

WATERWAYS IRELAND
ENVIRONMENTAL MANAGEMENT PLAN
ULSTER CANAL (UPPER LOUGH ERNE TO CLONES)

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LIST OF ABBREVIATIONS

WI	Waterways Ireland
EMP	Environmental Management Plan
CMP	Construction Management Plan
OMP	Operational Management Plan
LMP	Landscape Management Plan
WFD	Water Framework Directive
RBMPs	River Basin Management Plans
GEP	Good Ecological Potential
AWBs	Artificial Water Bodies
SNIFFER	Scottish and Northern Ireland Forum For Environmental Research
EPA	Environmental Protection Agency
NIEA	Northern Ireland Environment Agency
DCAL	Department of Culture, Arts and Leisure (NI)
IFI	Inland Fisheries Ireland
NPWS	National Parks and Wildlife Services
SACs	Special Areas of Conservation
SPA	Special Protection Area
ASSIs	Areas of Specific Scientific Interest
NHAs	Natural Heritage Areas
GES	Good Ecological Status
CBD	Convention on Biological Diversity
CAISIE	Controlling Aquatic Invasive Species in Ireland
IS	Invasive Species
SOP	Safety Operating Procedure
WAC	Waste Acceptance Criteria

GLOSSARY

Alien Species	A species (be it plant or animal) that is not native to a region.
Annex VIII / X	A list of particular polluting substances in water that require monitoring under EU legislation.
Aquatic macrophytes	Plants that grow in water.
Ballast water	Fresh or salt water, sometimes containing sediments, held in tanks and cargo holds of ships to increase stability.
Benthic	Relating to the bottom e.g. benthic riverine sediment is the sediment found on the river bed.
Biodegradable	A substance that is capable of decaying through the action of living organisms.
Biodiversity	We use this term to describe the variety of life on Earth. It refers to the wide variety of ecosystems and living organisms: animals, plants, their habitats and their genetic make-up.
Biological metrics	A method for statistically evaluating biological.
Biosecurity protocols	Measures put in place to protect native biodiversity.
Bunded units	A container that is waterproof e.g. a bund to contain an oil container in the case of a spill.
Bypass system	A channel that avoids the normal route of a liquid.
Canal morphology	The shape of a canal, including the bed and side slopes.
Climax vegetation	This is the vegetation which establishes itself on a given site in the absence of human action after a long time.
Cofferdams	Artificial structures put in aquatic environments to create a dry working area.
Competent authority	A competent authority is any person or organisation that has the legally delegated authority, capacity, or power to perform a certain function.
Competitive exclusion	Sometimes referred to as Gause's Law of competitive exclusion, this terms proposes that two species that compete for the exact same resources cannot stably coexist.
Conservation interests	The reasons why a certain area needs protection for habitats and species present. For example the conservation interests of a mountain system could be upland bog.
Coppice	The process of cutting back growth to the base of certain trees to encourage denser regrowth.

Design with Nature	The process by which developments are designed in a way that works with natural process and features to minimise disturbance. For example a navigation that is located in the naturally deeper sections of river reduces capital and maintenance dredging. It is therefore <i>Designed with Nature</i> .
Dewatering	The process of removing water from a certain area. For example, a section of canal may be dewatered to allow sediment to be removed by an excavator.
Ecological corridor	An ecological corridor is an area of habitat connecting wildlife populations separated by human activities.
Ecosystem	An ecosystem is a combination of all the living things in a particular area, as well as all the nonliving components with which the species interact, such as air, soil, water and sunlight.
Electrofishing	A means of sampling a fish population. A localised area of water is charged with an electrical current which temporarily stuns fish allowing them to be measured and noted.
Emergent macrophytes	Plants which grow in wetland or partially submerged soil. An example would be reed.
Environment designations	Should a certain habitat be of high value it can be given protection by law. In such a case it has an environmental designation e.g. Special Area of Conservation under the Habitats Directive. The term can also refer to sites not protected by legislation.
Flail	A motorised device, usually attached to the rear of a tractor that is used to cut grass or hedgerows.
Good Ecological potential	Under the Water Framework Directive Artificial Water Bodies (e.g. canals) must meet a separate target to that of natural watercourses. This target is called Good Ecological Potential as opposed to Good Ecological Status for natural rivers and lakes.
Habitat	The place or type of site where an organism or population naturally occurs.
Habitat Fragmentation	Habitat fragmentation is the breaking up of a large intact area of a single vegetation type into smaller intact units. Usually, the ecological effects are considered negative.
Hawthorn quicks	Very young hawthorn plants ideal for planting hedgerows.
Hull fouling	Refers to the way organisms can attach themselves to the hull of a boat during a voyage and transport themselves to another location.
Hydromorphology	The shape of watercourse channel e.g. have the banks steep or gently sloping sides? Is the bed of the river flat or undulant?

In-situ seed bank	Plant seeds naturally present in the soil that will grow following disturbance.
Interstitial spaces	The space in between grains of earth or sand. Not visible to the human eye and occupied by water and microorganisms.
Invasive Species	Plants or animals not native to a region that negatively affect the habitats they invade. Impacts can be economic, environmental or ecological.
Invertebrates	Species without a backbone (lacks vertebrae) e.g. insects.
Jute matting	A type of natural fibre currently being used to control invasive aquatic species. The fibre decomposes naturally over time.
Lock chamber mechanism	The way by which a lock chamber works and how it allows boats to move from one section of navigation to another. For a detailed visual explanation you can log onto www.waterwaysireland.org .
Macroinvertebrates	A term used for invertebrates (see above) that are visible to the naked eye.
Macrophytes	A scientific term used to describe an aquatic plant that grows in or near water and is either emergent, submergent, or floating.
Marginal (e.g. marginal aquatic vegetation)	This is an area where plants grow that is not in deep water but also not on land. An example would be shallow water with reeds and rushes.
Maritime	Of or relating to the sea.
Maternity roosts	These are nests or homes that bats establish when they are rearing young.
Mitigation measures	A term used to describe the process of compensating for certain impacts e.g. if a tree needs to be removed mitigation could involve planting one or more in its place.
Montane	Of or relating to highland areas.
Native ecosystems	An ecosystem that is natural and expected in a certain region. For example peat land is a native ecosystem in Ireland, tropical rainforest is not.
Natura 2000	A Natura 2000 designation means that a particular area is protected under European Law as it is of value to a particular species, bird or habitat. The collection of all these sites is called the Natura 2000 Network. The two pieces of legislation involved are the Habitats Directive and the Birds Directive.
Natural colonisation	The process by which plants and trees are allowed, or encouraged, to establish naturally from seed.

Natural recolonisation	The process by which plants and trees are allowed, or encouraged, to establish naturally from seed, following disturbance.
Physico-chemical	Relating to both physical and chemical properties.
Polesaw	A saw attached to a pole that eliminates the need for a ladder when maintaining trees, up to a given height.
Pollard	A method for shaping trees, cropping the branches above head-height to encourage denser regrowth.
Precipitation of material	Material within a river that falls to the bottom following disturbance.
Primary productivity	The production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis.
Propagules	A plant part, such as a bud, that becomes detached from the rest of the plant and grows into a new plant.
Ramsar	A global convention relating to the protection of wetlands.
Riparian fringe	The area of land between land and water. An example is a reed fringe along the edge of a river.
Riverine	Of or relating to rivers.
Salmonid lakes and rivers	Lakes and rivers that have suitable habitat conditions to support populations of salmonids such as trout and salmon.
Saplings	A young tree.
Silt curtains	A method to control the impact of disturbed sediment on an aquatic habitat. It consists of a weighted textile that prevents movement of sediment from one area to another, thereby reducing the overall impact.
Siltation	The pollution of water by fine material such as silt.
Spawning habitat	Areas where fish can reproduce and lay eggs.
Species diversity	See Biodiversity.
Species richness	The number of different species in a given area.
Stock proof barrier	A barrier such as a fence or wall that can contain livestock (e.g. cows, sheep) to a given area.
Structural stability	The ability of a river/canal bank to withstand erosion and disturbance.
Submerged berms	An underwater ledge created to aid in the planting and establishment of a riparian fringe.
Suction dredging	A dredging technique that employs a suction device to remove sediment from a watercourse.

Sustainable	The use of a resource (e.g. water/forestry/energy) that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come.
Sward	A sward is the upper layer of the soil where grass grows. Varying heights of grass and plants is of benefit to the environment as it allows for a greater range of species to live there.
Swims	A pool in a watercourse good for angling.
Transitional habitat	A habitat that joins two different adjoining habitats. For example a wetland would be a transitional habitat from a lake to grassland or woodland.
Turbidity	The cloudiness or haziness of a liquid caused by suspended solids that are generally invisible to the naked eye.
Turions	A specialised overwintering bud produced by aquatic plants, especially in the genera <i>Potamogeton</i> , <i>Aldrovanda</i> and <i>Utricularia</i> .
Understorey	The underlying layer of vegetation, especially the plants that grow beneath a forest's canopy.
Vectors	The means by which an organism can move from one area to another e.g. by attaching to other animals, by humans, by boats.
Vernacular	Of or being an indigenous building style using local materials and traditional methods.
Water bodies	A term used to describe any part of the earth's surface covered with water (such as a river, canal, lake or ocean).
Water column	The water column is the height of the water from surface to bottom sediments.
Waterborne machinery	Machinery that can be used on water.
Watercourse	A watercourse is any flowing body of water.
Wet / Live well	A wet well chamber is used for collecting liquid and to which the suction pipe of a pump is located. A live well is a tank found on many fishing boats that is used to keep bait and caught fish alive.
Whips	A whip is a slender, unbranched shoot or plant.

1 INTRODUCTION

1.1 ORGANISATION DESCRIPTION AND WATERWAY LOCATION

Waterways Ireland (WI) is the North/South Implementation Body for the inland navigable waterway systems of Ireland and was established under the British-Irish Agreement, 1999. The statutory remit of WI is to manage, maintain, develop and restore the inland navigable waterways, principally for recreational purposes.

WI is restoring the section of the Ulster Canal from Clones to Upper Lough Erne. The proposed development is situated both in Northern Ireland and the Republic of Ireland, crossing Counties Fermanagh, Cavan and Monaghan. Upon completion the 13km of navigation will be restored comprising a long section of canal, and river navigation connecting Upper Lough Erne at Quivvy Lough with the Ulster Canal.

WI recognises this location has true value as an area of ecological, archaeological, architectural, engineering and historic value within Ireland. The ecological value of the waterways here can be attributed to the fact that they support such a large diversity of plant and animal life, are home to a number of rare species, and are significant as ecological corridors providing links between important habitats of national and international significance.

Consequently, WI will maintain and develop the new navigation in line with its statutory remit and experience to date in developing and promoting inland waterways of high environmental and recreational quality.

This Environmental Management Plan (EMP) has been developed based on practical experience gained in the field by WI staff. The EMP will also be evaluated on a continual basis to conform with best practice from an environmental, engineering and economic perspective. The EMP is a detailed management and maintenance plan to ensure a balance between ecological and navigational requirements. This plan prioritises environmental quality and encompasses codes of practice.

All correspondence in relation to this EMP should be directed to:

Environment Section
Waterways Ireland
Dock Road, Drewsborough
Scariff, County Clare
Republic of Ireland

1.2 SCOPE OF THIS EMP

WI has a significant role to play in advocating and implementing high quality environmental management of the restored Ulster Canal (Upper Lough Erne to Clones), given the long-term viability of this unique asset is dependent on its environmental status. Consequently, WI has developed this EMP to assist in compliance with habitat and wildlife regulations, water pollution legislation, waste management during the operational phase of the navigation and also with future compliance with Water Framework Directive (WFD) to ensure Good Ecological Potential (GEP) is achieved.

The following aspects of the operation are covered by this EMP:

- Protection of surface water and groundwater during operation.
- Management of waste during operation.
- Maintenance of the waterway as a navigation, upon completion.
- Compliance with all relevant legislation, conventions and government policies regarding sustainable habitat management of the navigation, upon completion.
- Compliance of all maintenance operations with wildlife legislation, upon completion.
- Compliance with requirements set out under the WFD.
- Management of the canal as a fishery, upon completion.
- Management and control of the spread of invasive species throughout the construction and operation of the navigation.

The following aspects of the operation are *not* covered by this EMP:

- Environmental considerations during the construction of the Ulster Canal (Upper Lough Erne to Clones) (see Construction Management Plan (CMP)).
- Any licence needed for the abstraction or discharge of waters.
- Any licence needed for the importation or removal of material from the site.
- Any consent required to cross or divert watercourses within the site.

This plan is subject to change based on the evolving nature of the restored Ulster Canal (Upper Lough Erne to Clones) and the associated maintenance and management requirements and should be read in conjunction with the Operational Management Plan (OMP).

1.3 OBJECTIVES OF THIS EMP

The aim of the EMP is to maximise the overall ecological value of this section of canal. This will be achieved through the creation of a sustainable ecosystem whilst ensuring the conservation interests of Upper Lough Erne and its environs are protected.

In this context the following environmental objectives have been developed for the implementation of this Plan:

Env. Objective 1: Prevent damage to terrestrial, aquatic and soil biodiversity, particularly EU designated sites and protected species. Restore old navigation and canal aquatic habitat and provide a vehicle for development of new waterway wildlife corridor for the region.

Env. Objective 2: Provide an economic boost for the region and contribute to sustainable development.

Env. Objective 3: Provide a peaceful recreational environment for public use with access for all and with no risk to human health.

Env. Objective 4: Avoid damage to the function and quality of the soil resource in the area.

