

## **Environmental Impact** Statement

November 2016







## Appendices

The appendices for this EIS have been separated into three parts for convenient download from <u>www.glashaboyfrs.com</u> due to the size of some files. Please see below for where each Appendix may be found.

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## Appendix 3.2

Tree Removal Report

#### **GLASHABOY RIVER (GLANMORE/SALLYBROOK) DRAINAGE SCHEME EIS**

#### PROPOSED TREES TO BE REMOVED

#### Introduction

DixonBrosnan were commissioned to carry out a tree survey as part of the assessment procedure for the Glanmire Flood Relief scheme. The survey was carried out along the lower reaches of the Glashaboy River and tributaries within the proposed works area. The total length of the survey area was 9,041m. The purpose of the survey for the EIS assessment was as follows:

• Within the main works area there is very little scope to retain trees and therefore the focus in this area for the survey was to assess the number and type of trees affected. The majority of trees were tagged and described. The survey identified trees within 10m of the works area which could be potentially affected. Management recommendations were provided where required. This covered a length of 3,700m.

Following the results of the survey, the Arup environmental and engineering teams modified the design where possible to avoid trees where feasible. The drawings and table presented in this Appendix show just the trees which are proposed to be removed to facilitate the drainage scheme.

#### Survey Methodology

The survey was carried out from September 5-15, 2016. All trees are recorded on work areas with the exception of the some areas where unrecorded trees were low risk (C) of failure. The tree survey was also carried out within a 10 metre zone from the area within which construction works will be carried out. This was to assess the possible impacts on trees which lie on the periphery of the works area and which could be inadvertently damaged.

All trees in excess of 150mm, at approximately 1.3metres height, were included in the survey. Recorded trees were numbered with plastic tags. Where possible the tag was placed at the downstream side of the tree at 1-2metres height. GPS Co-ordinates were recorded for each tree and where trees form natural groups, readings were taken from the middle of the group. All individual trees and groups are recorded on tree condition record forms and marked on drawings. Recommendations were made to fell, monitor or retain the trees and this information assisted the environmental and engineering teams to modify the design to try to avoid trees which were recommended to be retained.

The survey key utilised for the survey, which is based on the guidelines outlined in the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* as detailed below in **Table 1.** 

#### Statement of authority

Carl Dixon M.Sc. is senior ecologist who has experience in ecological and woodland surveys. Mark Donnelly holds a BSc. (Hons) in Forestry from Bangor University, Wales and is a member of the Institute of chartered Foresters Society of Irish Foresters and is a registered Forester with the Irish Forest Service. He worked as an arboriculture consultant for The National Trust in Wales for 22 years and has worked as a lecturer in Forest Ecology at Bangor University. In Ireland he has undertaken a range of arboriculture and ecological surveys for projects including windfarms, quarries, housing developments, roads and pipelines.

Attribute	Description
Location	The river side location for each tree or group of trees is recorded looking downstream as either Left (L) or Right (R). GPS Co-ordinates
Species	Recorded as common name. A full list is in Appendix 1.
Age	IM - An immature tree greater than 150mm diameter but regarded as a sapling
	SM - Semi mature tree – A young tree but less than 50% of its ultimate size.
	M - Mature – A tree having attained dimensions typical of a fully grown specimen of its species.
	OM – Over mature – An old specimen of a species showing signs of decline in health. Usual symptoms include crown starting to break
	up and decreasing in size.
Girth	Measured in mm. An average diameter was recorded for multi-stemmed stools and number of stems recorded
Height	Approximate tree height in metres.
Spread	Approximate tree canopy diameter in meters. Where a crown is unbalanced, approximate dimensions for the crown are given for
	North, East, South and West directions.
Condition:	Good : Full healthy canopy with good form and health
	Fair: A specimen whose overall condition is typical of the site and may exhibit slightly reduced leaf cover/minor deadwood or maybe
	predisposed to defects e.g. Coppice re-growth, but otherwise in good health.
	Poor: A specimen which through defect or disease has a limited longevity, dead or may be un-safe.
Risk code - Risk Assessment	A: High Risk – Failure likely to, or very likely to occur with severe consequences/impacts on people and or property.
(Adapted from International	B: Medium risk – Failure could occur but is unlikely during normal weather conditions within short to medium term (0-5yrs).
Society of Arboriculture	Regular monitoring is necessary.
(ISA)Tree Risk Accepted	C: Low Risk – Failure unlikely during Short- Medium term (0-5 years). Regular monitoring is necessary.
Methodology)	

