawing.
 2. Proposed works geometry and extents are subject to detailed design.
 3. This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Confirmation Drawings and Schedules.

Figure 3 (Appendix 3.2b) Proposed Trees to be removed
Plan Layout (Sheet 3 of 5)

The map displays a proposed road project area. Key features include:

- Streets:** Brooklodge Grove, Copper Valley Vue, and Copper Valley Heights.
- Proposed Road Alignment:** Indicated by a thick blue line running diagonally across the map.
- Stationing Points:** Labeled in red along the alignment: C05_400, C05_500, C05_600, C05_700, C05_800, C05_900, and C05_971.
- Topography and Elevation:** Various elevation points are marked with numbers (e.g., 13.6, 14.5, 15.3, 16.7, 17.6, 18.2, 18.7, 19.4, 22.7, 24.3, 29.3, 32.6).
- Infrastructure:** Includes a 110Kv power line and a water main labeled "M8".
- Landmarks:** Brooklodge House, Corbally House, and several other buildings are shown as grey shapes.
- Annotations:** A yellow circle around a point near C05_971 is accompanied by the text "Trees may be removed here".
- Orientation:** A north arrow is located in the bottom right corner.

Key to Plan



Trees to be Removed

Channel Centreline,
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Scale 1:1,250 at A1
Scale 1:2,500 at A3


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Figure 4 (Appendix 3.2b) Proposed Trees to be removed
Plan Layout (Sheet 4 of 5)


This map displays a residential area with a prominent blue river or canal. The river flows from the bottom left towards the top right. Several streets are labeled, including Church Hill, Glean Caon, R639, E Cliff Road, and Woodbrook. A network of red labels, likely representing specific locations or points of interest, is distributed across the map. These labels include C01_1300, C01_1400, C01_1500, C01_1600, C01_1700, C01_1800, C01_1900, C01_2000, C01_2100, C01_2200, C01_2300, C02_100, C02_200, C02_300, C02_400, C02_434, C03_000, and C03_001. A north arrow is positioned in the upper right corner, indicating the orientation of the map.

25m SCALE 1:1250

Key to Plan



Trees to be Removed



Channel Centreline,
Reference (C06) and
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Appendix 4.1

Outline Invasive Species Management Plan

Cork County Council and Office of
Public Works

**Glashaboy River (Glanmire and
Sallybrook) Drainage Scheme**

**Outline Invasive Species
Management Strategy**

Appendix 4.1

Issue | May 2018

This report takes into account the particular
instructions and requirements of our client.

It is not intended for and should not be relied
upon by any third party and no responsibility
is undertaken to any third party.

Job number 234334-00



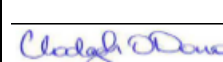
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Document Verification

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Appendices

Appendix A

Results of 2015 Invasive Species Survey - Drawings GR_201 to GR_219

Appendix B

Results of 2017 Japanese Knotweed Survey

1 Introduction

Invasive plant species have been identified and documented within proposed works areas that are included in the Glashaboy River (Glanmire and Sallybrook) Drainage Scheme.

The purpose of this outline non-native invasive species management plan is to present the strategy that will be adopted during the construction and operation of the proposed scheme in order to manage and prevent the spread of the invasive plant species.

This outline plan is intended to be a working document and will be updated during both the construction and operational phases. During construction, it will be updated by the contractor to form the detailed invasive species management plan which will form part of the detailed Construction Environmental Management Plan (CEMP). Following construction, the plan will be updated for the operational phase, taking into account the results of the detailed construction invasive species management plan and operational maintenance requirements etc.

Construction (and potentially operational maintenance works) could potentially disturb stands of invasive plants and/or soils contaminated with invasive plant material. In addition to lands within the proposed works areas, there is an identified risk of invasive plant species being spread onto neighbouring lands and onto public roads and other locations.

Invasive plant species which have been identified in the proposed works areas include Himalayan Balsam (*Impatiens glandulifera*), White Heliotrope (*Petasites fragrans*) and Japanese knotweed species. While other invasive plant species have also been identified in the area, Japanese knotweed is of primary concern for the structural integrity of these proposed flood works and for the designated sites downstream, therefore the focus of this report is on the prevention of the spread of knotweed. However, the same principles will apply to other invasive species.

This report outlines the strategy that will be adopted during the construction and operation of the flood relief scheme in order to prevent the spread of invasive plant species.

The main objective of the invasive species management strategy for the scheme will be to:

- Prevent the spread of invasive plant species during the construction phase;
- Manage the growth of invasive plant species adjacent to flood defences so as to protect the integrity of the structures from the impacts of these species;
- Prevent the spread of invasive plant species during channel maintenance works in the future.

2 Methodology

This report applies the most relevant and current guidance in relation to the treatment and management of non-native invasive plant species in construction projects. The following literature was referred to in preparation of this report.

- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2008)
- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)¹
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015).

3 Legislation

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000 where it states that

‘Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, [‘refers only to exotic species thereof’][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.’

Under the European legislation, the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011) , Section 49(2) prohibit the introduction and dispersal of species listed in the Third Schedule (including Japanese knotweed) whereby “*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [...] shall be guilty of an offence.*”

The implementation of the management measures set out in this plan have been informed by the above legislation.

4 Non-Native Invasive Species in the Study Area

Non-native invasive species have been identified in a number of areas where the proposed construction works and also throughout the Glashaboy catchment and throughout the Glanmire/Sallybrook area. Invasive plant species which have been

¹ This document was officially withdrawn by the UK Environment Agency as a guidance document in July 2016 but contains relevant, practical advice and is included here for that reason.

identified include Himalayan Balsam (*Impatiens glandulifera*), Winter Heliotrope (*Petasites fragrans*), Buddleia (*Buddleja davidii*) and Japanese knotweed species. Although these non-native invasive species are present throughout the study area, for the purposes of this scheme, a non-native invasive species management plan will only be put in place within the footprint of the construction works.

A number of surveys have been carried out in the study area in the last number of years. In 2015, a survey was carried out by Dixon Brosnan. Chemical treatment of knotweed infested areas was carried out by Cork County Council following this survey. In 2017, a survey was carried out by Japanese Knotweed Ireland and chemical treatment in the infested areas was also carried out in the same year.

The drawings appended to the end of this report show the locations of invasive species, including Japanese Knotweed. Refer to Drawings GR_201 to GR_219 in **Appendix A** for details of the locations of invasive species identified in September 2016. Refer also to **Appendix B** for details of the infestations identified and treated in 2017. It should be noted that the invasive species drawings were compiled in September 2016 and the design of the drainage scheme had not been finalised at that stage. Therefore, the design details shown on the invasive species drawings should not be relied upon. Refer to the Confirmation Drawings for details of the finalised design.

5 Management Options

5.1 General measures to avoid spreading invasive species during construction or soil movement

Many of the species noted above are highly invasive, and can easily spread to new areas. Most are particularly effective at colonising disturbed ground (e.g. construction sites). Some species spread by the re-growth of cut fragments or root material such as Japanese Knotweed, so if they are broken up during site clearance or other earthworks they can readily re-grow in new areas to which soil is moved.

The unintentional spread of invasive species during construction works is a significant issue, and if not managed in the correct manner, species like Japanese Knotweed could be spread to uninfested areas, which would increase the future cost and effort required to control the species, and could pose further public health and safety risks (Knotweed species can cause damage to buildings and infrastructure).

The most common ways that these species can be spread are:

- Site and vegetation clearance, mowing, hedge-cutting or other landscaping activities
- Spread of seeds or plant fragments during the movement or transport of soil
- Spread of seeds or plant fragments through the local surface water and drainage network

- Contamination of vehicles or equipment with seeds or plant fragments which are then transported to other areas
- Importation of soil from off-site sources contaminated with invasive species plant material

Depending on the timescale for the construction of the proposed scheme it may be possible to eradicate some species prior to the onset of construction on the site via an advance treatment contract (refer to Section 5.2 below); this would be preferable. However if control programmes have not been achieved before construction begins, then site hygiene measures will need to be put in place to ensure that the further spread of invasive species is avoided. Refer to the Section 5.4 below on site hygiene below for further details on same.

5.2 Advance Treatment

As mentioned previously, advance chemical treatment works on knotweed species have commenced. At least two rounds of treatment have been carried out so far and it is expected that further treatment will be carried out if deemed necessary and feasible. The specific treatment method is decided on a site by site basis. Details on the advance treatment (such as treatment locations, treatment methodologies etc) will be made available to the main contractor before the construction works commence.

5.3 Pre-construction Survey

As species may have spread, or their distribution may have changed, between the surveys and subsequent advance treatment carried out in 2017 and the commencement of the main construction works, the implementation of this Outline Invasive Species Management Plan will require a pre-construction re-survey by a suitably qualified person within the proposed scheme boundary and any additional areas where construction works are required (e.g. temporary construction compounds, haul routes etc.). In accordance with the TII guidance this survey will produce accurate 1:5,000 scale mapping for the precise location of invasive species. The pre-construction surveys will be undertaken by suitable experts with competence in identifying the species concerned having regard to any seasonal constraint.

5.4 Site Hygiene

Maintaining site hygiene at all times in an area where invasive non-native species are present is essential to prevent further spread. It is also necessary on sites where invasive non-native species are not present but where there is risk of contaminated material being brought to site, for example, site machinery being used on multiple site, construction staff travelling between infested and not infested sites. Preventative measures must be taken. Construction equipment, vehicles and footwear may provide a vector for the spread of invasive non-native species.

The following site hygiene measures shall be taken for each site where applicable:

- In relation to knotweed plant species - understand the possible extent of the rhizome (root) system underground – up to 7m horizontally and 3 meters vertically.
- Fence off the infested areas prior to and during construction works where possible in order to avoid spreading seeds or plant fragments around or off the construction site. In relation to knotweed plant species, allow for a 10m buffer around the area.
- Clearly identify and mark out infested areas. Erect signs to inform Contractors of the risk.
- Avoid if possible using machinery with tracks in infested areas.
- Clearly identify and mark out areas where contaminated soil is to be stockpiled on site and cannot be within 50m of any watercourse or within a flood zone.
- Create designated entry and exit points for operators on foot and for small mobile equipment. A delineated access track to be maintained free of non-native invasive species to be established through the site to avoid the spread of Japanese knotweed by permitted vehicles accessing the site.
- Installation of a dedicated footwear and vehicular wheel wash down facility into a contained area within each works site.
- Vehicles leaving the site to be inspected for any plant material and washed down into a contained area.
- Vehicles used in the transport of contaminated material will need to be visually checked and washed down into a contained area before being used for any other work, either on the same site or at a different site.
- Material gathered in dedicated wash down contained areas will need to be appropriately treated along with other contaminated soil on site. Refer to sections below in relation to treatment methods.
- If soil is imported to the site for landscaping, infilling or embankments, the contractor shall gain documentation from suppliers that it is free from invasive species.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Invasive Species Management Plan.
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material.

5.5 Treatment Methods

In addition to the advance treatment works (if implemented) and pre-construction survey, when the works areas becomes available to the contractor for fencing and commencement of site clearance, areas identified as requiring specific treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed scheme or beyond the land take.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below. It is also noted that it may not be possible to completely eradicate the invasive species before or during the construction phase. For example, where structures are proposed at sites that contain Japanese knotweed, root barrier membranes may require to be installed to protect the structures from the plant. The design of these membranes will form part of the detailed design stage.

It should be noted that those involved in the application of herbicides/pesticides must be competent to do so and, consequently, must have sufficient training, experience and knowledge in the area of herbicides/pesticides application. It is important that all staff involved in the application of herbicides/pesticides have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

5.5.1 Chemical Treatment

The control of some species will require the use of herbicides (if not buried), which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, a qualified and experienced Contractor will be employed to carry out all work.

It is advised that contractor refer to the following documents, which provides detailed recommendations for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2008)
- Invasive Species Ireland Best Practice Management Guidelines for Japanese Knotweed (2015)
- The Knotweed Code of Practice: Managing Japanese knotweed on development sites (UK Environment Agency, 2013)

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of a herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine. Generally, if herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective, or monitored for a minimum of two years during which no regrowth is recorded.

Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical - will impact all plant species) whereas 2-4-Amine, can be persistent for up to one month, can also be used near water but is more selective on certain plants. The selection of chemical will depend on the site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient. It is essential that a competent and qualified person carries out the herbicide treatment. Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be required in the site-specific invasive species management plan.

Chemical control of Himalayan balsam is readily achieved with the use of glyphosate or 2,4-D amine, which should be applied during active growth in late spring but late enough to ensure that germinating seedlings have grown sufficiently to be covered by the spray. Repeat treatments or other means of controlling seedling germination will be required for a period of five or more years. Monitoring of the site will be required in mid-spring and mid-summer to assess the occurrence of seedlings and determine appropriate control.

In relation to winter heliotrope, an application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in midsummer or later but before the foliage begins to die back.

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

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. It is an efficient way to treat large monocultures of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese knotweed.

In the case of knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system. While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as knotweed possesses many stomata openings on the leaf under surface. Dead stems should be cut, removed and burned on/off site in accordance with the Waste Management Acts 1996 as amended and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286).

The stem injection method is sometimes used for Japanese knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd node).

Subsequently approximately 10 mls of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate based products, are most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

In order to ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 dealing with the application on to non-target areas from the National Parks and Wildlife Service.

