

Appendix E – Ecological Report

Arklow Wastewater Treatment Works Phase 2 Site Selection Report

Ecology Assessment

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Ecology Assessment

1. Methodology

Three land parcels have been identified by Byrne Looby PH McCarthy as options for potential alternative sites for the proposed Arklow Waste Water Treatment Works (WWTW). A desk top review of existing ecological information was carried out, and included a review of areas subject to nature conservation designations. The Natura 2000 network comprises sites that are designated as Special Areas of Conservation (SACs) under the Habitats Directive, and/or Special Protection Areas (SPAs) that are designated under the Birds Directive. Existing information on Natura 2000 sites in the vicinity of Arklow was reviewed. The DoEHLG (NPWS now within DAHG) guidance on Appropriate Assessment indicates that Natura 2000 sites within 15 km of a plan area should be considered in the assessment of plans or projects. The location, type and extent of a plan or project will determine whether impacts on Natura 2000 sites may have a potential to arise; this will be decided on a case-by-case basis. In the case of water dependant habitats and species, plans or projects that may impact on water quality and quantity may need to be assessed over a greater radius, taking factors such as downstream effects, currents and plume dispersion into account. A 15km radius of the three alternative Waste Water Treatment Works sites under consideration at Arklow, was taken as a starting point in this assessment.

The occurrence of Habitats Directive Annex 2 listed species, and of Birds Directive Annex 1 listed species, in the vicinity of Arklow was reviewed, and information on other sites subject to nature conservation designations, was collected. Data sources included the original Arklow WWTW EIS, and more recent project documentation including the Natura Impact Screening Statements for the waste water discharge licence (2012), the interceptor sewers and the siphon under the Avoca River Estuary (2012), and the Alps storage tank and CSO at Arklow, Co. Wicklow (2013). EPA reports, and NPWS documentation were reviewed, and an internet search for any other relevant information. Recent documentation on the Conservation Status of Habitats Directive Annex listed habitats and species was reviewed (NPWS 2013). Fisheries information for the Avoca River previously provided by Inland Fisheries Ireland in 2012 is reproduced.

Walkover surveys of the Shelton Abbey and Kilbride sites, and of pipeline corridors, were carried out in April 2015, during which habitats, flora and fauna were noted, in order to provide an overview and summary comparison of the ecology of the sites. It was not possible to access the pipeline corridor between The Marshlands Youth and Sports Centre and the immediately adjoining lands to the east, and Dublin Road Arklow. Habitats present were classified in accordance with Fossitt (2000). The Ferrybank site and surrounding area had been reviewed in 2014, and was re-visited in April 2015 although the site itself was not accessed. Site evaluation was carried out having regard to NRA (2004) Guidelines. It should be noted that aquatic ecology baseline studies are not included in the scope of this report.

2. Potential interactions with Natura 2000 sites and protected species

All three land parcels under consideration lie on the northern side of the Avoca River. Natura 2000 sites in the general area are shown in Figure 1.

2.1. Natura 2000 sites within 15km

Ferrybank Parcel

Buckronev – Brittas Dunes and Fen SAC (Site Code 000729) lies to the north, and Kilpatrick Sandhills SAC (Site Code 001742) to the south, within 15km of the Ferrybank parcel. Part of Maharabeg Dunes SAC (Site Code 001766) lies within 15km of the Ferrybank parcel. Part of the Slaney River Valley SAC

(Site Code 000781) lies within 15km to the south west, but there is no hydrological connection between the Slaney River catchment and the Ferrybank parcel, so this SAC is not considered further.

Kilbride parcel

Natura 2000 sites within 15km of the Kilbride parcel are the same as the Ferrybank parcel: Buckrone y – Brittas Dunes and Fen SAC (Site Code 000729) to the north, and Kilpatrick Sandhills SAC (Site Code 001742) to the south, within 15km, and part of Maharabeg Dunes SAC (Site Code 001766) to the north. Part of the Slaney River Valley SAC (Site Code 000781) lies within 15km to the south west, but there is no hydrological connection between the Slaney River catchment and the Ferrybank parcel, so this SAC is not considered further.

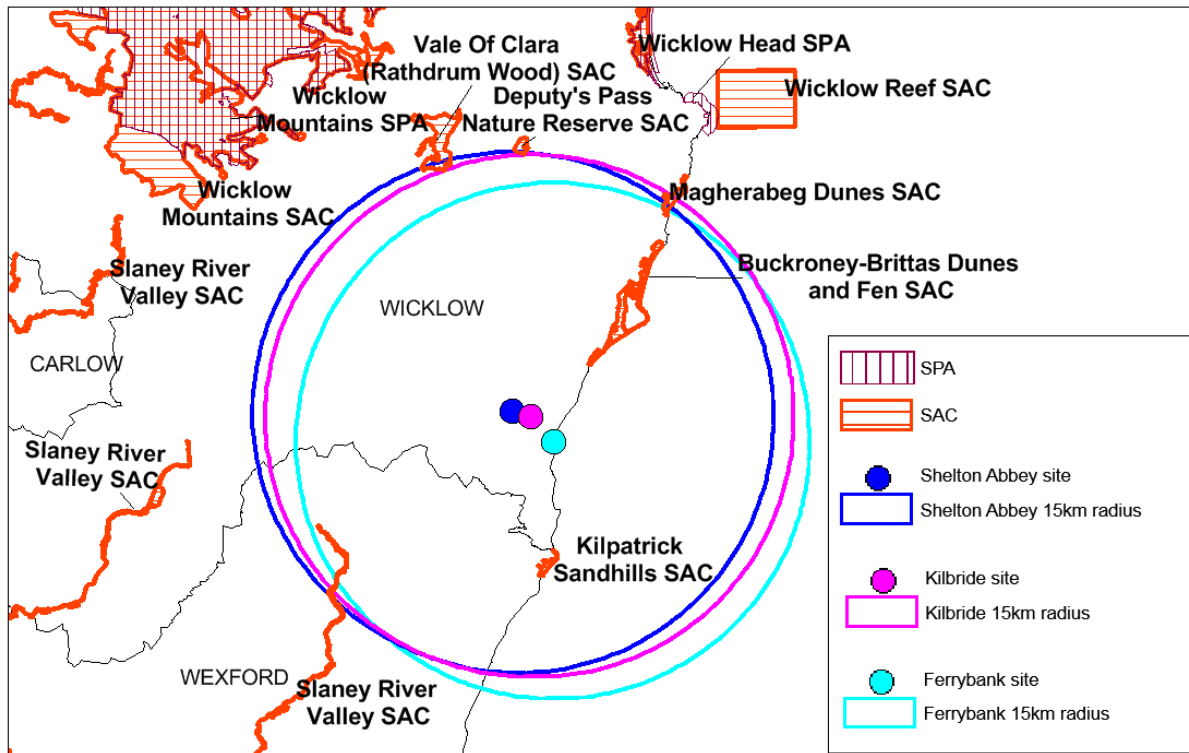


Figure 1. Natura 2000 sites in the vicinity of Arklow, and a 15km radius around each of the three sites under consideration.

Shelton Abbey parcel

Natura 2000 sites within 15km of the Shelton Abbey parcel are the same as those within 15 km of the Kilbride and Ferrybank parcels, but additionally include portions of the Vale of Clara (Rathdrum Wood) SAC (Site Code 000733), and the Deputy's Pass Nature Reserve SAC (Site Code 000717). Deputy's Pass Nature Reserve SAC lies outside the Avoca River catchment and is not hydrologically linked to the Shelton Abbey site, and is not considered further.

Other Natura 2000 sites within 15km of the Shelton Abbey, Kilbride and Ferrybank parcels are the same: Buckrone y – Brittas Dunes and Fen SAC (Site Code 000729) to the north, Kilpatrick Sandhills SAC (Site Code 001742) to the south, and part of Maharabeg Dunes SAC (Site Code 001766) to the north. Part of the Slaney River Valley SAC (Site Code 000781) lies within 15km to the south west, but there is no hydrological connection between the Slaney River catchment and the Shelton Abbey parcel, so this SAC is not considered further.

Coastal SACs

All of the Habitats Directive Annex 1 habitats that are listed as Qualifying Interests for the three SACs listed in Table 1 are considered to be water dependent (O’Riain *et al*, 2005). Drift line, stony bank, and sand dune habitats have been grouped as coastal onshore habitats in Mayes (2008). These coastal onshore habitats depend on coastal geomorphological and sediment transport processes for their formation and continued existence, and derive their ‘water dependent’ status, with regard to the Water Framework Directive, from these processes. For this reason, they are considered to be dependent on coastal and transitional water sources (Table 1). However, all of these habitats lie above high water spring tide level and are not capable of being impacted by changes in water chemistry should such changes arise.

Table 1. Qualifying Interests for the three coastal SACs located within 15km of Arklow.

Annex 1 Habitat	Magharabeg Dunes SAC	Buckrone/ Brittas Dunes and Fen SAC	Kilpatrick Sandhills SAC	Main water source
Annual vegetation of drift lines [1210]	✓	✓	✓	c, (t)
Embryonic shifting dunes [2110]	✓	✓	✓	c, (t)
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	✓	✓	✓	c, (t)
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*	✓	✓	✓	c, (t)
Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>) [2150]*	✓	✓	✓	c, (t)
Perennial vegetation of stony banks [1220]		✓		c, (t)
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]		✓		c, t, s, g
Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salix arenariae</i>) [2170]		✓		g, c, (t)
Humid dune slacks [2190]		✓		g, c, (t)
Alkaline fens [7230]		✓		g, s
Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]*	✓			g

Note: * **Priority Annex 1 habitats.** Main water source based on O’Riain *et al* (2005); c coastal; t transitional; s surface; g ground water.

The immediate hinterland of sand dune systems often includes low-lying areas of other water dependent habitats. At Buckrone – Brittas Dunes and Fen SAC, these include the fen habitat Alkaline fen located to the west of the R750, inland and above tidal influence, and a small area of the saltmarsh habitat Mediterranean salt meadow. Annex 1 listed saltmarsh habitats (1330, 1410 and 1420) develop in sheltered areas in estuaries and to the lee of islands and other coastal barriers and spits, where muddy sediments can accumulate. They occur on the upper shore, and tend to form zones or habitat mosaics

of halophytic and salt tolerant plant species in relation to the extent of tidal submergence and salinity. Mediterranean salt meadow generally occupies the upper zone of the saltmarsh, adjacent to the boundary with terrestrial habitats, with minimal inundation on spring tide high water. At Buckroney-Brittias, a small area of Mediterranean salt meadow is described, associated with the Buckroney River (McCorry and Ryle, 2009).

Sand dune systems may include the wetland habitats Humid dune slacks 2190, and Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) 2170, which occur in topographic depressions within dune systems and are mainly ground water dependent, generally with a lens of fresh water overlying more saline water. Both of these habitats occur at Buckroney-Brittias Dunes and Fen SAC.

Petrifying springs with tufa formation are listed as a Qualifying Interest at Magherabeg Dunes SAC. These are ground water dependent habitats, developed in this SAC where groundwater seeps through exposed rock above the littoral zone (NPWS Conservation Plan).

There will be no construction phase impacts on the coastal SACs Magherabeg Dunes SAC, Buckroney – Brittias Dunes and Fen SAC, and Kilpatrick Sandhills SAC, since all construction activity will occur well outside the boundaries of these sites, irrespective of which of the three WWTW land parcels under consideration is selected.

