



Irish Water

VARTRY WATER SUPPLY PROJECT

VARTRY WATER TREATMENT PLANT

Ecological Impact Assessment (EcIA)



March 2016



NICHOLAS O'DWYER LTD.

VARTRY WATER SUPPLY PROJECT

**VARTRY WATER TREATMENT PLANT
ECOLOGICAL IMPACT ASSESSMENT**

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EXECUTIVE SUMMARY

- Nicholas O'Dwyer was commissioned by Irish Water to carry out an ecological survey of the Vartry Water Treatment Plant (WTP) at Vartry Reservoir Lower in Co. Wicklow as part of the proposals to upgrade the Vartry Water Supply Scheme.
- The plans for the site comprise five main areas of work; construction of a new WTP to provide full water treatment facilities, improvements to the reservoir dam spillway and downstream channel to increase its hydraulic capacity, improvements to the existing draw-off arrangements within the draw-off tower, installation of siphon pipes and installation of a new pipeline that will connect the Vartry Water Treatment Plant to the existing Callowhill to Stillorgan pipeline.
- A Phase 1 Habitat Survey was carried out at the Vartry WTP on the 6th and 7th August 2015 and along the pipeline corridor on 28th October 2015 by an experienced ecologist. The ecological survey assessed the habitats present within the site, in accordance with guidelines set out in the Heritage Council Best Practice Guidelines for Habitat Survey and Mapping (Smith et al., 2011). Habitats and features present within the site (and land immediately adjacent to the site) were appraised for their suitability for use by protected species and other species of conservation concern.
- A variety of semi-natural and artificial habitats were recorded within the survey areas that were considered to be of Negligible to Regional ecological value.
- The River Vartry runs along the eastern boundary of the WTP site which is designated a Salmonid Water and was considered to be of Regional conservation importance. The new WTP will utilise the existing WTP effluent discharge locations into the river. Based on the waste assimilative capacity calculations, the receiving water downstream has adequate waste assimilative capacity to accommodate the proposed WTP discharge in terms of BOD, Orthophosphate, Ammonia and Suspended Solids, thereby ensuring compliance with the Surface Water Regulations and Quality of Salmonid Waters Regulations. Best practice environmental control measures will be implemented to minimise the risk of pollution to the watercourses on site during construction.
- The site supports a significant number of trees of varying species and maturity within a variety of habitats. Three woodland habitat types (WD2, WL2 and WN6) were considered to have a Local Level of ecological value meaning they are important examples of the habitat type within a local context. The wooded areas and treelines had a high intrinsic conservation value and are likely to provide valuable navigational and foraging features for bats and support a range of

nesting and foraging bird species. Any tree removal will be replaced with equivalent compensatory / enhancement planting within the site boundary to ensure there is no net loss of treeline and woodland habitat on site.

- Further surveys for badger, bats and otter were carried out between August and September 2015.
- No badger setts were recorded within the survey area but badger presence was confirmed by field signs in several locations. It has been recommended that a pre-construction survey for badger setts is undertaken no more than 3 months prior to the construction phase to confirm the continued absence of badger setts.
- Bat emergence surveys were carried out on a disused toilet block that is to be demolished as part of the proposals. The surveys confirmed the likely absence of roosting bats within the building. A high level of bat activity was recorded in the vicinity of the building and at least 5 species were identified. A precautionary working method has been recommended for the demolition of the building. An emergence survey of the building to be demolished at Callowhill will be undertaken between May – September 2016 the results of which will be provided as an addendum to this report. Trees identified as containing features suitable for roosting bats in this report that are to be felled should be inspected at height by an experienced ecologist prior to felling.
- Otter presence was confirmed along the spillway although no holts have been identified. The potential disturbance to otters during the construction phase is not considered to be significant.
- It is recommended that a breeding bird survey is undertaken April – June 2016 within areas of suitable nesting bird habitat in order to inform appropriate mitigation for the loss of suitable habitat. Due to the presence of suitable habitat for nesting birds, clearance of any woodland, trees or scrub will take place outside of the bird nesting season (March to August inclusive).
- Ponds 1 – 7 are subject to regular dredging and vegetation clearance to ensure their continued functionality as sediment settlement ponds. This is considered to greatly reduce their suitability to support breeding amphibians although individuals may opportunistically use these ponds for breeding on occasion. It is recommended that the ponds are drained and filled in during the period September – January when amphibians are likely to be absent.
- An Invasive Species Management Plan has been prepared that identifies measures to prevent the spread and eliminate the stand of Japanese knotweed at the Callowhill site.
- Ecological enhancement measures have been recommended which would make a positive, permanent contribution to local biodiversity.

1 INTRODUCTION

1.1 Details of the Ecological Assessment

Nicholas O'Dwyer was commissioned by Irish Water to carry out an ecological survey of the Vartry Water Treatment Plant at Vartry Reservoir Lower in Co. Wicklow including survey of a proposed pipeline route between the WTP and the existing Callowhill to Stillorgan pipeline as part of the proposals to upgrade the Vartry Water Supply Scheme.

The initial baseline survey of the Vartry WTP was carried out on 6th and 7th August and survey of the pipeline route was carried out on 28th October 2015 by an experienced ecologist, who is a member of the Chartered Institute of Ecology and Environmental Management.

Unless the client indicates to the contrary, information on the presence of species will be passed to the National Biodiversity Data Centre in order to augment their records for the area.

The objective of this report is to provide ecological information on the habitats present at the time of survey, and identify potential ecological constraints and opportunities on the site, in relation to a forthcoming planning application for the upgrade to Vartry Water Treatment Plant.

The report has been prepared in compliance with the European Communities Legal requirements and follows Guidelines on the Information to be contained in Environmental Impact Statements (Environmental Protection Agency, 2002) and Advice Notes on Current Practice in the preparation of EIS (2003).

The European Habitats Directive 92/43/EEC (Article 6) indicates the need for plans and projects to be subject to Appropriate Assessment if the plan or project not directly connected with or necessary to the management of a Natura 2000 site (which includes **SACs and SPAs**) but which has the potential to have implications on a site's conservation objectives. These implications can be significant effects either individually or in combination with other plans or projects.

The information provided in this report will form the basis of an Appropriate Assessment and will also be used to inform a Construction Method Statement for the proposed development.

1.2 Background

The Vartry Water Supply Scheme currently provides 14 % of average daily demand in the Greater Dublin Water Supply Area (GDWSA), a domestic population equivalent of 196,000 customers. Due to its age, condition and strategic importance, the Vartry Water Supply

Scheme is in urgent need of improvement and has been listed on the EPA Drinking Water Remedial Action List.

As part of the improvements to the Water Supply Scheme a new Water Treatment Plant (WTP) will be constructed on the existing Vartry WTP site along with remedial works to the spillway channel, draw-off tower, installation of siphon pipes at the reservoir dam and installation of a pipeline between the WTP and the existing Callowhill to Stillorgan pipeline.

This report provides an Ecological Impact Assessment (EcIA) of the works at the Vartry WTP site and along the proposed pipeline route.

2 PROJECT DESCRIPTION

2.1 Overview

The proposed works at the Vartry WTP site comprise five main areas of work:

- Construction of a new WTP to provide full water treatment facilities including processes that provide an effective barrier to diatomic algae.
- Improvements to the dam spillway and downstream channel to increase its hydraulic capacity.
- Improvements to the existing draw-off arrangements due to the age and condition of the pipes and fittings.
- Installation of siphon pipes. This will maintain supplies to the adjacent water treatment works in the event of a sudden failure of the existing pipes and fittings, and allow the existing intake pipes to be taken out of service for the improvement works.
- A new pipeline is proposed that will connect the Vartry Water Treatment Plant to the existing Callowhill to Stillorgan pipeline including construction of a break pressure tank at a high point on the pipeline and a hydropower turbine at the Callowhill site.

Descriptions of each of the above areas of work are detailed in the sub-sections below.

2.2 New WTP

As part of the Vartry Water Supply Scheme, a new WTP is to be constructed at the existing Vartry WTP site in the townland of Roundwood, c. 2.8 km south-west of Roundwood village (see Figure 2.1 for the site location, Figure 2.2 for an aerial photograph and Figure 2.3 for the proposed plant layout). The proposed site for the new WTP covers an area of c. 1.4 ha within the Vartry WTP site boundary which covers c. 22 ha.

The existing WTP at Vartry was constructed in the 1860's and a number of extensions and upgrading projects have been undertaken in the interim. It utilises a Slow Sand Filtration Process subsequent to which lime, chlorine and fluorine are added to the filtered water prior to flowing into a Covered Reservoir. The Vartry Water Supply Scheme is included in the current EPA's Remedial Action List (RAL) under the heading "EPA Audit Observation – Treatment and Management Issues".

The new Vartry WTP will replace the existing WTP and provide full water treatment facilities including processes that provide an effective barrier to diatomic algae that has caused seasonal reductions in production capacity in recent years. It will provide a Coagulation, Flocculation, Clarification and Rapid Gravity Filtration Process (FCF + RGF) with enhanced individual filtration control and monitoring. The treatment process will be capable of producing 85-90 MI/day of treated drinking water to the Greater Dublin Water Supply Area

(GDWSA), in compliance with the Drinking Water Regulations. The proposed Vartry WTP will utilise diverted water from the existing stilling basin and will be served by the existing Vartry Reservoir raw water source. The daily, annual and peak abstraction from the Vartry Reservoir will be maintained as is at present.

Throughout the Design – Build works, the Contractor shall take account of relevant legislation and best practice UK CIRIA guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice.

During construction of the new WTP best practice environmental control measures will form part of the construction methodology for the site. These will be included in a Construction Management Plan (CEMP) for the site which will be agreed in advance with the statutory authorities and will include the following controls:

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment. Fuelling and lubrication of equipment is not to be carried out close to any watercourse. Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and disposed of through waste contractor licenced for the purpose. Waste oils and hydraulic fluids are to be collected in leak-proof containers and removed from the site for disposal or recycling.
- Felled trees and excavated spoil and rock will be stockpiled at least 30 m from drainage ditches or high risk flood zones and 50 m from the River Vartry.
- To avoid the introduction of invasive non-native species and fish pathogens, all plant and machinery utilised on site will be thoroughly cleaned and washed using high pressured steam cleaning before delivery to the site. A visual inspection for evidence of attached plant or animal material, or adherent mud or debris will be completed on all equipment that has come into contact with the water before leaving the site.

There will be a supernatant discharge from the new WTP into the River Vartry which will comply with the water quality parameters detailed in the existing discharge licence (ESS/14/14/294) for supernatant waters. A summary of the existing discharge licence compliance parameters is included within Table 2.1 below. A number of new parameters

have been added and some adjustment to existing levels (i.e. Ammonia) require consideration in order to comply with applicable legislation. It is proposed to increase the volume of treated supernatant discharge from 1,700 m³ per day to 4,000 m³ per day. Due to this proposed change in volume, an application to revise the current discharge consent will be made to Wicklow County Council. The total volume to be discharged shall not exceed 4,000 m³ per day, subject to a maximum flow rate of 400 m³ per hour.

The quality of the discharge will fully comply with the parametric values set out in Table 2.1 below.

Table 2.1 – Quality Standards for Supernatant Discharge

Determinand	Baseline Levels (Average)	Existing Limit (95% compliance)	Proposed Limit (95% compliance)	Comments
Aluminium	N/A	N/A	≤ 2 mg/l	
Turbidity	N/A	N/A	≤ 10 NTU	
pH	6.04 – 7.27	≥ 6.0 ≤ 9.0	≥ 6.0 ≤ 9.0	Proposed limit compliant with existing discharge licence
BOD ₅	0.6 mg/l	≤ 4 mg/l	≤ 4 mg/l	Proposed limit compliant with existing discharge licence
COD	N/A	N/A	≤ 125 mg/l	
Suspended Solids	2 mg/l	≤ 25 mg/l	≤ 25 mg/l	Proposed limit compliant with existing discharge licence
Ammonia (N)	0.011 mg/l	≤ 1.0 mg/l	≤ 0.34 mg/l	Proposed limit lowered to ensure compliance with Salmonid Regs
Nitrites (N)	0.003 mg/l	≤0.015 mg/l	≤0.015 mg/l	Proposed limit compliant with existing discharge licence.
Ortho Phosphate (OP)	0.007 mg/l	N/A	≤0.25 mg/l	Proposed limit compliant with existing discharge licence.

2.1 Waste Assimilative Capacity (WAC)

The supernatant discharge from the proposed WTP will be discharged directly into the River Vartry at the existing discharge locations (NGR 321572E 201493N and 321622E 201136N). Waste Assimilate Capacity calculations included in Section 5 of this report and Appendix D demonstrate compliance with the Environmental Quality Standards (EQSs) set out for "Good status" in the Surface Waters Regulations (S.I. No. 272 of 2009) and the EQS for Suspended Solids and Ammonia set out under the European Communities (Quality of Salmonid Waters) Regulations, 1988.

2.2 Spillway Channel

The spillway channel runs from the dam weir at the south-eastern end of the Lower Vartry Reservoir at National Grid Reference (NRG) 321621E 201807N. The regrading works are proposed immediately south of the R764 road bridge at NGR 321635E 201789N to the area where there is a change in slope of the channel, a distance of about 170 m, at NGR 321629E 201615N as shown in Figures 2.2 and 2.4. The channel slope will be 1 in 55 which maintains supercritical flow in the channel. It is estimated that works to the spillway would take 3 months to complete.

The base width of the channel will be maintained but not widened, however, some excavation of the sides of the channel will be needed for access and vegetation clearance. It is proposed that an access path be maintained on the west bank of the spillway to allow for visual inspection. Slope trimming, where required, is likely to be preferred on the east bank.

The works will consist of tree felling, ground clearance and rock excavation to achieve the new spillway profile. The spillway will have a minimum discharge capacity of 160 m³/s.

It is proposed that the Contractor's compound be located in the field to the east of the spillway, downstream of the road, with access established through where the existing toilet block is located which is to be demolished. A ramp will be constructed down the spillway east bank to facilitate plant access to the spillway channel. This will be retained for future maintenance access.

Preliminary works will be required to clear trees and ground vegetation on access routes and along the spillway channel. This will be carried out outside of the bird nesting season.

Throughout the Design – Build works, the Contractor shall also take account of relevant legislation and best practice UK CIRIA guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects;

- SP156 Control of water pollution from construction sites – guide to good practice.

Prior to the construction phase an Environmental Management Plan will be prepared and agreed in advance with the statutory authorities which sets out proposed measures to mitigate against environmental impacts during the construction and operational stages taking cognisance of the following mitigation measures:

The reservoir water level will be controlled at a level below top water level during the spillway works. This will typically be set at least 0.5m drawdown. This will prevent waves overtopping the weir and minimise leakage through the weir. This should keep the working excavation zone predominantly dry to minimise sediment laden run-off entering the River Vartry.

To minimise the risk of pollution and siltation downstream of the working area, a bund would be formed upstream of the working area in order to maintain a dry working area. Any water draining to this bund would be pumped via a settlement tank to discharge back into the reservoir. To avoid excessive silt runoff, site clearance on the spillway channel banks is not to be undertaken during wet conditions, i.e. when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours. To avoid contamination of the river water during an extreme flood event, no works on the riverbank likely to generate soiled water is to be carried out when rainfall of more than 3 mm/hour is forecast within the next five days in the River Vartry catchment.

Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils, are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment. Fuelling and lubrication of equipment is not to be carried out close to any watercourse. Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed of by a licenced waste contractor. Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or recycling.

Felled trees and excavated rock swill be stockpiled outside of the channel and high risk flood zones. Plant shall not be stored within the spillway outside of working hours.

The spillway banks are to be reinstated in a manner so as to minimise the potential for erosion, and to return the bank to as close to its original condition as possible.

To avoid the introduction of invasive non-native species and fish pathogens, all plant and machinery utilised on site will be thoroughly cleaned and washed using high pressured steam cleaning before delivery to the site. A visual inspection for evidence of attached

plant or animal material, or adherent mud or debris will be completed on all equipment that has come into contact with the water before leaving the site.

To avoid impacts on suitable salmonid spawning areas downstream of the works, excavation should take place outside the period October to May, inclusive. Agreement with IFI and NPWS must be obtained as to the dates when the work can be allowed.

2.3 Siphon Pipes

The current proposal is to install siphon pipes (see Figure 2.5) to meet the following requirements:

- Maintain supplies to the water treatment works in the event of sudden failure of existing pipes and fittings;
- Maintain supplies whilst the existing intake pipes to be taken out of service for the upgrading works;
- Control the reservoir water level at a maximum nominal specified level below top water level whilst the spillway works are being carried out.

The minimum capacity of the siphon system will be 90 MI over 20 hours. (1.25 m³/s).

The siphon pipe installation would consist of:

- Three HDPE siphon pipes buried in the downstream face of the dam.
- Priming valves to be located at the highest point (in chamber within the crest road).

The actual location of the siphon pipes will be reviewed at detailed design taking into account site conditions and hydraulic considerations. It is estimated that the siphon pipes would take 6 weeks to install.

2.4 Draw-off tower and Dam Tunnel

The draw off tower and dam tunnel connecting to the water treatment plant is located at the south-eastern end of the Lower Vartry Reservoir at NGR 321421E 201708N as shown in **Figure 2.2**. It is estimated that the intake upgrade will take 9 months to complete.

The methodology for valves and fittings replacement will be similar to Dublin City Council's "Outline Scope of Works - Proposed Methodology & Sequencing, Revision E - Updated 04.02.2005" and will include the following:

- Isolate pipeline in draw-off tower. (Provide double isolation).
- Completely drain 33" & 48" pipes.
- Remove valve house main window and provide temporary support.

- Remove floor in valve chamber and supporting wall. Install supporting framework to replace horizontal support provided by ground floor arch.
- Remove valves and fittings and install temporary blank flanges on downstream end of 24", 33" & 48" pipes.
- Install temporary support structure and flooring.
- Construct gantry.
- **Excavate down to crown of pipe 48" pipe and remove side fill material.**
- Drill hole in spring line if required to enable attachment for pulling pipes apart. Remove pipe. Assuming existing CI pipes are spigot and socket, it may be possible **to pull the pipes apart. The method will form part of the contractor's** detailed method statement.
- Undertake metallurgical examination of pipe (specialist).
- **Excavate down to crown of 33" pipe and remove side fill material.**
- Drill hole in spring line to enable attachment for pulling pipes apart. Remove pipe.
- Excavate down to bedrock and remove all existing pipe supports *etc.*
- **Carefully excavate around 33" and 48" pipe immediately downstream of stop wall.** If spigot end exposed measure distance from spigot to stop wall.
- Measure pipes outside and inside diameters at a number of points to confirm out of roundness, pipes circumference and thickness.
- Cut pipes. (300 mm to 400 mm from face of stop wall will be required for connecting coupling).
- Geotechnical and structural assessment of wall, tunnel and bedrock.
- Install and grout anchors into central stop-wall and bedrock for new flange plate
- Install thrust flange plate, guard valves *etc.*
- Construct new invert to tunnel (TBC), construct pipe support plinths for 800 mm dia and 1200 mm dia pipes.
- Install 800mm dia and 1200 mm dia pipes.
- Install high level walkway above 800 mm dia pipe.
- Remove temporary flooring and supports in valve chamber.
- Install pipework, valves, flow meters, and telemetry lines to/from existing chemical/office building.

- Commission valves in valve chamber.
- Reinstate flooring and supports in valve chamber.

2.5 Pipeline connecting the Vartry WTP to the existing Callowhill to Stillorgan pipeline

A new pipeline is proposed that will connect the Vartry Water Treatment Plant to the existing Callowhill to Stillorgan pipeline within the townlands of Knockfadda, Callowhill Upper and Corsillagh in Co. Wicklow (see **Figure 2.6**). The proposed pipeline is ca. 4.3 km in length and follows a route comprising pasture farmland, field boundaries, scrub vegetation, plantation woodland and artificial hard surfaces (see **Figure 2.7**).

A break pressure tank will be located at a high point on the line, with a purpose of removing excess pressure from the pipeline after which water shall flow by gravity to Callowhill (see **Figure 2.7**). A new hydropower turbine is proposed at the Callowhill site which will be housed in a single storey building ca. 5 x 10 m in area.

The pipeline will be 1200 mm in diameter and installed with a cover depth of 1200 mm. The total average depth of the trench will be 2700 mm allowing for 300 mm of bedding. The pipeline will be installed using open cut techniques with an average trench width of 1800 mm excluding any additional width which may be required depending on the method of supporting the sides of the trench used during excavation (i.e. trench boxes, or stepping).

The installation of the pipeline will occur in discrete sections (typically 100-200 m in length) and will be completed progressively along the route. The precise timings of these works are not yet known. An excavator will be utilised to dig the trench, bury the pipeline and infill the trench. Wayleaves shall be 30 m in width allowing for 16 m permanent wayleave and a 14 m temporary wayleave which will be secured using temporary mesh fencing.

The pipeline route crosses a number of hedgerows, several field drainage ditches and a catchwater drain at NGR 323792E 202306N.

The catchwater drain flows in a south-westerly direction from its start point (ca. 185 m north of the crossing point) to its discharge point into the Vartry Reservoir Lower (ca. 215 m west of the crossing point).

Appropriate pollution control measures will be employed in accordance with current EPA guidance for all works within at least 8 m of the drainage ditch bank to ensure that detrimental impacts through pollution or permanent physical damage to the watercourse within the site are avoided during construction. Throughout the Design – Build works, the

Contractor shall take account of relevant legislation and best practice UK CIRIA guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;
- C648 Control of water pollution from linear construction projects: and
- SP156 Control of water pollution from construction sites – guide to good practice.