5.5.2 Excavation and Chemical Treatment

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species in particular knotweed is required to be completed in a shorter timeframe. The Environment Agency suggest that by digging up the rhizomes and recultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth (this is not recommended for a river bank habitat where there is the possibility of flooding occurring). They should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the Waste Management Acts 1996 as amended and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286). The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur and allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then cultivate the ground to stimulate rhizomes to produce higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site specific management plan.

5.5.3 Excavation and Burial

Excavated material containing knotweed can also be buried on site. This will require burying the material at a depth of at least five metres. The contaminated material must be covered with a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer's guarantee is required. Accurately map and record the location of the burial site to prevent any future accidental disturbance. Inform future owners of its position. If soil containing Japanese knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. The area should be clearly fenced and signed, and should be regularly treated with herbicide to prevent any regrowth or reinfestation.

As a precaution, the stockpiled material should be laid on a root barrier membrane and covered to avoid contaminating the site further.

5.5.4 Excavation and Root Barrier Cell Method

Excavated material containing knotweed can also be buried on site within a root barrier membrane cell. Similar procedure to above. This will require burying the material at a depth of at least two metres. The contaminated material must be within a contained cell consisting of a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer's guarantee is required. Stockpiling method as above.

5.5.5 Excavation and Bund Method

Where there is not sufficient depth on a site for deep burial the EA Guidelines set out another option whereby such excavated material is placed in a structured bund. The bund will comprise a raised area above ground level or a shallow excavation, no more than 0.5m deep, and lined with a root barrier membrane. The membrane must stay intact for at least 50 years and a manufacturer's guarantee is required. This method of treatment can also be used where knotweed material needs to be moved from a location and there is another ideal area of the site available to contain it.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly signed and protected from potential accidental damage.

Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

5.5.6 Excavation and Removal from Site

Where the above treatment options are not possible (site is too small to contain excavated material, too shallow for burial, or where there is lack of space or where the infestation simply cannot be avoided by the construction works) removal of excavated material may be the only option. Where there are small amounts of Knotweed material to be removed it is possible to double bag the material and send to a fully licenced waste facility for disposal (i.e. landfill). Where the amount of material is larger in volume it will be necessary to haul from site to a suitably licenced waste facility. It should also be noted that in the process of excavating the knotweed if it has been treated with a persistent herbicide, the excavated material will need to be classified as hazardous waste and there will need to be disposed of to a hazardous waste facility.

If any invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal will not lead to a risk of further spread. The movement of invasive plant material requires a licence from the National Parks and

Wildlife Service (NPWS) under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

Invasive species (particularly roots, flower heads or seeds) will be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation. For example Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; relevant local authority byelaws and any other relevant legislation). All disposals will be carried out in accordance with the relevant Waste Management legislation (as per guidance from NRA, 2008). It should be noted that some invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. Advice will be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures. As noted above, additional specific measures for the management of Japanese Knotweed cuttings or contaminated soil can be found in the UK Environment Agency document *The Knotweed Code of Practice: Managing Japanese knotweed on development sites* (UK Environment Agency, 2013).

5.5.7 Hand pulling/mowing or cutting

Control measures for Himalayan balsam should aim to prevent flowering and are therefore essentially undertaken before the commencement of flowering in June. Where flower production can be prevented, eradication may still take over 5 years.

Mechanical control is only likely to be effective where good access is available and the ground smooth enough to permit either mowing or cutting back. Where accessible plants can be cut, mown or strimmed back to ground level before flowering in June. Do not cut earlier as this promotes greater seed production in any re-growth. Unless the plant is cut to below the lowest node, it will re-sprout. Regular mowing will control the plant provided the frequency of mowing is regular enough to prevent sprouting and flower formation. Repeat annually until complete control is attained. As plants are very shallow rooted, they can also be easily pulled by hand. Hand pulling will require a follow up pull in August due to new seeds sprouting. Vegetative material can be disposed of by composting unless seeds are present, in which case the material should be disposed of to a licensed landfill or burnt.

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

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

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

Mowing and cutting is not effective, this potentially increases the spread as fragments of viable stem are displaced to unaffected areas.

6 Management during the Operational Phase

6.1.1 Protecting Flood Defence Structures

As part of the operation phase there will need to be on-going treatment of non-native invasive species. A management plan for the operational phase will need to be formulated in consultation with the relevant bodies i.e. NPWS, IFI, OPW and Cork County Council.

Site hygiene protocols will need to be implemented.

6.1.2 Channel Maintenance Works

During channel maintenance works, a management plan will need to be put in place to prevent the spread of non-native invasive species downstream during those works.

Site hygiene protocols will need to be implemented.

As discussed above, the management plan for the operational phase will need to be formulated in consultation with the NPWS, IFI, OPW and Cork County Council.

7 Conclusion

The presence of non-native invasive species along the works areas of the proposed scheme requires the need for an Invasive Species Management Plan to be finalised prior to construction commencing. This Plan shall be written by a qualified ecologist.

Given the nature of the species and the rate of growth, each proposed works site will need to be re-surveyed prior to works. Site hygiene will be particularly

important on sites where invasive species are present but also ‘clean’ sites. Incoming vehicles, and equipment (including footwear worn by all site visitors) will need to be cleaned and inspected before coming on site and upon leaving, to prevent the further spread of the plant.

Where possible material will remain on site and be reused. Any material that must be removed off site to landfill or other suitable facility will require a licence from the National Parks and Wildlife Service.

The Plan must be clearly communicated to all site staff and must be adhered to if it is to be implemented successfully.

8 References

Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)

Invasive Species Ireland (2015) Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*

Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)

Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)

NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2008)

Cornwall Nature Reserves, (2008). Invasive Species. [Online]. Available at:

<http://www.cornwallnr.org.uk/inspec.htm>

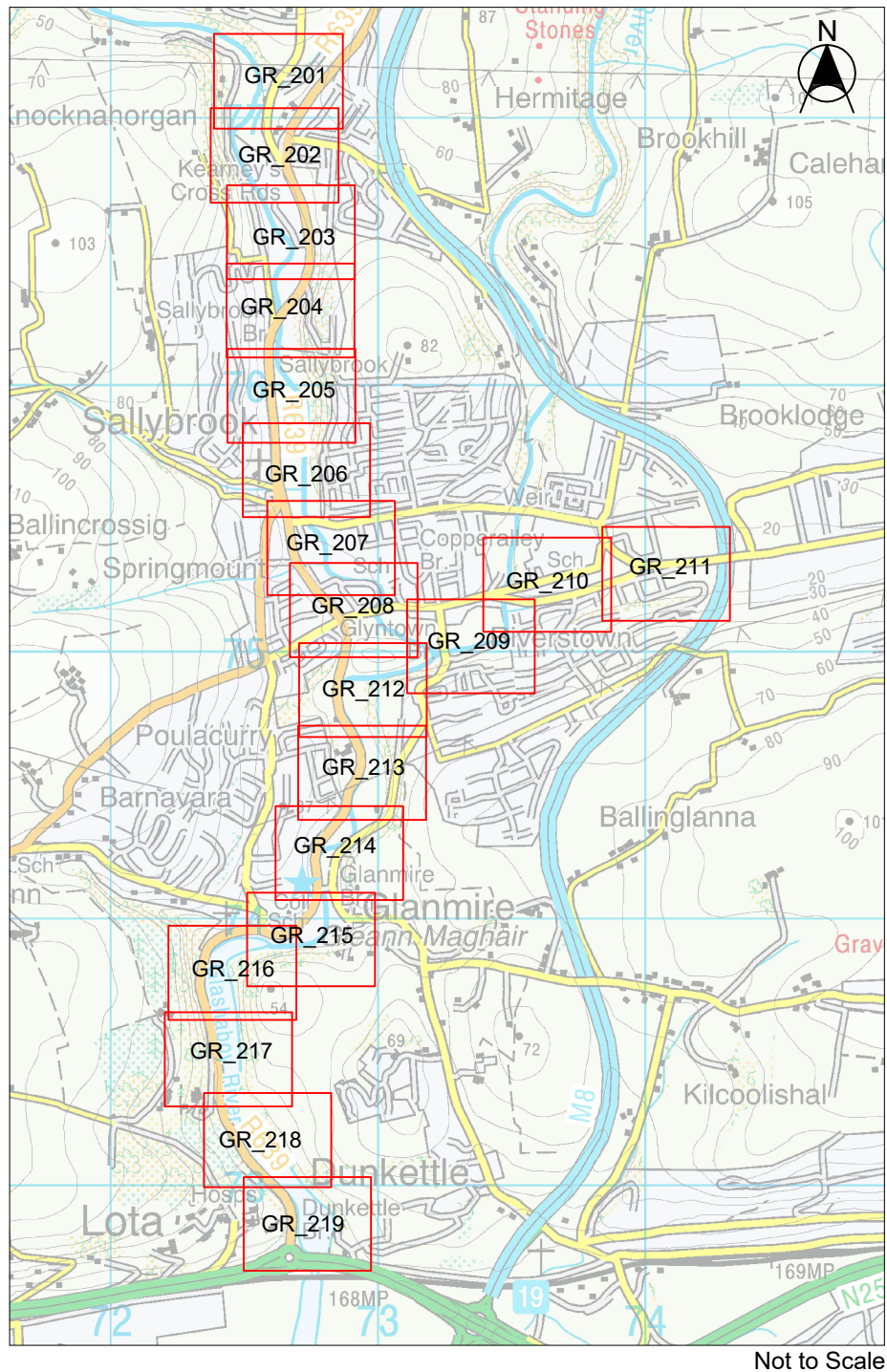
Royal Horticultural Society, 2008. Winter Heliotrope. [Online]. Available at:

http://www.rhs.org.uk/advice/profiles0904/winter_heliotrope.asp

Appendix A

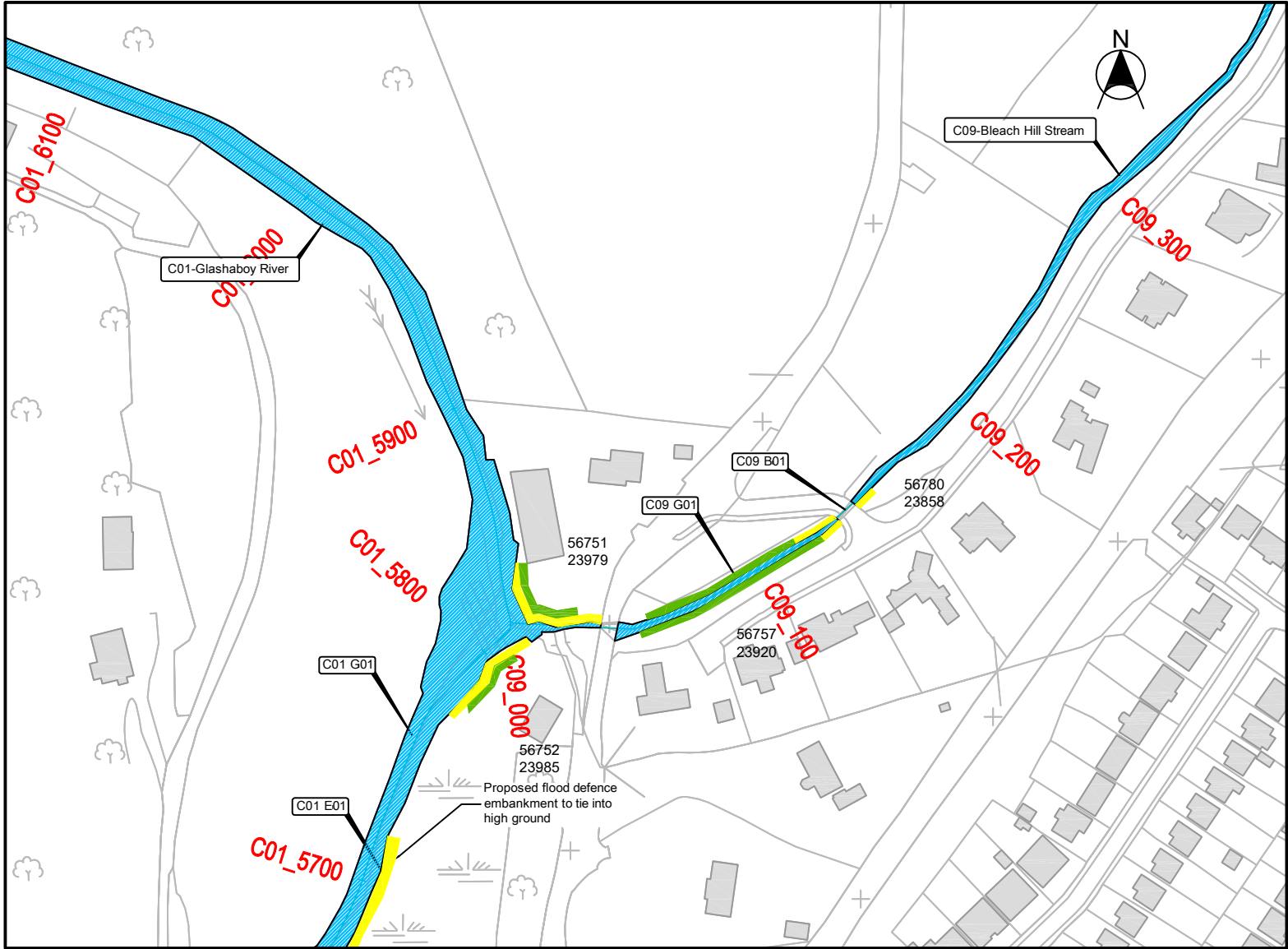
Results of 2015 Invasive Species
Survey - Drawings GR_201 to
GR_219

