APPENDIX 7-7

SURVEY SITE HABITAT DESCRIPTIONS

Appendix 7-7 Aquatic Habitat Descriptions

Roughty Sub-catchment:

Thureehouma Tributary Sites

Site K3 (506739, 577246)
Small stream: 0.6-1.0m with cobble and boulder substrates and heavy cover of leafy liverwort lying between short, vertical moorland peat banks. Habitat of stepped pool/cascade with up to 20cm depth in pools and <5cm in cascade/runs. Some salmonid potential but absence of trout at K5 (downstream) means fish are unlikely. No kick-sample taken owing to very coarse nature of substrate. Kick-sample taken downstream at K5 indicated Q4-5; potential 'high' status.

Site K4 (506766, 577119) – **Q4-5**
Small channel: 0.9-1.5m width, 5-10cm depth in cascades and 20cm in shallow pool/glides. Substrate comprises angular cobble and scattered boulders. Scattered short clumps of *Lemanea* were present on boulders and there was about 10% mixed filamentous green algae (FGA) (*Microspora, Zygnema, Mougeotia*). The channel narrows and steepens upstream of the sampling point and is considered to be of very minor, if any, fisheries value.

Site K5 (506526, 577031) – **Q4-5**
Sampled shortly below the confluence of the K3 and K4 channels. The channel is 2.5-3.0m wide with a substrate bedrock, cobble and boulders with 30% FGA cover (*Zygnema, Mougeotia*) and locally common leafy liverwort and *Lemanea* sp. Habitat comprised extended pool/glides and short run/cascades: 30cm depth (pools), 5cm (glide/run). Although habitat was suitable, electrofishing showed fish were absent. Good water quality. K5 eventually flows south to join the Roughty 1.6km downstream near Site K27.

Site K27 (505850, 575788) – **Q4-5** Steep channel, just upstream the Roughty confluence, roughly 3m wide with substrates of large cobble and boulder in moderate to swift and swift flow. Habitat comprised pools and short cascades, covered in light algal/peaty biofilm. Good water quality. The depth in the kick sample area was 10cm, with a sensitive macroinvertebrate community meriting high status (Q4-5). Habitat is broadly suitable for salmonid nursery, with electrofishing confirming a low density of juvenile salmon and trout.	

Lettercannon Tributary Sites

Site K25 (507494, 575666) – **Q4 (4-5)** Small, clear stony stream with no instream plant cover: 0.9-1.2m wide and 3-10cm deep. Instream habitats comprise shallow glide and riffle/run in a moderate to swift flow over roughly 50% cobble and 50% pebble with scattered boulders. Good water quality indicated by sensitive macroinvertebrate community. This channel flows south joining another small side stream and flowing via Site K23 to the Roughty 1km downstream. Potential salmonid habitat was noted, but there were no fish captured during electrofishing.	

Site K23 (509750, 575270) – **Q4-5** Small tributary of the Roughty, 1.0-1.5m wide and 3-5cm deep in a moderate to moderate/swift flow over a largely plant free substrate composed of 80% cobble/ pebble and 20% gravel. Habitat comprised riffle and shallow glide/run. Good water quality indicated by sensitive macroinvertebrate community meriting high status (Q4-5). Habitat is suitable for salmonid nursery, with electrofishing confirming a good density of juvenile salmon and trout.	

Glanlee Tributary Sites

Site K9 (509976, 576170) – **Q4**
Clear stony stream 0.8-1m wide and 2-3cm deep. Substrates comprised about 40% angular cobble and 60% pebble, with a small amount of leafy liverwort cover on larger cobble and a trace of FGA. Habitat comprised small shallow pools followed by short riffles, with fine peaty silt was raised during kick-sampling. Good water quality. It is unlikely that this small stream, so close to its source and with little depth or cover, contains any fish, including salmonids. Absence of fish downstream at K16 helps confirm this.

Site K20A (509786, 576634) – **Q4**
Small stony stream (1-2.4m wide) with heavy coating of iron bacterial layer on substrates of 60% cobble and 40% pebble in a moderate to moderate/swift flow between stable, rush-covered banks. Patches of *Vaucheria* were noted and a high cover of leafy liverwort on emergent cobbles. Unsuitable for trout spawning owing to coarse substrates and iron coating. Absence of fish during electrofishing downstream at K16 suggests fish are absent in this upper catchment area.

Site K12 (509976, 576170) – **Q4**
Clear stony stream 0.8-1m wide and 2-3cm deep. Substrates comprised about 40% angular cobble and 60% pebble, with a small amount of leafy liverwort cover on larger cobble and a trace of FGA. Habitat comprised small shallow pools followed by short riffles, with fine peaty silt was raised during kick-sampling. Good water quality. It is unlikely that this small stream, so close to its source and with little depth or cover, contains any fish, including salmonids. Absence of fish downstream at K16 helps confirm this.