Marine water quality is not considered relevant to the following habitats occurring at the coastal SACs, since their water dependency derives from coastal geomorphological and sediment transport processes for their formation and continued existence, and they lie above tidal high water:

- Annual vegetation of drift lines [1210]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- **Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]***
- **Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]***
- Perennial vegetation of stony banks [1220]

Mediterranean salt meadows (*Juncetalia maritimi*) [1410] are regarded as being of medium sensitivity to Nitrogen enrichment of marine waters and ground waters. Dissolved Inorganic Nitrogen (DIN) levels in coastal waters adjacent to Arklow were found to be consistent with High Status; the provision of secondary treatment at any one of the three WWTW sites under consideration will not result in any adverse impact.

Marine water quality is not considered relevant to the following habitats, because their nutrient sensitivity relates to ground water, and their marine water dependency water derives from coastal geomorphological and sediment transport processes:

- Dunes with *Salix repens* ssp. *argentea* (*Salix arenariae*) [2170]
- Humid dune slacks [2190]

Marine water quality is not relevant to the following habitats, since they are not dependent on marine waters:

- Alkaline fens [7230]
- **Petrifying springs with tufa formation (*Cratoneurion*) [7220]***

2.2. Natura 2000 sites within the Avoca River catchment

The Avonmore River (a tributary of the Avoca River) flows through the Vale of Clara (Rathdrum Wood) SAC (Site Code 000733), located 15km or more upstream of all three land parcels under consideration. This SAC is designated for the Annex 1 listed woodland habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (EU Habitat Code 91AO), currently listed as the sole Qualifying interest

for this SAC. This habitat is not regarded as water dependent (O’Riain et al, 2005), and is not considered further.

Some of the headwaters of the Avonbeg and Ow Rivers (tributaries of the Avoca River) rise within the Wicklow Mountains SAC (Site Code 002122), located some 25 to 30km upstream of all three land parcels under consideration. The Qualifying Interests for this SAC, are shown in Table 2.

Table 2. Qualifying Interests for Wicklow Mountains SAC

Annex listed habitat or species	Main water source
Otter (<i>Lutra lutra</i>) [1355]	
Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea [3130]	s, g
Natural dystrophic lakes and ponds [3160]	s, (g)
Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]	s, p, (g)
European dry heaths [4030]	-
Alpine and Boreal heaths [4060]	-
Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]	-
Blanket bog (*active only) [7130]	p, s, (g)
Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110]	-
Calcareous rocky slopes with chasmophytic vegetation [8210]	-
Siliceous rocky slopes with chasmophytic vegetation [8220]	-
Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0]	-

Note: * **Priority Annex 1 habitats.**

The main water source is indicated for water dependent habitats, based on O’Riain et al (2005): s surface; g ground water; p precipitation.

Four of the eleven habitats that are listed as Qualifying Interests for Wicklow Mountains SAC are considered to be water dependent (O’Riain et al, 2005). The water dependent habitats include two Annex 1 listed lake habitats, Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea [3130], and Natural dystrophic lakes and ponds [3160]. This SAC is located far upstream, and its qualifying interests do not have a potential to be impacted by the development of a waste water treatment works at any of the land parcels under consideration at Arklow.

2.3. The Avoca River and Habitats Directive Annex 2 listed fish species.

The Avoca River Catchment covers an area of 650 km² and the river itself is formed by the joining of the Avonbeg and Avonmore rivers and further south, by the Aughrim River as well as a few minor tributaries. The water quality of the Avoca River Catchment is generally good to high, however the lower 11.5 km of the Avoca River itself is badly polluted (McGarrigle *et al.*, 2010). This is mainly due to the input of mining leachate from the abandoned copper mines along the river (acid mine drainage), which has resulted in elevated levels of heavy metals including copper, cadmium and zinc (McGarrigle *et al.*, 2010).

Inland Fisheries Ireland provided the following information on the Avoca River in 2012:

“The Avoca is an important salmonid water with excellent populations of salmon, sea trout and brown trout throughout. It is a large mainly upland catchment, with many varying habitats for fish, excellent species diversity and a good fishery potential. According to the Central Fisheries Boards report “The Quantification of the Freshwater Salmon Habitat Asset in Ireland” (2003) a total of 261 discrete migratory salmonid “fishery systems” were identified nationally, of which 173 are recorded as “salmon

& sea trout” and 88 as sea trout only. Of these Rivers the Avoca system ranked 17th overall with regard to the fluvial habitat accessible to salmon.

Dr. Willie Roche in the “Preliminary Assessment of the Avoca River Electrofishing Survey 2002” states that salmon & sea trout continue to ascend into the Avoca despite the ongoing pollution of the lower reaches which has continued unabated for over 200 years. Trout dominate the catchment, good densities of 1 year plus, and older trout were a feature of the results at the majority of sites. Physically the catchment has excellent production potential, the presence of good trout stocks shows that the system can support salmonids. The presence of salmon fry indicated that adult salmon penetrated up into the upper reaches of the Avonmore, the middle reaches of the Avonbeg and the upper reaches of the Aughrim complex in Winter 2001. The wider distribution of salmon parr compared to fry indicates that there are no barriers to migration and salmon could ascend further into the headwaters than is the case at present. There is an abundance of clean well oxygenated gravels ideal for spawning in many parts of the catchment allied to the availability of good quality nursery water. In addition to a Summer run of salmon, grilse & sea trout the Avoca system is known for a spring salmon run. Subsequent surveys undertaken by the ERFB/IFI have highlighted excellent salmon/sea trout spawning and recruitment throughout the Avoca catchment upstream.

Inland Fisheries Ireland acknowledges that the Avoca River has been persistently polluted by Acid Mine Drainage discharges from the abandoned Avoca Mine site upstream of Avoca village for approximately 200 years. A biological survey carried out by the EPA as part of the EPA’s Interim Report on the Biological Survey of River Quality 2006 indicated a significant improvement in the biological quality of the Avoca River at Avoca village since 2003. This improvement which was noted by the EPA corresponds with the presence of significant populations of juvenile salmon in the lower freshwater reaches of the Avoca in 2006, indicating that salmon spawning has occurred in this area in recent years.

The Avoca is also known to contain populations of all three species of lamprey found in Ireland. All three Irish Lamprey species are Annex II species under the EU Habitats Directive. Fisheries staff have encountered large seaward runs of juvenile lamprey and large runs of adult River lamprey returning from the sea to spawn in the Avoca system. Dr. Roche’s electro-fishing survey recorded juvenile lamprey and adult River lamprey in the Avonmore, Aughrim and most notably in both the polluted and unpolluted sections of the Avoca. Otters (Habitats Directive Annex II listed species) and Kingfishers (Birds Directive Annex 1 listed species) are widely distributed throughout the entire catchment also.

Migratory salmon, sea trout, and lamprey (juvenile fish on their seaward run and adult fish returning from the sea to spawn) will have to pass through Avoca estuary / Arklow harbour to reach the sea or return to their spawning grounds. Large numbers of eels also migrate through this stretch. Estuaries / transitional waters include a variety of different habitats. Their importance to fisheries relate to the fact that migratory fish must pass through these zones on their passage to / from the sea, while such transitional waters also act as important spawning / nursery areas for a wide variety of different marine fish species.”

2.4. Coastal and marine Annex listed species

Habitats Directive Annex II listed marine mammals occur in coastal and marine waters off Arklow. The Harbour Porpoise (*Phocoena phocoena*) is the most commonly occurring Annex II listed cetacean in the waters off Arklow (Appendix 3). The only other cetacean listed in Annex II of the Habitats Directive that was recorded in the Arklow area is the Common Bottlenose Dolphin (*Tursiops truncatus*). Grey Seals (*Halichoerus grypus*) (Appendix 3) and Harbour Seals (*Phoca vitulina*) are likely to occur in the area occasionally, though there are no breeding colonies in the Arklow area due to the lack of any suitable, sheltered, undisturbed breeding habitat.

The Birds Directive Annex 1 listed bird species, Red-throated Diver *Gavia stellata* has been recorded in nationally important numbers in coastal waters between Brittas Bay and Mizen Head. A peak count of 49 Red-throated Divers was recorded in 1996, with a single Black-throated Diver *Gavia arctica* and two Great Northern Divers *Gavia immer* (Crowe, 2005). Boland and Crowe (2012) do not note Red-throated Diver numbers in coastal waters between Brittas Bay and Mizen Head more recently, though the species is likely to continue to occur. Divers are primarily wintering migrants to Irish waters. Red-

throated Divers are recorded mainly in shallow sandy inshore waters along the south and east coasts of Ireland (Pollock *et al*, 1997).

3. Arklow Town and Environs Development Plan 2011-2017

There are a good variety of natural habitats present in the Arklow Town and environs area, including three proposed Natural Heritage Areas (pNHA); Arklow Town Marsh, Arklow Sand Dunes and Arklow Rock. The marsh is the principal wetland habitat in the area, providing an important flood control role and supporting a variety of plant and animal life, in particular reed species and bird life.

The Natural Heritage and Biodiversity Objectives, and the Water Systems Objectives of the Arklow Town and Environs Development Plan 2011-2017, are reproduced below. The pNHAs are shown in Figure 2. Arklow Town Marsh is listed as nationally important in the Arklow Urban Habitat Mapping, reproduced in Figure 3.

“7.4.1. Natural Heritage and Biodiversity Objectives

BD1 To ensure that consideration is given to the impact of proposals for new developments on biodiversity, and that appropriate mitigation schemes are proposed as relevant.

BD2 To maintain the favourable conservation status of all proposed and future Natural Heritage Areas (NHAs) in the plan area in particular the Arklow Marsh which has been designated a ‘Conservation Zone’.

BD3 To protect features such as native hedgerows, trees and watercourses, and the locally important biodiversity areas from inappropriate development, and to strengthen through development management the role of these sites as “green corridors” to enhance overall biodiversity.

BD4 To ensure that appropriate consideration is given to the protection of trees of amenity and environmental value in the design of new developments, and discourage the felling of mature trees to facilitate development.

BD5 To require the planting of native and locally characteristic species of trees and shrubs in all new developments.

BD6 To encourage the retention and enhancement of hedgerows and traditional stone walls in the plan area.

BD7 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 Appropriate Assessment in accordance with Article 6 (3) and (4) of the EU Habitats Directive 1992 and ‘Appropriate Assessment of plans and projects in Ireland – Guidance for Planning Authorities’ DoEHLG 2009.

7.4.1 Water Systems Objectives:

WS1 To co-operate with statutory bodies and all stakeholders to reduce the pollution of the Avoca River and facilitate the Eastern Regional Fisheries Board in implementing the recommendations of the “Restoring the Avoca River” Report.

WS2 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 plan area, including rivers, lakes, ground water coastal and estuarine waters, and to restrict development likely to lead to deterioration in water quality.

WS3 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.

WS4 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.

WS5 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 10m along watercourses shall be provided free of built development with riparian vegetation generally 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."

WS6 To promote the development of riparian walks and parks, subject to the sensitivity and /or designation of the riverside habitat, particularly within 10m of the watercourse."