GLASHABOY RIVER, CORK (Glanmire/Sallybrook) - Invasive Species Survey
September 2016



GR_201 -GR_219 Indicates location on map of drawings contained herein

Glashaboy River (Glanmire/Sallybrook) Tree Survey



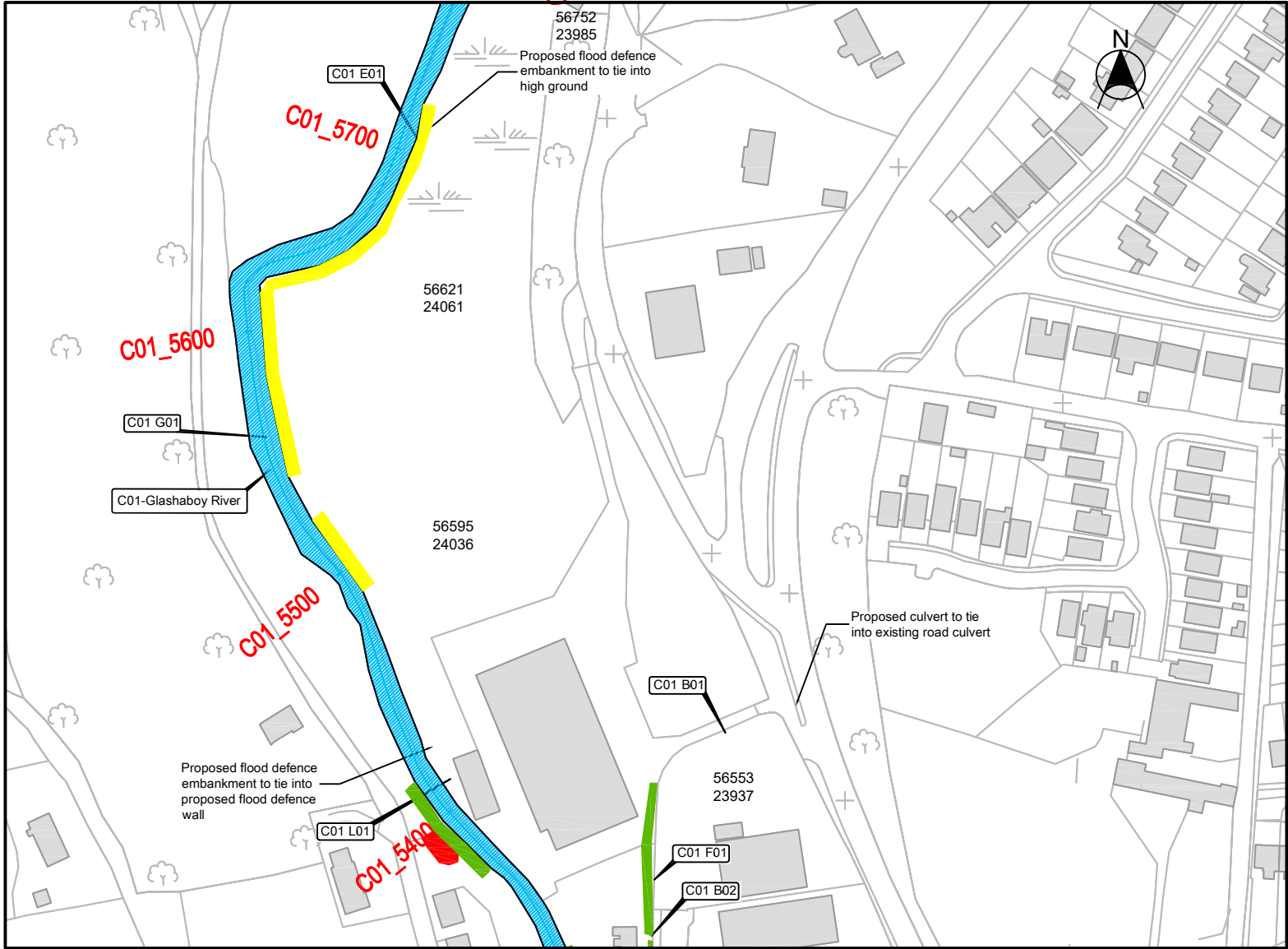
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_201 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



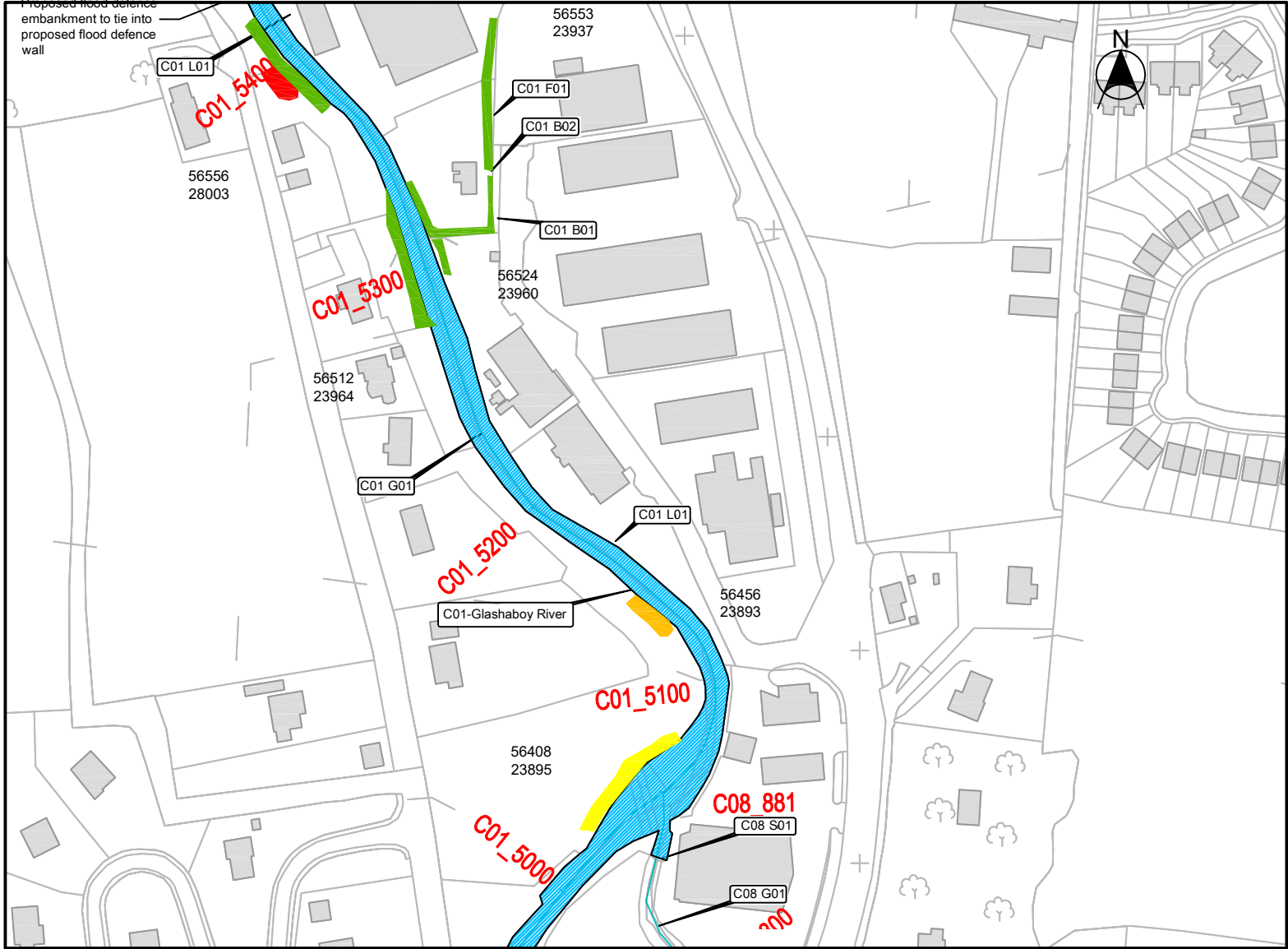
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_202 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



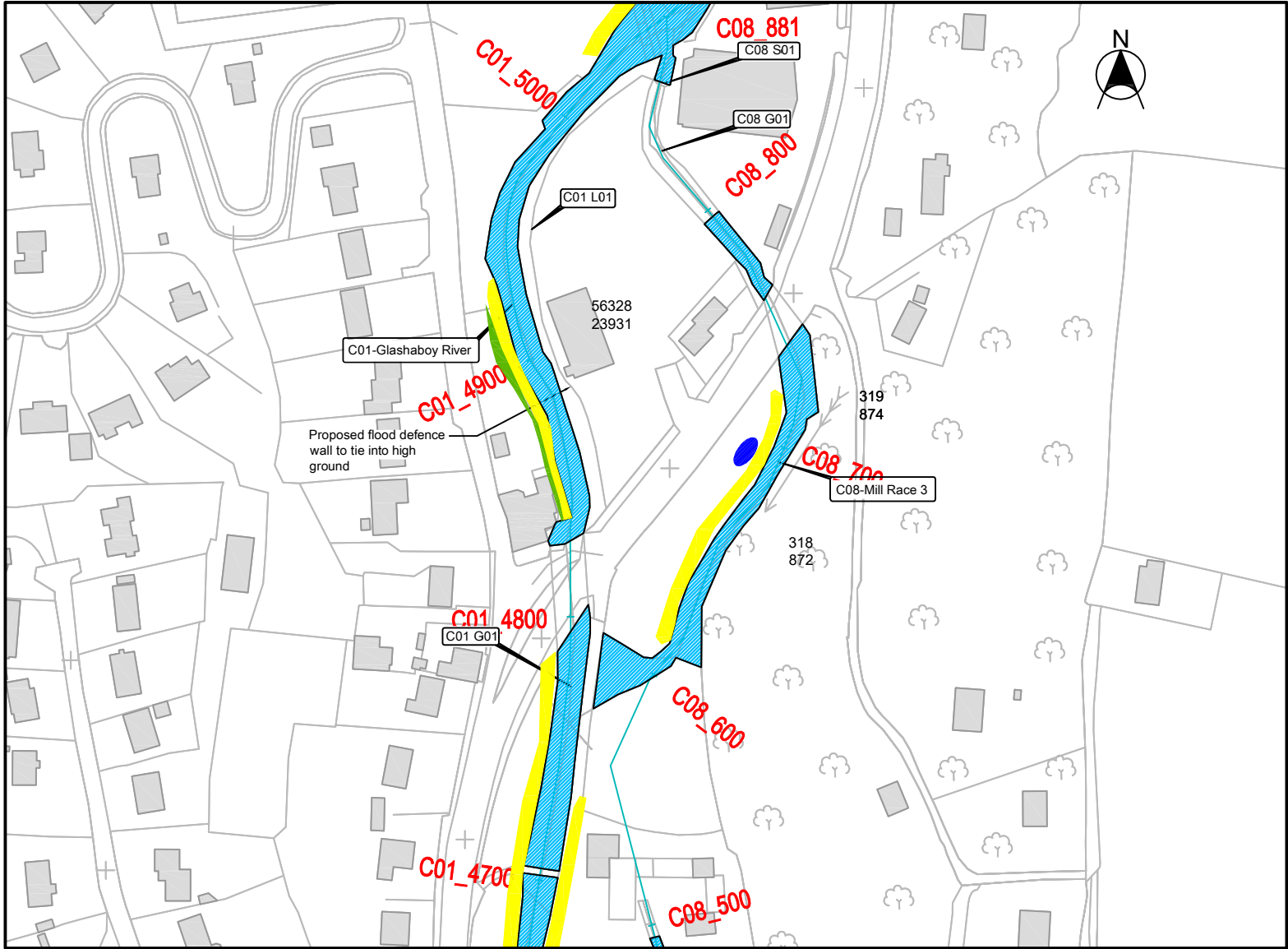
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_203 Invasive Species- Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



