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SERIES OF ECOLOGICAL ASSESSMENTS ON ARTERIAL DRAINAGE MAINTENANCE No 3

Ecological Impact Assessment (EcIA) in relation to Atlantic Salmon in Special Areas of Conservation and potential for impact of OPW's channel maintenance work

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Foreword

This Ecological Impact Assessment follows on from the strategic approach outlined in "**Series of Ecological Assessment on Arterial Drainage Maintenance No. 1: Screening of NATURA 2000 Sites for Impacts of Arterial Drainage Maintenance Operations."**

It examines the impacts of statutory arterial drainage maintenance activities on Atlantic Salmon, outlines measures to mitigate any negative impacts, and possible enhancement opportunities.

Environment Section

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May 2007

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Consultations have taken place with the National Parks & Wildlife Service and all maps and references to NATURA 2000 sites have been updated.

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1. INTRODUCTION

1.1 Biology of Atlantic salmon: The Atlantic salmon (*Salmo salar* L.) is an anadromous species, spending part of its life cycle in freshwater and part at sea. Salmon grow to adult size at sea and return to freshwater to spawn in natal rivers and streams. Adult fish enter freshwater predominantly in the spring or summer prior to spawning and travel up the channel seeking out gravelled areas. Upstream movement is often linked with periods of high volume discharge, which are more common in the autumn/winter period.

Spawning can occur as early as October in some catchments or channels and may be late in others (early spring). Spawning takes place in gravelled areas, with adults excavating depressions in the substrate and laying eggs there. Precocious male salmon parr (juvenile salmon) often contribute to the spawning effort where male fish numbers are limited. The eggs are then covered over by the adults with more gravel. The redds thus formed can be readily distinguished as mounds of freshly turned gravel with a hole or depression at the upstream end. Redds formed by individual pairs of fish can be up to one metre X one metre in dimension.

The juvenile fish hatch out from the eggs and live an intra-gravel phase for some months before emerging out of the gravels into the water column in late spring or early summer. Initially the fry or young-of-the-year are dependant on the gravel substrate for cover and can swim between the interstices. The stony bed also forms a three-dimensional mosaic, obscuring the young fish from their neighbours hatched from the same redd. This is important in view of the territorial nature of these fish. During the first summer the young fish, also referred to 0+ fish (i.e. still in their first year of life, no birthday event yet) may disperse out from the natal area to establish a territory for themselves. They live in shallow stony areas or riffles during their first year. They actively feed on small invertebrate animals - juvenile insect stages, snails, and shrimps taken on the bed of the channel or in aquatic vegetation. Growth rate is greater in calcareous or alkaline areas than in channels overlying hard rock strata. The fish in their first year may grow to a size
of 5 – 8 cm.

Young salmon grow until they reach the smoltification stage. The fish turn an intensely silvered colour and commence a migration in small shoals down the natal catchment and move out to sea. This process can happen during the second year of life, as 1+ fish, in channels where the growth rate is very fast. More commonly, it takes place during the third year of life, as 2+ fish, in freshwater. Those 1+ fish that do not smoltify continue to feed and grow. They may still be found adjacent to riffle areas but are more commonly taken in somewhat deeper glides or in pools. Smolt runs are recorded in large catchments primarily in the March – May period but smaller downstream migrations do occur at other times of the year, particularly autumn. Mortality rates differ among the various life history stages from hatching of eggs in the gravel to smolt migration to sea. An estimate for survival in the Corrib system, from 0+ age in autumn to the 2+ smolt stage, of 7.4% indicates the high overall mortality levels involved in the riverine stages of the juvenile salmon life cycle.

When smolts reach the sea they migrate north from Irish coastal waters to feeding grounds off the Faroe Islands, the north Norwegian Sea. Some travel further afield to feeding grounds off West Greenland. The fish increase in weight and size rapidly at sea, from smolts of 13-15 cm to fish in excess of 50cm. Those fish returning after one winter at sea, one-sea-winter fish, are known as grilse and move into natal waters generally in early summer. The multi-sea-winter fish, which will have spent more than one winter at sea, attain larger size than grilse and are also known as spring fish, moving into freshwater in the spring prior to spawning. Adult salmon do not feed once they move into fresh water. However, there can be a span of several months between arrival and the actual spawning phase. In large riverine systems, some of this time is spent in travelling up the system. Where obstructions to passage, such as weirs or natural rock barriers, occur the fish require the appropriate hydraulic conditions to pass these. Such conditions include the presence of areas of deep water immediately below the barrier, from which the fish can spring upward. Adult salmon, in view of their size, require large, deep resting areas or pools during their upstream migration.

The Atlantic salmon, in fresh water, is an Annex II species under the EU Habitats Directive. This requires that member states designate a series of habitats where special measures will be undertaken to maintain the favourable ecological status of the target species. In Ireland, a series of major river channels and their tributaries have been designated for this purpose. Such areas are known as Special Areas of Conservation (SACs). These include the main channel and major tributaries of the Boyne and Moy, both of which have been the subject of catchment arterial drainage schemes by the Office

of Public Works (Table 1).

Table 1. Overlap between Special Areas of Conservation for salmon and OPW drainage schemes (courtesy of OPW).

Site Code	Site Name	Arterial Drainage Scheme	No. of Channels within SAC
02299	Rivers Boyne & Blackwater	Boyne	210
02299	River Moy	Moy	204
02165	Lower River Shannon	circa 5No. – to be confirmed	circa 100
00297	Lough Corrib	Corrib Headford, Corrib Clare	55
00343	Castlemaine Harbour	Maine	19
02301	River Finn	Deele & Swillyburn	4
01976	Lough Gill	Bonet	2
00428	Lough Melvin	Kilcoo	1

1.2 Arterial drainage and maintenance: Arterial drainage was intended to provide flood relief and enable additional agricultural land to be brought into production. Under the 1945 Arterial Drainage Act, drainage work was executed on a catchment-wide basis and involved lowering the existing water table. This was done by lowering the bed of the river or channel to a new design level and creating a new cross-sectional form. The process created an entirely new bed and bank regime in terms of altered physical dimensions and removal of pre-existing habitat. Of particular importance was the impact of the engineering design on the longitudinal profile of the impacted channel. Conveyance was enhanced to the greatest degree by removal of bed high points that might cause obstruction to flood flow or impound water. The design bed profile was rendered as uniform as possible. In areas of moderate to high velocity, for any flow stage, the natural physical features such as shallow, stony areas or riffles and deeper, impounded areas or pools were largely replaced by an averaged grade creating extended areas of more uniform flow or glides.

Under the 1945 Arterial Drainage Act, under which the majority of the current portfolio of OPW arterial drainage schemes were executed, there is an obligation to maintain the channels originally excavated by it "in proper repair and effective condition….". The maintenance process has the potential to have a retrograde impact on channels that have been undergoing recovery or naturalisation in the years following arterial drainage.

Since 1990 the Central Fisheries Board (CFB) has been engaged in studies, commissioned by OPW, designed to examine the impact of maintenance processes on fish and the fisheries habitat and to examine the feasibility, conveyance benefit and ecological value of alternative strategies that may be adapted in maintenance. These studies are undertaken under the Environmental Drainage Maintenance (EDM) programme. These developments have occurred at a time of major change in emphasis in regard to environmental protection and land management practises, with greater awareness of the sensitivity of the environment and need to conserve biodiversity. Conscious of the role of national and EU legislation in environmental protection and of the potential for its (OPW) work practises to impact adversely on the environment of the river corridor, OPW adopted a new suite of maintenance practises designed to reduce environmental damage and, where appropriate, to provide habitat enhancement in the course of its river maintenance work. The implementation of this new policy involved training provision to OPW's team of field staff throughout the country. The training programme was devised and presented by CFB and was based on the experience and findings of the scientifically based EDM programme. An initial draft of the training programme was examined with colleagues from the Regional Fisheries Boards, who have regular dealings with OPW Drainage Division or with Local Authorities involved in channel maintenance work, and a number of significant additions were made. Training was provided to in excess of 250 OPW staff at 14 training sessions over the winter of 2002 – 2003. Follow-up involved individual site visits to machine crews (2 persons) and their foreman by CFB. By the end of 2004, approximately 70% of machine crews had been visited and it is planned that all machine crews will have been visited by the end of 2005.

It is considered that the experience compiled in the scientific studies and in on-site visits to machine drivers is of importance in contributing to the development of the proposed ecological assessment. The background to this assessment is as follows:

- OPW continues to have an obligation to maintain channels that now lie within SACs.

- Some of these SACs are designated for fish species that may be directly impacted by maintenance operations

- A potential difficulty arises in the context of the obligations of National Parks and Wildlife (NPWS) to maintain the favourable ecological status of Annex II species (under the EU Habitats Directive) within SACs with the obligations of OPW (under the Arterial Drainage Act, 1945) to maintain channels in proper hydraulic condition

- The assessment examines the range of maintenance activities that may impact on the different life-history stages of the fish species in question, assesses potential impacts and identifies appropriate channel management strategies that are consistent with conserving the ecological status of the target fish species

- In the present case, the target fish species is the Atlantic salmon

2. MAINTENANCE IMPACTS ON LIFE-HISTORY STAGES AND PROPOSED MITIGATIONS

2.1 Upstream passage of adult salmon

2.1.1Weirs, Bridges: Adult salmon travel into natal waters at any time from spring until autumn prior to their winter spawning activity. Their principal requirements are unimpeded passage and access to deep-water pools or resting areas. Passage may be impeded by weirs or some other physical barrier that creates total obstruction. In many arterially drained channels e.g. the Boyne, numerous large weirs were removed at the drainage stage. Not alone did this reduce access problems but it also helped to create new riffle areas of gravel accumulation suitable for salmon spawning as well as new areas of shallow-water habitat suitable for 1+ salmon. Where weirs are extant on OPW channels it is imperative that these are provided with suitable fish passage facilities and that these facilities are in proper working order.

Some weirs are constructed in such a manner that they create serious obstacles to salmon passage; the crest height may be too high to jump, the floor on the downstream side may be paved with concrete and thus eliminate any pool or deep area from which fish can jump upwards, the fish passage facility may be poorly sited relative to the flow conditions thus preventing the fish from reaching the pass. A similar problem can arise with bridge floors. This may be particularly pertinent in OPW schemes where many new bridges were constructed in concrete and old ones underpinned during scheme execution. These frequently had flat floors with an extended apron at both up-and downstream ends. In low flow situations, fish are presented with a thin film of water over a hard, hostile surface – circumstances not likely to facilitate upstream movement.

The impact of the obstruction may be exacerbated in conditions of low flow. In such conditions, adult salmon may, literally, be imprisoned in shallow water at the foot of the weir and are prey to predation and poaching. In such situations they may also be subject to disease outbreaks brought on by stress induced by low water and high temperatures. This can result in significant losses to the spawning run, particularly when the obstruction occurs to a single genetic stock in a discrete tributary channel.

These shortcomings in weir design, in ecological terms, are not necessarily the subject of routine maintenance work. However, trees and other major debris can be washed downstream in floods and collect on weirs. Accumulations of debris can lead to vegetation growth and the ability of the weir to pass adult salmon may be further impeded. Periodic cleaning of these structures is necessary. If maintenance is scheduled for a salmon SAC/OPW channel it would be appropriate for Fisheries Board personnel and OPW personnel to examine the weir and its shortcomings with a view to the potential for ameliorative measures to be implemented. Fisheries Engineers from the DoCMNR are also experienced in this area and NPWS should also be involved in any such discussions.

In recent works schemes, OPW has designed bridges to accommodate reasonable depth through the structure for all stages of flow. In the case of multi-ope structures, this has been done by having the design level of one floor placed at 500mm depth below the design for the other floors. This serves to concentrate the flow into this ope in low flows. Where new bridges have been installed using box-culvert sections, the same procedure has been adopted – with one section placed at 500mm below the other. Bridge floors can also be designed to lie BELOW the bed level of the channel both up- and downstream of the structure and to have the same gradient as the channel bed. This ensures that the floor area under the eye has a permanent flow of water and the channel deposits its own natural bed load along the floor. Thus the area under the bridge becomes a natural part of the stream continuum.

An additional problem with bridges having extended aprons emerges when a difference in bed level develops over time between the channel bed below the structure and the structure itself. This can be caused by the flow off the apron scouring down as it spills off the concrete. In time, serious scouring can occur at this point. If maintenance has been ongoing up to the bridge a differential can be developed in bed level – exacerbating the scouring effect. These factors can serve to undermine the bridge structure, something of obvious concern from the engineering perspective. However, this sequence of events can also prevent upstream movement of adult salmon, not to mention other species, such as lamprey, that do not have a jumping capacity.

A fisheries rehabilitation strategy has been developed that can address some of the problems associated with both weir passage and with bridge aprons. This approach can also be incorporated into remedial action for bridge scour. The approach involves use of large rock or rubble of a size that will not be washed out or displaced by heavy flows. Many OPW technical staff will have familiarity with use of such heavy material from its use on rock-armouring banks and in constructing weirs in channels. In the case of weirs, the shortcomings on the downstream side can be addressed, in whole or in part, by construction of a secondary weir. This creates an area of water of enhanced depth between itself and the parent structure. The secondary weir also creates a water surface level intermediate between that below the parent weir and that above the parent structure. The combination of enhanced depth and reduced jump-height can facilitate passage of adult salmon. Installation of rock below a bridge apron can eliminate the scour and preserve the bridge. If the rock is installed in an upstream-sloped manner and is built up to a level above that of the apron floor then an impounding effect will occur, with water lying over a floor of the bridge to a level with the height of the piled-up rock. In a multi-ope structure, this piling-up approach would only be required at one eye.

2.1.2 Suspended Solids: Excavation in any channel will generate a suspended solids load that may discolour the channel. Suspended solids can be transported downstream and be deposited out. In many arterially drained channels, solids loads tend to deposit out along the sides of the channel, forming lateral bars. Over time, these bars can stabilise and form a low-level narrowing of the wetted channel of benefit to fisheries. Solids can also be trapped by aquatic vegetation growing in the channel. Sediments

can also settle on low-growing vegetation and on bed material, smothering the plants and infauna as well as filling interstices in gravel-bed channels.

