NS 2 FRESHWATER PEARL MUSSEL SUB-BASIN MANAGEMENT PLANS

REPORT ON MORPHOLOGICAL MONITORING AND CATCHMENT WALKOVER RISK ASSESSMENTS IN THE LEANNAN CATCHMENT

September 2009

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1.0 INTRODUCTION

In order to assess the hydromorphological alterations within the Leannan catchment the EPA WFD classification tool called the River Hydromorphology Assessment Technique (RHAT) was utilised by RPS. This tool was developed through the North South Share project, to classify rivers in terms of their morphology. It is a field technique which assigns a channel typology. This influences the rivers physical attributes assessed in the field. The technique assigns a morphological classification directly related to that of the WFD – high, good, moderate, poor and bad.

RHAT surveys were carried out at high risk areas located within pearl mussel populations. The methodology classifies river hydromorphology based on a departure from naturalness, and assigns a morphological classification, based on semi-quantitative criteria. It is designed to be a rapid visual assessment based on information from desktop studies, using GIS data, aerial photography, historical data and data obtained from previous field surveys as well as observations in the field.

A catchment walkover risk assessment survey sheet was also designed by the project team in conjunction with NPWS in order to focus the collation of the pressure data in the field with respect to the Freshwater Pearl Mussel. The risk sheet was divided into eight categories designed to highlight the main pressures within the catchment. The eight categories are as follows:

- Source of erosion
- Diffuse Nutrient
- Diffuse Silt
- Current Riparian Zone
- Field Drainage
- Outfalls
- Abstractions
- Barriers to Migration

Each sub-pressure within the eight categories is analysed and an overall risk assessment of High, Medium or Low is assigned to that category. The “one out all out principle” is then used to assign the river stretch or point an overall risk category. A detailed description, together with a series of photographs outlining the pressures is also taken. The risk assessment sheets will assist the project team in focussing the specific freshwater pearl mussel measures within the catchment.

Location of survey stretches and points are shown in **Figure 3.1**

2.0 METHODOLOGY

Sampling was carried out on the 11t & 12th of May 2009.

2.1 RIVER HYDROMORPHOLOGY ASSESSMENT TECHNIQUE (RHAT)

Classification of hydromorphology can be used to contribute to the status classification of water bodies at high ecological status only. However, RHAT plays a vital role in identifying why a water body might be failing to achieve Good Ecological Status as it is based on the observed impact in the field. It can assist in deciding what indirect and direct efforts are needed to improve status and in helping to prevent further deterioration.

The eight criteria that are scored are:

1. Channel morphology and flow types
2. Channel vegetation
3. Substrate diversity and embeddedness
4. Channel flow status
5. Bank and bank top stability
6. Bank and bank top vegetation
7. Riparian land use
8. Floodplain connectivity

Sheet 1 of the RHAT form contains the Field Health and Safety sheet which is filled on arrival at the site. Before the field survey, a desk study is required this element of the survey was completed as part of the development of the draft sub-basin management plans. The reach identification and physical characterisation sections for each field site are recorded on Sheet 2 (see Appendix 1) with all information available from GIS and aerial photographs, including:

a. expected stream type and the description of various stream types
b. catchment and reach-scale pressures (these may help to identify, confirm or explain field observations);
c. expected riparian vegetation types (for high quality status);
d. the weather conditions on the day of the survey, and those immediately preceding the day of the survey. This information is important to interpret the effects of storm events on the survey results;
e. the estimated stream width and the reach length to be assessed (~ 40 x width).
f. any other notable issues (e.g. from previous surveys).

A score is allocated to each relevant attribute (the number of attributes to be assessed will depend on the stream type). Where the condition departs from the reference condition, note should be made if this condition results from a particular identifiable pressure. Where possible and where relevant, all attributes should be included in the assessment, using the assessment sheet (Sheet 3, see Appendix 1). If an attribute is not assessed, the score-summary table should be amended (cells shaded) and a note made as to why the assessment was not carried out. The WFD status can still be calculated on the basis of other attributes, but with a note that a particular attribute was omitted.

