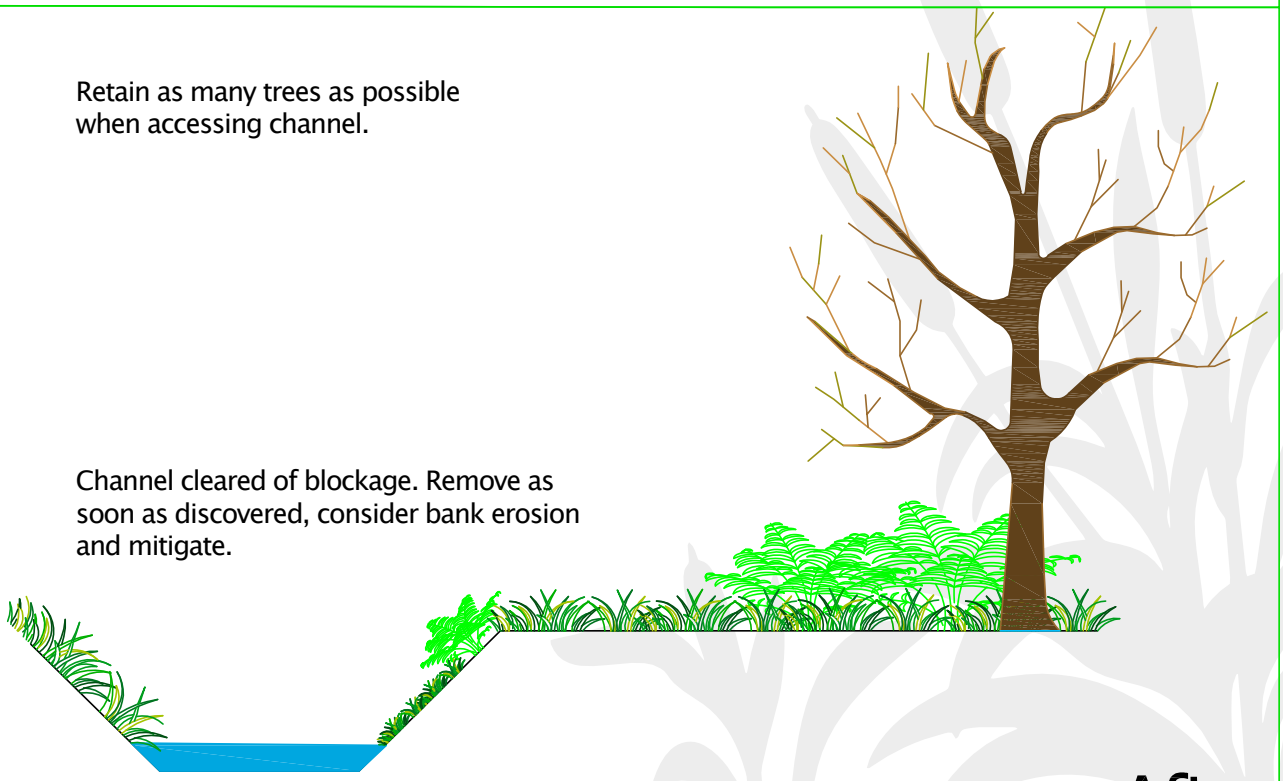
Fallen Tree

Channel blocked by fallen tree.

Before

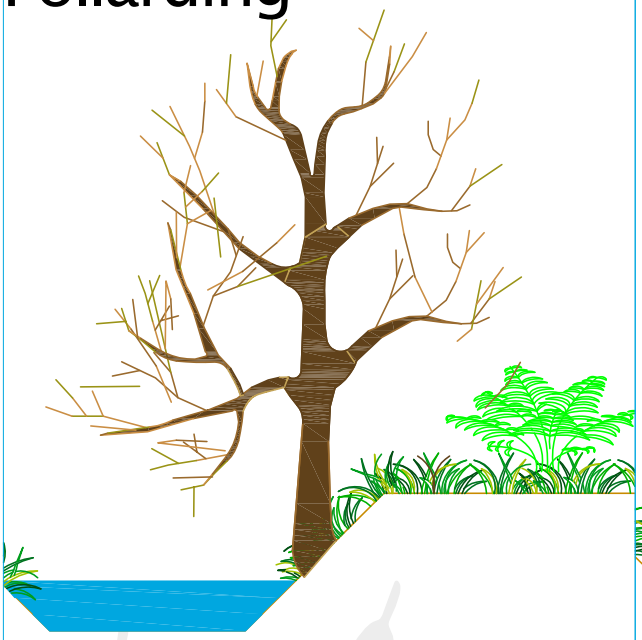
Retain as many trees as possible when accessing channel.

Channel cleared of blockage. Remove as soon as discovered, consider bank erosion and mitigate.



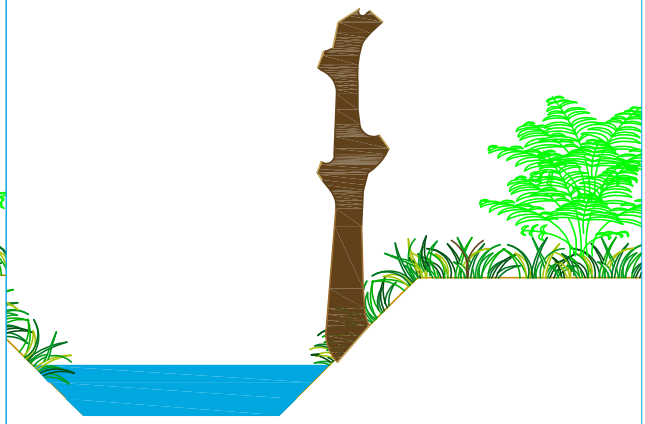
After

Pollarding



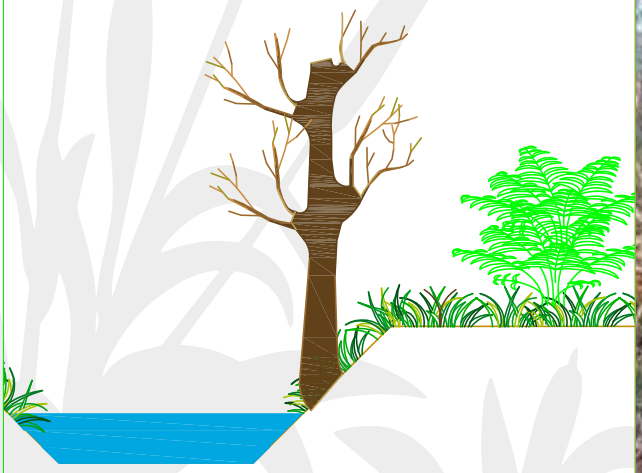
Tree within flow area with straight trunk, 1.5m (min) to first main limb suitable for Pollarding.

Consider risk of tree becoming destabilised due to flowing river.



Tree within flow area after Pollarding.

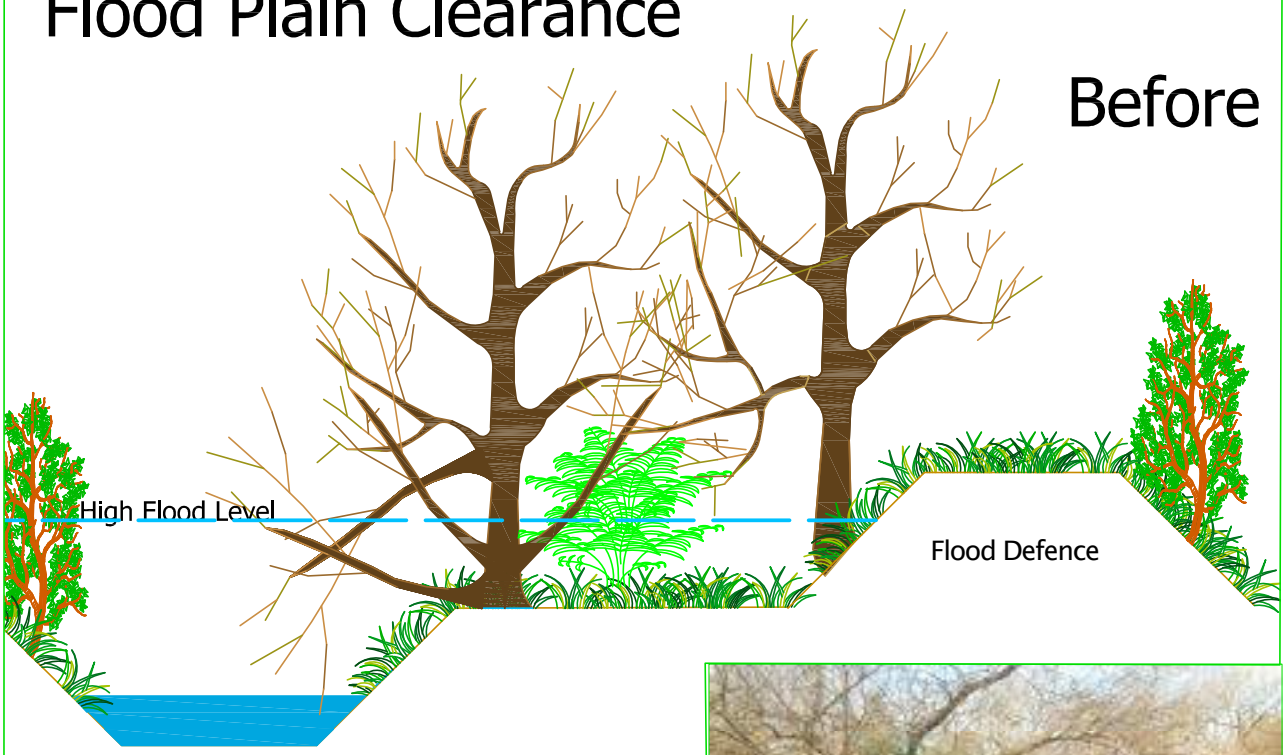
Encourage resprouting above flood level. Cutting this tree at butt can lead to resprouting within flow area.



Pollarded Tree after several years.