#### Table 1: Survey Key

## PROPOSED TREES TO BE REMOVED WHICH ARE LOCATED WITHIN THE WORKS AREAS

## SALLYBROOK – UNNAMED CHANNEL Read in conjunction with Drawing GR\_701 Tree Survey

River	No.	GPS coo	rdinates	Species	Age	Girth	Height	Spre	ead (r	n)			Condition	Risk	Comments	
Side		N	W		Class	(mm)	(m)							Code		
								Ν	Ε		S	W				
L	368	51 56 581	08 23 912	Sweet	Μ	850	12			12			Good	С	Pollarded	
				Chestnut												
L	369	51 56 583	08 23 903	Sweet	Μ	1,200	15			10			Good	С	Adjacent to road,	
				Chestnut											pollarded	

## SALLYBROOK – GLASHABOY RIVER Read in conjunction with Drawing GR\_701 Tree Survey

River	No.	GPS coc	ordinates	Species	Age	Girth	Height	Spre	ead (n	n)			Condition	Risk	Comments
Side		N	W		Class	(mm)	(m)							Code	
								Ν	Е	S	W				
L	386	51 56 641	08 24 073	Ash	Μ	450	20					15	Poor	А	3 stems over river
L	382	604 -	042 -	Elm	SM	280	15					10	Poor	А	In river. Dead
L	381	51 56 602	08 24 042	Elm	SM	220	15					10	Poor	А	In river
L	380	51 56 595	08 24 036	Ash	М	410	18					10	Good	А	1 limb only
L	378	51 56 584	08 24 029	Ash	М	350	18					10	Good	А	Over river 3 stems
L	379	51 56 581	08 24 031	Hawthorn	М	150	10					5	Good	А	Over river
L	375														
L	372	51 56 537	08 23 974	Sycamore	Μ	350	18					10	Good	А	Over river
L	371	51 56 534	08 23 972	Ash	Μ	370	18					10	Good	А	4 stems
L	350	51 56 473	08 23 931	Sycamore	SM	360	15					10	Fair	А	2 stems Rot
L	348	51 56 464	08 23 914	Alder	Μ	500	15					10		А	Undermined
L	346	51 56 462	08 23 908	Sycamore	Μ	500	18					10	Good	А	Leaning over channel
L	344	51 56 457	08 23 900	Elm	Μ	380	15					10	Good	А	
L	339	51 56 459	08 23 890	Alder	Μ	550	18					10	Fair	А	2 stems. Undermined
L	338	51 56 453	08 23 887	Sycamore	М	400	18					10	Fair	А	Undermined
L	336	51 56 414	08 23 878	Crack Willow	SM	160	8			5			Poor	А	8 stems group – damaged

#### SALLYBROOK – GLASHABOY RIVER Read in conju

#### Read in conjunction with Drawing GR\_702 Tree Survey

River	No.	GPS coc	ordinates	Species	Age	Girth	Height	Spre	ead (n	n)			Condition	Risk	Comments
Side					Class	(mm)	(m)							Code	
		N	W					Ν	Е	S	W				
L	339*	51 56 459	08 23 890	Alder	М	550	18					10	Fair	А	2 stems. Undermined
L	338*	51 56 453	08 23 887	Sycamore	Μ	400	18					10	Fair	А	Undermined
L	336	51 56 414	08 23 878	Crack Willow	SM	160	8			5			Poor	А	8 stems group – damaged