Fuels, lubricants and hydraulic fluids for equipment used within the works corridor, as well as any solvents and oils are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment. Fuelling and lubrication of equipment is not to be carried out close to any watercourse. Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and disposed of through waste contractor licenced for the purpose. Waste oils and hydraulic fluids are to be collected in leak-proof containers and removed from the site for disposal or recycling.

Felled trees and excavated spoil and rock will be stockpiled at least 20 m from drainage ditches or high risk flood zones and 50 m from the River Vartry.

To avoid the introduction of invasive non-native species and fish pathogens, all plant and machinery utilised on site will be thoroughly cleaned and washed using high pressured steam cleaning before delivery to the site. This is particularly pertinent for the Callowhill site where Japanese knotweed has been identified. A visual inspection for evidence of attached plant or animal material, or adherent mud or debris will be completed on all equipment before leaving the site.

In the unlikely event of an accidental spillage which gives rise to pollution of the watercourse, an Environmental Emergency Preparedness and Response Plan will be implemented and Inland Fisheries Ireland will be contacted and informed immediately.

In addition, the following best practice environmental design measures form a key component of the construction methodology to install the pipeline:

- Works will take place during daylight hours only.
- A ramp or shallow profiled sides should be placed into any open trenches that are left overnight to ensure that any small mammals and amphibians can escape. An inspection of the open trenches should be carried out prior to the trenches being infilled to avoid harm to animals.
- All materials and liquids associated with the works will be stored in a manner that will not result in pollution or habitat deterioration.

- Construction equipment will be refuelled or serviced at a designated location in order to avoid water quality impacts from potential spills or leaks of fuels or lubricants.
- The pouring of concrete or the application of curing agents, *etc.*, will be only completed in the dry to avoid pollution of the freshwater environment.
- The Contractor shall have measures in place to deal with spillages if they should occur. All staff shall be made aware of this procedure.
- The clearance of suitable bird nesting habitat will be completed outside of the bird nesting season (March – August) to comply with Section 46 of the Wildlife (Amendment) Act 2000.

In terms of the operation of the proposed works minimal maintenance requirements are anticipated.



Figure 2.1: Location of the Proposed Works (Source: NPWS Mapping)



Figure 2.2: Aerial Photograph of the Proposed Works and Site Boundary (Red Line) (Source: GoogleMaps)

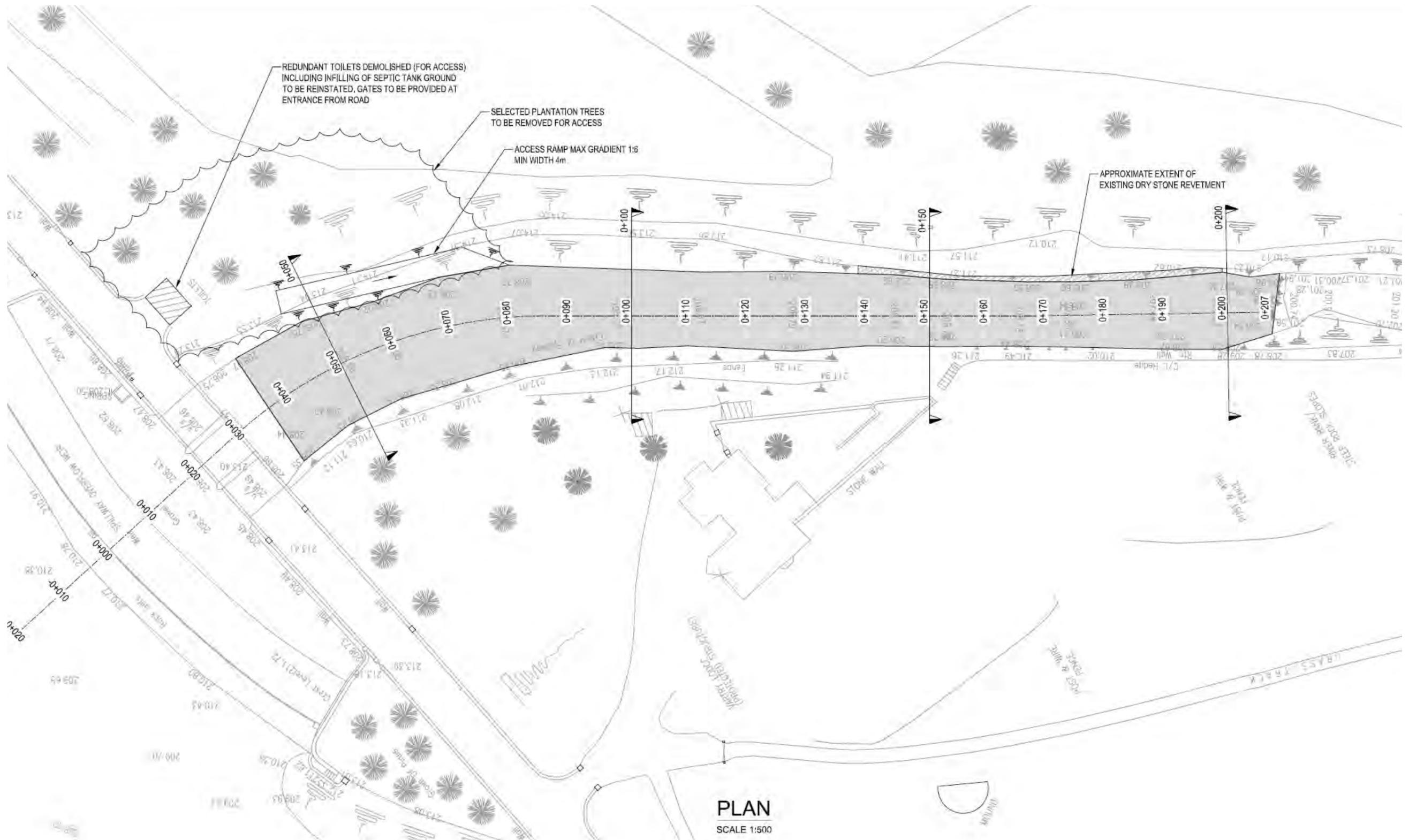


Figure 2.4 Drawing of the Proposed Works to the Spillway

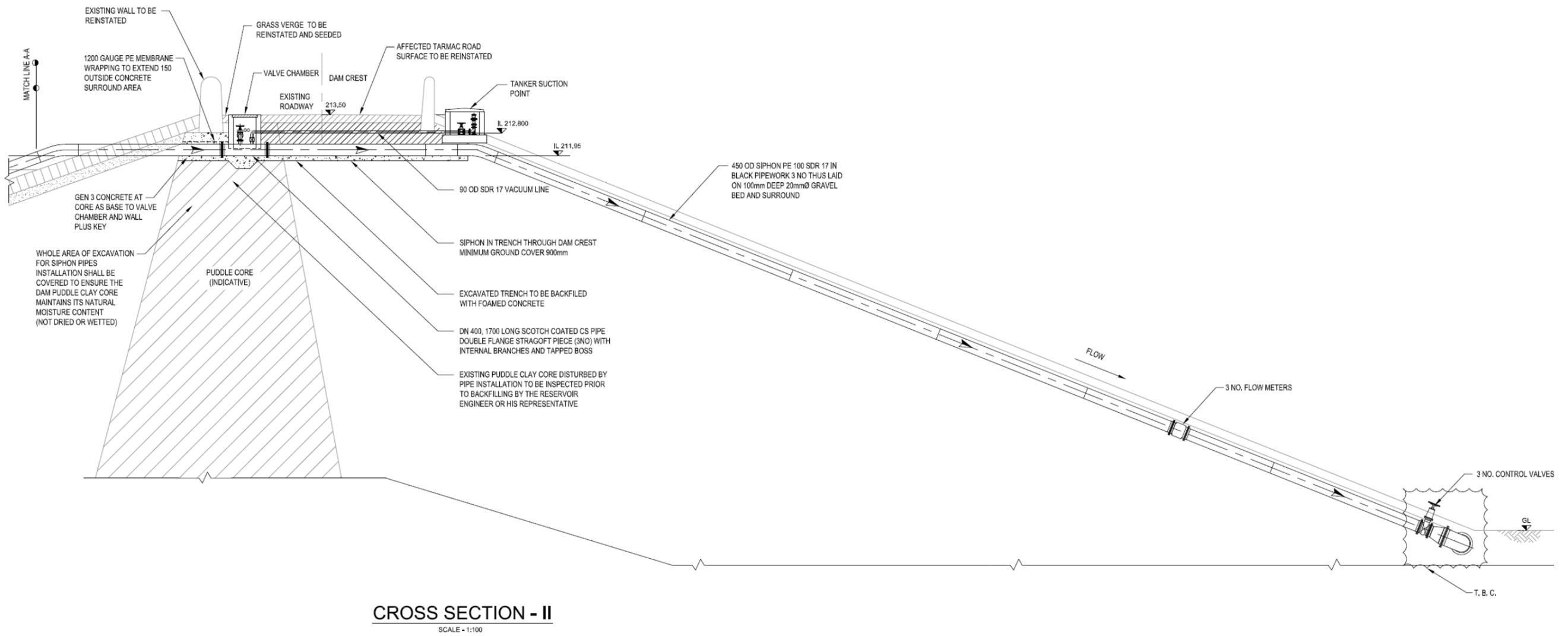


Figure 2.5: Drawing of the Proposed Siphon Pipes



Figure 2.6: Location of the Proposed Pipeline Route (Red Line) (Source: NPWS Mapping)

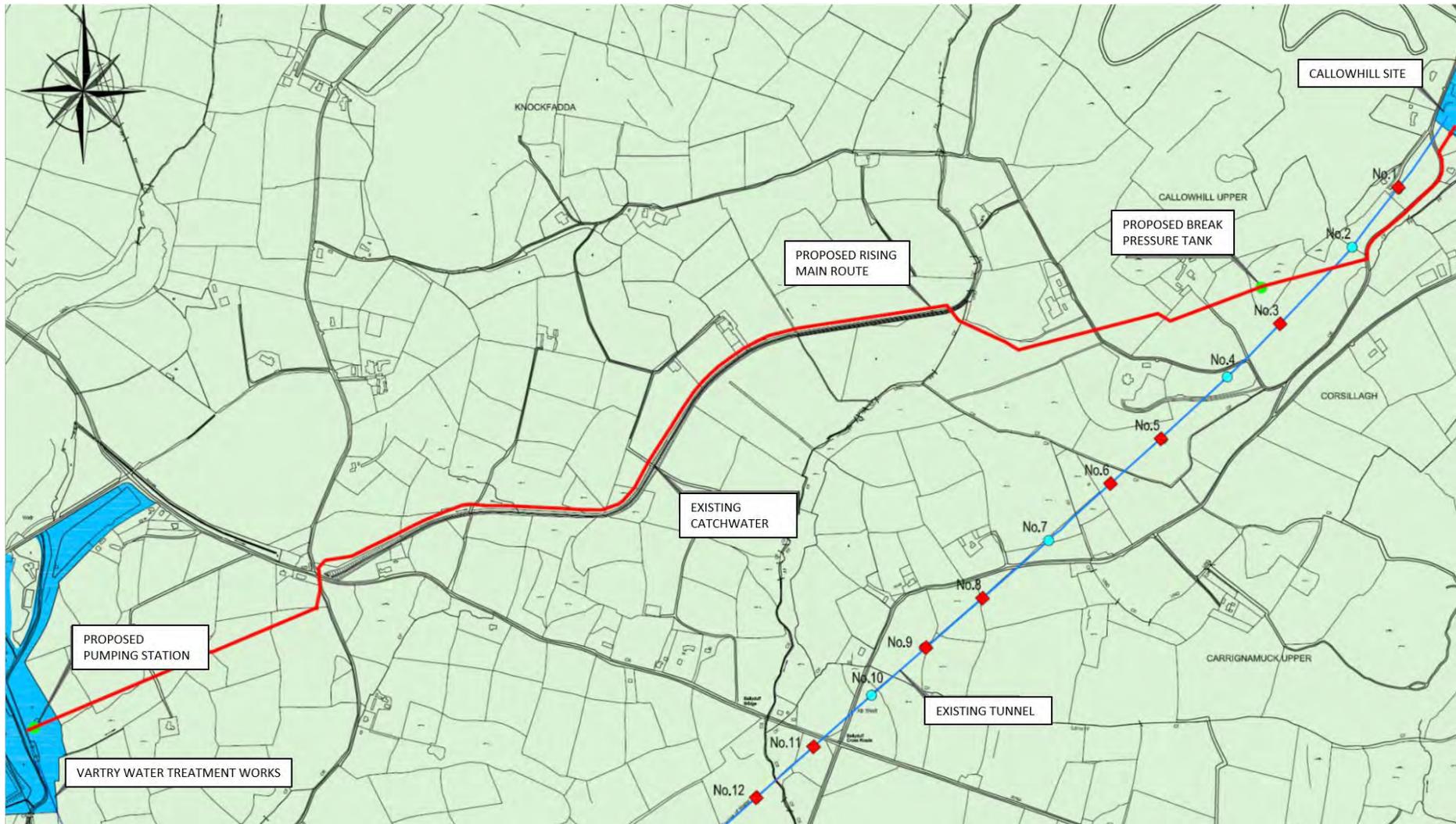


Figure 2.7: Map of the Proposed Pipeline Route and Break Pressure Tank

3 SURVEY AND ASSESSMENT METHODOLOGY

3.1 Desktop Assessment

A desktop assessment was carried out to determine existing records in relation to habitats and species present in the study areas. This included research on the NPWS metadata website, the National Biodiversity Data Centre (NBDC) database and a literature review of published information on flora and fauna occurring in the development area.

3.2 Field Survey

The second phase of the assessment involved a site visit to establish the baseline conditions within the footprint of the **site**. **"The site"** as described throughout this report is demarcated by the red line shown in Figure 2.2. The initial baseline survey was carried out on 6th and 7th August 2015 by an experienced ecologist. Areas which were highlighted during desktop assessment were investigated in closer detail according to the Heritage Council Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011).

3.2.1 Habitats

The habitat survey was carried out at Vartry WTP on 6th and 7th August 2015 by an experienced ecologist. The survey of the pipeline route was carried out on 28th October 2015 which assessed the habitats present along a 30 m corridor of the pipeline route. Habitats in the proposed development areas were classified according to the Heritage Council publication **"A Guide to Habitats in Ireland"** (Fossitt, 2000). This publication sets out a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. This form of classification uses codes to classify different habitats based on the plant species present. Species recorded in this report are given in both their Latin and English names. Latin names for plant species follow the nomenclature of **"An Irish Flora"** (Parnell & Curtis, 2012).

3.2.2 Protected and Notable Species

Details of the legislative protection afforded to those protected species which have been identified as occurring or potentially occurring on the site are detailed in Appendix A.

Badgers

The badger survey was carried out on 6th and 7th August 2015 by an experienced ecologist. A search was made for badger setts, and sett entrances were checked for signs of use by badgers or other mammals. Setts were classified into the following categories; Main, Subsidiary, Annexe or Outlying. Main setts are typically large structures which constitute the principal shelter and breeding location for a single social group. Subsidiary setts are significant setts which receive regular or sporadic usage but are not the focal sett for a social group. Annexe setts are smaller structures closely associated with Main setts but

are not connected by underground tunnels. Outlying setts are located away from other setts and usually comprise no more than two, infrequently used sett entrances.

Sett entrances are counted and mapped to record tunnel direction and their relative level of usage according to the categories well used, partially used and disused. Well used entrances show signs of having been used regularly or probably within the preceding 48 hours; partially used entrances may contain debris in the entrance indicating a lack of recent activity, but the tunnel and entranceway could be easily be cleared and brought back in to use, while disused entrances are largely or completely blocked and have not been in use for at least the previous year.

Field signs such as 'snuffle holes' (holes dug by badgers when searching for invertebrates), pathways through vegetation, 'latrines' (small pits in which badgers deposit their faeces) and 'day nests' (nests of bedding material made by badgers for sleeping above ground) were also mapped.

Bats

The assessment of the suitability of the site for foraging and roosting bats was based on current guidance set out by the Bat Conservation Trust.

Buildings: the exteriors of the buildings were examined on 6th and 7th August 2015 through the use of ladders, torches and binoculars for features capable of supporting roosting bats or allowing bats entry into potentially suitable roosting spaces beyond. Wherever possible, these points were thoroughly investigated using ladders and a video fibrescope to determine the likelihood of their occupation and evidence of presence. Extra factors taken into consideration included the potential for noise disturbance to the potential roost feature, exposure to the elements, lighting levels, proximity/connectivity of vegetation and water and whether these features/apertures led on to cavities further into the structure.

Internally, all accessible roof voids and accessible parts of the building were entered where safe and possible to do so in order to describe their characteristics and to look for potential roosting locations. A powerful torch, ladders and a video fibrescope were available for use where necessary. Any signs of occupation including urine staining, prey remains, fur rubbing marks and droppings were noted where found. Droppings were compared against reference material to identify likely species, but DNA analysis may be undertaken in certain circumstances.

Trees: an inspection of trees on site was carried out on 7th and 8th August 2015 from the ground, using binoculars, to record any signs of use of the tree by bat species. A ladder, powerful torch and a video fibrescope were available. Features such as frost cracks, rot cavities, flush cuts, split or decaying limbs (including hazard beams), loose bark and dense

plates of ivy were inspected and recorded. Any signs of staining (from urine or fur rubbing) and scratch marks below potential access points were noted, and a search was made for droppings underneath these features.

Habitat: the habitats within the site were appraised for their suitability for use by foraging and commuting bats.

Dusk Emergence Surveys

Four emergence surveys were carried out on 1st, 8th, 9th and 22nd September 2015 of the toilet block at NGR 321656E 201791N which will be demolished as part of the current development proposals. Two suitable vantage points were identified for the building both of which were surveyed twice by one surveyor over four separate evenings (see Figure 3.1). The surveys were undertaken to confirm the presence or likely absence of roosting bats within the building, identify the numbers and species of any bats using the buildings and to identify key access points for bats. The surveyor was equipped with an ultrasonic bat detector (Batbox Duet) and a digital file recorder (Zoom H1 Recorder) for later analysis. The surveyor recorded all bat activity, but particularly focussed their attention on whether bats emerged or re-entered the buildings. The surveyor documented the results by noting the time, bat species and behaviour. The surveyor had good lines of sight for bat surveying and it is highly unlikely that even quietly echolocating bats were missed. Each survey commenced at least 15 minutes prior to sunset and continued for at least 1.5 hours after sunset.

All emergence surveys were carried out at suitable times of year and during suitable weather to record bat activity: no rain, no strong wind and air temperatures above 8 °C.

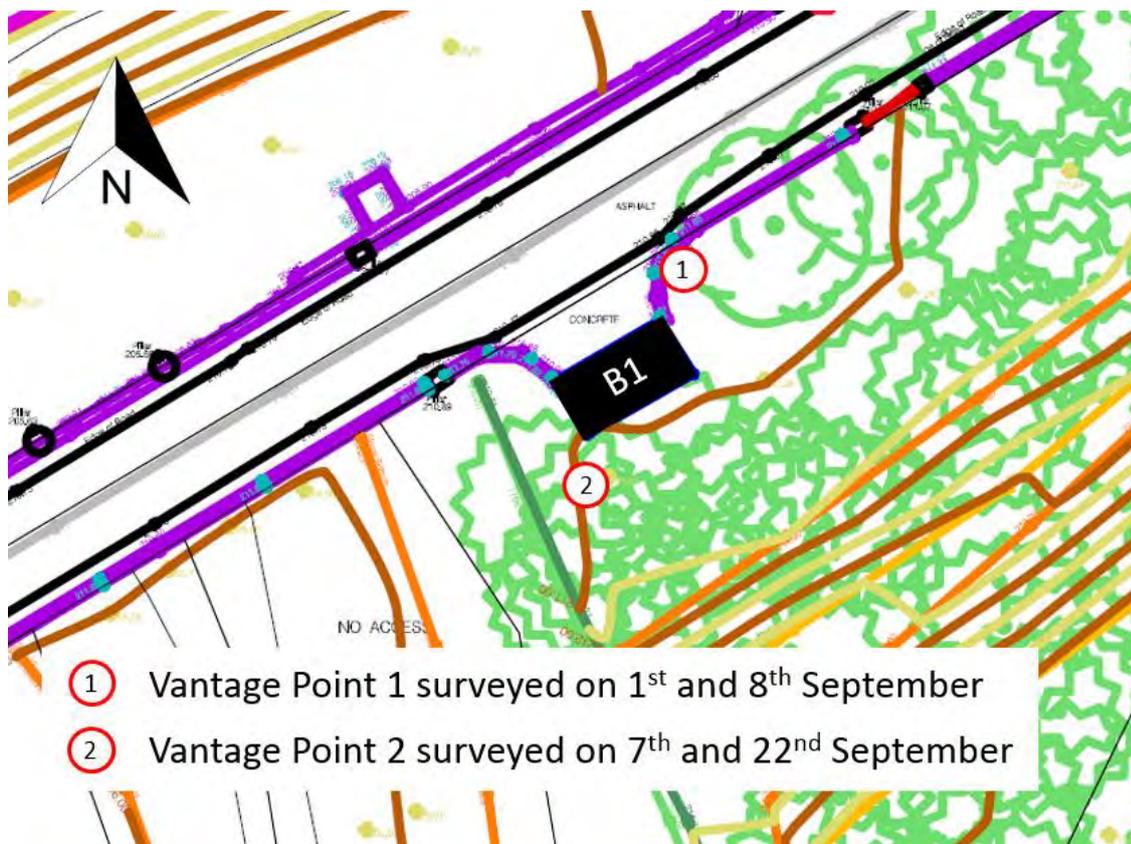


Figure 3.1 Surveyor Locations for the Dusk Emergence Surveys

Amphibians

Ponds within 500 m of the Site were identified using Ordnance Survey maps and aerial imagery, and were assessed during the field survey on the 6th and 7th August 2015 for their suitability to support amphibian species where access was possible.