Env. Objective 5: Navigation to achieve GEP and not to cause deterioration in water status of any waterbodies.

Env. Objective 6: Minimise emissions to air as a result of restoration and operation of the canal.

Env. Objective 7: Minimise contribution to climate change by emission of greenhouse gases associated with restoration and operation of the canal, and take account of the predicted changes in future climate.

1.4 SITE LAYOUT

An outline of the site is shown below.

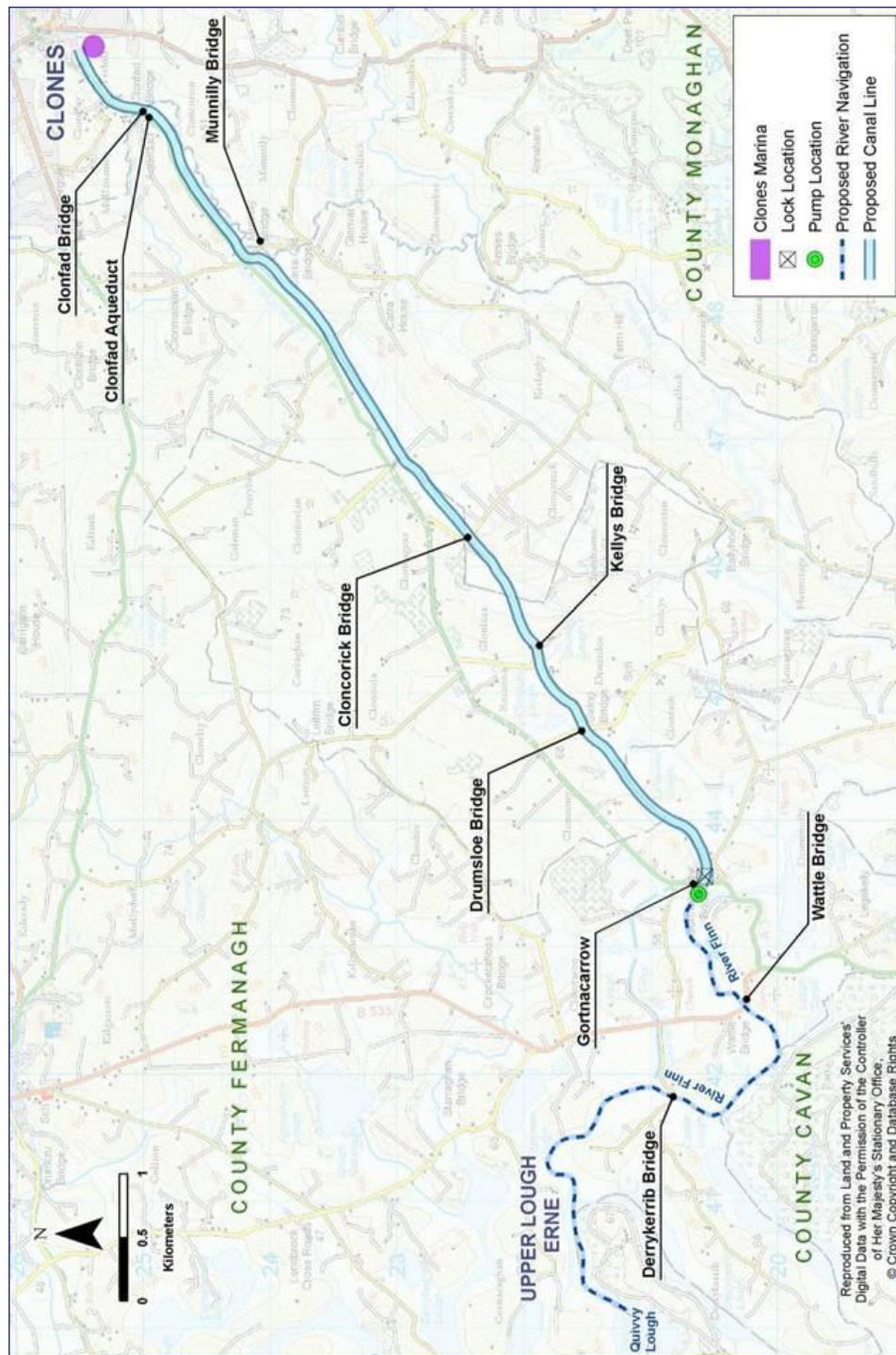


FIG. 1-1: SITE OUTLINE

2 PROTECTION OF WATER QUALITY

2.1 WATER QUALITY MONITORING

WI is the competent authority with responsibility for ensuring the canals under its remit are WFD compliant and for reporting on their ecological status to the relevant environmental authorities. To achieve this, WI has implemented environmental monitoring and management practices for the canals which will be replicated for the Ulster Canal. This will allow for the ecological potential of the Ulster Canal to be identified and will support the measures in the RBMPs for achieving GEP for AWBs.

Canals are included in the Operational Monitoring Programme of the WFD, recognising their status as AWBs with specific monitoring requirements to ensure their continued beneficial uses for navigation, recreation, environmental and amenity value.

Monitoring within the river navigation of the Ulster Canal (Upper Lough Erne to Clones) is outside the jurisdiction of WI.

2.1.1 RELEVANT LEGISLATION

The following European, Northern Ireland and Republic of Ireland legislation applies to the protection of water quality:

- EU WFD (2000/60/EC).
- The WFD (Priority Substances and Classification) Regulations (Northern Ireland) 2011.
- European Communities (Water Policy) Regulations 2003 SI No. 722 of 2003.

2.1.2 QUALITY ELEMENTS FOR CANAL MONITORING PROGRAMME

A number of monitoring points will be selected along the Ulster Canal from Clones to Gortnacarrow once this section is restored. The monitoring programme will then be implemented to determine if the canal is WFD compliant. This includes water quality parameters, biological metrics including invertebrates and macrophytes, and hydromorphology. The formal monitoring and reporting programme will commence two years following restoration of the canal. This programme is subject to change based on the monitoring requirements of the WFD.

Quality Elements To Be Monitored	Frequency of Monitoring
General physico-chemical	4 times per year
Benthic invertebrate fauna	Once per three years
Macrophytes	Annually
Hydromorphology	Once per six years
Fish	Once per three years
Annex X Substances	12 times per year for 1 year in 3 year cycle
Annex VIII Other pollutants	12 times per year for 1 year in 3 year cycle

TABLE 2-1: WFD QUALITY ELEMENTS

Physico-Chemical Parameter	Maximum Limit
Total Phosphorus (TP)	0.063 mg/l P
Molybdate Reactive Phosphorus (MRP)	0.02 mg/l P
Soluble Reactive Phosphorus (SRP)	0.02 mg/l P
Total Oxidised Nitrogen (TON)	11.3 mg/l N
Total Ammonia	0.12 mg/l N
Dissolved Oxygen (DO)	>5.0 mg/l O ₂
Biochemical Oxygen Demand (BOD)	<2.5 mg/l O ₂
Total Coliforms (TC)	5000/100 ml
Faecal Coliforms (FC)	1000/100 ml
Chlorophyll	<25 mg/m ³

TABLE 2-2: WFD PHYSICO-CHEMICAL PARAMETERS

With a view to implementing the WFD, WI has participated with British Waterways, various Irish, Scottish and UK regulatory authorities and the Scottish and Northern Ireland Forum For Environmental Research (SNIFFER) in the development of a WFD compliant canal classification tool. The tool uses macro invertebrate, macrophyte, hydromorphological and physicochemical data to classify the ecological potential of a canal. This tool will also be used in the future to ensure the Ulster Canal is compliant with WFD objectives.

WI also partnered with British Waterways and various Irish and UK regulatory authorities to identify best practice and cost effective management strategies and mitigation measures for application to inland navigation authorities in the UK and Ireland (AINA Guidelines). These guidelines will be used in assessing the hydro-morphological status of the restored Ulster Canal in line with WFD requirements.

2.1.3 ROLES AND RESPONSIBILITIES

WI has been identified by the EPA and NIEA as the government body with responsibility for ensuring this monitoring is implemented, for the AWBs under their jurisdiction.

2.2 FISHERY DEVELOPMENT

In the same manner as currently occurs for the other navigable canals under its remit, WI will deliver a wide ranging programme to improve habitat conditions for fish on the restored section of the Ulster Canal including fisheries development, aquatic plant management and water quality monitoring and pollution reduction.

Since 1991 WI and its predecessors have implemented a major programme of fish stocking to establish the Irish canals as a top class coarse fishery. Accompanied by programmes to maintain the high standards of water quality, there have been marked improvements in the number of fishing competitions and the level of foreign anglers. WI has been particularly keen to encourage local anglers. A similar initiative will be proposed for the Ulster Canal upon its restoration.

2.3 WATER POLLUTION RISKS AND CONTROLS

Water pollution poses a significant threat to the ecological value of a waterway as well as its recreational potential. Therefore it is necessary that WI identify potential sources and risks of both point source and diffuse water pollution and mitigate accordingly. Water pollution risks are dealt internally through the WI Risk Register. However specific risks associated to the Ulster Canal (Upper Lough Erne to Clones) will be dealt with here in detail.

In general water pollution events are a rare occurrence on the canals. In the most recent EPA report on water quality (2007-2009) it stated that water quality was good throughout the canal systems. However it should be noted that pollution to feeder systems (i.e. in this case the River Finn) will have a resultant knock on effect to the water quality of the Ulster Canal (Upper Lough Erne to Clones). WI will liaise closely with relevant agencies that have jurisdiction over the canal water supply to ensure the highest standard of water quality is maintained. Malicious pollution events, where traceable, will be followed up using the full powers of water pollution legislation.

2.3.1 RELEVANT LEGISLATION

The following European, Northern Ireland and Republic of Ireland legislation applies to water pollution:

- EU WFD (2000/60/EC).
- EU Floods Directive (2007/60/EC).
- The EU Freshwater Fish Directive (78/659/EEC).
- The Water (Northern Ireland) Order 1999.
- Local Government (Water Pollution) Act, 1977 – 1990, as amended.
- Fisheries Consolidation Act 1939 – 2003.

2.3.2 POLLUTION RISKS AND CONTROLS

Pollution of waters may result from a number of sources arising from activities undertaken by WI. These include:

- Accidental spillage of fuel/oil during refuelling exercises.
- Accidental leakage of foul water from vessels.
- Accidental leakage of hydraulic fluid from lock chamber mechanism.
- Seepage of foul water from amenity area holding tanks.
- Pollution of adjoining waters from surface water discharge from hardstanding amenity areas.
- Temporary elevations in suspended solid levels during dredging events.
- Disturbance to benthic sediment during weed cutting operations.

Table 2-3 outlines the proposed controls for these potential pollution instances:

Risk identification and contaminants of concern		<u>Proposed</u> pollution controls
Risk	Contaminant(s)	
<i>Accidental spillage of fuel/oil during refuelling exercises</i>	• Diesel • Petrol • Oil	All refuelling of equipment to be undertaken at WI depots. However should refuelling be required on site this is to be undertaken away from nearby surface waters. Use of biodegradable oils to be encouraged, where feasible.
<i>Accidental leakage of foul water from vessels</i>	• Foul water/sewage	On board foul water facilities and holding tanks are covered under WI's navigation bye laws. Failure to comply with bye laws can result in prosecution by the WI Inspectorate.

TABLE 2-3: PROPOSED POLLUTION CONTROLS

<i>Accidental leakage of hydraulic fluid from lock chamber mechanism</i>	Hydraulic fluid	- Regular maintenance to be undertaken to minimise potential of pollution from hydraulic fluid. - Use of biodegradable oils to be encouraged, where feasible. - Should a leak occur lock chamber and sluices to be kept closed until WI staff arrive with pollution spill kit.
<i>Seepage of foul water from amenity area holding tanks</i>	Foul water/sewage	Risk not present due to presence of public foul sewer system which WI intend to discharge to.
<i>Pollution of adjoining waters from surface water discharge from hardstanding amenity areas</i>	- Surface water - Oil - Sediment	Drainage from all hard-standing areas to be fitted with suitable settlement tanks and petrol/oil interceptors.
<i>Pollution of receiving waters from waste water treatment systems</i>	Foul water/sewage	Risk not present as there are no proposals to discharge directly to watercourses.
<i>Temporary elevations in suspended solid levels during dredging events</i>	Suspended Solids	Given the very slow flowing nature of the canal any re-suspended sediment during a dredging event will be not be transported far downstream. However to minimise suspended solids entering the water column a number of options can be adopted: Selective dredging: Only dredge where absolutely necessary thereby minimising the potential impact to the canal sediments. Dredging technique: Various methods can be employed including dewatering, suction dredging, installation of silt curtains, reduction of flow rate, etc. Containing water within a level: closure of lock gate at Gortnacarrow to ensure enough time is given for re-suspended material to settle out of the water column.