Suspended solids and bed load transport are natural features of any river and flood situations can generate substantial discolouration due to sediment transport. Adult salmon will lie in estuarine waters, on entering the natal catchment, and are drawn up into the river system and up the catchment by discharges of fresh water coming down in high flow or flood situations. Suspended solids generated in maintenance are not likely to impact adversely on adult salmon entering the lower reaches of a system. However, as the fish ascend into a discrete channel any maintenance work in that channel may cause disturbance. This would be particularly the case in situations of low flow, where adult salmon would be dependant on finding deep pool areas to rest up waiting for flood conditions to draw them further upstream. Turbid water with a sediment load would start to deposit silt in pool or low-velocity reaches and this could cause stress to fish. Suspended solids may displace adult salmon down the river. In OPW maintenance sites the channel is generally running clear some hours after completion of work each day. In addition, maintenance is not carried out at weekends. These breaks provide clear-water windows for adult salmon to pass through areas of maintenance work.

Mitigation strategies for suspended solids are similar for any life history stage of Atlantic salmon. The following mitigations are relevant, bearing in mind that suspended solids are generated naturally in elevated flows, that suspended solids are generated in agricultural and urban runoff and that suspended solids levels will arise in maintenance:

- Suspended solids arising from maintenance are likely to be entrained, re-entrained and carried further during flood or high flow events. This will discolour the water column. The value of continuing maintenance work in such flow conditions should be examined as drivers may have very limited view of the operational area and may be severely impeded in executing works efficiently

- Maintenance is generally carried out in an upstream direction. A reversal of this, with work proceeding downstream, is likely to provide significant benefits in terms of management of suspended solids loads. This arises due to the potential for solids to sediment out naturally in low velocity areas and/or be trapped by instream vegetation not yet removed in maintenance. This vegetation, if present in significant amounts, would form a natural screen and cause deposition of suspended solids. Thus the machine operators, moving in a downstream manner, may have a ‘second bite’ at removal of sediments.

- The downstream direction approach has been used on isolated occasions at the request of Fisheries. It has also been used on a regular basis by OPW in some of its maintenance regions. A decision to maintain a channel in a downstream direction could be arrived at in regard to a specific SAC channel following consultation between OPW and local expert staff from the NPWS and Regional Fisheries Board

- Installation of a screen or baffle structure in advance of maintenance has also been undertaken locally at the request of local Regional Fisheries Board staff. This has generally occurred on channels discharging upstream of important salmonid spawning areas, the channels being maintained having no spawning value in themselves. Barriers can be composed of rock or rubble derived from old spoil lines or from heavy-duty sheep wire fencing pinned securely across the channel with or without straw or hay bales placed on the upstream side. This type of structure is, obviously, of a temporary nature and type selection is dependant on the size of the channel and its flood characteristics. Such barriers are of value in channels that have little settlement features, such as areas of low velocity or instream flora, available. They are only cost-effective if combined with a downstream-direction of movement by the maintenance crew. If used with an upstream-moving machine, the OPW crew would have to track back with the machine and remove silt and structure at regular intervals. Such double tracking may not be feasible, or satisfactory to local landowner.

- In small channels, where maintenance is being carried out in areas with gravelled reaches used in the spawning season, it may be of value to excavate below the design bed level to create pools immediately upstream of such spawning sites. These pools can act to trap silt displaced locally as well as serving as deeper lies for older fish.

2.1.3 Pools: It is essential for upstream-migrating adult salmon to have access to areas of deep water, or pools, for resting. Adult fish will spend considerable periods of time in pools prior to the final stage of migration to the spawning grounds. While the arterial drainage process tended to remove pools and the highpoints creating them it is possible to restore pool habitat. Studies in the EDM programme validated the strategy of over-digging the channel bed, below design level, to create artificially deepened segments of water. The spoil removed was dispersed both up- and downstream of the excavated area in order to enhance existing riffle areas or to create new or embryo riffles. This strategy was successful in enhancing the autumn carrying capacity of these new areas for adult brown trout and for 1+ salmon. The same approach can be undertaken on a larger scale in order to create deeper holding pools for adult salmon. This approach can be undertaken in maintenance as an ‘added-value’ approach. For success, it should only be undertaken where the bed material is of such a nature as to be able to remain stable and not slump following the digging. In addition, any plan to excavate should be developed in the context of a rational fisheries management plan developed with the local Regional Fisheries Board. The development of such pools would be a mitigation for the species and would lead to development of hydraulic diversity, locally, in the channel. Such development would also create angling opportunities for salmon and trout anglers.

The holding value of these pools would be further enhanced by placement of large boulder(s) on the channel bed in the pool. Larger stone may be removed from spoil, where present, or may be encountered in channel cleaning. Replacement of this material also provides lies or resting stations for adult salmon as well as resident trout.

Such stone material is particularly valuable when placed into pools. In these cases the presence of the rock helps to form a scouring action that maintains the pool's integrity. Ideally, the boulder should lie fully below the low-flow water surface.

2.2 Spawning Activity of adult salmon

2.2.1 Timing of restrictions on maintenance – a mitigation: Adult salmon spawn in the autumn-winter period, although later spawning can occur. The Fisheries Boards are familiar with spawning patterns for specific catchments and channels in their jurisdictions and are in a position to advise on the specifics of timing in particular catchments. As a general rule, the Fisheries Boards do not permit inchannel works, including maintenance, to take place between the 31st October and 30th April of the following year – covering the winter period. This prevents disturbance of spawning activity as well as disturbance of the intra-gravel life stages. This protection of spawning produce is enshrined in Fisheries law. In developing this document with the Regional Fisheries Boards, it was apparent that spawning could occur over a wide part of the autumn-winter period. Spawning can occur during October in the waters of some Boards, and these would be anxious to impose restrictions from the 1st October. In other cases, salmon spawn late and these Boards would not sanction any disturbance of bed in gravelled /spawning channels prior to 1st June.

Regional Fisheries Board officers are in agreement that the specifics of spawning time – and hence, of cessation or start-up of maintenance in these channels - should be discussed locally and solutions developed that are consistent with the Fisheries requirements in each case.

In the case of recently constructed flood relief schemes managed by OPW, the restriction on inchannel works extended from 31st October to 1st July in the following year. This took account of all possible contingencies of early and late spawning and permitted significant development of the young-of-year salmon. This time span also provided protection for spawning of river and brook lamprey, both Annex II fish species.

2.2.2 Gravelled areas – conservation and mitigation strategies: Salmon spawn on gravelled areas. Gravel shoals tend to collect on points of inflection or grade breaks of the channel bed. These areas are naturally self-cleansing of silt and deposition and do not, as a rule, require maintenance. As a matter of course, OPW will frequently skip over such areas in maintenance and leave them alone. This approach is further encouraged in the CFB's training programme.

In addition, CFB recommends that loosening or tossing of gravels be undertaken, at the appropriate time of year. Following discussion with the Regional Fisheries Boards, the appropriate window for this activity runs from 1st July to 30th September. However, local variations may be permitted by Regional Boards, based on their own expert knowledge. Loosening or tossing has the effect of washing out fines from the gravel beds and, in the case of compacted or concretised gravel shoals, this can loosen the individual alluvial particles of appropriate spawning size and render the bed suitable for excavation by salmon. Such loosening has been shown, experimentally, to be effective within the EDM programme and supports similar findings from the UK.

This approach has also been undertaken locally by OPW and RFB personnel. The loosening is done by the machine crew using the teeth on the excavator bucket to rake over and agitate the bed. This is done as an alternative to leaving the section alone and constitutes a value-added operation. However, this operation should only be done at a time of year when no intra-gravel life stages of salmon, trout or lamprey are present in the gravels. The recommended time period lies between 1st July and 30th September inclusive. Local variations on this time frame will occur, but only following advice or request from local RFB staff.

The occurrence of spawning by the large sea lamprey in an area identified for gravel loosening would require significant modifications to the timeframe available for loosening.

2.3 Juvenile salmon in freshwater

2.3.1 Disturbance of gravels during intra-gravel life phase: The adult salmon lay their eggs in pockets in the gravel. After a time the eggs hatch but the young remain within the gravel, passing between the interstices, until they reach a size of 2 –3 cm when they come to the surface and actively swim and feed. The intra-gravel phase can last for 3 months and, obviously, any disturbance to the gravels by machinery at this stage would be extremely deleterious.

The egg and post-egg stages are dependent on water, passing through the gravel bed, to permit gaseous exchange and removal of waste metabolites. Any diminution of the rate of exchange, permitted through the passing water, could be deleterious to the young life stages. Some filling of the interstices in the gravel mound will occur naturally over time and as the young are still developing. However, this natural process could be augmented by the creation of additional silt or particulate loads from upstream created by a channel maintenance operation. Such actions should not be taking place in a salmon spawning channel at this time of year, as indicated above. The barring of such maintenance during this period ensures an absence of any potential for adverse impact from maintenance during this time.

2.3.2 0+ salmon habitat: Juvenile salmon in their first year, having emerged from the gravel, become free swimming and search for food and shelter. The young are territorial and benefit from large sized particles in the bed, such as larger gravels and grades of cobble. This material harbours invertebrate food items for the young fish but also creates territorial pockets by obscuring the view of young fish, permitting more juveniles to occupy the same area. Those fish that do not find a territory in the area of the natal redd or spawning site drop downstream in search of a suitable niche. Low-growing marginal vegetation such as water celery and grasses can provide cover for young salmon along the channel margins.

OPW drivers are instructed to retain vegetation along the water's edge in channels. They are also advised that stone material removed should be replaced and that stone or rock encountered when traversing the bank should be put into appropriate locations in the channel.

Channel maintenance and the environmentally-sensitive options that may present themselves in maintenance differ significantly from the strategy of channel enhancement, where a plan is developed to benefit specific life history stages of target fish species. The plan requires funding for implementation, to cover costs of materials as well as machinery and plant costs to carry out the proposed works. However, when substantial amounts of stone and rock are encountered in spoil during maintenance the potential exists to implement channel enhancement work as a form of value-added maintenance. This has been successfully undertaken during the EDM study and further opportunities have been identified by RFB staff locally and implemented by OPW in agreed areas. This value-added opportunity is of particular relevance in salmon-bearing channels that have been arterially drained and undergo maintenance.

2.3.3 Habitat of 1+ salmon up to smolt stage: The 1+ and older salmon continue to favour stony channel areas but move off the shallow, more torrential riffle area into deeper glide areas and small pools. These fish are large enough and are sufficiently strong swimmers to be able to evade excavation work and to move to undisturbed areas. These life stages would not be expected in silting, weeded habitat characteristic of areas requiring maintenance. The strategy of over deepening the bed level locally to create pools has been shown in the EDM study to create habitat preferred by 1+ salmon. These pool areas provide shade and cooler water during summer low flow situations as well as providing low velocity areas in flood conditions.

The process of placement, and replacement, of rock and stone removed in maintenance back into the channel is also of considerable value to 1+ salmon. Similarly, use of stone extracted from spoil lines is also valuable. The process creates greater spatial diversity and more 'niches' for juveniles to occupy. In addition, the stone can be colonised by a range of juvenile insects, snails, shrimps and other food items of importance to the juvenile fish. One reservation engineers might have in regard to re-placement of stone into a channel would be the potential for stone material to impede flood flows. However,
experience has shown that stone material can be effectively used for fisheries improvement without adversely impacting on the channel's flood flow capacity. In all cases, stone material should be placed so that its upper surfaces lies at or just above the summer low flow level. This ensures that structures are drowned out with rising flow, while still having their optimum impact at time of greatest fish need – at low flow. Individual rock pieces of large size should be placed centrally in the channel in order to prevent deflection of flow towards the banks, with potential to cause erosion. Where actual structures are envisaged, a plan should be developed with the competent senior Regional Fisheries Board officer and the work overseen with assistance from a competent RFB staff member. Structures should be keyed into the bank on each side, as appropriate, and should provide armouring along the bank both up- and downstream of the structure to protect the banks.

A major programme of channel enhancement was carried out in Ireland over the 1995-2000 period under the EU TAM programme, involving placement of large quantities of stone to form random boulders, rubble mats, stone deflectors etc. In many cases, the work was undertaken by the Regional Fisheries Board and structures were placed in channels managed by OPW, following consultation with OPW. The principal specifications were that structures would not show more than approximately

300 mm above the summer low flow level, ensuring they were drowned out in flood flow, and that structures did not direct flow towards banks, with the potential for erosion. The programme was successful in creating or enhancing extensive areas in tributary channels as spawning or nursery waters for salmon and for trout. In larger rivers, the programme created extensive areas of quality angling water. The programme facilitated extensive liaison between OPW and the Fisheries Boards, both in the planning and implementation stages. It also facilitated the development of a substantial knowledge base within the Fisheries Board service in regard to design of enhancement schemes, selection of appropriate strategies and structures and in construction of structures. This knowledge base is now available to service sound environmentally–sensitive strategies for value-added work in channel maintenance.

The question of suspended solids has been discussed above (2.1.2). However, maintenance work in the smaller spawning and nursery channels with resident juvenile salmon can adversely impact on these life stages. This may be particularly the case in low flow situations that pertain in summer – early autumn. Maintenance is frequently delayed in these channels to prevent adverse impact on spawning and intra-gravel life stages. A combination of low flow and suspended solids may be detrimental to juvenile fish. Maintenance proposals in such combination of circumstances should be discussed in advance with local regional Fisheries Board staff and any necessary mitigation should be implemented.