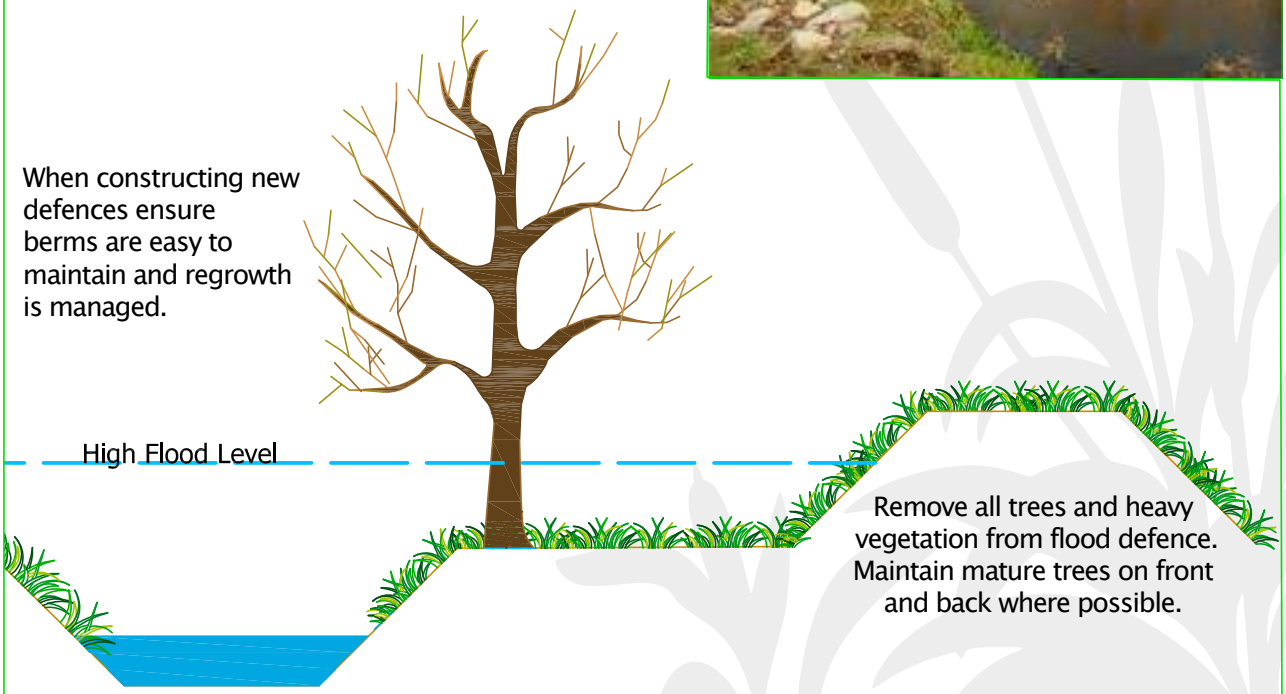
Flood Plain Clearance

Before



Channel requiring maintenance due to over hanging tree branches. All branches below approximate high flood level removed.

When constructing new defences ensure berms are easy to maintain and regrowth is managed.

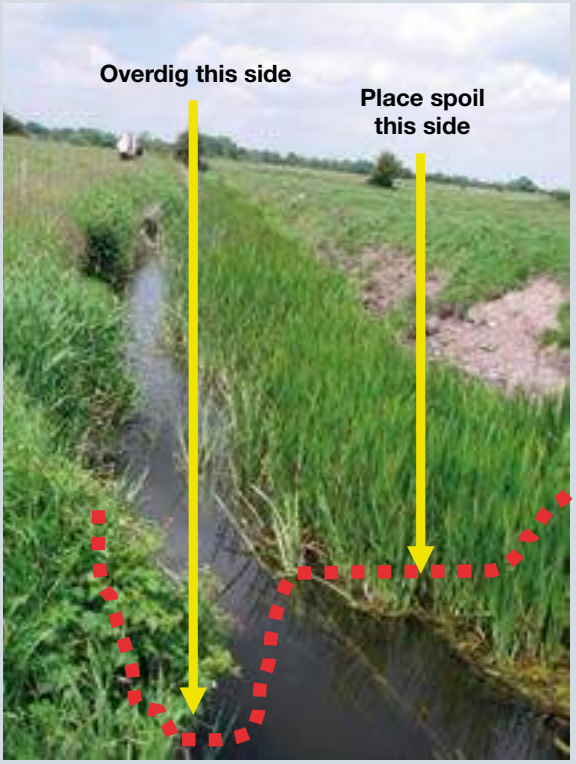


Remove all trees and heavy vegetation from flood defence. Maintain mature trees on front and back where possible.

Remove all branches that impede the flow of water. Branches in flood plain can impede flow.

After

Good Examples of Managing Riparian and Instream Vegetation:




Retain tall reeds and flaggers where possible
This can help nesting birds


Maintain centre of the channel only,
keep marginal vegetation


HYUNDAI
Before, instream vegetation restricts flow, with skilful driving : some instream vegetation can be retained


HYUNDAI
After, instream vegetation has been retained , drainage capacity is restored

EP 10 Silt Management

Scope

This procedure relates to drainage maintenance.

Purpose

To ensure the reduction in movement of sediment downstream of channel maintenance works. Sediment is an important component of a healthy river. However it can act as a pollutant in excessive amounts, reducing Light Penetration >> Photosynthesis >> Dissolved Oxygen and ultimately the ecology of a river.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

OPW Silt Monitoring Trials

Procedure

Drainage Maintenance

1. Start from the downstream and work upstream where appropriate. Zone of influence for sediment can extend up to 1km downstream
2. Where possible skip sections, this will act as a buffer to downstream transport of silt; consider leaving 20m unmaintained on minor channel outfalls to major channels, stagger this unmaintained length on following maintenance cycles.
3. Minimise all new diggings and restrict maintenance to the middle 2/3 rd section of the channel, and to one riverbank, do not deposit excavated material on the channel bank slope.
4. Prioritise softer solutions such as Christmas tree revetments and using root balls of excavated trees, where riverbanks are eroding.
5. Leave a 1.5 m buffer of undisturbed ground on the top of banks to act as sediment trap, where possible.
6. Encourage the fencing of channels to reduce cattle trespass, discourage direct cattle access.

Engineered solutions to erosion control should not be considered as the first and only solution. Natural erosion and deposition processes should be allowed where possible.

EP 11 Bank Protection

Scope

This procedure relates to drainage maintenance and construction works where bank protection is required.

Purpose

To ensure bank protection or erosion control is carried out while considering alternatives to concrete or rock type revetments.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

'Channels and Challenges' by Dr Martin O'Grady

Procedure

1. Engineer to assess eroding bank.
2. Consider both soft and hard engineering solutions.
3. Complete ERA for works, if works greater than 40m, an AA could be required.
4. Consider using planting, and/or organic material to achieve riverbank stabilisation. Hessian matting has yielded good results where steep sided banks require reseeding.
5. Consider Christmas tree revetments, live willow planting or other soft solutions, as well as hard approaches such as rock armour, retaining walls, gabions, poles and piles.
6. Consider the river type and energy, soft solutions may not be suitable in high energy environments.
7. For live branches or planting a "bedding in" period is needed before vegetation is fully established. Works maybe susceptible to large floods.
8. Remember erosion and deposition is a natural process and in all circumstances erosion control my not be in the best interest of the river environment.
9. Greater future maintenance of soft engineering solutions may be required leading to increased resource allocation.
10. Soft engineering may not achieve the same longevity or results as harder methods.
11. With any bank protection works the most susceptible element to failure is the toe of the revetment, erosion control should extend below the normal low flow water level.
12. Roots balls of trees can make a cost effective and useful revetment, entrapping fine material where energy is dissipated.

Christmas tree revetments work better in low energy rivers that carry a high silt load. Gravelly rocky channels do not have the silt load to deposit within the tree tops.


Pic. 11.1

Pic. 11.1 Shows soft and hard solutions working together, note the rock armouring at the toe.


Pic. 11.2

Pic. 11.2 Christmas tree revetment put in place. This entails placing a line of logs parallel to the flow that are drilled and secured in place with 2m long iron pins driven every 1.5 m for a 0.3m diameter log. The bushy Christmas tree tops are then secured to the logs at two points with large nails. Tops should overlap are when in place will trap sediment and will lead to a re-establishment of the river bank.


Pic. 11.3

Pic. 11.3 Christmas tree revetment with river banks starting to re-establish. With cattle proof fencing in place.

EP 12 Barrier Removal

Scope

This procedure relates to all structures that impede the passage of fish and other species including but not limited to, weirs, sluices, bridge aprons, spillways.

Purpose

To ensure catchments are open to several key species including salmon and lamprey

Responsibilities

The responsibility lies with the regional staff and the Environment Section

Related Documentation

Barriers layer

Procedure

1. OPW can act as a contractor to construct barrier improvement works on a drained channel where a solution has been approved by IFI or other environmental authority.
2. IFI, Environment Section or regional staff to identify barriers as appropriate, refer to barriers layer where information available..
3. Regional staff should consult with landowners and IFI or other environmental authority leads other permissions or consultations if required.
4. Dry bridge aprons in low flows can impede fish passage, consider solutions such as creating a backwater effect to drown out apron or construct low flow channel.
5. IFI/Environment section to consider the risk of allowing invasive species / crayfish plague upstream.
6. IFI/Environment section to carry out an ecological or heritage assessment where required.
7. Ensure location and description of the works recorded with Environment Section whom will update the national barrier GIS layer with IFI.


Pic. 12.1


Pic. 12.2

Pic. 12.1 and 12.2 Solution to a fish passage problem by concentrating flows to direct fish to a deeper channel and away from a shallow concrete bridge apron.


Pic. 12.3

Pic. 12.3 Partial removal of a weir.

EP 13 Embankment Maintenance

Scope

This procedure relates to all embankment works, including vegetation management and refurbishment.

Purpose

To ensure embankment works do not adversely affect the environment and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

Annual Programme, Relevant Appropriate Assessments.