Site K13 (509061, 576218) – **Q4**
Moderate sized stream: 1.5-3.0m width and a depth of 5-15cm in kick-sampling areas. Substrates of cobble / boulder in moderate to swift turbulent flow. Habitats were shallow glide/runs, short riffle/runs and short cascades with heavy cover of leafy liverworts on boulders, localised clumps of *Fontinalis antipyretica* and very little FGA. Suitable for salmonids in the absence of barriers to passage below, although absence of fish confirmed by electrofishing at K16 downstream suggests downstream barriers that exclude fish. Eel may be present.

Site K14 (509976, 576170)
Small channel of 70% cobble and 30% pebble in a moderate and moderate to swift flow. Surveyed just above a fording point on the existing access track. No kick sample was taken here, as another was taken at K16 downstream. Scattered clumps of leafy liverwort present. The habitat comprised shallow pool/glides and short riffle/runs. A downstream barrier (vertical drop) suggests that no fish occur upstream in this stretch. Absence of fish in these upper headwaters confirmed by electrofishing (no fish) at K16 downstream.

Site K16 (508928, 575840) – **Q4**
Main channel of Garrow Branch of Glanlee Stream: 2.5-3.8m wide, 25-30cm deep in pools and 10cm deep in kick sample areas. Good water quality. Substrates comprise bedrock, boulder and cobbles. Habitats include long pool/glides and short runs over cobble, plus vertical drops that may form barriers to fish passage upstream. Leafy liverworts, *Fontinalis antipyretica* and *Rhynchostegium* and trace amounts of FGA (*Microspora, Mougeotia*) on coarse substrate. The channel should be suitable for trout nursery, but none were recorded during electrofishing.

Site K17A (508870, 575242) – **Q4**
Main channel of Glanlee Stream: 2-3m wide and 3-10cm deep in kick sample areas. Good water quality. Wide range of substrates and habitats ranging from gravel up to boulders with pools, glides, short riffle and runs. Locally heavy cover of leafy liverwort and *Fontinalis antipyretica* on boulders and <1% cover of FGA (*Mougeotia*). It should be ideal spawning and nursery for trout, but electrofishing confirmed their absence, suggesting downstream barriers (vertical drops). Eel could be present, but lamprey unlikely.

Site K18 (509976, 576170)
Step-pool, cascade, glide/run and riffle/run with swift and often turbulent flow. Moderately high gradient, mountain-type stream with leafy liverworts, *Fontinalis antipyretica* and *Rhynchostegium.* Some vertical drops were recorded upstream of the site. Electrofishing revealed low trout density, much lower than expected with respect to the high quality of habitat, possibly related to upstream forestry and/or intensity of spate flow.

Site K18B (508078, 575311) – **Q4**
Small stony stream is a tributary of the Glanlee main channel: 0.9-1.5m wide and <5cm in kick-sampling areas. Habitat comprised small pool/glides and short riffle/runs, the latter in moderate to swift flow. Substrates a mix of cobble and pebble with a good cover of leafy liverwort, *Fontinalis antipyretica* and *Batrachospermum* on larger substrates. A small amount of interstitial peaty detritus present. Suitable for trout nursery, with small numbers of trout confirmed by electrofishing.

Site K19 (508078, 575311) – **Q4-5** Most downstream site on the Glanlee Stream, just upstream of the Roughty confluence: 4.5-5.5m wide and 10cm deep in kick-sample riffle area. Habitat consisted of moderate to swift flow riffle/run with short step-cascades. In unshaded areas the channel had 30-50% cover of FGA (*Ulothrix zonata*). Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5). The channel is ideal for salmonid nursery, although electrofishing confirmed relativelt low density of juvenile salmon and trout.	

Roughty River Sites

Site K19US (507276, 574468) – **Q4-5** Upstream Glanlee tributary confluence: 10-12m wide and 10-15cm deep. The dominant habitat is shallow, riffle and riffle/run in moderate to swift flow over cobble dominated substrate with pockets of large pebbles. 30-50% cover of FGA (*Ulothrix zonata*) with *Lemanea* sp. locally common on large cobbles and boulders. Ideal for salmonid nursery. The right-hand side (RHS) bank had overhanging willow, ash, holly and rhododendron with an understorey of woodland/hedge bank herbaceous species. Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5).	