Terrestrial habitats were also assessed for their suitability for foraging and sheltering amphibians. Amphibians require habitats such as grassland, scrub, woodland and hedgerows for dispersal and hibernation. Further hibernation features include buried rubble and logs, or mammal burrows.

Reptiles

Features on site were assessed during the habitat survey carried out on 6th and 7th August 2015 for their potential to provide suitable habitats for use by common lizard *Zootoca vivipara*. These include rough, tussocky grassland, scrub, disturbed land or refugia such as wood piles or rubble. Where present, suitable existing refugia were inspected for sheltering reptiles, and the ground was scanned whilst walking to look for basking species.

Birds

Any buildings and vegetation were surveyed for signs of use by nesting birds and any birds seen or heard during the survey on 6th and 7th August 2015 were noted. The aquatic habitats were assessed for suitability for kingfisher *Alcedo atthis* nest sites and for other

riparian bird species including dipper *Cinclus cinclus* and grey wagtail *Motacilla cinerea*. The site's potential to support bird species of particular conservation concern (i.e. Birds of Conservation Concern Ireland and Red List species) was assessed, taking into consideration the bird species assemblage observed during the survey, the habitats present on and around the site, the context of the site in the wider landscape and the results of the desk study.

Otter

A search was made along the banks of water courses and water bodies and their adjacent habitats for otter signs including spraints, tracks, castling, and rolling on the 6th and 7th August 2015. The banks of any water courses were searched for the presence or potential for holts or other sheltering areas.

Invertebrates

Species of invertebrate were noted during the ecological walkover survey on the 6th and 7th August 2015. The macro invertebrate community in the ponds was assessed using sweep netting in the marginal vegetation while the spillway was assessed in suitable locations using kick-sampling.

Invasive Species

Invasive species, such as Japanese knotweed *Fallopia japonica* and Himalayan Balsam *Impatiens glandulifera* were searched for and recorded during the habitat survey on 6th and 7th August 2015.

3.3 Impact Assessment

The final part of the assessment involved an evaluation of the proposed development area and determination of the potential impacts on the flora and fauna of the area. This part of the assessment forms the basis for Impact Assessment and is based on the following guidelines and publications:

- Assessment of plans and projects significantly affecting Natura 2000 sites (EC, 2002)
- Managing Natura 2000 Sites (EC, 2000)
- Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC (EC, 2007)
- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, December 2009, Rev 2010)
- EPA Advice Notes on Current Practice (EPA, 2003)
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011)

3.4 Quality Assurance

The field survey was undertaken by Joel Wright BSc MSc CIEEM. Joel has four **years'** experience undertaking ecological surveys and has a BSc and MSc in relevant subjects. **Joel has been assessed under the Nicholas O'Dwyer QA processes as competent to complete the survey.**

Quality assurance for the Ecological Impact Assessment was carried out by Richard Nairn who is the Managing Director of Natura Environmental Consultants Ltd. Richard has twenty **five years' experience in** carrying out Ecological Impact Assessment and has overseen many major water infrastructure projects. He is a Fellow of the Chartered Institute of Ecology and Environmental Management (FCIEEM) and a Chartered Environmentalist (CEnv).

3.5 Ecological Evaluation

The evaluation of ecological value builds upon the criteria provided within the CIEEM guidelines for Ecological Impact Assessment (2006)^a and the Criteria for Nature Conservation Evaluation described by Ratcliffe (1977)^b. These criteria are described further in Appendix B. With due consideration to the evaluation criteria ecological receptor value **is then classified on a scale between "International" and "Site" value with an additional Negligible category included for those features which are of no intrinsic ecological value.** Where further information is required to determine the true value of a species or habitat **present the value of the receptor is marked as "unknown".**

^a CIEEM (2006). Guidelines for Ecological Impact Assessment. www.cieem.net

^b Ratcliffe, D.A. (1977). *A Nature Conservation Review*, Cambridge University Press

4 SURVEY LIMITATIONS

4.1 Badgers

Areas with dense ground cover (reedbeds, scrub, woodland etc.) were examined closely. If impenetrable vegetation prevented entry then the perimeter was examined in order to detect mammal paths suggesting a hidden badger sett within the area. It cannot be guaranteed that all the entrances have been located, especially if a small sett is currently inactive or used seasonally and concealed in an area of thick scrub. Badgers may dig new holes and create new setts in a very short space of time.

4.2 Bats

Bats are very small creatures, capable of secreting themselves away into extremely small spaces and it is possible that these animals, or their signs, might have been missed during the survey if they are normally present opportunistically or in small numbers for a short period of time each year.

Not all features in trees or buildings suitable for use by bats are visible from the ground and there can be no external evidence of use of features by bats; consequently it is only possible to make a best effort when carrying out such a survey.

4.3 Otters

Otters have no defined breeding season and the breeding holt is kept deliberately obscure by the female so locating one can be difficult and time consuming, especially in the summer when the vegetation is very dense.

4.4 General

This survey offers only a single 'snapshot' of the Site and takes no account of seasonal differences, or of any species which might choose to take up residence subsequently. At the same time a lack of signs of any particular species does not confirm its absence, merely that there was no indication of its presence during this survey.

If no action or development of this land takes place within twelve months of the date of this report, then the findings of this survey should be reviewed and may need to be updated. After three years the findings will be out of date and the full survey should be repeated.

5 RESULTS

5.1 Desktop Study

5.1.1 Statutory Designated Sites

Eleven Natura 2000 sites of European importance were identified within 15 km of the proposed works. **Figure 5.1** shows the location of all Natura 2000 sites within the 15 km zone of impact and those connected to the proposed works *via* receptor pathways. **Table 5.1** lists the Natura 2000 sites within this zone of impact. The features of qualifying interest that have the potential to be impacted by the proposed works have been highlighted red and are assessed within Section 7.

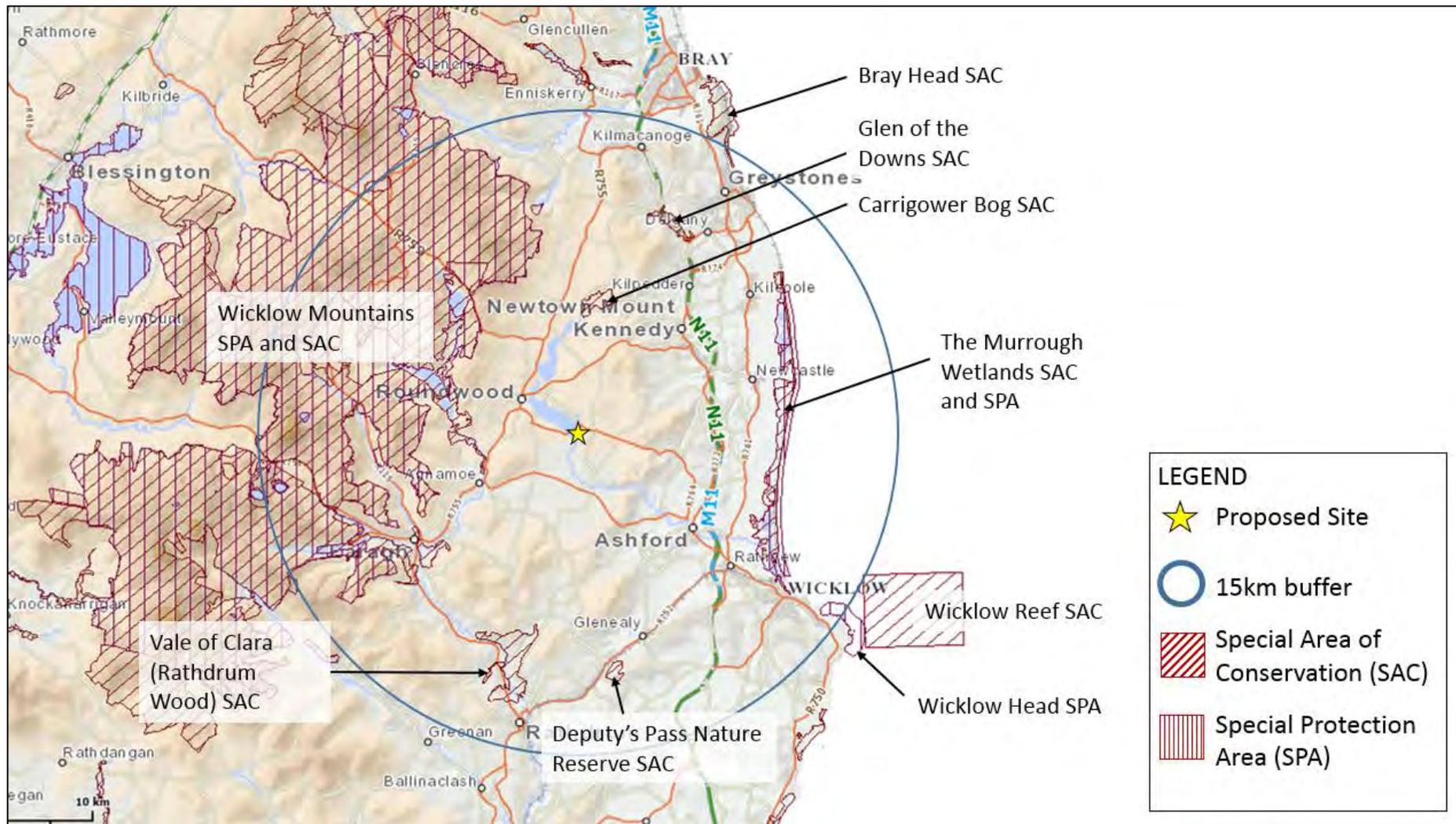


Figure 5.1: Natura 2000 Sites within 15 km of the Proposed Works

Table 5.1: Natura Sites located within the zone of Impact from the proposed works (*=priority habitat)

Site Code	Site Name (approx. distance from the proposed works)	Qualifying Interest	Potential Impact
002122	Wicklow Mountains SAC (4 km)	[3130] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i>	None- due to distance and lack of potential impact pathway
		[3160] Natural dystrophic lakes and ponds	
		[4010] Northern Atlantic wet heaths with <i>Erica tetralix</i>	
		[4030] European dry heaths	
		[4060] Alpine and Boreal heaths	
		[6230] Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*	
		[7130] Blanket bogs (* if active bog)	
		[8110] Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)	
		[1355] Otter <i>Lutra lutra</i>	Potential for disturbance to holts and resting places
000716	Carriggower Bog SAC (5 km)	[7140] Transition mires and quaking bogs	None- due to distance and lack of potential impact pathway
000733	Vale of Clara (Rathdrum Woods) SAC (9 km)	[91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	None- due to distance and lack of potential impact pathway
002249	The Murrough Wetlands SAC (9 km)	[1210] Annual vegetation of drift lines	None – due to distance and lack of potential impact pathway
		[1220] Perennial vegetation of stony banks	None – due to distance and lack of potential impact pathway
		[1330] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Potential impact from pollution and sedimentation as River Vartry flows into the SAC
		[1410] Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	Potential impact from pollution and sedimentation as River Vartry flows into the SAC

Site Code	Site Name (approx. distance from the proposed works)	Qualifying Interest	Potential Impact
		[7210] Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> *	Potential impact from pollution and sedimentation as River Vartry flows into the SAC
		[7230] Alkaline fens	Potential impact from pollution and sedimentation as River Vartry flows into the SAC
000719	Glen of the Downs SAC (10 km)	[91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	None- due to distance and lack of potential impact pathway
000717	Deputy's Pass Nature Reserve SAC (11 km)	[91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	None- due to distance and lack of potential impact pathway
000714	Bray Head SAC (14 km)	[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts [4030] European dry heaths	None- due to distance and lack of potential impact pathway
002274	Wicklow Reef SAC (15 km)	[1170] Reefs	None- due to distance and lack of potential impact pathway
004040	Wicklow Mountains SPA (6 km)	[A098] Merlin <i>Falco columbarius</i> [A103] Peregrine <i>Falco peregrinus</i>	None- due to distance and lack of suitable habitat at site
004186	The Murrough SPA (10 km)	[A001] Red-throated Diver <i>Gavia stellata</i> [A043] Greylag Goose <i>Anser anser</i> [A046] Light-bellied Brent Goose <i>Branta bernicla hrota</i> [A050] Wigeon <i>Anas penelope</i> [A052] Teal <i>Anas crecca</i> [A179] Black-headed Gull <i>Chroicocephalus ridibundus</i> [A184] Herring Gull <i>Larus argentatus</i> [A195] Little Tern <i>Sterna albifrons</i>	None – no interaction due to distance and lack of suitable habitat on the site for any of the qualifying species
004127	Wicklow Head SPA (14 km)	[A188] Kittiwake <i>Rissa tridactyla</i>	None – no interaction due to distance

5.1.3 Data Search – River Vartry

The River Vartry is designated a Salmonid Water under the European Communities (Quality of Salmonid Waters) Regulations, 1988. Salmon *Salmo salar*, brown trout *Salmo trutta* and sea trout *Salmo trutta* were recorded within the river during surveys north of Ballinamona in 2008 (Central and Regional Fisheries Board, 2008).

The most recent EPA biological monitoring assessment (2010) identified the River Vartry to have an overall ‘good’ water quality status with a ‘good’ ecological status, ‘good’ fish status, ‘good’ hydromorphology status, ‘good’ general physio-chemical status and ‘high’ macroinvertebrate status. The EPA Biological Water Quality monitoring data upstream of the effluent discharge at Vartry WTP at Ballinastoe Bridge was Q4 – Q5 (High Status) and the nearest monitoring point downstream at Annagolan Bridge was Q4 (Good Status).

The River Vartry has been listed as being at risk of not achieving good status based on water abstraction and impoundments (1a).

Monitoring data of the River Vartry from 2012 - 2014 both upstream (Ballinastoe Bridge) and downstream (Annagolan Bridge) of the WTP effluent discharge locations demonstrates that the water quality within the River Vartry is in compliance with Schedule 5 of the European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009) as shown in Table 5.2 below. In terms of the European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988), the upstream and downstream monitoring data is in compliance with the EQS for Suspended Solids.

Table 5.2 - Monitoring Data both Upstream and Downstream of WTP Discharge**

Parameter	EQS* (mg/l)	Upstream	Downstream
BOD	≤2.6 (Surface Waters)	0.6	0.9
Ammonia	≤0.1 (Salmonid Waters)	0.011	0.016
Orthophosphate	≤0.075 (Surface Waters)	0.007	0.005
Suspended Solids	≤25 (Salmonid Waters)	2	2

*European Communities Environmental Objectives (Surface Waters) Regulations 2009, S.I. No. 272 of 2009 and European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988) (95 %ile standards presented)

** Data from 2012 - 2014 monitoring

5.1.4 Waste Assimilative Capacity

The assimilative capacity calculations shown in Table 5.3 are based on the 95%ile hydrometric estimate of flows of the River Vartry from the EPA and water quality standards specified within the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009) for BOD and Orthophosphate and the more

onerous European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988) for Ammonia and Suspended Solids. Assimilative capacity was calculated using both actual background concentrations and the 'notionally clean river' approach (see Table 5.3 below and Appendix D).

Table 5.3 Assimilative capacity calculations for actual upstream background concentrations and for a notionally clean river.

Parameter		Background (mg/l)	Predicted downstream quality (mg/l)	EQS* (mg/l)
BOD	Actual Upstream Background	0.60	1.644	≤2.6
	Notionally Clean	0.260	1.304	
Ammonia	Actual Upstream Background	0.011	0.100	≤0.1
	Notionally Clean	0.008	0.097	
Orthophosphate	Actual Upstream Background	0.007	0.072	≤0.075
	Notionally Clean	0.005	0.070	
Suspended Solids	Actual Upstream Background	2	8.528	≤25
	Notionally Clean	N/A	N/A	

*European Communities Environmental Objectives (Surface Waters) Regulations 2009, S.I. No. 272 of 2009 European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988) (95 %ile standards presented).

The estimated discharge from the new WTP (*i.e.* 4,000 m³/d) comprises c. 35 % of the daily flow of the River Vartry at the discharge location. Therefore, a potential localised impact on the water quality within the River Vartry at this site is anticipated. However, based on the waste assimilative capacity calculation detailed above, the receiving water downstream has adequate waste assimilative capacity to accommodate the WTP discharge in terms of BOD, Orthophosphate, Ammonia and Suspended Solids, thereby ensuring compliance with the Surface Water Regulations and Quality of Salmonid Waters Regulations.

5.1.5 Data Search – Vartry Reservoir

Vartry Reservoir Lower provides the raw water source for the WTP which is abstracted from the Draw-off Tower. The reservoir is a large (c. 150 ha) artificial waterbody that involved the partial redirection and damming of the River Vartry. The most recent EPA biological monitoring assessment (2010) identified that the reservoir had a ‘good’ overall water status with ‘good’ ecological status, ‘good’ physio-chemical status, ‘good’ nutrient enrichment status, ‘high’ chlorophyll status and ‘high’ macrophyte status. The waterbody is listed as being ‘probably at risk’ (1b) from achieving good status by 2015 due to impoundment pressures. The objective of the Vartry Reservoir Lower is to protect its status by preventing deterioration.

5.1.6 Data Search – Protected and Notable Species

Birds

The following birds shown in Table 5.4 have been recorded within same 2 km OS grid square as the Site and are listed under the Birds of Conservation Concern in Ireland (BoBBI) red/Amber list (Colhoun and Cummins 2013).

Table 5.4 Bird species recorded within 2 km since 2000

Species	Latin	Designation
Sparrowhawk	<i>Accipiter nisus</i>	BoCCI Amber List
Meadow Pipit	<i>Anthus pratensis</i>	BoCCI Red List
House Martin	<i>Delichon urbicum</i>	BoCCI Amber List
Robin	<i>Erithacus rubecula</i>	BoCCI Amber List
Common Snipe	<i>Gallinago gallinago</i>	BoCCI Amber List
Barn Swallow	<i>Hirundo rustica</i>	BoCCI Amber List
Lesser Black-backed Gull	<i>Larus fuscus</i>	BoCCI Amber List
Grey Wagtail	<i>Motacilla cinerea</i>	BoCCI Red List
Spotted Flycatcher	<i>Muscicapa striata</i>	BoCCI Amber List
House Sparrow	<i>Passer domesticus</i>	BoCCI Amber List
Goldcrest	<i>Regulus regulus</i>	BoCCI Amber List

Species	Latin	Designation
Starling	<i>Sturnus vulgaris</i>	BoCCI Amber List
Mistle Thrush	<i>Turdus viscivorus</i>	BoCCI Amber List

Mammals

Badger *Meles meles* and red fox *Vulpes vulpes* have been recorded within the same 2 km grid square as the Site since 2000. There are also historical records of otter *Lutra lutra*, red squirrel *Sciurus vulgaris* and Irish hare *Lepus timidus* within 2 km of the Site.

5.1.7 Data Search - Planning Policy

The following policies have been identified within the Wicklow County Development Plan 2010 – 2016 (adopted October 2010) which are considered relevant to the site.

BD2 To ensure that the impact of new developments on bio-diversity is minimised and require measures for the protection and enhancement of bio-diversity in all proposals for large developments.

BD3 To maintain the favourable conservation status of existing and future Natura 2000 sites (SACs and SPA’s) and Annex I-Habitats and Annex II-Animal and Plant species in the County.

BD4 Any programme, plan or project carried out on foot of this development plan, including any variation thereof, with the potential to impact upon a Natura 2000 site(s) shall be subject to an Appropriate Assessment in accordance with Article 6(3) of the EU Habitats Directive 1992 and “Appropriate Assessment of plans and projects in Ireland-Guidance for Planning Authorities” (DoEHLG 2009).

BD5 To maintain the conservation value of all proposed and future Natural Heritage Areas (NHAs) in Wicklow.

BD6 The Council recognises the natural heritage and amenity value of the Wicklow Mountains National Park and shall consult at all times with National Park management regarding any developments likely to impact upon the conservation value of the park, or on issues regarding visitor areas.

BD7 To protect non-designated sites from inappropriate development, where it is considered that such development would unduly impact on locally important natural habitats or wildlife corridors.

BD8 To facilitate, in co-operation with the relevant statutory authorities and other groups, the identification of valuable or vulnerable habitats of local or regional importance, not otherwise protected by legislation.

BD9 The National Parks and Wildlife Service will be invited to prioritise the preparation of Management Plans for Natura 2000 Sites. This will facilitate the development of site specific Conservation Objectives in the context of the proper planning and sustainable development of the County.

WH1 To promote the protection of trees, in particular native species, and those associated with demesne planting, which are of conservation and/or amenity value, as set out in Schedules 17.5 & 17.6 and Maps 17.05 & 17.06 (Volume 2) of this plan.

WH2 To consider the making of Tree Preservation Orders (TPOs) to protect trees of high value, where it appears that they are in danger of being felled.

WH3 Development that requires the felling of mature trees of conservation and/or amenity value, even though they may not be listed in the Development Plan, will be discouraged.

WH4 To discourage the felling of mature trees to facilitate development and encourage tree surgery rather than felling where possible

WH5 To encourage the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees, as part of the development control process, and require the planting of native, and appropriate local characteristic species, in all new developments

WH6 To encourage the retention, wherever possible, of hedgerows and other distinctive boundary treatment in the County. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, provision of the same type of boundary will be required of similar length and set back within the site in advance of the commencement of construction works on the site.

WT1 To implement the EU Water Framework Directive and associated River Basin and Sub-Basin Management Plans and the EU Groundwater Directive to ensure the protection, improvement and sustainable use of all waters in the County, including rivers, lakes, ground water, coastal and estuarine waters, and to restrict development likely to lead to a deterioration in water quality.

