

Gruggies Burn Flood Alleviation Scheme

Ecological Appraisal

March 2024



Balfour Beatty



FAIRHURST

West Dunbartonshire Council

Gruggies Burn Flood Alleviation Scheme Ecological Appraisal

Final report
Prepared by LUC
March 2024



West Dunbartonshire Council

**Gruggies Burn Flood Alleviation Scheme
Ecological Appraisal**

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Contents

Chapter 1		Appendix A	
Executive Summary	1	Figures	A-1
<hr/>			
Chapter 2		Appendix B	
Introduction	2	Target Notes	B-1
Remit	2	<hr/>	
Policy and Legislation	2	Appendix C	
Scheme Context	3	Site Photography	C-1
Site Description	3		
<hr/>			
Chapter 3			
Methods	4		
Overview	4		
Desk Study	4		
Field Study	5		
Methodological Limitations	6		
<hr/>			
Chapter 4			
Baseline	7		
Desk Study	7		
Field Study	8		
<hr/>			
Chapter 5			
Interpretation	11		
Scheme Context	11		
Designated Sites	11		
Habitats	12		
Protected Species	13		
Invasive Non-Native Species	13		
<hr/>			
Chapter 6			
Mitigation and Enhancement	14		
Embedded Mitigation	14		
Additional Mitigation	14		
Enhancement	15		

Chapter 1

Executive Summary

1.1 LUC was appointed by Fairhurst, on behalf of West Dunbartonshire Council, to provide ecological support during the design and statutory consenting stages of the Gruggies Burn Flood Alleviation Scheme in Dumbarton, West Dunbartonshire.

1.2 This Ecological Appraisal details the baseline findings of both desk and field studies, provides an interpretation of the significance of these baseline findings, and sets out mitigation measures necessary to protect sensitive ecological features during the construction process. Opportunities to achieve enhancement for biodiversity are also discussed.

1.3 The Ecological Appraisal reports that, owing to its largely urban location and limited footprint, the Flood Alleviation Scheme is largely unconstrained by sensitive ecological features. However, the following key ecological features must be considered:

- the proximity of the Scheme to the Inner **Clyde Special Protection Area (SPA)/Ramsar/Site of Species Scientific Interest (SSSI) complex** will require the careful management of construction activity to ensure the conservation objectives of the complex are not adversely affected.
- The prevalence of **invasive non-native species** throughout the site will require comprehensive management throughout construction activity.

Chapter 2

Introduction

Remit

2.1 LUC was appointed in April 2023 by Fairhurst, on behalf of West Dunbartonshire Council, to provide ecological support during the design and notification stage of the proposed Gruggies Burn Flood Alleviation Scheme (FAS) (the Scheme) in Dumbarton, West Dunbartonshire (the Site).

2.2 This Ecological Appraisal has been prepared to inform the notification stages of the Scheme and seeks to establish and interpret the Site's sensitive ecological features. The Ecological Appraisal sets out the methods by which baseline ecological data was collected, provides an overview of the baseline, and an interpretation of baseline in relation to relevant legislation and policy.

2.3 The Ecological Appraisal also establishes mitigation measures that ensure the Scheme can be delivered in an environmentally responsible manner and considers opportunities for biodiversity enhancement.

2.4 This Ecological Appraisal has been prepared for the sole use of West Dunbartonshire Council and its project partners. The Ecological Appraisal does not constitute legal advice.

Policy and Legislation

2.5 This Ecological Appraisal has been informed by relevant legislation, national and local planning policy, and biodiversity policy, including:

- The Conservation (Natural Habitats, &c) Regulations 1994 as amended.
- The Wildlife and Countryside Act 1981 (as amended).
- The Protection of Badgers Act 1992 (as amended).
- National Planning Framework 4 (NPF4)¹;
- West Dunbartonshire Local Plan²
- West Dunbartonshire Biodiversity Action Plan³; and

¹ Scottish Government (2023) National Planning Framework 4. Available online at: <https://www.gov.scot/publications/national-planning-framework-4/>

² West Dunbartonshire Development Plan (2010). Available online at: <https://www.west-dunbarton.gov.uk/council/key-council-documents/local-development-planning/development-plan/>

³ No contemporary LBAP was available at the time of writing. The most recently published LBAP was consulted. Available online at: https://www.west-dunbarton.gov.uk/media/3197361/biodiversity_plan_2010_final.pdf

- The Scottish Biodiversity List⁴.

Scheme Context

2.6 Gruggies Burn flows south from its source in the Kilpatrick Hills, discharging to the River Clyde immediately south of Dumbarton. While the burn's catchment is largely rural, its flow through Dumbarton is characterised by canalisation and the land use pressures associated with a heavily urbanised area. The hydrological characteristics of the watercourse are such that it regularly experiences fluvial flooding, creating significant challenges for Dumbarton's communities. This pressure is compounded by coastal flooding during high tides and storm surges at the burn's confluence with the River Clyde.

2.7 The scheme will achieve flood relief via:

- A **flow diversion culvert**, intercepting high flows, via a flow diversion weir and culvert inlet, north of the A82 and discharging to the River Clyde via an existing culverted watercourse (Hunter's Burn) and a new culvert outfall. Hunter's Burn discharges approximately 800m east of Gruggies Burn. The relief culvert will include new infrastructure at both its inflow and outflow points.
- **Tidal embankments**, extending approximately 470m east from the Gruggies Burn's confluence with the River Clyde.
- A **tidal floodgate** on Castle Road adjacent to its junction with Castlegate Avenue immediately south of the entrance to Dumbarton Football Stadium.
- **Flood walls**, comprising sheet pile walls with cladding to reflect local landscape and conservation features between the River Clyde and Glasgow Road in Dumbarton.