Site K19DS (507156, 574720) – **Q4-5** Downstream of Glanlee tributary confluence: 8-12m wide and 5-10cm deep in the kick-sample stretch. The habitat comprises a mix of riffle and riffle/run and low cascades in moderate to swift flow over medium-sized cobble with 60-70% cover of FGA (*Ulothrix zonata*). Open and mainly unshaded. Both banks were fronted by low cobble berms with scattered *Oenanthe crocata* and *Fontinalis antipyretica*. Ideal for salmonid nursery. Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5).	

Site K23US (506802, 575107) – **Q4-5**
Upstream of Lettercannon tributary confluence: 9-12m wide and 12-20cm in a moderate to swift flow. Substrate dominated by cobbles and large pebble with 40-60% cover of FGA (*Ulothrix zonata*) and *Lemanea* sp. common. Open and unshaded, the left-hand side (LHS) bank is armoured below and grassed above. The RHS side of the channel has a cobble berm backed by a low bank with woodland/hedge banks herbs. Ideal for salmonid nursery. Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5).

Site K23DS (506679, 575282) – **Q4-5**
Downstream of Lettercannon tributary confluence: 7-9m wide and 10-20cm deep with 60-80% cover of FGA (*Ulothrix zonata*). The 100% riffle habitat is dominated by medium cobble with pockets of pebble in a moderate to swift flow. *Lemanea* sp. and *Fontinalis antipyretica* present. The RHS bank had some armouring below and grass / tall herb above. Open and unshaded. Ideal for salmonid nursery, with electrofishing showing a very high density of salmon and trout of varying age classes. Kick-sampling merited 'high' status (Q4-5).

Site K27US (506029, 575696) – **Q4-5**
Upstream of Thureehouma tributary confluence: 12m wide and 15-20cm deep flowing over a mix of small cobble and pebbles between large boulders. The habitat is a mix of riffle/run and cascade in moderate to swift and locally swift flows. FGA cover (*Ulothrix zonata*) was 10-20% at the time, with *Lemanea* sp. on boulders and *Racomitrium* sp. above the waterline. Ideal for salmonid nursery with some holding pools locally. Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5).

Site K27DS (505770, 575764) – **Q4-5**
Downstream of Thureehouma tributary confluence: 10m wide and 15-30cm deep. Habitat comprised a boulder cascade with small cobble and pebble between in a moderate to swift and swift turbulent flow. FGA cover was 10-20% at the time (*Ulothrix zonata*) and with a moss and *Lemanea* cover of 20-30% on large cobble and boulders. Ideal for salmonid nursery with some holding pools. Kick-sampling revealed an array of sensitive macroinvertebrates meriting 'high' status (Q4-5).

Flesk Sub-catchment:

Flesk River Sites

Site F1 (510171, 582038) – **Q5 (EPA)**
Main Flesk River channel upstream of Poulgorm Bridge (N22). The channel is entering a deep gorge at this point, with torrential cascades and rapids over mainly bedrock with large boulders. Broadleaf tree cover atop steep banks. Habitats would be nsuitable for salmonid spawning or nursery in this reach, but form a migration route to the upper catchment. EPA monitoring shows pristine waters in this reach (Q5). Small tributaries flowing from the access track (Sites F4 and F5) enter along this reach.

Site F2 (509534, 581783) – **Q4-5**
&
Site F3 (508595, 581517) – **Q4-5**

The Flesk River main channel downstream of the Owgarriv tributary confluence broadens out briefly at Site F2 before entering another torrential cascade and rapid section over sculpted bedrock with large boulders. It then broadens out again and becomes more depositing by Site F3. The river is generally 16-18m wide and 30cm in riffle/runs, with deep holding pools (>1m) and glides (ca. 50cm). The channel is enclosed by mature broadleaved trees and woodland herb understorey. Ideal salmon and trout habitats, with reaches suited to spawning and nursery.

Cloonkeen Tributary Sites

Site F4 (510632, 582024) – **Q4**
Small channel, 1.6-2.0m width and 10-15cm deep in pools. Substrates of small boulder and cobble with patches of interstitial gravel/sand and moderate flow down a mainly steep gradient through dense mixed broadleaf and conifer forest. Generally natural morphology, but fish passage severed by a number of culverts/pipes related to N22 and site access track. Potential trout habitat, but fish unlikely to be present owing to barriers and hydromorphological damage. Macroinvertebrate community merited 'good' status (Q4).

Site F5 (510560, 581867) – **Q4**
Small channel, 1.3-1.6m wet width and 5-15cm deep in pools. Steep gradient, with step/pool flow over small boulder and cobble with patches of interstitial gravel/sand. Dense mixed broadleaf and conifer forest on both banks. Potential trout nursery habitat, but fish unlikely to be present owing to downstream barriers and general lack of spawning habitat locally. Macroinvertebrate community merited 'good' status (Q4).