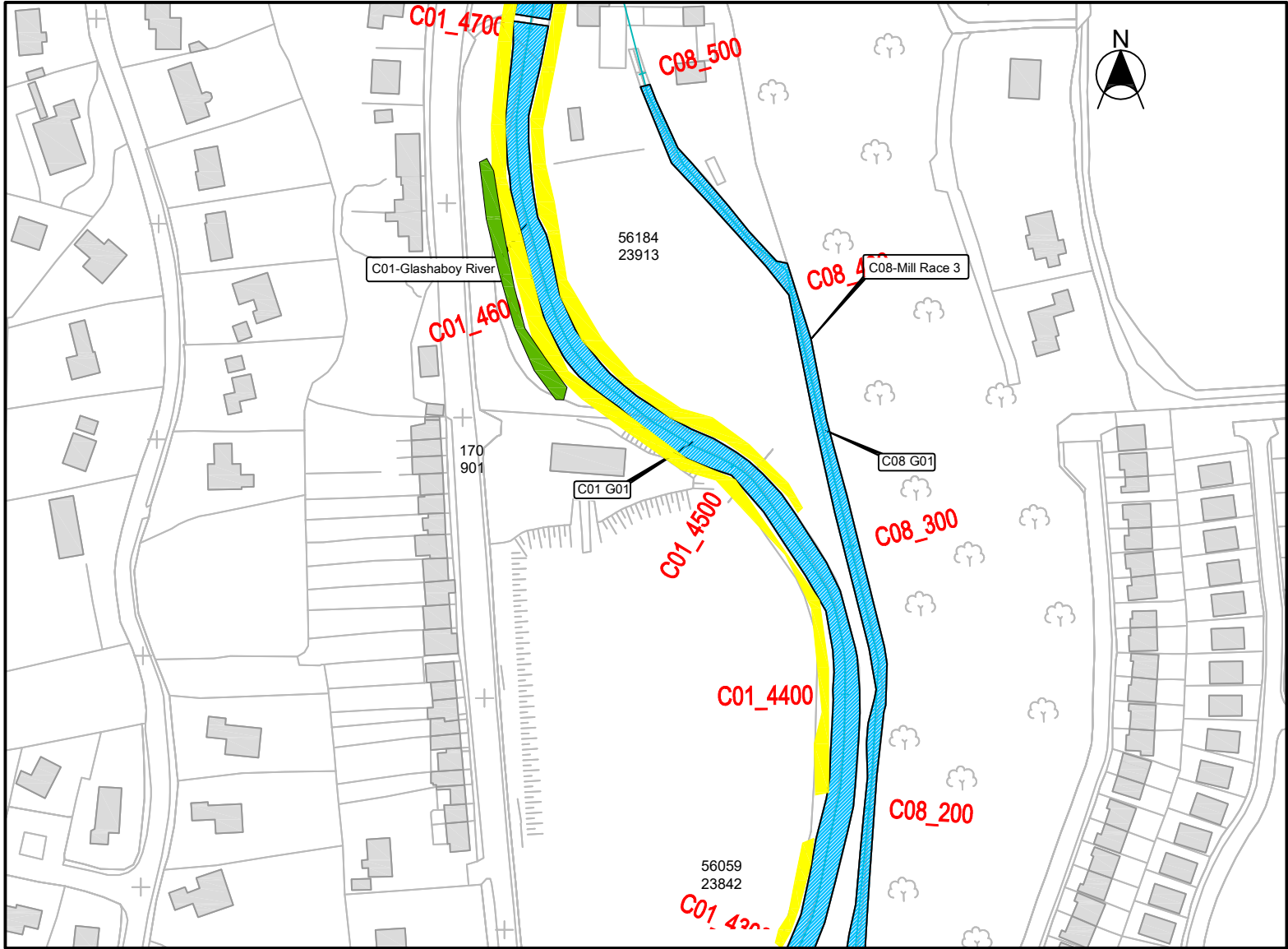
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_204 Invasive Species - Plan Layout

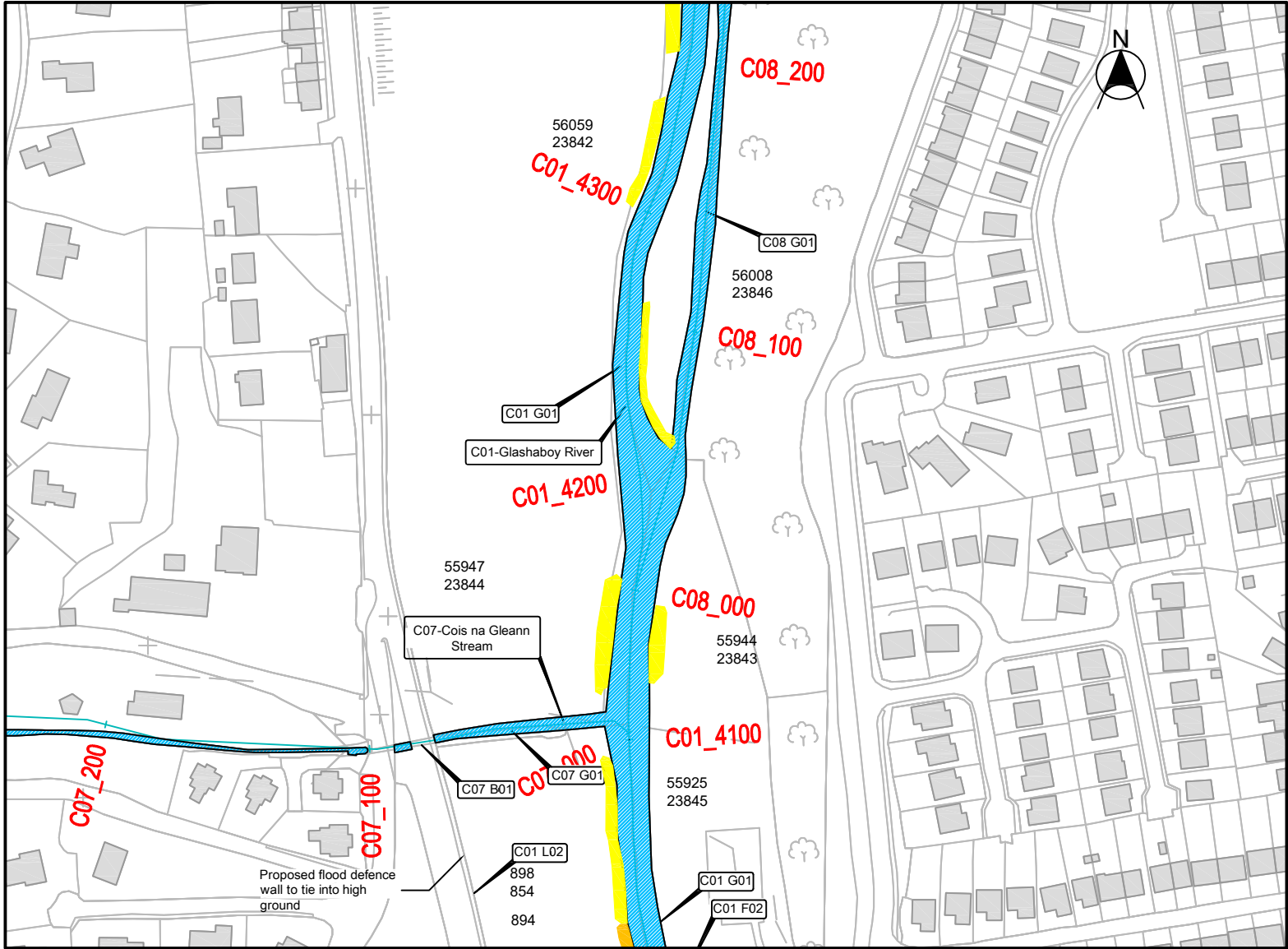
Glashaboy River (Glanmire/Sallybrook) Tree Survey



NOT TO SCALE

DRG. NO. GR_205 Tree Survey - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



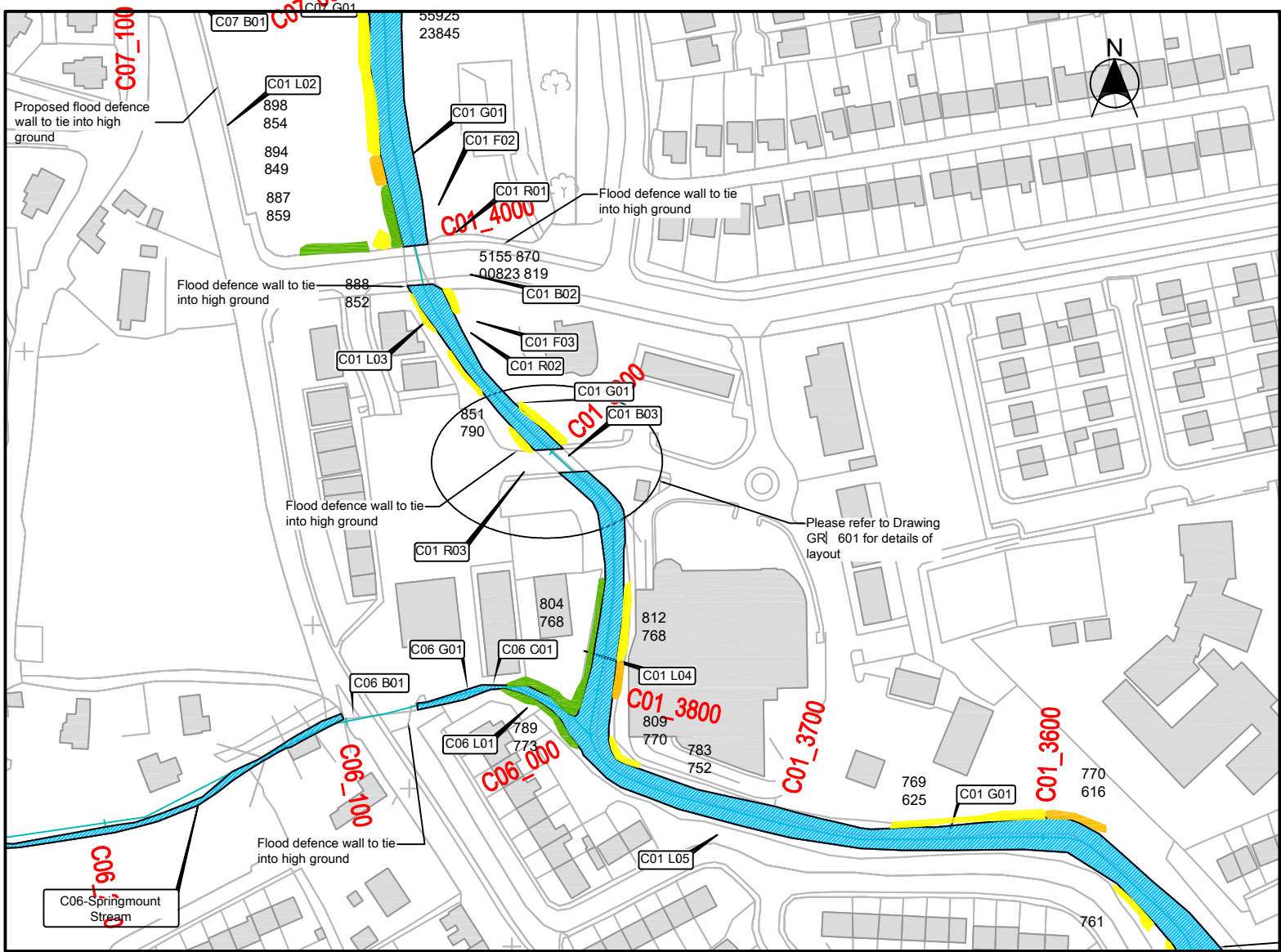
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_206 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



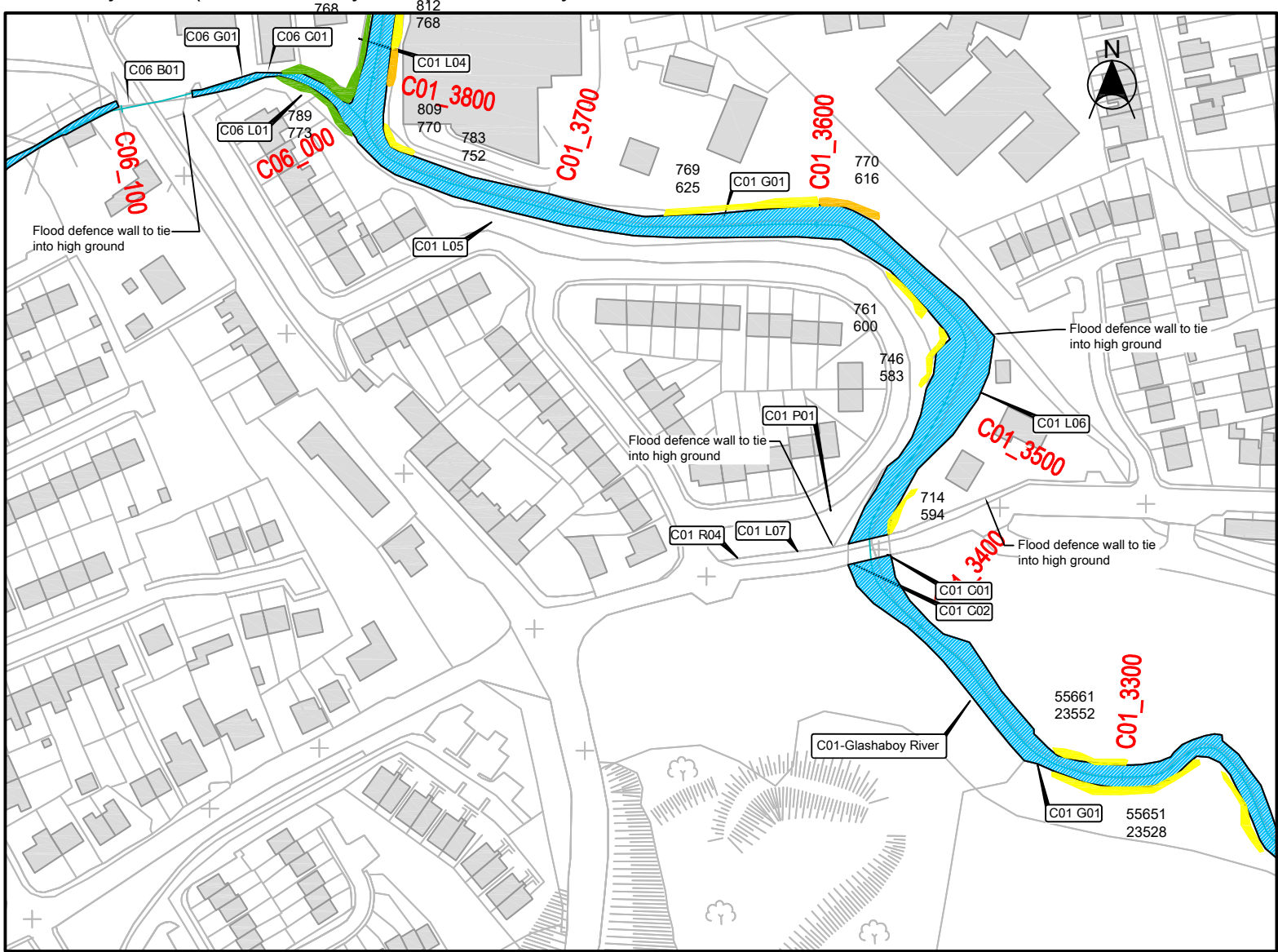
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_207 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