3. MAINTENANCE REQUIREMENTS AND OPTIONS THAT MAY ARISE IN SALMON-BEARING CHANNELS, INCLUDING SACs

3.1 Timing:

- Fisheries Boards currently restrict OPW maintenance in salmonid (salmon and trout) spawning channels to the May - October period
- This window can be modified in the light of local RFB expert opinion and knowledge
- This window may not be adequate in the case of late spawning channels and may require restriction
- Overlap or synchronisation of windows may be needed in regard to SACs designated for both salmon and lamprey. The latter, combining the three species, spawn from April through to late July

3.2 Standard Maintenance Procedures (new environmental protocol):

- Retain non-working bank slope and water's edge intact
- Retain working bank slope intact where possible
- Place spoil on bank full line or old spoil heaps where possible
- Confine desilting and weed removal activity to the wetted channel
- Manage vegetation types as per training, with particular emphasis on retention of tall emergent *Phalaris* vegetation at the water's edge
- Leave sections untouched where maintenance is not required
- Manage trees as required and within environmental window, as appropriate
- Replace occasional stones/rocks into channel as these are encountered. This can include rock taken from old spoil heaps
- Manage berms by 'topping' them. Narrowing width of berm should be avoided except in those cases where berm width has become obviously excessive. Any narrowing should be discussed and agreed with Regional Fisheries Board personnel

3.3 Additional Procedures:

- A walk-over survey of the channel should be conducted involving OPW and Fisheries Board staff and should lead to an agreed programme, specifying the approaches in specific segments identified by OPW chainage marks. The walkover should lead to development of a permanent record of the visit (report) with a register of items agreed for specific sectors and a representative pictorial record.
- The walk-over should identify specific or specialist items can may be undertaken in maintenance. These may include
  - Leaving important areas of spawning untouched
  - Loosening of gravel beds
  - Use of rock, where sufficient is available, to form specific instream structures, of hydraulic and ecological value to Fisheries
  - Areas where bed over digging should be done to develop a more diversified riffle – pool sequence
  - Timing of works to tie in with local expert Fisheries knowledge

- The requirement to introducing baffles or obstructions to trap silt and suspended solids should be investigated. This has been done in different OPW work sites before with some success

- It should be agreed by all parties and stakeholders that OPW machine crews take their instruction from their own line management, not from landowners or from NPWS, RFB or CFB personnel. It is proposed that Fisheries Board personnel approach drivers in the company of the resident foreman, unless other arrangements have been clearly agreed.

Contributors

An initial draft of this document was compiled by the author and circulated to colleagues in the Central Fisheries Board, with expertise in salmon ecology and management, and to colleagues in the Regional Fisheries Boards who also deal with fisheries management and environmental issues in salmonid waters as well as having dealings with OPW or Local Authorities engaged in channel maintenance in those Special Areas of Conservation designated for Atlantic salmon. All colleagues responded generously and their input is reflected in this final version of the document.

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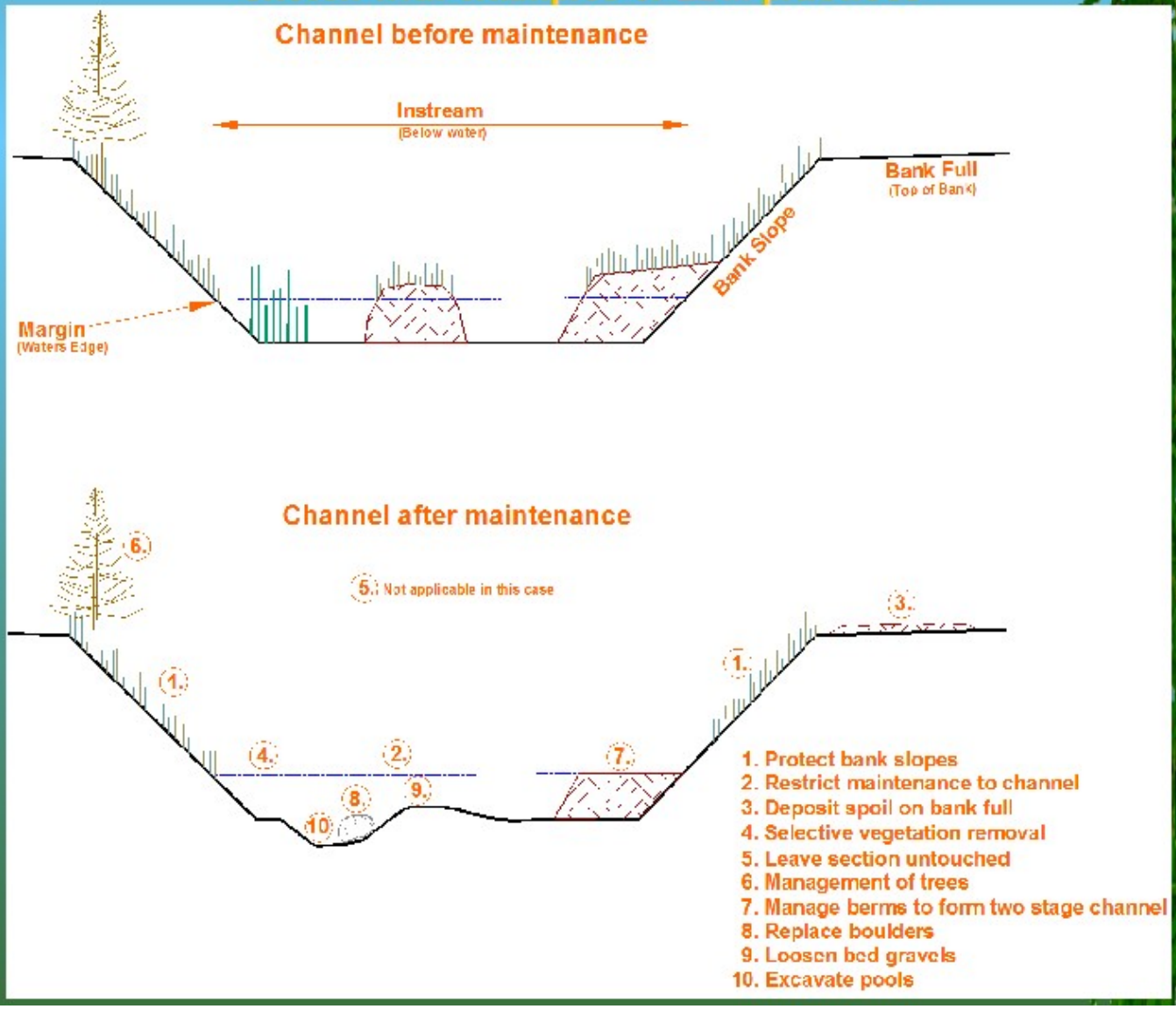
Appendices

Environmental Drainage Maintenance

Guidance Notes

10 Steps to Environmentally Friendly Maintenance

Sketch with examples of EDM practices



Steps to be carried out as standard procedure

1. **Protect bank slopes**
   - Retain vegetation on non-working bank
   - Minimise scraping of bank slope on working bank
2. **Restrict maintenance to channel**
   - Remove instream material only
   - Retain marginal vegetation
3. **Deposit spoil on bank full**
   - Maximise spoil deposition on bank full or spoil heaps
   - Minimise spoil deposition on bank slopes
4. **Selective vegetation removal**
   - Retain Canary and other marginal grasses
   - Remove Bulrush, Bur-reed and Water celery type vegetation

Steps to be carried out in consultation with Foreman/Technician

1. **Leave sections untouched**
   - If channel capacity is not effected, then leave intact
   - Only maintain if environmental works required
2. **Management of trees**
   - Leave intact if no reduction in channel capacity caused
   - Remove overhanging branches to flood level
   - Use saw or secateurs for removal, not excavator
3. **Manage berms to form two stage channel**
   - Remove top of berms to low flow levels
   - Remove vegetation and soil from gravel berms
   - Replace sod to the berm where feasible
4. **Replace boulders**
   - Reinstate boulders and gravels as removed by maintenance operations
   - Reinstate boulders into channel from spoil heaps
   - Boulders placed below low flow level and staggered

Steps to be carried out in consultation with Fisheries

1. **Loosen bed gravels**
   - Loosen or toss bed gravels to wash out fines
   - Only considered between 1st July and 30th September
2. **Excavate pools**
   - Excavate pools staggered along channel centre and sides
   - Excavated material placed to form adjacent riffles
   - Completed only if channel bed of suitable material

July 2003

Appendix II: Details of other conservation aspects associated with the relevant Salmon SACs. ***(courtesy of OPW).***

Site Code	Site Name	Other Conservation Aspects	
		Species	**No. of Habitats**
2298	River Moy	Crayfish, Sea Lamprey, Otter.	5
2299	Rivers Boyne & Blackwater	River Lamprey, Otter.	2
2165	Lower River Shannon	Fresh Water Pearl Mussel, Sea / River & Brook Lamprey, Otter, Bottlenose Dolphin.	15
297	Lough Corrib	Crayfish, Fresh Water Pearl Mussel, Sea & Brook Lamprey, Otter, Lesser Horseshoe Bat, Slender Naiad.	14
343	Castlemaine Harbour	Sea & River Lamprey, Otter.	15
2301	River Finn	Otter.	4
1976	Lough Gill	Sea / River & Brook Lamprey, Crayfish, Otter.	3
428	Lough Melvin	Otter.	1
2162	River Barrow & River Nore	Crayfish, Fresh Water Pearl Mussel, Sea / River & Brook Lamprey, Otter, Twaite Shad, Whorl Snail.	13
2137	Lower River Suir	Crayfish, Fresh Water Pearl Mussel, Sea / River & Brook Lamprey, Otter, Twaite Shad.	7

Appendix III:Maps and Drainage Scheme details for relevant Salmon SACs and OPW Drainage Schemes (*courtesy of OPW*)

List of maps;

A4 nationwide map denoting extents of relevant Salmon SACs
Maps of individual SACs denoting OPW Channels, Channel Extensions and Embankments:
River Moy - A3 @ scale 1:150,000
Rivers Boyne & Blackwater - A3 @ scale 1:150,000
Lower River Shannon - A3 @ scale 1:300,000
Lough Corrib - A3 @ scale 1:200,000
Castlemaine Harbour - A3 @ scale 1:100,000
River Finn - A3 @ scale 1:150,000
Lough Gill - A3 @ scale 1:100,000
Lough Melvin - A3 @ scale 1: 50,000

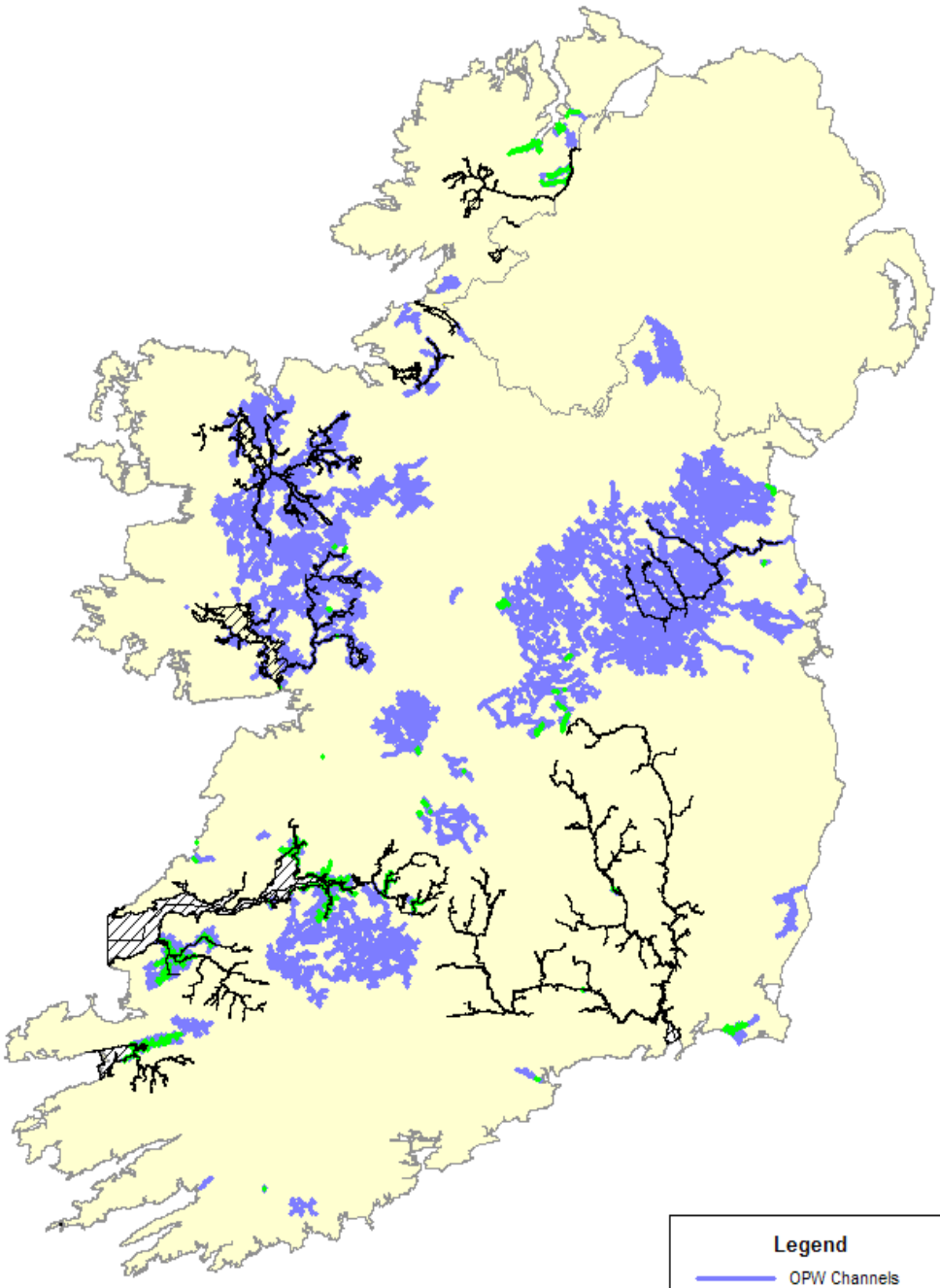
Notes on Maps:

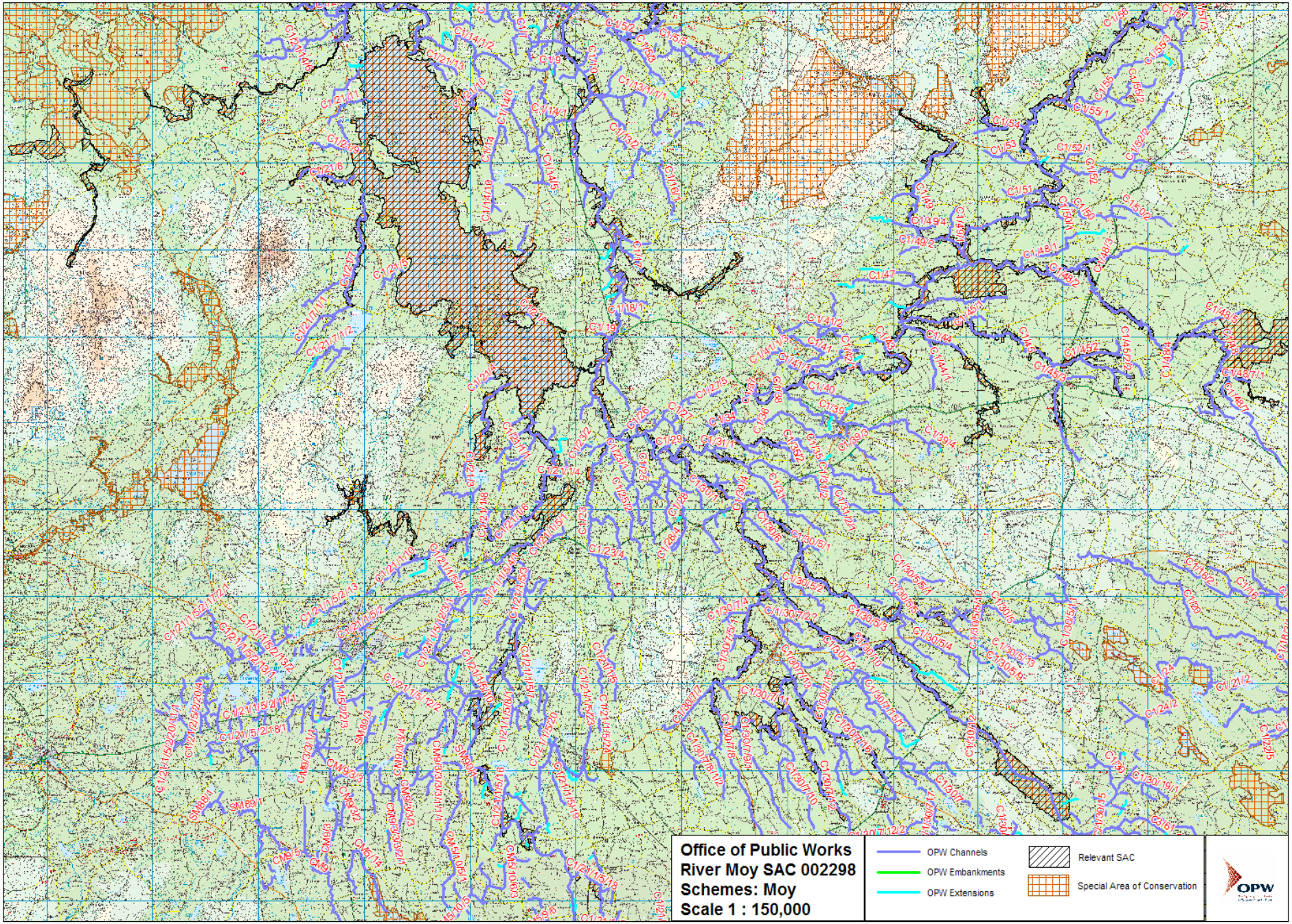
- Maps are not supplied for the SACs Rivers Barrow and Nore and the Lower River Suir. The relevant Flood Relief Schemes are of a more localised nature and contained within urban limits.
- Names for all the Channels, Channel Extensions and Embankments are not shown in the interest of clarity.

Notes on Tables:

- Tabular lists denote all Channels, Channel Extensions and Embankments that lie either entirely or partly in the relevant SAC.
- Channels that partly lie in the SAC are defined as “intersecting”.
- At the time of print, the OPW were in the process of correcting the digitised drainage information, hence some of the tabular information may be revised at a later date.
- All the channels listed, while relevant to the overall SAC, may not necessarily be pertinent to the specific conservation aspect i.e. in this case Atlantic Salmon.

Salmon (EU Code 1106)
SACs & OPW Channels / Embankments




Office of Public Works
River Moy SAC 002298
Schemes: Moy
Scale 1 : 150,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon(EU Code 1106) SAC: River Moy 002298
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Moy	2298		√
C1/10	Moy	2298		√
C1/11	Moy	2298		√
C1/12	Moy	2298		√
C1/13	Moy	2298		√
C1/14	Moy	2298		√
C1/15	Moy	2298		√
C1/16	Moy	2298		√
C1/17	Moy	2298		√
C1/17/1	Moy	2298		√
C1/18	Moy	2298		√
C1/19	Moy	2298		√
C1/20	Moy	2298		√
C1/21	Moy	2298	√	
C1/21/1/1	Moy	2298		√
C1/21/1/10	Moy	2298		√
C1/21/1/2	Moy	2298		√
C1/21/1/3	Moy	2298		√
C1/21/1/4	Moy	2298		√
C1/21/1/5	Moy	2298		√
C1/21/1/5/1	Moy	2298		√
C1/21/1/5/10	Moy	2298		√
C1/21/1/5/11	Moy	2298		√
C1/21/1/5/12	Moy	2298		√
C1/21/1/5/13	Moy	2298		√
C1/21/1/5/14	Moy	2298	√	√
C1/21/1/5/15	Moy	2298		√
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C1/21/1/5/18/4	Moy	2298		√
C1/21/1/5/18/5	Moy	2298		√
C1/21/1/5/18/6	Moy	2298		√
C1/21/1/5/3	Moy	2298		√
C1/21/1/5/4	Moy	2298		√
C1/21/1/5/5	Moy	2298		√
C1/21/1/5/6	Moy	2298		√
C1/21/1/5/7	Moy	2298		√
C1/21/1/5/8	Moy	2298		√
C1/21/1/5/9	Moy	2298		√
C1/21/1/6	Moy	2298		√
C1/21/1/7	Moy	2298		√
C1/21/1/8	Moy	2298		√
C1/21/1/9	Moy	2298		√
C1/21/10	Moy	2298		√
C1/21/10/1	Moy	2298		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/21/11	Moy	2298		√
C1/21/12	Moy	2298		√
C1/21/13	Moy	2298		√
C1/21/13/1	Moy	2298		√
C1/21/14/1	Moy	2298		√
C1/21/14/2	Moy	2298		√
C1/21/14/2/1	Moy	2298		√
C1/21/14/2/2	Moy	2298		√
C1/21/14/3	Moy	2298		√
C1/21/14/4	Moy	2298		√
C1/21/14/5	Moy	2298		√
C1/21/14/5/1	Moy	2298		√
C1/21/14/5/2	Moy	2298		√
C1/21/14/6	Moy	2298		√
C1/21/2	Moy	2298		√
C1/21/3	Moy	2298	√	
C1/21/5	Moy	2298		√
C1/21/5/18	Moy	2298		√
C1/21/7	Moy	2298		√
C1/21/7/1	Moy	2298	√	
C1/21/7/1/1	Moy	2298		√
C1/21/8	Moy	2298		√
C1/21/9	Moy	2298		√
C1/21A	Moy	2298		√
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C1/27	Moy	2298		√
C1/28	Moy	2298		√
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C1/30/2	Moy	2298		√
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C1/30/5/3	Moy	2298		√
C1/30/5/4	Moy	2298		√
C1/30/5/4/1	Moy	2298		√
C1/30/5/5	Moy	2298		√
C1/30/5/7	Moy	2298		√
C1/30/5/8	Moy	2298		√
C1/30/5/9	Moy	2298		√
C1/30/6	Moy	2298		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/30/7	Moy	2298		√
C1/30/7/1	Moy	2298		√
C1/30/7/11	Moy	2298		√
C1/30/7/12	Moy	2298		√
C1/30/7/12/1	Moy	2298		√
C1/30/7/13	Moy	2298		√
C1/30/7/14	Moy	2298		√
C1/30/7/15	Moy	2298		√
C1/30/7/16	Moy	2298		√
C1/30/7/16/1	Moy	2298		√
C1/30/7/2	Moy	2298		√
C1/30/7/3	Moy	2298		√
C1/30/7/5	Moy	2298		√
C1/30/7/6	Moy	2298		√
C1/30/7/7	Moy	2298		√
C1/30/7/8	Moy	2298		√
C1/30/7/9	Moy	2298		√
C1/30/7/9A	Moy	2298		√
C1/30/8	Moy	2298		√
C1/30/9	Moy	2298		√
C1/31	Moy	2298		√
C1/31/1	Moy	2298		√
C1/31/2	Moy	2298		√
C1/32	Moy	2298		√
C1/33	Moy	2298		√
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C1/37	Moy	2298		√
C1/38	Moy	2298		√
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C1/45/2/1	Moy	2298		√
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C1/48	Moy	2298		√
C1/48/1	Moy	2298		√
C1/48/2	Moy	2298		√
C1/48/3	Moy	2298		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/48/4	Moy	2298		√
C1/48/5	Moy	2298		√
C1/48/6	Moy	2298	√	
C1/48/6/1	Moy	2298	√	
C1/48/7	Moy	2298		√
C1/48/7/1	Moy	2298	√	
C1/48/8	Moy	2298		√
C1/49	Moy	2298		√
C1/49/1	Moy	2298		√
C1/49/2	Moy	2298		√
C1/49/3	Moy	2298		√
C1/49/4	Moy	2298		√
C1/49/5	Moy	2298		√
C1/49/6	Moy	2298		√
C1/5	Moy	2298		√
C1/5/1	Moy	2298		√
C1/5/3	Moy	2298		√
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C1/50/1	Moy	2298		√
C1/51	Moy	2298		√
C1/52	Moy	2298		√
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C1/55	Moy	2298		√
C1/56	Moy	2298		√
C1/57	Moy	2298		√
C1/57/1	Moy	2298		√
C1/57/2	Moy	2298		√
C1/57/3	Moy	2298		√
C1/57/4	Moy	2298		√
C1/58	Moy	2298		√
C1/7	Moy	2298		√
C1/8	Moy	2298		√
C1/9	Moy	2298		√
unnamed	Moy	2298		√
Total Number			**10**	**190**

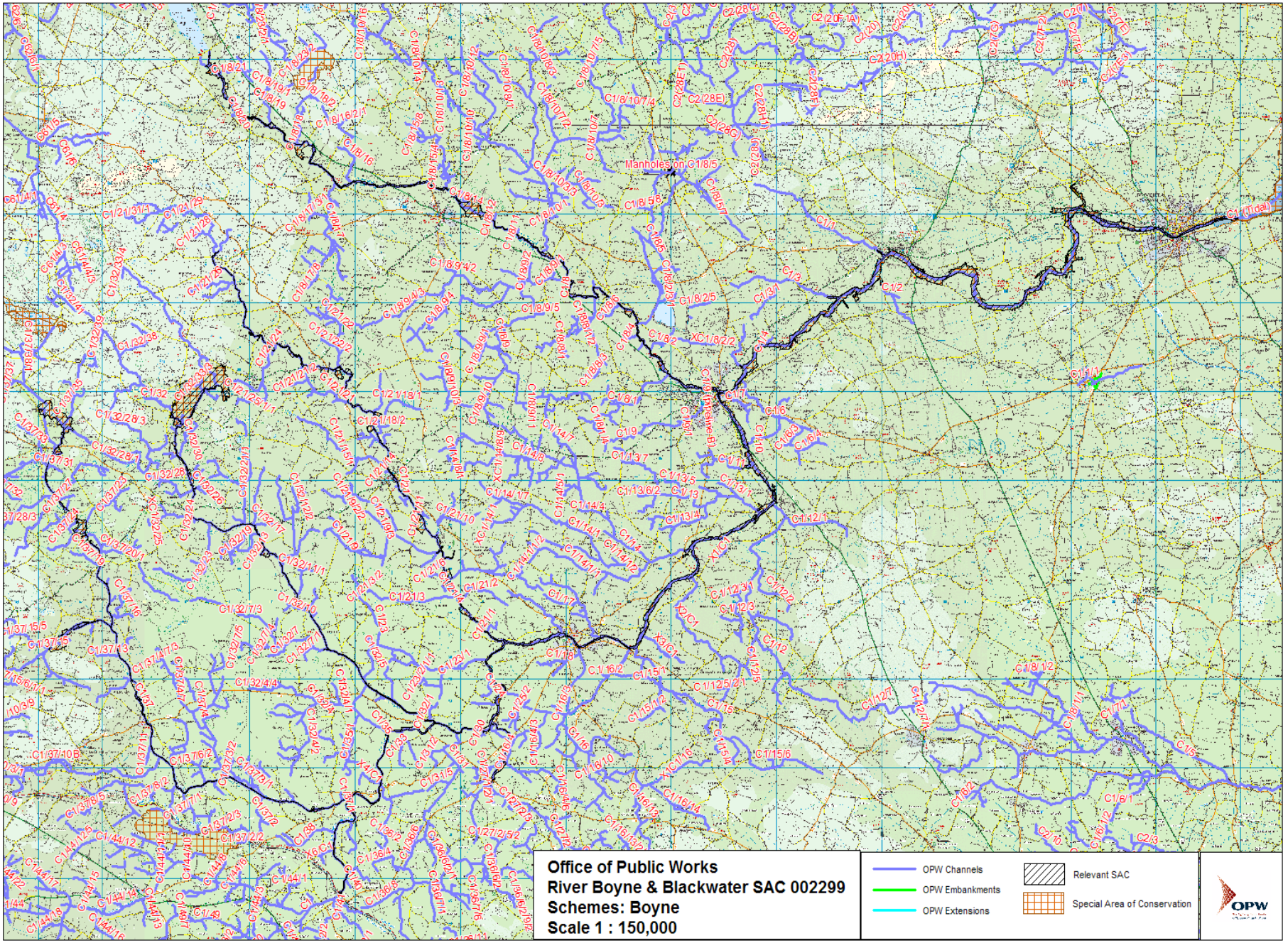
Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
F/1465	Moy	2298		√
C85/358/1181	Moy	2298	√	
F/961	Moy	2298		√
F909	Moy	2298		√
C85/358/1390	Moy	2298		√
F/1314	Moy	2298		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
F/1597	Moy	2298		√
F/312	Moy	2298		√
F/1070B	Moy	2298		√
F/1070	Moy	2298		√
F673	Moy	2298		√
F242	Moy	2298		√
F290	Moy	2298		√
F/1599	Moy	2298		√
F/1155	Moy	2298		√
F/1536	Moy	2298		√
Total Number			**1**	**15**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		2298		
Total Number			**0**	**0**