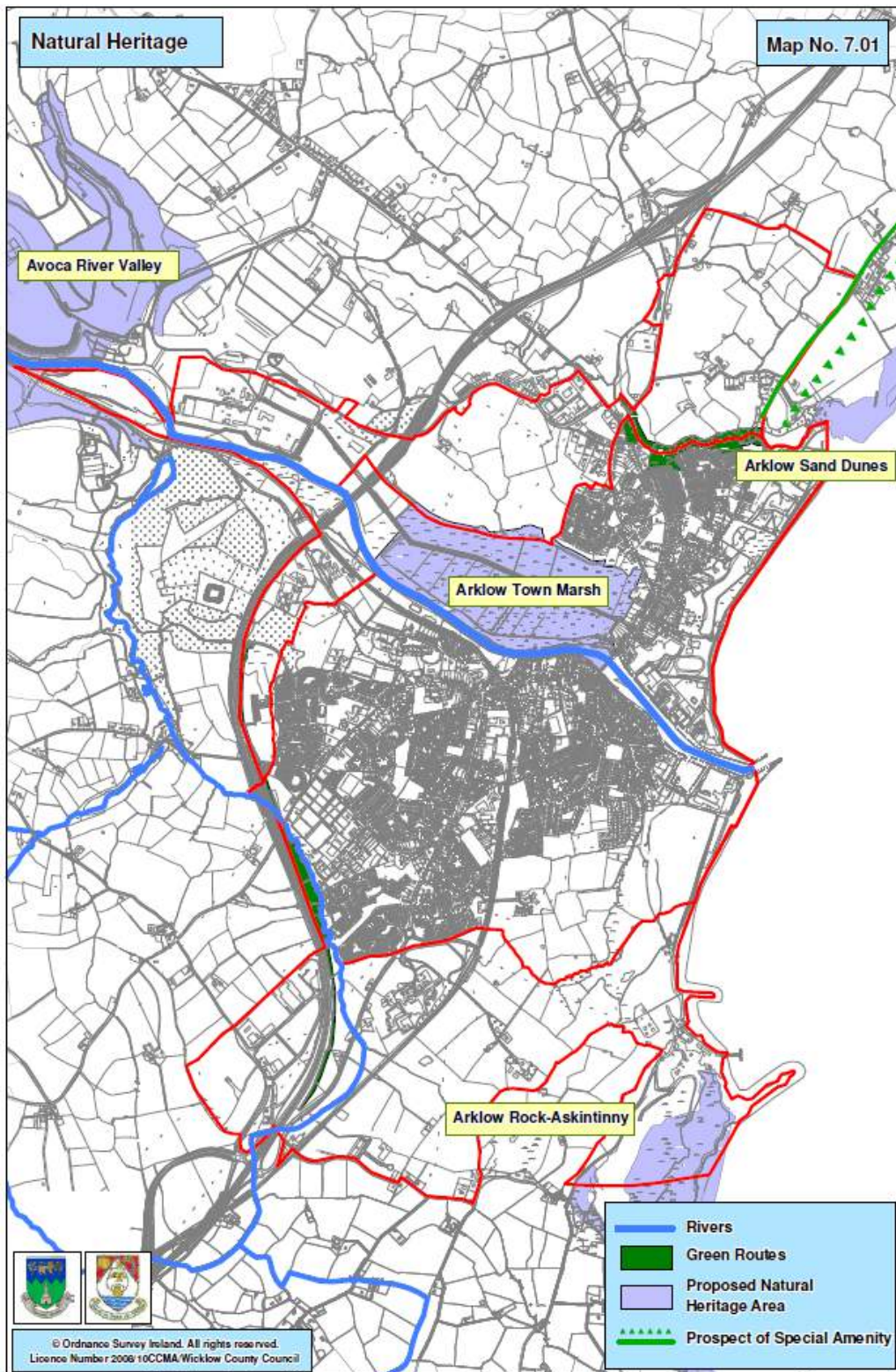


Figure 2. Natural Heritage Map. Reproduced from Arklow Town and Environs Development Plan 2011-2017

Figure 3.5 Urban Habitat Mapping (MERC: 2008)

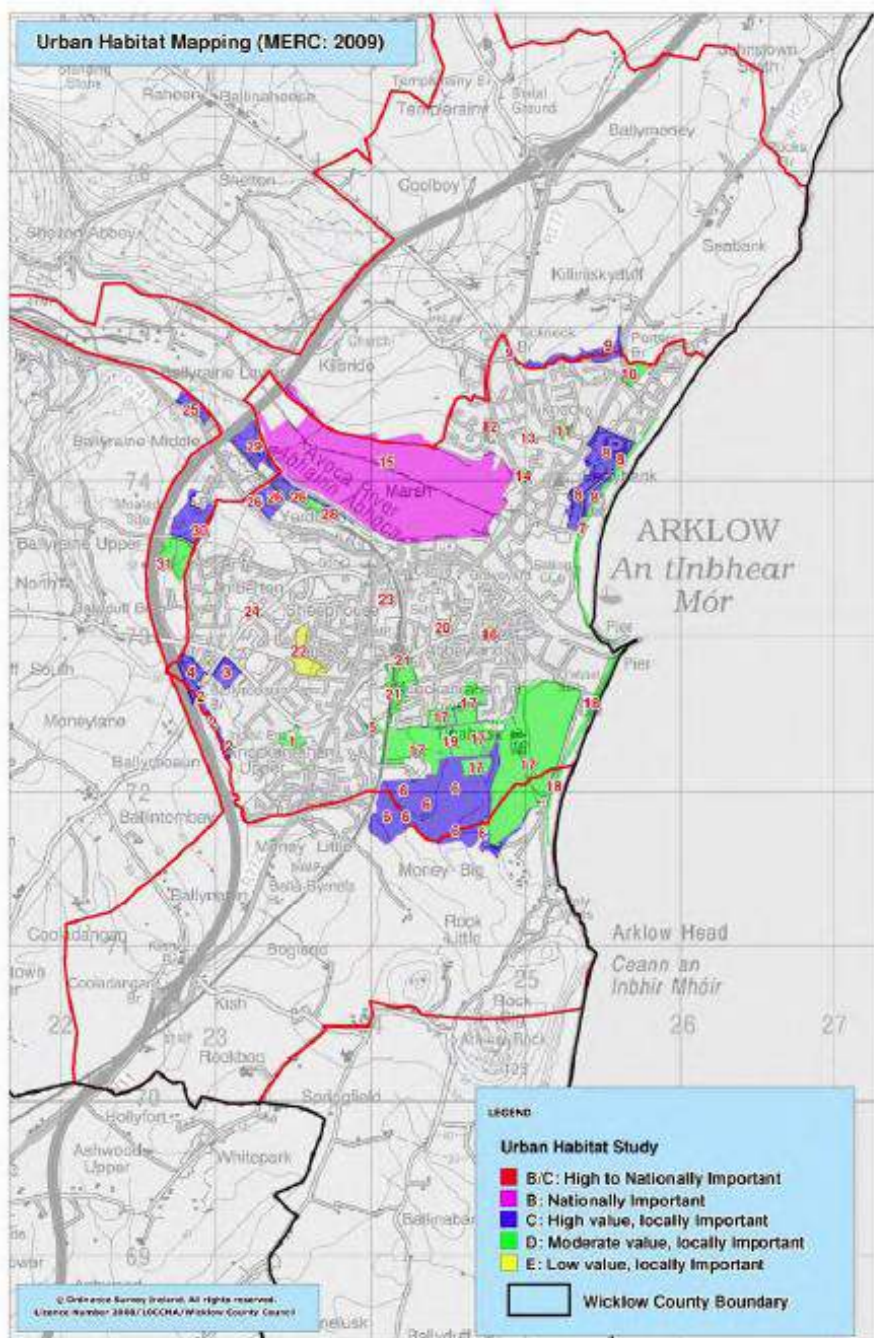


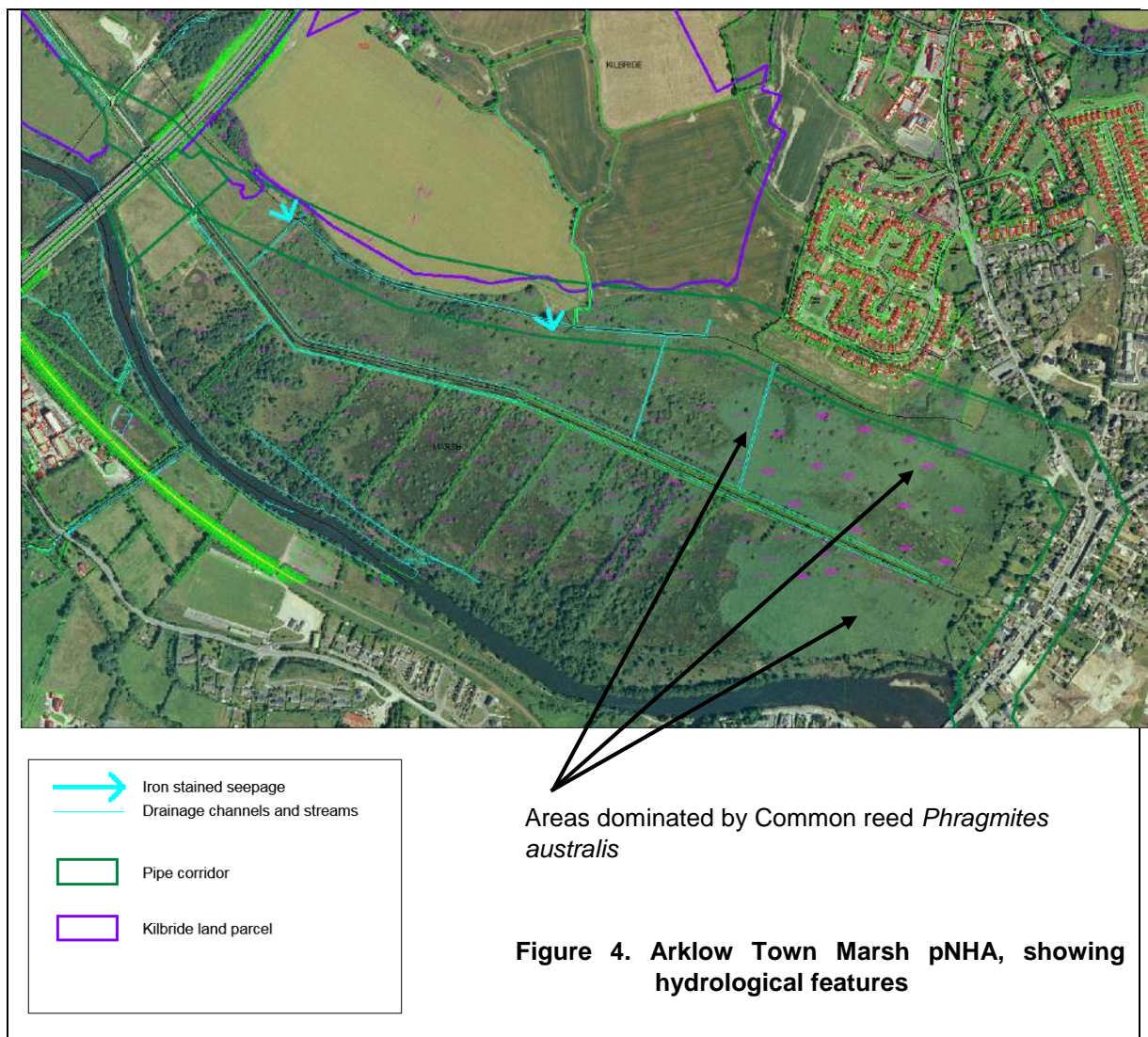
Figure 3. Arklow Urban Habitat Mapping.