2.8 Further design detail is provided in the Scheme's notification documents and supporting information.

Site Description

2.9 For the purposes of this Ecological Appraisal, the Site is defined as the notification boundary submitted with Fairhurst's EIA Screening Opinion, submitted to West Dunbartonshire Council in June 2023, and shown in **Figure 1, Appendix A**. The Site can subsequently be divided as described below.

Flow Diversion Culvert

2.10 At its northern edge, the Site encompasses a small, wooded section of the southern bank of Gruggies Burn immediately north of the A82 (NGR NS 41268 75247).

2.11 The Site then extends south along the highly urbanised Greenhead Road, before turning east to include heavily managed greenspace between Geils Avenue and Dumbuck Crescent. This area of greenspace supports a short section of National Cycle Route 7.

2.12 The Site then turns south, following the route of the culverted Hunter's Burn. The Site passes over Glasgow Road, before aligning with Dogs Loan (a core path) leading from Glasgow Road to the River Clyde. The Site passes beneath the Glasgow-Dumbarton railway line before concluding at the Hunter's Burn discharge point at the River Clyde.

Gruggies Burn (Flood Walls)

2.13 The Site includes a stretch of Gruggies Burn between Glasgow Road and the River Clyde. At this location, the burn is largely canalised and follows Buchanan Street before passing beneath Castlegreen Street. South of Castlegreen Street the burn passes alongside industrial land uses before discharging to the River Clyde.

Tidal Embankments

2.14 The proposed tidal embankments section of the Site extends approximately 470m east from Gruggies Burn's confluence with the River Clyde. This part of the River Clyde's shore supports part of West Dunbartonshire's core path network and comprises a complex mosaic of woodland, scrub, and grassland habitats. The shore at this location is a popular recreational area, frequently used by dog walkers.

Tidal Floodgate

2.15 The Site also includes two small car parks along Castle Road. Each car park is hard surfaced but surrounded by semi-natural woodland habitats. Note that only one of these components of the Site will be chosen to support the tidal floodgate.

⁴ Available online at: <https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/scottish-biodiversity-list>

Chapter 3

Methods

Overview

3.1 The Ecological Appraisal comprises a desk study and a field study:

- **Desk Study** – a review of designated sites and recorded protected species populations within 500m of the Site.
- **Field Study** – an ecological constraints walk-over by experienced ecologists with a view to identifying key ecological constraints, including:
 - Habitats of conservation concern⁵.
 - Suitable habitat for, and direct evidence of, protected or notable species⁶.
 - Invasive Non-Native Species (INNS)⁷

3.2 Gruggies Burn is assumed to support fish populations, including spawning salmonids. It is understood that during both construction and operation of the Scheme, the burn will remain passable, while substrates will be unaffected. Further, as the Scheme will seek to prevent catastrophic flooding events, it is considered that opportunities for salmonids within the burn may improve, via both water quality improvements and the natural development of spawning habitat associated with a more stable aquatic environment. As such, fisheries interests are not further addressed in this Ecological Appraisal, however mitigation and enhancement measures addressed in later chapters will seek to protect existing fisheries resources.

Desk Study

3.3 The desk study included a search for internationally, nationally, and locally designated sites within 500m of the Site.

3.4 Sites searched for included statutory sites, such as Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar Sites and Sites of Special Scientific Interest (SSSI), and non-statutory designated sites including Local Nature Conservation Sites (LNCS) and Ancient Woodland Inventory (AWI) sites.

⁵ Defined as Annex 1 habitats and habitats listed on either the Local Biodiversity Action Plan or Scottish Biodiversity List.

⁶ Defined as species included on the schedules of relevant legislation or recognised in the Local Biodiversity Action Plan or Scottish Biodiversity List.

⁷ Defined in accordance with the Wildlife and Countryside Act and its terminology.

3.5 Statutory site data was collected from the NatureScot SiteLink tool⁸, while non-statutory sites were searched for via Scotland's Environment website⁹.

3.6 The desk study also includes a search of publicly available records of protected species within 500m of the Site and recorded from 2004 onwards. This was completed using the National Biodiversity Network (NBN) online database¹⁰.

Field Study

3.7 An ecological constraints walk-over was undertaken by experienced ecologists in dry, bright conditions on 20th June 2023.

3.8 The walkover was based on the Extended Phase 1 Habitat survey method¹¹. The Phase 1 habitat survey technique provides a rapid and standardised approach to identifying and classifying habitats. The 'Extended' component of the survey involves an assessment of the Site's potential to support legally protected and notable fauna.

3.9 Evidence of suitable habitat for, or direct evidence of, the following protected species was searched for within the Site, as informed by the desk study and LUC's experience of ecological survey in west central Scotland:

- Otter (*Lutra lutra*)
- Water vole (*Arvicola amphibius*)
- Badger (*Meles meles*)
- Bats (all species)
- suitable habitat for nesting birds (including identifying old nests).

3.10 Searches for protected species followed standard best practice for each taxa¹².

3.11 The most common invasive non-native species (INNS) were also searched for, including:

- Japanese knotweed (*Fallopia japonica*)
- Giant hogweed (*Heracleum mantegazzianum*)
- Himalayan balsam (*Impatiens glandulifera*)

Preliminary Bat Roost Assessment

3.12 A preliminary Bat Roost Assessment (PBRA) survey was conducted on trees and structures within the Site, where it was likely these features would be directly affected by the Proposed Development. The PBRA survey seeks to identify any features that could provide suitable roosting opportunities for bats, and subsequently identify areas for further surveys if required.

3.13 The survey method takes into consideration a host of roosting conditions required by bats throughout the year and adheres to assessment criteria set out in standard guidance prepared by the Bat Conservation Trust (BCT)¹³.

3.14 The criteria used to categorise bat roosting potential (BRP) are summarised in **Table 3.1**. The table also summarises what actions, if any, are required following surveying and classification.

⁸ NatureScot (n.d.). NatureScot SiteLink Map [Online]. Available at: <https://sitelink.nature.scot/home> [Accessed June 2023].