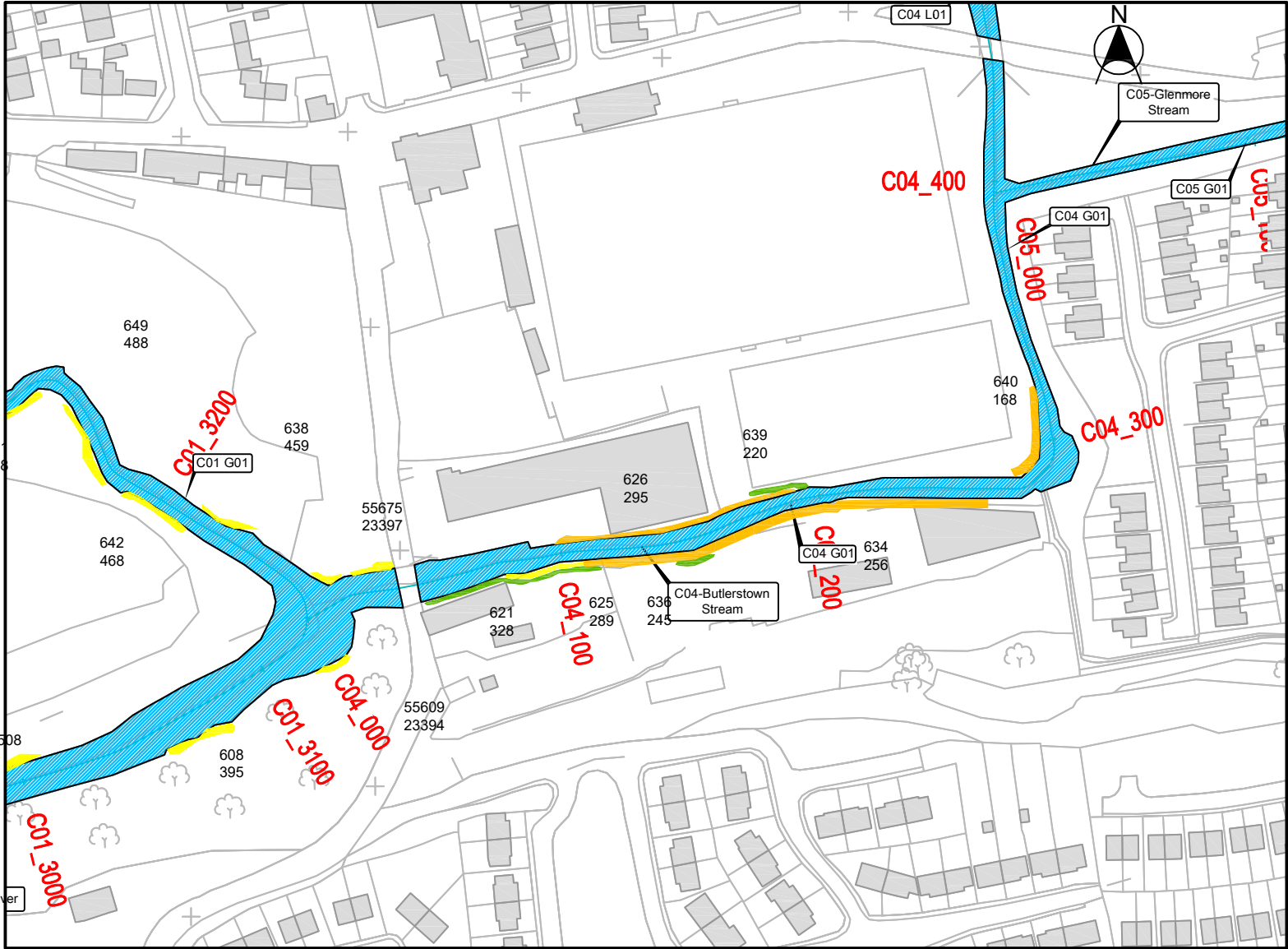
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_208 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



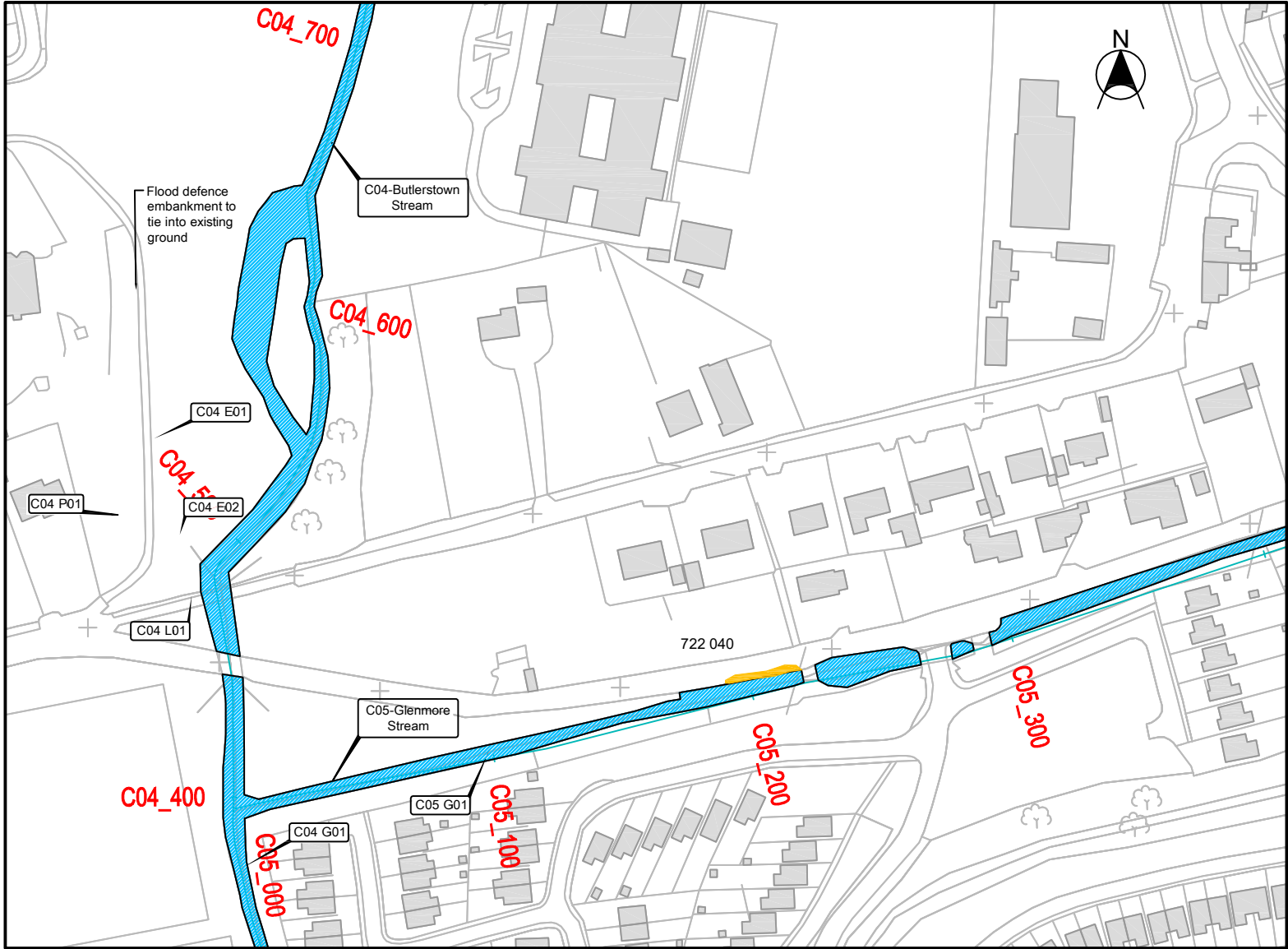
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_209 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



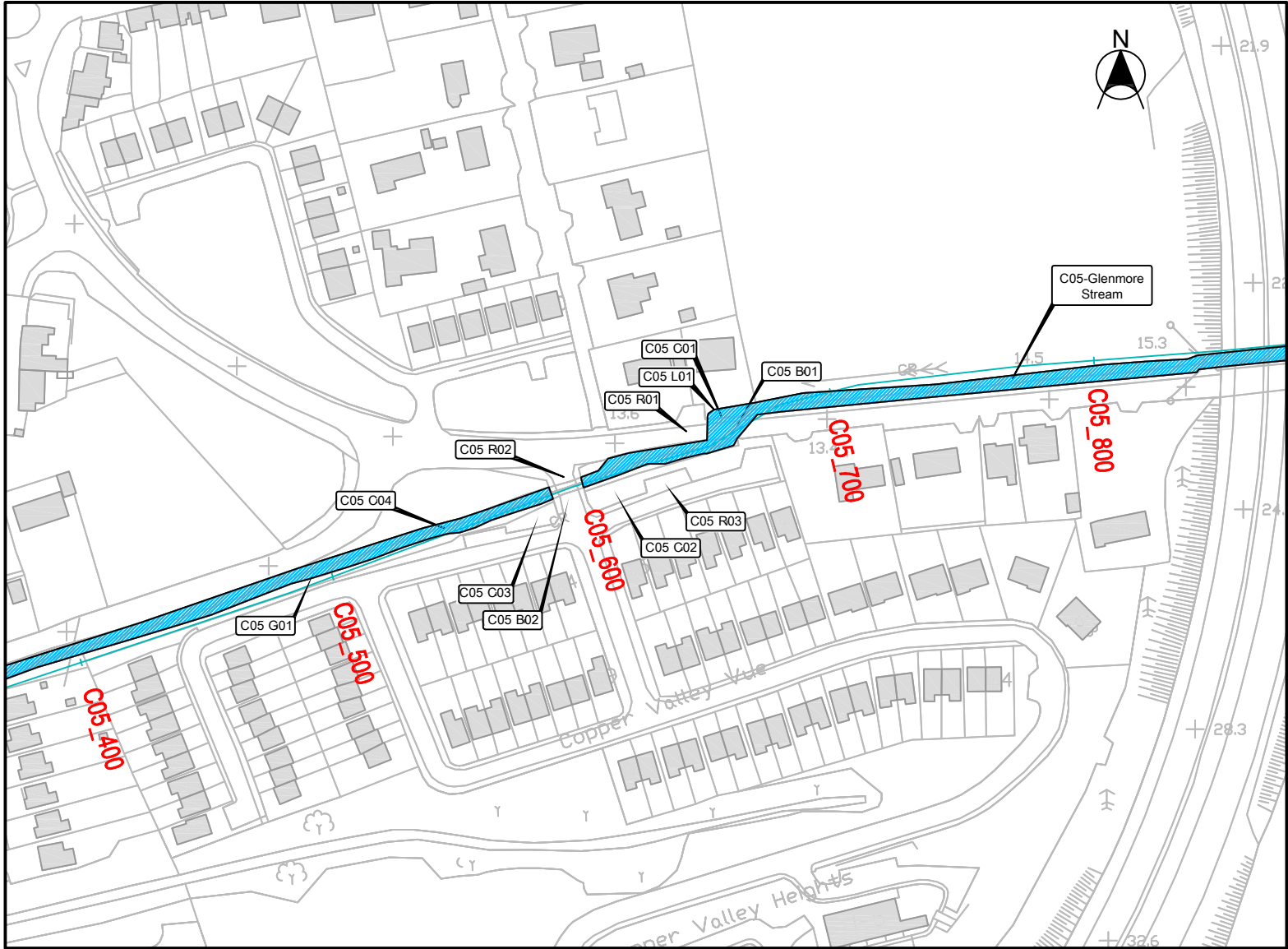
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_210 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