WT2 To resist development that would interfere with the natural water cycle to a degree that would interfere with the survival and stability of natural habitats.

WT3 To prevent development that would pollute water bodies and in particular, to regulate the installation of effluent disposal systems in the vicinity of water bodies that provide

drinking water or development that would exacerbate existing underlying water contamination

WT4 To minimise alterations or interference with river / stream beds, banks and channels, except for reasons of overriding public health and safety (e.g. to reduce risk of flooding); a buffer of 10 m along watercourses should be provided free of built development, with riparian vegetation generality being retained in as natural a state as possible. In all cases where works are being carried out, to have regard to Regional Fisheries Board "Requirements for the protection of fisheries habitat during the construction and development works at river sites"

WT5 To promote the development of riverine walks and parks, subject to the sensitivity and / or designation of the riverside habitat, particularly within 10m of the watercourse.

WT6 To ensure that any development or activity with the potential to impact on ground water has regard to the GSI Groundwater Protection Scheme (as shown on Map 17.12, Volume 2).

5.2 Field Survey Results

5.2.1 Habitats

The Vartry WTP is located at the south-eastern end of Vartry Reservoir Lower dam. The site lies within the Vartry River Catchment and the soil type consists of a loamy drift with igneous and metamorphic stones. The immediate surroundings of the site are characterised by agricultural farmland and patches of semi-natural woodland to the east, south and west and Vartry Reservoir Lower to the north.

The habitats have been mapped in Figure 5.3 and described below. For clarity, the survey area has been split into distinct areas within this section of the report:

- Spillway channel (River Vartry) and Adjacent Habitats
- Proposed Spoil Storage Area
- Existing WTP and Associated Buildings
- Proposed New WTP Site
- Vartry WTP to Callowhill Pipeline

Spillway Channel and Adjacent Habitats

The River Vartry runs from a stone cut weir at the lower end of the lower reservoir into a shallow basin before flowing under a three arch bridge into an artificially cut channel along the eastern boundary of the site. The existing WTP discharges effluent into the river at two locations (321568E 201491N and 321617E 201134N). The river channel (spillway) south of the reservoir weir and north of the effluent discharge locations is predominantly dry at most times of the year with low levels of water flow from seepage and groundwater

sources. The spillway weir floods when the reservoir exceeds top water level during periods of sustained high precipitation.

The spillway channel was c. 15 m in width with steep / vertical c. 3 m exposed rock and earth banks. The channel bed consisted of gravel, sand and mud sediment within the section immediately south of the road bridge. Further south along the channel the substrate comprised exposed siliceous rock **ER1**.

At the time of the survey, an area immediately south-east of the spillway weir and north-east of the R764 road bridge held standing water which supported a low diversity of emergent and submerged flora such as water horsetail *Equisetum fluviatile*, water milfoil *Myriophyllum sp.*, perfoliate pondweed *Potamogeton perfoliatus*, common spike rush *Eleocharis palustris*, hard rush *Juncus inflexus*, shoreweed *Littorella uniflora* and water-cress *Nasturtium officinale*. A stream approximately 1 m in width flowed from the standing water along the length of the channel and had slow flow rate, low turbidity and depth of <20 cm. The vegetation within the channel had affinities with freshwater marsh **GM1** and consisted of reed canary grass *Phalaris arundinacea*, flote grass *Glyceria fluitans*, watermint *Mentha aquatica*, water forget-me-not *Myosotis scorpioides*, marsh marigold *Caltha palustris*, marsh pennywort *Hydrocotyle vulgaris*, fools watercress *Apium nodiflorum*, hard rush *Juncus inflexus*, jointed rush *Juncus articulatus*, bur-reed *Sparganium sp.*, marsh ragwort *Senecio aquaticus*, selfheal *Prunella vulgaris*, marsh woundwort *Stachys palustris*, horsetail and lesser spearwort *Ranunculus flammula*.

Further south along the spillway the channel bed consisted of exposed siliceous rock **ER1** that was frequently covered by mosses but also contained pockets of grasses, ferns and sapling trees on higher ground that included species such as creeping bent *Agrostis stolonifera*, false oat grass *Arrhenatherum elatius*, smooth-meadow grass *Poa pratensis*, royal fern *Osmunda regalis*, bracken *Pteridium aquilinum* and sapling ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus*.

The spillway contained steep / vertical earth and exposed rock banks that supported occasional shade tolerant ground flora such as herb Robert *Geranium robertianum*, bramble *Rubus fruticosus*, common ivy *Hedera helix*, hart's-tongue fern *Asplenium scolopendrium*, cherry laurel *Prunus laurocerasus*, bracken and tree species including beech *Fagus sylvatica*, ash, cherry laurel *Laurus laurocrasus*, sycamore and holly *Ilex aquifolium*.

Approximately 170 m downstream of the bridge, the spillway drops over a ca. 10 m high rock step and the channel narrows to ca. 7 m in width. Within this middle section, the channel continues in an inaccessible narrow gorge for ca. 250 m with steep to vertical rock walls and numerous rock steps. This section has a lot of standing water in pools in the

bedrock and its lower section receives an inflow from an effluent discharge. Due to the heavy overhanging canopy, there is no aquatic vegetation and the rock walls are heavily blanketed in moss and ferns. The fern flora is diverse and includes common Polypody *Polypodium vulgare*, spleenwort *Asplenium trichomanes*, hart's tongue *Asplenium scolopendrium*, and various buckler ferns *Dryopteris* spp. There is an historic record (dated 1825) of the Killarney fern from the 10 km square (O20) on the NPWS database. The conditions within the gorge section of the spillway provide potentially suitable conditions for this Flora Protection Order species, though the difficulty in access prevented a thorough search being made.

The site was bordered to the north by Vartry Reservoir Lower which is a large (c. 150 ha) artificial waterbody **FL7** that was constructed in the 1860's and involved the partial redirection and damming of the River Vartry.

The fringes of the dam north of the dam weir comprised gravel and stone ground that was dominated by shoreweed. On higher ground typical marsh species occurred including redshank *Persicaria maculosa*, silverweed *Argentina anserina*, creeping bent, marsh ragwort, wild angelica, creeping buttercup *Ranunculus repens*, lesser spearwort, rushes *Juncus inflexus* and *J. conglomeratus*, marsh marigold, horsetail and sapling goat willow *Salix caprea*. A fringe of alder and willow *Salix sp* were present to the north-east of the dam weir. The edge of the reservoir to the south-west of the dam weir was characterised by large rocks with no vegetation coverage.

The river channel was bordered to the east by a belt of mixed woodland **WD2** that was dominated by Scots pine *Pinus sylvestris* and also included occasional beech, ash, larch *Larix* sp., oak *Quercus robur* with a dense understorey of cherry laurel, box, rhododendron and holly. There were three buildings **BL3** associated with the woodland including a disused toilet block (Building 1, Figure 5.3), a corrugated iron livestock shed (Building 2, Figure 5.3) and a derelict hut constructed of corrugated metal sheeting (Building 3, Figure 5.3).

The river channel was bordered to the west by the Vartry WTP which included mixed woodland **WD2**, grassy verges **GS2**, filtration ponds **FL8**, associated feeder channels **FW4**, Water Treatment Facility buildings and access roads **BL3**.

There were two effluent discharge points from the adjacent WTP into the River Vartry **FW1** approximately 100 m and 450 m south of the proposed spillway works. The river flow increased downstream of the first discharge point and supported a moderate flow. The channel bed over its remaining length to the natural river channel was comprised of a mixture of cobble and boulder with some outcrops of bedrock. The channel was approximately 4 m in width with a variable stream width comprising deep pools and

shallow rifles. Throughout its length, there was no aquatic plants present and the vegetation along the margins consisted of a moderate diversity of riparian species including marsh woundwort, montbretia *Crocsmia* × *crocsmiflora*, lesser spearwort, reed canary grass, watermint, jointed rush *Juncus articulatus*, soft rush *Juncus effusus*, meadowsweet *Filipendula ulmaria*, bracken, horsetail, bramble, wild angelica *Angelica sylvestris*, marsh ragwort, meadow buttercup *Ranunculus acris*, creeping buttercup, buddleja *Buddleja davidii*, thistle *Cirsium sp.*, purple loosestrife *Lythrum salicaria*, red valerian *Valeriana officinalis* and coltsfoot *Tussilago farfara*. On the gravel – cobble bars in the lower reaches, buddleia *Buddleia davidii* and coltsfoot dominate.

A semi-improved grassland **GS1** field with strips of pine *Pinus sp* plantation **WD4** was present at the north-eastern section of the site that was grazed by a low density of sheep. The grassland contained a low proportion of herbaceous species and included grasses such as sweet vernal grass *Anthoxanthum odoratum*, crested dog's tail *Cynosurus cristatus*, smooth meadow-grass, Yorkshire fog *Holcus lanatus*, Timothy *Phleum pratense*, cock's foot *Dactylis glomerata*, perennial rye-grass *Lolium perenne* and common bent *Agrostis capillaris*.

A block of mixed woodland **WD2** was present to the east of the River Vartry along the eastern boundary of the site. The land rose steeply from west to east from the river channel and was dominated by Scots pine with beech, ash, holly and cherry laurel also present. There was sparse ground flora coverage with occasional pockets of grass and scrub species such as meadow grass *Poa sp.*, common bent, red fescue, bracken, bramble, gorse *Ulex europaeus* where light penetrated the canopy. The southern section of the woodland was waterlogged and supported ground-flora typical of wet woodland **WN6**. The tree species within this section included downy birch *Betula pubescens*, alder *Alnus glutinosa*, ash, beech and pine and the associated ground flora included rushes *Juncus articulatus* J. bulbosus *J. conglomeratus*, lady-fern *Athyrium filix-femina*, common marsh bedstraw *Galium palustre*, watermint, foxglove *Digitalis purpurea*, common chickweed *Stellaria media*, lesser spearwort, meadowsweet *Filipendula ulmaria* and creeping buttercup *Ranunculus repens*.

Proposed Spoil Storage Area

The proposed spoil storage area is located within an agricultural pasture field north-east of the spillway weir and adjacent to the Lower Reservoir with its centre at NGR 321749E 201934N. The field is used for grazing sheep and supported semi-improved grassland **GS1** that comprised species such as sweet vernal grass, crested dog's tail, smooth meadow-grass, Yorkshire fog, cock's foot, perennial rye-grass, common bent, thistle *Cirsium sp*, dandelion and creeping buttercup. There were patches of dense scrub **WS1** dominated by gorse along the northern and eastern boundaries of the site. An earth bund **BL2** ran

adjacent to the southern boundary of the field that contained a strip of mixed woodland **WD2** on its southern side comprising larch, pine, ash and sycamore. A catchwater drain **FW4** formed part of the northern boundary of the field that discharges into Vartry Lower Reservoir immediately north of the site.

Existing WTP and Associated Buildings

The existing WTP is located in the centre of the site boundary and comprised a series of Slow Sand Filter ponds **FL8** with associated feeder channels **FW4**, Water Treatment Facility buildings and access roads **BL3**. The filtration ponds are entirely artificial, concrete lined waterbodies that contain no emergent or submerged vegetation.

The ponds are frequently bordered by grassy verges **GS2** and occasional ornamental shrub borders **WS3**. The grassland verges were maintained at a short sward height and had a moderate diversity of widespread grasses and herbaceous species such as sweet vernal grass, crested dog's tail, perennial rye-grass, false oat-grass, cock's-foot, Yorkshire-fog, smooth meadow-grass, meadow foxtail *Alopecurus pratensis*, red fescue *Festuca rubra*, yarrow *Achillea millefolium*, dandelion *Taraxacum officinale*, common daisy *Bellis perennis*, red clover *Trifolium pratense*, lady's bedstraw *Galium verum*, smooth hawksbeard *Crepis capillaris*, dock sp *Rumex sp*, common sorrel *Rumex acetosa*, common vetch *Vicia sativa*, cranes-bill *Geranium sp*, germander speedwell *Veronica chamaedrys*, selfheal *Prunella vulgaris*, ribwort plantain *Plantago lanceolata*, common birds-foot trefoil *Lotus corniculatus*, creeping cinquefoil *Potentilla reptans*, cow parsley *Anthriscus sylvestris*, common hogweed *Heracleum sphondylium*, field bindweed *Convolvulus arvensis*, creeping buttercup, meadow buttercup and common knapweed *Centaurea nigra*. Occasional borders of ornamental shrubs commonly comprised wilson's honeysuckle *Lonicera nitida*, dogwood *Cornus sanguinea* and fuchsia *Fuchsia magellanica*.

Vartry Lodge (Building 4, Figure 5.3) **BL3**, a residential house associated with the WTP is located within the north-east section of the site and is surrounded by mixed broadleaved/conifer woodland **WD2** and dry meadows **GS2** with scattered trees **WD5**. The dry meadow supported a tussocky sward with a moderate diversity of grass and herbaceous species including barren brome *Anisantha sterilis*, sweet vernal grass, false oat-grass, common bent, Yorkshire fog, cock's foot, smooth meadow-grass, meadow foxtail, common quaking grass *Briza media*, common knapweed, common vetch and common bird's-foot trefoil. Numerous mature standing trees were also present within the grassland including apple *Malus sp.*, pine and larch.

The southern bank of the reservoir dam supports species-rich neutral grassland **GS2** with some scattered trees **WD5** and ornamental shrubs **WS3** at the southern edge.

Proposed New WTP Site

The proposed new WTP is situated within land at the western section of the site. This area is bordered by mixed broadleaf/conifer woodland **WD2** with a mature mixed treeline **WL2** bisecting the area north to south. The strips of mixed woodland were noted to be species-rich and were frequently dominated by Douglas fir *Pseudotsuga menziesii* but also contained pine sp, larch sp, beech, ash, holly, downy birch, cypress *Cupressus* sp, horse chestnut *Aesculus hippocastanum*, sycamore, holm oak *Quercus ilex*, cherry laurel, yew *Taxus baccata*, elder *Sambucus nigra*, rowan *Sorbus aucuparia* and whitebeam *Sorbus aria*. The mature, mixed tree line running north-south through this area comprised oak, sycamore, larch and ash.

The north-western area of the proposed WTP site is dominated by semi-improved neutral grassland **GS1** with patches of scrub vegetation **WS1** at the field margins. The grassland had been recently cut and comprised several species typical of damp conditions including marsh foxtail *Alopecurus geniculatus*, compact rush *Juncus conglomeratus* and creeping buttercup *Ranunculus repens*.

The eastern section of the proposed WTP area contains seven settling ponds (Ponds 1 – 7, Figure 5.3) **FL8** that comprise a series of connected waterbodies used for sediment settlement in order to reduce suspended solids within the effluent discharge. The ponds are situated perpendicular to the slope and in two rows with percolation occurring between the ponds in each row. The ponds vary in size but all are rectangular shallow structures approximately 8 m in width and 25 to 30 m in length. They have shallow grassed banks which are mown and the ponds are subject to periodic maintenance by cleaning out accumulated sediments. The ponds varied in water quality, turbidity and abundance of associated aquatic vegetation.

Ponds 1 and 2 are the smallest with the remainder being fairly uniform in size. Pond 1 occurs in the southwest of the group and is the first in the sequence of through-flow. This pond has a thick accumulation of silt and no aquatic vegetation present.

Pond 2 located immediately downslope, is a similar sized to pond 1 but has very little standing water. It has a luxuriant grass sward indicating considerable nutrient enrichment.

Pond 3 is entirely open water which supports a small amount of broad-leaved pondweed *Potamogeton natans*.

Pond 4 is the lowest in this row and consists of open water in its southern third while the northern part is a dense growth of sedge *Carex* sp. with a small amount of rush *Juncus* sp.. There are no macrophytes in the open water. Ponds 5 to 7 form a chain to the north of the ponds 1-4. Pond 5 consists of open water which is very turbid and has no aquatic macrophytes present. Pond 6 is primarily open water though at its northern end there is a dense raft of creeping bent grass. Broad-leaved pondweed is abundant in the open

water along with small amounts of flote grass. Pond 7 supports a dense sward of hard rush and creeping bent, with virtually no open water.

North of the ponds is an area of recolonising bare ground **ED3** and patches of scrub **WS1**. A drainage ditch **FW4** borders the proposed WTP site to the east and north that contained a watercourse with a moderate flow and a depth of <15 cm.

Vartry WTP to Callowhill Pipeline

The land cover of the proposed route is principally occupied by grazed pasture farmland **GA1, GS4**, although areas of dry neutral grassland **GS1**, grassy verges **GS2**, conifer woodland **WD3, WD4**, immature woodland **WS2**, scrub vegetation **WS1**, field boundaries **WL1, WL2, BL2**, a drainage ditch **FW4** and artificial hard surfaces **BL3** also comprise sections of the route.

Figures 5.4 to 5.7 show the 30 m corridor that was covered by the ecological survey. This corridor has been split into twenty eight sections for the purposes of this report which are described below.

Section 1: Mixed conifer woodland **WD3** on sloping ground which was dominated by Scots pine but also contained downy birch, beech, larch and cherry laurel with ground flora including bramble, bracken, holly and honeysuckle *Lonicera periclymenum*. A stone wall **BL1** formed the boundary at the eastern end of Section 1.

The western extent of Section 1 is located ca. 25 m east of the River Vartry.

Section 2: A field of dry neutral grassland **GS1** with newly planted sitka spruce *Picea sitchensis* **WS2** at 2 m spacing. An area of willow scrub **WS1** was present at the southern boundary of the field and a rocky outcrop **ER4** with gorse scrub was present at the north-eastern end of Section 2. An overgrown earth and stone bank formed the eastern boundary of the grassland field that was dominated by gorse.

Section 3: An improved grassland field **GA1** used for grazing livestock which contained a perimeter wire and post fence. The grassland was species-poor and dominated by widespread species such as perennial rye-grass and white clover. A stone and earth bank formed the south and eastern boundaries of the field and supported abundant gorse.

Section 4: A tussocky wet grassland **GS4** field dominated by false oat grass, cock's foot and rushes with immature sitka spruce **WS2** planted at 2 m intervals. The field was bordered by a farm track to the north **ED2**.

Section 5: Wet grassland **GS4** field that supported grasses such as Yorkshire fog, creeping bent, marsh foxtail, rough meadow-grass and rushes. The grassland also contained a high proportion of herbaceous species such as thistle, common nettle and creeping buttercup.

The field boundaries comprised earth and stone banks that were dominated by gorse and bracken.

Section 6: A dry neutral grassland field **GS1** with recently planted sitka spruce **WS2**. The grassland contained a moderate species diversity including creeping bent, smooth meadow-grasses, meadow foxtail, Timothy, red fescue, crested dog's-tail Yorkshire fog, silverweed, ribwort plantain, bush vetch *Vicia sepium*, common mouse-ear *Cerastium fontanum*, meadow buttercup and ragwort.

Section 7: Comprised two dry neutral grassland fields **GS1** bisected by a wide field boundary **WL1** made up of gorse, bramble and common nettle.

Section 8: A short section of the route to be laid within a local road **BL3**.

Section 9: An improved grassland field **GA1** bordered to the south by a strip of amenity grassland **GA2** that forms the northern boundary of a deep drainage channel **FW4**. The steep earth banks of the ditch supported scrub vegetation **WS1** with occasional trees that included species such as bramble, broom *Cytisus scoparius*, gorse, bracken, hawthorn, sycamore and ash.

Section 10: A strip of dense scrub vegetation **WS1** comprising bramble, broom, elder *Sambucus nigra*, hawthorn and gorse. A field of wet grassland **GS4** was present to the north that was dominated by rushes with abundant tufts of hair-cap moss *Polytrichum commune*.

Section 11: Wet grassland **GS4** field with abundant creeping bent, Yorkshire fog, rushes and creeping buttercup. A drainage ditch crossed the route at the eastern end of Section 11 which contained still water with a width of 1 m and depth of 0.5 m. The ditch supported abundant emergent floating sweet-grass.

Section 12: Wet grassland **GS4** field with patches of gorse scrub **WS1**.

Section 13: An area of sparse scrub **WS1** on damp ground with gorse, willow and hawthorn.

Section 14: Improved grassland field **GA1** dominated by perennial rye-grass and white clover.

Section 15: Dense gorse scrub **WS1**.

Section 16: Three fields of improved pasture grassland **GS1** dominated by widespread grasses such as perennial rye-grass and meadow grass. The field boundaries comprised defunct species-poor hedgerows **WL1** typically made up of gorse and hawthorn.

Section 17: Two parallel treelines **WL2** of mature ash and hawthorn with a dry drainage ditch **FW4** running down the centre.

Section 18: Two fields supporting wet grassland **GS4** with species such as creeping bent, Yorkshire fog, rushes and creeping buttercup. The fields were bisected by a bramble and gorse field boundary **WL1**.

Section 19: The route crossed a drainage ditch at approximate coordinates NGR 323792E 202306N. The watercourse at this point was ca. 1 m wide and 0.3 m in depth with a moderate flow and silt and gravel substrate bed. The ditch contained steep earth banks that supported grassy verge **GS2** and scrub vegetation **WS1**. Due to its small size and low suitability for fish prey species, the drainage ditch was considered to be sub-optimal habitat for otter although this species may use the ditch on occasion for commuting through the landscape. The watercourse flows in a south-westerly direction from its start point (ca. 1.85 km north of the crossing point) to its discharge point into the Vartry Reservoir Lower (ca. 2.15 km west of the crossing point).

South of the drainage ditch is a small patch of wet grassland **GS4** with some gorse scrub **WS1** adjacent to plantation conifer woodland **WD4** made up of mature sitka spruce.

Section 20: A large improved grassland field **GA1** used for grazing livestock.

Section 21: A farm track **ED2** bordered on either side by species-poor hedgerows **WL1** dominated by gorse.