\* Also shown in Drawing GR\_701

#### GLASHABOY RIVER – NORTH OF HAZELWOOD AVENUE BRIDGE

## Read in conjunction with Drawing GR\_702 Tree Survey

River	No.	GPS coor	dinates	Species	Age	Girth	Height	Sp	read (m	ו)		Conditio	Risk	Comments
Side		N	W		Class	(mm)	(m)					n	Code	
								Ν	Е	S	W			
L	008	924	843	Elm	SM	300	14				5	Good	В	Over river
L	007	918	841	Sycamore	SM	280	20				10	Good	А	2 stems over river
L	006	909	838	Elm	SM	400	12		6			Poor	А	Dead
L	003	902	839	Sycamore	М	540	23		15			Good	В	2 trees undermined
L	005	907	839	Willow	М	340	10	5				Poor	А	Decay at base
L	004	898	838	Sycamore	М	540	25		15			Poor	А	Multistemmed. Decay at base
L	015	51 55 892	08 23 345	Elm	SM		8				5	Good	С	
R	014	51 55 887	08 23 840	Willow	М	180	6	8				Fair	С	Multistemmed
R	013	51 55 887	08 23 839	Alder	SM	220	6		4			Good	С	Multistemmed

#### IN FIELD NEXT TO R639 NORTH OF HAZELWOOD AVENUE BRIDGE

Read in conjunction with Drawing GR\_702 Tree Survey

River Side	No.	GPS coo	ordinates	Species	Age	Girth	Height	Spre	ad (m)				Condition	Risk	Comments
		N	W		Class	(mm)	(m)							Code	
								Ν	Е		S	W			
	006	51 55 917	08 23 892	Elm	SM	600	7			3			Poor	С	Pollarded, Elm Disease
0	007	51 55 916	08 23 893	Sycamore	SM	300	7			3			Fair	С	3 Stems, Pollarded
it to	008	51 55 910	08 23 891	Elm	SM	350	7			3			Poor	С	Pollarded, Elm Disease
nex	009	51 55 901	08 23 881	Elm	SM	350	5			3			Dead	С	Dead
pla -	010	51 55 897	08 23 885	Sycamore	SM	350	5			3			Poor	С	Pollarded, Multistemmed
Fie 539	011	51 55 888	08 23 871	Ash	IM	270	8			8			Fair	С	Multistemmed
ц <u>ж</u>	012	51 55 888	08 23 852	Ash	SM	470	9			8			Good	С	Multistemmed

### GLASHABOY RIVER SOUTH OF HAZELWOOD AVENUE BRIDGE including MEADOWBROOK & RIVERSTOWN BRIDGE

### Read in conjunction with Drawing GR\_702 Tree Survey

River Side	No.	GPS coo	ordinates	Species	Age	Girth	Height	Spre	ad (m)			Condition	Risk	Comments
		N	W		Class	(mm)	(m)	Ν	E	S	W		Code	
Roadside	133	51 55	08 23 840	Alder		220	12		7			Good	С	2 Stems
		880												
R	281	51 55	08 23 814	Alder	SM	250	18		10			Good	С	8 Stem, 1 Sycamore
		874												
L	21	51 55	08 23 819	Willow	М	250	5				5	Fair	В	Leaning over river
		872												
L	20	51 55	08 23 827	Alder	SM	210	10		8			Good	С	4 Stems
		875												
L		51 55	08 23 820	Alder	SM	350	12				12	Good	В	
	22	871												
L		51 55	08 23 815	Elm	SM	350	15		8			Good	В	Healthy
	23	873												
R	283	51 55	08 23 811	Alder	SM	220	15		10			Good	С	Undermined,2Trees,
		859												Hawthorn
L	24	51 55	08 23 815	Sycamore	SM	350	15		8			Good	С	
		873												

River Side	No.	GPS coo	ordinates	Species	Age	Girth	Height	Spre	ad (m)			Condition	Risk	Comments
		N	W		Class	(mm)	(m)	Ν	E	S	W		Code	
L	25	51 55	08 23 815	Alder	SM	350	15		12			Good	С	4 Stems
		871												
L	26	51 55	08 23 809	Willow	М	350	8		8			Fair	А	
		866												
R	31	51 55	08 23 798	Alder	SM	400	15		8			Fair	С	3 stem
		852												
R	32	51 55	08 23 794	Beech	М	1000	20		15			Good	В	Poor Form
		850												