Reproduced from Environmental Report of the Arklow Town and Environs Development Plan 2011-2017 Strategic Environmental Assessment (SEA)

4. Arklow Town Marsh

Arklow Town Marsh pNHA (Site Code 001931) is located on the northern side of the Avoca River in Arklow, and covers an area of approximately 0.84 km², including the adjoining river channel (Figure 2 and 3). The NPWS site synopsis is reproduced in Appendix 1. Arklow Town Marsh was included in the Wicklow Wetlands Survey in 2012 (Wilson *et al*, 2012), the report is reproduced in Appendix 2. Habitats recorded within the site by Wilson *et al* are as follows:

- FS1 Reed and large sedge swamps
- FW2 Depositing/lowland rivers
- FW4 Drainage Ditches
- GM1 Marsh
- WN6 Wet willow-alder-ash woodland
- WS1 Scrub.



The hydrology of Arklow Town Marsh does not appear to have been studied in detail. Water sources supporting the wetland habitats of the marsh are likely to include hydrological inputs from the canal and Sheepwalk stream flowing eastwards from the Shelton Abbey lands, water inputs from higher ground to the north of the marsh including a small stream at Kilbride together with overland and groundwater

flow, tidal flooding from the east immediately upstream of Arklow bridge, and riverine flooding. Two iron stained seepages into the marsh were identified during field survey in April 2015, and are shown in Figure 4 and Plate 1. Common reed *Phragmites australis* dominated swamp occurs mainly in the eastern part of Arklow Town Marsh (Figure 4), and may reflect a brackish water influence in this area in addition to hydrological factors. Water level was at or above ground level within the marsh in April 2015. In general, the western end of the marsh is more grassy in character, particularly under wet willow dominated woodland.



Plate 1. Top left, iron stained seepage with Bulrush *Typha latifolium* flowing into western end of marsh; Top right, drainage channel within pNHA at western end with Branched bur-reed *Sparganium erectum* and Sweet-grass *Glyceria* spp.; Centre left, arable land sloping down to northern marsh edge at Kilbride; Centre right, tall sedge swamp dominated by Greater pond sedge *Carex riparia* at northern marsh edge in Kilbride; Bottom left, standing water with Yellow iris *Iris pseudacorus* at northern marsh edge; Bottom right, tall sedge swamp with Common reed *Phragmites australis* swamp and Wet willow woodland in the background.

Existing hydrological impacts on the marsh include infilling at the western end, and past drainage. The effects of aerial pollution noted in the Site Synopsis (Appendix 1) are no longer apparent, with recovery and re-growth of willow within the marsh area and of trees on adjoining lands. It is likely that the marsh receives nutrient inputs from adjoining arable land to the north.

5. Shelton Abbey land parcel.

The Shelton Abbey land parcel is shown in Figure 5. This land parcel includes two areas of made ground with paved or stone chip surfaces (Figure 5, plot A and lands to the south), which are separated by an access track and drainage ditches including a wider feature to the south of the access track which is better described as a canal, although its original function is unclear (Byrne Looby PH McCarthy, 2015). A third area, Plot C, is a former land filled area that has been capped with soil and supports grassland currently in use for horse grazing.

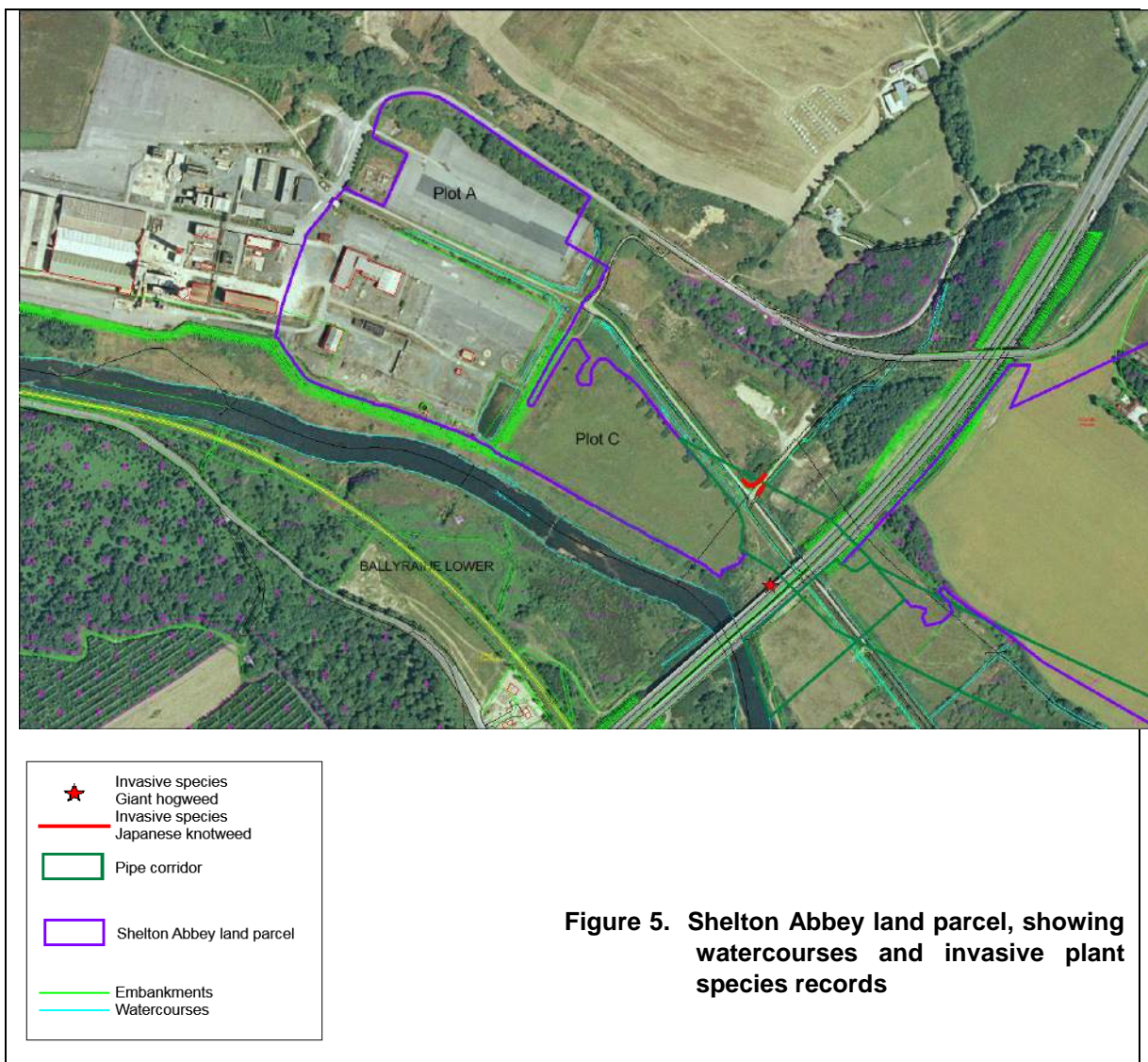


Figure 5. Shelton Abbey land parcel, showing watercourses and invasive plant species records

Plot A

Plot A is almost entirely un-vegetated Fossitt habitat **BL3 Buildings and paved surfaces**. Small areas of stone chip surface within the plot are sparsely vegetated with colonising mosses, Annual meadow grass *Poa annua*, Willowherb *Epilobium* spp., and Common ragwort *Senecio jacobaea*, classified as **ED2 Spoil and bare ground**. A **Drainage ditch FW4** outside the palisade fence at the western end of the plot supports wetland vegetation of Sweet-grass *Glyceria* spp. with Bulrush *Typha latifolia* and Soft rush *Juncus effusus*, with Reed canary grass *Phalaris arundinacea*, False oat grass *Arrhenatherum elatius* and Cock's-foot grass *Dactylis glomerata* growing along the banks, with occasional Grey willow *Salix cinerea* and Bramble *Rubus fruticosus* agg. A narrow strip of **Mixed broadleaved woodland WD1** of planted origin is included in Plot A (Figure 5, Plate 2); this includes Grey willow and Silver Birch *Betula pendula*, with a shrub layer of Elder *Sambucus nigra* and Bramble and with little ground flora. A narrow strip of mown **Amenity grassland GA2** lies between this woodland strip and the access road to the overall former IFI site.

Fauna

Habitat for fauna on Plot A is limited to the woodland and drainage ditches at the site margins. Blackbird, Robin, Chaffinch and Wren were recorded in the woodland.

Summary: Plot A is largely un-vegetated and of low value for flora and fauna. It is assumed that there is some connectivity between the drainage ditches at the plot margins and those present elsewhere in the Shelton Abbey land parcel. The woodland strip along the northern margin of the site has moderate local value as a wildlife corridor.



Plate 2. Plot A at Shelton Abbey, viewed from the access track adjoining the south eastern corner of the site

Lands south of Plot A

Lands south of Plot A, on the southern side of the access track, are almost entirely un-vegetated Fossitt habitat **BL3 Buildings and paved surfaces** (Figure 5). Small areas of stone chip surface within the plot are sparsely vegetated with colonising mosses, Annual meadow grass *Poa annua*, Willowherb *Epilobium* spp., and Common ragwort *Senecio jacobaea*, classified as **ED2 Spoil and bare ground**.

A wide drainage channel classified as a **Canal FW3** adjoins the track and supports a vegetation of Sweet-grass and Duckweed *Lemna minor*, with a line of Grey willow along its southern side. False oat grass and Cock's-foot grass grow on the banks, with occasional Soft rush and Common reed; Reed canary grass *Phalaris arundinacea* is occasional on the higher banks together with bramble. Sluices are in place that control water flow southwards into a series of two constructed **Reservoirs FL7 (Plate**

3). The smaller reservoir is vegetated with Common reed with shrubs of grey willow on the banks, while the larger reservoir is fringed with Common reed along part of the margins.

Fauna.

This plot provides limited habitat for fauna at the canal and reservoir and associated vegetation.

Summary: Lands south of Plot A are largely un-vegetated and of low value for flora and fauna. It is assumed that there is some connectivity between the canal and reservoirs at the plot margins and those present elsewhere in the Shelton Abbey land parcel; these water bodies and the adjoining Willow scrub have moderate local value as a wildlife corridor.



Plate 3. Shelton Abbey, lands south of Plot A. Top left, Canal at north east corner of site showing sluices and aquatic vegetation; Top right, embankment at south east corner of site showing Avoca River and floodplain to left; Bottom left, Reservoir with fringing reedbed; Bottom right, smaller reservoir with reedbed; un-vegetated areas of site can be seen in the background.

Plot C

Plot C is a former land filled area that has been capped with soil and supports grassland currently in use for horse grazing. Colonising mosses of bare ground are frequent in a closely grazed grassy sward of **Improved agricultural grassland GA1**. Creeping bent grass *Agrostis stolonifera* and Yorkshire fog *Holcus lanatus* are the dominant grasses, with Ryegrass *Lolium perenne*, False oat grass and Cock's-foot grass also occurring occasionally. Broad-leaved herbs present include White clover *Trifolium repens*, Red clover *T. pratense*, Ribwort *Plantago lanceolata*, Creeping buttercup *Ranunculus repens*, Creeping thistle *Cirsium arvense*, Common mouse-ear *Cerastium fontanum*, Common ragwort *Senecio jacobaea*, Dandelion *Taraxacum* agg., Daisy *Bellis perennis*, and occasional Soft rush. Occasional

small shrubs of Laurel *Prunus laurocerasus* occur in a broken line close to the western boundary of Plot C, while closely planted groups of Lodgepole pine *Pinus contorta* occur with Gorse *Ulex europaeus*, Birch and Grey willow along the northern boundary of Plot C. Bramble dominated **Scrub WS1** with occasional willow forms the northern boundary of Plot C, and adjoins the Canal.