Manholes on C1/8/5
Office of Public Works
River Boyne & Blackwater SAC 002299
Schemes: Boyne
Scale 1 : 150,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: Rivers Boyne & Blackwater 002299
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Boyne	2299		√
C1/1	Boyne	2299		√
C1/10	Boyne	2299		√
C1/11	Boyne	2299		√
C1/12	Boyne	2299		√
C1/13	Boyne	2299		√
C1/14	Boyne	2299		√
C1/15	Boyne	2299		√
C1/16	Boyne	2299		√
C1/16/4	Boyne	2299		√
C1/17	Boyne	2299		√
C1/18	Boyne	2299		√
C1/19	Boyne	2299		√
C1/2	Boyne	2299		√
C1/21	Boyne	2299		√
C1/21/1	Boyne	2299		√
C1/21/10	Boyne	2299		√
C1/21/11	Boyne	2299		√
C1/21/12	Boyne	2299		√
C1/21/13	Boyne	2299		√
C1/21/14	Boyne	2299		√
C1/21/15	Boyne	2299		√
C1/21/16	Boyne	2299		√
C1/21/17	Boyne	2299		√
C1/21/18	Boyne	2299		√
C1/21/2	Boyne	2299		√
C1/21/20	Boyne	2299		√
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C1/21/22	Boyne	2299		√
C1/21/23	Boyne	2299		√
C1/21/24	Boyne	2299		√
C1/21/25	Boyne	2299		√
C1/21/26	Boyne	2299		√
C1/21/27	Boyne	2299		√
C1/21/3	Boyne	2299		√
C1/21/4	Boyne	2299		√
C1/21/5	Boyne	2299		√
C1/21/6	Boyne	2299		√
C1/21/7	Boyne	2299		√
C1/21/8	Boyne	2299		√
C1/21/9	Boyne	2299		√
C1/23	Boyne	2299		√
C1/24	Boyne	2299		√
C1/25	Boyne	2299		√
C1/26	Boyne	2299		√
C1/27	Boyne	2299		√
C1/27/1	Boyne	2299		√
C1/27/2	Boyne	2299		√
C1/29	Boyne	2299		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/3	Boyne	2299		√
C1/30	Boyne	2299		√
C1/31	Boyne	2299		√
C1/32	Boyne	2299		√
C1/32/1	Boyne	2299		√
C1/32/10	Boyne	2299		√
C1/32/12	Boyne	2299		√
C1/32/13	Boyne	2299		√
C1/32/16	Boyne	2299		√
C1/32/17	Boyne	2299		√
C1/32/18	Boyne	2299		√
C1/32/19	Boyne	2299		√
C1/32/2	Boyne	2299		√
C1/32/21	Boyne	2299		√
C1/32/22	Boyne	2299		√
C1/32/23	Boyne	2299		√
C1/32/24	Boyne	2299		√
C1/32/25	Boyne	2299		√
C1/32/27	Boyne	2299		√
C1/32/28	Boyne	2299		√
C1/32/29	Boyne	2299		√
C1/32/3	Boyne	2299		√
C1/32/30	Boyne	2299		√
C1/32/31	Boyne	2299		√
C1/32/32	Boyne	2299		√
C1/32/33	Boyne	2299		√
C1/32/33/2	Boyne	2299		√
C1/32/33/2/1	Boyne	2299		√
C1/32/33/2/2	Boyne	2299		√
C1/32/33/3	Boyne	2299	√	
C1/32/34	Boyne	2299		√
C1/32/4	Boyne	2299		√
C1/32/5	Boyne	2299		√
C1/32/7	Boyne	2299		√
C1/32/8	Boyne	2299		√
C1/32/9	Boyne	2299		√
C1/33	Boyne	2299		√
C1/35	Boyne	2299		√
C1/36	Boyne	2299		√
C1/37	Boyne	2299		√
C1/37/1	Boyne	2299		√
C1/37/10	Boyne	2299		√
C1/37/11	Boyne	2299		√
C1/37/12	Boyne	2299		√
C1/37/13	Boyne	2299		√
C1/37/14	Boyne	2299		√
C1/37/15	Boyne	2299		√
C1/37/15/1	Boyne	2299		√
C1/37/15/3	Boyne	2299		√
C1/37/15/4	Boyne	2299		√
C1/37/18	Boyne	2299		√
C1/37/17	Boyne	2299		√
C1/37/19	Boyne	2299		√
C1/37/2	Boyne	2299		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/37/20	Boyne	2299		√
C1/37/21	Boyne	2299		√
C1/37/22	Boyne	2299		√
C1/37/23	Boyne	2299		√
C1/37/24	Boyne	2299		√
C1/37/25	Boyne	2299		√
C1/37/26	Boyne	2299		√
C1/37/27	Boyne	2299		√
C1/37/28	Boyne	2299		√
C1/37/29	Boyne	2299		√
C1/37/3	Boyne	2299		√
C1/37/30	Boyne	2299		√
C1/37/31	Boyne	2299		√
C1/37/32	Boyne	2299		√
C1/37/33	Boyne	2299		√
C1/37/34	Boyne	2299		√
C1/37/35	Boyne	2299		√
C1/37/35/1	Boyne	2299		√
C1/37/35/2	Boyne	2299	√	
C1/37/36	Boyne	2299	√	
C1/37/4	Boyne	2299		√
C1/37/5	Boyne	2299		√
C1/37/6	Boyne	2299		√
C1/37/7	Boyne	2299		√
C1/37/8	Boyne	2299		√
C1/37/9	Boyne	2299		√
C1/38	Boyne	2299		√
C1/39	Boyne	2299		√
C1/4	Boyne	2299		√
C1/40	Boyne	2299		√
C1/5	Boyne	2299		√
C1/6	Boyne	2299		√
C1/7	Boyne	2299		√
C1/8	Boyne	2299		√
C1/8/1	Boyne	2299		√
C1/8/10	Boyne	2299		√
C1/8/11	Boyne	2299		√
C1/8/12	Boyne	2299		√
C1/8/13	Boyne	2299		√
C1/8/14	Boyne	2299		√
C1/8/15	Boyne	2299		√
C1/8/16	Boyne	2299		√
C1/8/17	Boyne	2299		√
C1/8/18	Boyne	2299		√
C1/8/19	Boyne	2299		√
C1/8/2	Boyne	2299		√
C1/8/20	Boyne	2299		√
C1/8/21	Boyne	2299		√
C1/8/22	Boyne	2299		√
C1/8/3	Boyne	2299		√
C1/8/4	Boyne	2299		√
C1/8/5	Boyne	2299		√
C1/8/6	Boyne	2299		√
C1/8/7	Boyne	2299		√

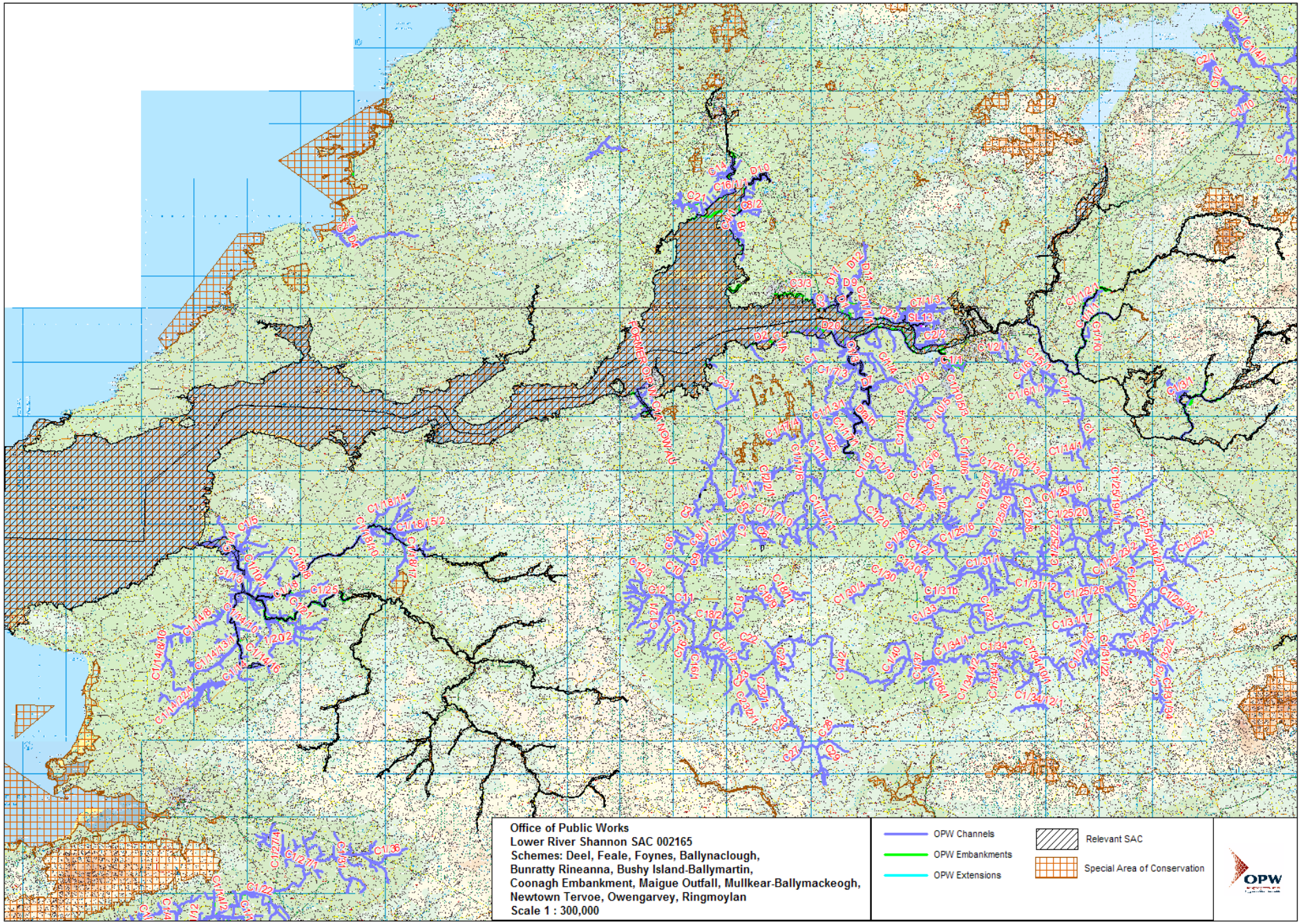
Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/8/8	Boyne	2299		√
C1/8/9	Boyne	2299		√
XC1/32	Boyne	2299		√
XC1/32/15	Boyne	2299		√
X1/C1/37	Boyne	2299		√
XC1/37/15	Boyne	2299		√
XC1/37/16	Boyne	2299		√
XC1/37/6/1	Boyne	2299		√
X2/C1	Boyne	2299		√
X3/C1	Boyne	2299		√
X4/C1	Boyne	2299		√
X5/C1	Boyne	2299		√
X6/C1	Boyne	2299		√
X1/C1/37	Boyne	2299		√
Total number			**3**	**171**

Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
X2/C1	Boyne	2299		√
X3/C1	Boyne	2299		√
C1/21/18	Boyne	2299		√
XC1/21/22	Boyne	2299		√
X5/C1	Boyne	2299		√
X4/C1	Boyne	2299		√
C85/352/940	Boyne	2299		√
XC1/37				√
XC1/32/33/2	Boyne	2299	√	
XC1/32/33/2/1	Boyne	2299	√	
XC1/32	Boyne	2299		√
XC1/32/15	Boyne	2299		√
XC1/37/15				√
XC1/37/16	Boyne	2299		√
Total number			**2**	**12**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		2299		
Total number			**0**	**0**


Office of Public Works
Lower River Shannon SAC 002165
Schemes: Deel, Feale, Foynes, Ballynaclough,
Bunratty Rineanna, Bushy Island-Ballymartin,
Coonagh Embankment, Maigue Outfall, Mullkear-Ballymackeogh,
Newtown Tervoe, Owengarvey, Ringmoylan
Scale 1 : 300,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: Lower River Shannon 002165
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Ballynaclough	2165	√	
D3	Bunratty Rineanna	2165		√
D4	Bunratty Rineanna	2165		√
C1/A	Bushy Island – Ballymartin	2165		√
D1	Bushy Island – Ballymartin	2165		√
D2	Bushy Island – Ballymartin	2165	√	
C10	Coonagh Embankment	2165		√
C3	Coonagh Embankment	2165		√
C7/1	Coonagh Embankment	2165		√
C7/4	Coonagh Embankment	2165		√
C8	Coonagh Embankment	2165		√
D24	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
unnamed	Coonagh Embankment	2165		√
C1	Feale	2165	√	
C1/1	Feale	2165		√
C1/10	Feale	2165		√
C1/14	Feale	2165	√	
C1/14/11	Feale	2165		√
C1/14/12	Feale	2165		√
C1/14/13	Feale	2165		√
C1/14/14	Feale	2165		√
C1/14/15	Feale	2165		√
C1/14/16	Feale	2165		√
C1/14/16/1	Feale	2165		√
C1/14/16/2	Feale	2165		√
C1/14/16/3	Feale	2165		√
C1/14/3	Feale	2165		√
C1/14/4	Feale	2165		√
C1/14/7	Feale	2165		√
C1/14/8	Feale	2165		√
C1/15	Feale	2165		√
C1/16	Feale	2165		√
C1/17	Feale	2165		√
C1/18	Feale	2165	√	
C1/18/1	Feale	2165		√
C1/18/10	Feale	2165		√
C1/18/11	Feale	2165		√
C1/18/12	Feale	2165		√
C1/18/13	Feale	2165		√
C1/18/14	Feale	2165		√
C1/18/15	Feale	2165		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/18/15/1	Feale	2165		√
C1/18/16	Feale	2165		√
C1/18/17	Feale	2165		√
C1/18/18	Feale	2165		√
C1/18/2	Feale	2165		√
C1/18/2/1	Feale	2165		√
C1/18/3	Feale	2165		√
C1/18/4	Feale	2165		√
C1/18/5	Feale	2165		√
C1/18/6	Feale	2165		√
C1/18/7	Feale	2165		√
C1/18/8	Feale	2165		√
C1/18/9	Feale	2165		√
C1/19	Feale	2165		√
C1/20	Feale	2165		√
C1/21	Feale	2165		√
C1/22	Feale	2165		√
C1/23	Feale	2165		√
C1/25	Feale	2165		√
C1/26	Feale	2165		√
C13	Feale	2165		√
C14	Feale	2165		√
C25	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165		√
unnamed	Feale	2165	√	
unnamed	Feale	2165		√
unnamed	Feale	2165	√	
unnamed	Feale	2165		√
unnamed	Feale	2165	√	
unnamed	Feale	2165		√
unnamed	Feale	2165	√	
C4/1	Fergus	2165		√
C6	Fergus	2165		√
D1	Fergus Embankment	2165		√
D10	Fergus	2165	√	
D13	Fergus	2165		√
D2	Fergus Embankment	2165		√
D27	Fergus	2165		√
D3	Fergus Embankment	2165		√
D4	Fergus	2165	√	
D6	Fergus	2165		√
D7	Fergus	2165		√
D9	Fergus	2165		√
C3	Foynes	2165		√
D5	Foynes	2165		√
C1	Groody	2165		√
C1	Maigue Outfall	2165	√	