#### SPRINGMOUNT STREAM

Arup

## Read in conjunction with Drawing GR\_702 Tree Survey

	No.	GPS coo	ordinates	Species	Age	Girth	Height		Ν		Condition	Risk	Comments	
River		N	W		Class	(mm)	(m)		Е			Code		
Side									S					
			-						W					
R	95	51 55	08 23	Hawthorn	М	260	8		15		Poor	А	6 Stems	
		793	794											
R	96	51 55	08 23	Ash	SM	300	15		10		Fair	С	2 Stems	
		794	800											
R	97	51 55	08 23	Sycamore	SM	320	15		10		Good	С		
		774	817											
R	98	51 55	08 23	Ash	SM	340	15		10		Good	С	3 Stems	
		793	823											
R	99	51 55	08 23	Sycamore	М	500	13		10		Good	С	8 Stems	
		789	829											
R	100	51 55	08 23	Elm	SM	470	15		10		Poor	А	Dead 3 Trees	
		789	825											
R	48	51 55	08 23	Sycamore	SM	460	18		12		Good	А	2 Stools, 3 Stems, In river	
		794	781	-										
R	50	51 55	08 23	Elm	IM	310	15	5			Poor	А	Dead	1
		790	780											

#### **GLASHBOY RIVER – SOUTH OF SPRINGMOUNT STREAM**

Read in conjunction with Drawing GR\_702 Tree Survey

R	53	51 55 778	08 23 738	Alder	IM	230	12		12		Good	С	5 Stems ( 1Ash)
R	293	51 55 789	08 23 773	Cypress	М	500	18		10		Poor	В	In Garden
R	295	51 55 784	08 23 754	Ash	SM	320	16		8		Good	С	
R	54	51 55 780	08 23 752	Elm	IM	240	12	8			Good	А	Leaning over river
R	294	51 55 789	08 23 773	Sycamore	М	280	15		10		Good	С	2 Stem

### GLASHABOY RIVER AT MEADOWBROOK AND RIVERSTOWN Read in conjunction with Drawing GR\_702 Tree Survey

River	No.	GPS coo N	ordinates W	Species	Age Class	Girth (mm)	Height (m)	Spre	ead			Condition	Risk Code	Comments
Side								N	Е	S	W			
L	85	51 55 746	08 23 577	Ash	SM	600	25				10	Good	В	3 ash Stems
L	86	51 55 743	08 23 575	Ash	М	240	23				10	Good	A	2 ash Stems, over river
L	306	51 55 740	08 23 573	Alder	М	190	20			10		Poor	В	Over river
L	307	51 55 740	08 23 573	Ash	SM	150	20				10	Poor	В	Over river
L	87	51 55 737	08 23 575	Sycamore	SM	450	20				10	Good	А	3 Stems in river
L	88	51 55 736	08 23 575	Sycamore	М	440	20				10	Good	В	
L	89	51 55 732	08 23 578	Beech	м	1300	30		25			Poor	A	Rot in Crown – reduce by 30%, Bat Survey required
L	90	51 55 731	08 23 581	Ash	SM	220	20		10			Good	С	
L	308	51 55 727	08 23 577	Ash	М	330	20			8		Good	A	2 Stems
L	91	51 55 729	08 23 581	Beech	М	800	20		25			Good	А	Multi-stemmed