Procedure

Embankment Vegetation Management

1. Comply with EP 18A related to invasives, machinery can have a considerable range when maintaining embankments.
2. Avoid areas where alien invasive plants are present refer to Invasives GIS layer.
3. If information related to burrowing mammals is available, ensure machinery not used within 30m of the sett/holt entrance.
4. Promote natural colonization; beware of invasive colonisation of newly cleared ground.
5. Increase the biodiversity by planting sections of wildflower meadow.
6. Programme alpine tractor works for early or late in the growing season to allow wild flowers to establish naturally, creating corridors of habitat for bees, if possible.
7. Do not use mulchers in summer due to nesting birds, if possible.
8. Use cleaning equipment to remove all organic material from machinery when moving between sites.
9. Skip sections to allow refuge habitats.

Promote biodiversity where possible; introduce wildflower meadow seed into grass mixes. Leave some sections of maintenance untouched, leave as much space for nature as is possible.

Embankment Refurbishment

1. Ensure AA is in place where appropriate.
2. Confirm the presence of burrowing mammals with an ecological survey or Key environmental data GIS layer, licence from NPWS may be required.
3. Do not allow embankment refurbishment works to encroach onto protected mudflats, any rock armouring should not extend past the toe of the embankment.
4. Retain margins of grasslands on the edge of the mudflat where appropriate.
5. Comply with otter (EP 20) and badger (EP 23) procedure.
6. Programme embankment refurbishment work adjacent to protected estuaries not to extend into the winter months (typically October to March inclusive) where disturbance to over wintering birds could impact.
7. If you are replacing an existing embankment and moving further inland, leave the existing embankment in place until the new structure is constructed. The existing embankment can be useful in limiting noise and disturbance to estuarine habitat.
8. Relocate some plant species from old to new embankment where appropriate.

Pic. 13.1 Typical atlantic salt meadow habitat and should be retained where possible.

Pic. 13.2 Typical mudflat. This habitat can be protected and can only be interfered with after environmental assessment.

Pic. 13.3 Wildflower embankment

Pic 13.4 Seed spraying that can help promote wildflower growth

Pic. 13.5 Habitat left in place on an embankment refurbishment works.

Pic. 13.6 Excavator mulching heavy vegetation on embankment.

Pic. 13.7 Alpine mower maintaining mulched embankment.


ROAD
FLOODED

Section 2 – Construction Procedures

Relevant to Construction Staff

EP 14 Construction Environmental Management

Scope

This procedure relates to construction related environmental management.

Purpose

To ensure the management of the key environmental obligations that apply to all staff and contractors on site.

Responsibilities

The responsibility lies with all OPW staff (direct works personnel, contractors and consultants), Environmental Officer when relevant and Project Archaeologist when relevant.

Related Documentation

Site specific Environmental Impact Assessment Report (EIAR), Natura Impact Assessment (NIS) Ecological Surveys, Construction Environmental Management Plan (CEMP), Plans and Environmental Method Statements.

Procedure

Roles and responsibilities

Resident Engineer - where OPW are the main contractor

- Ensure Project Archaeologist and Environmental Officer appointed where required.
- Manage staff to conduct all activities in a manner consistent with the CEMP procedures, work practices and controls.
- Implement environmental control measures minimising the impact of noise, dust, soil and water, excavated spoil, waste, traffic, ecology and landscape resulting from construction activity as per the CEMP.
- Schedule and plan works programme to comply with the CEMP.
- Ensure all Contractors, and site personnel informed on the CEMP requirements in a site induction.
- Ensure site staff participate fully in environmental training if provided.
- Encourage site staff issue feedback to ensure effective environmental management on site.
- Implement environmental recommendations with regard to method statements by Environmental Officer, if reasonably practicable and conforms to Health and Safety requirements.
- Display monthly compliance reports on project website, typically for large construction projects.

Environmental Officer

- Carryout Weekly Site Visits, Monthly Reports, Environmental audits and preparation of the Environmental Compliance summary.
- Conduct ongoing consultation with state bodies as required.
- Propose and manages a monitoring strategy for impacts as set out in the CEMP.
- Ensure agreed thresholds are measured and documented in monthly reports.
- Produce waste management plan if required.
- Use ecological surveys to locate sensitive locations on site.
- Update CEMP when required.
- Review method statements with regard to environmental issues; recommend improved environmental work practices where relevant.
- Liaise with Project Archaeologist and Contractor Ecologist.
- Ensure that relevant permits and consents are in place.
- Give recommendations with regard to the communication plan.