Section 22: Two improved grassland **GA1** fields with grazing livestock that were bisected by a treeline **WL2** comprising mature oak, ash, sycamore, spruce and gorse.

Section 23: A farm track **ED2** bordered to the south-west by a mature treeline **WL2** comprising mature sycamore and ash.

Section 24: Sloping improved grassland **GA1** field used for grazing livestock.

Section 25: The top of a hill dominated by gorse scrub **WS1** with areas of bare ground **ED2** caused by poaching from cattle.

Section 26: Sloping improved grassland **GA1** field used for grazing livestock.

Section 27: A section of the route to be laid within a local road **BL3**.

Section 28: The route crosses an area of mixed woodland **WD2** comprising pine, ash, beech, holly, elder and larch. The route then enters the Callowhill site which comprises artificial hard surfaces and buildings **BL3**, scrub vegetation **WS1**, scattered trees **WD5** and amenity grassland **GA2**. A large stand of Japanese knotweed was present within the Callowhill site at NGR 324996E 202758N.

Appropriate control and management of the Japanese knotweed will be set out within the Invasive Species Management Plan for the site.

The proposed site of the break pressure tank is situated within an agricultural pasture field **GA1** on the top of a hill (Section 25) which was dominated by gorse scrub **WS1** and bare ground **ED2** and was considered to be of low ecological value.

The proposed hydropower turbine is situated within the Callowhill site on land occupied by artificial hard surfaces **BL3** and scrub vegetation **WS1**.



Figure 5.3 – Phase 1 Habitat Map



Figure 5.4: Aerial photograph showing sections of the pipeline route surveyed during the ecological survey



Figure 5.5: Aerial photograph showing sections of the pipeline route surveyed during the ecological survey

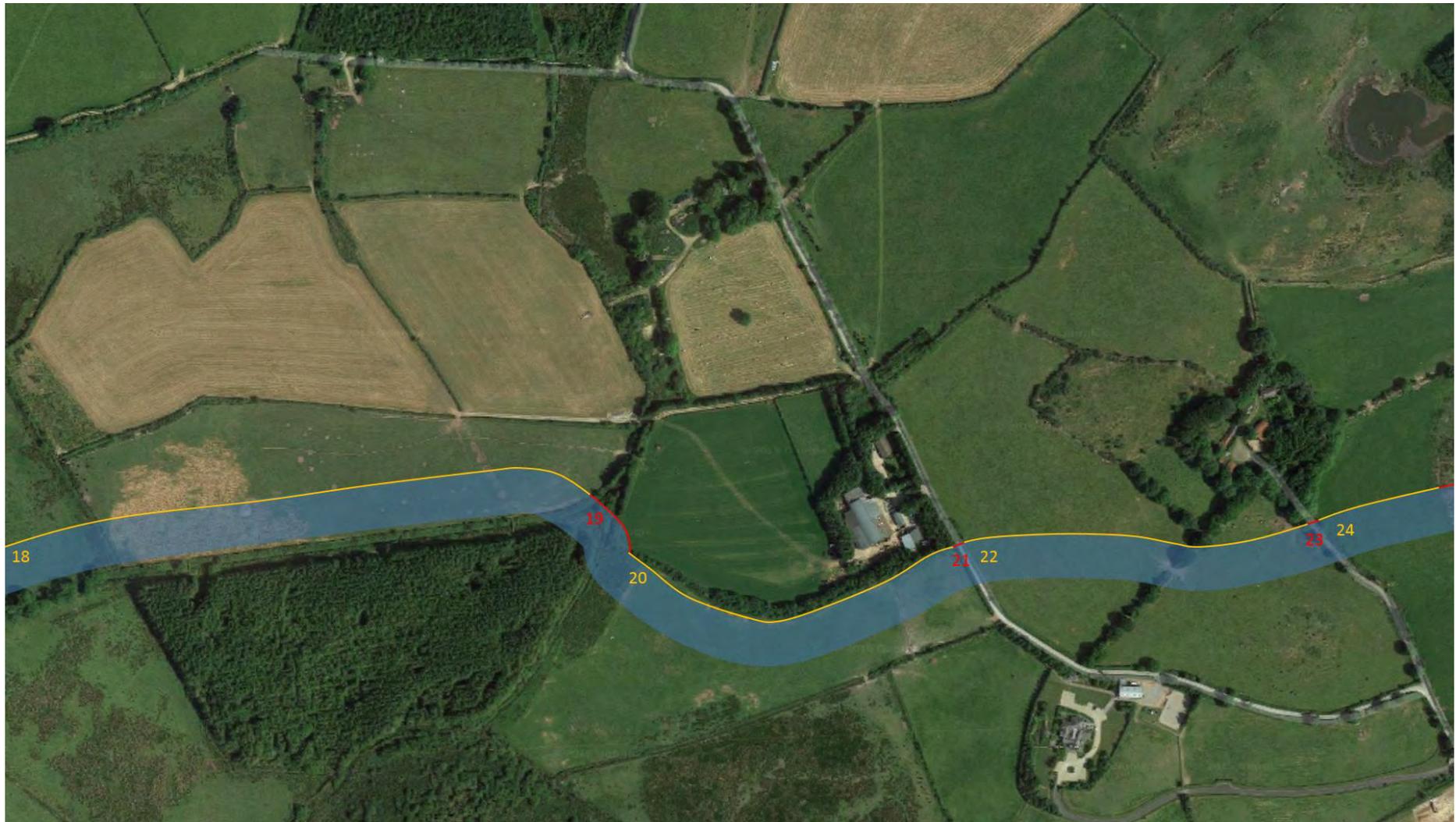


Figure 5.6: Aerial photograph showing sections of the pipeline route surveyed during the ecological survey

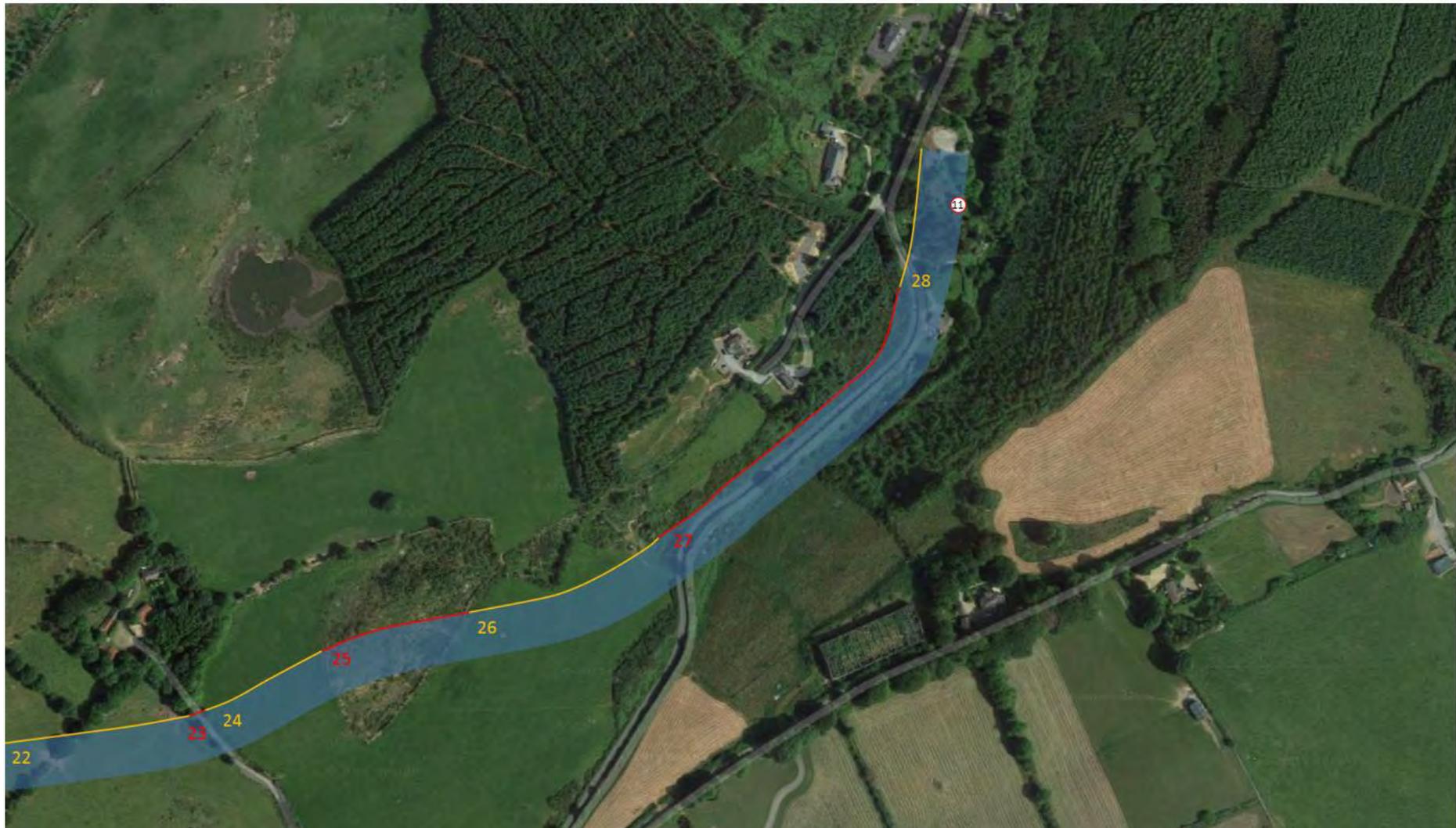


Figure 5.7: Aerial photograph showing sections of the pipeline route surveyed during the ecological survey

Table 5.5 - Description of Target Notes

Number	Description
1	Otter spraint recorded beneath the R764 Road Bridge
2	Small mammal scat within spillway channel likely to be that of American mink <i>Neovison vison</i>
3	Effluent discharge location from WTP
4	Effluent discharge location from WTP
5	Badger snuffle holes within meadow grassland
6	Badger guard hair recorded on barbed wire fence
7	Otter spraint recorded on the banks of Vartry Reservoir
8	Mature oak (Tree No. 929) that had definite bat roosting potential at least for individual bats if not larger maternity colonies (Category 1).
9	Mature oak (Tree No. 930) that had definite bat roosting potential at least for individual bats if not larger maternity colonies (Category 1).
10	Mature oak (Tree No. 931) that had definite bat roosting potential at least for individual bats if not larger maternity colonies (Category 1).
11	Derelict house to be demolished as part of the current proposals

5.2.2 Fauna

Badgers

No badger setts were identified within the site during the survey. A number of mammal paths likely to be used by badgers, foxes and deer species were noted, particularly within the mixed woodland along the eastern boundary of the site. One such path followed a route underneath a barbed wire fence that was noted to contain badger guard hairs (Target Note 6, Figure 5.3), **confirming use of the site by badgers. Characteristic badger 'snuffle holes' were also noted within the woodland and the dry meadow grassland south-west of Vartry Lodge (Target Note 5, Figure 5.3).** The grassland and woodland habitats are likely to be of importance to foraging badgers whose territories encompass the site.

Bats

Building Roost Inspection

The toilet block (Building 1, Figure 5.3) located at approximate coordinates NGR 321657E 201791N is to be demolished as part of the proposals and was assessed for its potential to support roosting bats. A visual assessment of the building was made from the exterior only as it was not possible to access the interior of the building.

Building 1 was a single storey disused toilet block with pebble-dash rendered walls, a pitched roof with slate tiles supported by wooden beams and a slate-tiled ridge. The slate

tiles were in a poor state of repair with numerous tiles missing, providing potential access to the internal roof void. The interior comprised several ground-floor rooms with a self-contained roof void above a plastered ceiling. The ground-floor rooms were light and draughty as a result of the open windows which reduced the suitability for roosting bats. The roof void was not inspected for evidence of roosting bats due to a lack of access but was considered to provide potential roosting habitat for a range of open-roosting and crevice-dwelling bat species. The building was generally considered to have a **moderate roosting potential for bats** according to the Bat Survey Good Practice Guidelines (Bat Conservation Trust 2012).

A derelict house is present at the Callowhill site 325007E 202732N (Target Note 11, Figure 5.7). The building is to be demolished as part of the current proposals and was assessed for its potential to support roosting bats. A visual assessment of the building was made from the exterior only as health and safety procedure prevented an internal inspection prior to a structural survey being carried out.

The building is a two-storey house with cement rendered walls and a pitched slate tiled roof. The building is in a poor state of repair having not been occupied for many years. There are numerous potential entry points for bats through broken windows and missing roof tiles. The interior was relatively light and draughty but there is likely to be areas within the interior such as roof voids and cupboards that provide more suitable conditions for roosting bats. The building was generally considered to have a **good roosting potential for bats** according to the Bat Survey Good Practice Guidelines (Bat Conservation Trust 2012).

Emergence Surveys

The current development proposals indicate that Building 1 will be demolished for the **provision of access onto the spillway**. The building was considered to have a 'moderate' potential to support roosting bats and, according to the Bat Surveys Good Practice Guidelines (Bat Conservation Trust 2012), two emergence surveys were required to confirm the presence or likely absence of roosting bats.

Two vantage points were deemed sufficient to cover all of the potential egress points for bats. One experienced ecologist conducted two emergence surveys of each vantage point which meant visiting the site on four separate evenings; 1st, 8th, 9th and 22nd September during suitable weather conditions.

A high level of bat activity was recorded during the surveys comprising a moderate species diversity. At least five bat species were recorded over the four surveys including common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's *Nyctalus leisleri*, brown long-eared bat *Plecotus auritus* and at least one species from the

Myotis genus. Bats from the *Myotis* genus are inherently difficult to distinguish using sound recordings due to the similarities of their echolocation calls and it is standard practice to group these species together during acoustic surveys.

During all four surveys soprano pipistrelle was the first species to be recorded with individuals being observed 16, 22, 19 and 25 minutes after sunset on Surveys 1, 2, 3 and 4 respectively. Although emergence times are quite variable and species specific, soprano pipistrelle often emerge around 20 minutes after sunset (Bat Conservation Trust: Soprano Pipistrelle Factsheet. 2010) which suggests that a roost for this species is potentially close by. A high level of foraging activity was recorded from soprano pipistrelle which was concentrated within the conifer plantation to the south of Building 1 and above the standing water north of the R764 road bridge.

Common pipistrelle were recorded foraging in similar areas to soprano pipistrelle in each of the four surveys but were less abundant. **Leisler’s bat was** infrequently observed foraging high above the reservoir to the north of the survey location during each of the four surveys. *Myotis* bat was recorded on three occasions during the surveys on 9th and 22nd September within the woodland habitat to the south of the toilet block.

Brown long-eared bat was recorded foraging within the woodland habitat to the south of the toilet block during the surveys on 8th 9th and 22nd September. During the survey on 22nd September one individual brown long-eared bat was observed entering the toilet block through an open window on its southern elevation. The bat was observed foraging within the toilet block for several minutes before emerging through the same open window. The toilet block is likely to be used by brown long-eared bats as an opportunistic night time feeding perch and foraging area.

No bats were observed emerging from the building during the four emergence surveys.

Tree Roost Inspection

The survey area supports a large number of mature trees, not all of which were assessed for their potential to support roosting bats. Many of the mature trees on site are likely to contain features that are suitable for use by roosting bats. Trees that are likely to be directly affected by the proposed development were assessed for their potential to support roosting bats during the ecological survey. The trees are numbered according to the Tree Survey Key Plan that was prepared as part of the Arboricultural Assessment (CMK Horticulture and Arboriculture, 2016).

Table 5.6 – An assessment of bat roost potential within trees to be felled with suitability based on Bat Conservation Trust guidelines

Tree No.	Species	Features	Suitability
413	Scots pine	No obvious features for roosting bats	Category 3

	<i>Pinus sylvestris</i>		
414	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
415	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
416	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
417	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
418	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
422	Larch <i>Larix decidua</i>	No obvious features for roosting bats	Category 3
423	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
424	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
425	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
426	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
427	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
437	Aspen <i>Populus tremula</i>	No obvious features for roosting bats	Category 3
439	Douglas fir <i>Pseudotsuga menziesii</i>	No obvious features for roosting bats	Category 3
913	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
914	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
915	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
916	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
917	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
918	Norway maple <i>Acer platanoides</i>	No obvious features for roosting bats	Category 3
920	Sycamore <i>Acer pseudoplatanus</i>	Large mature tree partially covered with ivy. Lifted bark was noted on stem and limbs.	Category 2
921	Sycamore <i>Acer pseudoplatanus</i>	Large mature tree with no obvious features for roosting bats but was covered in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	Category 2
922	Ash <i>Fraxinus excelsior</i>	Relatively well developed tree with no obvious features for roosting bats but was covered in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	Category 2
923	Ash <i>Fraxinus excelsior</i>	Large mature tree with no obvious features for roosting bats but was covered	Category 2

		in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	
924	Sycamore <i>Acer pseudoplatanus</i>	Large mature tree with no obvious features for roosting bats but was covered in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	Category 2
925	Douglas fir <i>Pseudotsuga menziesii</i>	No obvious features for roosting bats	Category 3
926	Sycamore <i>Acer pseudoplatanus</i>	Large mature tree partially covered with ivy. Lifted bark was noted on stem and limbs.	Category 2
927	Larch <i>Larix decidua</i>	Large mature tree with no obvious features for roosting bats but was covered in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	Category 2
928	Sycamore <i>Acer pseudoplatanus</i>	Large mature tree with no obvious features for roosting bats but was covered in dense ivy which may form suitable roosting cavities or obscure potential features within the stem or limbs.	Category 2
929	Oak <i>Quercus robur</i>	Large mature tree with several dead limbs containing knot holes. Densely covered with ivy.	Category 1
930	Oak <i>Quercus robur</i>	Large mature tree with several dead limbs containing knot holes. Densely covered with ivy.	Category 1
931	Oak <i>Quercus robur</i>	Large mature tree with several dead limbs containing knot holes. Densely covered with ivy.	Category 1
932	Birch <i>Betula pendula</i>	No obvious features for roosting bats	Category 3
933	Oak <i>Quercus robur</i>	Large mature tree partially covered with ivy. Lifted bark was noted on stem and limbs.	Category 2
934	Birch <i>Betula pendula</i>	No obvious features for roosting bats	Category 3
935	Ash <i>Fraxinus excelsior</i>	No obvious features for roosting bats	Category 3
936	Scots pine <i>Pinus sylvestris</i>	No obvious features for roosting bats	Category 3
938	Lawsons cypress <i>Cupressus lawsoniana</i>	No obvious features for roosting bats	Category 3
939	Lawsons cypress <i>Cupressus lawsoniana</i>	No obvious features for roosting bats	Category 3
940	Douglas fir <i>Pseudotsuga menziesii</i>	No obvious features for roosting bats	Category 3
941	Lawsons cypress <i>Cupressus lawsoniana</i>	No obvious features for roosting bats	Category 3
942	Birch <i>Betula pendula</i>	No obvious features for roosting bats	Category 3

The trees to be removed to provide access to the spillway largely comprised Scots pine and beech that were not seen to contain the deep fissures, cracks and splits which can offer suitability for roosting bats and were therefore classified as Category 3 according to the Bat Conservation Trust: Good Practice Guidelines (2012), meaning they do not currently have the potential to support roosting bats.

Three mature oak (Target Notes 8,9 and 10, Figure 5.3. Trees 929, 930, 931 on Tree Survey Key Plan) were identified as having features that had definite bat roosting potential at least for individual bats if not larger maternity colonies and were therefore classified as **Category 1 according to the Bat Conservation Trust's Good Practice Guidelines (2012)**.

Habitat Assessment

All bat species within Ireland are insectivorous and forage within a range of natural, semi-natural and artificial habitats that support invertebrate prey species. Linear features such as hedgerows, tree-lines and woodland edge are important for bats navigating through the landscape.

The site is situated within a lowland, rural environment that is well connected to suitable habitats within the wider landscape via vegetated field boundaries, the River Vartry and boundary habitats of the Vartry Reservoir. The WTP site comprises a mosaic of aquatic, grassland and woodland habitats that are likely to support a high diversity of invertebrate prey species providing optimal foraging resources for bats. The open water within the site **was particularly suitable for Daubenton's bat *Myotis daubentonii* and soprano pipistrelle *Pipistrellus pygmaeus*** which are species that specialise in taking insect prey above the **water's** surface.

The diverse range of suitable habitats found within Vartry WTP provide abundant foraging opportunities for bats within the locality of the site. The site is likely to constitute a foraging resource of high value to a range of bat species.

Amphibians

The 16 existing Slow Sand Filtration Ponds within the WTP are considered unsuitable as breeding habitat for amphibians due to the vertical concrete sides restricting access and egress of the waterbodies.

Ponds 1 – 7 are a series of connected waterbodies used for sediment settlement in order to reduce suspended solids within the effluent discharge. The ponds are situated perpendicular to the slope and in two rows with percolation occurring between the ponds in each row. They have shallow grassed banks which are mown and the ponds are subject to regular maintenance by cleaning out accumulated sediments and vegetation. The

process of cleaning out the ponds at 6 month intervals greatly reduces the suitability for amphibians due to regular disturbance and removal of suitable egg laying material.

The ponds vary in terms of turbidity, water quality and abundance of aquatic vegetation.

Ponds 1, 2 and 5 contained highly turbid water with little emergent or submerged aquatic vegetation and were considered sub-optimal as breeding habitat for amphibians.

At the time of the survey Ponds 3 and 6 supported abundant submerged and emergent vegetation that would provide cover and suitable egg laying material for amphibians and the water quality was considered to be moderate. However, due to the high levels of disturbance that comprises dredging, pond maintenance and vegetation clearance that occurs every 6 months the suitability for breeding amphibians is greatly reduced.

Ponds 4 and 7 were dry at the time of the survey and were unsuitable for breeding amphibians.