TABLE 2-3: PROPOSED POLLUTION CONTROLS (CONTINUED)

<i>Disturbance to benthic sediment during weed cutting operations</i>	Suspended Solids	Given the low flow rates within the canal the disturbance caused by mechanical weed cutting would be mitigated by the precipitation of material out of the water column within a short distance of the disturbance.
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TABLE 2-3: PROPOSED POLLUTION CONTROLS (CONTINUED)

2.3.3 EMERGENCY SPILL RESPONSE PLAN

The following emergency response plan is to be implemented in the event of a spill within the Ulster Canal (Upper Lough Erne to Clones):

- In the event that a vehicle or trailer accidentally spills waste into a canal, harbour or marina the driver must first ensure the safety of all staff present.
- Once all staff are safe the supervisor/foreman should be contacted immediately and/or the WI Environment Section to ensure the safe and appropriate remediation/mitigation measures are implemented.
- Staff will advise foreman of nature of waste in the water in order to identify the most suitable materials required to clean up the area - equipment required may include, but not limited to: work boats, additional lorry with grab loader arm, sweeping brushes, shovels, extra refuse bags.
- Flow in the canal to be reduced, where possible to limit the spread of the pollutant.
- Foreman/Supervisor will arrange for vehicles and trailers and equipment suitable for removal of waste from the area.
- Environment Staff will contact and notify the Local Authority Environment Section (Water Quality) and Fisheries if there is an anticipated risk to water quality and any impact to aquatic flora and fauna.
- Once all waste is safely retrieved from the water all staff must ensure the waste is transported to/disposed off at a licensed facility.
- Waste will not be stored in vehicles or trailers overnight in any instance, either at Depots or on the roadside.**
- The standard procedures for transporting waste as set out in the collection permit, including covering of loads, must be adopted at all times.

3 **HABITAT MANAGEMENT**

WI has developed and currently implements a multifaceted programme to improve habitat conditions for fish and wildlife on our canals and this work will be replicated for the restored Ulster Canal, from Upper Lough Erne to Clones. This includes integrating biodiversity principles into our management practices to protect species diversity, the habitats of rare species and to control of invasive exotics. For example, since 2003 measures have been adopted on the Barrow Navigation to mitigate the impact of maintenance dredging operations upon lamprey, a protected species, and research is ongoing into the natural recolonisation by plants and invertebrates in recently dredged canal habitats.

In recognition of the particularly high value and sensitivity of the ecosystems in this area, WI will strive to continuously improve the environmental health and physical condition of this section of the Ulster Canal. This will be achieved by restoring an ecologically sound ecosystem and by ensuring good water quality results from all of our construction and maintenance activities. This will prevent the deterioration of habitats or their associated species and ensure increased biodiversity in the canal corridor.

3.1 **RELEVANT LEGISLATION**

European Legislation		
<i>Name</i>	<i>Year</i>	<i>Subject</i>
Habitats Directive (92/43/EEC)	1992	Biodiversity Conservation
WFD (2000/60/EC)		
Birds Directive (79/409/EC)		

TABLE 3-1: HABITAT MANAGEMENT – EUROPEAN LEGISLATION

Domestic Legislation			
<i>Name</i>	<i>Year</i>	<i>Jurisdiction</i>	<i>Subject</i>
Wildlife (Northern Ireland) Order	1985	NI	Biodiversity Conservation
Wildlife Act	1976	RoI	Biodiversity Conservation
Wildlife (Amendment) Act	2000	RoI	Biodiversity Conservation
Fisheries Act	1966	NI	Fisheries
The Fisheries Act	1980	RoI	Fisheries

TABLE 3-2: HABITAT MANAGEMENT – DOMESTIC LEGISLATION

3.2 **RANGE OF CANAL HABITATS**

Canal ecosystems are important linear wildlife corridors within a landscape and provide for a diverse range of habitats, flora and fauna within this narrow corridor. Canals are not natural landscape features and therefore require maintenance to ensure their use both as a navigation but also as a viable and sustainable ecosystem.

The range of habitats that will become established within the Ulster Canal (Upper Lough Erne to clones) will include:

- Open water habitat (include aquatic vegetation).
- Benthic canal bed habitat.
- Riparian fringe.
- Scrub.
- Hedgerow.
- Short sward towpath.
- Long sward grassland (buffer area between towpath and riparian fringe/hedgerow).
- Grassed embankments.
- Masonry bridges.

Figure 3-1 outlines a typical cross section of canal illustrating these habitats.

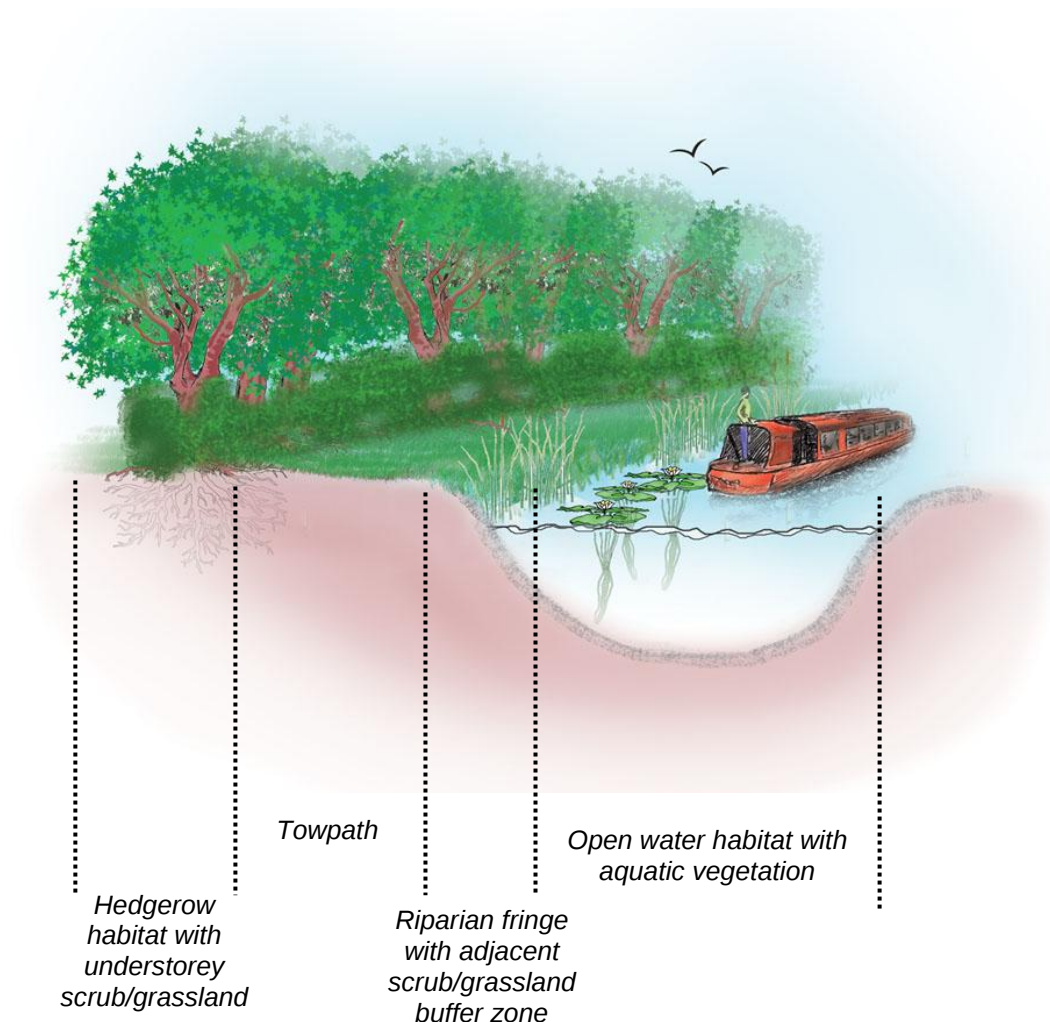


FIG. 3-1: TYPICAL CANAL CROSS SECTION

3.3 CANAL HABITAT MANAGEMENT PRACTICES

In conjunction with the Ulster Canal (Upper Lough Erne to Clones) Landscape Plan the following management practices are recommended to be implemented upon establishment for each of the habitat types. It should be noted that it may take several years for planted and naturally colonised plants to become established.

3.3.1 OPEN WATER HABITAT – AQUATIC PLANT MANAGEMENT

Aquatic plants play a fundamental role in the functioning of aquatic ecosystems. In particular, macrophytes considerably improve environmental conditions for invertebrates and fish. Retaining the vegetation structure of a canal, including a well-developed marginal / riparian fringe, is important in providing a diversity of habitats, and can also help to prevent bank erosion by stabilising loose sediments and reducing the erosive energy of moving water.

However, excessive growth can have negative ecological impacts and prevent access to and use of the amenity by a diverse range of end users. Therefore, the primary maintenance practice for maintaining navigation and open water habitat on the Ulster Canal (Upper Lough Erne to Clones) will be aquatic weed management. An Annual Weed Control Programme for the canal will be developed to facilitate navigation and amenity use, while retaining habitat diversity and function. This will include maintaining a 1-2 m wide stretch of emergent macrophytes along each bank.

Should weed growth become problematic within the centre channel (for both navigation and maintaining GEP) a number of techniques may be employed. Those that are currently implemented in other canal navigations include:

- 1. Natural control through boat movements:** It has been shown through research that the disturbance caused by low to moderate traffic in canals limits aquatic plant growth. It also opposes competitive exclusion which helps to maintain species richness (Willby *et al.*, 2001).
- 2. Weed harvester:** Mechanical cutting and harvesting of weed is an important component of any aquatic plant management programme. The harvesters provide for a shallower cut of the weed and subsequent removal from the water. When used in combination with other techniques it provides for effective overall management of canal networks (See Plate 3-2 page 27).
- 3. Trailing blades:** This control method has proven particularly effective in dislodging aquatic plants at the root base thereby eliminating growth later in the growing season (See Plate 3-2 page 27).
- 4. Turion removal:** Some aquatic plants such as *Myriophyllum verticillatum* reproduce by producing turions between September and November each year. These over-wintering propagules sink to the canal bed where they remain dormant until February. Trials on the Royal Canal where turions were harvested over winter have shown to significantly reduce the number of propagules present. Biomass and plant cover with *M. verticillatum* throughout that growing year and subsequent growing seasons was dramatically reduced.

5. Jute matting: Use of this natural textile fibre was piloted in the Grand Canal in 2010 to control nuisance aquatic invasives. The effectiveness of jute is being monitored but preliminary results show it to be an efficient means of curtailing aquatic plant growth and particularly invasive weeds. Medium term studies of its use in Lough Corrib to control *Lagarosiphon major* indicate that upon decomposition of the matting natural flora within the benthic sediment become reestablished. (See Plate 3-1 page 27)

It should be noted that management options will be tailored to specific conditions as they arise (both in the context of canal morphology, water quality and clarity as well as the specific species that colonise the canal). Any management process shall first undergo relevant consultations with the Department of Culture, Arts and Leisure (DCAL) Fisheries, Inland Fisheries Ireland (IFI), NIEA and National Parks and Wildlife Services (NPWS).

3.3.1.1 Potential Impacts from Weed Control

Weed removal operations can occasionally require the use of heavy plant operating from the bank edge, resulting in impacts upon the existing bank structure, riparian habitat and marginal vegetation. For this reason, WI utilise waterborne machinery, where possible.

The physical removal, or uprooting of aquatic plants, can result in sediment becoming disturbed or destabilised, and subsequently entering the watercourse. As such, the following hydromorphological and ecological impacts have been identified:

- Increased sediment input.
- Mobilisation of sediment.
- Loss of marginal vegetation.
- Loss of riparian habitat.
- Fragmentation of alien invasive plant species during removal, leading to the gradual spread of species downstream.
- Potential transfer of alien invasive plant species to other water bodies.

The following options have been identified to help mitigate the negative impacts associated with aquatic vegetation control and will be implemented on the Ulster Canal:

- Selective vegetation control regime.
- Appropriate vegetation control technique (**NOTE:** Aquatic plant control by use of herbicides has been made illegal since March 2010).
- Appropriate timing.
- Appropriate harvesting technique.
- Prevention of spread of (invasive species).



PLATE 3-1: JUTE MATTING BEING PILOTED ON THE GRAND CANAL



PLATE 3-2: CANAL WEED HARVESTER. INSET: V-BLADE CURRENTLY BEING USED AT THE ROYAL CANAL

3.3.2 BENTHIC CANAL BED - DREDGING

Canals, by their very nature, require frequent management intervention to retain their navigation and amenity functions as well as ensuring habitat diversity and achievement of GEP as prescribed under the WFD.

Because they are generally static or slow flowing, sediment inputs and the decomposition of plant material lead to heavy silt deposits. These deposits are often highly organic and significantly promote growth of potentially obstructive algae and higher plants. Dredging is, therefore, necessary to remove these deposits which can impair navigation and other amenity uses.

Dredging of navigation channels results in the removal and disturbance of some flora and fauna (notably benthic invertebrates and submerged macrophytes) and depending on the technique employed, marginal and riparian habitats may also be impacted.

However, impacts are usually short lived (see Plates 3-4 & 3-5 on page 31) especially considering that a typical canal may only be dredged every few decades. Furthermore in artificial navigations, dredging is beneficial by ensuring the long term survival of open water habitats. Without dredging, most canals would be likely to silt up and cease to function as open water bodies.

3.3.2.1 Dredging Protocol

Prior to any dredging event the following protocol will be adopted:

1. Initial consultation with Environment Section.
2. Identification of potential environmental and heritage risks.
3. Sediment sampling and analysis.
4. Scheduling of dredging to minimise impacts to local flora and fauna.
5. Electrofishing if necessary.
6. If necessary, under licence, the capture and relocation of protected species.
7. Mitigation of potential impacts to fisheries, depending on the dredging methodology utilised.
8. Submission of appropriate assessment, if required.
9. Identification of areas where sediment can be reused / disposed, in accordance with Waste Management legislation.

The above represent broad objectives to be followed during a dredging event. Consultation with relevant wildlife authorities (i.e. NIEA and NPWS) is of paramount importance throughout.

A number of dredging techniques can be employed depending on site specific conditions and access:

1. Bank-side excavator with long reach arm (see Plate 3-3 Right).
2. Water-based excavating equipment (see Plate 3-3 Left).
3. Suction dredging.
4. Use of GeoTubes TM.
5. Dewatering and subsequent dredging.