Pic 14.1 Construction works in progress

Large Flood Relief Scheme Environmental Management Process

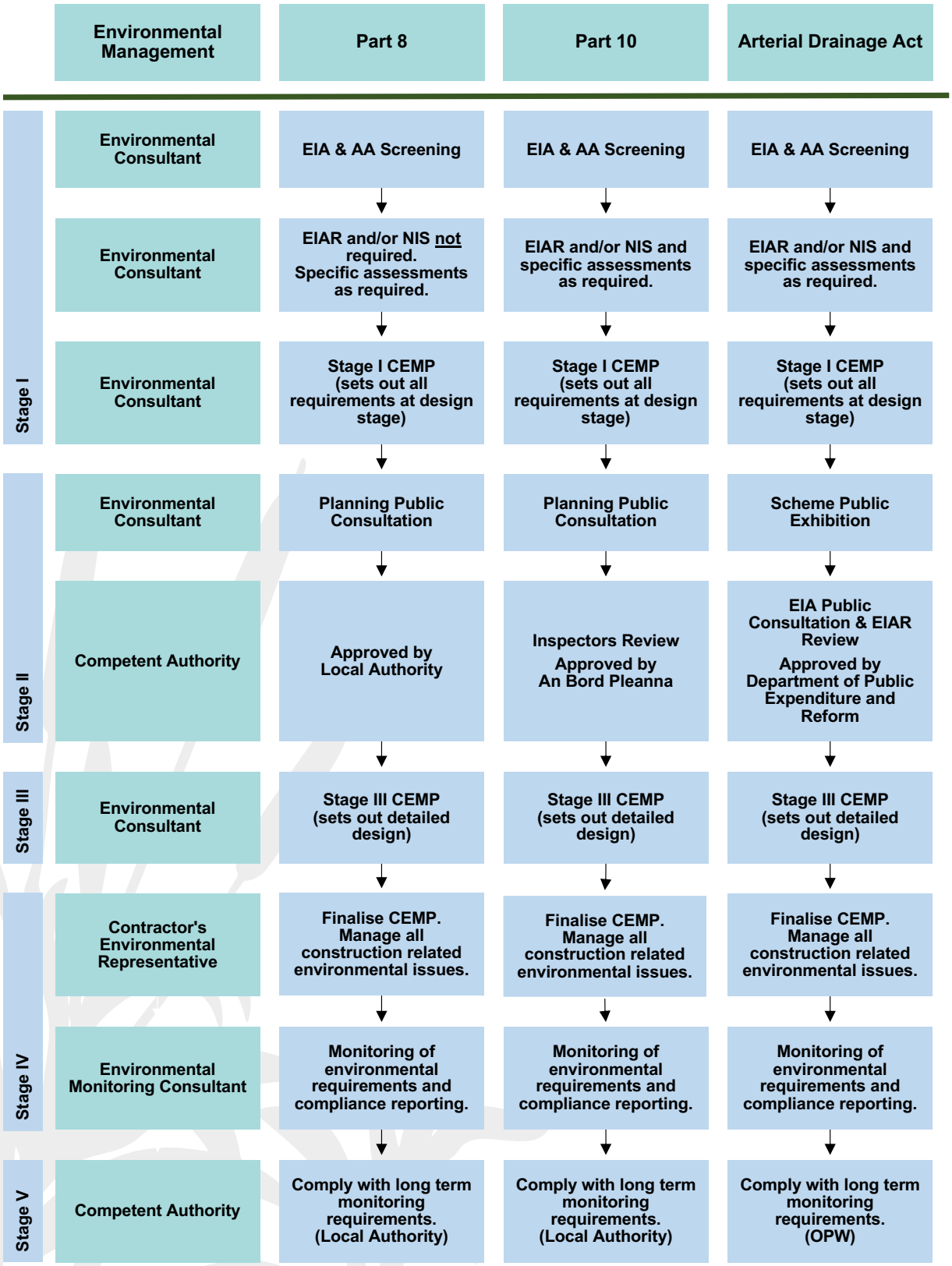


Fig. 14.1

Construction Environmental Management Plan

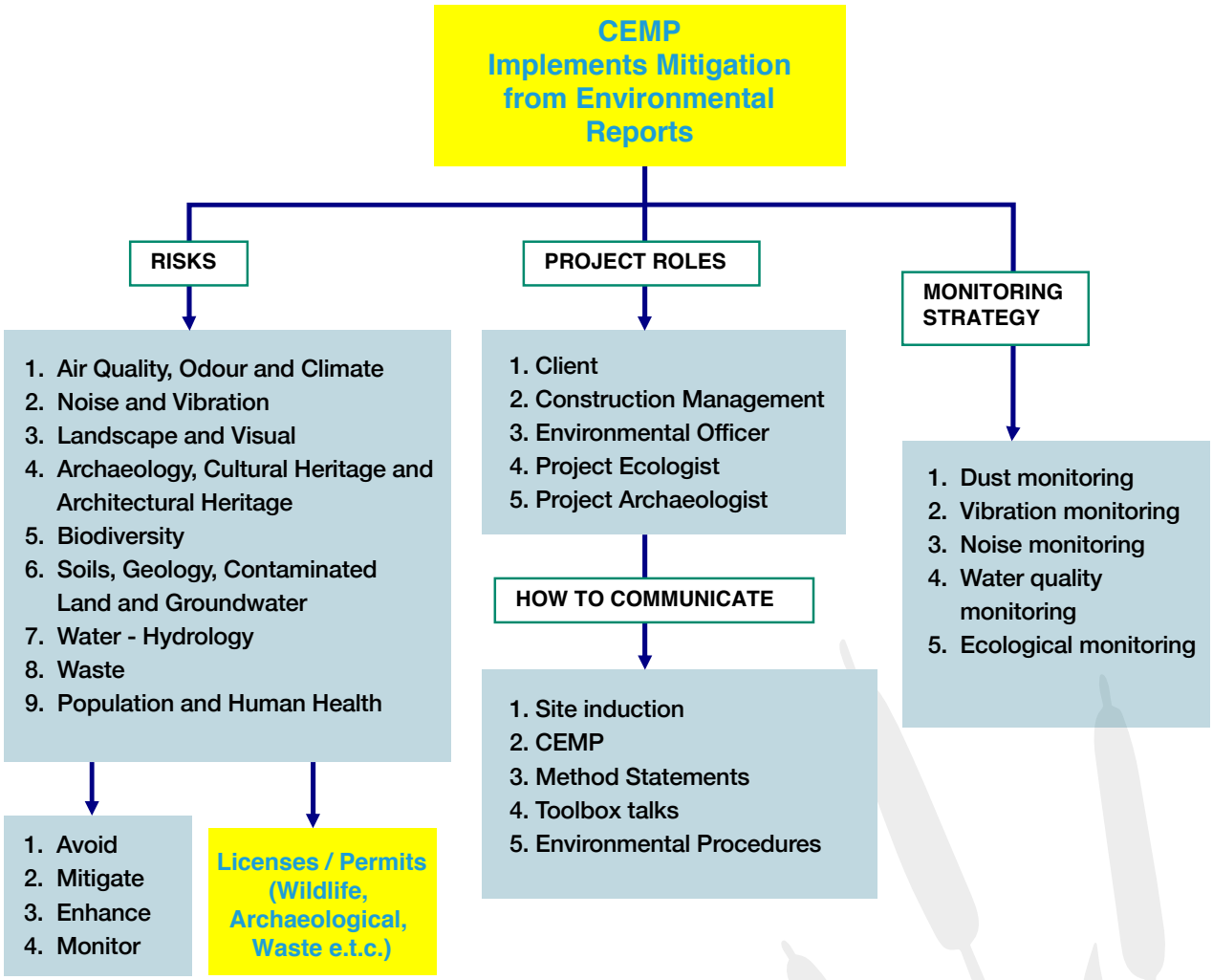


Fig. 14.2

CEMPS are live documents that are updated throughout the project

EP 15 Construction Silt Management

Scope

This procedure relates to all construction works where silt mitigation is required.

Purpose

To ensure the reduction in artificial sources of silt from total silt load of waterbodies.

Responsibilities

The responsibility lies with the relevant staff.

Related Documentation

Guidelines on Protection of Fisheries IFI.

Procedure

Before Works Commence

1. Consider the key ecological receptors and water flow paths.
2. Consider options available (set back defences rather than dredging), remove risk of silt rather than mitigate, where possible.
3. Define contractually agreed thresholds from silt mitigation in CEMP where required.
4. Install turbidity monitoring where required.
5. Consult with IFI and NPWS regarding systems and timing of work.

During the Works

6. Use ecological assistance when dewatering behind cofferdams or temporary diversions, translocation of specific species maybe required.
7. Ensure works area within waterbody does not become dry in an unmanaged fashion, killing fish or other aquatic species.
8. Monitor the effectiveness of the installed silt control measure.
9. Minimise increased silt levels, when removing control measures.
10. Develop a maintenance and inspection schedule for silt control measures,
11. Manage site compound and works area runoff effectively including wheel washings of transport.
12. Minimise in-channel works and design haul roads and crossing points effectively, to allow fish transition at all times..
13. Manage excavated spoil or dredged material effectively.
14. Consider allowing river to return to background silt levels when required, use turbidity monitoring or other data to manage effectively.
15. Ensure reporting procedure in place in the event of a pollution incident.

Where deepening and widening of a natural watercourse is required, consider a full diversion as the first option. This will isolate the works area, reducing ecological impacts by limiting the ongoing generation of silt. Flow should be transferred to the bypass in a carefully managed way, translocating relevant species, ensuring the downstream watercourse does not run dry, while taking into account fish passage and appropriate design flow. The bypass can be open channel or pipe. An open channel requires erosion control and if constructed sufficiently in advance, this can re-vegetate naturally before the flow is diverted, reducing requirements for artificial erosion control.

There are three options for temporary works against the flowing of clean water into a works area. In order of preference you should,

A. ***AVOID*** isolate works area completely with full flow temporary bypass channel, flume or pump; overtopping into the works area due to flooding can occur.


Pic 15.1 Bypass channel


Pic 15.2 Bypass channel

B. ***REDUCE*** partial isolation- damming off half the channel with cofferdam, could result in more overtopping into the works area due to flooding, consider flood risk.


Pic 15.3 Cofferdam


Pic 15.4 Cofferdam

C. ***MITIGATE*** use silt traps to reduce silt load downstream, more effective for slower flowing channels.


Pic 15.5 Silt trap.


Pic 15.6 Silt trap.

There are three options to consider when reducing silt load in a channel.

I. ***Minimise the source:*** do not enter when weather conditions are not suitable, build stable working platforms, use machine mats to limit stripping of sod, stabilise excavated areas and consider the type of machinery used.


Pic. 15.7

Pic. 15.7 Build stable clean promontories adjacent to works area. Use appropriate machinery, mini diggers or long reach machinery can minimise generation of artificial silt loads.


Pic. 15.8

Pic. 15.8 Use machine mats where appropriate they will prevent machinery from eroding adjacent riverbanks and floodplains that can generate runoff with a high silt load.


Pic. 15.9

Pic. 15.9 Use correct machinery and ensure excavated spoil is removed/heaped appropriately. Ensure excavated river berms left in a stable condition after natural vegetation removed where appropriate.

II. ***Intercept the pathway:*** leave natural buffer strips in place, intercept surface water drains or overland flows.


Pic. 15.10


Pic. 15.11

Pic. 15.10 and 15.11 Use silt curtains or buffer strips to intercept overland flows


Pic. 15.12


Pic. 15.13

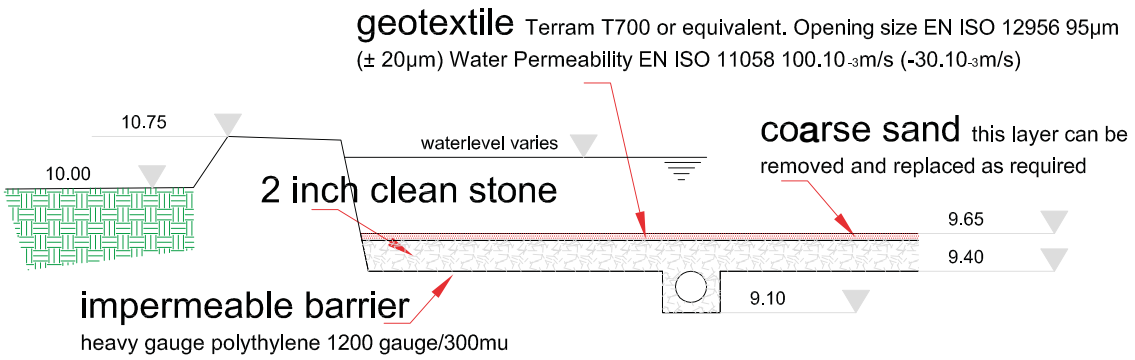
Pic. 15.12 and 15.13 Slow down and intercept surface water drains.

III. ***Protect the receptor:*** use silt curtains within the water column, stabilise exposed soil, filtrate / retain / slow down the flow of water and use data from silt monitoring

Use retention or filtration ponds where appropriate.

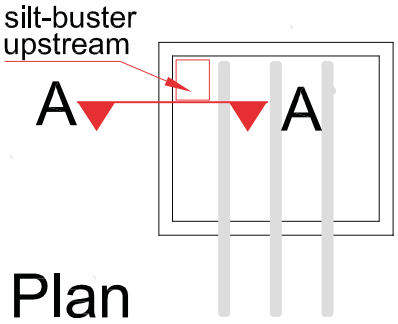
Use silt bags and baffle boxes where appropriate.

Stabilise exposed earth and limit silt within waterbody where appropriate.



Section A-A

siltation pond 250m3 per hectare of disturbed land



Plan

3 no. 225 pipes will have a max. discharge capacity of 0.36 cumecs with 1m of head

225 mm perforated pipe outfalling to local watercourse via surface water flow over naturally grassed ground.

General Notes

1.Do not scale from this drawing

2.All dimensions are in mms

3.All levels are to local datum.

No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

Silt Filtration and Settlement Pond

Project	C - 004
Date	05-05-14
Scale	NTS
Sheet	1/1

Fig 15.1

EP16 Ecologically Friendly Culvert

Scope

This procedure relates to all new culvert construction.

Purpose

To ensure new culverts are constructed in an environmentally friendly way.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

Guidelines for the crossing of watercourses during the construction of National Road Schemes. TII and IFI Guidelines on Protection of Fisheries.

Procedure

1. Construct culverts with a concrete base, bury to a minimum of 500mm below the riverbed, matching the bed slope, and allow regrading with natural material.
2. Prevent low summer flow from impeding fish passage by using baffles or impoundment structures.
3. Construct deflectors in large culverts to create sinuosity and to prevent low flows from becoming impassable.
4. Install bird nesting boxes and bat boxes in structures that do not drown out.
5. Construct elements to aerate water such as riffles, where possible.
6. Leave crevices in any stone masonry for bat habitat where possible.
7. Consider natural beds in concrete lined artificial channels.

Pic 16.1 Low flow channel with deflector. Mammal passage facilitated in low flows.

EP 17 Water Pollution

Scope

This procedure relates to all works beside waterbodies.

Purpose

To ensure best practice for works beside waterbodies

Responsibilities

The responsibility lies with the relevant staff.

Related Documentation

Guidelines on the Protection of Fisheries, IFI.

Procedure

1. Monitor the weather forecasts during all works, develop a contingency plan to prevent damage or pollution during extreme weather and high flow events.
2. Isolate works area from aquatic environment where possible.
3. Ensure measures taken to prevent cement or concrete entering the waterbody.
    a) Use precast concrete where possible.
    b) Prevent old cured concrete when demolishing from entering waterbody.
    c) Deploy suitable sealed shuttering where required.
    d) Position scaffold above high water level where possible.
    e) Use youngman boards, toe boards, and netting as required.
    f) All concrete equipment should be washed out in designated/designed area.
    g) Concrete delivery trucks should return to batching plant for washout.
4. Ensure measures taken to prevent fuel or oil entering the waterbody.
    a) Refuelling should not be undertaken within 50m of a watercourse, or ensure no direct flowpath.
    b) Use biodegradable oils.
    c) Operators should check their vehicles on a daily basis before starting work.
    d) Emergency spill kits should be available on machines.
    e) Ensure no flowpath from parked overnight vehicles.
    f) Ensure on site fuel stored in bunded tanks.
    g) Use plant “nappies” on compressors and pumps as required.