Terrestrial habitats within the WTP were suitable for hibernation, summer refuge, dispersal and foraging activities for common frog and smooth newt. The strips of mixed woodland, scrub vegetation and grassland provided suitable newt foraging habitat as they are likely to attract a wide variety of ground-dwelling invertebrates for them to prey upon. Additionally, the ground associated with the treelines and woodland also provided suitable refuges for winter hibernation. Therefore, these areas would all provide suitable amphibian habitat during the terrestrial phase of their life cycle.

Reptiles

The dry neutral grassland and dry meadow grassland within the site provide suitable foraging habitat for common lizard *Zootoca vivipara*. The south-facing, species-rich dry meadow present on the southern bank of the dam was identified as being particularly suitable for this species. The scrub vegetation, treelines and woodland habitats provide suitable refuge for hibernating reptiles.

No reptiles were observed during the baseline surveys carried out in August 2015.

Otter

Otter spraints were recorded on the bank of the Vartry Reservoir north of the site (Target Note 7, Figure 5.3) and immediately south of the R764 Road bridge within the spillway channel (Target Note 1, Figure 5.3) which confirm the presence of otters within the site boundary.

The spillway channel is predominantly dry for most of the year and does not support the prey species that would provide suitable foraging habitat for otters. The channel was however considered suitable as a commuting corridor for otters travelling between

foraging sites. Vartry Reservoir and the Vartry River downstream of the WTP are likely to contain good populations of fish species and provide optimal foraging resources for otter. Otter habitat preferences are not confined to waterways and this species is likely to travel through other habitats within the site boundary such as woodland and grassland on occasion.

The banks of the spillway comprise steep / vertical earth and stone banks that contain occasional trees particularly along its northern extent. Several shallow cavities in the banks have been identified that provide potential daytime resting places for otters, however, no holts have been recorded.

Birds

The mixed woodland, treelines, buildings and scrub vegetation within the site provide suitable nesting habitat for a wide range of bird species. The diverse range of habitats on site are likely to support high levels of invertebrate abundance and diversity that provide foraging opportunities for an array of bird species. Numerous fruit-bearing tree species were noted on site that provide a foraging resource for a number of bird species.

The species recorded during the ecological survey were typical of woodland and freshwater habitats and included goldcrest *Regulus regulus*, coal tit *Parus ater*, blue tit *Cyanistes caeruleus*, dunnock *Prunella modularis*, sparrowhawk *Accipiter nisus*, robin *Erithacus rubecula*, grey wagtail *Motacilla cinerea*, grey heron *Ardea cinerea*, hooded crow *Corvus cornix*, rook *Corvus frugilegus*, raven *Corvus corax*, woodpigeon *Columba palumbus*, blackbird *Turdus merula*, house martin *Delichon urbicum*, swift *Apus apus*, barn swallow *Hirundo rustica* and wren *Troglodytes troglodytes*.

Goldcrest, house martin, robin, sparrowhawk, swallow, swift are listed as being species of Medium Conservation Concern and grey wagtail are listed as a species of High Conservation Concern according to the BoCCI.

The areas of trees and woodland to be removed as part of the proposals will be subject to a breeding bird survey between April – June 2016 to inform appropriate mitigation for the site the results of which will be included within the breeding bird survey report for the site.

Invertebrates

The site supports a number of aquatic and terrestrial habitats that are likely to be of value to a range of invertebrates. The species-rich dry meadow grassland was frequently noted to support a high proportion of flowering plants that provide a valuable foraging resource for pollinating insects such as bees, butterflies and flies. A number of the mature standard trees within the woodland were noted to be dead or have dead limbs which is likely to be of value to saproxylic and other invertebrates.

The invertebrate community within the spillway was assessed by kick sampling in the lower reaches where the substrate was comprised of gravel and cobble. The sampling yielded larvae of mayfly, cased and uncased caddis fly, water beetles, a small number of blackfly along with the freshwater crustacean water louse. No stonefly larvae (indicators of high water quality) were recorded.

Within the sediment settlement ponds Pond 6 was the only waterbody which yielded any invertebrates during a sweep net search. This pond supports abundant whirligig beetles *Gyrinidae* and water boatmen *Corixidae* along with diving beetles *Dytiscus sp.* and damselfly larvae *Zygoptera*.

Water quality within Ponds 2 and 6 appeared to be moderate, these features may support an aquatic invertebrate fauna of some local conservation value including invertebrates that rely on freshwater habitats to breed such as dragonflies and damselflies.

Fish & Fisheries

The entire section of the spillway did not contain any salmonid spawning habitat and the stone gorge is impassable to fish. The lower River Vartry has runs of seatrout and salmon but fish are unable to ascend the waterfall in the Devils Glen. A resident population of brown trout occurs upstream of the Devils Glen.

The section of the spillway between the dam weir and effluent discharge locations contained minimal water flow and was suitable for small fish species only. Three-spined stickleback *Gasterosteus aculeatus* and minnow *Phoxinus phoxinus* were noted within the standing water immediately south of the dam weir. Downstream of the effluent discharge locations the river has an increased flow and was considered suitable for larger fish species such as brown trout *Salmo trutta*.

The Vartry Reservoir is a commercial angling water and contain stocks of brown trout along with typical coarse species such as roach *Rutilus rutilus*, perch *Perca fluviatilis* and pike *Esox lucius*.

Other Protected Species, Species of Conservation Concern and Invasive Species

The woodland, grassland and scrub habitats provide suitable habitats for hedgehogs *Erinaceus europaeus*.

There was abundant evidence of deer within the woodland habitats on site. Co Wicklow has a large population of red deer *Cervus elaphus* and sika deer *Cervus nippon* hybrids that pose a conservation threat to both species.

Cherry laurel and rhododendron were recorded within the woodland on site and are invasive species that can have a negative impact on native flora.

A large stand of Japanese knotweed *Fallopia japonica* was present within the Callowhill site at NGR 324996E 202758N.

Appropriate control and management of the Japanese knotweed has been included within the Invasive Species Management Plan for the site.

6 ECOLOGICAL EVALUATION

This section provides an analysis of the value of ecological receptors (the designated sites, habitats and protected species) identified as actually or potentially occurring within or in proximity of the site. The valuation of the receptor reflects its legal protection, rarity and conservation status as well as its relative abundance on site and whether it is identified as a local or national conservation priority. Where appropriate the social and economic value of ecological receptors has also been considered.

Table 6.1 – Evaluation of Ecological Receptors

Ecological Receptor	Description/Comments	Ecological Evaluation
Designated Sites		
Wicklow Mountains SAC	The site comprises the largest complex of upland habitats in eastern Ireland, with important examples of blanket bog, wet heath and dry heath, extensive in area and mostly of good quality	International.
The Murrough Wetlands SAC	This is the most extensive series of wetland habitats on the east coast, with six Annex I habitats occurring. The site is also of importance for the populations of rare invertebrate and plant species that it supports.	International.
Vartry Reservoir pNHA	Vartry Reservoir is a large artificial waterbody with a fringe of woodland and marsh habitats. It has been identified as having a 'good' overall water status with 'good' ecological status within the most recent EPA biological monitoring assessment (2010).	County
Devil's Glen pNHA	Devil's Glen encompasses an area of mixed woodland within the River Vartry valley. The section of the River Vartry that flows through Devil's Glen supports Atlantic salmon spawning grounds and the river is designated a Salmonid Water under the European Communities (Quality of Salmonid Waters) Regulations, 1988.	County
Habitats		
BL1 Stone Walls and Stonework	A number of artificial stone banks that provide refuge for invertebrates and small mammals	Site
BL3 Buildings and Artificial Surfaces	A variety of residential, industrial and agricultural buildings some of which are disused / derelict.	Site
ER1 Exposed Siliceous Rock	The spillway comprises a section of exposed rock which forms the channel bed. The rock was dominated by mosses and also included grasses, ferns and sapling trees on higher ground.	Site

Ecological Receptor	Description/Comments	Ecological Evaluation
ED1 Exposed Sand, Gravel or Till	Several areas of sand or gravel with early colonising tall ruderal flora.	Negligible
ED3 Recolonising Bare Ground	Recently disturbed soil with early colonising flora	Negligible
FL8 Artificial Ponds	16 Slow Sand Filtration ponds in current usage for water filtration	Site
FL5 Eutrophic lakes	A series of ponds used for sediment settlement to reduce suspended solids within the effluent discharge. The ponds vary in terms of water quality and abundance of aquatic vegetation.	Site
FS1 Reed and large sedge swamp	The spillway channel south of the dam weir is predominantly dry and dominated by common reed beds	Site
FW4 Drainage Ditch	Several artificial watercourses are present on site used for either drainage or feeding water around the WTP system.	Site
FW1 Eroding Upland River	The River Vartry runs along the eastern boundary of the site. The EPA has identified that the river has a 'good' overall water status and the section running through the site is likely to provide habitat for protected species such as otter.	Regional
GA1 Amenity Grassland	Several small patches of well-managed, species poor grassland associated with gardens and grass borders	Negligible
GS1 Dry Neutral Grassland	Several fields that are either low-intensively grazed, or infrequently cut that contain a moderate diversity of grass and herbaceous species	Site
GS2 Dry Meadow and Grassy Verge	Abundant dry meadow and grass verges that were infrequently cut and contained a high proportion of flowering plants.	Local
WD2 Mixed Woodland	Abundant mixed woodland that was species-rich in places.	Local
WD4 Conifer Plantation	Strips of pine plantation within the pasture field at the north-east corner of the site.	Site
WD5 Scattered Trees	Scattered trees within the dry neutral grassland south-west of Vartry Lodge.	Site
WL2 Treelines	A mature mixed tree line bisecting the proposed new WTP site.	Local
WN6 Wet Woodland	A small area of woodland that contained waterlogged ground and supported associated wet woodland ground flora	Local

Ecological Receptor	Description/Comments	Ecological Evaluation
WS1 Scrub	Numerous patches of dense marginal scrub comprising widespread flora	Site
WS3 Ornamental Shrub	Several planted ornamental borders	Negligible
Species		
Badgers	The site is likely to provide a foraging resource for badgers	Site
Bats	Buildings and trees on site provide potential roosting opportunities for bats. The site provides optimal foraging and commuting habitat for a range of bat species	Local
Amphibians	Ponds 1 – 7 are regularly dredged and cleared of vegetation and this disturbance reduces the suitability of the ponds for breeding amphibians. The semi-natural habitats on site provide opportunities for foraging and hibernating amphibians during the terrestrial phase of their lifecycle.	Site
Reptiles	The grassland and woodland areas on site provide suitable habitat for foraging and hibernating common lizard.	Site
Otter	Otter presence was confirmed on site. Otters are likely to use the spillway channel for commuting through the landscape and utilise the Vartry Reservoir and River Vartry adjacent to the site for foraging.	Local
Birds	The habitats on site comprise a large area of suitable foraging and nesting habitat for a range of bird species.	Local
Invertebrates	There are a variety of terrestrial and aquatic habitats on site that provide suitable habitat for a wide range of invertebrates.	Local
Fish	The spillway channel is predominantly dry at most times of the year and was suitable for small fish species only. The River Vartry south of the effluent discharge locations provides habitat for larger species such as brown trout. The ponds on site were considered sub-optimal for fish.	Local

7 IMPACT ASSESSMENT AND RECOMMENDATIONS FOR MITIGATION AND ENHANCEMENT

7.1 Introduction

This section considers the effects of the proposed development upon the ecological receptors identified in Section 6. Avoidance, mitigation and compensatory measures are then described to ensure adverse effects associated with the construction and operation of the proposed development can be eliminated or reduced as far as possible. Recommendations are also provided for any further work that might be required as well as suggestions for ecological enhancement measures that would be appropriate within the development.

7.2 Details of Proposed Development

This assessment has been based upon the following desk study reports prepared by Nicholas O'Dwyer in relation to different aspects of the Vartry Water Supply Scheme:

- 'Vartry Reservoir Works – Desk Study Report' Nicholas O'Dwyer (May 2015)
- 'Water Treatment Strategy – Desk Study Report' Nicholas O'Dwyer (August 2015)

It is understood that the key development principles underpinning the project include the following:

New WTP

Construction of a new WTP to provide full water treatment facilities including processes that provide an effective barrier to diatomic algae. The footprint of the new WTP will cover ca. 1.5 ha and will comprise Treatment Buildings, Sludge Plant, Washwater Settling Tanks and associated hardstanding and access roads. The proposals include the removal of all semi-natural habitats within the footprint of the development which include:

- Mature mixed treeline ca. 50 m in length with approximately 17 trees to be felled
- Stand of mixed woodland dominated by large cypress tree ca. 250 m² in area with 5 trees to be felled
- Perimeter mixed woodland with up to 20 trees to be felled
- Patches of scrub vegetation
- Ponds 1 – 7
- Grassy verges surrounding ponds ca. 2000 m²
- Semi-improved neutral grassland ca. 1000 m² in area
- Bare ground with early colonising flora

Table 7.1 below lists the trees that will potentially require felling as part of the current proposals for the WTP.

Table 7.1 – Trees to be felled as part of the current proposals

Tree	Species	Comments
413	Scots pine <i>Pinus sylvestris</i>	A tall slender specimen with very heavy ivy growth up trunk obscuring view for assessment. Vigour appears to be limited.
414	Scots pine <i>Pinus sylvestris</i>	A well developed specimen in an open area of site. Tall slender with classic scots pine form. No visible defects.
415	Scots pine <i>Pinus sylvestris</i>	A tall slender specimen with very heavy ivy growth up trunk obscuring view for assessment. Vigour appears to be limited.
416	Scots pine <i>Pinus sylvestris</i>	A tall slender specimen with very heavy ivy growth up trunk obscuring view for assessment. Vigour appears to be limited.
417	Scots pine <i>Pinus sylvestris</i>	A tall slender specimen with very heavy ivy growth up trunk obscuring view for assessment. Vigour appears to be limited.
418	Scots pine <i>Pinus sylvestris</i>	A tall slender specimen with very heavy ivy growth up trunk obscuring view for assessment. Vigour appears to be limited.
422	Larch <i>Larix decidua</i>	A relatively well developed specimen within shelter belt planting to western boundary of site. No visible defects but crown restricted in development due to competition from neighbouring trees.
423	Scots pine <i>Pinus sylvestris</i>	A relatively well developed specimen though heavy ivy growth up trunk obscuring view for assessment. Crown slightly restricted due to competition from neighbouring trees but not significantly so.
424	Scots pine <i>Pinus sylvestris</i>	A relatively well developed specimen within a small group of trees. Crown mainly oriented toward east due to competition from neighbouring trees but not significantly so. Suitable for retention within current sheltered environment.
425	Scots pine <i>Pinus sylvestris</i>	A well developed specimen within a small group of trees. Heavy ivy growth up trunk obscuring view for assessment but crown well developed with no visible defects.
426	Scots pine <i>Pinus sylvestris</i>	A relatively well developed specimen within a small group of trees. Deadwood scattered throughout crown but unlikely to be indicative of overall decline.
427	Scots pine <i>Pinus sylvestris</i>	A dominant specimen within small group of trees. Very heavy ivy growth up trunk obscuring view for assessment and crown restricted toward east due to competition from neighbouring trees. No visible defects.
437	Aspen <i>Populus tremula</i>	A sub dominant specimen within shelter belt planting to western boundary of site. Trunk at an extreme angle to east due to competition from neighbouring trees. Of limited long term potential but providing an element of low canopy cover to site.
439	Douglas fir <i>Pseudotsuga menziesii</i>	A large dominant specimen within shelter belt planting to western boundary of site. Heavy ivy growth up trunk obscuring view for assessment but upper crown well developed with no visible defects.
913	Norway maple <i>Acer platanoides</i>	Located within a small cluster of trees. Trunk co-dominant from 22 m with potential for failure at this point. Long term potential limited as a result.
914	Norway maple <i>Acer platanoides</i>	A well developed specimen within a small cluster of trees near entrance to western field. No visible defects.
915	Norway maple <i>Acer platanoides</i>	A tall slender sub dominant specimen within a small cluster of trees. Of limited long term potential due to form and competition from neighbouring trees.

916	Norway maple <i>Acer platanooides</i>	Located within a small cluster of trees. Form poor with extensive areas of included bark in lower crown with potential for failure. Long term potential limited as a result.
917	Norway maple <i>Acer platanooides</i>	Located within a small cluster of trees. Form poor with extensive areas of included bark in lower crown with potential for failure. Long term potential limited as a result.
918	Norway maple <i>Acer platanooides</i>	A relatively well developed specimen though trunk co dominant from 2.5m with a tight union between stems. Crown also restricted due to competition from neighbouring trees. Long term potential limited as a result.
920	Sycamore <i>Acer pseudoplatanus</i>	A large dominant specimen within former hedgerow. Trunk multi-stemmed from 2 & 3 m with a well developed crown. No visible defects.
921	Sycamore <i>Acer pseudoplatanus</i>	A large dominant specimen within former hedgerow. Trunk multi stemmed from 2 m with tight union]s between stems. These are areas of structural weakness but are unlikely to be significant at present.
922	Ash <i>Fraxinus excelsior</i>	A relatively well developed specimen on former hedgerow. Crown restricted toward west due to competition from neighbouring tree and heavy ivy growth up trunk. No visible defects.
923	Ash <i>Fraxinus excelsior</i>	A large dominant specimen within former hedgerow. Extensive ivy growth up trunk obscuring view for assessment. Light suppressed deadwood scattered throughout crown but not indicative of decline. Crown restricted toward east due to competition from neighbouring tree.
924	Sycamore <i>Acer pseudoplatanus</i>	A large dominant specimen within former hedgerow. Trunk multi stemmed from 2m with wide unions between stems. Minor decay in a lower limb to south but not significant at present. Upper crown well developed with no visible defects.
925	Douglas fir <i>Pseudotsuga menziesii</i>	A relatively well developed specimen on former hedgerow. Very heavy ivy growth up trunk obscuring view for assessment but upper crown well developed with no visible defects.
926	Sycamore <i>Acer pseudoplatanus</i>	A large dominant specimen within former hedgerow. Trunk multi stemmed from 1m & 2m with wide unions between stems. Very heavy ivy growth up stem to north but upper crown well developed with no visible defects.
927	Larch <i>Larix decidua</i>	Located on former hedgerow. Very heavy ivy growth up trunk obscuring view for assessment and beginning to swamp tree. Upper crown appears to have been lost or is poorly developed.
928	Sycamore <i>Acer pseudoplatanus</i>	A well developed specimen on former hedgerow. Crown restricted toward east due to competition from neighbouring tree and very heavy ivy growth up trunk obscuring view for assessment. No visible defects.
929	Oak <i>Quercus robur</i>	A well developed dominant specimen within former hedgerow. Very heavy ivy growth up trunk obscuring view for assessment but upper crown well developed with no visible defects.
930	Oak <i>Quercus robur</i>	A well developed dominant specimen within former hedgerow. Very heavy ivy growth up trunk obscuring view for assessment but upper crown well developed with no visible defects.
931	Oak <i>Quercus robur</i>	A large dominant specimen within former hedgerow. Storm damage in lower crown and very heavy ivy growth up trunk obscuring view for assessment but upper crown well developed with no visible defects.
932	Birch <i>Betula pendula</i>	In a state of advanced decline.

933	Oak <i>Quercus robur</i>	A well developed specimen on former hedgerow. No visible defects.
934	Birch <i>Betula pendula</i>	A well developed specimen within former hedgerow. Crown slightly restricted toward west due to competition from neighbouring tree but no visible defects.
935	Ash <i>Fraxinus excelsior</i>	Poorly developed sub dominant with extensive decay in trunk.
936	Scots pine <i>Pinus sylvestris</i>	Located on former hedgerow. Trunk with a very strong lean toward east. Upper crown vertical in orientation but tree suitable for retention within current sheltered environment only.
938	Lawsons cypress <i>Cupressus lawsoniana</i>	A sub dominant specimen within a cluster of cypress and fir trees which are possibly part of the original plantings. This specimen has never really developed and now has very limited long term potential.
939	Lawsons cypress <i>Cupressus lawsoniana</i>	Possibly part of the original plantings for the development of the reservoir. This is a large dominant specimen within a cluster of cypress and fir trees. Soil build-up to base to south. This is a high value tree in terms of its landscape character historic origins and large size.
940	Douglas fir <i>Pseudotsuga menziesii</i>	A large dominant specimen possibly part of the original plantings for the development of the reservoir. Very heavy ivy growth up trunk obscuring view for assessment and crown restricted toward south due to competition from neighbouring tree but no visible defects.
941	Lawsons cypress <i>Cupressus lawsoniana</i>	Possibly part of the original plantings for the development of the reservoir. This is a tall slender specimen within group of cypress and fir trees. Soil build-up at base to south and crown restricted toward south due to competition from neighbouring trees. No visible defects.
942	Birch <i>Betula pendula</i>	A sub dominant specimen in a state of advanced decline

Spillway

Improvements to the dam spillway and downstream channel to increase its hydraulic capacity. This work will involve the following aspects:

- Demolition of disused toilet block for provision of access road
- Removal of c. 125 m² mixed woodland for provision of site compound and access
- Excavation of c. 170 m of the spillway channel to achieve a slope gradient of 1 in 55. This will involve the excavation of the channel bed, removal of channel vegetation and removal of overhanging bankside trees where necessary.

To minimise the risk of pollution and siltation downstream of the working area a bund will be formed upstream of the working area. Standard design measures detailed in Section 2.3 will be implemented.

Draw-off Tower

Improvements will be made to the existing draw-off arrangements due to the age and condition of the pipes and fittings. This work will be self-contained within sealed underground tunnels.