Transfer scores for individual attributes to the summary table on the survey Sheet 2. Finally the overall WFD category can be calculated using the following values:

> 0.8	= high
0.6 – 0.8	= good
0.4 – 0.6	= moderate
0.2 – 0.4	= poor
< 0.2	= bad

For the purposes of the assessment as part of the NS2 project, a high status for morphology is desirable for pearl mussel habitats. Through work carried out by the Shannon IRBD project on the Freshwater Morphology Programme of Measures Study, it was found that an observed relationship exists between biological data and a RHAT score. The study confirmed that morphological pressure can impact biology and therefore ecological status. In general, sites with RHAT scores less than 0.6 also have less than good Q scores. Similarly high levels of siltation affecting macrophyte populations are reflected by less than good RHAT scores.

Grid references were recorded at all sites using a GPS together with site photographs which were taken using a digital camera.

2.2 CATCHMENT WALKOVER RISK ASSESSMENT

During the development of the draft sub-basin management plans throughout 2008 a complete desk study was conducted of all relevant biological, water quality and pressure source data within the Leannan catchment. Best use was made of all available datasets such as the pressure source data collated by the River Basin District Projects for the Article V Characterisation and Programme of Measures Studies. This work allowed the NS 2 project team to assess the catchment through the combined availability of aerial imagery and digitised pressure information. Where gaps in this data existed together with areas that required ground truthing such as physical barriers to migration, catchment walkover risk assessments were focussed throughout the 2009 field survey season.

The catchment walkover risk assessment sheet (See Appendix 3) covers eight main categories or pressures which are subsequently sub-divided into the various sources. Each source is ticked if present and an overall risk assessment for each pressure assigned from High to Medium to Low over the survey length or point. All eight pressures are combined to give an overall risk assessment to the catchment based on the “one out all out principle”.

3.1 RESULTS

Figure 3.1 indicates where the Leannan RHAT assessments were carried out throughout the catchment.