5. Do not leave exposed soil from vehicle track marks, use bog mats and leave natural vegetation buffer strips where appropriate.
6. Ensure good housekeeping of site waste and compound.
7. Store and remove wastewater from site.
8. Ensure good systems of work involving use of chemicals harmful to aquatic life.

Pic 17.1 Plant nappy under a compressor.

Water quality can be degraded by nitrogen and phosphorus. Nitorogen is water soluble and could become concentrated within drains that are not working efficiently. Phosphorus is less soluble and can be entrained in silt, this can impact on water quality when it becomes mobile within the receiving waters. Accordingly, care should be taken when maintenance is occurring in lands where slurry has been recently spread, do not compromise natural buffers that may be in place.

Section 3 – Invasive Species Procedures

Relevant to all staff

EP 18A Standard Biosecurity

Scope

This procedures relates to where standard biosecurity is required, is the minimum requirement and refers to plant and animal based invasives.

Purpose

To ensure drainage maintenance is not a vector for the spread of alien invasive plants and animals

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

OPW invasive species GIS layer IFI Best Practice Guidance.

Procedure

1. Check for invasives referring to GIS mapping, proceed with caution. Note on “Observed on Site” on weekly records card, if newly found.
1. Avoid ensuring a 7m machine buffer zone, skipping of infested area where feasible.
2. Control (standard biosecurity)
    a. Wash down all machinery and equipment using power washer ensuring removal of all organic plant and soil mater before leaving site.
    b. Ensure all organic material removed from personal equipment and clothing including footwear.
    c. Ensure water retaining compartments are drained on-site.
    d. Audits required to confirm that procedure is being executed.
    e. Hot wash low loader and machine when in the yard, especially when moving between regions.


Pic. 18a.1


Pic. 18a.2

Pic. 18A-1 & Pic 18A-2 Zebra mussel characteristics for identification, they are thumbnail-sized black and orange striped shellfish. They grow in dense clusters.

Pic. 18a.3

Pic. 18A-3 Site locations where zebra mussels have been present, please take care when working in the vicinity of these areas.


Pic. 18a.4


Pic. 18a.5

Pic. 18A-4 & Pic 18A-5 is for identification of Asian clams they are yellow-green – brown clam with concentric thick ridges usually < 25mm but can grow to 50mm

Pic. 18a-6

Pic 18A-6 shows verified site where Asian Clam has been present, please take when working in vicinity of these areas.

EP 18B High Biosecurity

Scope

This procedure relates to High Biosecurity where a **known presence** of crayfish plague or a particular waterborne invasive risk **has been identified** and should be implemented on a catchment/sub catchment basis, in consultation with Environment Section.

Purpose

To ensure OPW drainage maintenance procedures are not a vector for the spread of crayfish plague or other waterborne pathogens or microorganisms.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Crayfish_leaflet.pdf

http://www.fisheriesireland.ie/Biosecurity/biosecurity.html, Invasive Species GIS layer.

Procedure

On commencing work, where a known waterborne risk has been identified.

1. Demark a contaminated zone line with bunting this line should be approximately 50m away from any watercourse and should be on the access route.
2. Any equipment vehicles or personnel crossing this contamination zone line will be subject to High biosecurity.
3. The canteen, staff vehicles, fuel bowser or any non-construction related vehicles should not cross the contaminated zone line. These vehicles will require no biosecurity measures.
4. Use a site-specific fuel drum on a fuel bund to refuel excavator. Fill this drum, while not touching the drum with the bowser hose. Use the machine fuel pump to deliver fuel from drum as it is filling. The bowser, hose and personnel will not cross high biosecurity line and will have no physical contact with the excavator/contaminated zone.
5. Personnel leaving the contaminated zone will be subject to biosecurity protocols at all times, minimise personnel entering contaminated zone.
6. All staff sign off detailed method statement outlining this procedure.

All personnel must comply with the following High biosecurity when leaving a contaminated zone.

Equipment High Biosecurity

1. **Check >> Clean >> Dry>> equipment/vehicles** when leaving a contaminated area zone.
2. Visually inspect all equipment/vehicles, disinfect and remove any attached material.
3. Clean excavator with power washer to remove all organic material, clean underside of tracks and park on clean surface.
4. Spray all surfaces liberally with Virkon Aquatic 1 sachet per 5L. Spray twice to ensure no surfaces missed.
5. Ensure no reservoirs of water retained within tracks, channels or crevices.
6. Leave within the contaminated zone for 48 hrs to dry.

Personal Biosecurity

1. Disinfect **All boots and footwear** when leaving a contaminated area zone.
2. Scrub footwear with a brush to remove any organic material.
3. Use a boot bath and sprayer to disinfect boots and footwear. Add 1 virkon sachet per 5L for boot bath container or sprayer.
4. Ensure adequate contact time within boot bath or spray liberally.
5. Dispose of solution weekly by spreading over soil, unless it is very soiled.
6. Visually inspect all PPE and remove attached material. Wipe down affected PPE with a cloth soaked in disinfectant solution.
7. Place disposable gloves bag in clean bag and dispose of correctly, if used.

Do not move machinery within the works area unless there is a requirement to do so, particularly where invasive species are present. This will conserve resources, limit disruption and minimise potential spread of invasives. Reduce sloshing of river water from the machine bucket onto the works area, as this will reduce the risk of water borne invasives contamination.

Pic 18B.1 Typical high biosecurity refuelling, at any stage the fuel bowser or hose should not make contact with the fuel filling drum or machine fuel delivery hose.

Pic 18B.2 Typical high biosecurity refuelling and disinfection point, this should be set up at a point of easy access away from the river channel, 50m if possible, and no unnecessary vehicles or personnel should cross this line.

Pic. 18B.3 High biosecurity signs.

Pic. 18B.4 Personal High Biosecurity kit, used for water-bourne invasives.

EP 18C Boat Cleaning

Scope

This procedure relates where boats are moved between catchments

Purpose

To ensure OPW drainage maintenance is not a vector for the spread of water-borne invasives.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

IFI Best Practice Guidance.

Procedure

1. Visually inspect all equipment for attached material and remove, before leaving the site.
2. Ensure all water is drained from boats or machinery, live wells and other water retaining compartments, outboard motors, tanks and other equipment before transportation.
3. When moving from one water course to another clean using cold water washer (including oars, rowlocks, attachment ropes, anchors, buoys, trailers and outboard motors) when moving from one watercourse to another. After cleaning visually inspect to ensure all material removed.
4. Spray disinfectant, to the undercarriage and wheels of the vehicle and trailer after power hosing. Wet or live wells and other water retaining compartments in boats cleaned, rinsed or flushed with a one sachet per 5L Virkon Aquatic concentration. Rinse thoroughly with clean water.
5. Outboard motors flushed with same concentration of Virkon Aquatic.

Minimising movement of plant and machinery between sites reduces the risk of spreading invasives. Reducing any unnecessary plant and machinery movements also leads to reductions in carbon output, energy usage and emissions.

EP 18D Invasive Plants Treatment

Scope

This procedure relates to any site where works are required to enter within a 7m buffer from an invasive plant or where invasive plants colonise after tree and vegetation maintenance. There is no legal requirement to proactively manage invasive plants, it is however illegal to cause their dispersal. Avoid invasive plants and avoid the requirement for treatment plans.

Purpose

To ensure the correct undertaking of invasive species treatment plans for Japanese Knotweed, Himalayan Balsam and Giant Hogweed.

Responsibilities

The responsibility lies with the relevant staff and Environment Section.

Related Documentation

Invasive Species GIS Layer.

Site specific Invasive species Management Plans.

Pic. 18D.1 PPE used when spraying.

- Light Tyvek suit not suitable when working in scrub. Wear oilskins or Tyvek 5 or 6 suit.
- Wear Tyvek 5 or 6 suit when working with Giant Hogweed

Where a river berm that contains invasive plants requires removal, stockpile material adjacent or within the river corridor in a spoil heap demark this area, map if possible, inform Environment Section to include on Invasive register of treatment sites and manage the spoil heap on a multi-annual basis until plant is eradicated.

Procedure

What to do before implementing a treatment plan.

1. Confirm if location within a SAC/SPA, has an AA screening been carried out? Consult Environment Section.
2. Consider licences under Section 49 of SI 477 and Waste Management legislation where required.
3. Inform Environment Section, to record treatment plan on Invasives register.
4. Estimate area of invasives supply map if possible. Use this as a baseline to assess progress of treatment plan.
5. Consult with local landowners and relevant stakeholders.

Who Should Spray.

Personnel who have completed the required Pesticide Training

How to implement a treatment plan

1. Select appropriate strategy for the appropriate plant.
2. Strictly comply with EP18A Standard Biosecurity.
3. Mix herbicide off site, to 1:100 concentration.
4. Refer to the Fig 18D.1 showing the minimal required P.P.E.
5. Record amount of herbicide applied on site per hectare.
6. Ensure adequate warning signs are in place. Especially when applying herbicide beside public areas.
7. Restrict livestock access for 3 hrs after spraying.

Roundup Bioactive or Gold are approved for application within an aquatic environment, spraying is permitted up to the water's edge without the requirement of buffer zones, however minimise contamination of watercourses, drains and water supplies.

What to Spray With.

Use Glyphosate (broad spectrum herbicide), typically Round Up Gold or Roundup Biactive in a concentration of 1:100 i.e.200ml for a 20 L knapsack sprayer.

How to Spray.

1. Only mix what you require and if necessary under estimate the amount needed.
2. Use a selective approach avoid non-target species and protect flowering plants.
3. Spray liberally, or fill desiccated tubes until over flowing.
4. Ensure the wind drift is not significant < 7km/hr. Glyphosate will kill most plants.
5. Double back, wilted areas will highlight areas missed. Dye based highlighting admixture have proved ineffectual.
6. Use a pesticide-sticking agent when working in wet conditions; insert this agent directly into the herbicide mix.
7. Use a flat fan nozzle recommended for selective targeted spraying.
8. Use telescopic lances to reach less accessible areas, especially when spraying Giant Hogweed.
9. Dispose of unused glyphosate by emptying contents on bare soil that is not near to a drain, water point or pond.