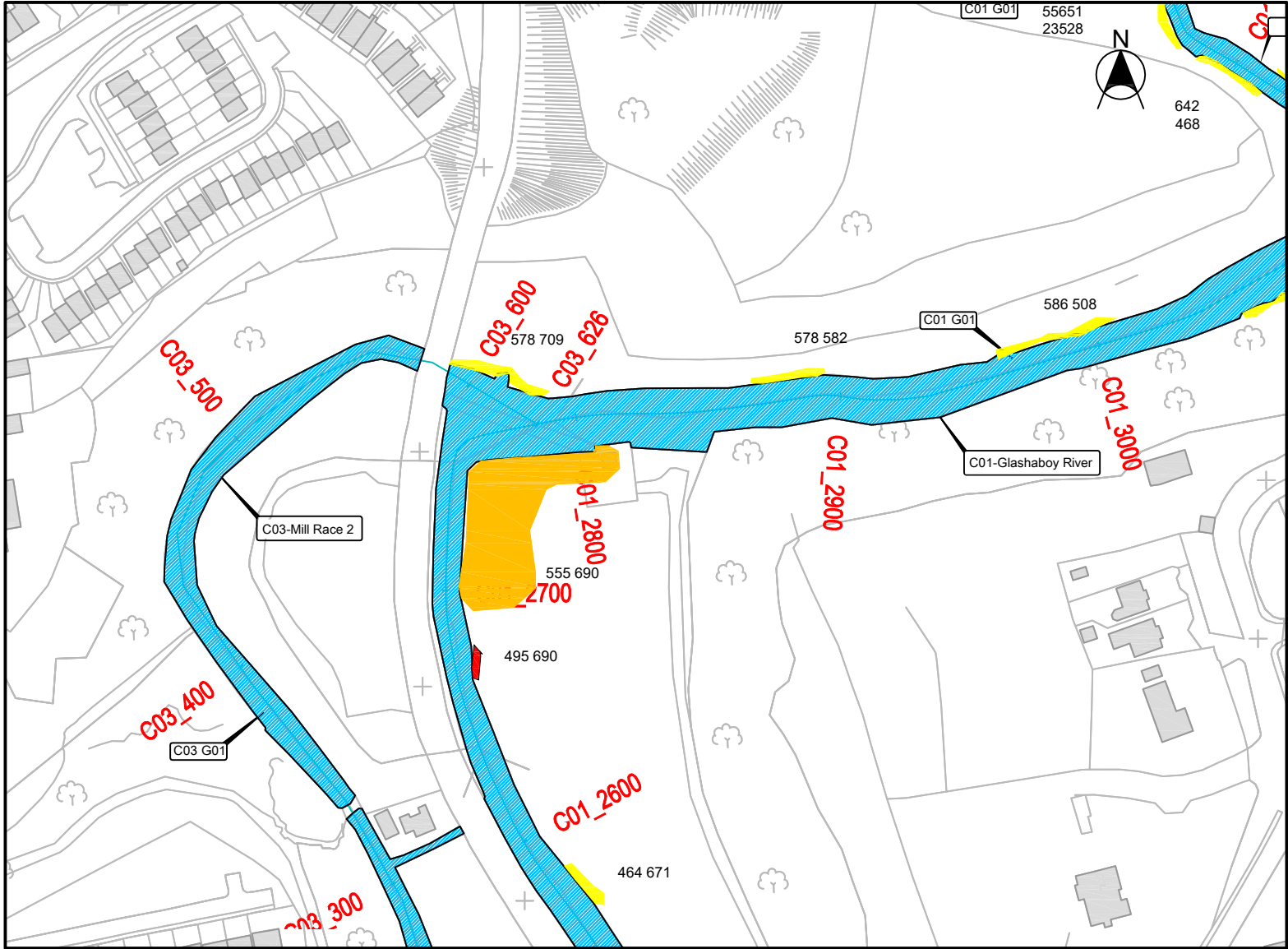
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_211 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



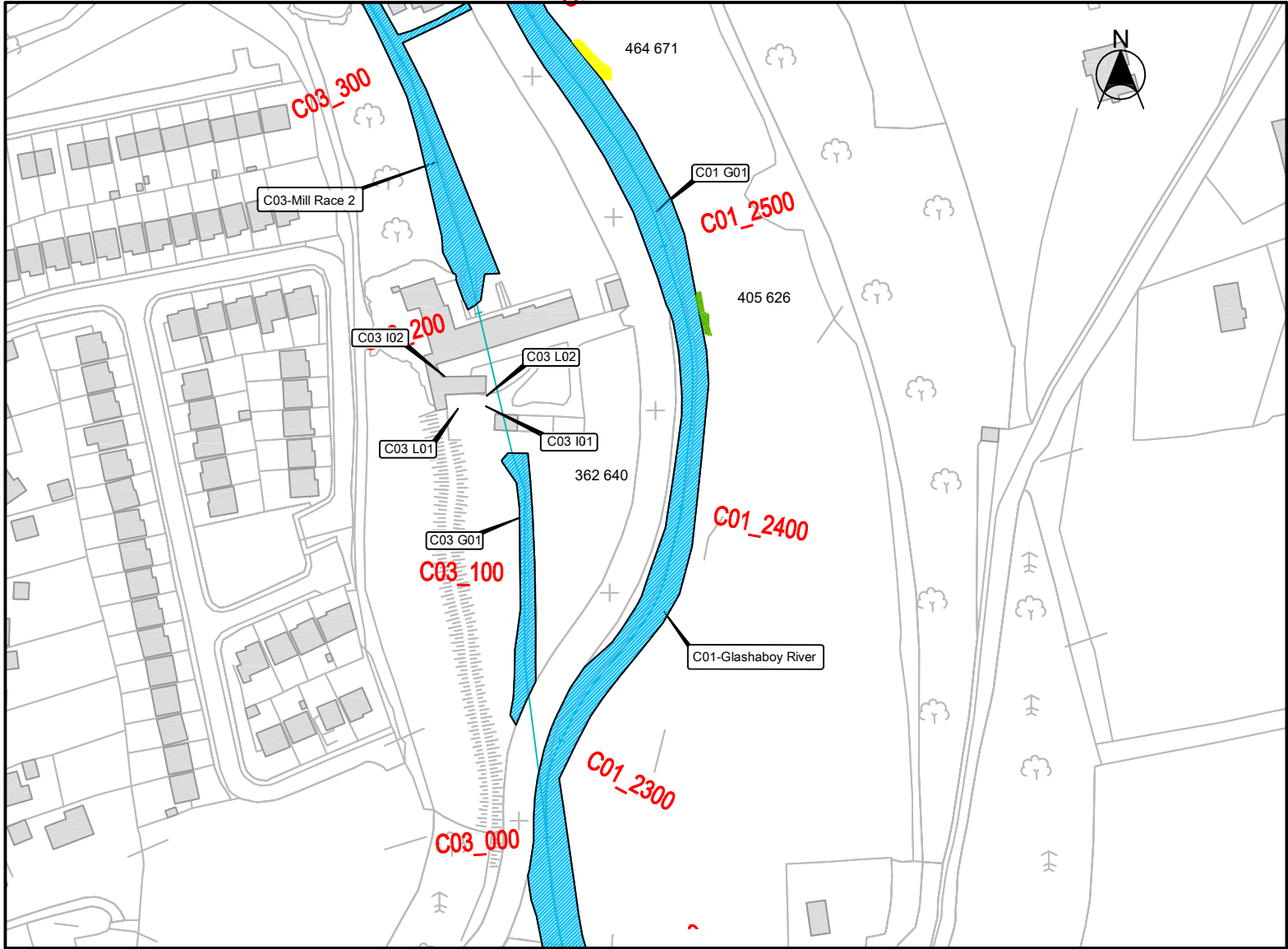
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_212 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



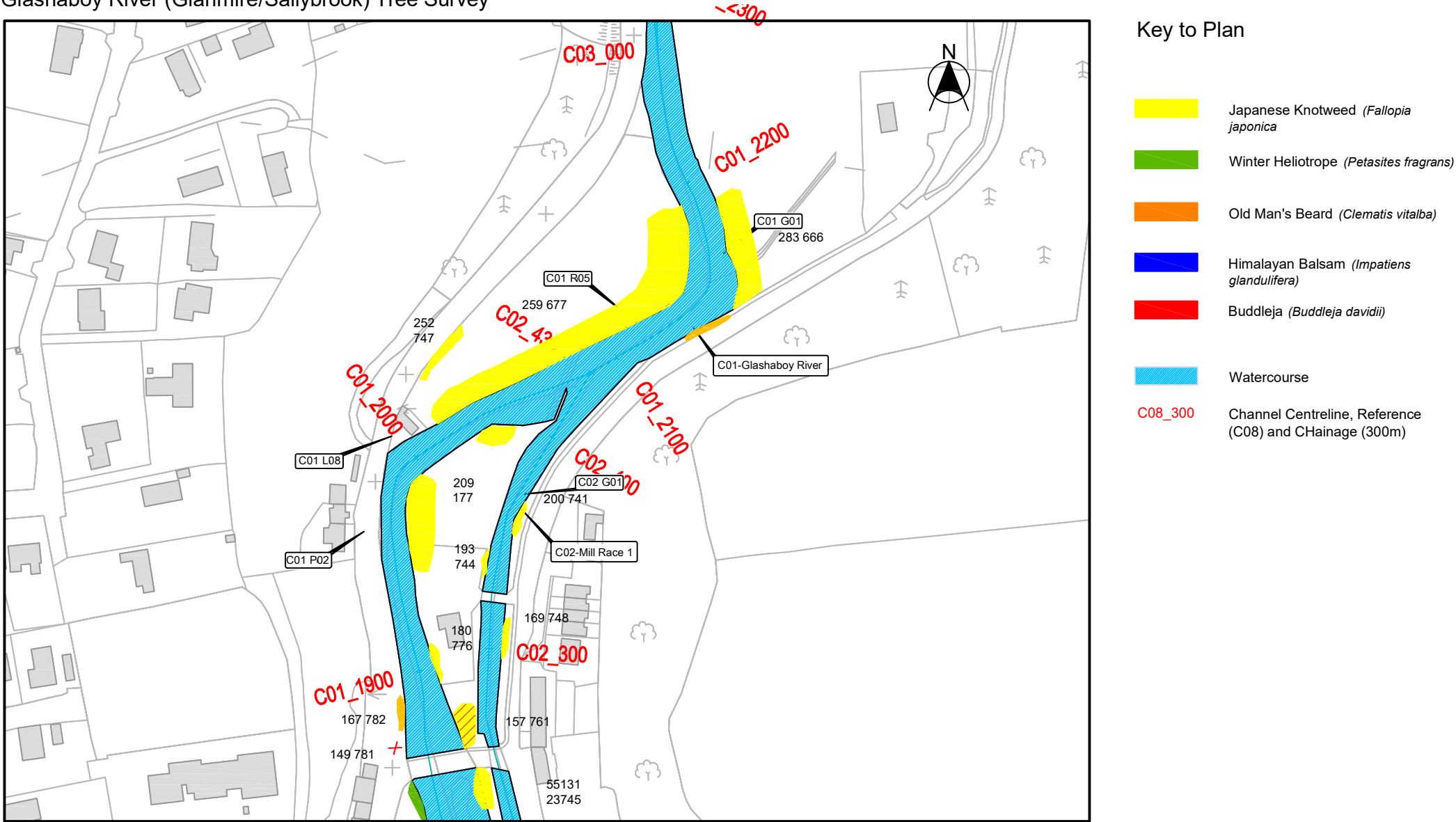
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