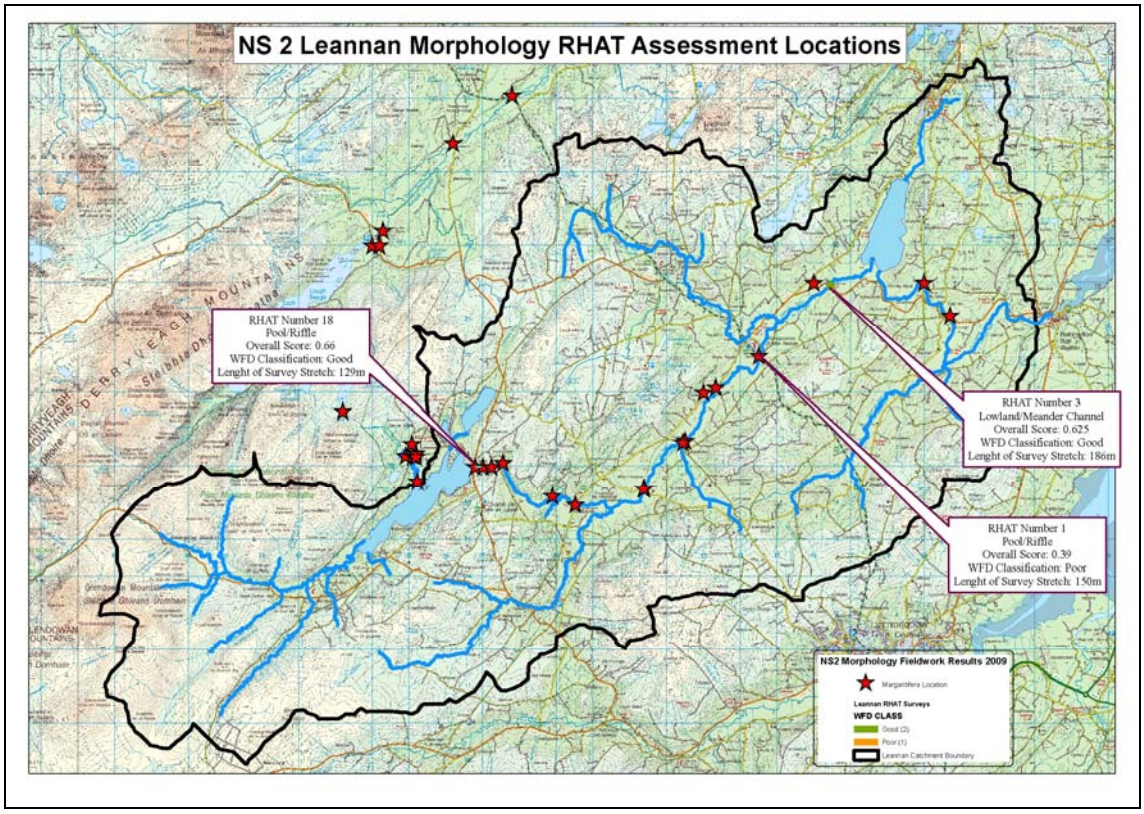


Figure 3.1 Morphology RHAT Assessment Locations

(The RHAT numbering system corresponds to the site code which may mean they are not sequential where a RHAT was not carried out at a particular site)

3.1 RHAT Survey Results

Three RHAT surveys were carried out throughout the Leannan catchment. The results of these surveys can be found in the electronic appendix. Two were deemed to be at good status, one in the upper reaches of the catchment (RHAT number 18) and one at the lower end of the catchment (RHAT Number 3) at Ballydone Bridge before the Leannan flows into Fern Lough. The third RHAT survey (RHAT Number 1) was carried out at the bridge in Kilmacrenan and was classified as being at poor status. This stretch had no buffer zone on the downstream end with extensive bank works together with site clearance and infilling located at the bridge. These works are largely associated with the new housing development which is show in pictures 1, 2 & 10 of Site 1. This area is a significant source of diffuse silt and runoff to the main channel.

This is largely an urban river stretch with excessive resectioning on both banks and also reinforcement on both the left and right bank. Some storm pipes were found to be culverted and entering the channel together with over deepening and over widening (Site 1, Photo 6).

RHAT number 3 which was carried out just upstream of Fern Lough was found to have large silt deposits which were left behind following recent flooding. The receding waters have left behind a film or fine silt on the bank vegetation as is evident in Site 3, Photo 11. The lowest scoring attributes on this stretch were the substrate condition, bank vegetation and riparian landcover. All other attributes scored 3 – 4. Again, resectioning and reinforcement were evident on both the left and right bank. Land drainage and site clearance work was also noted along this stretch which led to these low scores.

RHAT number 18 was carried out just at the outlet from Gartan Lough on a stretch downstream of Gartan Bridge. Resectioning (Site 18 Photo 4) was noted on both the left and right bank together with reinforcement on the right bank. One weir was recorded (Site 18, Photo 6) and although it has altered the channel form and flow it did look passable. Again the bank structure & stability, Bank vegetation and Riparian Landcover scored lowest from the 8 attributes due to the morphological alterations along this stretch.

Plate 3.1 Representative photographs from reach:

RHAT 1 – Site 1 Photo 1	**RHAT 1 – Site 1 Photo 2**
	

RHAT 3 – Site 3 Photo 11 	**RHAT 3 – Site Photo 14** 
RHAT 18 – Site 18 Photo 4 	**RHAT 18 – Site 18 Photo 6** 

Details in relation to photographs are tabulated in Appendix 2.

3.2 Catchment Walkover Risk Assessment Results

A total of twenty-six sites were surveyed in the Leannan sub-basin catchment, with a risk assessment carried out at twenty-five of these sites (one stopping points). **Figure 3.2** outlines the High to Low Risk Assessment from the Catchment Walkover Risk Assessments together with the location of the stopping point. Sixteen high risk sites were recorded out of the twenty-five that were assessed. A further seven were considered to be at medium risk, while only two sites assessed were considered low risk. Figure 3 outlines the percentage of sites classified at high, medium and low risk together with the stopping point throughout the catchment.