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1/10	Maigue Outfall	2165		√
C1/17	Maigue Outfall	2165		√
C1/4	Maigue Outfall	2165		√
C1/4/1	Maigue Outfall	2165		√
D1	Maigue Outfall	2165		√
D10	Maigue Outfall	2165		√
D11	Maigue Outfall	2165		√
D14	Maigue Outfall	2165		√
D18	Maigue Outfall	2165		√
D19	Maigue Outfall	2165		√
D2	Maigue Outfall	2165	√	
D20	Maigue Outfall	2165	√	
D21	Maigue Outfall	2165		√
D22	Maigue Outfall	2165		√
D23	Maigue Outfall	2165		√
D24	Maigue Outfall	2165		√
D3	Maigue Outfall	2165		√
D7	Maigue Outfall	2165		√
C1	Mulkear Ballymackeogh	2165	√	
C1	Mulkear Ballymackeogh	2165		√
C1/1	Mulkear Ballymackeogh	2165	√	
C1/1/1	Mulkear Ballymackeogh	2165	√	
C1/1/3	Mulkear Ballymackeogh	2165		√
C1/1/4	Mulkear Ballymackeogh	2165		√
C1	Mulkear Cappamore	2165	√	
C1/1	Mulkear Cappamore	2165		√
C1/3	Mulkear Cappamore	2165		√
C1/4	Mulkear Cappamore	2165		√
C1/5	Mulkear Cappamore	2165		√
D1	Newtown Tervoe	2165		√
C1	Owenagarney	2165		√
C2	Owenagarney	2165		√
C3	Owenagarney	2165		√
C4/1	Owenagarney	2165		√
C5	Owenagarney	2165		√
D15	Owenagarney	2165		√
D4	Owenagarney	2165		√
D5	Owenagarney	2165		√
D6	Owenagarney	2165		√
D8	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
C1	Ringmoylan Foynes	2165		√
Former opw chan	Ringmoylan Foynes	2165	√	
C1	Ringmoylan Mellon	2165		√
C2	Ringmoylan Mellon	2165	√	
D3	Ringmoylan Mellon	2165	√	
D2	Ringmoylan Mellon	2165	√	
Total number			**22**	**134**

Extensions

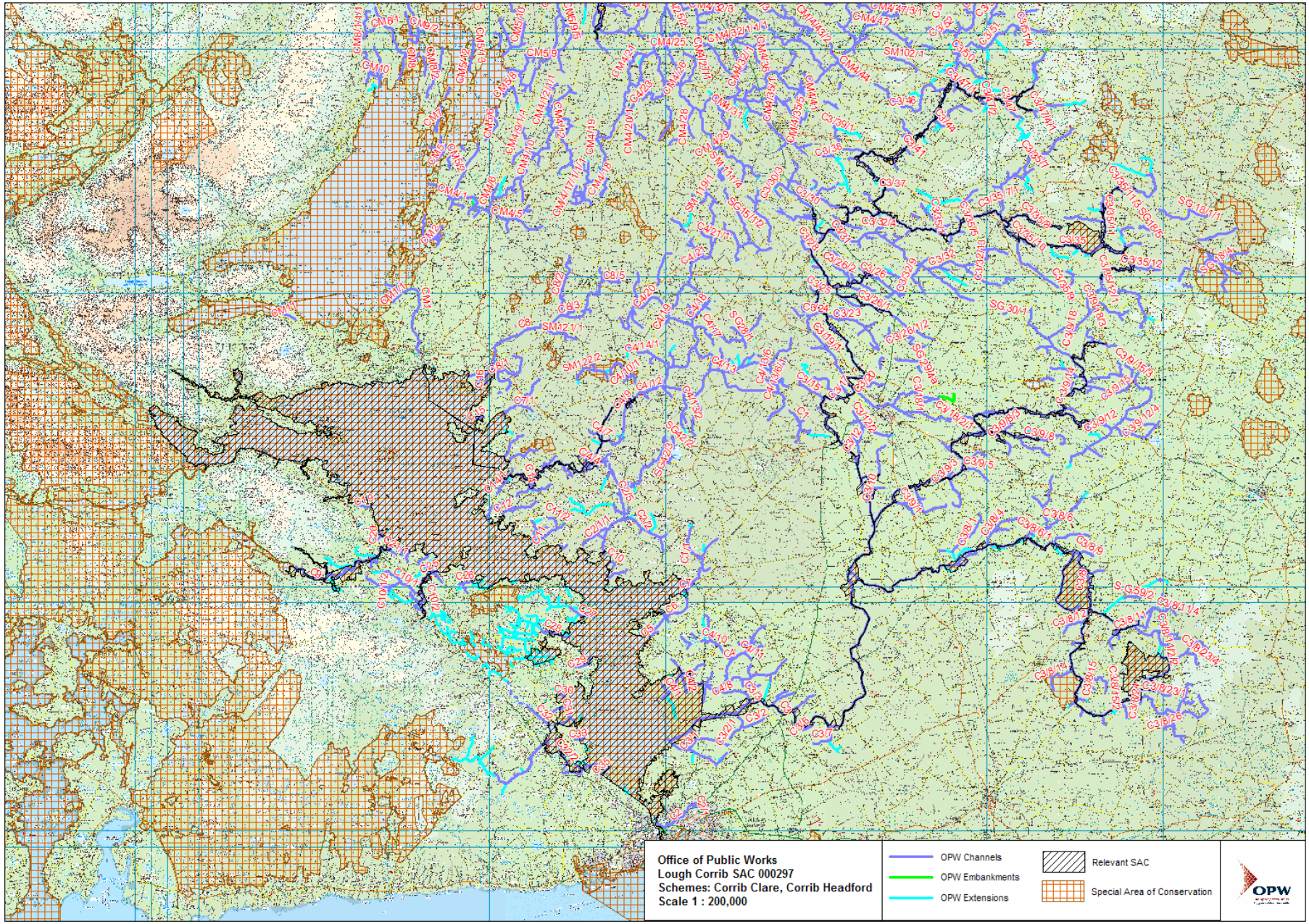
Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		2165		
Total number			**0**	**0**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E10	Bunratty Rineanna	2165		√
E11	Bunratty Rineanna	2165		√
E1	Bunratty Rineanna	2165		√
E4	Bunratty Rineanna	2165		√
E5	Bunratty Rineanna	2165		√
E6	Bunratty Rineanna	2165		√
E7	Bunratty Rineanna	2165		√
E8	Bunratty Rineanna	2165		√
E9	Bunratty Rineanna	2165	√	
E3E	Bunratty Rineanna	2165		√
E2	Ballynaclough	2165		√
E12	Coonagh Embankment	2165		√
E13	Coonagh Embankment	2165		√
E14	Coonagh Embankment	2165		√
E2	Coonagh Embankment	2165		√
E21	Coonagh Embankment	2165		√
E22	Coonagh Embankment	2165		√
E23	Coonagh Embankment	2165	√	
E24	Coonagh Embankment	2165		√
E10	Feale	2165		√
E11	Feale	2165		√
E110	Feale	2165		√
E114	Feale	2165		√
E115	Feale	2165		√
E116	Feale	2165		√
E12	Feale	2165		√
E13	Feale	2165		√
E14	Feale	2165		√
E15	Feale	2165		√
E17	Feale	2165		√
E18	Feale	2165		√
E19	Feale	2165		√
E2	Feale	2165		√
E20	Feale	2165		√
E21	Feale	2165	√	
E23	Feale	2165		√
E24	Feale	2165		√
E28	Feale	2165		√
E29	Feale	2165		√
E3	Feale	2165		√
E30	Feale	2165		√
E31	Feale	2165		√
E32	Feale	2165		√
E33	Feale	2165		√
E34	Feale	2165		√
E36	Feale	2165		√
E37	Feale	2165		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E40	Feale	2165		√
E42	Feale	2165		√
E43	Feale	2165		√
E44	Feale	2165		√
E46	Feale	2165		√
E47	Feale	2165		√
E48	Feale	2165		√
E49	Feale	2165		√
E5	Feale	2165		√
E50	Feale	2165		√
E51	Feale	2165		√
E6	Feale	2165		√
E64	Feale	2165		√
E65	Feale	2165		√
E66	Feale	2165		√
E8	Feale	2165		√
E81	Feale	2165		√
E82	Feale	2165		√
E84	Feale	2165		√
E9	Feale	2165		√
E19	Fergus	2165		√
E1	Fergus Embankment	2165		√
E17	Fergus Embankment	2165		√
E2	Fergus Embankment	2165	√	
E3	Fergus Embankment	2165		√
E4	Fergus Embankment	2165	√	
E5	Fergus Embankment	2165		√
E6	Fergus Embankment	2165		√
E1	Maigue Outfall	2165		√
E10	Maigue Outfall	2165		√
E11	Maigue Outfall	2165		√
E12	Maigue Outfall	2165	√	
E13	Maigue Outfall	2165		√
E14	Maigue Outfall	2165		√
E15	Maigue Outfall	2165		√
E17	Maigue Outfall	2165		√
E2	Maigue Outfall	2165		√
E3	Maigue Outfall	2165		√
E38	Maigue Outfall	2165		√
E39	Maigue Outfall	2165		√
E40	Maigue Outfall	2165	√	
E41	Maigue Outfall	2165		√
E44	Maigue Outfall	2165		√
E1	Mulkear Ballymackeogh	2165		√
E2	Mulkear Ballymackeogh	2165		√
E3	Mulkear Ballymackeogh	2165		√
E4	Mulkear Ballymackeogh	2165		√
E5	Mulkear Ballymackeogh	2165		√
E6	Mulkear Ballymackeogh	2165		√
E1	Newtown Tervoe	2165	√	
E2	Newtown Tervoe	2165		√
E1	Ringmoylan Foynes		√	
E2	Ringmoylan Foynes	2165		√
E3	Ringmoylan Foynes	2166		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E5	Ringmoylan Foynes	2165		√
W1	Ringmoylan Foynes	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165	√	
unnamed	Owenagarney	2165		
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
unnamed	Owenagarney	2165		√
Total number			**10**	**103**