⁹ Scottish Government (n.d.). Scotland's Environment Map [Online]. Available at: <https://map.environment.gov.scot/sewebmap/> [Accessed June 2023].

¹⁰ National Biodiversity Network (n.d.). National Biodiversity network Atlas, Scotland [Online]. Available at <http://www.nbnatlas.org> [Accessed June 2023].

¹¹ JNCC (2010). Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit. JNCC, Peterborough.

¹² CIEEM (2021). Good Practice Guidance for Habitats and Species

¹³ Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. Note that this guidance was updated in October 2023, following the completion of fieldwork at Gruggies Burn.

Table 3.1: Bat Roost Potential Categories

BRP Category	Roosting Habitat Features	Commuting and Foraging Habitat Features	Survey Requirement
Negligible	Negligible habitat features likely to support roosting, commuting or foraging bats.		No surveys required
Low	Structures in this category offer one or more potential roost sites for individual, opportunistically roosting bats. These sites do not offer the space, shelter, or appropriate conditions to support large numbers of bats or maternity roosts. Trees in this category include those of sufficient size and age to support suitable roosting features, but none are visible from the ground.	Habitat on and around the Site could be used by a small number of commuting bats. This category includes densely urbanised landscapes or linear vegetation features poorly connected to the wider landscape (e.g., gappy hedges in an agricultural context).	One dusk or dawn survey required for structures. No surveys required for trees.
Moderate	Structures and trees in this category offer one or more roost site that, due to their space, shelter, or conditions, offer roosting potential for a range of species. Roosts may be more permanent, rather than opportunistic. Small maternity roosts of common species may form in one of these roost sites.	Habitat on and around the Site is well-connected to wider continuous habitat and offers commuting and foraging habitat to a larger number of bats across a number of species. (e.g. tree lines or linked gardens in the urban context, or continuous hedge/ tree lines and watercourses in an agricultural setting).	One dusk and one dawn survey required for both structures and trees. Tree-climbing may be an appropriate alternative to dusk and dawn surveys.
High	Structures and trees in this category have one or more potential roost sites that are suitable for large number of bats. Roosts are likely to be permanent and include maternity roosts. Potential roost sites exist for a wide range of species or species of particular conservation interest.	Habitat on and around the Site is diverse, continuous, and linked to extensive suitable habitat. This category includes well-vegetated rivers, streams, hedgerows, and woodland edge. Habitat is sufficiently diverse to offer opportunities to a wide range of species or those of particular conservation interest	Three surveys, including both dusk and dawn elements. Tree-climbing may be an appropriate alternative to dusk and dawn surveys.

Methodological Limitations

3.15 Evidence of protected species is not always discovered during a survey. This does not mean that a species is absent, hence the surveys also record and assess the suitability of the habitats to support protected species. The time frame in which the survey is conducted provides a broad understanding of activity within the ESA and cannot necessarily detect all evidence of use by a species.

3.16 All non-native species are legally controlled under the Wildlife and Countryside Act 1981 (as amended). The Extended Phase 1 Habitat Survey examined the Site for the presence of Japanese knotweed (as well as giant knotweed and hybrid knotweed), giant hogweed and Himalayan balsam. There may be other invasive plant species present within the Site which were not recorded, but it is considered that this survey is sufficient to identify any significant constraints posed by invasive plant species.

Chapter 4

Baseline

Desk Study

4.1 No protected or notable species records were identified within the Site or a 500m buffer.

4.2 Designated sites located within 500m of the Site are summarised in **Table 4.1**. The spatial arrangement of these sites is shown in **Figure 2, Appendix A**.

Table 4.1: Designated Sites within 1km of the Site

Site Name	Designation	Approximate Distance and Orientation from the Site	Qualifying Feature(s)
Inner Clyde	SPA Ramsar SSSI	The proposed Coastal Embankment in its entirety is less than 50m from the northern edge of the designation complex. At its eastern edge, the Coastal Embankment impinges approximately 30m into the designated area. The proposed outlet of the proposed food relief culvert is similarly located within the designation complex.	Non-breeding populations of: <ul style="list-style-type: none"> ■ Redshank (<i>Tringa totanus</i>) ■ Cormorant (<i>Phalacrocorax carbo</i>) ■ Eider (<i>Somateria mollissima</i>) ■ Goldeneye (<i>Bucephala clangula</i>) ■ Oystercatcher (<i>Haematopus ostralegus</i>) ■ Red-breasted merganser (<i>Mergus serrator</i>) ■ Red-throated diver (<i>Gavia stellata</i>) Other features <ul style="list-style-type: none"> ■ Saltmarsh habitat
Dumbarton Rock	SSSI	Abuts the western boundaries of both Castle Road sites.	Designated as a SSSI on geological grounds. This designation is not further discussed in this Ecological Appraisal
Overtoun Estate, Overtoun Burn & Barwood Hill	LNCS	The proposed flood relief culvert inlet is located within this designated area.	Extensive woodland resource
River Leven	LNCS	Approximately 160m west of Site at closest point (Castle Road sites)	Watercourse and associated habitat
Brucehill Cliffs	LNCS	Approximately 330m west of Site at closest point (Castle Road sites)	Grassland communities and associated invertebrate communities
Unnamed woodland	AWI	Long-Established (of plantation origin) [LEPO] woodland	Woodlands associated with the former Overtoun estate are of sufficient antiquity to qualify for designation under AWI criteria

Site Name	Designation	Approximate Distance and Orientation from the Site	Qualifying Feature(s)
		approximately 50m north of proposed flood relief culvert inlet Ancient (of semi-natural origin) woodland approximately 160m east of site at closest point	

Field Study

4.3 For ease of reference, the findings of the field study are presented according to each part of the Site, as described in **Paragraphs 2.9 – 2.15**.