The most common high risk categories identified were:

- Erosion – high risk at 81% of high risk sites
- Field drainage – high risk at 63% of high risk sites

The most common source of erosion was bank erosion; recorded as high risk at thirteen sites, with animal trampling high risk at eleven sites. The remaining sources are shown below in Figure 4. The most common source of high risk field drainage is managed ditches; each individual source of field drainage is illustrated in Figure 5.

The Current Riparian Zone category of the Catchment Walkover Risk Assessment slightly varies from the seven other categories or pressures. The Current Riparian Zone is not a pressure in itself; however the aspects listed in this category are the interceptors to the pressure and convey the extent or lack of buffer provided by the riparian zone. A high risk riparian zone indicates that the pressures acting on the river are more likely to have significant impact. For example the lack of fencing along a river stretch can lead to excessive trampling and/or poaching which in turn may lead to siltation within a pearl mussel habitat. The various categories and pressures listed in the Catchment Walkover Risk Assessment sheet were designed to assist the project in focussing the measures which will be needed to combat the pressure along its pathway, rather than removing a source which may not always be possible such as intensive agriculture. Recording the Riparian Zone in terms of its current performance as a buffer is important in this regard.

Current Riparian Zone has ten aspects as follows:

- Fencing
- Buffer
- Tree line at bank
- Tree line buffer
- Plantation with no buffer
- Urbanisation
- Flood Protection
- Marshy Land
- Landuse at bank
- Other Sources

Where one or any of these aspects is found to be the cause of significant impact to the riparian zone, or the channel along the stretch then this category may be assigned a high risk score. Throughout the 25 risk assessments 6 sites were deemed to be at high risk due to the current riparian zone. This was largely due to inadequate buffers, fencing which was either too close to the river channel or no fencing which allowed animal trampling. The landuse at the bank, mainly improved grassland was also a significant issue along the river stretches covered within the Leannan.