	No.	GPS co	ordinates	Species	Age	Girth	Height	Spr	ead			Condition	Risk	Comments
River		N	VV		Class	(mm)	(m)						Code	
Side								N	Е	S	W			
L	92	51 55 725	08 23 584	Alder	IM	210	25		8			Good	С	
L	93	51 55 720	08 23 589	Sycamore	М	410	18		15			Good	С	3 Stems
L	94	51 55 713	08 23 595	Ash	SM	430	18		5			Good	А	2 Stems
	309	51 55 709	08 23 594	Ash	М	350	20			15		Good	А	
BANK	310	51 55 708	08 23 620	Cherry	М	300	9		6			Poor	В	
(LEFT	316	51 55 696	08 23 621	Birch	М	320	9		10			Good	В	
AREA	311	51 55 702	08 23 639	Norway Maple	М	420	15		10			Fair	А	
UBLIC	313	51 55 706	08 23 643	Norway Maple	М	520	18		10			Good	В	
	315	51 55 705	08 23 653	Rowan	М	430	9		8			Fair	В	

River	No.	GPS coo	ordinates	Species	Age	Girth	Height	Spre	Spread (m)		Condition	Risk	Comments		
Side		N	W		Class	(mm)	(m)								
								Ν	Е		S	W		Code	
R	176	788	698	Elm	М	350	10	15					Good	В	2 stems
R	179	793	674	Alder	М	400	15			15			Good	В	Multiple stems
L	180	794	674	Alder	М	450	18			10			Good	С	Good form
L	182	792	672	Turkey	М	600	18			15			Good	С	Good form
				Oak											
L	183	795	663	Alder	М	430	15	10					Good	В	2 stems
	195	788	668	Birch	SM	200	10			7			Good	С	Amenity Planting
	198	788	676	Beech	SM	210	12			8			Good	С	Amenity Planting
	200	783	690	Willow	SM	150	8			10			Good	С	
	113	784	692	Beech	SM	150	12			8			Good	C	

### GLENMORE STREAM AT COPPER VALLEY VUE ESTATE Read in conjunction with Drawing GR\_703 Tree Survey

#### GLASHABOY RIVER – NORTH OF GLANMIRE BRIDGE Read in conjunction with Drawing GR\_704 Tree Survey

	No.	GPS coo	rdinates	Species	Age	Girth	Height	Spread (m)		Condition	Risk	Comments	Rec.	RPA		
River		N	VV		Class	(mm)	(m)	N	F		ς		Code			
Side								w	-		5					
	141	51 55 196	08 23 793	Sycamore										Group growing in retaining wall above river		
	141	51 55 196	08 23 793	Elm	SM	205	15		8			Fair	А		3	-
	141	51 55 196	08 23 793	Fig tree										41 metre		
	141	51 55 196	08 23 793	Alder												
	143	51 55 222	08 23 781	Sycamore	М	360	18			12		Good	С		2	4.2
	145	51 55 225	08 23 777	Sycamore	М	520	20			15		Good	С		2	6.0
	146	51 55 228	08 23 780	Sycamore	М	840	20			15		Fair	С	Poor form	3	-
	147	51 55 235	08 23 772	Ash	М	820	17			15		Fair	С	Poor form	3	-

Appendix 3.2

Tree Removal Drawings

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Location Plan





Scale 1:2,500 at A3

Notes:

SCALE 1.1250

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

Drg. No. GR\_701 Proposed Trees to be removed - Plan Layout (Sheet 1 of 4)

ARUP	JBA consulting	1990	OFFER OF Public Works
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Scale 1:2,500 at A3

## Notes:

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



Drg. No. GR\_702 Proposed Trees to be removed - Plan Layout (Sheet 2 of 4)

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Location Plan





Key Plan

Notes:

1. Do not scale from drawing.

Proposed works geometry and extents are subject to detailed design.
 This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Exhibition Drawings and Schedules.