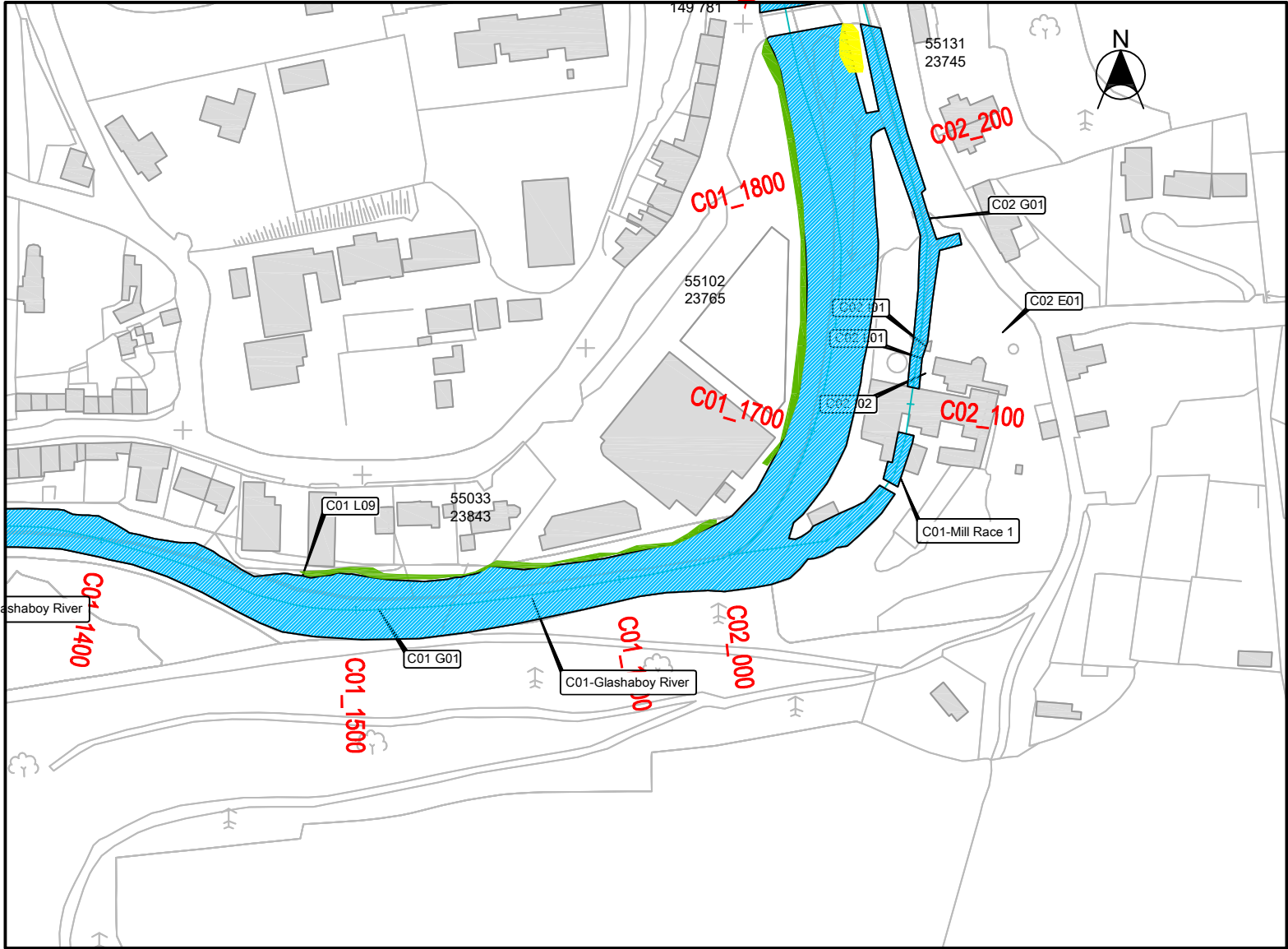
NOT TO SCALE

DRG. NO. GR_213 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



Glashaboy River (Glanmire/Sallybrook) Tree Survey



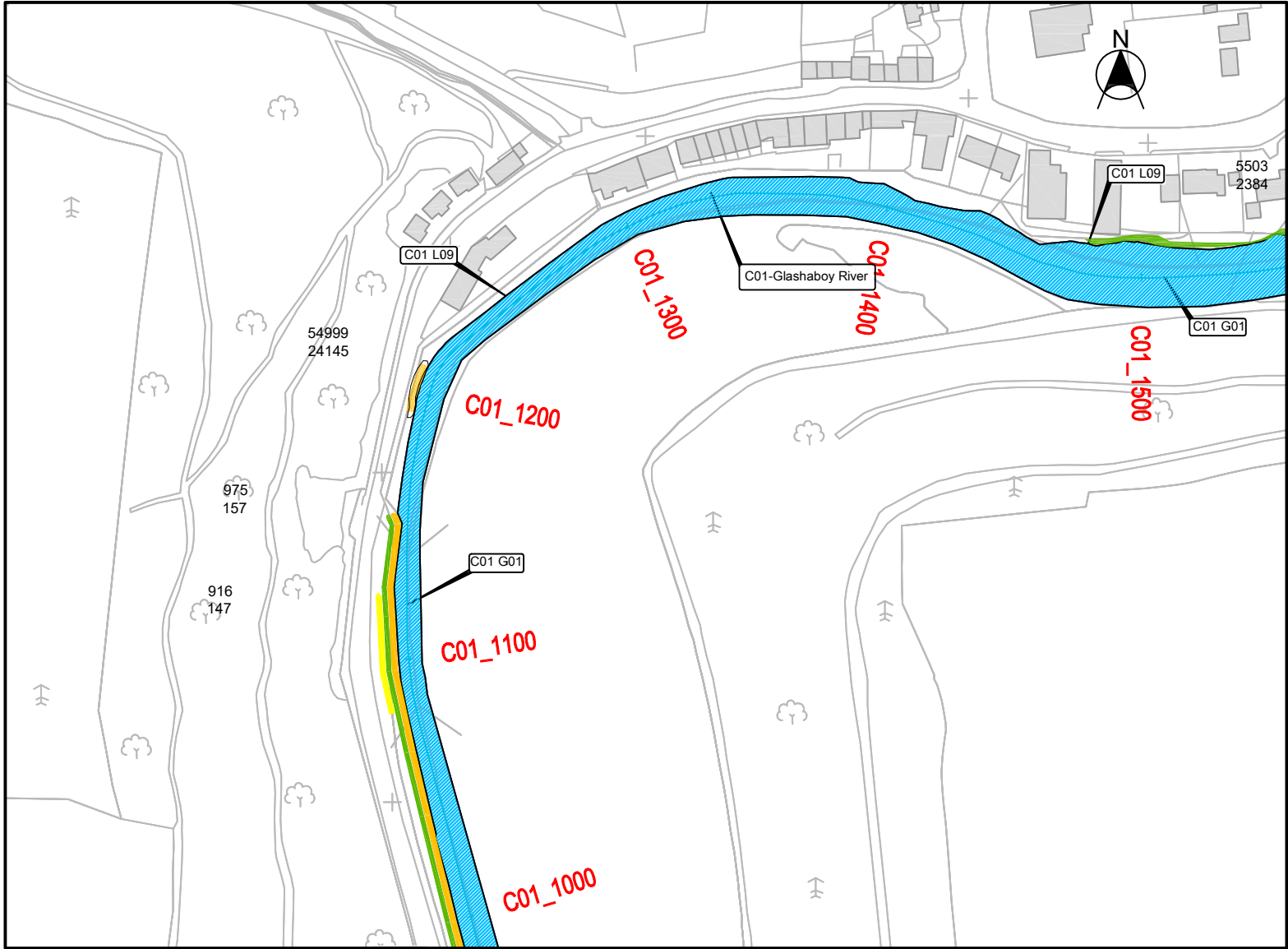
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_215 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



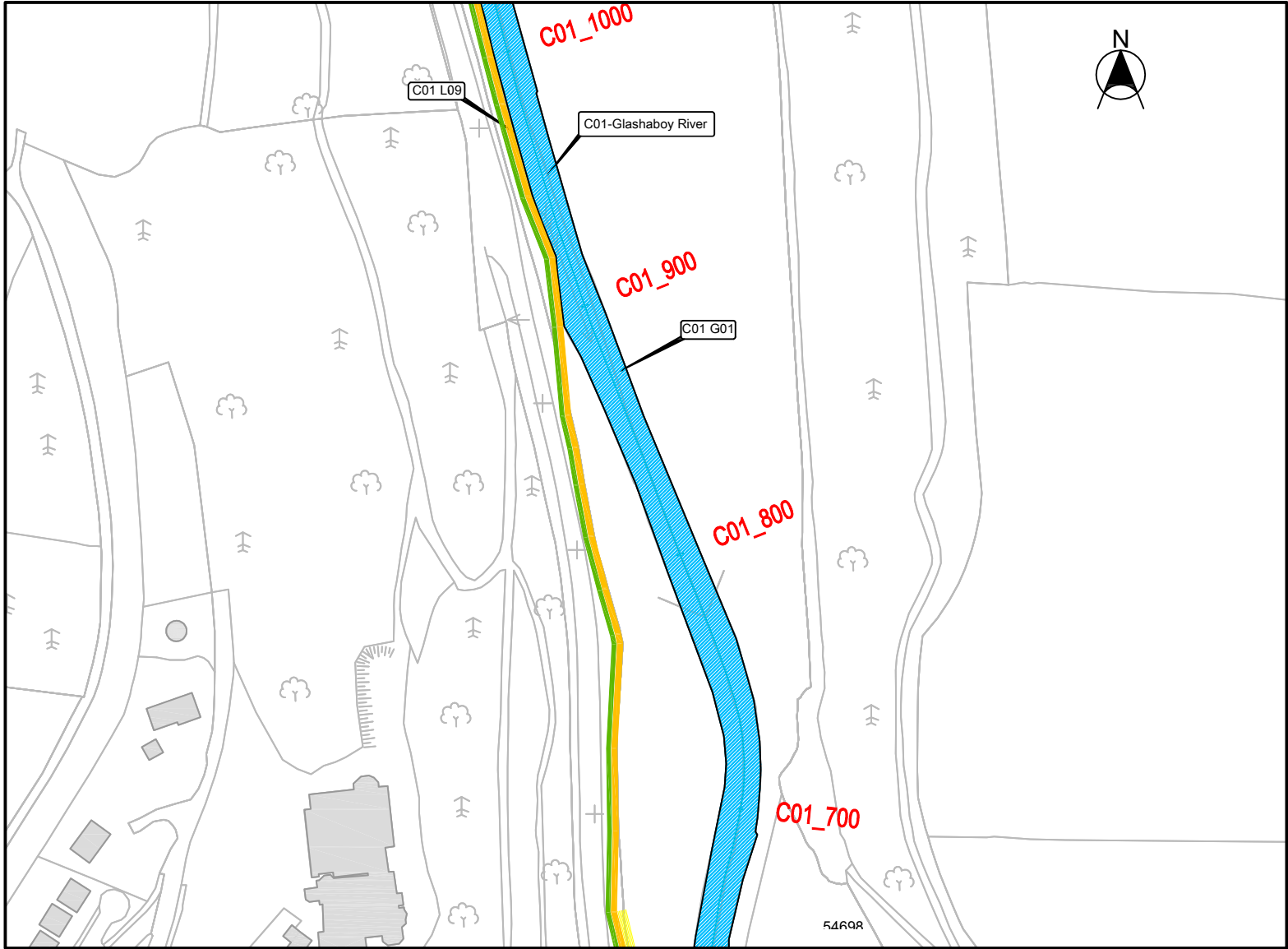
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_216 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



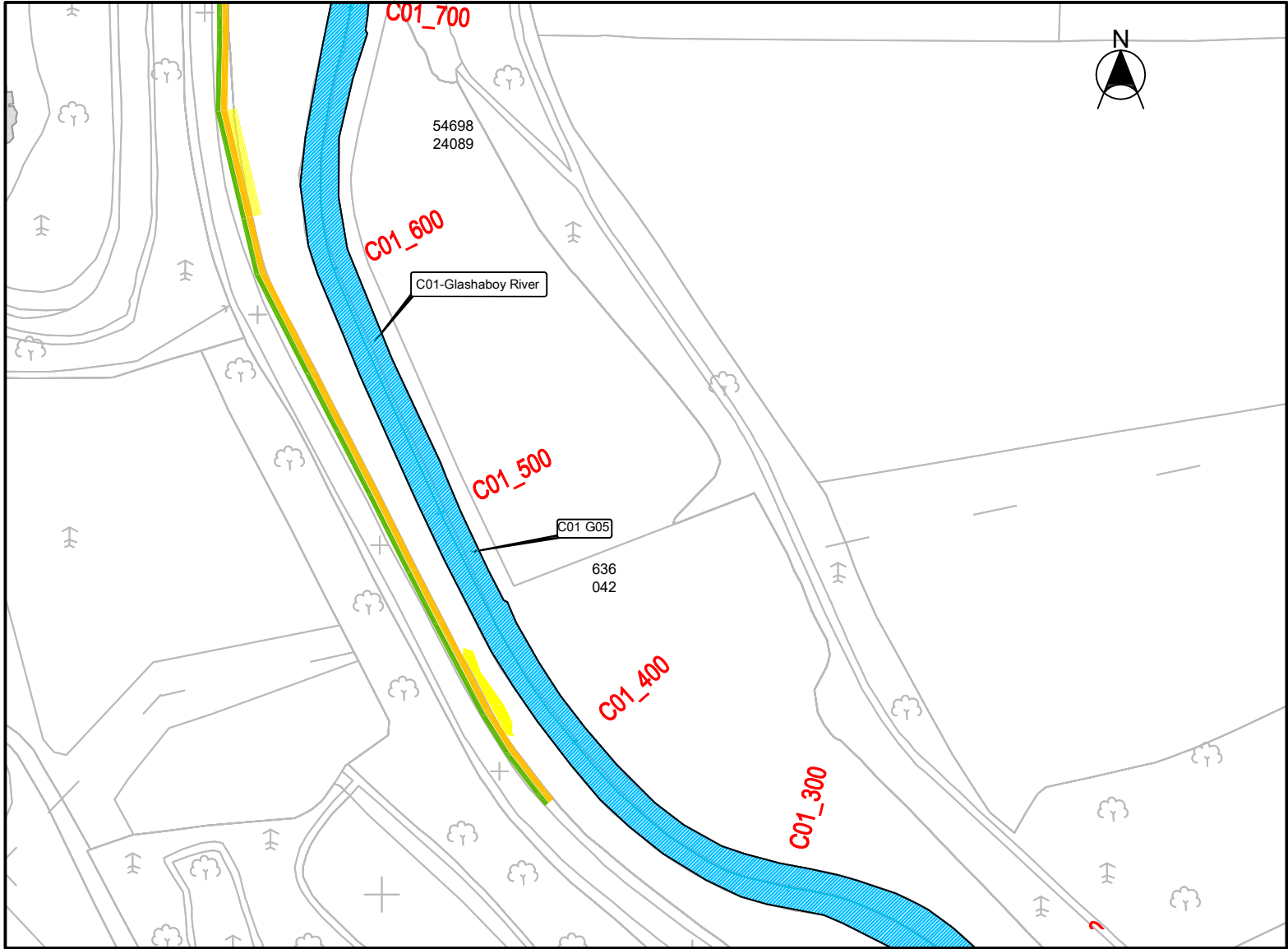
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_217 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