The southern boundary of Plot C coincides with the edge of the land filled area; ground slopes steeply down from the boundary to the Avoca River floodplain (Figure 5, Plates 3 and 4). Floodplain Wet grassland GS4 on sandy alluvial soil is dominated by Creeping bent with Yorkshire fog and Sweet-grass, with Marsh ragwort *Senecio aquaticus*, Common sorrel *Rumex acetosa*, *Celandine Ranunculus ficaria*, and occasional soft rush. An area of standing water is dominated by Sweet-grass with Soft rush (Plate 4). There is some slumping along the Avoca river bank. Scattered willow and birch, tussocks of Tufted hair-grass *Deschampsia cespitosa*, Common reed and Yellow iris growing along the bank. Flood debris caught in bramble scrub towards the eastern end indicates that flooding can extend across the floodplain to the sloped edge of the land-filled area.

Bramble scrub with gorse, birch, ash and oak occurs on sloping ground near the M11. Higher mounded ground adjoining the eastern end of Plot C has been planted with Ash *Fraxinus excelsior*, Pine and Larch *Larix decidua*, Gorse and willow have colonised the area.



Plate 4. Shelton Abbey, Plot C. Top left, standing water within Wet grassland GS4 on the Avoca river floodplain adjoining Plot C; Top right, river floodplain looking east towards M11 bridge, with bramble and gorse scrub near the bridge; Bottom left and right, Plot C viewed from higher ground to the east.

Fauna

Rabbits, Wood pigeon and Pheasant occur in this plot, fox and badger signs were also recorded. Birds were associated principally with the immediately adjoining scrub where Blackbird, Song thrush, Robin,

Wren, Chiffchaff, Willow warbler, Coat tit and Chaffinch were recorded. Mallard were recorded on the Avoca river and on the canal; a Grey heron was recorded feeding at the canal. Buzzards were recorded soaring over the general area.

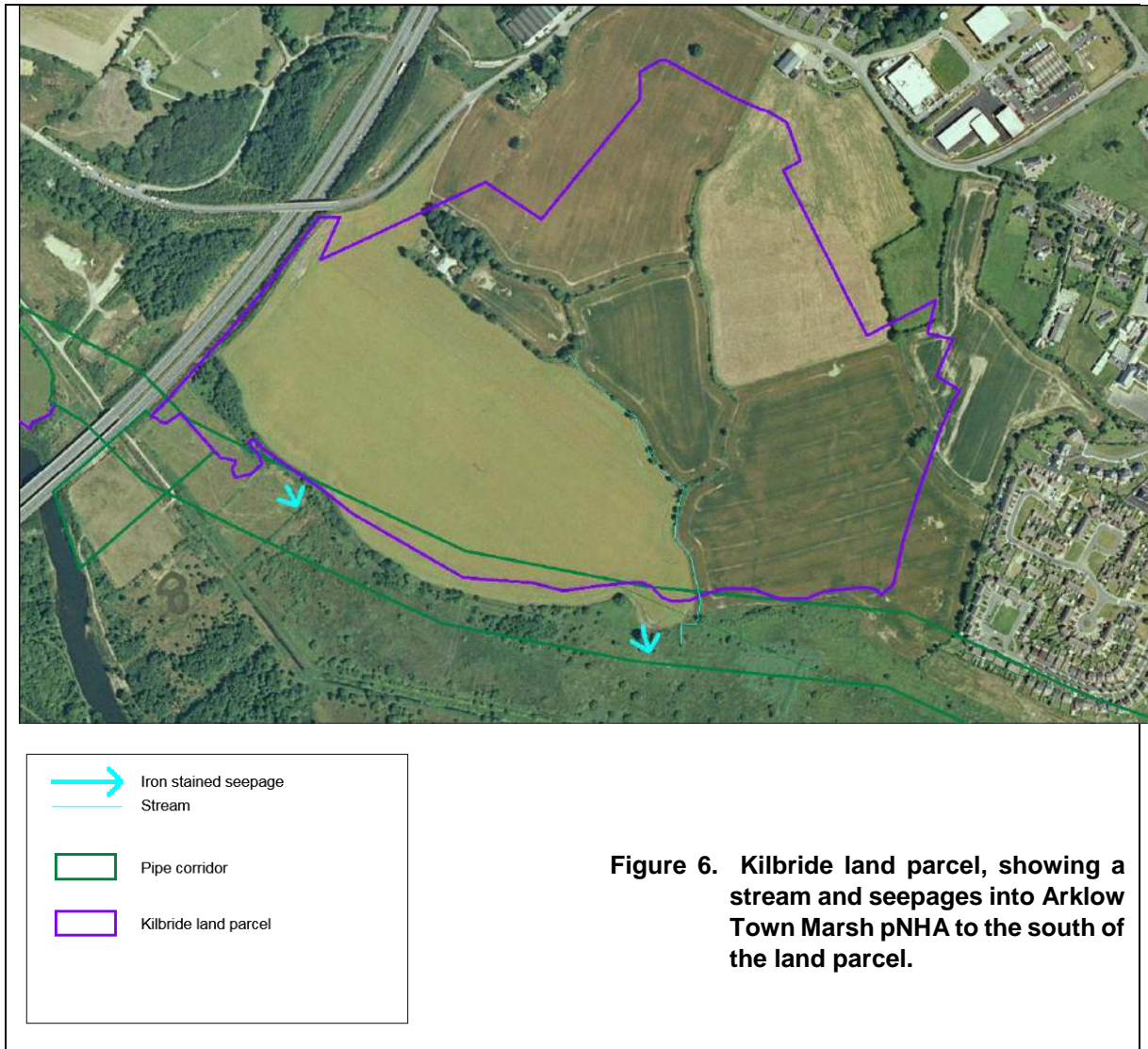
Summary: Plot C at Shelton Abbey supports common plant species; biodiversity is higher in the adjoining scrub and aquatic habitats of the Avoca river and of the canal which is hydrologically linked to Arklow Town Marsh pNHA.

Relevant considerations:

1. Disturbance of previously land-filled areas may have a potential to mobilise contaminants that could enter watercourses connected to Arklow Town Marsh and the Avoca river and may require additional geotechnical site investigation
2. The distribution of invasive plant species Giant hogweed *Heracleum mantegazzanum* and Japanese Knotweed *Fallopia japonica* recorded in April 2015 is shown in Figure 5. It is recommended that the Giant hogweed is treated with appropriate herbicide as a matter of priority by the relevant agency. Any works in the vicinity of the Japanese knotweed should be subject to a management plan.

6. Kilbride land parcel

Kilbride land parcel covers an area of 0.45km², the principal land cover is **Arable crops BC1**. Field boundaries in the immediate area range from fences to treelines. Within the land parcel most field boundaries are earth banks with associated drainage ditches; these were generally overgrown with Bramble scrub, with occasional Gorse and Elder.



There are two small woodland areas within the Kilbride land parcel. To the south west of the site adjoining the M11, a **Mixed broadleaved /conifer woodland WD2** includes Cypress, Birch, Ash, Holly and Grey willow, with Bramble and Bracken *Pteridium aquilinum* extending southwards into a previously land-filled and capped area with flora as described for Plot C at Shelton Abbey. A small area of **Mixed broadleaved woodland WD1** adjoins a partially derelict group of farm buildings in the central western part of the lands (Figure 6); this includes Sycamore, Ash, Holly and Elder, with a shrub layer of Elder and Bramble and some Laurel. Treelines WL2 dominated by Sycamore and Ash with Holly, Elder, Bramble and occasional Gorse extend westwards from the Mixed broadleaved woodland. A small stream arises from drainage ditches adjoining these treelines, and flows south eastwards to Arklow Town Marsh in a channel that is largely overgrown with bramble. The stream substrate is initially silty but cobble and gravel further along the channel bed suggest permanent water flow. Great willowherb *Epilobium hirsutum* and Fool's watercress *Apium nodiflorum* grow in unshaded sections of the stream, with Celandine, Bracken, Nettle, Hogweed and Alexanders *Smyrniolum olusatrum* on the banks among grasses and occasional trees of Oak, Ash and Sycamore. Treelines of Oak, Ash and Holly with

Hawthorn, Blackthorn, Gorse and Bramble occur in the eastern part of the land parcel and extend northwards outside the site boundary; these are the most diverse treelines in the immediate area (Plate 5).



Plate 5. Kilbride land parcel. Top left, Mixed broadleaved /conifer woodland WD2 in the south west of the site; Top right, Treeline and Mixed broadleaved woodland in the centre west; Bottom left, treeline near the eastern site boundary; Bottom right, treeline extending from the north eastern site boundary.

Fauna.

Rabbit burrows were found in all field boundary earth banks. Badger feeding signs and tracks were recorded frequently within the site, with one latrine; active setts were not found but could not be ruled out because of extensive bramble scrub that could not be thoroughly searched. Fox scats were found. A bat survey was not carried out. Treelines were identified as including trees with bat roost potential, and the stone built farm buildings within the site may also have bat roost potential. Treelines and scrubby field boundaries have potential as feeding and commuting corridors for bats. A Buzzard pair and a Red Kite pair were recorded hunting and soaring over the general area. Bird species recorded as probable breeders within the site hedgerows and treelines were Robin, Blackbird, Chaffinch, Wren, Wood pigeon, Pheasant, Magpie, and Great tit.

Summary: in the Kilbride land parcel, the arable crops are low diversity with regard to plant species but provide feeding habitat for birds and mammals. Treelines, woodland and scrub, and the small stream channel, within and adjoining the Kilbride land parcel are of high local importance for biodiversity and as ecological corridors between features of higher ecological value.

Relevant considerations: Arklow Town and Environs Development Plan 2011-2017 Objectives: BD1, BD2, BD3, BD4, BD5, BD6 are considered to be capable of being implemented given the size of individual field areas within the land parcel.

7. Ferrybank land parcel

Vegetation and habitats

The Ferrybank parcel is located on the northern side of Avoca River estuary, which is retained by the quay walls of Arklow Harbour in this area. The parcel includes a derelict gypsum factory and the following habitats are present:

Buildings and artificial surfaces BL3
Spoil and bare ground ED2
Recolonising bare ground ED3
Amenity grassland (improved) GA2
Scrub WS1

Derelict buildings and tanks occupy c. 60% of the parcel area. Ivy *Hedera helix* is present on some walls, and gutters are overgrown with grasses. The derelict buildings are otherwise unvegetated.

Spoil and bare ground, comprising paved and gravel surfaces, is vegetated with common colonising plant species. At the eastern end of the parcel adjoining the quay wall of Arklow Harbour, a marine influence is evident and a sparse flora includes Buck's-horn plantain *Plantago coronopus*, stonecrop *Sedum* and Sea Mayweed *Tripleurospermum maritimum*.