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## Scale 1:1,250 at A1 Scale 1:2,500 at A3

## Drg. No. GR\_703 Proposed Trees to be removed - Plan Layout (Sheet 3 of 4)



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Scale 1:2,500 at A3

## Notes:

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



Drg. No. GR\_704 Proposed Trees to be removed - Plan Layout (Sheet 4 of 4)

ARUP	JBA consulting	1893	OPPW Offge an effiltresc-the Public The Office of Public Works
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Key Plan

## Appendix 4.1

Outline Japanese Knotweed Management Strategy Cork County Council and Office of Public Works

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

Outline Japanese Knotweed Management Strategy

Appendix 4.1

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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

#### Ove Arup & Partners Ireland Ltd

## ARUP

## **Document Verification**

# ARUP

Job title		Glashaboy I Scheme	<b>Job number</b> 234334-00							
Document ti	itle	Outline Japa	File reference							
Document ref		Appendix 4.1								
Revision	Date	Filename	234334_EIS_Append	сх						
ssue 11 Nov Descript 2016			Issue							
			Prepared by	Checked by	Approved by					
		Name	Alexandra Fleming	Fiona Patterson	Fiona Patterson					
		Signature	Alexandra Flening	Jon Patterson	300 number   234334-00   File reference     xx     Approved by   Fiona Patterson   Joan Patterson     Approved by     Approved by     Approved by     Approved by					
		Filename								
		Description								
			Prepared by	Checked by	Approved by					
		Name								
		Signature								
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		Description								
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		Name								
		Signature								
		Filename								
		Description								
			Prepared by	Checked by	Approved by					
		Name								
		Signature								
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Drawings

**Pictures** 

**Photographs** 

## Attachments

## Appendices

## Appendix A

Invasive Species Drawings GR\_201 to GR\_219

## 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.

While other invasive plant species have also been identified in the area, such as Himalayan Balsam (*Impatiens glandulifera*) and White Heliotrope (*Petasites fragrans*), 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 drainage scheme in order to prevent the spread of the knotweed species. This report will outline the steps that will be taken during construction and operation of the scheme.

The main objective of the Japanese knotweed management strategy for the scheme will be to:

- Prevent the spread of Japanese knotweed during the construction phase.
- Manage the growth of Japanese knotweed adjacent to flood defences so as to protect the integrity of the structures from the impacts of Japanese Knotweed.
- Prevent the spread of Japanese knotweed 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 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)
- 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."

## 4 Invasive Species in the Study Area

The most recent invasive species survey carried out on the Study Area in September 2016 by Dixon Brosnan. While other invasive plant species were also identified, such as Himalayan Balsam (*Impatiens glandulifera*) and White Heliotrope (*Petasites fragrans*), Japanese knotweed is of primary concern for the structural integrity of these proposed flood works, therefore the focus of this report is on the prevention of the spread of knotweed.

Japanese knotweed is present in many areas within the Glashaboy catchment however for the purposes of this scheme, a Japanese Knotweed Management Plan will only be put in place within the footprint of the construction works.

The key times during the scheme when a japanese knotweed management plan will be put in place will be during the construction phase and during the operation phase which includes the protection of flood defence structures and preventing the spread of knotweed during channel maintenance activities by the OPW.

The drawings appended to the end of this report show the locations of invasive species, including Japanese Knotweed within the works area in September 2016. Refer to Drawings GR\_201 to GR\_219 in **Appendix A**.

## 5 Japanese Knotweed Management Plan During Construction Phase

The contractor will be required develop a Japanese Knotweed Management Plan prior to construction activities commencing. This purpose of this plan will be to:

- Identify the extent of the infestation on the site
- Ensure further growth and spread of the plant on the site does not occur,
- Ensure the plant is not spread to other sites either adjacent to the infested site or through transportation of contaminated soil to another site
- Identify the best method for managing and controlling Japanese knotweed on the site with regard to the proposed site works and construction methods
- Communicate the plan to all site operatives to ensure success of the plan
- Document and record the treatment and management methods carried out on site for future reference (future site owners, site users, avoid litigation etc.)

The plan shall be completed by a suitably qualified ecologist, made as simple as possible and should contain the following:

- Site background including proposed works
- Extent of the Japanese knotweed infestation
- Specific control plan to be put in place
- Site hygiene protocols
- Responsible individuals
- Follow up requirements
- Any other relevant information (in Appendix)

Where flood relief structures are proposed at sites that contain Knotweed, root barrier membranes will be installed to protect the structures from the plant. The design of these membranes will form part of the detailed design stage.

Site hygiene protocols, like those listed in **Section 5**, will need to be implemented on all works sites.