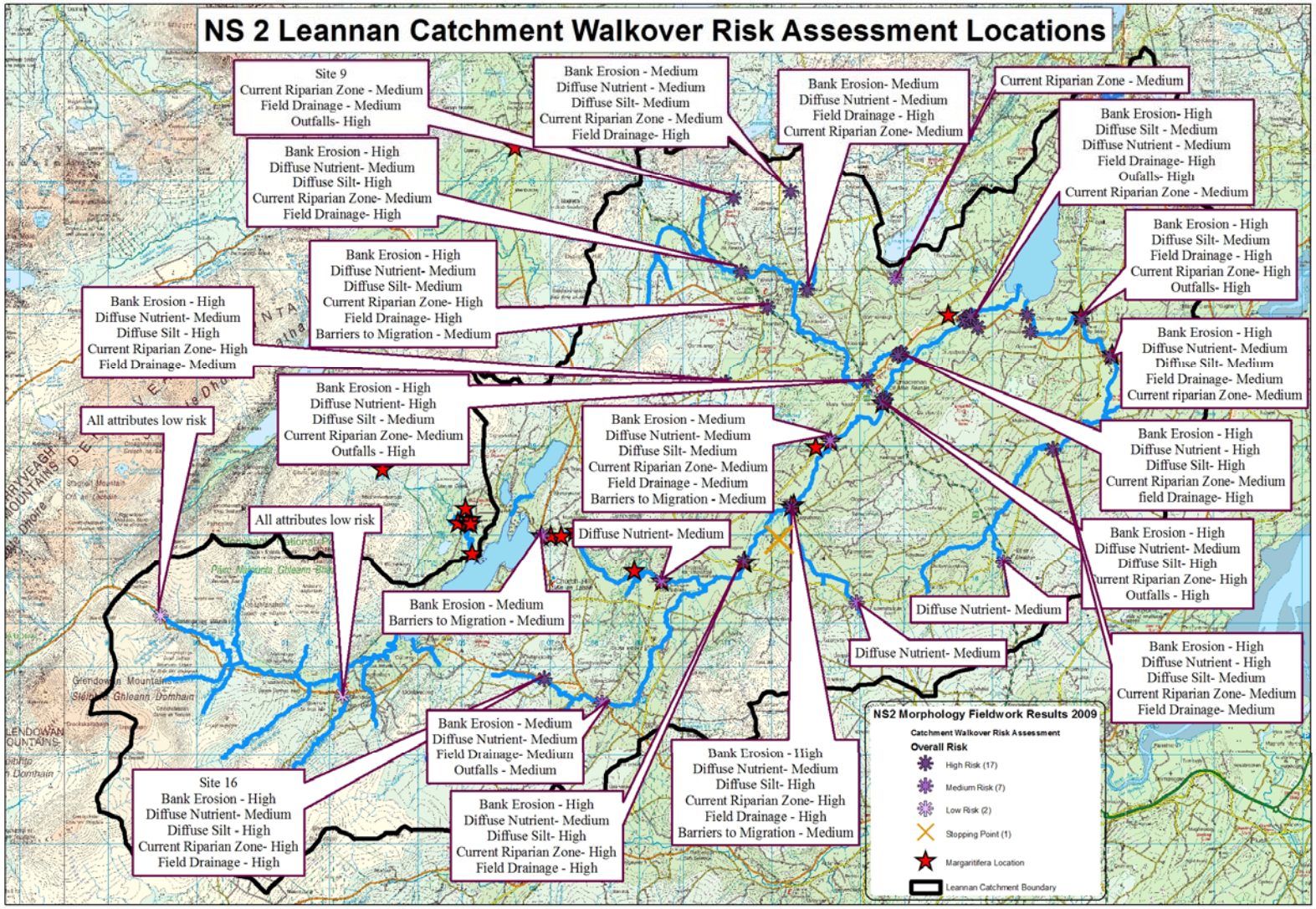


Figure 3.2 Locations of Catchment Walkover Risk Assessments and Stopping Point