4.4 The narrow nature of the Site does not lend itself to Phase 1 Habitat mapping as, in many locations, its dimensions are smaller than recommended minimal mappable units¹¹. However, target notes shown in **Figure 1, Appendix A** and presented in **Appendix B**, along with detailed photography in **Appendix C**, allows the reader an understanding of the Site's habitat composition.

Flow Diversion Culvert

Habitats

4.5 Broadleaved woodland is present in the north of the Site, on the southern bank of Gruggies Burn, immediately north of the A82. The woodland is dominated by mature lime *Tilia* sp., sycamore *Acer pseudoplatanus* and beech *Fagus sylvatica*. Understorey was absent while ground flora was sparse, however the presence of woodrush *Luzula sylvatica* and wild garlic *Alium ursinum* suggests a long-established woodland resource at this location.

4.6 No natural or semi-natural habitat was recorded along Greenhead Road, however as the Site turns east and follows National Cycle Route 7, intensively managed greenspace was recorded. Closely mown c.4m-wide amenity grassland verges were recorded. Mature trees were regularly planted along the verges, including Turkey oak *Quercus cerris*, Ash *Fraxinus excelsior*, sycamore, and cherry *Prunus* spp. Some areas of scrub were recorded, dominated by hawthorn *Crataegus monogyna* and elder *Sambucus nigra*. Garden escapes, including Cypress were common amongst the vegetation.

4.7 As the Site turns south it moves through an area of dense sycamore scrub before passing across Glasgow Road. South of Glasgow Road the Site aligns with a core path edged with dense immature woodland. Sycamore, ash, and birch *Betula* spp. dominate the low canopy with hawthorn and willow *Salix* dominating the understorey. The ground is wet at this

location, supporting a shrub layer dominated by bramble *Rubus fruticosus* agg. and a ground layer dominated by ground elder *Aegopodium podagraria*, ivy *Hedera* spp. buttercups *Ranunculus* spp and nettle *Urtica dioica*.

4.8 Moving further south, below the Glasgow-Dumbarton railway line, the culverted Hunter's Burn discharges, creating a swamp dominated by reed canary-grass *Phalaris arundinacea* and meadow sweet *Filipendula ulmaria*.

Protected and Notable Species

4.9 Most of this area of the Site was heavily urbanised and opportunities for protected species were limited.

4.10 North of the A82, the southern bank of Gruggies Burn ostensibly offered suitable habitat for otter and badger, however no evidence of either species was identified. It was noted how close this section of the Site was to the very busy A82 corridor. All trees within this part of the Site had low bat roost potential.

4.11 Greenhead Road offered negligible habitat for protected species, however the amenity grassland, scrub and mature trees associated with the National Cycle Route 7 corridor offered greater potential for nesting birds and roosting bats. Trees along the corridor were considered to have moderate potential for roosting bats.

4.12 Vegetation south of the Glasgow Road provided suitable habitat for nesting birds, however the busyness of the adjacent core path meant opportunities for protected mammals were minimal, and no evidence was recorded.

4.13 The outflow of Hunter's Burn and its confluence with the River Clyde created opportunities for otter activity, however no evidence of the species was recorded.

Invasive Non-Native Species

4.14 Japanese knotweed and Himalayan balsam were recorded throughout this part of the Site. Refer to **Figure 1, Appendix A**, target notes in **Appendix B** and photography in **Appendix C** for further detail.

Gruggies Burn (Flood Walls)

Habitats

4.15 The Site between Glasgow Road and Castlegreen Street entirely comprises Gruggies Burn. At this location, the burn is wide and heavily engineered with vertical concrete walls. Vegetation is limited to stands of birch, willow, ash, and bramble, which have established on silt deposits, or which have grown through the channel's walls. Other species present in small patches include bindweed *Calystegia sepium*, Cow parsley *Anthriscus sylvestris*, butterfly bush *Buddleja davidii* and red campion *Silene dioica*. Large beds of *Petasites* locally dominated silt bars within the channel.

4.16 South of Castlegreen Street, Gruggies Burn narrows and vegetation becomes dominated by a mature closed-canopy woodland. Dominated by sycamore and ash with an understory of willows and hawthorn, the ground flora is dominated by nettle, ground elder, ivy, thistles *Cirsium* spp. and common neutral grasses such as cock's-foot *Dactylis glomerata*. Towards the southern extent of the burn, the brackish influence of the tidal River Clyde become apparent, with seaweeds appearing in-channel.

4.17 Crucially, this part of the Site has experienced significant fly-tipping in recent times, with extensive accumulations of domestic and industrial waste recorded in both the channel and on the banks. A footpath runs alongside this lower section of the burn.

Protected and Notable Species

4.18 The canalised nature of the watercourse between Glasgow Road and Castlegreen Street, coupled with the largely urban nature of the surrounding area, means that opportunities for protected species are extremely limited. Breeding birds may use some of the scrappy vegetation along the burn, but opportunities for other species are absent.

4.19 Between Castlegreen Street and the burn's discharge point, the closed-canopy woodland offers some opportunity for protected species, however the vegetation corridor is narrow and heavily influenced by an immediately adjacent footpath. Ostensibly, more nature bankside structures at this location create greater opportunities for badger, otter and water vole, however no evidence was recorded. Trees along this lower section were identified as having low bat roost potential, largely due to their crowded growth and subsequent thin, single-stemmed nature. However, opportunities for nesting birds were ubiquitous.

Invasive Non-Native Species

4.20 Japanese knotweed and giant hogweed were recorded throughout this part of the Site. Refer to **Figure 1, Appendix**

A, target notes in **Appendix B** and photography in **Appendix C** for further detail.

Tidal Embankments

Habitats

4.21 The proposed tidal embankments are located within a large area of semi-natural habitat on the upper shore of the River Clyde. Beyond the influence of the tidal river, and its brackish conditions, the footprint of the proposed tidal embankments is dominated by a mosaic of broadleaved woodland and neutral grassland.