Installation of Siphon Pipes

The siphon pipes will maintain supplies to the adjacent water treatment works in the event of a sudden failure of the existing pipes and fittings, and allow the existing intake pipes to be taken out of service for the improvement works.

Any significant changes to the design, layout and landscaping of the proposals prior to submitting for planning should be issued to the **Nicholas O'Dwyer Ltd.** Environment Team for review. Ecological impacts and mitigation opportunities may be affected by these changes.

7.3 Designated Sites

7.3.1 Wicklow Mountains SAC [002122]

The Wicklow Mountains SAC is located 4 km west of the proposed development and there will therefore be no direct impact on the Natura 2000 site.

Elevated noise and vibration has the potential to have a disturbance effect on ex-situ otter populations associated within the Wicklow Mountains SAC during construction. Due to the small-scale nature of the disturbance and the timing of works during daylight periods only, the disturbance associated with the construction phase of the development is not considered to be significant. Impacts on the Conservation Objectives of Wicklow Mountains SAC and their features of qualifying interest relating to disturbance will not be compromised.

7.3.2 The Murrough Wetlands SAC [002249]

The Murrough Wetlands SAC is located 9 km south-east of the proposed development and there will therefore be no direct impact on the Natura 2000 site.

The Murrough Wetlands SAC is connected to the Vartry WTP via the River Vartry. There is potential for indirect impacts on habitats associated with the SAC as a result of changes to water quality within the river during construction and operation of the development.

There is potential for accidental releases of fuels/oils/chemicals from construction plants and increased levels of sediment within the River Vartry during excavation of the spillway channel and construction of the new WTP. Excessive discharges of highly turbid water can cause water pollution and the settling out of large quantities of sediment can smother benthic organisms. Sediment controls, which form part of the construction methodology (see **Section 5**) will ensure that impacts on water quality during construction are negated.

During the operation of the new WTP the increase in effluent discharge volume has the potential to affect the total loading of critical pollutants and cause a degree of water quality deterioration in the receiving watercourse. This could have indirect impacts on the water quality dependent Annex I habitats associated with The Murrough Wetland SAC.

Based on the WAC, as detailed in Appendix D, which demonstrates sufficient assimilative capacity in the river in terms of Ammonia, BOD, Orthophosphate and Suspended Solids, no significant water quality impacts on the receiving waterbody are anticipated from the operation of the WTP. The Conservation Objectives of The Murrough Wetlands SAC and its features of qualifying interest will not be compromised.

7.3.3 Vartry Reservoir pNHA [001771]

Vartry Reservoir pNHA is located immediately north of the WTP and the Draw-off Tower is located within the pNHA. **Vartry Reservoir has been identified as having a 'good' overall water status with 'good' ecological status within the most recent EPA biological monitoring assessment (2010).**

The remedial works to the Draw-off Tower will be self-contained and no ecological impacts are anticipated. There will be no increase in the abstraction of raw water from the reservoir and it is expected that the status of the waterbody will remain unchanged.

7.3.4 Devil's Glen pNHA [000718]

Devil's Glen pNHA is located 2.4 km south of the WTP and includes a section of the River Vartry downstream of the works. **The section of the River Vartry that flows through Devil's Glen supports Atlantic salmon spawning grounds and any changes in water quality as a result of the proposals could have a negative impact on the pNHA.**

There is potential for accidental releases of fuels/oils/chemicals from construction plants and increased levels of sediment within the River Vartry during excavation of the spillway channel and construction of the new WTP. Excessive discharges of highly turbid water can cause water pollution and the settling out of large quantities of sediment can smother benthic organisms. Sediment controls, which form part of the construction methodology (see **Section 5**) will ensure that impacts on water quality during construction are negated.

Based on the WAC, as detailed in Appendix D, which demonstrates sufficient assimilative capacity in the river in terms of Ammonia, BOD, Orthophosphate and Suspended Solids, no significant water quality impacts on the receiving waterbody are anticipated from the operation of the WTP. As such, it is anticipated that there will be no significant impact on Devil's Glen pNHA.

7.4 Habitats

A construction environmental management plan (CEMP) will be prepared to detail how the habitats within and surrounding the site should be protected during the construction phase. The CEMP should include details of appropriate fencing to restrict access into key ecological areas, information on any timing restrictions and measures to prevent damage to water bodies and sensitive ecological habitats. Typically the preparation of a CEMP will be a conditional requirement of the planning permission.

A site landscape layout plan has been prepared for the site (Figure 7.1) which details compensatory planting of trees and grassland areas. Seven of the original filter beds will be filled in using spoil from the new WTP site and planted with belts of woodland and patches of species-rich meadow grassland. Existing belts of woodland will be filled in and enhanced with new tree planting of species that reflect the existing woodland character.

It is recommended that a Landscape and Ecological Management Plan (LEMP) for the site is written to specify how habitats within the operational site will be managed to ensure the biodiversity value of the site is maintained. This will include the landscape and management details of all retained and newly created habitats.



Figure 7.1 – Site Landscaping Plan

7.4.1 Waterbodies

River Vartry

The River Vartry flows along the eastern boundary of the site. The River was considered to have a Regional Level of ecological value and is designated a Salmonid Water under the European Communities (Quality of Salmonid Waters) Regulations, 1988.

There is potential for the works to impact the water quality of the river during both the construction and operational phases of the development.

Potential Impacts during Construction

Approximately 170 m of the spillway channel will be regraded to improve its hydraulic capacity. The channel bed comprises, silt, gravel and bedrock which will be excavated using plant machinery and transported off site.

In addition, the construction of the new Vartry WTP will involve movement of plant and materials within the development footprint. Although this is over 150 m west of the River Vartry, there is a feeder channel which runs along the eastern boundary of the proposed WTP to the Vartry which provides ecological continuity with the river.

The regrading works to the spillway and construction of the WTP have the potential to have an indirect impact on the aquatic environment within the River Vartry due to the potential for accidental releases of fuels/oils/chemicals from construction plants and increased levels of sediment within the stream flow as a result of the excavation works and movement of plant and materials. Excessive discharges of highly turbid water can cause water pollution and the settling out of large quantities of sediment can smother benthic organisms. Siltation can be particularly injurious to aquatic species such as juvenile Atlantic salmon. Releases of pollution and sediment would then enter the River Vartry and subsequent effects on water quality and associated local aquatic ecology could result.

The river channel (spillway) south of the reservoir weir and north of the effluent discharge locations is predominantly dry at most times of the year with low levels of water flow from seepage and groundwater sources. The spillway weir floods when the reservoir exceeds top water level during periods of sustained high precipitation.

Environmental Control Measures for Spillway Works

Throughout the Design – Build works, the Contractor shall also take account of relevant legislation and best practice UK CIRIA guidance including but not limited to the following:

- C532 Control of water pollution from construction sites: guidance for consultants and contractors;

- C648 Control of water pollution from linear construction projects;
- SP156 Control of water pollution from construction sites – guide to good practice.

Prior to the construction phase a Construction Environmental Management Plan will be prepared and agreed in advance with the statutory authorities which sets out proposed measures to mitigate against environmental impacts during the construction and operational stages taking cognisance of the following mitigation measures:

The reservoir water level will be controlled at a level below top water level during the spillway works. This will typically be set at least 0.5 m drawdown. This will prevent waves overtopping the weir and minimise leakage through the weir. This should keep the working excavation zone predominantly dry to minimise sediment laden run-off entering the River Vartry.

To minimise the risk of pollution and siltation downstream of the working area, a bund would be formed upstream of the working area in order to maintain a dry working area. Any water draining to this bund would be pumped via a settlement tank to discharge back into the reservoir. To avoid excessive silt runoff, site clearance on the spillway channel banks is not to be undertaken during wet conditions, i.e. when rainfall of more than 0.5 mm/hour is forecast within the next 24 hours. To avoid contamination of the river water during an extreme flood event, no works on the riverbank likely to generate soiled water is to be carried out when rainfall of more than 3 mm/hour is forecast within the following five days in the River Vartry catchment.

Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils, are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment. Fuelling and lubrication of equipment is not to be carried out close to any watercourse. Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and properly disposed of by a licenced waste contractor. Waste oils and hydraulic fluids is to be collected in leak-proof containers and removed from the site for disposal or recycling.

Felled trees and excavated rock will be stockpiled outside of the channel and high risk flood zones. Plant shall not be stored within the spillway outside of working hours.

The spillway banks are to be reinstated in a manner so as to minimise the potential for erosion, and to return the bank to as close to its original condition as possible.

To avoid the introduction of invasive non-native species and fish pathogens, all plant and machinery utilised on site will be thoroughly cleaned and washed using high pressured

steam cleaning before delivery to the site. A visual inspection for evidence of attached plant or animal material, or adherent mud or debris will be completed on all equipment that has come into contact with the water before leaving the site.

To avoid impacts on suitable salmonid spawning areas downstream of the works, excavation should take place outside the period October to May, inclusive. Agreement with IFI and NPWS must be obtained as to the methodology proposed and dates when the work can be allowed.

Environmental Control Measures for Construction of WTP

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils are to be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment. Fuelling and lubrication of equipment is not to be carried out close to any watercourse. Any spillage of fuels, lubricants or hydraulic oils is to be immediately contained and the contaminated soil removed from the site and disposed of through waste contractor licenced for the purpose. Waste oils and hydraulic fluids are to be collected in leak-proof containers and removed from the site for disposal or recycling.
- Felled trees and excavated spoil and rock will be stockpiled at least 15 m from drainage ditches or high risk flood zones and 50 m from the River Vartry.
- To avoid the introduction of invasive non-native species and fish pathogens, all plant and machinery utilised on site will be thoroughly cleaned and washed using high pressured steam cleaning before delivery to the site. A visual inspection for evidence of attached plant or animal material, or adherent mud or debris will be completed on all equipment that has come into contact with the water before leaving the site.

Potential Impacts during Operation of the WTP

The new WTP will utilise the existing WTP effluent discharge locations into the river at the approximate coordinates 321568E 201491N and 321617E 201134N. The estimated discharge from the new WTP (*i.e.* 4,000 m³/d) comprises c. 35 % of the daily flow of the River Vartry at the discharge location. Therefore, a potential localised impact on the water quality within the River Vartry at this site is anticipated. This impact could be measurable up to the point of the next significant inflow to the River Vartry approximately 300 m downstream from the discharge. However, based on the waste assimilative capacity calculation detailed above, the receiving water downstream has adequate waste assimilative capacity to accommodate the WTP discharge in terms of BOD,

Orthophosphate, Ammonia and Suspended Solids, ensuring compliance with the Surface Water Regulations and Quality of Salmonid Waters Regulations.

Drainage ditch

A drainage ditch runs along the eastern boundary of the proposed new WTP site which flows into the River Vartry approximately 275 m south of the proposed works. Suitable precautions are necessary to ensure the ditch is not polluted during construction.

Soil or any other spoil/pollutants must not enter the watercourse. A buffer strip of at least 10 m is to be put in place along the ditch, where no construction will take place. No materials, machinery or plant will be stored within the buffer area between the security fencing and the waterbodies. No vehicular movements will take place within this buffer zone.

Site compounds will be located at least 15 m from the drainage ditch and the refuelling of all plant and vehicles will take place within a designated area, at least 15 m away from the watercourse.

A spill kit must be kept on site with sand, earth or commercial products for the containment of fuel and other material spillages. All staff will receive appropriate training in the use of these kits and are to be made aware of where the kit is stored. In the event of a spillage of oils or chemicals resulting in contamination of water courses the following procedure will be adopted:

- The site manager is to be informed and the appropriate spill kit is to be deployed immediately
- The incident is to be recorded within the site log book
- In the event of contaminants being discharged directly to water courses, or in the event of significant spillage (in excess of 10 litres), the EPA is to be contacted.

Ponds

The proposed WTP area contains seven settling ponds that are connected waterbodies used for sediment settlement in order to reduce suspended solids within the effluent discharge. The ponds are subject to dredging and vegetation clearance every 6 months to ensure the continued function of the sediment settlement. The high levels of disturbance associated with the regular maintenance activities reduces the value of the ponds for aquatic wildlife. The ponds were considered to have a Site level of ecological value.

Ponds 1 – 7 will be removed to accommodate the new WTP.

The drainage and infilling of the ponds should be undertaken during the period September – January when breeding amphibians are more likely to be absent from the waterbodies.

If it is not possible to drain and infill the ponds during this period, an amphibian survey and translocation should be undertaken.

7.4.2 Woodland and Treelines

An arboricultural survey has been undertaken by CMK Horticulture and Arboriculture to make an assessment of the composition and condition of the trees on site. A Tree Protection Strategy has been included within the Arboricultural Report that provides a detailed commentary on methodologies to be undertaken to protect trees during construction which will comply with the recommendations set out in BS5837 (2012) Trees in Relation to Design, Demolition and Construction.

The site supports a significant number of trees of varying species and maturity within a variety of habitats. Three woodland habitat types (WD2, WL2 and WN6) were considered to have a Local Level of ecological value meaning they are important examples of the habitat type within a local context.

The wooded areas and treelines had a high intrinsic conservation value and are likely to provide valuable navigational and foraging features for bats and support a range of nesting and foraging bird species.

Policies WH1 - 6 of the Wicklow County Development Plan 2010 – 2016 (adopted October 2010) underline the importance of trees as a material consideration during the planning process.

The vast majority of the trees on site will be retained as part of the development proposals. The areas of trees to be removed on site include:

- Mature mixed treeline c.50 m in length to accommodate the new WTP.
- Stand of mixed woodland dominated by large cypress tree c. 250 m² in area to accommodate the new WTP.
- Removal of c. 125 m² mixed woodland for provision of site compound and access associated with the excavation of the spillway.
- Removal of c. 750 m² mixed woodland at Callowhill site to lay pipeline.

All tree removal will be replaced with equivalent compensatory / enhancement planting within the site boundary to ensure there is no net loss of treeline and woodland habitat on site in order to comply with Policy WH6 of the Wicklow County Development Plan 2010 - 2016. Enhancement tree planting has been detailed within the Site Landscaping Plan as shown in Figure 7.1. Areas of green space and any landscape planting will consist of native species including a proportion of fruit bearing species that provide foraging opportunities for badgers, birds and invertebrates. The loss of the areas of treeline and mixed woodland is not considered to be significant in the context of the site as mitigation / compensatory

planting will ensure a residual increase in the extent of trees on site that reflect the existing character of the woodland areas.

In order to prevent damage to the structure and integrity of retained trees and woodland, construction areas within the site will have clearly-defined set-down areas, haul routes, pedestrian walkways and plant parking and manoeuvring areas. This will minimise the potential for accidental physical damage to retained trees. These measures and working practices will be set out within the CEMP which will also include specifications for appropriate perimeter or hazard fencing, fluid discharge, waste or other contaminants and occurrence of fires. All retained trees and hedgerows will be protected in accordance the recommendations set out in BS5837 Trees in relation to design, demolition and construction (2012), including the erection of robust protective fencing encompassing root protection areas.

Where access routes pass through the treeline, these areas must not be lit to avoid **fragmentation through light pollution**. 'Dark corridors' through the site must be created by keeping the treelines and woodland edge unlit, thus allowing wildlife to continue to navigate through the site.

7.4.3 Grassland

A variety of grassland habitats were recorded on site including amenity grassland, dry neutral grassland and dry meadow and grassy verges. The amenity grassland was species-poor, well-managed and was considered to have negligible ecological value. Dry neutral grassland is widespread within the local landscape and the habitat on site had a Site level of ecological value. The dry meadow and grassy verges were frequently recorded as having a high level of diversity with a high proportion of flowering plants and was considered to have a Local Level of ecological value.

Approximately 1000 m² of dry neutral grassland and 2000 m² of dry meadow and grassy verge will be lost to accommodate the new WTP. The vast majority of grassland within the site will be retained as part of the proposals. The loss of the grassland associated with the development is not considered to be significant in the context of the extent of retained habitat within the site and the provision of extensive areas of species-rich grassland within the landscaping plan (Figure 7.1). The grassland surrounding the WTP should be managed post construction to encourage the development of a more diverse sward than is currently present. The following management regime should be adopted to reduce the nutrient content within the habitat and allow the wildflowers to set seed.

Mid-February	<i>Cut short any significant winter growth leaving 25-50 mm of sward</i>
August/September	<i>After flowering, carry out main cut and remove all of the arisings.</i>

Mowing will only take place during periods of dry weather to ensure that no waterlogged ground is damaged by machinery. When mowing the grassland all arisings will need to be removed off site to prevent nutrient build up.

7.4.4 Freshwater Marsh

The spillway channel south of the dam weir is predominantly dry and supports vegetation typical of freshwater marsh habitat. This habitat was considered as having a Site level of ecological value. During excavation of approximately 170 m of the spillway channel the marsh habitat within this area will be lost. It is anticipated that recolonisation of the spillway channel by marsh vegetation following completion of the construction phase may take a number of years as the channel bed substrate will change from sediment / mud to exposed rock. Flooding of the spillway will increase the sediment deposition within the channel over a number of years and gradually increase the suitability of the channel for colonization of riparian flora.

It is not considered that the loss of freshwater marsh habitat within the spillway channel is significant as the habitat is expected to recover to its previous state within a relatively short period of time.

7.4.5 Invasive Species

An Invasive Species Management Plan has been prepared which recommends measures to prevent the spread and eliminate the stand of Japanese knotweed at the Callowhill site.

7.5 Protected Species and Species of Conservation Concern

7.5.1 Badgers

No badger setts were recorded on the site, however, evidence of badger foraging activity was confirmed within the survey area. It is recommended that a pre-construction survey for badger setts is undertaken no more than 3 months prior to the beginning of the construction phase. Badgers are able to excavate new setts and tunnel systems very quickly and therefore an up-to-date survey is required so as to confirm the absence of badger setts within the development footprint. It is also recommended that site staff are briefed on the potential of encountering badger setts. In the event that a new sett is

discovered Ecologists at Nicholas O'Dwyer should be contacted immediately to devise an appropriate mitigation strategy.

The development proposals are highly unlikely to have a long-term adverse impact upon the available foraging habitat for badgers, considering the retention of the vast majority of suitable badger foraging habitat on site.

7.5.2 Bats

Further Surveys

The derelict house at the Callowhill site was considered to have good potential to support roosting bats. In line with best practice guidance, it is recommended that at least two emergence / re-entry surveys are undertaken of the building to confirm the presence or likely absence of roosting bats during May-September. The results of the survey will be included as an addendum to this report and will include appropriate mitigation.

Interpretation / Evaluation of Emergence Survey Results

A high level of bat activity was recorded during the emergence surveys carried out on Building 1 in September 2015. At least five widespread bat species were recorded with soprano pipistrelle being the most abundant species. The emergence surveys indicated that bats were not roosting within Building 1 but are likely to be roosting nearby. Brown long-eared bats were observed using the toilet block as a feeding site, characterised as a building where bats rest between feeding bouts during the night but are not present by day. Brown long-eared bats are common and widespread in Ireland and a night roost of this species is considered to be of low conservation significance (see Figure 7.2). As the survey results indicated that no bats were using the building as a day roost it is considered that the demolition of the building will not result in the disturbance of any bats or destruction of a bat roost and as such a licence from the National Parks and Wildlife Service is not considered to be necessary.

However, due to the suitability of the building as a bat roost and the use of the building by brown long-eared bat during the night it is recommended that a precautionary working methodology is adopted when demolishing the building.

Precautionary Working Method

- It is recommended that the works to demolish the buildings are programmed to be undertaken October – February when bats are highly unlikely to be roosting within the building.
- All demolition and construction staff must be appropriately briefed by the Ecologist in a toolbox talk at the beginning of the demolition/construction phase.

- A bat box (Schwegler 2F) will be attached to a tree to the north of the building to provide refuge in the highly unlikely event that a bat is discovered during the demolition phase.
- The licensed ecologist will then supervise the roof strip and the disassembly of the wooden beams until such a point that they are satisfied that there is a negligible potential of encountering roosting bats.
- If bats are encountered during supervised works, the licensed bat handler will capture the bat with thin gloved hands, place the bat in a drawn-string cloth bag and then take it to the bat box placed in a nearby tree.
- If a bat is discovered at other, unsupervised times, work will cease immediately, and the licensed bat ecologist or accredited agent will be called for advice.
- In the event that a bat is encountered at any stage during the demolition an assessment would be made by the ecologist as to the need to obtain a bat licence from National Parks and Wildlife Service. In the event it is clear that continuing with demolition works will destroy roosts that have not already been adversely affected by demolition works then it would be necessary to delay such works until a licence can be obtained from National Parks and Wildlife Service. Failure to stop works would risk offences being committed under the Habitats Regulations (2010) and the Wildlife Act (1976) and Wildlife [Amendment] Act (2000). The Ecologist would be responsible for ensuring that the adopted approach was consistent with legislation protecting bats and their roosts.

<p>Low</p>	<p>Roost status</p> <p>Feeding perches of common/rarer species</p> <p>Individual bats of common species</p> <p>Small numbers of common species. Not a maternity site</p> <p>Feeding perches of Annex II species</p> <p>Small numbers of rarer species. Not a maternity site</p> <p>Hibernation sites for small numbers of common/rarer species</p> <p>Maternity sites of common species</p>	<p>Mitigation/compensation requirement (depending on impact)</p> <p>Flexibility over provision of bat-boxes, access to new buildings etc. No conditions about timing or monitoring</p> <p>Provision of new roost facilities where possible. Need not be exactly like-for-like, but should be suitable, based on species' requirements. Minimal timing constraints or monitoring requirements</p> <p>Timing constraints. More or less like-for-like replacement. Bats not to be left without a roost and must be given time to find the replacement. Monitoring for 2 years preferred.</p>
<p>Conservation significance</p>	<p>Maternity sites of rarer species</p> <p>Significant hibernation sites for rarer/rarest species or all species assemblages</p> <p>Sites meeting SAC guidelines</p> <p>Maternity sites of rarest species</p>	<p>Timing constraints. Like-for-like replacement as a minimum. No destruction of former roost until replacement completed and usage demonstrated. Monitoring for at least 2 years.</p> <p>Oppose interference with existing roosts or seek improved roost provision. Timing constraints. No destruction of former roost until replacement completed and significant usage demonstrated. Monitoring for as long as possible.</p>
<p>High</p>		

Figure 7.2 Guidelines for proportionate mitigation (Bat Mitigation Guidelines for Ireland)

Considerations for Mitigation and Enhancement

Although no bats were recorded roosting within the building it is recommended that four bat boxes are installed on adjacent mature trees as mitigation for the removal of potential

bat roosting features. It is recommended that boxes suited for use by pipistrelle and brown long-eared bats are provided given that these were the most common species recorded during the surveys. Bat boxes such as the Schwegler 2F, 1FD and 2FN would provide suitable roosting sites.