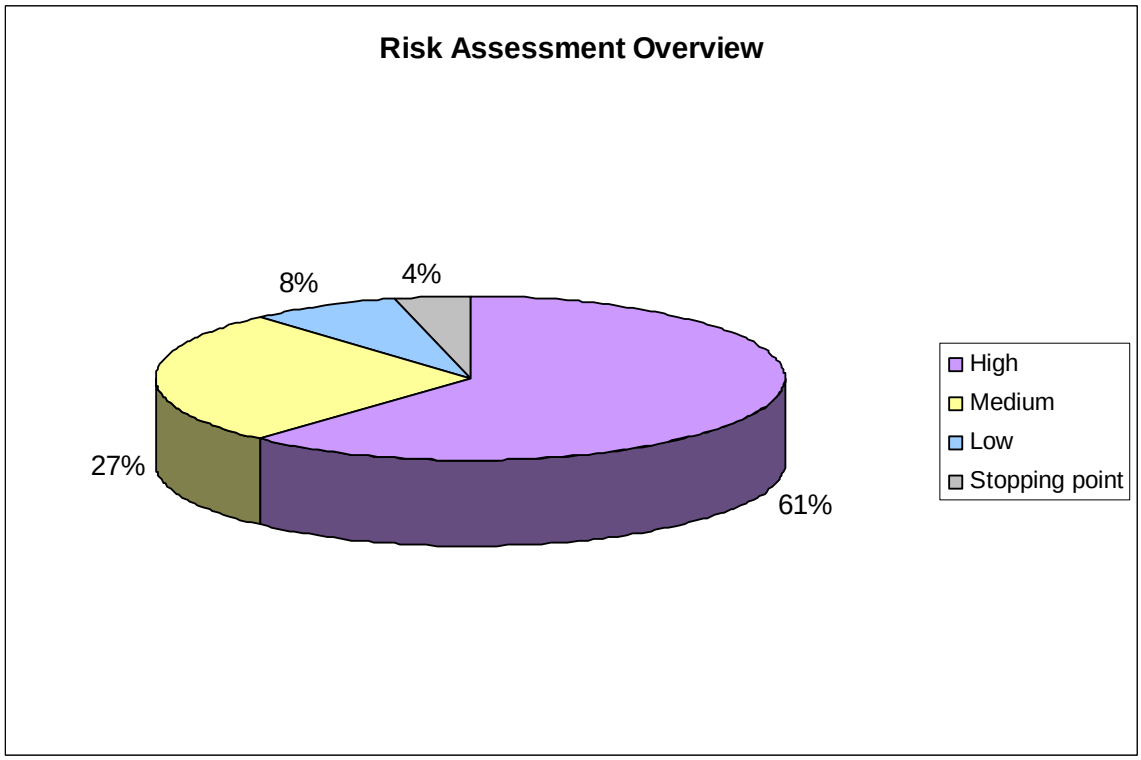


Figure 3.2 Risk Assessment Overview

The break-down of pressure categories identified as high risk are outlined in **Figure 3.3**