PLATE 3-3: DREDGING USING WATER BASED PLANT AND BANK SIDE LONG REACH EXCAVATOR

3.3.2.2 Protecting Water Quality During Dredging

Water quality can be impacted upon by the re-suspension of particulate matter during the dredging process. The resulting rise in suspended solid levels can impact on:

- Alteration or disruption to canal sediments.
- The suspended sediment load and turbidity of a canal are increased during the removal of sediment. The effects rarely persist some distance downstream given the low flow rates within the canal.
- Suspended sediment in the water affects the respiratory system of fish.
- Increased turbidity reduces light penetration and therefore primary productivity, which has a knock-on effect throughout the food chain.
- Macroinvertebrates can be affected by the blocking of interstitial spaces, causing oxygen-depletion and hence species mortality.
- Reduced primary productivity and reduced invertebrate and fish populations can affect local mammal and bird populations which rely on these sources of food.
- Aquatic macrophytes will also be affected within the navigable section of the river.

To avoid excessive changes in water quality every precaution should be taken to minimise initial re-suspension. This could include:

1. Using contained dredging operations such as suction dredging,
2. Working in the dry by diverting water or creating cofferdams,
3. Isolation of turbid waters from the rest of the waterbody by erection of silt curtains,
4. Lower water levels prior to dredging,
5. Reduce flow rate in the canal,
6. Undertake dredging in the dry – but avoiding continuous stretches of canal. Staggering large dredging operations allows for natural recolonisation.
7. Use of GeoTubesTM.
8. A water quality monitoring programme may also be initiated, when appropriate.



PLATE 3-4: DREDGED CANAL – NOTE REMAINING REED STALKS



PLATE 3-5: DREDGED SITE – 18 MONTHS LATER

3.3.3 RIPARIAN FRINGE MANAGEMENT



PLATE 3-6 – SPECIES RICH RIPARIAN FRINGE

The riparian fringe includes the marginal aquatic vegetation up to and including a buffer strip between the reed/rushes and the towpath. This area is hugely important for wildlife, in particular nesting birds and spawning coarse fish. Its infrequent management also leads to areas of high plant biodiversity.

It provides an important base for marginal aquatic invertebrates which in turn support a wide range of fish, birds and mammals.

The riparian fringe is the designated area of a canal (AWB) where monitoring takes places to ensure compliance with the WFD (See Section 2 page 17 for more information).

The riparian fringe also has an important engineering function as it absorbs much of the energy from boat wash thereby affording protecting to the canal embankment.

3.3.3.1 Relevant Legislation

Domestic Legislation			
<i>Name</i>	<i>Year</i>	<i>Jurisdiction</i>	<i>Subject</i>
Wildlife (Northern Ireland) Order	1985	NI	Wildlife Conservation
Wildlife Act	1976	RoI	Wildlife Conservation
Wildlife (Amendment) Act	2000	RoI	Wildlife Conservation

TABLE 3-3: RIPARIAN FRINGE MANAGEMENT – DOMESTIC LEGISLATION

3.3.3.2 Management Practices for Riparian Fringe

The canal has been designed to incorporate a submerged shelf with a gradual slope to the canal bed. As a result maintenance of marginal aquatics should not be an intensive annual requirement. Furthermore, as per the Landscape Plan, it is proposed to seed pockets of these submerged shelves with a mixture of *Phalaris arundinacea*, *Iris pseudacorus* and Greater/Lesser Pond sedges *Carex riparia* & *acutiformis*. These species provide excellent habitat for insects, birds and fish and importantly do not encroach into the deeper parts of the canal, thereby impacting navigation.

However should natural colonisation take place of certain encroachment prone species these will be managed on an as needs basis. Management will also only take place during the months of September to February, so as to protect nesting birds.

A detailed manual targeted at WI General Operatives has been included in Appendix 2. This manual has been presented to staff over 2 years. Staff assigned to the Ulster Canal (Upper Lough Erne to Clones) will also benefit from this training.

3.3.4 HEDGEROW MANAGEMENT



PLATE 3-7 – CANAL HEDGEROW

Hedgerows are very important habitat types along waterways as they provide food and shelter for insects, birds and other animals. Hedgerows in particular act as corridors that permit wildlife to move between habitats. As many birds and small mammals never venture more than a few metres from cover, populations would become isolated and vulnerable without hedges. Nearly two thirds of Ireland's bird species nest in hedges.

WI has some of the best examples of hedgerow in Ireland today and along with the canal itself offer green corridors through many cities, towns and villages permitting the movement of wildlife. Hedgerows are particularly beneficial to boaters as they provide shelter from strong winds.

3.3.4.1 Relevant Legislation

Domestic Legislation			
<i>Name</i>	<i>Year</i>	<i>Jurisdiction</i>	<i>Subject</i>
Wildlife (Northern Ireland) Order	1985	NI	Wildlife Conservation
Wildlife Act	1976	RoI	Wildlife Conservation
Wildlife (Amendment) Act	2000	RoI	Wildlife Conservation

TABLE 3-4: HEDGEROW MANAGEMENT – DOMESTIC LEGISLATION

3.3.4.2 Management Practices for Hedgerows

Following establishment of planted hedgerows (see Landscape Management Plan (LMP)) maintenance will be on an as needs basis until the trees reach maturity. Once mature, hedges will be subject to annual/biannual maintenance as required to ensure safe use of the towpath by recreational users and vehicles.

A detailed manual targeted at WI General Operatives has been included in Appendix 2. This training has been presented to staff as part of their ongoing in-house training. Staff assigned to the Ulster Canal (Upper Lough Erne to Clones) will also benefit from this training.

3.3.4.3 Suitable species for hedge/woodland planting/replacement

Close monitoring of planted woodland and hedgerow will be required throughout the first 10 years of the Ulster Canal (Upper Lough Erne to Cones). Throughout this time trees may need to be replaced due to natural wastage, onset of disease, vandalism, etc. In such an event the tree which needs replacement should be replaced with the same species or a suitable native species from the list below:

Alder <i>Alnus glutinosa</i>	A small tree capable of growing in wet or waterlogged conditions. It has a dense fibrous root system that binds soil well.
Ash <i>Fraxinus excelsior</i>	A tall, light demanding tree with an open canopy, often found on river banks.
Birch <i>Betula alba</i>	Both downy and silver birch can be planted and will form slender graceful trees which are visually pleasing. Downy birch is tolerant of damp sites. Both are light-demanding and should not form part of a mixture of trees for this reason.
Blackthorn <i>Prunus spinosa</i>	A low dense shrub that is valuable as cover for birds and useful for hedging.
Spindle <i>Euonymus europaeus</i>	An attractive open shrub with very striking scarlet and orange fruits.
Guelder Rose <i>Viburnum opulus</i>	An attractive open shrub with striking white, many flowered heads and good autumn colour.
Hawthorn <i>Crataegus monogyna</i>	A dense medium sized tree or hedgerow shrub. It established easily from whips and gives a good stock proof barrier. The white bunches of flowers provides a rich nectar for insects. Birds benefit from the cover for roosting and nesting whilst the fruit is a valuable food in autumn.
Hazel <i>Corylus avellana</i>	A medium to low open shrub that gives an early pollen source and edible nuts in autumn. It coppices well and the coppice stakes and whips can be used in hedging.
Oak <i>Quercus sp.</i>	A large open crowned tree, but slow growing. It is a valuable tree for insects but given its wide root network should not be planted close to the canal bank.
Willows <i>Salix sp.</i>	They are all fast growing and tolerant of wet conditions. There are two native tree species (White and Crack Willow) and the remainder are shrubs or small trees. The tree species can pollarded and all varieties can be coppiced. Willow are the food plant for many moth caterpillars.

TABLE 3-5: SUITABLE SPECIES FOR HEDGE / WOODLAND PLANTING / REPLACEMENT

3.3.5 GRASSLAND – GRASS CUTTING

The majority of grassland habitat in Northern Ireland and the Republic of Ireland can be classed as semi-natural or arable, in that active management is required. The exceptions to this would be plant communities present in maritime or montane environments where factors such as salt, wind or altitude prevent the establishment of woody plants. Due to the climatic conditions present in the island of Ireland trees are the natural climax vegetation. Management, which prevents tree establishment, is thus critical in the maintenance of grassland habitats. Grassland provides an important habitat for plant communities and forms the basis for an important part of the canal food web, sustaining insect populations and therefore birds and mammals.

In line with the Landscape Plan for the Ulster Canal (Upper Lough Erne to Clones), the canal corridor will be allowed to vegetate naturally based on the contents of the in situ seed bank (establishment of a pilot area of seeded species rich grassland is also being proposed – see LMP).

Grass cutting operations commence in April and cease in October each year. The frequency of the cutting depends on location and type of the amenity areas and walkways. Push, ride-on and flail mowers are employed at various locations. The general principle is one of minimal intervention.

As a number of different areas and management techniques will be required throughout the canal corridor this will be dealt with separately:

3.3.5.1 Towpath

Grassed towpaths will typically occur in rural locations of the Ulster Canal with use primarily by walkers and anglers. Maintenance cutting should be confined to the centre of the towpath. An area of uncut grass should be left uncut between the riparian fringe and the hedgerow/embankment.

3.3.5.2 Embankments

Embankments need to be carefully managed to ensure that scrub encroachment does not take place. Embankments will be kept clear of dense vegetation to allow for regular monitoring and inspection for potential leaks. Furthermore establishment of climax vegetation such as tree species can lead to root penetration of the canal bank and resultant loss of water through leakage.

The mowing regime should however maximise the ecological potential of the established grassland. Therefore cutting should only take place twice a year (once in March/April and again in September) to promote species richness and provide cover for insects and birds. Cuttings, if feasible, should be removed to prevent enrichment of the underlying soil.

3.3.5.3 Amenity Areas

Given the heavy use of amenity areas these areas are to be mown on a regular basis to provide for user friendly space for recreational users.

3.3.5.4 Buffer Fringes

These fringes should be only be cut twice a year (once in March/April and again in September) to promote species richness and provide cover for insects and birds.

3.3.5.5 Lock Chambers and Moorings

These areas can be subject to regular pedestrian traffic. Therefore maintenance should be on a regular basis to make falls (e.g. lock chambers) and trip hazards (mooring posts) more visible.

3.4 RIVER FINN HABITAT MANAGEMENT GUIDELINES

Restoration of the Ulster Canal from Upper Lough Erne to Clones will provide the area with a new high quality environmental asset. The majority of the restored canal will run through agricultural land, however, a navigation channel will also be established within Upper Lough Erne up to the existing navigation markers at Quivvy Point. Within the Plan area Upper Lough Erne and the Lough Oughter Complex are designated as part of the European Natura 2000 network and encompass two Special Areas of Conservation (SACs) and one Special Protection Area (SPA).

Upper Lough Erne and the Lough Oughter Complex are rich in aquatic plant species and have extensive wetland habitats that hold a dense and large population of otters. This Annex II species are a primary reason for the Natura 2000 designation of this site given Northern Ireland holds one of the strongest populations of otters in the UK. In addition, the area supports internationally important numbers of wintering Whooper Swan and other important bird species such as Greenland White-fronted Goose, Common Tern, and Corncrake. Within the Plan area there are also other internationally and nationally protected environmental designations, such as wetland Ramsar Sites, Areas of Special Scientific Interest (ASSIs), Natural Heritage Areas (NHAs), and Salmonid Lakes and Rivers.

3.4.1 DREDGING

The creation of navigable channels in natural aquatic systems such as lakes and rivers has advanced considerably in recent decades. In fact most maintenance dredging is now regarded as 'partial dredging' as it is now considered bad practice to dredge continuous lengths of river from bank to bank. As is illustrated in the accompanying Environment Impact Statement the connection of the Erne and Ulster Canal Navigations involves partial dredging between Quivvy Lough and

Gortnacarrow. The navigation channel was located using the *Design with Nature* principle i.e. the channel is located in the naturally eroding deeper sections of the river, where feasible.

The *Design with Nature* approach ensures a minimal amount of river habitat is disturbed during the construction phase of the project. It also ensures that maintenance dredging is kept to an absolute minimum throughout the operational phase.

It should also be noted that management interventions to retain navigation and amenity functions will also have to factor in the ecological aspects of the river to ensure the achievement of Good Ecological Status (GES) as prescribed under the WFD.

As with canal maintenance, dredging of the river navigation results in the removal and disturbance of some flora and fauna (notably benthic invertebrates and submerged macrophytes). However given the SAC and SPA designations secondary impacts (e.g. disturbance to overwintering birds) need to be carefully assessed prior to any maintenance activity taking place.

However, impacts are usually short lived and the frequency between dredging events will be as large as possible given the *Design with Nature* approach.

3.4.1.1 Dredging Protocol

Prior to any Riverine dredging event the following protocol will be adopted:

1. Initial consultation with Environment Section.
2. Identification of potential environmental and heritage risks.
3. Sediment sampling and analysis.
4. Scheduling of dredging to minimise impacts to local flora and fauna, in particular species protected under the SAC/SPA designation.
5. If necessary, under licence, the capture and relocation of protected species.
6. Mitigation of potential impacts to fisheries, depending on the dredging methodology utilised.
7. Submission of appropriate assessment, if required.
8. Identification of areas where sediment can be reused/disposed.

The above represent broad objectives to be followed during a dredging event. Consultation with relevant wildlife authorities (i.e. NIEA, NPWS, Fishery Authorities) is of paramount importance throughout.