Do not leave diluted glyphosate herbicide in sprayer tanks for extended periods (over a weekend without being covered) as it breaks down with exposure to light, making it ineffectual. Under-mix rather than over-mix.

1. For **Japanese Knotweed**. Management Strategy
    a. Do not cut or trespass unnecessarily (you can enter into large stands and spray as you are exiting if required), Japanese Knotweed spreads by fragments of plant material being physically moved.
    b. Underground root systems (rhizomes) can extend further from the visible plant (up to 7m) and cause further spreading if excavated or disturbed.
    c. When excavating contaminant soil, manage spoil heap on a multi-annual basis until eradicated. Consider burying in a lined pit or disposal to licensed landfill (licences required) if appropriate.
    d. Plant dies back in the winter, revealing desiccated tubes. If removing dead tubes manage within a spoil heap on a multi-annual basis until eradicated, or bury in a lined pit.
    e. Spray when the planting is dying back in the late Autumn, in October-November will yield good results, ensure the broken desiccated tubular stalks are sprayed with herbicide until overflowing.
    f. Avoid spraying when the plant is flowering, it will achieve little and will limit foraging for bees.
    g. If there is a requirement to enter onto a contaminated site, when the knotweed is in it's growing season, avoid dense areas if possible and treat in Autumn when the best results will be achieved.
    h. A multi annual approach is required until plant eradicated from site.

Treating Japanese Knotweed in late Autumn when plant in dying back yields the best results.

Japanese Knotweed Identification


Pic 18D.2

- Flowers are small creamy-white and may be seen from August to October
- Spraying when flowering will achieve limited results
- In Ireland, plants are female and propagate from dispersal of plant material only not by seed.

- Leaves are heart shaped
- Leaves grow up to 15cm long
- Stems are bamboo-like
- Stems can purple or with purple specks
- Dies back in late Autumn
- Several variants including bohemian knotweed, giant knotweed and Himalayan knotweed


Pic 18D.3

2. For **Himalayan Balsam.** Management Strategy.

a. A shallow rooted plant that spreads from seed that explode on contact in late summer July-Aug (wear safety glasses as the seed can shoot up to 7m).

b. In order of preference pull, strim, or spray with roundup from March-May, prior to when the seed are mobile.

c. Place all pulled or strimmed plant material from the works area in a 1.5 m deep pit lined and enclosed with heavy gauge polythene. Backfill pits to ground level ensuring 1 meter of soil covers the enclosed material.

d. Continue to manage the works area by pulling, strimming all vegetation to 4 inches or spraying from March – May before seeds are mobile.

e. A multi annual approach is required until plant eradicated from site.

f. Removal to licensed landfill considered where appropriate.

Invasive plants limit natural biodiversity, restrain approach to drainage and construction work and cause erosion of riverbanks in the winter. Ensure work practices do not disperse and implement Standard Biosecurity Procedure 18A.

Himalayan Balsam Identification

Pic 18D.3

- Grows up to 3m tall.
- Flowers are pink/purple 3cm long and are visible from late May to October
- Leaves are 6-15cm long
- With sharply tooted edges.
- Seeds explode on contact in late summer and management at this time will not yield good results

3. For **Giant Hogweed**. Management Strategy

a. Giant Hogweed produces (phytophototoxic) sap and contact with direct sunlight can cause severe burns. Do not strim this plant.

b. Ensure you wear protective equipment that includes Tyvek Suit Type 5 or 6, Chemical Resistant Gauntlet Gloves, Acetate Face Shield and Long Rubber boots.

c. Spraying of the plant saplings should occur early in the spring. Both sides of leaves sprayed liberally, with Roundup gold or Bioactive.

d. Dehead any remaining plants mid-summer and spray, plant should not be allowed to flower. Seeds remain in ground close to parent plant unless spread by the river. If flowers have not been present for 4 years the plant is generally eradicated from site. However, seeds can remain dormant and re-emerge for up to 15yrs.

e. If plant is flowering and gone to seed, treatment will not yield good results.

f. A multi-annual approach is required until plant eradicated from the site.

Encourage natural colonisation and avoid invasive colonisation. Where riverbanks are cleared of scrub or heavy tree cover. Invasive plants can thrive in the newly cleared ground; implement a treatment plan if this occurs.

Giant Hogweed Identification


Pic 18D.4


Pic 18D.5


Pic 18D.6

- Grows up to to 2-5m. Leaves are often 1m across.
- Stems are large with reddish/purple speckles, covered in bristles
- Flowers are small, white and grouped together in an umbrella shape
- Dies back in Autumn
- Not to be confused with the smaller native hogweed or angelica.

Easy to confuse some Plants

- Butterbur smaller leaves less than 1m, not an invasive

- Gunnera giant rhubarb invasive plant leaves up to 3m wide.

Good Practice

- Consider different tools for different jobs this Gator has a 250l tank with two 40m reels of hose.

- This is an example of a lined spoil pit used to bury material contaminated by Japanese Knotweed.

Other invasive plants will be encountered please contact Environment Section for advice.

Invasive Plants, How to Proceed.

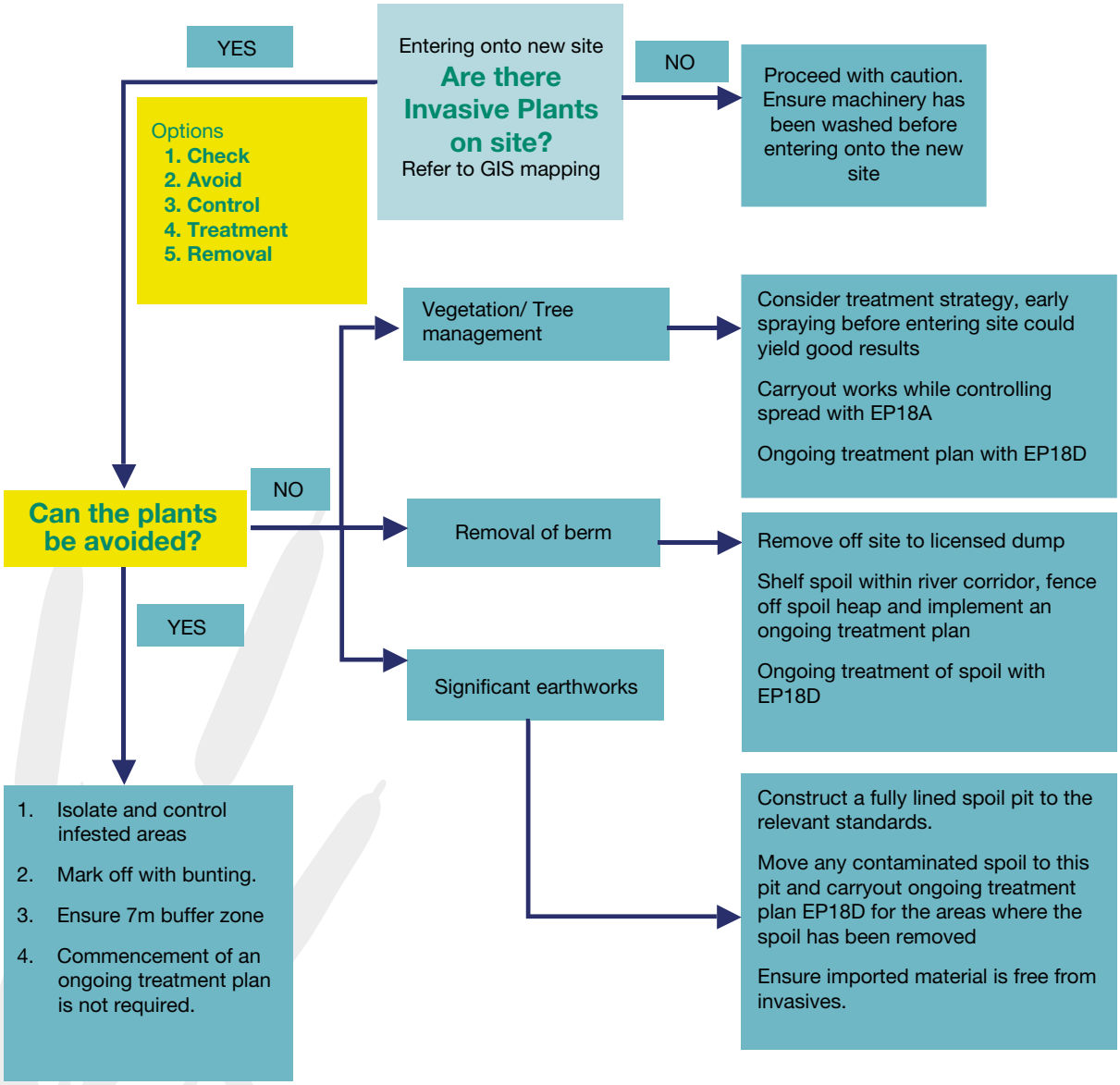


Fig 18D.1

Implement inconjunction with ecological assistance or a mangement plan where scale is significant or appropriate.When carrying out a Flood Relief Scheme ensure Invasive Species Management Plan included as part of the tender documents.

Section 4 – Animal and Plant Procedures

Relevant to all staff

EP 19 Salmonid

Scope

This procedure relates to drainage maintenance channels with spawning gravels and all construction works.

Purpose

To protect salmonid (Salmon and Trout) species and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

OPW Series EcIA No.3 Atlantic Salmon

Procedure

1. Ensure adequate ongoing consultation with local IFI and comply with CEMP where required.
2. Programme instream maintenance works on salmonoid channels between July and September but timing subject to slight adjustment with local IFI consultation due to the variation in the timing of spawning.
3. Only rake spawning gravels to improve spawning capacity between July and September.
4. River enhancement works refer to EP 8.
5. Check programmed channels against GIS records for presence of previous enhancement works.
6. Protect or enhance river enhancement works, when encountered.
7. Carefully consider fish passage with regard to temporary or new structures.
8. Manage construction related pollution appropriately.

Each adult river salmon is important to the economy. They are a valuable resource due to tourism and fisheries related activities.