Tree Roost Survey

The treeline to be removed as part of the construction of the WTP contained a number of mature trees of a size and age that elevated surveys may result in cracks or crevices being found. Three mature oak (Target Notes 8, 9 and 10, Figure 5.3) within the treeline were identified as having features that had definite bat roosting potential at least for individual bats if not larger maternity colonies and were therefore classified as Category 1 according to the **Bat Conservation Trust's Good Practice Guidelines** (2012). Felling of all trees within the treeline should be preceded by an aerial inspection by an experienced ecologist. In the absence of evidence of roosting bats being discovered, work should be conducted in a sensitive manner, and where reasonably practicable, timber with bat potential should not be directly sawn through. If such timber is removed, it should be left at the base of the tree for at least 48 hours. Where it is impractical to lower potential bat roosts, piles of brush or logs can be used to soften the impact of them hitting the ground.

If evidence of roosting bats is discovered before or during the arboricultural works, the operations on the specific tree will halt and a licence from NPWS will be applied for. If bats are found and need to be moved or taken into care for their own safety, the task should ideally be conducted by an experience bat ecologist.

Where this is not possible, they should be placed in a box with air holes and kept in a safe and quiet location until they can be passed into the care of such an individual.

Increases in Artificial Lighting

Construction activities for the WTP and spillway will be largely conducted within daylight hours although some lighting may be used in the winter months when daylight hours are restricted. During operation of the proposed WTP, there may be increased levels of artificial lighting although detailed plans have not yet been provided.

Lighting can impact upon bats by directly discouraging them (certain bat species are generally light-averse) but also by affecting the behaviour of their insect food populations; insects have been found to be drawn to light sources from the wider environment. This has a potential effect of encouraging insects from the unlit countryside towards artificial light sources which will deter certain bat species and make the habitat less favourable. The development therefore has the potential to impact upon certain bat species using the site (mainly *myotis* and long-eared species), especially if the hedgerows and trees likely to be important bat features are subject to direct lighting or light spill. Should any of the

treelines / woodland edge on site be subject to artificial lighting, it is likely that these bats will avoid the lighting, have their insect food source disrupted and fragment flight lines. **Conversely, Leisler's and pipistrelle bats are known to swarm around artificial light sources** to catch the insects attracted by these features. The effect of lighting upon these species will therefore be less significant in comparison to other more light-sensitive species. A 15m buffer will be maintained between the construction zone and the perimeter of the site in order to reduce the amount of light spilling onto retained boundary habitats and levels of disturbance during construction. It is recommended that a 15 m buffer is maintained between the built environment and all boundary habitats. It is recommended that lighting throughout the site is minimised through the use of screening and low-level, directional lighting, particularly focussing on avoidance of light-spill onto the treelines and woodland edge on site.

During operation of the WTP lights on site must be set at the minimum level required for safety purposes and be directed away from habitat features suitable for bats (trees, treelines, grassland areas, artificial bat roosts [discussed further below]), utilising lighting hoods and cowls where necessary.

Any outside security lighting should be set on a motion-sensor and timer to decrease the light pollution impacts. These lights should also be directed away from treelines and woodland edge (and hooded/cowled where necessary) and be of the lowest intensity/brightness necessary for their purpose.

7.5.3 Amphibians

The slow sand filtration tanks were considered unsuitable as breeding habitat for amphibians. The sediment settlement ponds are subject to regular maintenance such as dredging and vegetation clearance to ensure their continued functionality. The high levels of disturbance greatly reduces the suitability of the Ponds as breeding habitat for amphibians. Due to the disturbance it is considered unlikely that the ponds support an established breeding population of amphibians although some individuals may opportunistically use the waterbodies for breeding on occasion.

As a precaution, the drainage and infilling of the ponds should be undertaken during the period September – January when breeding amphibians are more likely to be absent from the waterbodies. If it is not possible to drain and infill the ponds during this period, an amphibian survey and translocation should be undertaken if amphibians are confirmed present.

7.5.4 Reptiles

Suitable habitat for foraging and hibernating common lizard was identified within the survey area. The south-facing, species-rich dry meadow present on the southern bank of

the dam was identified as being particularly suitable for this species. No reptiles were observed during the ecological survey.

Approximately 1000 m² of dry neutral grassland and 2000 m² of dry meadow and grassy verge will be lost to accommodate the new WTP. These areas were considered sub-optimal for common lizard due to the high levels of disturbance from vehicle movement associated with the WTP. The loss of the relatively small area of sub-optimal habitat is not considered to be significant as large areas of suitable habitat will be retained and new species-rich grassland areas will be created.

7.5.5 Otter

Evidence of otter presence within the survey area was confirmed during the ecological survey. It is likely that otter forage within the Vartry Reservoir and the River Vartry downstream of the effluent discharge locations and utilise the spillway channel to commute between these areas. There is potential for otter to be affected by the proposals during both the construction and operational phases of the development.

Water pollution represents one of the principal threats to otter populations in Ireland (Reid et al., 2013). Otters can tolerate significant levels of pollution (Chanin, 2003; Bailey & Rochford, 2005; Romanowski et al., 2012) but poor water quality tends to result in reduced numbers and variety of fish species which in turn will have a negative impact on otter presence in polluted waterways. Any change in water quality as a result of pollution or increased sedimentation during construction or changes to effluent discharge during operation, could potentially have indirect negative effects on otters, as a result of reduced food supply. However based on the WAC, which demonstrates sufficient assimilative capacity in the river in terms of Ammonia, BOD, Orthophosphate and Suspended Solids, no significant water quality impacts on the receiving waterbody are anticipated from the operation of the WTP. Therefore it is considered highly unlikely that foraging resources for otters within the River Vartry will be reduced.

Elevated noise and vibration levels during the construction phase of the project will occur. There is potential for otters adjacent to the proposed works to be subject to certain levels of disturbance. The main disturbance will be as a result of the increase in noise and vibration during excavation of the spillway and construction of the WTP. Otters are considered to be mainly nocturnal, particularly within freshwater territories, and are mainly active after dusk and before dawn (Hayden & Harington, 2000). The noise and vibration disturbance associated with the construction works will occur during daylight hours which will reduce the potential impact on otter populations. It is considered likely that otters will avoid the spillway completely during the construction phase due to the loss of habitat. However, there are many alternative commuting routes and these can be used

temporarily. Overall, it is considered that the proposals will not have a significant adverse impact on local otter populations.

7.5.6 Fish

The section of the spillway between the dam weir and effluent discharge locations contained minimal water flow and was suitable for small fish species only. Downstream of the effluent discharge locations the river has an increased flow and was considered suitable for larger fish species such as brown trout *Salmo trutta*. Salmon *Salmo salar* and sea trout *Salmo trutta* have been recorded within the Devil's Glen pNHA approximately 3km south-east of the site.

Fish have the potential to be affected the proposals during both the construction and operational phases of the development resulting from changes in water quality.

The environmental control measures detailed in Section 7.4.1 will ensure that impacts on water quality during construction are minimised. To avoid impacts on suitable salmonid spawning areas downstream of the works, excavation of the spillway should take place outside the period October to May, inclusive. Agreement with IFI and NPWS must be obtained as to the methodology proposed and dates when the work can be allowed.

Based on the WAC, which demonstrates sufficient assimilative capacity in the river in terms of Ammonia, BOD, Orthophosphate and Suspended Solids, no significant water quality impacts on the receiving waterbody are anticipated from the operation of the WTP. Therefore it is considered highly unlikely that favourable fish conditions within the River Vartry will be reduced.

7.5.7 Birds

The site supports a range of artificial and semi-natural habitats that are suitable for nesting and foraging birds. A number of bird species typical of woodland and freshwater habitats were recorded during the ecological survey including six species of Medium Conservation Concern and one species of High Conservation Concern according to the BoCCI. The site is likely to support an assemblage of nesting and foraging birds of Local ecological value. Several areas of suitable nesting habitat will be removed as part of the development including:

- Mature mixed treeline c.50 m in length
- Stand of mixed woodland dominated by large cypress tree c. 250 m² in area
- Patches of scrub vegetation
- Removal of c. 125 m² mixed woodland for provision of site compound and access associated with the excavation of the spillway

It is recommended that a series of breeding bird surveys are undertaken (April – June) to record the assemblage of birds nesting within the suitable habitat to be lost as part of the proposals. The results of these surveys, along with detailed analysis of the value of the site and recommendations for mitigation will be presented within the Breeding Bird Survey Report.

Any tree removal will be replaced with equivalent compensatory / enhancement planting within the site boundary to ensure there is no net loss of bird nesting habitat. Enhancement tree planting is shown in the Site Landscaping Plan (Figure 7.1). The loss of the small area of suitable bird nesting habitat is not considered to be significant in the context of the large area of available habitat on site.

Nesting birds are protected under the Wildlife Act 1976 (as amended). Therefore, it is essential that trees and scrub vegetation is removed between October and February (inclusive) when nesting birds will be absent.

7.6 Ecological Enhancements

Enhancements for biodiversity, such as the following, are additional to specific mitigation measures mentioned above and are not expressly required. Any adopted enhancements would however, make a positive, permanent contribution to local biodiversity.

Suitably mature trees within the woodland network could be used to fix a variety of long-lasting bat boxes, such as **boxes made of 'woodcrete', which are widely available**. Examples of boxes are shown below, along with typical species known to be attracted to them.

Type	Species	Suggested Number
Schwegler 2F Bat Box	Suitable for small bat species	6
Schwegler 1FW Bat Box	Suitable for large colonies and hibernating bats	2

Bird nesting boxes, such as Schwegler 3SV, 2GR or 1B, could be attached to the mature trees within the site to provide enhancement of the area to nesting bird species likely to be present. It is recommended that ten bird boxes of varying design would make a positive contribution to available bird nesting opportunities within the site.

A pond / wetland area would provide habitat for a range of aquatic wildlife. The pond would be landscaped to provide shallow and deeper areas and planted with a variety of plants to provide food and egg-laying vegetation for invertebrates and amphibians.

Hedgehogs are a native mammal which has suffered a marked decline in population in recent years due to development and habitat loss. Their survival can be aided and adoption

of the site encouraged by the use of two artificial hedgehog houses within the boundaries of the site.

8 CONCLUSIONS

The proposed development has the potential to result in adverse impacts upon a number of ecological receptors; eutrophic ponds, reedbeds, eroding upland river, dry neutral grassland, dry meadow and grassy verge, treelines, bats, amphibians, otter, birds, invertebrates and fish that range from Regional to Site level of ecological value.

Avoidance measures, and mitigation measures have been proposed to ensure that these adverse impacts are reduced as far as possible.

The vast majority of semi-natural habitat within the site is to be retained which will ensure that the favourable conservation status of bats, amphibians, otter, birds, invertebrates and fish can be maintained both within the local area and on the site. It is proposed that there will be extensive planting of native trees to ensure there is a residual increase in the woodland area on site. Landscaping will also include the provision of species-rich meadow grassland on seven filtration tanks that are to be filled in with excess spoil from the site.

Assuming the successful implementation of the measures described the scheme can be considered in line with planning policies BD2 – BD9, WH1 – WH6 and WT1 – WT6 of the Wicklow County Development Plan.

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APPENDIX A: POLICY & GUIDANCE

EU Habitats Directive

The "Habitats Directive" (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) is the main legislative instrument for the protection and conservation of biodiversity within the European Union and lists certain habitats and species that must be protected within wildlife conservation areas, considered to be **important at a European as well as at a national level**. A "Special Area of Conservation" or SAC is a designation under the Habitats Directive. The Habitats Directive sets out the protocol for the protection and management of SACs.

The Directive sets out key elements of the system of protection including the requirement for **"Appropriate Assessment"** of plans and projects. The requirements for an Appropriate Assessment are set out in the EU Habitats Directive; articles 6(3) and 6(4) of the Directive.

EU Birds Directive

The "Birds Directive" (Council Directive 79/409/EEC as codified by Directive 2009/147/EC) provides for a network of sites in all member states to protect birds at their breeding, feeding, roosting and wintering areas. This Directive identifies species that are rare, in danger of extinction or vulnerable to changes in habitat and which need protection (Annex I species). Appendix I indicates Annex I bird species as listed on the Birds Directive. A **"Special Protection Area" or SPA, is a designation under The Birds Directive**.

Special Areas of Conservation and Special Protection Areas form a pan-European network of protected sites known as Natura 2000 sites and any plan or project that has the potential to impact upon a Natura 2000 site requires Appropriate Assessment.

Wildlife Acts 1976 - 2012

The primary domestic legislation providing for the protection of wildlife in general, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976. The **aims of the wildlife act according to the National Parks and Wildlife Service are "...to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims."** **All bird species are protected under the act.** The Wildlife (Amendment) Act of 2000 amended the original Act to improve the effectiveness of the Act to achieve its aims. The Wildlife (Amendment) Act of 2012 amended the 2010 Act with regard to hunting timing.

APPENDIX B: ECOLOGICAL EVALUATION CRITERIA

It is important to appreciate that the level of protection given to a particular species or habitat through national or international legislation does not necessarily relate to the evaluated level of importance of that receptor to nature conservation. Whilst species may be widespread or common nationally, but of scarce occurrence in a particular county (for example, it might be at the limit of its geographical range), a species may also be considered to be rare nationally or internationally but be abundant within particular areas.

The Ratcliffe Criteria (Ratcliffe, 1977) provide a long established and widely accepted method of determining the nature conservation value of a particular site and have been used to aid the evaluation of the habitats associated with the Scheme. The attributes of the Ratcliffe Criteria are described below.

Ratcliffe Criteria for Nature Conservation Evaluation	
Criteria	Description
Size	Large, continuous areas of habitat are considered to be of greater importance than small or fragmented areas.
Diversity	Species and habitat diversity, including variations in topography and wetness, increase the wildlife value.
Naturalness	This reflects man's intervention or management of the habitat. Most habitats of this survey are semi-natural. Naturalness indicates the amount of modification of the land by man. Generally a less modified area results in an increase in the nature conservation value.
Rarity	The scarceness of a habitat, and the presence of rare/uncommon species, relates to its importance and priority for nature conservation. Rarity is related to the frequency of occurrence at national or county level.
Fragility	Fragile habitats are those where changes due to man's intervention, environmental factors or natural succession can directly threaten it. Scrub invasion, agricultural improvement, fire and changes in hydrological regime are the most common threats.
Typicalness	This relates to the quality of the habitat in terms of how good an example it is of a recognised type.
Position in an ecological/geographical unit	The relationship of a site to adjacent areas of nature conservation value. It is important to recognise the important and characteristic formations, communities and species of a district.
Recorded history	The extent to which a site has been used for scientific study and research is a factor of some importance.
Potential wildlife value	The likely quality of the habitat for birds, mammals, reptiles, amphibians and invertebrates if it is managed for wildlife. If appropriate habitat management is undertaken, it is possible for an increase in the diversity and nature conservation value of an area.
Intrinsic appeal	The knowledge of the distribution and numbers of popular groups of species such as birds, is greater than for obscure groups. Similarly, colourful wild flowers and rare orchids arouse more enthusiasm than liverworts. It is pragmatic to give more weight to some groups than to others.
Criteria are based on Ratcliffe, D.A. (1977). A Nature Conservation Review, Cambridge University Press	

There are currently no standard guidelines for ecological evaluation within Ireland.

Nicholas O'Dwyer Ltd has therefore adapted evaluation criteria and techniques based on the CIEEM Guidelines for Ecological Impact Assessment in the UK.

The criteria described by Ratcliffe and CIEEM will then be used to ascribe a value to each receptor according to its value in a geographic context. This is described in the table overleaf.

Level of Value	Ecological Features
International	<p>A habitat or species cited as a reason for the designation or proposed designation of a Ramsar Site, Special Protection Area (SPA) or Special Area of Conservation (SAC).</p> <p>A large extent of habitat that is listed as a Priority Habitat Type in Annex 1 of the EC Habitats Directive in good condition with typical species diversity.</p> <p>A large and viable population of a regularly occurring species that is rare within an international context.</p>
National	<p>A habitat or species cited as a reason for the designation or proposed designation of a National Heritage Area (NHA).</p> <p>Any area of habitat listed as a Priority Habitat Type in Annex 1 of the EC Habitats Directive that has potential to support typical species diversity.</p> <p>A large and viable population of a regularly occurring species that is scarce within an international context.</p> <p>A large and viable population of a regularly occurring rare species (e.g. a species that is listed in Red Data Books).</p>
Regional	<p>Sites that are prime and extensive examples of the habitat (natural or seminatural) type, exhibit high biodiversity or support important communities/assemblages of species within the region.</p> <p>Sites exhibiting habitats that are scarce within the region.</p> <p>Sites that support nationally scarce plant species (recorded from less than 65 10-km² squares, unless they are locally abundant).</p> <p>Sites that support regionally scarce species.</p>
District	<p>Sites that are good examples of the habitat type (natural or seminatural), exhibit moderate - high levels of biodiversity or important communities/assemblages of species within the district.</p> <p>Sites that support species that are scarce within the District</p>
Local	<p>Sites that are typical examples of the seminatural habitat type, exhibit important communities/assemblages of species within the local context.</p> <p>Habitats of importance in a local context – e.g. semi-natural habitats within an urban setting, hedgerows and treelines that serve as important ecological corridors within an otherwise modified landscapes.</p> <p>Sites exhibiting habitats/species that are generally scarce within the local area.</p>
Site	<p>An artificial habitat or habitat that has readily established e.g. amenity grassland.</p> <p>A species which is common and widespread.</p>
Negligible	<p>A habitat or species common within the Application Site, offering little benefit to Irish wildlife and biodiversity.</p>

APPENDIX C: PHOTOGRAPHS



Photograph 1: Toilet block (Building 1)



Photograph 2: Conifer plantation woodland north of Building 1





Photograph 5: Southern section of channel with exposed siliceous rock



Photograph 6: Spillway weir north of the R764 road bridge





Photograph 9: Slow Sand Filtration Pond within existing WTP



Photograph 10: Ponds 2 and 3 within proposed new WTP area





Photograph 13: Sand storage area



Photograph 14: Derelict Building at Callowhill

APPENDIX D: WASTE ASSIMILATIVE CAPACITY CALCULATIONS

Waste Assimilative Capacity (WAC) Calculation				Calculation Sheet		
				Date	03/09/2015	
WTP Name	Vartry WTP					
Name of River	Vartry					
	m ³ /s	Data Source		m ³ /d		
Dry Weather Flow				0		
95% Flow (m ³ /s)	0.131	Hydro-tool EPA		11,318		
Mean Annual Flow				0		
Effluent Standards	mg/l					
Carbonaceous BOD	4.000	From 1994 discharge licence ammended to comply with salmonid regs				
Ammonia	0.340	ammended to comply with surface water regs				
Ortho Phosphate (OP)	0.250					
Suspended Solids	25.000	From 1994 discharge licence				
Average Background Concentration (Notional)				Average Background Concentration (Actual)		
Parameter	mg/l	Data Source		mg/l	Data Source	
Carbonaceous BOD	0.260	EPA Notionally Clean		0.6	Wicklow Council data 2012 - 2014 Ballinastoe Br	
Ammonia	0.008	EPA Notionally Clean		0.011	Wicklow Council data 2012 - 2014 Ballinastoe Br	
Ortho Phosphate (OP)	0.005	EPA Notionally Clean		0.007	Wicklow Council data 2012 - 2014 Ballinastoe Br	
Suspended Solids		No data		2	Wicklow Council data 2012 - 2014 Ballinastoe Br	
Allowable Downstream Concentration (Surface Water Regulations)						
Parameter	95%ile mg/l	Mean mg/l		Data Ref		
Carbonaceous BOD	2.60	1.30		Surface Water Regs - Good Status (for compliance with FWPM Regs)		
Ammonia	0.10	0.040		Salmonid regs		
Ortho Phosphate (OP)	0.075	0.025		Surface Water Regs - Good Status (for compliance with FWPM Regs)		
Suspended Solids	25.000			Salmonid regs		
WTP Daily Flow	Allowable effluent conc			Comments		
	BOD	NH	OP			
	m ³ /d	mg/l	mg/l	mg/l		
	4,000	9.22	0.36	0.27		
WTP Daily Flow	WAC					
	BOD					
	m ³ /d	kg/d	kg/d	kg/d		
	4,000	36.89	1.44	1.09		
WTP Daily Flow	Resultant Concentration (Average Background Concentrations)			Resultant Concentration (Actual)		
	BOD	NH	OP	SS		
	m ³ /d	mg/l	mg/l	mg/l		
	4,000	1.644	0.100	0.0723	8.528	
	Acceptable	Acceptable	Acceptable	Acceptable		
	(Notionally Clean)			Resultant Concentration (Actual)		
	1.304	0.097	0.0703	NA		
	Acceptable	Acceptable	Acceptable	NA		