4.22 The woodland component is relatively immature and comprises a dense canopy of ash, sycamore, and crack willow *Salix fragilis*, with a dense understory of mixed willows, butterfly bush and hawthorn. Locally dominant spirea *Spiraea douglasii* was also noted. Ground and field layers were dominated by bramble, hemlock water dropwort *Oenanthe crocata*, meadowsweet and neutral grasses. Extensive stands of invasive non-native species were recorded (further details below).

4.23 The grassland component of the footprint was diverse. Grass composition included fescues *Festuca* spp, crested dog's-tail *Cynosurus cristatus* and meadow grasses *Poa* spp. The herb component included extensive silverweed *Potentilla anserina*, wood anemone *Anemone nemorosa*, buttercups *Ranunculus* spp, violas *Viola* spp. and meadowsweet. Some grassland communities, particularly around the core path network that crosses this area, were more akin to amenity grassland.

4.24 Stands of rosebay willowherb *Chamaenerion angustifolium* and reed canary-grass drifted across the footprint of the proposed tidal embankments, stretching inland from wetter, marshy vegetation communities closer to the shoreline. Invasive non-native species were prevalent throughout the grassland areas, particularly Japanese knotweed.

Protected and Notable Species

4.25 This part of the Site experienced high levels of recreational use, particularly from dog walkers, which ultimately reduced its potential value for protected species. While suitable habitat for otter and badger was observed, primarily along the banks of the River Clyde and dense woodland respectively, no evidence of either species was recorded.

4.26 All woodland features within this part of the Site provided suitable habitat for nesting birds.

Invasive Non-Native Species

4.27 Invasive non-native species were prevalent within this part of the Site. Dense, mature stands of Japanese knotweed were recorded in woodland clearings, while smaller, more recent, infestations of the species were recorded in grassland areas. Himalayan balsam was also prevalent throughout wooded areas.

4.28 Refer to **Figure 1, Appendix A**, target notes in **Appendix B** and photography in **Appendix C** for further detail.

Tidal Floodgate

Habitats

4.29 Both small parts of the Site along Castle Road comprised existing car parking facilities. Each supported expanses of made ground, edged with mixed broadleaved woodland and/or scrub.

Protected and Notable Species

4.30 Neither Castle Road sites supported suitable habitat for, or direct evidence of, protected or notable species.

Invasive Non-Native Species

4.31 No evidence of invasive non-native species was recorded at either of the Castle Road sites.

Chapter 5

Interpretation

Scheme Context

5.1 This chapter of the Ecological interprets the baseline in relation to relevant legislation and policy, and within the context of the Scheme. It is important to note the following features of the Scheme, which inform the interpretation:

- Detailed design, including full requirements for vegetation removal, construction methods and construction timescales are yet to be determined.
- The Scheme seeks to reduce the severity of flood events along Gruggies Burn. In doing so, it is anticipated that Gruggies Burn will become a more stable environment, with the associated benefits for the ecosystem's structure and function.
- While the notification boundary associated with the Site is large, the physical footprint of the Scheme within Gruggies Burn is limited.

Designated Sites

5.2 The desk study identified 8¹⁴ designated sites within 500m of the Site:

Inner Clyde SPA/Ramsar/SSSI complex

5.3 The Inner Clyde SPA/Ramsar/SSSI complex is an extensive designation, encompassing approximately 1,825 ha of the intertidal zone of the Clyde estuary from Clydebank in the east to Helensburgh (north shore) and Greenock (south shore). While qualifying features vary slightly between the SPA, Ramsar and SSSI designations, the complex is designated for the resource is offers internationally important populations of winter wildfowl and waders. The complex also supports important estuarine vegetation communities, including saltmarsh.

5.4 As required by The Conservation (Natural Habitats, &c) Regulations 1994 as amended, potential effects on the Inner Clyde SPA must be considered in a Habitat Regulations Appraisal (HRA). A standalone shadow HRA (sHRA) has been prepared and accompanies this Ecological Appraisal. The sHRA should be referred to for an assessment of potential

¹⁴ Excluding Dumbarton Rock SSSI, which qualifies on geological grounds.

effects on the Inner Clyde SPA (and the wider Ramsar/SSSI complex by proxy).

Local Nature Conservation Sites (LNCS)

5.5 Three LNCS were identified within 500m of the Site.

5.6 The River Leven LNCS is approximately 160m west of the Proposed Development. There is no structural or functional connectivity between the Site and the River Leven LNCS and, consequently, the Scheme is unlikely to result in any negative effects on the designation. Similarly, the Brucehill Cliffs LNCS, which qualifies for its grassland diversity, is structurally and functionally distinct from the Site and is unlikely to experience negative effects as a consequence of the Scheme.

5.7 The Overtoun Estate, Overtoun Burn & Barwood Hill LNCS is an expansive designation north of Dunbarton. It encompasses the Overtoun Burn, which becomes Gruggies Burn, and the various riparian and terrestrial woodland features associated with the estate. The Site includes the southernmost point of the designation; the south bank of Gruggies Burn immediately north of the A82. The Ecological Constraints Walkover noted that this area supports broadleaved woodland, a qualifying feature of the LNCS.

5.8 It is assumed that vegetation removal will be required to facilitate the construction of the proposed flow diversion culvert inlet. While the extent of vegetation removal is currently unknown, it is considered unlikely that the integrity and functionality of the LNCS will be significantly affected, given its scale of the designation, and the likely limited footprint of removal. It is also noted that, as discussed in the Scheme Context introduction to this chapter, that the wider benefits of the Scheme will contribute to improved ecosystem function of the designation.

Ancient Woodland Inventory Sites

5.9 Two woodland features registered on the AWI inventory were identified within 500m of the Site. The identified LEPO site is approximately 50m upstream of the northern edge of the Site, where the proposed flow diversion culvert inlet is proposed. As an upstream feature, no significant effects are predicted. The AWI feature, associated with the embankment of the A82 to the north west of the Site, is structurally and functionally distinct from the Scheme and is unlikely to experience any negative effects as a consequence of development.