In-Stream Works Window

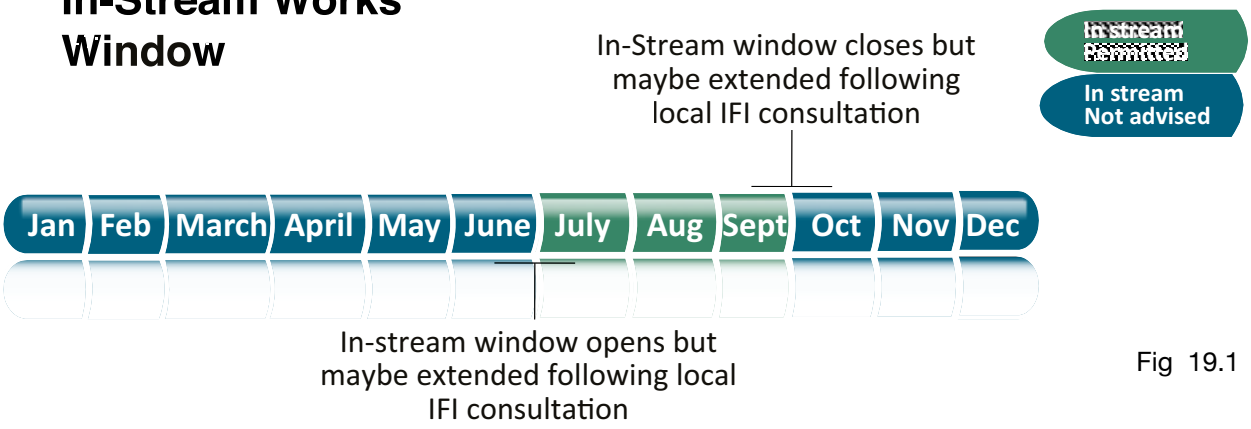


Fig 19.1

Pollutant	Examples of Construction Source
Silts and solids.	Earthworks, new drainage networks and instream works.
Cementitious residues.	Bridge, culvert and drainage headwall construction, etc.
Oils and greases. Anti freeze.	Construction plant and equipment.
Wood preservative.	Treatment of new timber fencing.

Fig 19.2

Healthy salmonoid rivers should have glide >> riffle >> pool sequence

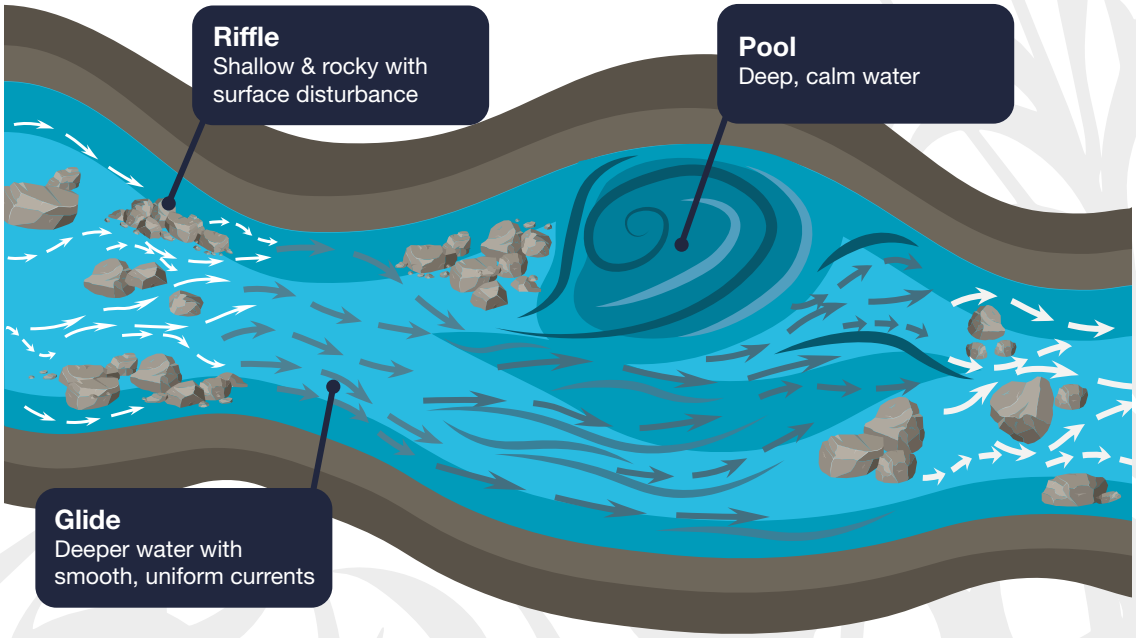


Fig 19.3

EP 20 Otter

Scope

This procedure relates to any location where works encounter the presence of otters.

Purpose

To ensure protection of Otters and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff and Environment Section.

Related Documentation

Otter Threat Response Plan 2009 NPWS

Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. NRA

OPW Series EcIA No.4 Otter

Procedure

Drainage Maintenance

1. Check Environmental information from mapping. Tick “Shown on Map Checklist” if present on weekly records card as per EP6.
2. Operational Staff will walkover the works area one week in advance noting dense cover with access directly to the water that is to be avoided where feasible.
3. Note channel and chainage on “observed on site” section of ganger’s card if newly found. If burrow opens onto river assume otter, ecologist will review if required.
4. While holts are usually well concealed, when identified no general maintenance works within 30m (transient nature of drainage maintenance results in less potential disturbance that construction works).
5. A derogation licence is required from the NPWS if there is a requirement to interfere with an otter holt and excavation of a holt should only occur under ecological supervision.

Construction Projects

1. Ensure pre-construction ecological surveys have occurred in advance of works.
2. Do not undertake works within 150m of a holt until ecological guidance has been sought, screening and other mitigation may allow reduction of buffers.
3. Ensure ecologist applies for a derrogation licence from the NPWS if there is a requirement to interfere with or enter into the buffer zone.


Pic. 20.1

Pic. 20.1 Artificial otter holt. They are typically required as part of a licence to remove a natural holt or can be constructed for habitat enhancement purposes. Artificial holts can be pre-fabricated from recycled plastic as in the photo or can be fabricated on site with ply-wood or concrete blocks.


Pic. 20.2

Pic. 20.2 Otters are widespread on drained channels. They are shy animals and can grow to 1m in length and weigh up to 10kg. They have a streamlined dog-like appearance.

Pic. 20.3

Pic. 20.4

Pic. 20.3 and Pic. 20.4 Examples of otter spraints they are found on rocks, paths and channel junctions. They are dark and sweet smelling and are an indicator of the presence of otters.

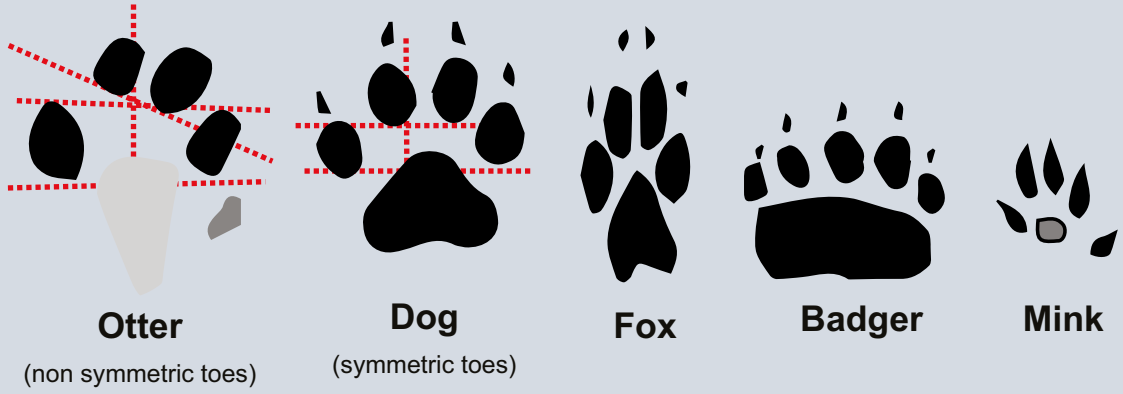
Pic. 20.5

Pic. 20.5 Otter holt usually well concealed. Typically containing burrows, or spaces under banks, tree roots or dense cover. They are protected under the Wildlife Act and should not be interfered with.

Pic. 20.6

Pic. 20.7

Pic. 20.6 and Pic. 20.7 are suitable areas of cover where dense backside vegetation allows covered access to the water.



EP 21 Lamprey

Scope

This procedure relates to any location where works encounter the presence of lamprey.

Purpose

To ensure protection of lamprey and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

Lamprey GIS Layers, OPW Series EcIA No.9 Lamprey Species.

Procedure

1. Check Environmental information from mapping. Tick “Shown on Map Checklist” if present on weekly records card as per EP6.
2. Observe the spoil three times daily and note on “Observed on Site” on weekly records card, if newly found.
3. Inform Foreman if new lamprey encountered.
4. Salvage stranded lamprey by placing in a bucket of water and gently wash into watercourse at a suitable location. Ensure spoil spread thinly and carefully inspected.

What to do if lamprey present:

1. Confirm extent of channel where mitigating measures apply from mapped Environmental Information or from observing spoil.
2. Reduce new excavations to the middle leaving 25% of marginal silt and vegetation on both sides of channel.
3. Maintain in an upstream direction to avoid secondary disturbance of a species.
4. Use weed cutting bucket where aquatic vegetation removal is the primary objective.
5. Maximise length of time between maintenance cycles.
6. Programme maintenance to accommodate spawning. For River & Brook Lamprey, no works from end March to start of June. For Sea Lamprey (less abundant), no works from late April to early July.
7. Consider removing barriers that impede upstream migration.
8. Strictly comply with EP8 ”10 point plan” with emphasis on
    - Point 2 Restrict maintenance to channel
    - Point 3 Spoil management
    - Point 5 Leave sections untouched
    - Point 7 Manage berms
    - Point 9 Work in gravel bed channels

Pic. 21.1 Lamprey in spoil on the bank, they can look like eels and this is where some identification skills are required.

Pic. 21.2 Lamprey out spoil on glove, they are harmless but should be handled with care as they are a protected species.

Pic. 21.3 Average lamprey 8 to 15 cm in length.