Figure 3.3 Breakdown of High Risk Categories

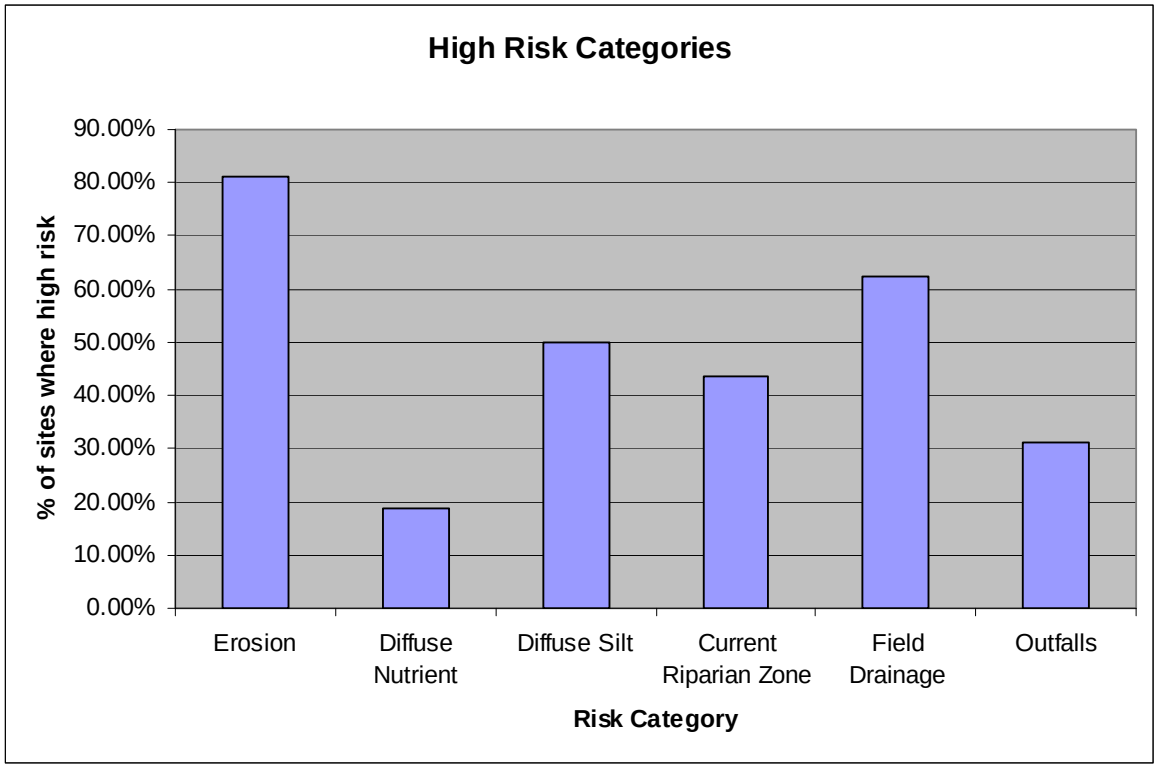
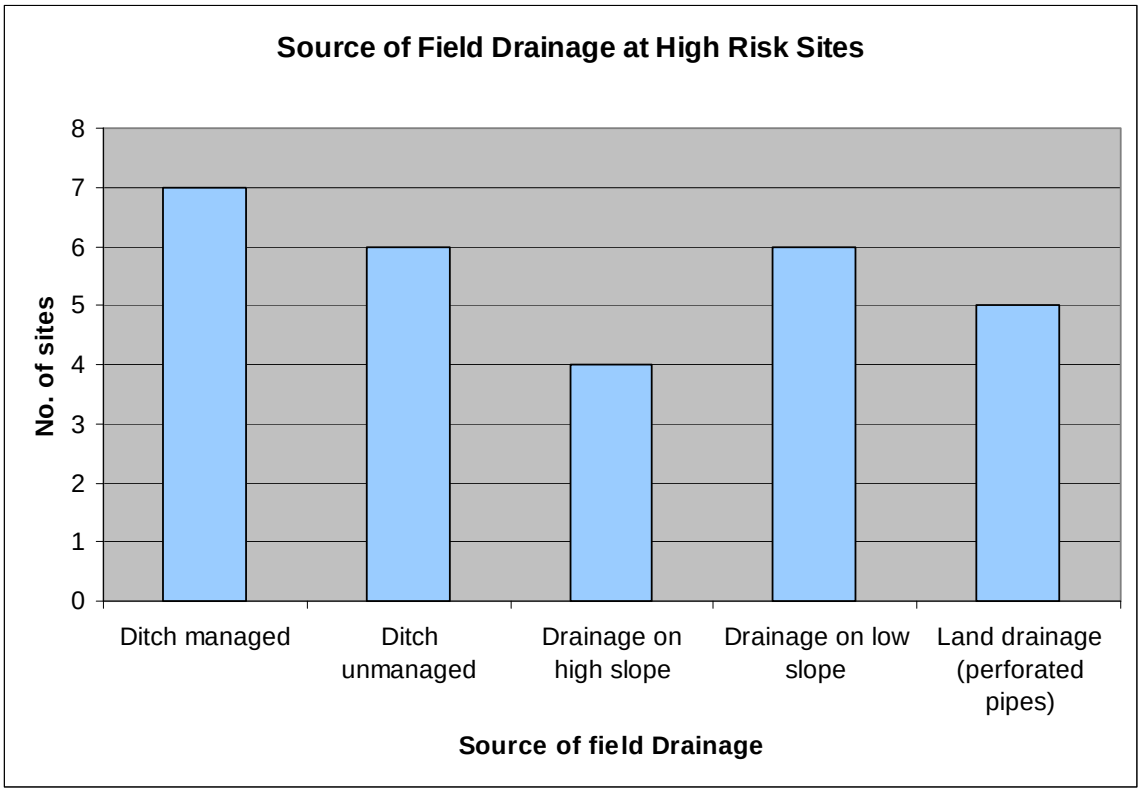