A number of dredging techniques can be employed along the river section depending on site specific conditions and access:

- Water-based excavating equipment.
- Suction dredging.
- Use of GeoTubes TM.

3.4.1.2 Protecting Water Quality during Dredging

Water quality can be impacted upon by the re-suspension of particulate matter during the dredging process. The resulting rise in suspended solid levels can impact on:

- Alteration or disruption to riverine sediments.
- The suspended sediment load and turbidity of a river are increased during the removal of sediment. The effects may persist for some distance downstream.
- Settling out of the material in suspension will alter the composition of the downstream.
- Substrate removal can affect spawning habitat of certain fish species as well as affecting in-situ eggs/juveniles.
- Substrate siltation by fine sediment is known to affect the spawning, incubation and emergence of some species of fish, such as salmonids. Fine sediment can reduce the suitability of gravels for spawning and as a habitat for young fish.
- Suspended sediment in the water affects the respiratory system of fish.
- Increased turbidity reduces light penetration and therefore primary productivity, which has a knock-on effect throughout the food chain.
- Macroinvertebrates can be affected by the blocking of interstitial spaces, causing oxygen-depletion and hence species mortality.
- Reduced primary productivity and reduced invertebrate and fish populations can affect local mammal and bird populations which rely on these sources of food.
- Aquatic macrophytes will also be affected within the navigable section of the river.

To avoid excessive changes in water quality every precaution should be taken to minimise initial re-suspension. This could include:

1. Using contained dredging operations such as suction dredging.
2. Isolation of turbid waters from the rest of the waterbody by erection of silt curtains.
3. A water quality monitoring programme may also be initiated, when appropriate.

3.4.2 OPEN WATER HABITAT – AQUATIC PLANT MANAGEMENT

Aquatic plant management will be monitored on an ongoing basis but based on similar Riverine navigations throughout Ireland maintenance is considered unlikely.

4 CONTROL OF NON-NATIVE INVASIVE SPECIES

Non-native invasive species can negatively transform native ecosystems, thereby threatening indigenous and endangered flora and fauna. The problems caused by invasive species are so serious that the introduction of these species is identified as one of the main causes of biodiversity loss worldwide. This has been recognised in decisions on alien species agreed by the contracting parties to the Convention on Biological Diversity (CBD), including Ireland and the United Kingdom (*source: Invasive Species in Ireland Report, 2006*).

The vectors and pathways by which non-native species are transported are numerous. They result from the diverse range of human activities which operate over a range of scales. Primary introductions often result from the accidental transport of species, for example via hull fouling or ballast water. Secondary introductions result from the expansion of species from the initial place of establishment. Secondary spread will normally include a wider range of vectors that may act either separately or together (*source: Invasive Species in Ireland Report, 2006*).

As this EMP covers a canal that remains within the catchment of the River Finn and Upper Lough Erne the risk of spread is contained. However efforts will have to be made to prevent infestation of the canal system to ensure compliance with the WFD and to minimise accidental/natural spread to watercourses adjacent to the canal.

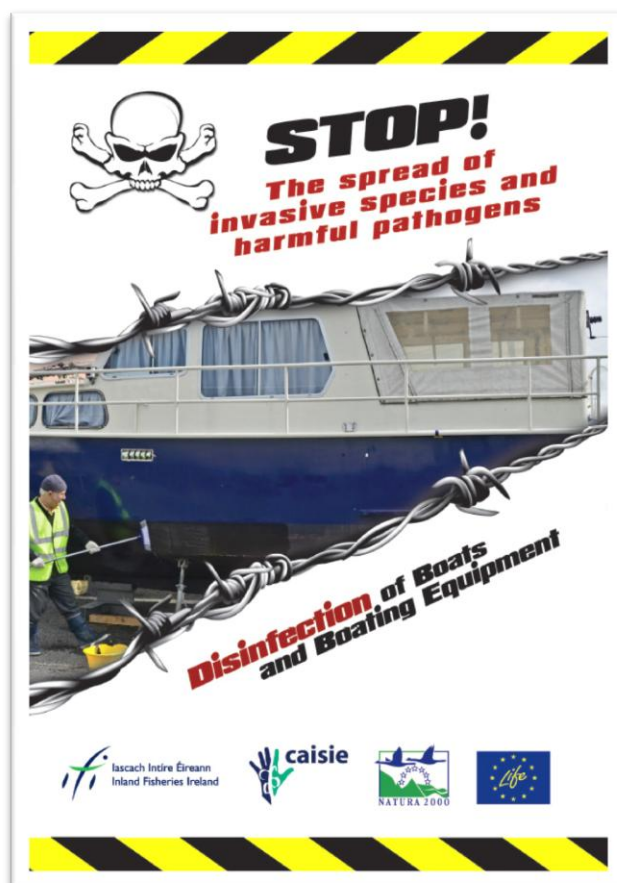


Figure 4-1 is an example of educational material being developed to increase awareness of the vectors and impacts of invasive species.

This flyer was developed by CAISIE (Controlling Aquatic Invasive Species in Ireland) An EU Life+ funded project being project managed by IFI with WI a project partner.

Pilot projects are currently underway on the Grand Canal and Barrow Navigation.

FIG. 4-1: 'STOP! THE SPREAD OF INVASIVE SPECIES AND HARMFUL PATHOGEN' LEAFLET

4.1 **RELEVANT LEGISLATION**

A great deal of international and national legislation is in place to deal with invasive species; a selection of the most pertinent pieces is outlined below:

International Instruments		
<i>Name</i>	<i>Year</i>	<i>Subject</i>
CBD	1993	Biodiversity Conservation
Bern Convention on conservation of European Wildlife and Natural Habitats	1982	Biodiversity conservation
Bonn Convention on the conservation of Migratory Species of Wild Animals	1983	Biodiversity Conservation
IUCN Guidelines for the Prevention of Biodiversity loss caused by alien invasive species	2000	Biodiversity Conservation
Ramsar Convention on Wetlands of International importance especially as Waterfowl Habitat	1975	Biodiversity Conservation
Agenda 21	1992	Biodiversity Conservation

TABLE 4-1: CONTROL OF INVASIVE SPECIES: INTERNATIONAL INSTRUMENTS

European Legislation		
<i>Name</i>	<i>Year</i>	<i>Subject</i>
Habitats Directive (92/43/EEC)	1992	Biodiversity Conservation
WFD (2000/60/EC)		
Birds Directive (79/409/EC)		
Wildlife Trade Regulation (EC No. 338/97, EC No. 939/97 and EC No. 191/2001)	1997	Trade-related agreements / Biodiversity conservation

TABLE 4-2: CONTROL OF INVASIVE SPECIES: EUROPEAN LEGISLATION

Domestic Legislation			
<i>Name</i>	<i>Year</i>	<i>Jurisdiction</i>	<i>Subject</i>
Wildlife (Northern Ireland) Order	1985	NI	Biodiversity Conservation
Wildlife Act	1976	RoI	Biodiversity Conservation
Wildlife (Amendment) Act	2000	RoI	Biodiversity Conservation
Environmental Protection Agency Act	1992	RoI	Biodiversity Conservation
Heritage Act	1995	RoI	Biodiversity Conservation
Fisheries Act	1966	NI	Fisheries
The Fisheries Act	1980	RoI	Fisheries

TABLE 4-3: CONTROL OF INVASIVE SPECIES: DOMESTIC LEGISLATION

4.2 **BIOSECURITY PROTOCOLS TO STOP / MINIMISE THE SPREAD OF INVASIVE SPECIES (IS)**

In line with current best practice and research being undertaken on the Grand Canal (CAISIE - LIFE Project Number LIFE07 NAT/IRL/000341) the following actions and biosecurity protocols are being proposed:

- Implement targeted and focused biosecurity protocols (see below) for all works undertaken by WI to stop/minimise the spread of non native invasive species.
- Participate in relevant invasive species working groups in order to be kept abreast of the latest information and developments with regard to IS management.
- Facilitate a focused, intensive canal boat-based survey on a periodical basis to document and locate potential new infestations by invasive species.
- Proactive removal of identified infestations prior to establishment, where feasible.
- Work in conjunction with relevant statutory agencies to increase and raise awareness with stakeholders and members of the public with regard to IS.

Activity	Biosecurity Protocols
<i>Ecological Fieldwork</i>	• Regular fieldwork should be undertaken to allow for early identification and subsequent removal/containment of invasive species. • All field equipment will be suitably disinfected and/or cleaned, as required, before being returned to WI Environment Section.
<i>Dredging</i>	• All equipment that has come into contact with the water will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This will be done before leaving the site. • Any attached or adherent material (fish, fish scales, vegetation and debris) will be removed before leaving the site of operation. • All water will be drained from water retaining compartments and other equipment before transportation elsewhere.
<i>Towpath Management</i>	• All equipment will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site. • Any attached or adherent material (vegetation and debris) will be removed before leaving the site of operation. • NOTE: In the event of: ○ Japanese Knotweed being noted specific guidance on its management will be sought from the Environment Section. ○ Giant Hogweed being noted the relevant WI Safety Operating Procedure (SOP) will be consulted for both environmental and health and safety reasons.

TABLE 4-4: BIOSECURITY PROTOCOLS TO STOP / MINIMIZE THE SPREAD OF IS

<i>Aquatic Weed Management</i>	• All equipment that has come into contact with the water will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This will be done before leaving the site. • Any attached or adherent material (fish, fish scales, vegetation and debris) will be removed before leaving the site of operation. • All water will be drained from boats, live wells and other water retaining compartments, outboard motors, tanks and other equipment before transportation elsewhere. • High-pressure steam cleaning, with water > 40 degrees C, is recommended for boats (including oars, row locks, attachment ropes, anchors and buoys), trailers and outboard motors that are being moved from one watercourse to another. If it is not possible to steam clean the equipment, a normal power-hose will be used. After cleaning the equipment will be visually inspected to ensure that all adherent material and debris has been removed. • Wet or live wells and other water retaining compartments in survey boats will be cleaned, rinsed or flushed with a 1% solution of Virkon Aquatic or another appropriate disinfection product. • Outboard motors will be flushed with a 1% solution of Virkon Aquatic or another appropriate disinfection product, or with water > 40 degrees C.
<i>Fish Stocking</i>	• Fish stocking to be outsourced to a suitably qualified agency. A key part of the associated contract will be to ensure that biosecurity protocols are core to their day to day works.
<i>Water abstraction and/or discharge</i>	• Discharge will pass through a chamber containing filter mesh screens to prevent any invasive plant fragments or seeds being passed to the catchment. Filters will be cleaned at regular intervals by WI operational staff to ensure free discharge to the River Finn at a location to be agreed with Monaghan Co. Co.
<i>Bank Protection Works</i>	• All equipment will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site. • Any attached or adherent material (vegetation and debris) will be removed before leaving the site of operation.

TABLE 4-4: BIOSECURITY PROTOCOLS TO STOP / MINIMIZE THE SPREAD OF IS (CONTINUED)

<i>Drain Clearance</i>	• All equipment will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This should be done before leaving the site. • Any attached or adherent material (vegetation and debris) will be removed before leaving the site of operation.
<i>Inspectorate</i>	• All equipment that has come into contact with the water will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This will be done before leaving the site. • Any attached or adherent material (fish, fish scales, vegetation and debris) will be removed before leaving the site of operation. • All water will be drained from boats, live wells and other water retaining compartments, outboard motors, tanks and other equipment before transportation elsewhere. • High-pressure steam cleaning, with water > 40 degrees C, is recommended for boats (including oars, row locks, attachment ropes, anchors and buoys), trailers and outboard motors that are being moved from one watercourse to another. If it is not possible to steam clean the equipment, a normal power-hose will be used. After cleaning the equipment will be visually inspected to ensure that all adherent material and debris has been removed. • Wet or live wells and other water retaining compartments in survey boats will be cleaned, rinsed or flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product. • Outboard motors will be flushed with a 1% solution of Virkon Aquatic or another proprietary disinfection product, or with water > 40 degrees C.
<i>Slipways</i>	• Signage and educational information will be placed at slipway access points. The purpose is to make stakeholders and members of the public aware of the importance of containing the spread of invasive species.

TABLE 4-4: BIOSECURITY PROTOCOLS TO STOP / MINIMIZE THE SPREAD OF IS (CONTINUED)

4.3 **PRIORITY INVASIVE SPECIES**

The National Biodiversity Data Centre considers the list below to be of paramount concern (STRIVE Priority Species List). This list is not exhaustive and monitoring for potential new invasives should also be undertaken by regulatory agencies.