Pic. 21.4 Lamprey are jawless fish. They have Gill Pores (Holes) close to their heads.

Pic. 21.5 Typical Eel, they have no gill pores, that have a jawed mouth and they are typically longer, average length is 65cm.

Pic. 21.6 Juvenile lamprey are found in the sediment we typically remove when carrying out maintenance. Please carefully check spoil and place lamprey in the plastic bucket available. Then gently wash the lamprey into the river.

Good practice for Lamprey and Crayfish

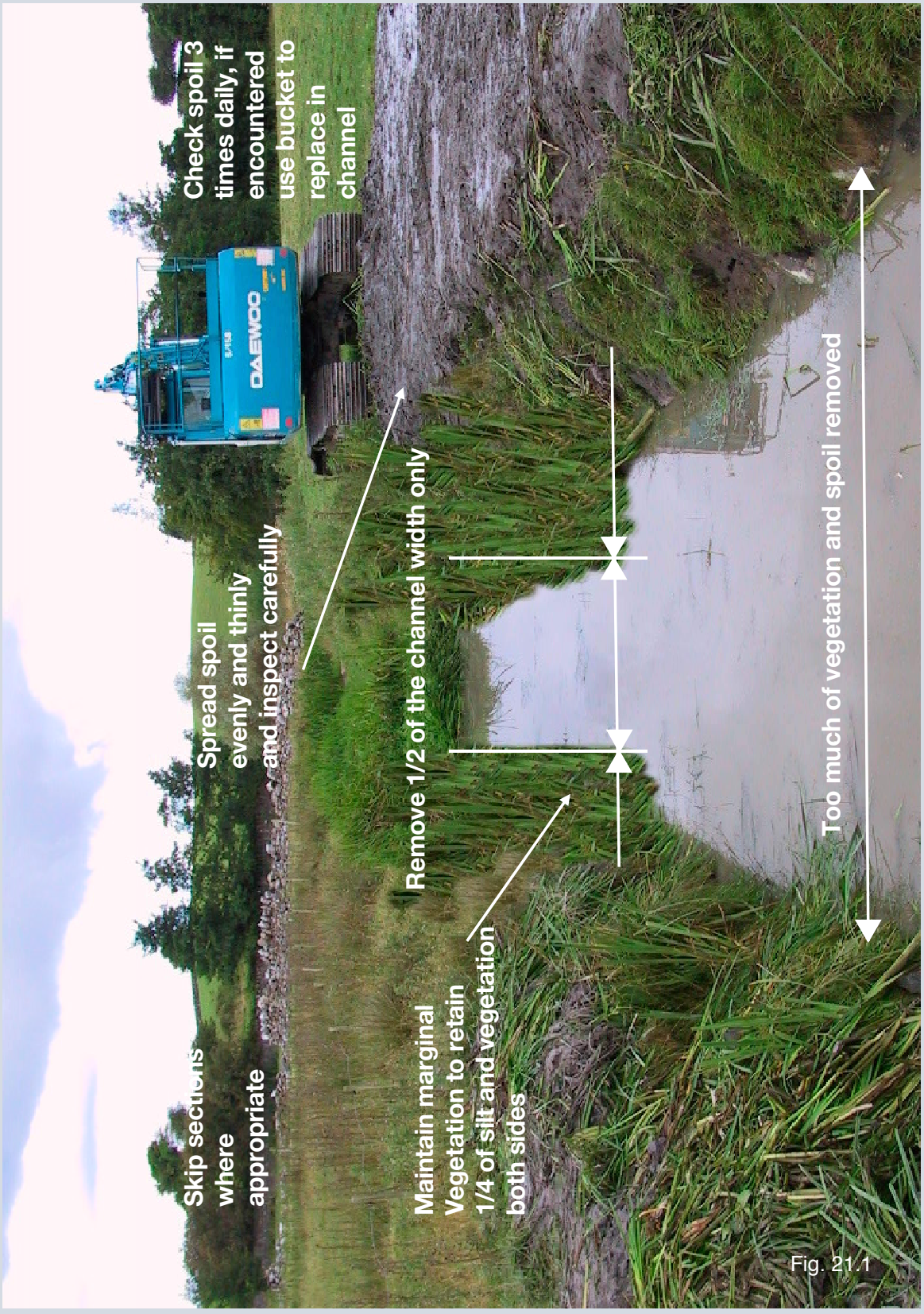


Fig. 21.1

EP 22 Crayfish

Scope

This procedure relates to any location where works encounter crayfish.

Purpose

To protect white-clawed crayfish and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

Crayfish GIS Layers.

NPWS Crayfish Plague Brochure, https://www.npws.ie/sites/default/files/publications/pdf/Crayfish_leaflet.pdf

OPW Series EcIA No.10 White-clawed Crayfish

Procedure

1. Check Environmental information from mapping. Tick “Shown on Map Checklist” if present on weekly records card as per EP6.
2. Inform Environment Section if entering onto site with known presence of crayfish.
3. Observe the spoil three times daily and note on “Observed on Site” on weekly records card, if newly found.
4. Inform Foreman if new crayfish encountered.
5. Replace stranded crayfish by placing in a bucket of water and gently wash into watercourse at a suitable location. Ensure spoil spread thinly and carefully inspected.

What to do if crayfish present:

1. Confirm extent of channel where mitigating measures apply from mapped Environmental Information or from observing spoil.
2. Reduce new excavations to the middle leaving 25% of marginal silt and vegetation on both sides of channel.
3. Comply with EP18B High Biosecurity when crayfish plague present.
4. Maintain in an upstream direction to avoid secondary disturbance of a species.
5. Use weed cutting bucket where aquatic vegetation removal is the primary objective.
6. Maximise length of time between maintenance cycles.
7. Do not programme in channel works on recorded crayfish sites between May and mid-July when Crayfish are berried (i.e. carrying eggs)
8. Consider removing barriers that impede upstream migration.
9. Strictly comply with EP7 ”10 point plan” with emphasis on

- Point 2 Restrict maintenance to channel
- Point 3 Spoil management
- Point 5 Leave sections untouched
- Point 7 Manage berms
- Point 9 Work in gravel bed channels


Pic. 22.1


Pic. 22.2

Pic. 22.1, Pic.22.2 & Pic. 22.3

Crayfish details:

- Resemble small lobsters.
- Colour varies from light to dark green-brown, with large front claws.
- Adults typically 7cm - 10cm (3” - 4”) long.
- Juveniles can be a small as 2cm (1”) long.
- Prefer channels with
  - dense weed cover (flaggers / watercelery) or
  - with a mixture of rocks / gravels that provide crevices for cover.

Pic 22.4. Signal crayfish are an invasive species not currently found in Ireland, contact Environment Section if found. They have a red claw with a white flash between finger and claw.


Pic. 22.3


Pic. 22.4

EP 23 Badger

Scope

This procedure relates to any location where works encounter the presence of badgers.

Purpose

To ensure the protection of badgers and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff and Environment Section.

Related Documentation

Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes.

Procedure

1. Check Environmental information from mapping. Tick “Shown on Map Checklist” if present on weekly records card as per ep6.
2. Note channel and chainage on “observed on site” section of weekly records card if newly found. If burrow opens onto river assume otter, ecologist will review if required.
3. Observe 30m exclusion zone, increase to 50m during breeding season. (December-June)
4. Clearly mark exclusion zones and ensure all staff and contractors are informed.
5. Carry on with works outside the exclusion zone.

Working within exclusion zone, what is required?

1. Consult with an ecologist, if you are required to work within the exclusion zone.
2. Ecologist may reduce exclusion zone, depending on the works, with mitigation in place.
3. Ensure ecologist applies for a licence from NPWS if sett directly interfered with.
4. Sett removal should occur under supervision of an ecologist commencing 25m from outer sett entrances working towards centre digging 0.5m trench slices to a depth of 2m. Destroy the sett from several directions. Confirm that no badgers remain, then destroy sett.
5. Construct artificial setts if required, isolate setts from flood defences and retain if possible.
6. Include a plank at a 45 degree to allow badgers to escape from steep sided excavations where badgers present.


Pic. 23.1 a


Pic. 23.1 b

Pic. 23.1a & Pic 23.1b
A badger sett was encountered within an existing embankment that was being rebuilt on a new footprint further inland. After applying for a derogation licence the badger sett was left in place and isolated from the new embankment structure with wire mesh**.**


Pic. 23.2 a


Pic. 23.2 b

Pic. 23.2a & Pic. 23.2b
This badger sett was evacuated and replaced with a new artificial sett constructed adjacent. Wire mesh was built into the embankment to prevent the sett from re-extending back into flood defence.

EP 24 Bank Nesting Birds

Scope

This procedure relates to any location where works encounter bank nesting sites.

Purpose

To ensure the protection of bank nesting birds and to comply with relevant legislation.

Responsibilities

The responsibility lies with the regional staff.

Related Documentation

King of the Rivers, NPWS/OPW. Operations Layer, OPW Series EcIA No.12 Kingfisher.

Procedure

1. Check Environmental information from mapping. Tick “Shown on Map” if nesting bank present on weekly records card as per EP6.
2. Note nesting banks on “observed on site” on weekly records card, if newly found.
3. Avoid disturbing nesting banks where possible.
4. When placing rock armour do not extend the rock to the top of bank, retain some earthen cliff face.
5. Install artificial nest boxes, where appropriate.

Look for easy wins. Sometimes good results can be accomplished without complex planning. Look to achieve some habitat creation, nest boxes or bat boxes are easily installed and can yield some useful environmental gain.


Pic. 24.1


Pic. 24.2


Pic. 24.3


Pic. 24.4

Pic. 24.1 Kingfisher, **Pic 24.2** Dipper, **Pic. 24.3 and Pic. 24.4** Artificial bank nest, install on a vertical river bank, timber pole revetments make good locations.


Pic. 24.4


Pic. 24.5

Pic. 24.4 and Pic. 24.5.
Vertical river bank where there are kingfisher nest sites indicated by the holes. It is likely that these nest sites were uninhabited as there was scratch marks from mink shown as bank slippage allowed access for the mink. This shows the need to position artificial nests in well-considered locations.

Current best practice regarding artificial nest sites, suggests leaving artificially constructed vertical river banks that can be naturally exploited by relevant species.