## 5.1 Management Options

There are a number of management options that may be taken to control and prevent the spread of Japanese knotweed. In consultation with a qualified ecologist, the contractor will decide upon a suitable methodology. The proposed management plan will need to be agreed with the National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and Cork County Council prior to the works being carried out. It should be noted that:

- Where any infested material (soil containing Japanese Knotweed) is to be taken off site, a license to transport the material will need to be sought from NPWS.
- A permitted landfill will need to be sourced to deposit excavated material which can accept such material. The landfill site operator will need to be informed of what the material contains.
- Where herbicide treatment will be used, consideration must be made as to where the herbicide will be located, the proximity to watercourses and other vegetation.
- For all management plans, site hygiene protocols will need to be implemented. These protocols should include sites which are infested with Knotweed and those where Knotweed is not growing to prevent contaminated material being brought to site. Site hygiene protocols are outlines in **Section 5.2** below.

**Figure 1** provides an example of a simple flow chart that may be used in the process of forming a management plan.

## 5.2 Site Hygiene

Maintaining site hygiene at all times in a Japanese knotweed affected area is essential to prevent further spread. It is also necessary on sites where Japanese Knotweed is 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 Knotweed.

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

- Understand the possible extent of the rhizome (root) system underground up to 7m horizontally and 3 meters vertically.
- Where possible avoid the infested area and fence it off or clearly mark off the rhizome extent.
- 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 Japanese knotweed should be established through the site to minimise the spread of Japanese knotweed by permitted vehicles accessing the site.
- Installation of a dedicated footwear & vehicular wheel wash down facility into a contained area within the site.
- Vehicles leaving the site should 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.
- For any material entering the site, the supplier must provide an assurance that it is free of Japanese Knotweed.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Japanese knotweed Site Management plan.
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material.

## 6 Japanese Knotweed Management – Operation Phase

## 6.1.1 **Protecting Flood Defence Structures**

As part of the operation phase there will need to be on-going treatment of knotweed at sites where it could potentially compromise the structural integrity of the flood defence structures. A management plan for the operational phase will need to be discussed with the relevant bodies i.e. NPWS, IFI 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 Japanese Knotweed 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 discussed with the NPWS, IFI and Cork County Council.

# Flowchart for treating Japanese knotweed



Figure 1. Flowchart for treating Japanese knotweed (Environment Agency, 2013).

## 7 Conclusion

The presence of Japanese Knotweed requires the scheme to have a Japanese Knotweed Management Plan. The Plan shall be written by a suitably 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 Knotweed is present but also 'clean' sites. Incoming vehicles, equipment and including footwear worn by contractors will need to be cleaned and inspected before coming on site 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.

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

## 8 **References**

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

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

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

## Appendix A

Invasive Species Drawings GR\_201 to GR\_219

## **A1**



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

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_201 Invasive Species - Plan Layout



Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_202 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_203 Invasive Species- Plan Layout





NOT TO SCALE

DRG. NO. GR\_204 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_205 Tree Survey - Plan Layout



Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_206 Invasive Species - Plan Layout



NOT TO SCALE

DRG. NO. GR\_207 Invasive Species - Plan Layout





NOT TO SCALE

DRG. NO. GR\_208 Invasive Species - Plan Layout



NOT TO SCALE

DRG. NO. GR\_209 Invasive Species - Plan Layout



Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_210 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_211 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_212 Invasive Species - Plan Layout





DRG. NO. GR\_213 Invasive Species - Plan Layout



NOT TO SCALE

DRG. NO. GR\_214 Invasive Species - Plan Layout



Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_215 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_216 Invasive Species - Plan Layout

Glashaboy River (Glanmire/Sallybrook) Tree Survey



DRG. NO. GR\_217 Invasive Species - Plan Layout



#### NOT TO SCALE

DRG. NO. GR\_218 Invasive Species - Plan Layout



Glashaboy River (Glanmire/Sallybrook) Tree Survey





DRG. NO. GR\_219 Invasive Species - Plan Layout