Office of Public Works
Lough Corrib SAC 000297
Schemes: Corrib Clare, Corrib Headford
Scale 1 : 200,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: Lough Corrib 000297
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C10	Corrib Clare	297		√
C11	Corrib Clare	297		√
C12	Corrib Clare	297		√
C13	Corrib Clare	297		√
C14	Corrib Clare	297		√
C14/2	Corrib Clare	297		√
C14/3	Corrib Clare	297		√
C14/4	Corrib Clare	297		√
C15	Corrib Clare	297	√	
C16	Corrib Clare	297	√	
C16/1	Corrib Clare	297	√	
C16/1a	Corrib Clare	297	√	
C17	Corrib Clare	297	√	
C18	Corrib Clare	297		√
C19	Corrib Clare	297		√
C2	Corrib Clare	297		√
C20	Corrib Clare	297	√	
C20/1	Corrib Clare	297		√
C21	Corrib Clare	297	√	
C21/1	Corrib Clare	297		√
C23	Corrib Clare	297		√
C24	Corrib Clare	297		√
C25	Corrib Clare	297		√
C25/1	Corrib Clare	297		√
C25/2	Corrib Clare	297		√
C26	Corrib Clare	297		√
C27	Corrib Clare	297		√
C28	Corrib Clare	297		√
C29	Corrib Clare	297		√
C3	Corrib Clare	297		√
C3/1	Corrib Clare	297		√
C3/10	Corrib Clare	297		√
C3/10a	Corrib Clare	297		√
C3/11	Corrib Clare	297		√
C3/12	Corrib Clare	297		√
C3/14	Corrib Clare	297		√
C3/15	Corrib Clare	297		√
C3/16	Corrib Clare	297		√
C3/17	Corrib Clare	297		√
C3/18	Corrib Clare	297		√
C3/19	Corrib Clare	297		√
C3/2	Corrib Clare	297		√
C3/20	Corrib Clare	297		√
C3/21	Corrib Clare	297		√
C3/22	Corrib Clare	297	√	
C3/23	Corrib Clare	297		√
C3/24	Corrib Clare	297		√
C3/25	Corrib Clare	297		√
C3/26	Corrib Clare	297		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C3/26/1	Corrib Clare	297		√
C3/26/1/1	Corrib Clare	297		√
C3/26/2	Corrib Clare	297		√
C3/26/3	Corrib Clare	297		√
C3/26/4	Corrib Clare	297	√	
C3/26/5	Corrib Clare	297		√
C3/26/6	Corrib Clare	297		√
C3/26/7	Corrib Clare	297		√
C3/27	Corrib Clare	297		√
C3/28	Corrib Clare	297		√
C3/29	Corrib Clare	297		√
C3/3	Corrib Clare	297		√
C3/30	Corrib Clare	297		√
C3/30/1	Corrib Clare	297		√
C3/31	Corrib Clare	297		√
C3/32	Corrib Clare	297		√
C3/32/1	Corrib Clare	297		√
C3/33	Corrib Clare	297		√
C3/34	Corrib Clare	297		√
C3/35	Corrib Clare	297		√
C3/35/1	Corrib Clare	297		√
C3/35/10	Corrib Clare	297		√
C3/35/11	Corrib Clare	297		√
C3/35/11/1	Corrib Clare	297		√
C3/35/11/2	Corrib Clare	297		√
C3/35/11/3	Corrib Clare	297	√	
C3/35/12	Corrib Clare	297		√
C3/35/12/1	Corrib Clare	297		√
C3/35/13	Corrib Clare	297		√
C3/35/2	Corrib Clare	297		√
C3/35/3	Corrib Clare	297		√
C3/35/4	Corrib Clare	297		√
C3/35/5	Corrib Clare	297		√
C3/35/7	Corrib Clare	297		√
C3/35/8	Corrib Clare	297	√	
C3/35/9	Corrib Clare	297		√
C3/36	Corrib Clare	297		√
C3/37	Corrib Clare	297		√
C3/38	Corrib Clare	297		√
C3/39	Corrib Clare	297		√
C3/4	Corrib Clare	297		√
C3/40	Corrib Clare	297		√
C3/41	Corrib Clare	297		√
C3/42	Corrib Clare	297		√
C3/43	Corrib Clare	297		√
C3/44	Corrib Clare	297		√
C3/45	Corrib Clare	297		√
C3/46	Corrib Clare	297		√
C3/47	Corrib Clare	297		√
C3/47/1	Corrib Clare	297		√
C3/47/2	Corrib Clare	297		√
C3/47/3	Corrib Clare	297		√
C3/47/4	Corrib Clare	297		√
C3/5	Corrib Clare	297		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C3/6	Corrib Clare	297		√
C3/7	Corrib Clare	297		√
C3/8	Corrib Clare	297		√
C3/8/10	Corrib Clare	297		√
C3/8/11	Corrib Clare	297		√
C3/8/11/1	Corrib Clare	297		√
C3/8/11/2	Corrib Clare	297		√
C3/8/11/5	Corrib Clare	297		√
C3/8/12	Corrib Clare	297		√
C3/8/13	Corrib Clare	297		√
C3/8/14	Corrib Clare	297		√
C3/8/15	Corrib Clare	297		√
C3/8/16	Corrib Clare	297		√
C3/8/17	Corrib Clare	297		√
C3/8/18	Corrib Clare	297		√
C3/8/19	Corrib Clare	297		√
C3/8/2	Corrib Clare	297		√
C3/8/20	Corrib Clare	297		√
C3/8/22	Corrib Clare	297		√
C3/8/23	Corrib Clare	297		√
C3/8/23/1	Corrib Clare	297		√
C3/8/23/2	Corrib Clare	297		√
C3/8/23/3	Corrib Clare	297		√
C3/8/24	Corrib Clare	297		√
C3/8/3	Corrib Clare	297	√	
C3/8/4	Corrib Clare	297		√
C3/8/6	Corrib Clare	297		√
C3/8/8	Corrib Clare	297		√
C3/8/9	Corrib Clare	297		√
C3/9	Corrib Clare	297		√
C3/9/1	Corrib Clare	297		√
C3/9/10	Corrib Clare	297		√
C3/9/12	Corrib Clare	297		√
C3/9/12/1	Corrib Clare	297		√
C3/9/13	Corrib Clare	297		√
C3/9/14	Corrib Clare	297		√
C3/9/15	Corrib Clare	297		√
C3/9/16	Corrib Clare	297		√
C3/9/17	Corrib Clare	297		√
C3/9/18	Corrib Clare	297		√
C3/9/19	Corrib Clare	297		√
C3/9/2	Corrib Clare	297		√
C3/9/3	Corrib Clare	297		√
C3/9/4	Corrib Clare	297		√
C3/9/5	Corrib Clare	297		√
C3/9/6	Corrib Clare	297		√
C3/9/7	Corrib Clare	297		√
C3/9/8	Corrib Clare	297		√
C3/9/8/2	Corrib Clare	297		√
C3/9/8/3	Corrib Clare	297		√
C3/9/8/4	Corrib Clare	297		√
C3/9/8/5	Corrib Clare	297		√
C3/9/9	Corrib Clare	297		√
C30	Corrib Clare	297	√	

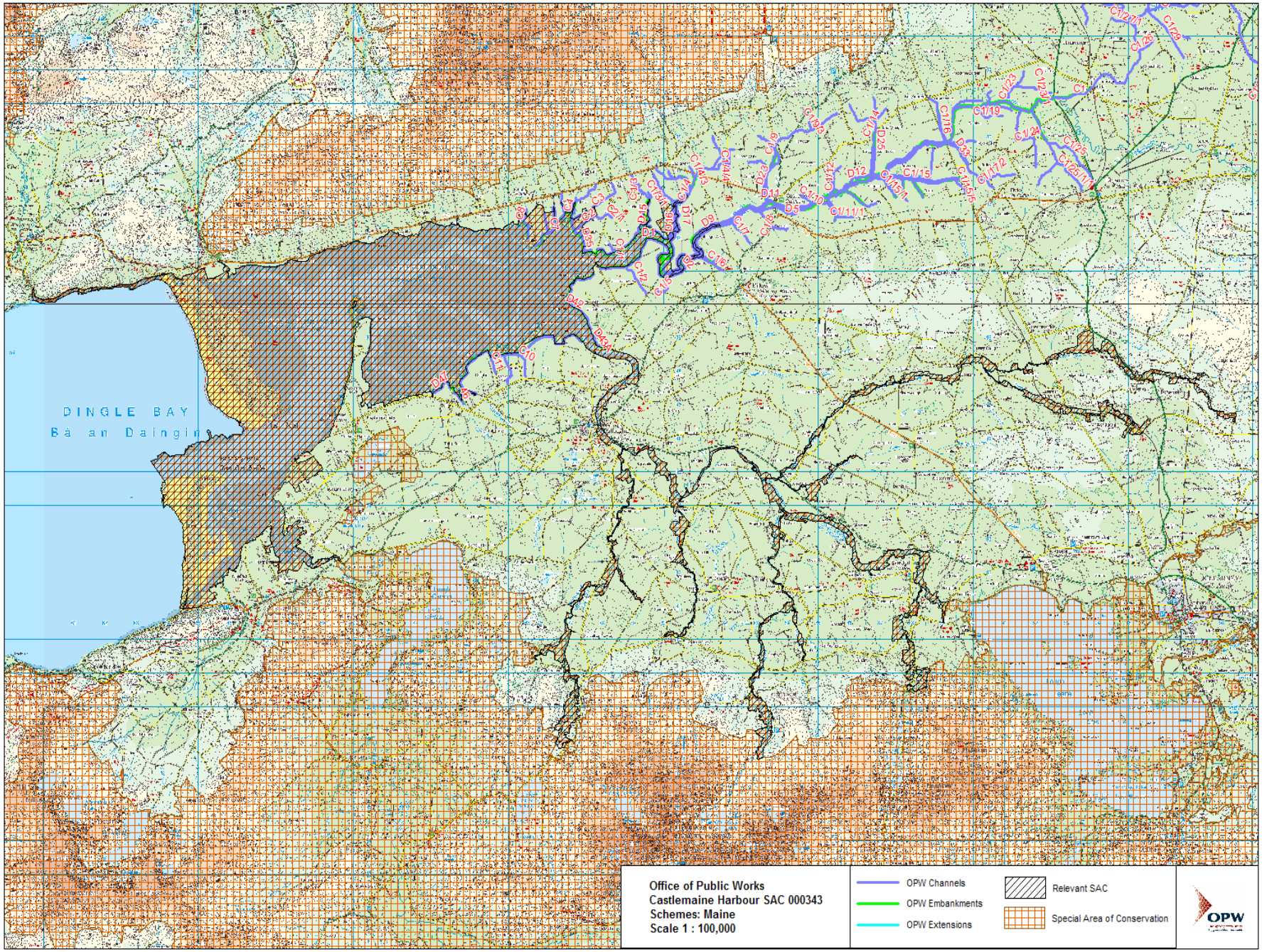
Type ID	Scheme Name	Sitecode	Entire	Intersecting
C31	Corrib Clare	297		√
C32	Corrib Clare	297		√
C32/1	Corrib Clare	297		√
C32/2	Corrib Clare	297		√
C33	Corrib Clare	297		√
C34	Corrib Clare	297		√
C34/1	Corrib Clare	297	√	
C35	Corrib Clare	297	√	
C4	Corrib Clare	297		√
C4/1	Corrib Clare	297	√	
C4/2	Corrib Clare	297	√	
C4/3	Corrib Clare	297		√
C4/4	Corrib Clare	297		√
C5	Corrib Clare	297		√
C6	Corrib Clare	297		√
C7	Corrib Clare	297		√
C8	Corrib Clare	297		√
C9	Corrib Clare	297		√
SC3/8/7	Corrib Clare	297		√
C/4/4	Corrib Headford	297	√	
C1	Corrib Headford	297		√
C10	Corrib Headford	297		√
C10/1	Corrib Headford	297		√
C10/2	Corrib Headford	297	√	
C10/3	Corrib Headford	297		√
C10/4	Corrib Headford	297		√
C10/5	Corrib Headford	297	√	
C10/5/1	Corrib Headford	297		√
C11	Corrib Headford	297		√
C2	Corrib Headford	297		√
C3	Corrib Headford	297		√
C4	Corrib Headford	297		√
C4/1	Corrib Headford	297		√
C4/2	Corrib Headford	297		√
C4/3	Corrib Headford	297		√
C4/4/1	Corrib Headford	297	√	
C4/4/2	Corrib Headford	297		√
C4/5	Corrib Headford	297		√
C4/5/1	Corrib Headford	297	√	
C4/6	Corrib Headford	297		√
C4/6/1	Corrib Headford	297		√
C4/7	Corrib Headford	297		√
C4/8	Corrib Headford	297		√
C4/9	Corrib Headford	297	√	
C4/9/1	Corrib Headford	297		√
C5	Corrib Headford	297		√
C6	Corrib Headford	297		√
C7	Corrib Headford	297		√
C8	Corrib Headford	297		√
C9	Corrib Headford	297		√
C9/1	Corrib Headford	297		√
C9/2	Corrib Headford	297	√	
Total Number			**24**	**185**

Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
F.534	Corrib Clare	297		√
F.129	Corrib Clare	297		√
F.1290	Corrib Clare	297		√
F.137	Corrib Clare	297		√
F.159	Corrib Clare	297		√
F.180	Corrib Clare	297		√
F.186	Corrib Clare	297		√
F.242	Corrib Clare	297		√
F.242/1	Corrib Clare	297		√
F.363	Corrib Clare	297	√	
F.391	Corrib Clare	297		√
F.459	Corrib Clare	297		√
F.466	Corrib Clare	297		√
F.475	Corrib Clare	297		√
F.477	Corrib Clare	297		√
F.508	Corrib Clare	297	√	
F.551	Corrib Clare	297		√
F.565	Corrib Clare	297		√
F.583	Corrib Clare	297		√
F.604	Corrib Clare	297	√	
F.604/1	Corrib Clare	297	√	
F.623A	Corrib Clare	297		√
F.623B	Corrib Clare	297		√
F.652A	Corrib Clare	297		√
F.652B	Corrib Clare	297		√
F.711 (F.154)	Corrib Clare	297		√
F.722	Corrib Clare	297	√	
F.746	Corrib Clare	297		√
F.75	Corrib Clare	297	√	
F.765	Corrib Clare	297		√
F.772	Corrib Clare	297		√
F.776	Corrib Clare	297	√	
F.808	Corrib Clare	297		√
F.837	Corrib Clare	297		√
F.898	Corrib Clare	297		√
F.945	Corrib Clare	297		√
F.987/1	Corrib Clare	297		√
F.987/2	Corrib Clare	297		√
P196/6 L5-M5, F.154	Corrib Clare	297		√
P196/8 P5-Q5	Corrib Clare	297		√
R5 & R6 ON C3/8	Corrib Clare	297		√
Realign C16	Corrib Clare	297	√	
Realign C20	Corrib Clare	297	√	
Realign C4	Corrib Clare	297	√	
Realignment on C14/1	Corrib Clare	297		√
Unknown on C3	Corrib Clare	297	√	
F.145	Corrib Headford	297		√
F.78	Corrib Headford	297		√
F/193	Corrib Headford	297		√
Total number			11	38

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		297		
Total number			0	0


DINGLE BAY
Bá an Daingin
Office of Public Works
Castlemaine Harbour SAC 000343
Schemes: Maine
Scale 1 : 100,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: Castlemaine Harbour 000343
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Maine	343		√
C1/4	Maine	343		√
C1/5	Maine	343		√
C1/6	Maine	343		√
C2	Maine	343		√
C3	Maine	343		√
C4	Maine	343		√
C4/1	Maine	343		√
C5	Maine	343		√
C7	Maine	343		√
C8	Maine	343		√
D14	Maine	343		√
D16	Maine	343		√
D3	Maine	343		√
D35	Maine	343		√
D38	Maine	343		√
D39	Maine	343	√	
D43	Maine	343		√
D45	Maine	343		√
D47	Maine	343		√
D7	Maine			√
D8	Maine	343		√
D9	Maine	343		√
Total number			**1**	**22**