Habitats

5.10 For ease of reference, habitats are interpreted within the context of each component of the Site.

Flow Diversion Culvert

5.11 Woodland habitat, a national and local conservation priority, was identified along the route of the proposed flow diversion culvert. In addition to the woodland resource identified within the LNCS described above, broadleaved woodland was recorded along the route of the culverted Hunter's Burn. However, it was noted that the woodland strip in this location was narrow, poorly structured and had limited species diversity. It is also recognised that invasive non-native species were recorded within this community. If unmanaged, these species are likely to reduce the diversity of the woodland feature over time. The woodland feature was also heavily disturbed by recreational activity, primarily dog walking.

5.12 Vegetation removal within this part of the Site is likely to be extensive, however the loss of this isolated and poor woodland resource is unlikely to have wider significant consequences for biodiversity at the local level.

5.13 It is likely that the construction of the flow diversion culvert outfall will result in the loss of some *Phalaris* marsh, however this is a common and widespread habitat. While it conveys some ecological value, its loss will not negatively affect biodiversity at a local level.

Gruggies Burn (Flood Walls)

5.14 Between Glasgow Road and Castlegreen Street, the Site encompasses the open channel of Gruggies Burn. Vegetation here is very limited. The loss of habitat along this section, if necessary, is unlikely to negatively affect biodiversity at a local level. Indeed, the implementation of the Scheme will create a more stable environment at this location and may improve biodiversity over time.

5.15 South of Castlegreen Street, riparian habitat becomes closed canopy woodland, a local and national biodiversity priority. Like the flood relief culvert route, this habitat is in poor condition and experiences regular disturbance as a consequence of recreational pressure. Also like the flood relief culvert route, invasive non-native species are present here; unmanaged, they threatened to further reduce the biodiversity of this stretch of Gruggies Burn.

5.16 Notwithstanding the poor quality of the woodland habitat at this location, the loss of riparian woodland resource represents a poor outcome for biodiversity, although it is not likely to negatively affect biodiversity at a local level, given the relatively small scale of the feature.

Tidal Embankments

5.17 The footprint of the proposed tidal embankments currently supports a mosaic of immature broadleaved woodland and relatively diverse neutral grassland. Both

habitats are recognised as national and local conservation priorities. However, it was noted that recreational pressure at this location is high, while invasive non-native species were widespread, posing a long-term threat to these habitats.

5.18 The loss of these habitats, while representing a poor outcome for biodiversity, are unlikely to negatively affect biodiversity at a local level, given the ubiquity of similar habitat structures along the northern shore of the River Clyde. Furthermore, given that the tidal embankments will be a reinforced bund structure, an opportunity exists to create a landscape plan that recreates and enhances biodiversity at this location.

Tidal Floodgate

5.19 Both small areas at Castle Road support hard standing and made ground. While both are surrounded by broadleaved woodland and scrub, habitat loss at either site is unlikely as the proposed tidal floodgate infrastructure is unlikely to require significant vegetation removal.

Protected Species

5.20 No records of protected species within 1km of the Site were identified during the desk study. Field surveys identified that, while marginally suitable habitat existed for protected species, including otter, badger, bat and nesting birds, no direct evidence was recorded. Ostensibly, this outcome is surprising, however given that extensive recreational pressure was noted in all vegetated parts of the Site, particularly along the River Clyde, the survey findings are understandable.

5.21 While field surveys represent a snapshot in time, the urban nature of most of the Site means that protected species, if present, are likely so in small numbers and no individual part of the Site is likely to be of particular importance for protected species populations.

5.22 A small number of trees within the Site had limited potential to support roosting bats and the linear vegetation corridors in some locations are likely to support foraging and community individuals. While full vegetation removal plans are currently unknown, it is likely that linear vegetation corridors will remain in some form, allowing foraging and commuting to persist.

5.23 Habitat for breeding birds was widespread across the Site and, where vegetation removal is required, there will be a net loss of habitat for these species. This is particularly acute where woodland features are to be removed as these offer a wide variety of nesting opportunities for a range of species. However, while suitable habitat will be lost, the scale of retained vegetation, and similarly suitable habitat in the wider area, means that significant negative effects are unlikely.

5.24 Mitigation and enhancement opportunities for protected species are discussed in the following chapter.

Invasive Non-Native Species

5.25 Invasive non-native species were widespread across all parts of the Site. Japanese knotweed, giant hogweed and Himalayan balsam were recorded, both in large, mature stands, and in areas of apparently new growth.

5.26 Invasive non-native species pose a threat to biodiversity as they outcompete native vegetation, often resulting in homogenous stands of single species.

5.27 Japanese knotweed was particularly prevalent. The species was recorded in several locations along Gruggies Burn. Notably, immediately north of the Site a particularly mature stand of knotweed was recorded along a riparian footpath. This stand may be the primary source of infestation along the burn. In the south of Gruggies Burn, several areas of new growth were identified, highlighting that the development of invasive species along the watercourse is ongoing, potentially exacerbated by flood events and recreational pressure.

5.28 Construction of the Scheme, if poorly executed, has the potential to exacerbate the spread of invasive non-native species, further diminishing biodiversity. Mitigation measures are discussed in the following chapter.

Chapter 6

Mitigation and Enhancement

Embedded Mitigation

6.1 This Ecological Appraisal is cognisant of the following mitigation measures embedded in the design process:

- Gruggies Burn will remain passable to fish. All Scheme features will allow for the continued movement of fish between the River Clyde and Gruggies Burn.
- Vegetation removal will be minimised during construction and operational maintenance of the Scheme.
- Construction activity will adhere to a Construction Environmental Management Plan (CEMP). An outline CEMP has been prepared in support of the notification process. The outline CEMP sets out measures to ensure the water environment is protected and that biosecurity, particularly as it relates to invasive non-native species, is considered.