Elsewhere within the parcel colonising plant species include mosses, Creeping bent-grass *Agrostis stolonifera*, Annual meadow-grass *Poa annua*, Willowherb *Epilobium* species, Ribwort *Plantago lanceolata*, Common Ragwort *Senecio jacobaea*, White clover *Trifolium repens*, yellow clover *T. dubium*, Hairy bittercress *Cardamine hirsuta*, and Dandelion *Taraxacum officinale* agg.

Recolonising bare ground is more densely vegetated with more than 50% plant cover, and includes the species listed above with additional grass species Red fescue *Festuca rubra*, Cock's-foot grass *Dactylis glomerata*, and Yorkshire fog *Holcus lanatus*.

A narrow strip of abandoned amenity grassland lies to the east between the main building and the rock armour along the shore at Ferrybank. This vegetation is dominated by Red fescue grass, with occasional Creeping thistle *Cirsium arvense*, Dock *Rumex* species, and Bush vetch *Vicia cracca*.

Scrub is developing in parts of the parcel, and is dominated by bramble *Rubus fruticosus* agg., Gorse *Ulex europaeus*, with occasional Alder *Alnus glutinosa*, Grey willow *Salix cinerea* and Elder *Sambucus nigra*.

Fauna

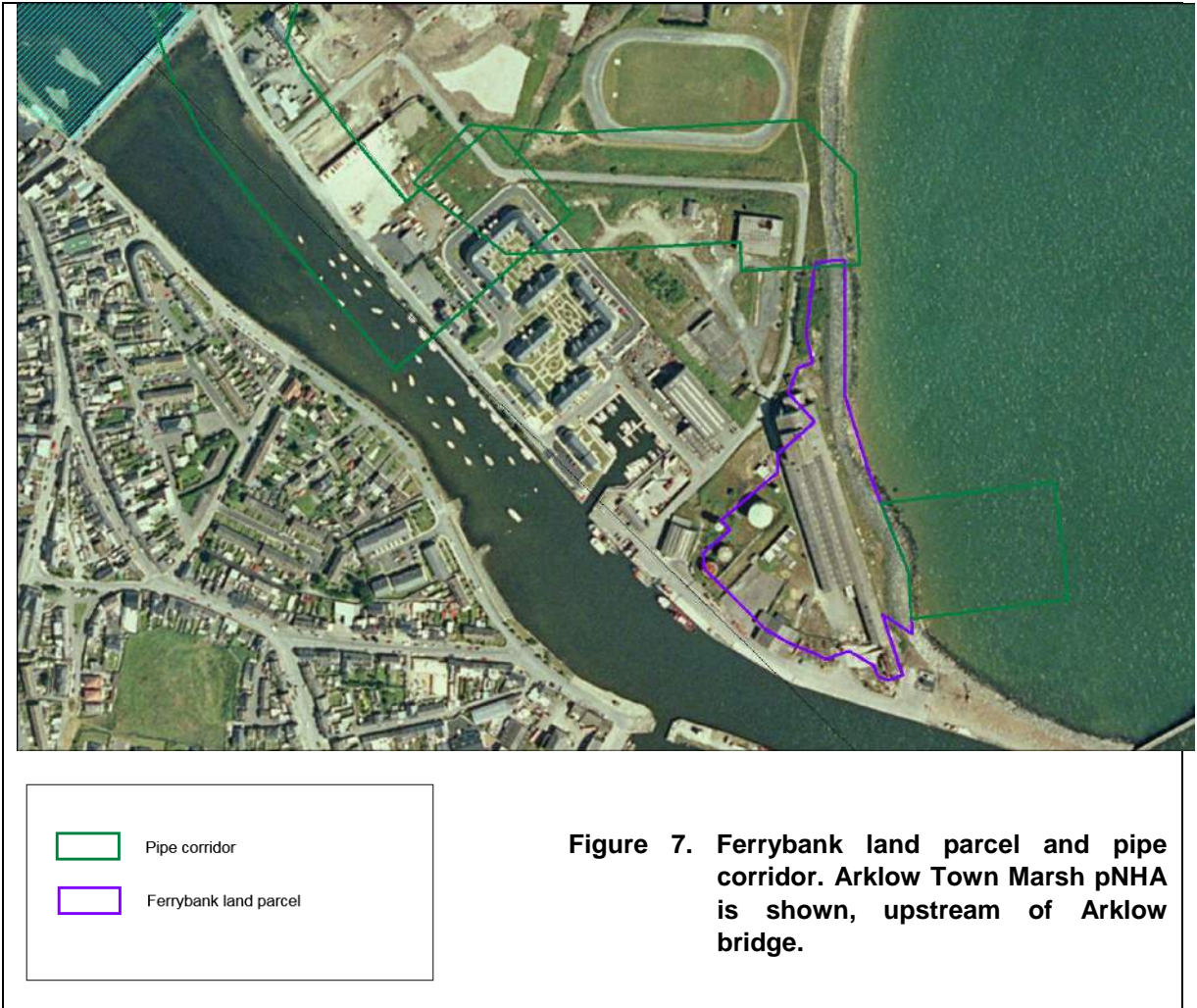
There is evidence that feral pigeons breed in the main building, 12 birds were present during the site visit in 2014. Birds recorded in scrub habitat and as probable breeding species within the parcel were Great tit, Blue tit, Chaffinch, Goldfinch, House sparrow, Wren, and Blackbird. A Hooded crow carrying nest materials was also recorded. A Mallard pair was recorded landing briefly on the roof of a building and in flight over the parcel.

A bat survey has not been completed at the parcel; there may be limited potential for buildings and tanks to be used as bat roosts. Fox signs were recorded, and rodents are likely to occur.

Summary

The habitats, flora, and fauna present at the Ferrybank parcel are typical of derelict urban sites.

Relevant considerations: none



8. Pipe corridors

8.1. Potential river outfall

The pipe corridor is indicated as a 100m wide strip in Figure 8, within which a construction corridor in the order of 6 to 8m wide will be required. The Shelton Abbey and Kilbride options both involve a proposal to discharge treated waste water to the Avoca river at a point to the east of the M11 bridge, subject to appropriate treatment level and licencing requirements. This route crosses into a previously land-filled and capped area with flora as described for Plot C at Shelton Abbey, and traverses a narrow strip of Scrub WS1 on the Avoca river bank.

Relevant considerations:

1. Disturbance of previously land-filled areas may have a potential to mobilise contaminants that could enter watercourses connected to Arklow Town Marsh and the Avoca river and may require additional geotechnical site investigation
2. Arklow Town and Environs Development Plan 2011-2017 Objectives: WS1, WS2

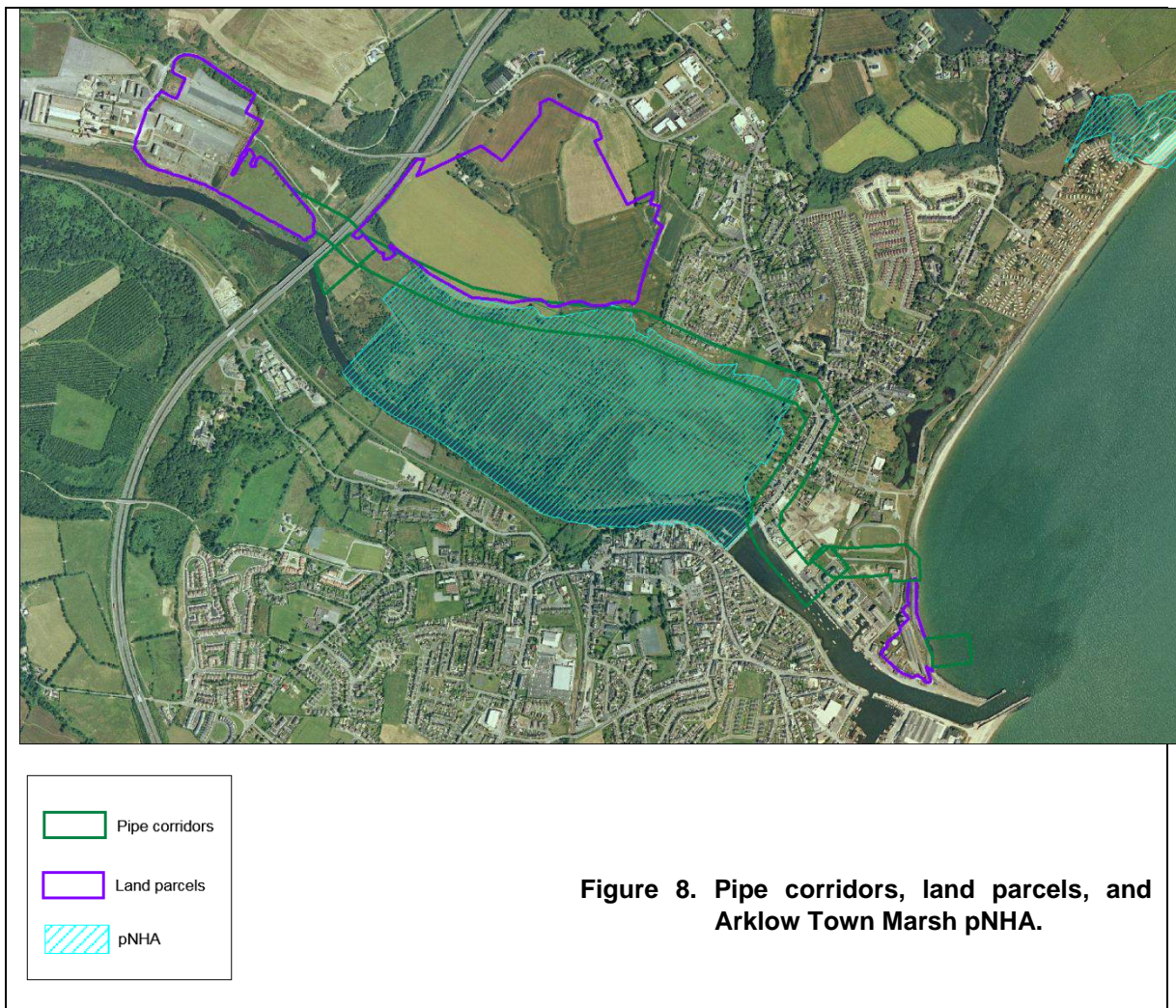
8.2. Foul main connection to Shelton Abbey and Kilbride options: Arklow Town Marsh

The pipeline corridor indicated for the transfer of foul flows to waste water treatment works at the Shelton Abbey and Kilbride options runs along the northern margins of Arklow Town Marsh pNHA. The indicative 100m wide corridor includes portions of the pNHA area; construction of a pipeline within the pNHA area would be contrary to Objective BD2 of Arklow Town and Environs Development Plan 2011-2017 since it would be likely to give rise to short term (one to seven years) to medium term (seven to fifteen years) impacts on wetland habitats, and a potential to give rise to long term (fifteen to sixty years) impacts, depending on detailed routing and construction methodology in wetland habitats in which water level is at or above the ground surface.

The indicative pipeline corridor available outside Arklow Town Marsh pNHA is narrow at The Marshlands Youth and Sports Centre and to the rear of properties in Avondale Crescent, and from this area to Dublin Road Arklow, with variations in ground level. More detailed investigations are recommended to establish the feasibility of this route; ecologically the main pipeline design constraint is the avoidance of any diversion of existing surface and ground water flows to Arklow Town Marsh since these could have hydrological impacts on the wetland. An alternative pipeline route to the north may be preferable and it is recommended that this possibility is investigated further.