Established high impact	
<i>Latin Name</i>	<i>Common Name</i>
Aquatic Plants	
<i>Lagarosiphon major</i>	Curly Waterweed
<i>Elodea nuttallii</i>	Nuttall's Waterweed
<i>Myriophyllum aquaticum</i>	Parrots Feather
<i>Crassula helmsii</i>	New Zealand Pigmyweed
<i>Azolla filiculoides</i>	Water Fern
<i>Lemna minuta</i>	Least Duckweed
<i>Nymphoides peltata</i>	Fringed Water-lily
<i>Hydrocotyle ranunculoides</i>	Floating Pennywort
Invertebrate	
<i>Dreissena polymorpha</i>	Zebra Mussel
<i>Gammarus pulex</i> & <i>G. tigrinus</i>	Invasive Gammarids
<i>Eriocheir sinensis</i>	Chinese Mitten Crab
Fish	
<i>Leuciscus cephalus</i>	Chub
<i>Leuciscus leuciscus</i>	Dace
Riparian plants	
<i>Heracleum mantegazzianum</i>	Giant Hogweed
<i>Impatiens glandulifera</i>	Himalayan Balsalm
<i>Fallopia japonica</i>	Japanese Knotweed
Potential High Impact	
<i>Latin Name</i>	<i>Common Name</i>
Aquatic plants	
<i>Ludwigia peploides/grandiflora</i>	Water Primrose
Invertebrate	
<i>Astacus astacus</i>	Noble crayfish
<i>Aatacus eptodactylus</i>	Turkish Crayfish
<i>Pacificastacus leniusculus</i>	Signal Crayfish
<i>Orconectes limosus</i>	Spiny-cheeked/striped Crayfish
<i>Procambarus clarkii</i>	Red Swamp Crayfish
<i>Hemimysis anomala</i>	Ponto-Caspian Mysid
<i>Gyrodactylus salaris</i>	Parasite
<i>Dreissena bugensis</i>	Quagga Mussel
<i>Corbicula fluminea</i>	Asian Clam
Fish	
<i>Gymnocephalus cernuus</i>	Ruffe
<i>Zander lucioperca</i>	Zander
<i>Pseudorasbora parva</i>	Topmouth Gudgeon

TABLE 4-5: STRIVE PRIORITY SPECIES LIST

5 WASTE MANAGEMENT

WI has identified a number of streams through which waste can arise during the operation and maintenance of the Ulster Canal (Upper Lough Erne to Clones). These include:

- **Sediment arising from maintenance dredging**
 - Sediment from maintenance dredging will be first classified to determine the appropriate use/disposal methods in accordance with Waste Acceptance Criteria (WAC) and relevant waste legislation.
 - Once the classification is determined and if deemed suitable the material will be re-used along the length of the site where possible for improvements to the canal, bank, towpath or where required.
 - If there is no re-use need on site for the material, approved and licensed facilities will be sought at which to dispose of the material. As a rule, and subject to the material being accepted land remediation and landfill capping is the first preferred option, followed by inert disposal and finally non hazardous disposal.
 - If material is deemed to be of a hazardous nature then suitable and appropriate hazardous transport and disposal facilities will be sought at which to dispose of the material.
- **Foul water arising from amenity areas and service blocks**
 - All foul-water will be diverted into main foul sewer lines or holding tanks for treatment.
 - All surface waters from amenity areas will be passed through silt and petrol/oil interceptors before discharge under approved discharge licences.
- **Litter from rubbish bins at amenity areas and service blocks**
 - Litter and appropriate waste recycling facilities to service recreational users will be provided at key points along the canal. These waste streams will be collected for processing/recovery/recycling by the council or by private companies under contract/agreement with WI.
- **Hydraulic oil from lock chambers**
 - The design and operation of the hydraulic lock mechanisms is such that there is minimal loss of any oil. Filters and bypass systems in the mechanisms allow for the regular cleaning and maintenance of filters. This eliminates the need for oil replacement.
 - All hydraulic oil systems in the lock chambers are filled with biodegradable hydraulic oil, further reducing the impact to the environment
- **Waste oil from maintenance vehicles**
 - All waste oils and hazardous materials associated with the maintenance of machinery and vehicles is to be collected and transported for recovery, recycling and/or disposal by licenced waste oil recovery contractors.
 - Appropriate waste oil receptacles or bunded units are to be used for the storage of waste oil, waste oil filters, oil canisters etc, until a suitable quantity is available for collection.

5.1 **RELEVANT LEGISLATION**

5.1.1 EUROPEAN LEGISLATION

Name	Year	Jurisdiction	Subject
EU Waste Framework Directive	2008/98/EC	EU	Waste
EU Hazardous Waste Directive	91/689/EEC	EU	Waste
EU Landfill Directive	1999/31/EC	EU	Waste
EU Environmental Liability Directive	2004/35/EC	EU	Waste
EU Integrated Pollution Prevention and Control Directive	2008/1/EC	EU	Waste

TABLE 5-1: WASTE MANAGEMENT – EUROPEAN LEGISLATION

5.1.2 DOMESTIC LEGISLATION

Name	Year	Jurisdiction	Subject
Controlled Waste (Duty of Care) Regulations (Northern Ireland) and Amendments	2002	NI	Waste
Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations	1999	NI	Waste
Waste and Contaminated Land (Northern Ireland) Order and Amendments	1997	NI	Waste
Waste Management Regulations (Northern Ireland)	2006	NI	Waste
Waste Management Licensing Regulations (Northern Ireland) and Amendments	2003	NI	Waste
Waste Regulations (Northern Ireland)	2011	NI	Waste
Transfrontier Shipment of Wastes Regulations	2007	NI	Waste
Landfill Regulations (Northern Ireland) and Amendments	2003	NI	Waste
Pollution Prevention and Control Regulations (Northern Ireland)	2003	NI	Waste
Protection of the Environment Act	2003	RoI	Waste
Waste Management Act and Amendments	1996	RoI	Waste
Waste Management (Hazardous Waste) Regulations	1998	RoI	Waste
Waste Management (Licensing) Regulations	2004	RoI	Waste
Waste Management (Facility Permit and Registration) Regulations	2007	RoI	Waste

TABLE 5-2: WASTE MANAGEMENT – EUROPEAN LEGISLATION

5.2 WASTE MANAGEMENT HIERARCHY

In line with waste management best practice WI adopts the principles of the waste management hierarchy (see below) when dealing with waste generated as a result of its maintenance activities.

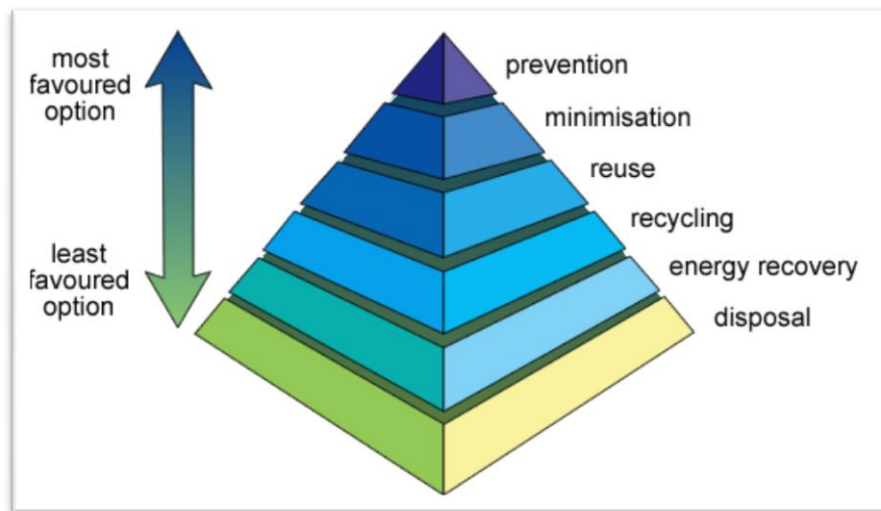


FIG.5-1: WASTE MANAGEMENT HIERARCHY

The following are examples of the implementation of this best practice

Preferred management option (most to least favourable)	Example
Prevention	- Regular maintenance of machinery to prevent machinery failure and potential oil spillages. - Provision of sensor activated air hand dryer units at all service blocks to eliminate the use paper towel waste. - Use of bypass systems in the hydraulic lock mechanisms that allows staff to service the units without needing to replace the biodegradable hydraulic oils.
Minimisation	All service blocks to utilise sensor activated water, soap and hand dryers to reduce waste as well as dual flush toilets.
Reuse	Reuse of dredged sediment for bank and towpath repairs, subject to WAC.
Recycling	Recycling of waste oils, where feasible.
Energy recovery	<i>Outside the scope of this EMP.</i>
Disposal	Only used where absolutely necessary.

TABLE 5-3: EXAMPLES OF IMPLEMENTATION OF WASTE MANAGEMENT BEST PRACTICE

5.3 ROLES AND RESPONSIBILITIES

WI has the following responsibilities with regard to waste management on the Ulster Canal (Upper Lough Erne to Clones)

- WI has a duty of care and responsibility to ensure that all waste arising from its activities is correctly characterised. Furthermore WI must ensure the principles of the waste management hierarchy adhered to.
- WI has ultimate responsibility to ensure that it only uses licensed hauliers and disposal sites at all times when dealing with waste.
- All WI vehicles must be suitably licensed to transfer waste from one location to another.

APPENDICES

APPENDIX I - CONTACT PHONE NUMBERS

Organisation	Telephone
WI Environment Section	+353-(0)61-922141
Emergency services: NI and RoI	112 or 999
Cavan County Council	+353-(0)49-4378300
Monaghan County Council	+353-(0)47-30500
Fermanagh District Council	+44-(0)28-66325050
EPA	1890 335 599
Inland Fisheries Ireland, Swords (HQ)	+ 353-(0)1-8842600
Inland Fisheries Ireland, Ballyshannon	+353-(0)71-9851435
DCAL Fisheries	+44-(0)28-90258825
NPWS	1890 202 021
NIEA - Water Management Unit	+44-(0)28-92623100
NIEA - Natural Heritage Section	+44-(0)28-90569515

APP TABLE 1-1: CONTACT PHONE NUMBERS

APPENDIX II - RIPARIAN AND HEDGEROW MANAGEMENT – MANUAL FOR OPERATIVES

1. RIPARIAN FRINGE – CUTTING OF REED FRINGE

Riparian is another term used for that area of a river, lake or canal that relates to the bank. It comes from Latin *ripa*, meaning *bank*. The riparian fringe, once it becomes established, will provide a diverse community of plants, which in turn will attract insects in summer and seed eating mammals and birds in winter. Where the vegetation is tall, the structure provides habitat for nesting birds, invertebrates and small mammals. This transitional habitat from open water to grassed towpath requires sensitive management both as a wildlife refuge but also as an important bank protection asset within the navigation. Riparian areas absorb the wash from boats and high winds thereby protecting the structural stability of the canal bank.

The area is very good for angling as fish use the riparian habitat to:

- Hide from predators.
- Hunt for food (insects).
- Lay their eggs.

The plants can absorb excess nutrients and pollutants in the water should they occur. This natural pollution reducing function of reed fringes is now being incorporated into the design of new waste water treatment plants and cleaning run-off from roadway schemes.

Finally it possesses aesthetic qualities, i.e. the riparian habitat provides a beautiful natural waterway fringe that contributes to the enjoyment of a boaters experience along the waterways.

1.1. RELEVANT LEGISLATION

As an established riparian area is important for nesting waterfowl management of this habitat is limited to certain times of the year as prescribed under the:

- Wildlife (Northern Ireland) Order 1985.
- The Wildlife Act 1976.
- The Wildlife (Amendment) Act 2000.

Under the above legislation management of the riparian fringe is limited to September 1st to the last day in February. Though these dates are not prescribed under legislation in Northern Ireland it is an agreed window of opportunity during which works are permitted.

Careful monitoring of the reed fringe will be undertaken throughout the growing season to ensure areas that are encroaching on the navigation can be cut during the

open season. Any necessity to cut on health and safety grounds during the closed season can be facilitated but should be avoided.

1.2. MANAGEMENT PRACTICES FOR RIPARIAN FRINGE

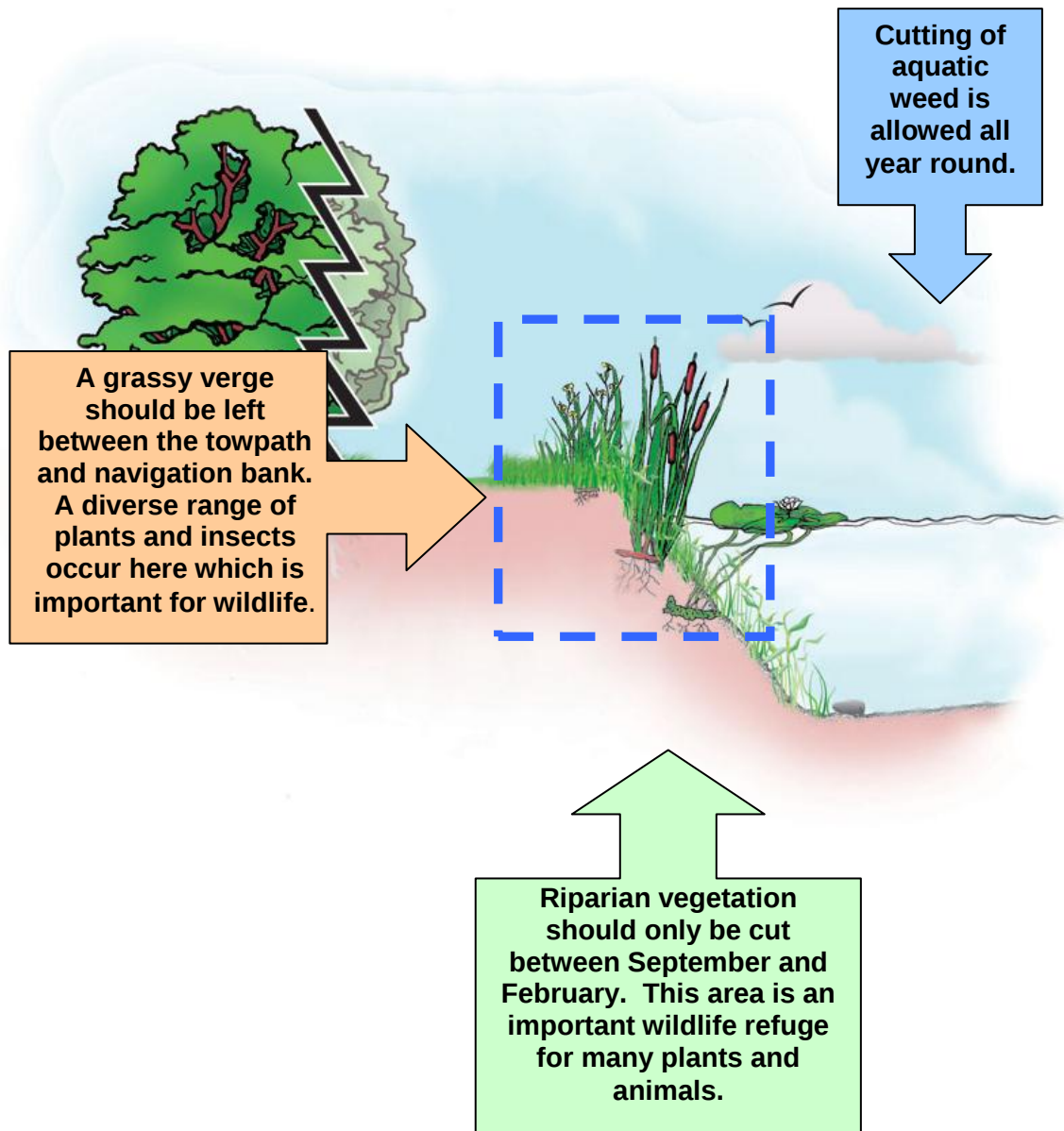
In order to maintain this area to allow navigation and maintain its value for wildlife, appropriate management is essential. WI staff have extensive experience in undertaking sensitive management practices as can be seen in the multitude of wild flora and fauna along the waterways.