Additional Mitigation

6.2 In order that the Scheme achieves legislative compliance during construction, the following additional mitigation measures will be implemented.

- An advisory Environment Clerk of Works (ECoW) will be appointed to provide ongoing compliance support during construction activity. The terms of the ECoW role will be agreed with West Dunbartonshire Council and their stakeholders in advance.
- A pre-construction protected species walkover will be undertaken no more than 3 months prior to the commencement of works. In the event that protected species evidence is recorded, where necessary, the protected species licensing process will be implemented.
- In addition to general protected species walkovers, all trees scheduled for removal will be subject to further bat roost potential inspections. Where trees are identified as having moderate or high potential, further activity surveys will be undertaken at an appropriate time of year (May – August). Where roosting bats are identified, the protected species licensing process will be implemented.
- Where possible, all vegetation removal will be completed outwith the breeding bird season (March – August inclusive). Where this is not possible, vegetation will be searched for evidence of active nesting no more than 24

hours prior to removal. Where active nests are found, an appropriate buffer zone will be determined and implemented.

- A comprehensive invasive non-native species management plan will be prepared prior to works commencing. The management plan will identify all necessary measures to prevent the accidental spread of plant material during the construction process and, where appropriate, seek to manage the further threat from invasive species.

Enhancement

6.3 An opportunity exists, via the design of the Scheme, to enhance the Site's biodiversity. In addition to creating a more stable environment in which fauna and flora can thrive, the following measures should be prioritised as a means of achieving biodiversity enhancement:

- Enhancing existing opportunities for fish passage along Gruggies Burn.
- Eradicating invasive non-native species within the Site.
- Improving the structure of woodland vegetation with the Site.
- Creating new woodland and grassland habitat, particularly along the tidal embankments. The development of landscape designs for the embankments should be discussed with West Dunbartonshire Council's biodiversity team.

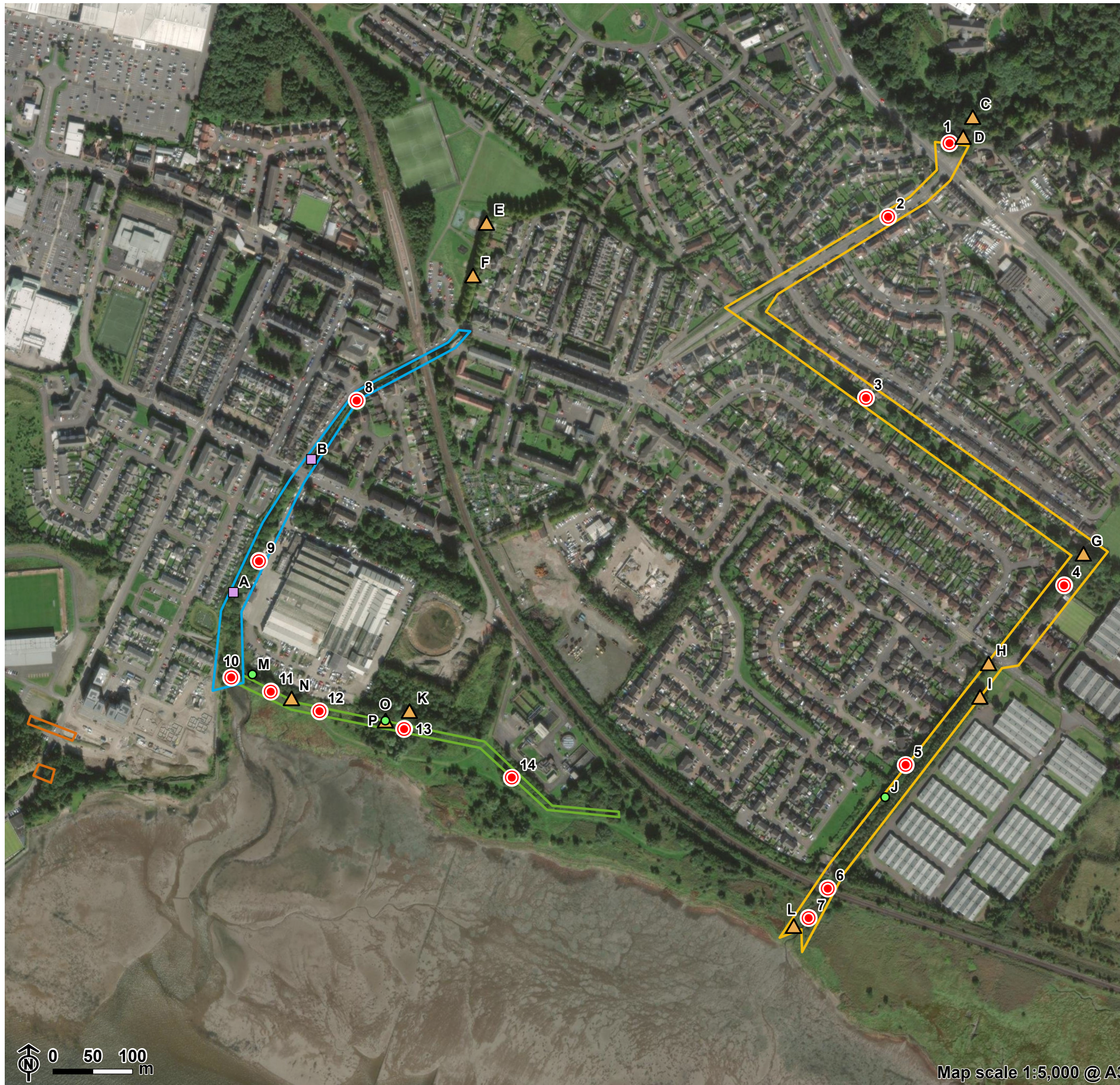
Appendix A

Figures

Figure 1: Site Boundary and Target Notes

Figure 2: Designated Sites

Figure 1: Site Boundary and Target Notes

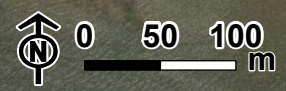


The Site

- Tidal floodgate
- Tidal embankments
- Flow diversion culvert
- Gruggies Burn (Flood Walls)
- Target note