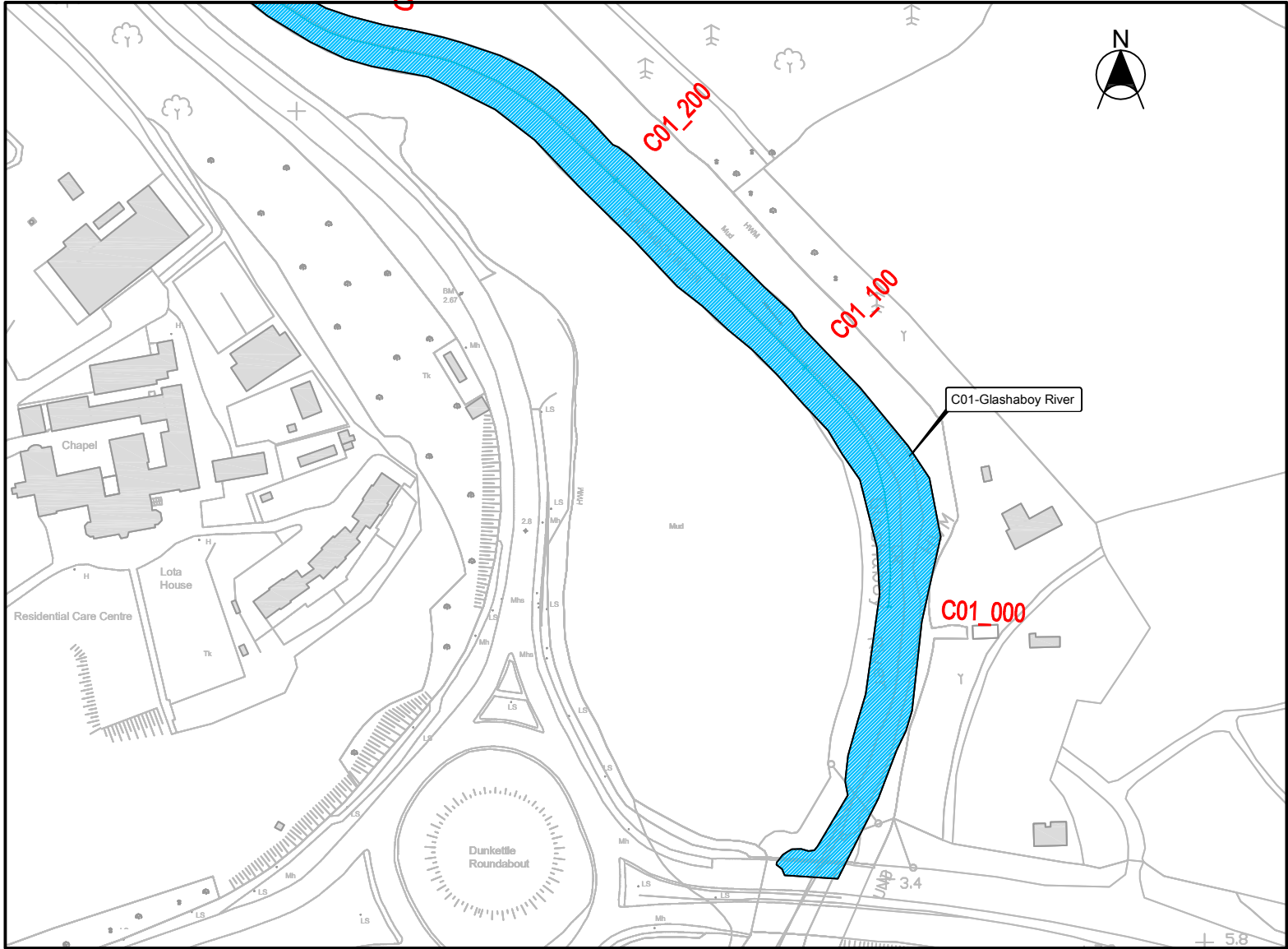
Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- C08_300 Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_218 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



Key to Plan

- Japanese Knotweed (*Fallopia japonica*)
- Winter Heliotrope (*Petasites fragrans*)
- Old Man's Beard (*Clematis vitalba*)
- Himalayan Balsam (*Impatiens glandulifera*)
- Buddleja (*Buddleja davidii*)
- Watercourse
- Channel Centreline, Reference (C08) and CHainage (300m)

NOT TO SCALE

DRG. NO. GR_219 Invasive Species - Plan Layout

Appendix B

Results of 2017 Japanese Knotweed Survey

B1

GLASHABOY FRS JAPANESE KNOTWEED ADVANCE TREATMENT WORKS

Survey drawings 2017





Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy

tel: +00353 21 2019732 / +353 (0)87 457 4112 / +353 (0)86 362 0047
Email: info@japaneseknotweedireland.ie
www: japaneseknotweedireland.ie



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Co. Cork, Ireland.

T-00218-glashaboy

tel: +00353 21 2019732 / +353 (0)87 457 4112 / +353 (0)86 362 0047
Email: info@japaneseknotweedireland.ie
www: japaneseknotweedireland.ie



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Co. Cork, Ireland.

T-00218-glashaboy



Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy



Granig, Minane Bridge,
Co. Cork, Ireland.

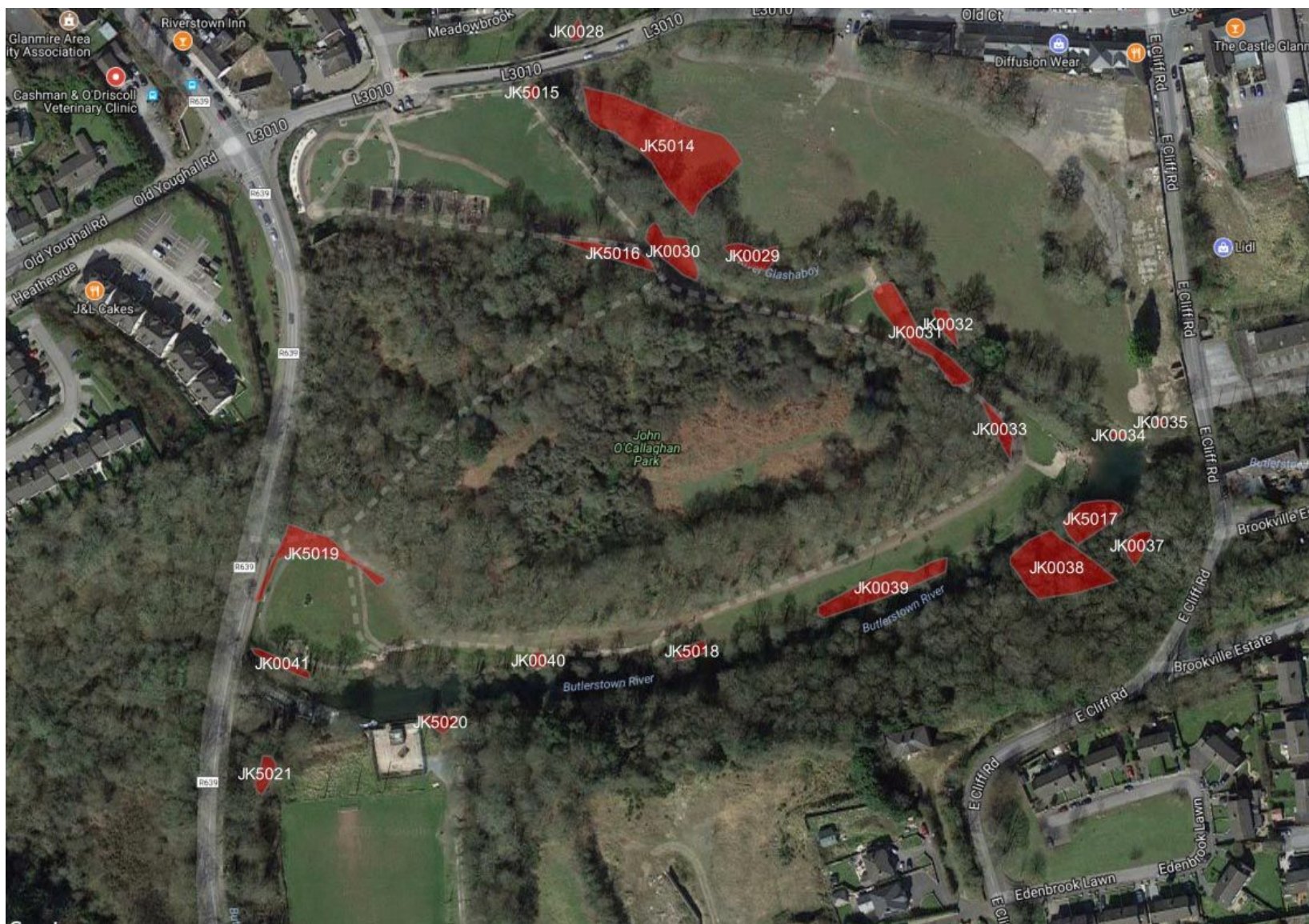
T-00218-glashaboy



Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy

tel: +00353 21 2019732 / +353 (0)87 457 4112 / +353 (0)86 362 0047
Email: info@japaneseknotweedireland.ie
www.japaneseknotweedireland.ie



Granig, Minane Bridge,
Co. Cork, Ireland.

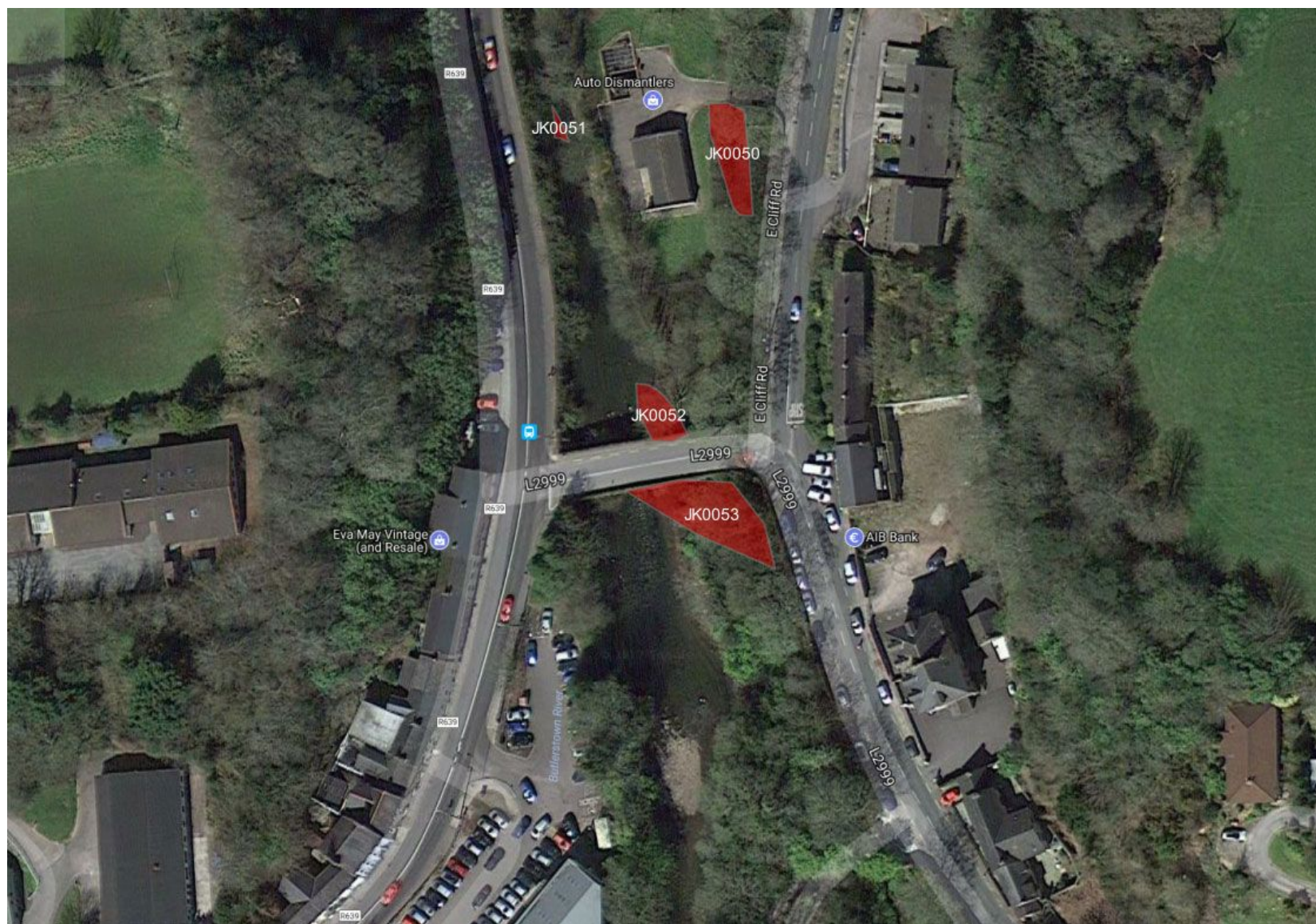
T-00218-ghashaboy



Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy

tel: +00353 21 2019732 / +353 (0)87 457 4112 / +353 (0)86 362 0047
Email: info@japaneseknotweedireland.ie
www.japaneseknotweedireland.ie



Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy

tel: +00353 21 2019732 / +353 (0)87 457 4112 / +353 (0)86 362 0047
Email: info@japaneseknotweedireland.ie
www: [japaneseknotweedireland.ie](http://www.japaneseknotweedireland.ie)



Granig, Minane Bridge,
Co. Cork, Ireland.

T-00218-glashaboy