Site F6 (511012, 581963) – **Q3-4**
Small channel that narrows to 1.0m through conifer forest downstream of the access road. Substrates of unstable cobble, gravel and pebble forming step/pool habitat with low flow, although clearly subject to spates. Fish are very unlikely owing to downstream barriers and general lack of spawning habitat locally. Macroinvertebrate community merited 'moderate' status (Q3-4) at this upper part of the stream network, indicative of slightly enriched waters.

Owgarriv Tributary Sites

Site F7 (509714, 581792) – **Q4-5**
Owgarriv Stream - moderately large channel: 6m width and 20cm depth in riffle/run. Generally steep gradient forming cascades and step/pool, but broadens out in places to form riffle/run over cobble/pebble. Banks mainly wooded with fairly natural hydromorphology. Good salmonid nursery habitat, although salmon unlikely owing to steep cascade (migration barrier) down to the Flesk main channel. Trout are likely at this point in the catchment. The macroinvertebrate community merited 'high' status (Q4-5) indicating very good water quality.

Site F8 (510278, 581020) – **Q4-5**
Located ca.1.2km upstream of Site F7 on the Owgarriv tributary branch that drains a large proportion of the mid-section of the wind farm access track. Generally, a narrow steep channel with long waterfalls over bedrock, but broadening out in places forming riffle/run. The sampling site was a gravel riffle of width 3.0m and 5cm depth. Trout may be present, but there are so many migration barriers (vertical waterfalls) and a relative paucity of suitable spawning habitat that it is unlikely. The macroinvertebrate community merited 'high' status (Q4-5) indicating very good water quality.

Site F9 (511583, 579783)
Small shallow stream: 0.4-1.0m with cobble, pebble and gravel substrates. Eroded moorland peat banks upstream of access track where the gradient is higher. Piped beneath the existing access track and then narrows into a lower gradient, embanked drain through forestry. Habitat of stepped pool/cascade and glide/run. The stream has some potential for trout but has clearly been altered by forestry drainage and residual trout may or may not have recolonised given that steep waterfalls further downstream act as fish passage barriers from the Flesk River.

Site F10 (511418, 579525)
Small channel: 0.4-0.7m width, 3-8cm depth in the dominant glide/run habitat. Substrate comprises small cobble and pebble embedded in peaty clay with a heavy iron bacterial coating. Deeply drained through moorland downstream of the piped crossing point. The stream may be ephemeral, drying out at times. It has little, if any, fisheries significance.

Site F11 (511177, 578911)
Very small channel: 0.25m width, <5cm depth in the dominant step/pool habitat. Substrate comprises small cobble and pebble embedded in peaty clay. Drained through forestry immediately downstream of the piped crossing point. The stream is likely to be ephemeral. It has no fisheries significance.

Site F12 (511160, 578808)
Very small channel: 0.25m width, <5cm depth in the dominant step/pool habitat. Substrate comprises small cobble and pebble embedded in peaty clay. Drained through forestry immediately downstream of the piped crossing point. The stream is likely to be ephemeral. It has no fisheries significance.

Site F13 (510797, 578499)
Roadside collector drainage – water flows via small pipes beneath the access track, collecting on the downslope, directed via small channels into the upper Owgarriv Stream. These are ephemeral drains are of no fisheries significance but are conduits to the more sensitive downstream habitats of the Owgarriv.

Site F14 (510846, 578319)
Roadside collector drainage – water flows via small pipes beneath the access track and via small forestry drains towards the upper Owgarriv Stream. This is an ephemeral drain with no fisheries significance but is a conduit to the more sensitive downstream habitats of the Owgarriv.

Sullane Sub-catchment:

Site S1 (513553, 576865) – **Q4-5**
This site is on the main channel draining a small proportion of the site access track, located 3.5km downstream (at the nearest accessible point). It is a fast flowing, clear mountain stream with 90% cobble, and 10% gravel/pebble with interstitial coarse sand. Habitats include step/pool and riffle/run with only occasional mosses on exposed small boulders. There was a mix of conifer forest and grazed moorland in the upstream catchment. Ideal for salmonid nursery with pockets of spawning habitat, suitable for both trout and salmon. The macroinvertebrate community merited 'high' status (Q4-5) indicating very good water quality.

Site S2 (510608, 577630)
Very small stream piped under the access track, approximately 3.5km upstream of Site S1. The stream descends quite steeply downhill passing through extensive tracts of forestry in the upper Sullane. It is <5cm depth in the step/pool, riffle/run habitat. Substrate comprises mainly pebble with silted gravels. At this point high in the catchment the stream has little, if any, fisheries significance, but trout and eel cannot be ruled out.