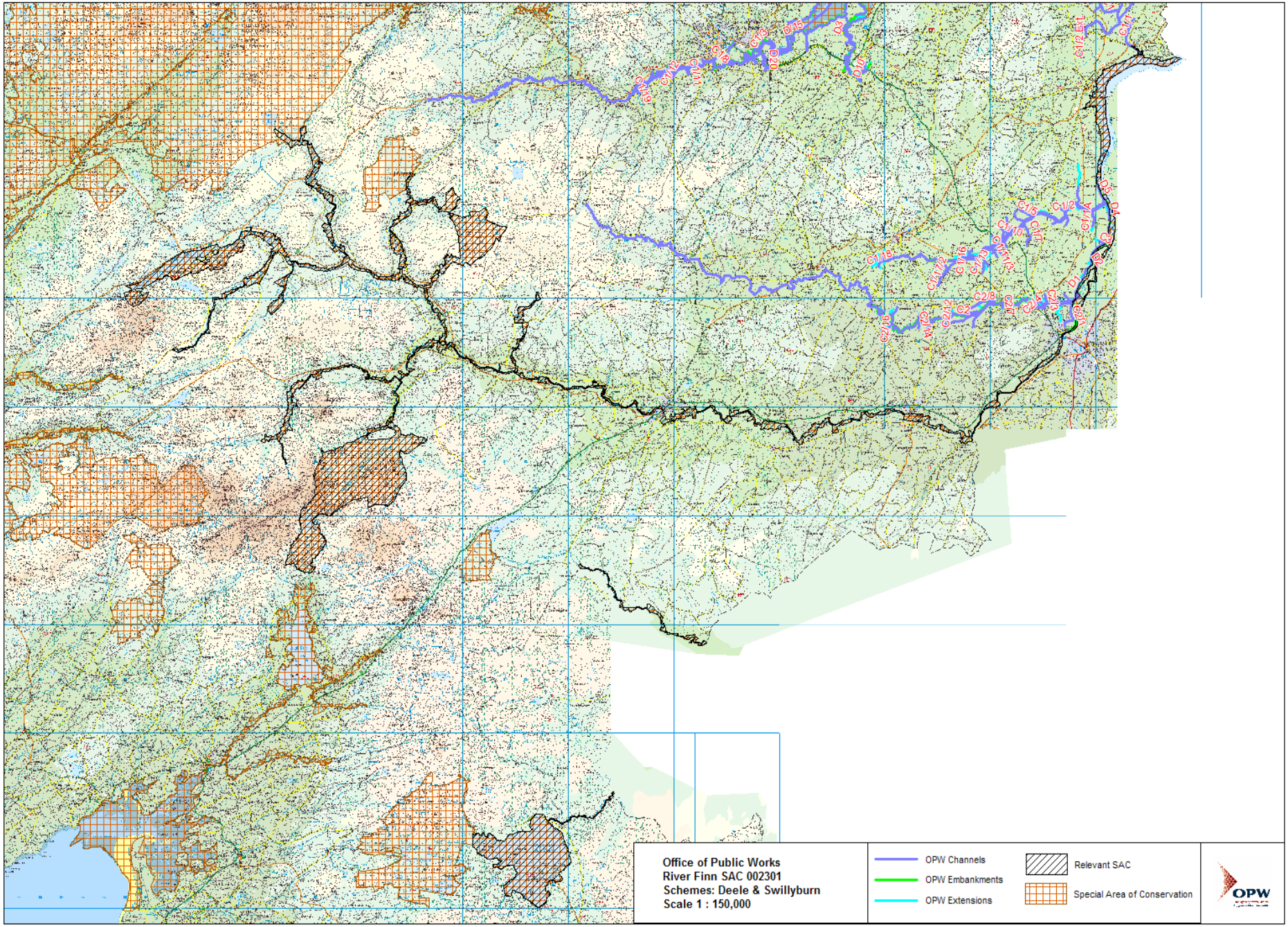
Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		343		
Total number			**0**	**0**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E2	Maine	343		√
E9	Maine	343		√
E18	Maine	343		√
E1	Maine	343		√
E14	Maine	343		√
E15	Maine	343		√
E16	Maine	343		√
E7	Maine	343		√
E8	Maine	343		√
E40	Maine	343		√
E37	Maine	343		√
E39	Maine	343		√
E41	Maine	343		√
E43	Maine	343		√
E43A	Maine	343		√

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E1	Maine	343		√
E14	Maine	343		√
E15	Maine	343		√
E16	Maine	343		√
E18	Maine	343		√
E2	Maine	343		√
E22	Maine	343		√
E37	Maine	343		√
E39	Maine	343		√
E40	Maine	343		√
E41	Maine	343		√
E43	Maine	343		√
E43A	Maine	343		√
E44	Maine	343		√
E7	Maine	343		√
E8	Maine	343		√
E9	Maine	343		√
Total number			**0**	**17**


Office of Public Works
River Finn SAC 002301
Schemes: Deele & Swillyburn
Scale 1 : 150,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: River Finn 002301
Intersecting OPW Channels, Extensions & Embankments

Channels

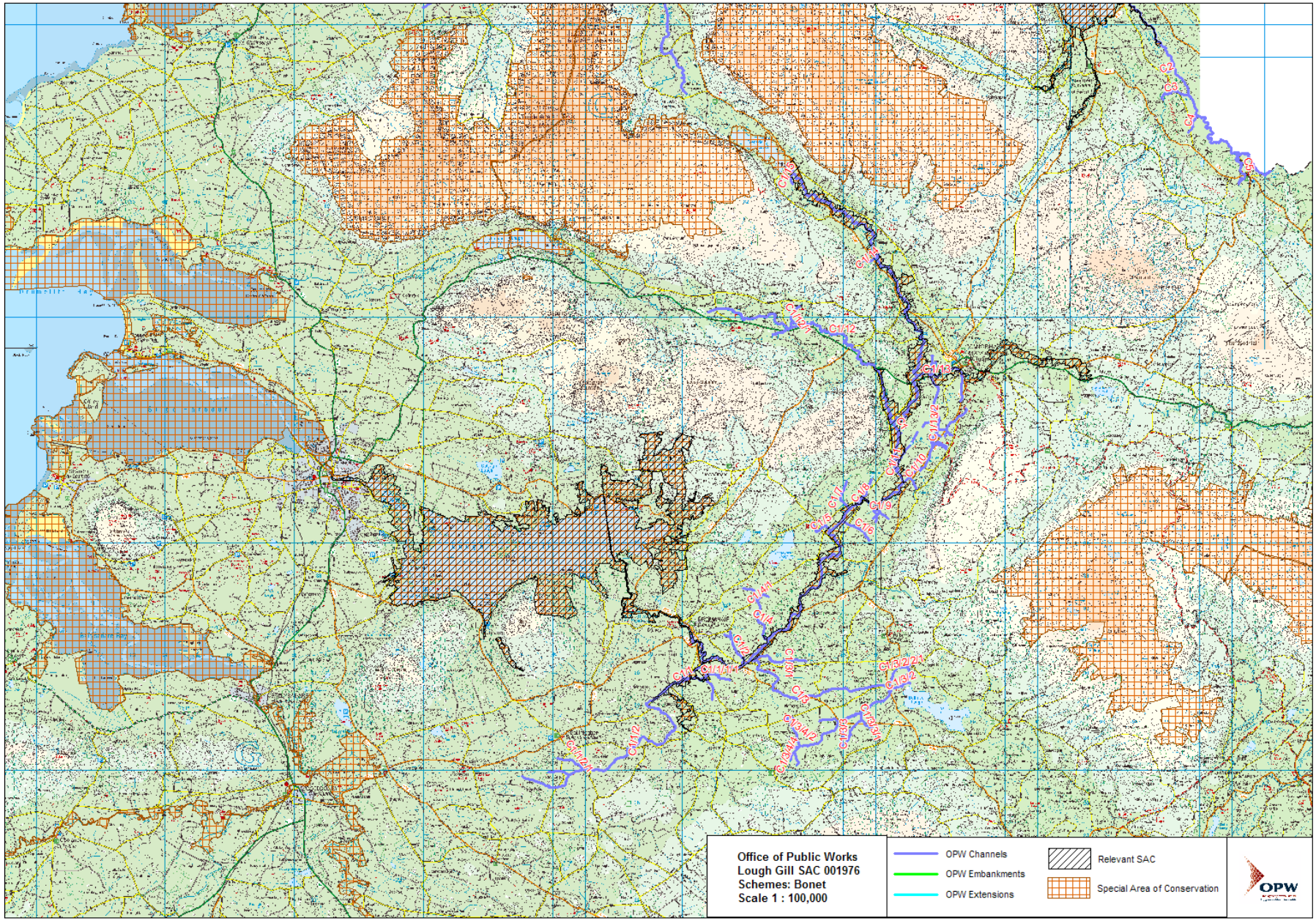
Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Deele & Swillyburn	2301		√
C2	Deele & Swillyburn	2301		√
D2	Deele & Swillyburn	2301		√
D3	Deele & Swillyburn	2301		√
Total Number			**0**	**4**

Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		2301		
Total Number			**0**	**0**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
E6	Deele & Swillyburn	2301		√
E1	Deele & Swillyburn	2301		√
E2	Deele & Swillyburn	2301		√
E5	Deele & Swillyburn	2301		√
Total Number			**0**	**4**


Office of Public Works
Lough Gill SAC 001976
Schemes: Bonet
Scale 1 : 100,000
OPW Channels
OPW Embankments
OPW Extensions
Relevant SAC
Special Area of Conservation
OPW

Salmon (EU Code 1106) SAC: LoughGill 001976
Intersecting OPW Channels, Extensions & Embankments

Channels

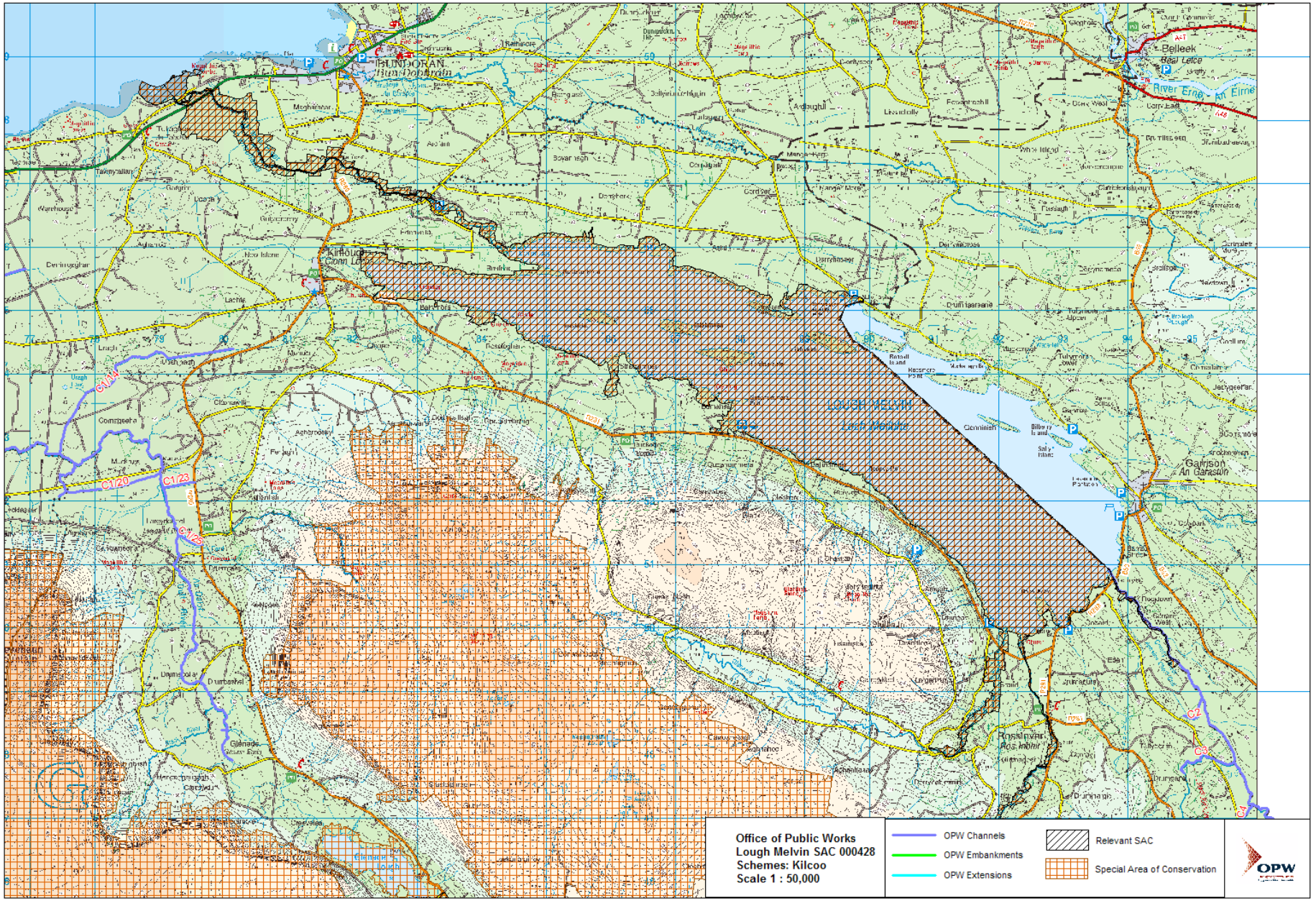
Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Bonet	1976		√
C1/1	Bonet	1976	√	
C1/1/1	Bonet	1976		√
C1/1/1/1	Bonet	1976		√
C1/1/1/2	Bonet	1976		√
C1/1/2	Bonet	1976		√
C1/10	Bonet	1976		√
C1/11	Bonet	1976		√
C1/12	Bonet	1976		√
C1/13	Bonet	1976	√	
C1/13/1	Bonet	1976		√
C1/13/1/1	Bonet	1976		√
C1/13/2/3	Bonet	1976		√
C1/14	Bonet	1976		√
C1/15	Bonet	1976		√
C1/2	Bonet	1976		√
C1/3	Bonet	1976		√
C1/3/1	Bonet	1976		√
C1/4	Bonet	1976		√
C1/5	Bonet	1976		√
C1/6	Bonet	1976		√
C1/7	Bonet	1976		√
C1/8	Bonet	1976		√
C1/9	Bonet	1976		√
Total number			**2**	**22**

Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		1976		
Total number			**0**	**0**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		1976		
Total number			**0**	**0**



Office of Public Works
Lough Melvin SAC 000428
Schemes: Kilcoo
Scale 1 : 50,000

OPW Channels
OPW Embankments
OPW Extensions

Relevant SAC
Special Area of Conservation

Salmon (EU Code 1106) SAC: Lough Melvin 000428
Intersecting OPW Channels, Extensions & Embankments

Channels

Type ID	Scheme Name	Sitecode	Entire	Intersecting
C1	Kilcoo	428		√
Total number			**0**	**1**

Extensions

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		428		
Total number			**0**	**0**

Embankments

Type ID	Scheme Name	Sitecode	Entire	Intersecting
None		428		
Total number			**0**	**0**