In general these practices include the following:

- Only cutting / removal of reed fringe when it is impacting on the health and safety of boat operators or other recreational users (e.g. rowers).
- **Reed cutting is never undertaken during the period March 1st to August 31st as to do so could negatively impact nesting birds and their young. To cut during this timeframe is illegal.**
- EXCEPTION: If, for health and safety reasons, cutting is required during the period March 1st to August 31st the relevant authorities must first be contacted for their approval. All out of season cutting must first be notified to the Environment Section. Proper planning should remove this necessity, though not always depending on a particular seasons growth (i.e. very good weather, nutrient levels).
- Small scale reed cutting is permissible to facilitate angling competitions. The relevant fishing authorities will be notified of such works on the canals.
- When undertaking towpath maintenance only the required path width will be cut, i.e. the very edge of the towpath will not be cut or down the side slope towards the water. This riparian zone is very important for wildlife.
- Dredging will be carried out from one bank only (where possible) leaving a wide band of riparian/marginal vegetation on the offside.
- In sections where the only surviving reed beds are on the towpath side of the canal the floating dredger should be used to avoid damaging the marginal riparian vegetation.
- Where possible submerged berms should be created to facilitate the establishment of a reed fringe.

All current field operatives have been given Tool Box Talks relating to hedge and riparian management. New staff will also be given this training. Refresher courses, as deemed necessary, can also be given.

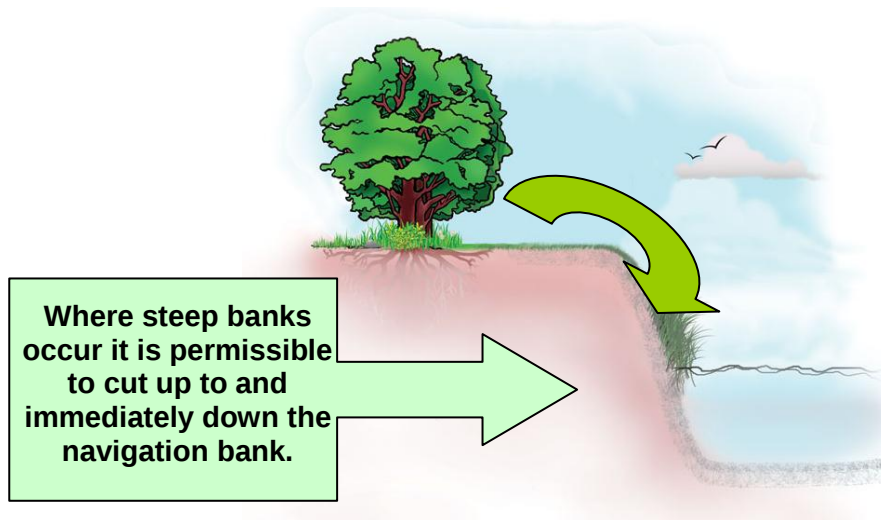
Therefore, where possible, the following illustration (App Fig. 1) is an example of the ideal riparian zone:



APP FIG. 1: IDEAL SITUATION FOR RIPARIAN ZONE

Cutting in the area outlined in blue should be avoided to maintain and improve the rich flora and fauna adjacent the waterbody.

App Fig. 2 to 6 are permissible exceptions to this rule:



APP FIG. 2: EXCEPTION 1: STEEP EMBANKMENTS

NOTES

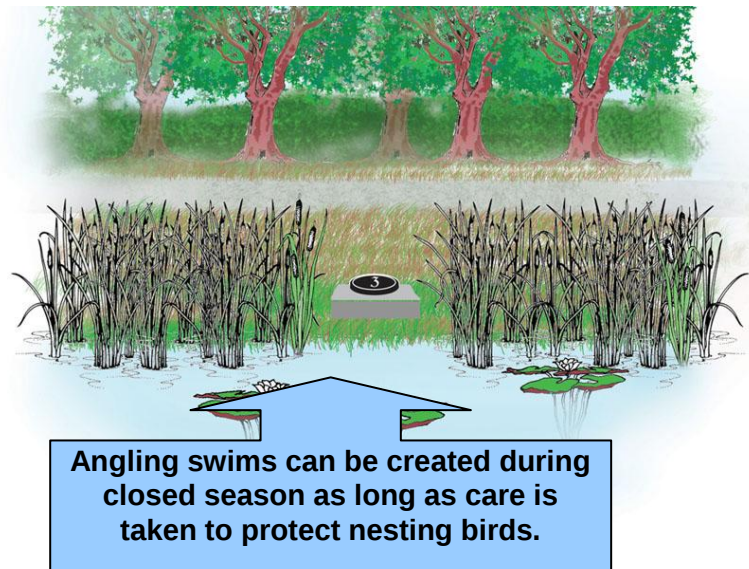
- Cutting should only be undertaken on the bank slope to highlight the risk associated with the steep bank to recreational users. There is no need to cut right down to the water's edge.



APP FIG. 3: EXCEPTION 2: URBAN AREAS

NOTES

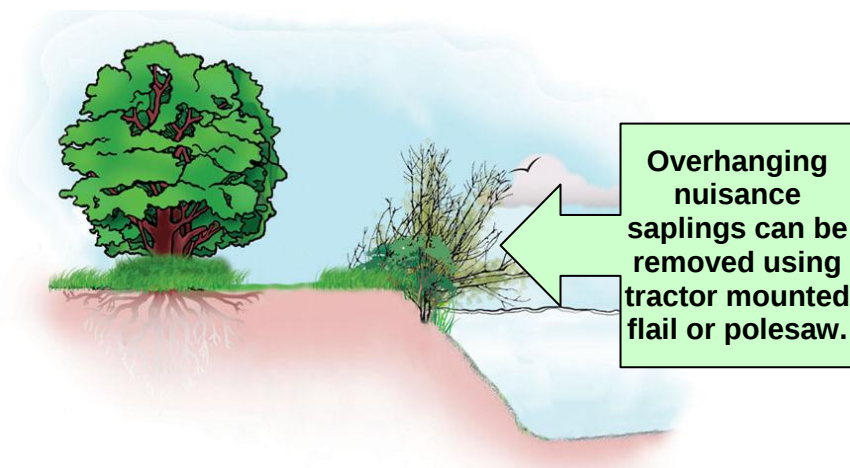
- To blend in with the aesthetic qualities of an urbanised area a more manicured approach is adopted.
- Also rubbish can collect more easily in longer reed fringes and grasses. This can prove unsightly and make the job of staff harder and riskier. Keeping the grassed area to the edge of the navigation short helps avoid this.
- Reed should not be cut as they are important for wildlife and they will also reduce the chance of litter entering the water as they act like natural trash screens.



APP FIG. 4: EXCEPTION 3: CREATING ANGLING SWIMS

NOTE:

- This act is permissible during the closed season. However when doing so every precaution will be taken to avoid areas with nesting birds.
- Swims will only be cut to the minimum width.
- Notification will be given to IFI / DCAL Fisheries. This can be done through the Environment Section.



APP FIG. 5: EXCEPTION 4: NUISANCE SAPLINGS

NOTE:

- Nuisance saplings can cause a number of hazards along the waterways:
 - They can overhang and impact navigation.
 - They can pull sections of the bank away and perhaps lead to a breach.
- In certain areas it is permissible to overhang the flail / mower and cut these species.
- Cutting should not be undertaken too close to the base as this will reduce the wildlife quality of the area and could also lead to more vigorous growth of the tree (coppicing).
- Spot treating with herbicide is also an option.



APP FIG.6: EXCEPTION 5: AREAS AROUND LOCK CHAMBERS / NAVIGATION INFRASTRUCTURE
NOTE:

- Though often located in rural areas a more urban maintenance practice is allowable here.
- This is to reflect the local vernacular heritage (e.g. a lock chamber and surrounding features) which is an extension of a lock house / public open space.

For health and safety reasons it is advisable to maintain well mown grass so features such as bollards, mooring posts and steep drops (into the lock chamber) are visible to all visitors and staff.

2. HEDGEROW – CUTTING HEDGEROWS

Hedgerows provide food and shelter for insects, birds and other animals, forming corridors that permit wildlife to move between habitats. As many birds and small mammals never venture more than a few metres from cover, populations would become isolated and vulnerable without hedges. Nearly two thirds of Ireland's bird species nest in hedges. In general, wide and high hedges with a broad diversity of plant species are the most beneficial to wildlife.

Hedgerows are proposed for planting along certain stretches of the Ulster Canal (Upper Lough Erne to Clones) to enhance habitat diversity as well as providing shelter for boaters and screening from adjacent roads. Please refer to the Landscape Plan for where hedgerows are proposed.

As hedgerows take longer than most habitats along the canal to become established it is necessary to outline a greater degree of maintenance to ensure a healthy and vibrant hedge. Planting of the hedge will be undertaken by the contractor during the construction phase of the project so this section will deal only with hedge maintenance.

2.1. LEGISLATION

As hedgerows important for nesting birds management of this habitat is limited to certain times of the year as prescribed under the:

- Wildlife (Northern Ireland) Order 1985.
- The Wildlife Act 1976.
- The Wildlife (Amendment) Act 2000.

Under the above legislation management of hedgerows is limited to September 1st to the last day in February. Though these dates are not prescribed under legislation in Northern Ireland it is an agreed window of opportunity during which works are permitted.

Careful monitoring of hedges should be undertaken throughout the growing season to ensure areas that are encroaching onto the towpath/roadway can be cut during the open season. Any necessity to cut during the closed season can be facilitated under Health and Safety legislation but should be avoided.

2.2. HEDGEROW MAINTENANCE PRACTICES

Hedgerows must be managed to encourage their long-term conservation and development. Proper maintenance encourages flowering, fruiting, vigour, and wildlife potential. Mature hedgerows in good condition should be allowed to grow naturally, with maintenance confined to essential practices.

The following general hedgerow maintenance practices will be employed on the Ulster Canal:

- Weak hedgerows, which have lost their vigour, will require more intervention such as laying or coppicing. A hedgerow should have a dense base, form an unbroken barrier, and be at least 1.5 m high.
- Staff should check every hedge to assess its general condition. Desirable replacement species are outlined in Table 3-3 page 32.
- Hedges should be cut while they are dormant and outside the nesting season, from September 1st to the end of February.
- Overgrown or neglected hedges with sufficient vigour may be restored by coppicing – selective cutting at ground level to promote bushy regrowth.
- Gaps in hedgerows that cannot be closed by laying should be planted with hawthorn quicks, blackthorn or other suitable native species at not more than 30 cm (1ft) spacing in prepared ground. The young plants should be cut back to half their height after planting to promote growth.
- Do not apply herbicides, pesticides or fertilisers within 1.5m of a hedgerow, as this leads to nutrient enrichment that can adversely affect biodiversity.
- Fencing wire will not be attached to hedgerow trees and shrubs.
- Where practicable, hedge trimmings should be piled in a non-intrusive manner to provide habitat or mulched.