Invasive Non-Native Species locations

- Giant hogweed
- Himalayan balsam
- Japanese knotweed



Map scale 1:5,000 @ A3

Figure 2: Designated Sites



- Site boundary
- 500m buffer
- Local Nature Conservation Site
- Special Protection Area
- Site of Special Scientific Interest
- Ramsar site
- Ancient Woodland Inventory**
- Ancient (of semi-natural origin)
- Long-Established (of plantation origin)



Map scale 1:9,000 @ A3

Appendix B

Target Notes

Table B.1: Target Notes

Target Note Number	Grid Reference	Detail
1	NS 41267 75252	The location of the proposed flow diversion culvert inlet. This small area supports broadleaved woodland and falls within a LNCS for which broadleaved woodland is a qualifying feature.
2	NS 41180 75154	Greenhead Road streetscape. The street offers no natural or semi-natural vegetation and is limited ecological value.
3	NS 41146 74943	A linear stretch of intensively managed amenity grassland and mature avenue trees. This linear park supports a short section of a national cycle route and experiences extensive recreational pressure.
4	NS 41428 74719	A small area of dense scrub and broadleaved woodland with limited access. Japanese knotweed was noted in this area.
5	NS 41212 74471	A narrow strip of poorly structured broadleaved woodland over the culverted Hunter's Burn. Invasive species are particularly prevalent within this small woodland feature.
6	NS 41114 74316	A low bridge supporting the Glasgow-Helensburgh railway. This area was flooded at the time of survey and while it supports a section of core path, the feature was impassable.
7	NS 41090 74279	The existing outflow of the culverted Hunter's burn. A small area of <i>Phalaris</i> wetland was recorded around the outflow.
8	NS 40528 74942	An open section of Gruggies Burn running parallel to Buchannan Street. At this point the burn's channel is at its widest, but it is heavily engineered with canalised walls and gabions.
9	NS 40384 74718	A further open section of Gruggies Burn with a closed broadleaved woodland canopy. Like many other sections of the burn, invasive non-native species were present here. An informal footpath runs alongside the watercourse here, meaning recreational pressure is high.
10	NS 40363 74575	Gruggies Burn's confluence with the River Clyde. A footbridge spans the burn at this location, creating connectivity with residential development to the west.
11	NS 40396 74578	Broadleaved woodland within the footprint of the proposed tidal embankments. Again, this area experiences recreational pressure. Invasive non-native species were recorded throughout this woodland feature.
12	NS 40474 74535	An area of relatively diverse open grassland habitat. A core path traverses the grassland area.
13	NS 40563 74508	Mixed semi-mature broadleaved woodland, heavily influenced by invasive non-native species

Target Note Number	Grid Reference	Detail
14	NS 40717 74455	Semi-mature willow dominated broadleaved woodland. The woodland has a poor, even-aged structure and is lacking in species diversity.

Table B.2: Invasive Non-Native Species

Target Note Letter	Grid Reference	Detail
A	NS 40376 74688	A single giant hogweed plant amongst riparian woodland.
B	NS 40467 74852	A single giant hogweed plant in an open area immediately adjacent to Gruggies Burn.
C	NS 41323 75283	An extensive and mature stand of Japanese knotweed. Adjacent to a well-used informal path, with evidence of new growth spreading along the margins of the path.
D	NS 41291 75262	Immature Japanese knotweed growth, potentially spreading from Target Note C.
E	NS 40687 75143	Relatively immature stand of Japanese knotweed adjacent to private gardens.
F	NS 40669 75081	Relatively immature stand of Japanese knotweed amongst denser vegetation.
G	NS 41431 74739	Single immature Japanese knotweed plant amongst scrub vegetation.
H	NS 41313 74600	Single immature Japanese knotweed plant amongst scrub vegetation.
I	NS 41301 74566	Single immature Japanese knotweed plant amongst scrub vegetation.
J	NS 41190 74434	Small stand of Himalayan balsam amongst woodland vegetation.
K	NS 40590 74531	Extensive stand of very mature Japanese knotweed in centre of woodland feature.
L	NS 41067 74261	Single immature Japanese knotweed plant amongst scrub vegetation.
M	NS 40391 74583	Small stand of Himalayan balsam in woodland feature, immediately adjacent to core path.
N	NS 40438 74547	A single immature Japanese knotweed immediately adjacent to core path.
O	NS 40542 74518	Immature Japanese knotweed and Himalayan balsam in complex mosaic, within woodland feature.
P	NS 40542 74518	Immature Japanese knotweed and Himalayan balsam in complex mosaic, within woodland feature.

Appendix C

Site Photography



Plate 1: Gruggies Burn as it passes beneath the A82 in the north of the Site.



Plate 2: A view of the typical channel structure of Gruggies Burn between the A82 and Glasgow Road.



Plate 3: Gruggies Burn at Buchannan Road.



Plate 4: Giant Hogweed on Gruggies Burn at Buchannan Road.



Plate 5: Gruggies Burn as it passes through riparian broadleaved woodland, near its confluence with the River Clyde.



Plate 6: A footbridge over Gruggies Burn at its confluence with the River Clyde.



Plate 7: National Clyde Route 7, in central Dumbarton and within the Site.



Plate 8: Scrub and woodland vegetation along the route of the culverted Hunter's Burn.



Plate 9: The Site as it passes below the Glasgow-Helensburgh railway. Note flooding beneath the bridge structure.



Plate 10: Hunter's Burn's current culvert outflow and confluence with the River Clyde.



Plate 11: A view east across part of the footprint of the proposed tidal embankments (grassland).



Plate 12: A further view east across part of the footprint of the proposed tidal embankments (broadleaved woodland).