Relevant considerations:

Arklow Town and Environs Development Plan 2011-2017 Objectives BD2, WS2



8.3. Foul main connection to Shelton Abbey land parcel

A pipeline for the transfer of foul flows to waste water treatment works at the Shelton Abbey land parcel would seem likely to be constructed within the existing access track that adjoins the northern boundary of Plot C at Shelton Abbey (Figure 5). The Canal lies between Plot C and the track. In its western section, there is little evidence of flow and the canal is vegetated with Sweet-grass and Duckweed. In shallower silty sections towards the east, Water-cress *Nasturtium officinale*, Fool's water-cress, Bulrush, Branched bur-reed, Reed canary-grass and Common reed, and Great willowherb occur (Plate 6). A smaller wet drainage ditch adjoins the northern side of the access track from the Sheepswalk stream eastwards; both the ditch and the canal extend eastwards into Arklow Town Marsh and provide a surface water flow into the marsh.

A short section of the pipeline corridor to the east of the M11 bridge crosses into a previously land-filled and capped area with flora as described for Plot C at Shelton Abbey. An iron stained seepage towards the eastern end of the land-filled area flows into the marsh (Figure 4).

Relevant considerations:

The maintenance of existing water sources supporting the wetland habitat of Arklow Town Marsh, and maintaining or improving water quality, are the main considerations that arise.

1. Disturbance of previously land-filled areas may have a potential to mobilise contaminants that could enter watercourses connected to Arklow Town Marsh and the Avoca river and may require additional geotechnical site investigation
2. Arklow Town and Environs Development Plan 2011-2017 Objectives: BD2



Plate 6. Canal and adjoining access track at Shelton Abbey. Left, looking east, the Sheepswalk stream is culverted under the track and into the canal; Right, looking west.

8.4. Foul main connection to Ferrybank land parcel

The pipeline corridor associated with Ferrybank runs on the existing road network. Adjoining potentially available lands comprise amenity grassland GA2.

Relevant considerations: none

9. Outfalls

Natura 2000 sites

Potential impacts on the coastal SACs Magharabeg Dunes SAC, Buckronev – Brittas Dunes and Fen SAC, and Kilpatrick Sandhills SAC and their conservation interests are assessed as neutral for each one of the three land parcels under consideration as a location for Arklow WWTW.

Protected species

With regard to Birds Directive Annex 1 listed bird species, Red-throated Diver *Gavia stellata* has been recorded in nationally important numbers in coastal waters between Brittas Bay and Mizen Head. A peak count of 49 Red-throated Divers was recorded in 1996, with a single Black-throated Diver *Gavia arctica* and two Great Northern Divers *Gavia immer* (Crowe, 2005). Boland and Crowe (2012) do not note Red-throated Diver numbers in coastal waters between Brittas Bay and Mizen Head more recently, though the species is likely to continue to occur. Divers are primarily wintering migrants to Irish waters. Red-throated Divers are recorded mainly in shallow sandy inshore waters along the south and east coasts of Ireland (Pollock *et al*, 1997). Potential impacts on Red-throated Divers are assessed as neutral for both the construction phase and operational phase of a marine outfall from Ferrybank, and as neutral for a river outfall from Kilbride or from Shelton Abbey. The shallow marine waters within which Red-throated divers have been recorded are currently assessed, and are expected to remain at, High Status. Potential impacts are therefore assessed as neutral for the outfalls for each of the three parcels under consideration.

Kingfishers *Alcedo atthis* occur in the Avoca River catchment, and have been observed at Three Mile Water in Magharabeg Dunes SAC (NPWS Conservation Plan), and are likely to occur at the inflowing rivers at Buckronev – Brittas Dunes and Fen SAC. Potential impacts on Kingfisher are assessed as neutral for both the construction phase and operational phase of a marine outfall from Ferrybank parcel. With regard to a river outfall potentially required in association with the Kilbride and Shelton Abbey land parcels, riverine flooding in this area may exclude Kingfishers from nesting in the banks immediately south of the M11 bridge, however this section would need to be re-surveyed as part of any detailed design phase. Otter signs were not found along the Avoca river bank in April 2015, but are likely to occur and would also require re-survey as part of any detailed design phase.

Marine mammals sensitive to noise are likely to occur in the vicinity of a marine outfall associated with the Ferrybank option under consideration (Appendix 3). A Marine Mammal Observer (MMO) would be required to be employed during any geophysical survey or piling operations for the protection of individual marine mammals from noise-related injury or disturbance. With regard to the operational phase, the shallow marine waters within which marine mammals have been recorded are currently assessed, and are expected to remain at, High Status. Potential impacts are therefore assessed as neutral for the marine outfalls for each of the three parcels under consideration.

A river outfall option from the Kilbride and Shelton Abbey land parcels will be required to be subject to appropriate treatment levels and licencing requirements in order to maintain or improve the conservation status of Habitats Directive Annex II listed fish species that occur in the Avoca river and its estuary; Salmon, Sea lamprey and River lamprey.

References

- Boland, H. and Crowe, O. 2012. *Irish wetland bird survey: waterbird status and distribution 2001/02 - 2008/09*. BirdWatch Ireland, Kilcoole, Co. Wicklow
- Byrne Looby PH McCarthy (2015). Irish Water & Wicklow County Council Arklow Wastewater Treatment Works: Flood Risk Assessment and Management Report – IFI Site (Shelton Abbey) Report No. W3111-R002 April 2015
- Crowe, Olivia (2005). *Ireland's Wetlands and their Waterbirds: Status and Distribution*. BirdWatch Ireland.
- Department of Arts, Heritage & the Gaeltacht (Draft - March 2012). *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*
- Department of the Environment, Heritage and Local Government (December 2009, revised February 2010). *Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*
- Fossitt, Julie A. (2000). *A Guide to Habitats in Ireland*. The Heritage Council
- Mark McCorry and Tim Ryle (2009) *Saltmarsh Monitoring Project 2007-2008. A Report for Research Branch, National Parks and Wildlife Service*
- McGarrigle, M., Lucey, J. and Ó Cinnéide (2010). *Water Quality in Ireland 2007-2009*. Environmental Protection Agency, Johnstown Castle Estate, Wexford, Ireland.
- Mayes, Eleanor, (2008) *Water Framework Directive: Annex IV Protected Areas: water dependent habitats and species and high status sites*. Guidance on Measures under the Habitats Directive and for High Status sites. http://www.wfdireland.ie/docs/27_HighStatusSites/.
- National Roads Authority (NRA) 2004. *Guidelines for Assessment of Ecological Impacts of National Road Schemes*.
- Ó Riain, Gearóid Katherine Duff and Maria Long (2005). *Water Framework Directive – Water Status: identifying and ranking of Nature Conservation Designated Areas (2005)*. Prepared by Compass Informatics Limited and Natura (Environmental Consultants) Ltd. Environmental RDTI Programme 2000-2006 (2002-W-DS-10).
- Pollock, Claire, Jim Reid, Andy Webb and Mark Tasker (1997). *The distribution of seabirds and cetaceans in the waters around Ireland*. JNCC Report No. 267 ISSN 0963-8091
- Wicklow Co. Council and Arklow Town Council, April 2011. *Environmental Report of the Arklow Town and Environs Development Plan 2011- 2017 Strategic Environmental Assessment (SEA)*.
- Wilson, F., Crushell, P. Curtis, T. & Foss, P.J. (2012). **The County Wicklow Wetland Survey II**. Report prepared for Wicklow County Council and The Heritage Council.

Appendix 1. Arklow Town Marsh Site Synopsis

SITE NAME: ARKLOW TOWN MARSH

SITE CODE: 001931

This site is now the principal wetland area in Arklow. It is a large marsh located north of the Avoca estuary on the perimeter of Arklow town. A disused roadway bisects the site from east to west.

Much of the site is dominated by Reeds (*Phragmites australis*), with Creeping Bent Grass (*Agrostis stolonifera*) and Valerian (*Valeriana officianalis*) common in places. On the southern side, numerous scattered bushes of Willow (*Salix* spp.) are growing among the Reeds, forming a scrub in places. Drier areas are characterised by large tussocks of Tufted Hair Grass (*Deschampsia caespitosa*). Other plants present include Soft Rush (*Juncus effusus*), Iris (*Iris pseudacorus*), Skullcap (*Scutellaria galericulata*), Lesser Pond Sedge (*Carex acutiformis*) and several other Sedges (*Carex* spp.).

Wet grassy areas with extensive stands of Water Horsetail (*Equisetum fluviatile*) occur on the northeast margin, with Creeping Bent Grass (*Agrostis stolonifera*), Spike Rush (*Eleocharis palustris*), Meadowsweet (*Filipendula ulmaria*) and Rushes (*Juncus articulatus* & *J. conglomeratus*) present.

The scarce Broad-leaved Cottongrass (*Eriophorum latifolium*) has been recorded growing on this site.

Much of the Willow (*Salix* spp.) has been defoliated, possibly due to atmospheric pollution from the nearby fertilizer factory.

The importance of this site is that it is a good example of a relatively large wetland, despite the impacts of atmospheric pollution and its proximity to Arklow town. The presence of at least one scarce plant species increases the interest of the site.

16th February 1995.

Appendix 2. Wicklow Wetland Survey report on Arklow Town Marsh

Wicklow Wetland Survey 2012

ARKLOW TOWN MARSH pNHA

Site Name: ARKLOW TOWN MARSH pNHA

Site Code: WW193 **Area (ha):** 81.36 **Easting:** 324079 **Northing:** 174095 **County:** WI



Photograph 1. Arklow Town Marsh County Wicklow showing reed beds with willow scrub on site. Photograph: F. Wilson

Site Designation(s):

cNHA

pNHA

Surveyed by:

Faith Wilson

Date of Wetland Survey:

12/10/2012

Survey Code:

WWS2012

Site Source Information:

Detailed Wetland Survey undertaken

Wetland Present on the Site

YES

Conservation Ranking after Survey:

B Rating: Nationally Important

Townland:

MARSH

Solid Geology:

Ordovician Metasediments

Subsoil Type:

AlluvMIN

Substrate Type:

Made Ground

Mineral Soil

Peat

Substrate Stability:

Firm

River Catchment:

Not applicable

Site Location

This extensive reedbed and marsh is located within the boundaries of Arklow town.

Site Description and Wetland Habitats Recorded

This is a large reedbed with scattered *Sally* scrub adjoining the Avoca River. There has been recent infilling and development along the northern edge of the site with historic infilling at the western end.

Target Notes - (see Habitat Map for location of Target Notes)

No.	Category	Easting	Northing	Comment
-----	----------	---------	----------	---------

Management Recommendations following Survey

Ensure no further infilling occurs on the site.

Future Survey Recommendations

None.

Landowner Information Comments

Arklow Town Council.

Description of potential EU Habitats Directive Annex 1 Habitats

None.