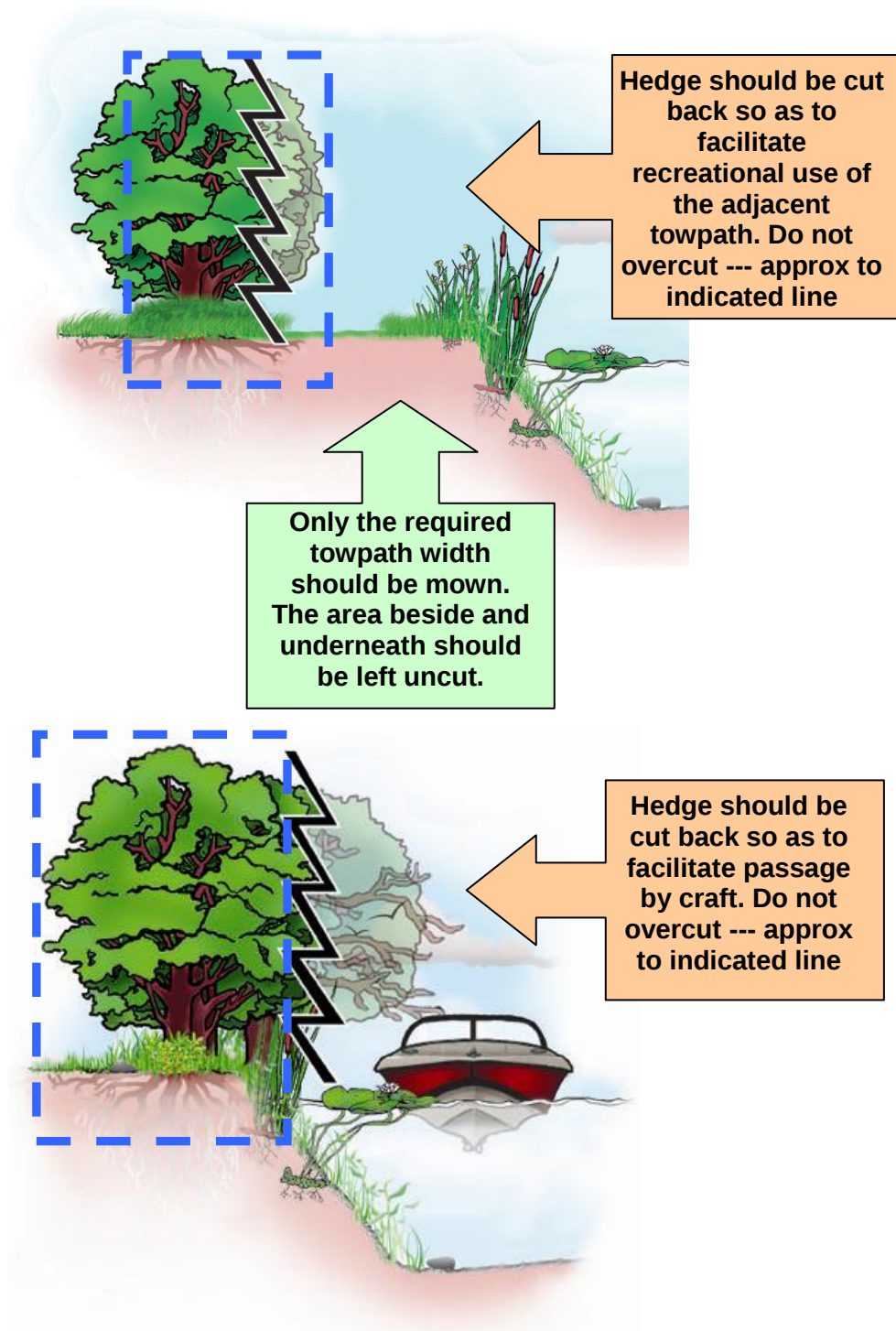
2.3. MANAGEMENT PRACTICES FOR HEDGEROWS

In order to maintain this area to allow safe navigation and maintain its value for wildlife appropriate management is essential. WI staff have extensive experience in undertaking such sensitive management practices as can be seen in the multitude of wild flora and fauna along the waterways.

In general such practices should take in the following:

- Hedgerows are only cut/maintained when it is impacting on the health and safety of boat operators or other recreational users (e.g. walkers).
- **Never undertake tree cutting during the period March 1st to August 31st as to do so could negatively impact nesting birds and their young. To cut during this timeframe is illegal.**
- EXCEPTION: If, for health and safety reasons, cutting is required during the period March 1st to August 31st please first consult with your foreman or relevant line manager. All out of season cutting must first be notified to the Environment Section so the relevant authorities can first be contacted for their approval. However proper planning should remove this necessity, though not always depending on a particular season's growth (i.e. very good weather).
- When undertaking towpath maintenance only the required path width should be cut, i.e. do not cut to the very base of the hedgerow. An area of uncut vegetation should be left between the path and hedgerow.
- Removal of overhanging branches should be confined to those which overhang the towpath or waterway and catch floating debris or obstruct navigation or impact on towpath users.
- If selective tree removal is required, again this should be undertaken between September and March. Priority should be given to non native species such as conifers or Sycamore. Native species such as alder, willow, ash, etc. should be retained where possible.
- The same guidance applies to areas of scrub. Scrub should only be removed when necessary for maintenance purposes and only during the period September to March.
- Where possible gaps in hedgerows should be replanted with native tree and shrub species such as those which grow naturally in the surrounding countryside.

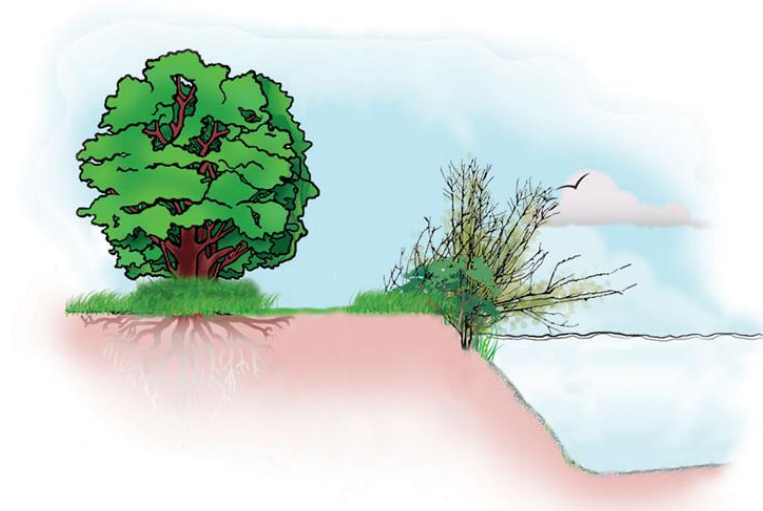
Therefore, where possible, the following illustration (App Fig. 7) are an example of the ideal hedgerow:



APP FIG. 7: IDEAL SITUATION FOR HEDGEROWS

Cutting in the area outlined in blue should be avoided to maintain and improve the rich flora and fauna associated with the hedge

App Fig. 8 to 11 are permissible exceptions to this rule:



APP FIG. 8: EXCEPTION 1: NUISANCE SAPLINGS

NOTE:

- Nuisance sapling can cause a number of hazards along the waterways:
 - They can overhang and impact navigation.
 - They can pull sections of the bank away and perhaps lead to a breach.
- In certain areas it is permissible to overhang the flail / mower and cut these species.
- Cutting will not be undertaken too close to the base as this will reduce the wildlife quality of the area and could also lead to more vigorous growth of the tree (coppicing).
- Spot treating with herbicide is also an option.



APP FIG. 9: EXCEPTION 2: FALLEN TREES / STORM DAMAGE

NOTE:

- Though the removal of fallen trees is permissible at all times of year (if they impact the health and safety of the public) notification will first be given to the Environment Section.
- The Environment Section will then liaise with the NPWS / NIEA.



APP FIG. 10: EXCEPTION 3: URBAN AREAS

NOTE:

- To tie in with the aesthetic qualities of an urbanised area a more manicured approach can be adopted.
- Tree canopies must be kept sufficiently maintained so as not to pose a hazard to cyclists, walkers or runners on the canal.
- It can often be a case that areas beneath hedgerow, if not kept short and maintained, can lead to anti-social behaviour.



APP FIG. 11: EXCEPTION 4: AREAS AROUND LOCK CHAMBERS / NAVIGATION INFRASTRUCTURE

NOTE:

- Though often located in rural areas a more urban maintenance practice is allowable here.
- This is to reflect the local vernacular heritage (e.g. a lock chamber and surrounding features) which is an extension of a lock house / public open space.
- For health and safety reasons it is advisable to maintain well mown grass and keep tree canopies high so features such as bollards, mooring posts and steep drops (into the lock chamber) are visible to all visitors and staff and low branches do not pose a hazard to people.

APPENDIX III – HABITAT MANAGEMENT OVERVIEW

Optimum Time			Not Required					Restricted by Law						
Habitat Type			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hedgerows														
Trees														
Canal Riparian Fringe														
Canal	Aquatic	Macrophytes ¹												
River	Aquatic	Macrophytes ²												
Grassed Towpath														
Buffer Zones ³														
Embankments														
Pilot	Species	Rich												
Grasslands ⁴														
Amenity areas														

Notes

- ¹ Management of canal aquatic macrophytes will be assessed upon colonisation of the canal. Site specific and targeted management practices will be developed in accordance with the species that become established. The March to September timeframe indicated for management is based on current aquatic macrophyte management practices for the Grand and Royal Canal developed by IFI, on behalf of WI.
- ² Potential management of riverine aquatic macrophytes will be assessed following establishment of the navigation channel. Historical experience within WI has shown that aquatic macrophytes rarely become an issue in Riverine navigations given in-situ environmental conditions, primarily flow rates and turbidity. However the situation will be monitored on an ongoing basis and management techniques developed and implemented with consultation from relevant agencies.
- ³ Buffer zones include the area between the riparian fringe and towpath and the hedgerow and towpath. These areas will be subject to infrequent management to promote species and sward height diversity.
- ⁴ Areas chosen to pilot a seeded species rich grassland mix will be managed in a way so as to maximise species diversity. To this end one cut with removal of cut vegetation is proposed for March and early September.

APPENDIX IV – HABITAT/SPECIES SURVEY OVERVIEW

Optimum Time	Sub Optimum Time	Not Appropriate
---------------------	-------------------------	------------------------

Habitat Surveys	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Woodland												
Hedgerows												
Grassland												
Orchids												
Aquatic Macrophytes												
Riparian Fringe												

Mammals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Otter ^{1,2}												
Badger ²												
Bats ^{1,2,A}												

Birds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Breeding Birds ^{2,3}												
Over Wintering Birds ^{2,3}												
Kingfisher ^{2,3}												

Aquatic Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salmon ^{1,4}												
Trout ^{1,B}												
Coarse Fish ^{B,4}												
River Lamprey ^{1,3}												
Brook Lamprey ^{1,3}												
Invertebrates												
White Clawed Crayfish ^{1,3}												

Notes

- ¹ Protected species under the Habitats Directive
- ² Protected Species under the Birds Directive
- ³ Protected species under the Wildlife (Northern Ireland) Order & Wildlife Act (RoI)
- ⁴ Fish and fisheries habitat are protected under relevant Fisheries Acts in Northern Ireland and the Republic of Ireland
- ^A This is a general timeframe and would need to be revised specific to monitoring for maternity roosts, feeding grounds or hibernation roosts.
- ^B Survey period reflects that used for monitoring of fish stocks to ensure compliance with the WFD, source: www.wfdfish.ie

APPENDIX V – INVASIVE SPECIES SURVEY OVERVIEW & IDENTIFICATION GUIDE

1. INVASIVE SPECIES SURVEY OVERVIEW

Optimum Time

Sub Optimum Time

Not Appropriate

Priority Aquatic Invasive Species to be surveyed on a periodic basis within the canal corridor:

Invasive Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nuttall's Pondweed												
Parrott's Feather												
Curly leaved waterweed												
New Zealand Pygmyweed												
Red Water Fern												
Asian Clam ¹												
Zebra Mussel ¹												

Priority Terrestrial Invasive Species to be surveyed on a periodic basis within the canal corridor:

Invasive Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Japanese Knotweed												
Himalayan Balsam												
Giant Hogweed												

Notes

There should be strict adherence to the biosecurity protocols outlined in Table 4-4 when undertaking fieldwork.

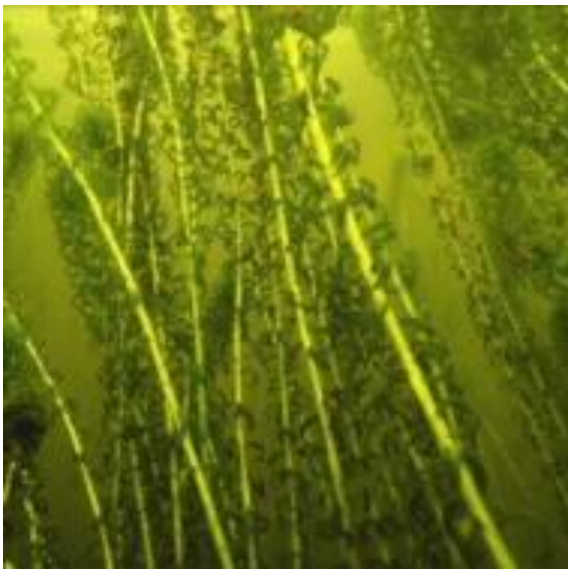
2. IDENTIFICATION GUIDE TO KEY INVASIVE SPECIES



Common Name: Nuttall's Pondweed
Latin Name: *Elodea nuttallii*
Source: www.fisheriesireland.ie



Common Name: Parrott's Feather
Latin Name: *Myriophyllum aquaticum*
Source: www.habitas.org.uk



Common Name: Curly Leaved Waterweed
Latin Name: *Lagarosiphon major*
Source: www.caisie.ie



Common Name: New Zealand Pygmyweed
Latin Name: *Crassula helmsii*
Source: www.habitas.org.uk



Common Name: Water Fern
Latin Name: *Azolla filiculoides*
Source: www.habitas.org.uk



Common Name: Japanese Knotweed
Latin Name: *Fallopia japonica*
Source: www.habitas.org.uk



Common Name: Himalayan Balsam
Latin Name: *Impatiens glandulifera*
Source: www.habitas.org.uk



Common Name: Giant Hogweed
Latin Name: *Heracleum mantegazzianum*
Source: www.habitas.org.uk



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Common Name: Zebra Mussel

Latin Name: *Dreissena polymorpha*

Source: www.habitas.org.uk



Common Name: Asian Clam

Latin Name: *Corbicula fluminea*

Source: www.caisie.ie