Main Fossil Habitats on Site

F81 Reed and large sedge swamps

FW2 Depositing/lowland rivers

FW4 Drainage ditches

GM1 Marsh

WN6 Wet willow-alders-ash woodland

WS1 Scrub

Fossil Habitats Surrounding Site

BC1 Arable crops

BL3 Buildings and artificial surfaces

ED2 Spoil and bare ground

GA1 Improved agricultural grassland

WL1 Hedgerows

EU Habitats Directive Habitats on Site

None noted

Landuse / Management Activity

None

Frequency of Use

4 Dominant (>50%)

Impacting Activity (EU code and title)

J02.05 Modification of hydrographic functioning,

Intensity

C = low

Impact

- 1 = repairable negative influence

J02.01.03 Infilling of ditches, dykes, ponds, pools,

B = medium

- 2 = irreparable negative influence

E03.02 disposal of industrial waste

C = low

- 1 = repairable negative influence

E03.03 disposal of inert materials

C = low

- 1 = repairable negative influence

J01.01 burning down

C = low

0 = neutral

Threats

J02.01.02 reclamation of land from sea, estuary or marsh

J02.01.03 Infilling of ditches, dykes, ponds, pools, marshes or pits

Flora on Site - Latin & English Species Name

Agrostis stolonifera

Creeping Bent

Anthoxanthum odoratum

Sweet Vernal-grass

Calystegia sepium

Hedge Bindweed

Cardamine pratensis

Cuckooflower

Carex acutiformis

Lesser Pond-sedge

Carex paniculata

Greater Tussock-sedge

<i>Carex rostrata</i>	Bottle Sedge
<i>Carex sp.</i>	Sedge
<i>Cirsium palustre</i>	Marsh Thistle
<i>Comarum palustre</i>	Marsh Cinquefoil
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Eleocharis palustris</i>	Common Spike-rush
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Equisetum fluviatile</i>	Water Horsetail
<i>Equisetum palustre</i>	Marsh Horsetail
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Gallium palustre</i>	Marsh-bedstraw
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Iris pseudacorus</i>	Yellow Iris
<i>Juncus effusus</i>	Soft-rush
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil
<i>Lythrum salicaria</i>	Purple-loosestrife
<i>Mentha aquatica</i>	Water Mint
<i>Phalaris arundinacea</i>	Reed Canary-grass
<i>Phragmites australis</i>	Common Reed
<i>Rubus fruticosus</i> agg.	Blackberry
<i>Salix cinerea</i> subsp. <i>oleifolia</i>	Rusty Willow
<i>Schedionorus arundinaceus</i>	Tall Fescue
<i>Scutellaria minor</i>	Lesser Skullcap
<i>Typha latifolia</i>	Bulrush
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Valeriana officinalis</i>	Common Valerian
<i>Vicia cracca</i>	Tufted Vetch

Fauna on Site - English and Latin Species Name

Common Frog	<i>Rana temporaria</i>
Common Kingfisher	<i>Alcedo atthis</i>
Grey Heron	<i>Ardea cinerea</i>
Otter	<i>Lutra lutra</i>

GIS Habitat Map of the Site

Wicklow Wetland Survey 2012

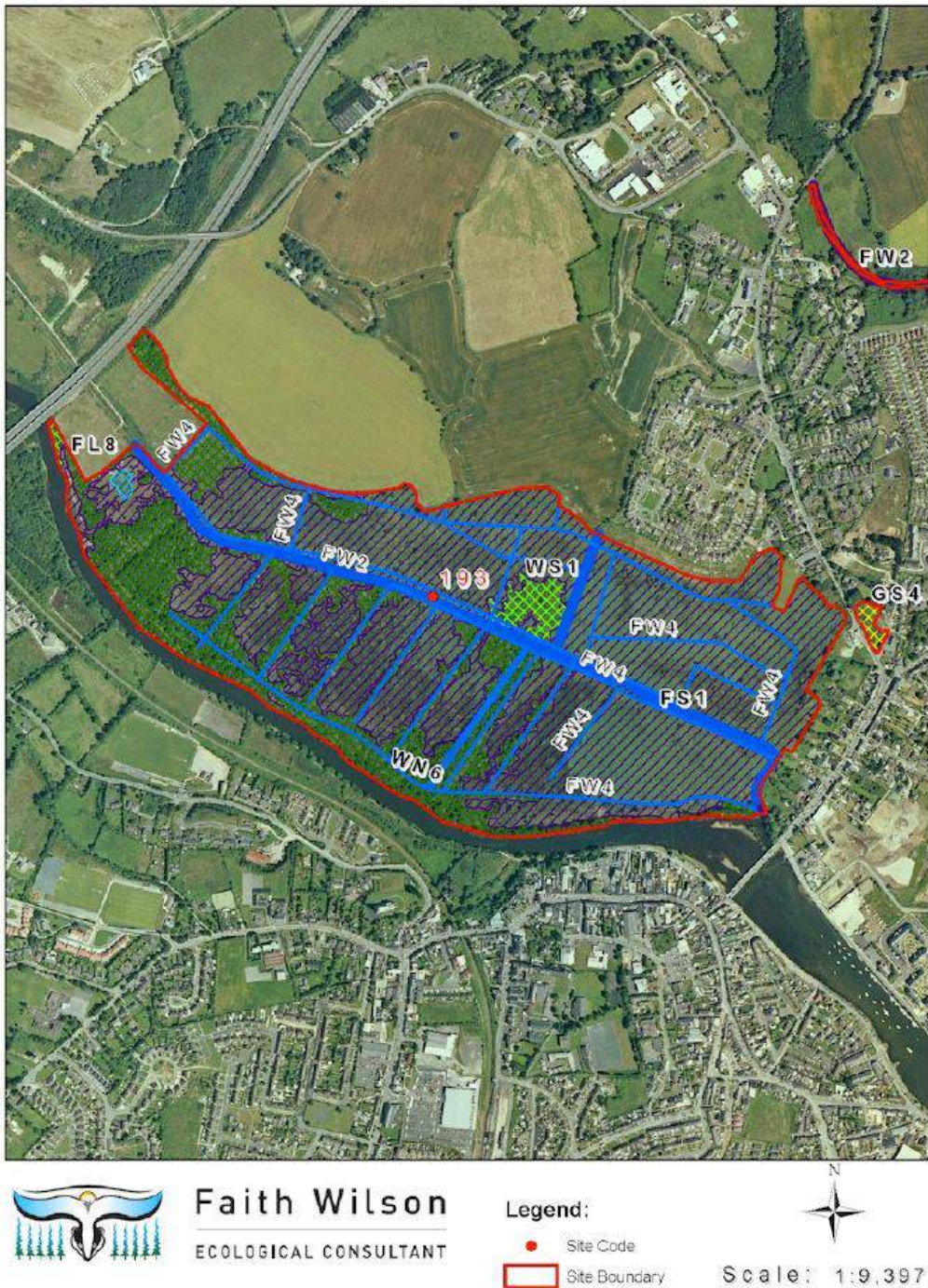
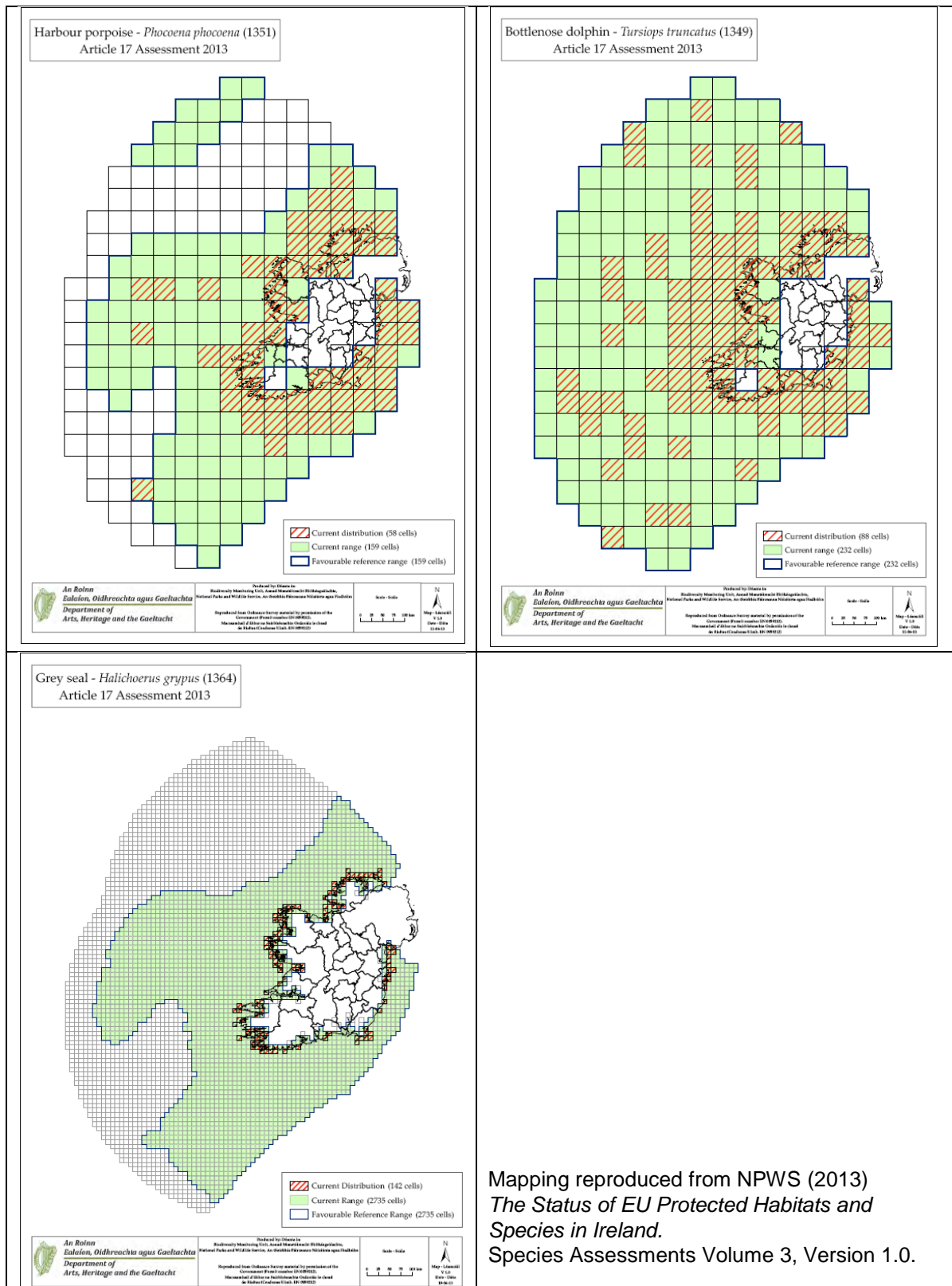


Figure 2. Habitat map of Arklow Town Marsh (site number WW193). Base map copyright Ordnance Survey of Ireland. Key to habitat symbols is presented at the start of this report.

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Appendix 3. Habitats Directive Annex 2 listed marine mammal species occurring in the study area and/or adjoining coastal waters.



Cetaceans			Pinnipeds in water	Pinnipeds in air
Low frequency 7 Hz-22 kHz	Mid-frequency 150 Hz-160 kHz	High frequency 200 Hz-180 kHz	75 Hz-75 kHz	75 Hz-30 kHz
Baleen whales	Most toothed whales, dolphins	Certain toothed whales, porpoises	All species	All species
Species- Ireland Humpback Whale Blue Whale Fin Whale Sei Whale Minke Whale	Species- Ireland Sperm Whale Killer Whale Long-finned Pilot Whale Beaked whale species Dolphin species	Species- Ireland Pygmy Sperm Whale Harbour Porpoise	Species- Ireland Grey seal Harbour seal	Species- Ireland Grey seal Harbour seal

Table 1. Cetacean and seal sensitivity to sound frequency.

Reproduced from Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (Dept. of Artes, Heritage and the Gaeltacht, Draft, March 2012).