Figure 3.4 Sources of Field Drainage at High Risk Sites



3.3 Point Source Pressures

Quarries

Two quarries were located in the vicinity of the catchment walkover risk assessments. The first, **Barnes Limestone Quarry Ltd**, was located in the north of the catchment on a tributary of the Lurgy, An Chamabhainn near Site number 9. Slightly coloured, grey water containing suspended solids were found in the stream adjacent to the quarry. The Lurgy is an important tributary of the Leannan which contains the main pearl mussel population. Any suspended solids entering the river should be stopped immediately.

The second quarry, **Churchill Quarries Ltd**, was located just upstream of the Sruhancam which is a tributary of the Glashagh River at Site 16. In early November 2008 a serious pollution incident occurred from this quarry. This involved the release of several thousand cubic metres of Limestone slurry from the quarry into the Glashagh River which is again a tributary of the Leannan. During the 2009 survey season the small tributary which comes from the Quarry and joins the Sruhancam was found to contain grey water indicating continued release of silt from the Quarry at Site 16, Photo 3, 4, 5.

Plate 3.2 Representative photographs from reach:

Site 9 Photo 6 	**Site 16 Photo 3** 
Site 16 Photo 4 	**Site 16 Photo 5** 

4.0 CONCLUSIONS

The Leannan catchment displays poor morphological conditions in particular the further downstream that is assessed **Figure 3.1** clearly demonstrates this pattern. Two sites were surveyed in the upper reaches of the catchment upstream of Gartan Lough; both were found to be low risk. Nine sites were surveyed along the main Leannan channel in areas where Freshwater Pearl Mussel records exist, from Gartan Lough to the catchment boundary near Rathmelton. Six of these were high risk and the remaining three medium risk. Of the further fourteen sites surveyed along tributaries of the Leannan ten were high risk, and three medium risks. It is significant that nine of these high risk sites were recorded along the River Lurgy and its tributaries. To the south west of the catchment this trend is also reflected with significantly high risks recorded along the Glashagh and its tributaries. Overall, the Leannan catchment has many pressures acting on the river system which is leading to the decline in pearl mussel populations.

APPENDIX A

RHAT Field Sheet

Field Health and Safety sheet

River Name_____ Site Code_____ Date_____

1 = Low risk 5 = High risk

Please circle applicable number

PARKING	1	2	3	4	5
FENCES/BARRIERS	1	2	3	4	5
GROUND STABILITY	1	2	3	4	5
DENSE VEGETATION	1	2	3	4	5
BANK STEEPNESS OR STABILITY	1	2	3	4	5
RISK FROM ANIMALS	1	2	3	4	5
PHONE COVERAGE	1	2	3	4	5

Previous RHS/RAT/RHAT surveys - year and code _____

Details of access _____

RHAT (VERSION 2)

TRIBUTARY / MAIN CHANNEL*

Site Identification

River Name _____ Site Code _____

Nearest WFD site FF10 _____

Water Body ID _____ Start U / S or D / S*

First IGR _____ Last IGR _____

Bank surveyed from L / R / Both / in-Channel*

Desk-study notes		Field Notes
ACTION TO TAKE PRIOR TO FIELDWORK General overall shape of river Check weirs, impoundments etc. on catchment		River type Date
Floodplain connectivity and land use Expected river type Rain last week Estimated river width Estimated survey length Riparian land cover(s) River Agency designated? Other comments including geology - limestone / siliceous / peat*		Time Surveyors Weather conditions now Estimated river width (m) (average 3 readings) Estimated survey length (m) (40 X wetted width) Estimated river depth (m) Channel characteristics (e.g. different stream types on the reach)
RESULTS		Pressures
Hydromorph score WFD class		*Circle as appropriate

Photograph details include IGR or approximate location

_____

_____

_____

_____

N.B. The survey length should be 40x the wetted width with a minimal stretch of 160m but not exceeding 1km.

NS RHAT

Anthropogenic Impacts

River Name _____ Site Code _____ Date _____

Feature		Tick if present, record as E if > 30%		
Resectioning		None ☐	Left bank ☐	Right bank ☐
Reinforcement		None ☐	Left bank ☐	Right bank ☐
Embankments	NO*	LB ☐	RB ☐	Set back LB ☐ SB RB ☐
Culverts**		Y / N / Unknown*		
Over deepening		Y / N / Unknown*		
Wver widened		Y / N / Unknown*		
Narrowing		Y / N / Unknown*		
Fords**		Y / N*		
		Major	Intermediate	Minor
Bridges**	NO*			
Weirs**	NO*			
Fish Pass**	NO*			

Physical features or resource use if applicable. *

Deflectors / Jetties / Arterial drainage / Side channels / Mid channel bar / Field Drains / Mill Race

Navigation / Fishing / Recreation / Forestry/ Urban / Industry / HEP

Trashline present (height __ m) above water / Buffer zone (LBm / RBm back from water edge)

Other observations - Invasives - Trees - Birds - Pollution indicators - Invertebrates*

Rhododendron / Himalayan Balsam / Japanese Knotweed / Giant hogweed / Snowberry / Cherry-Laurel/ Gunnera

Sycamore / Beech / Conifers / Oak / Ash / Alder / Willow / Birch / Hazel / Hawthorn / Blackthorn / Holly

Heron / Sand martin / Grey wagtail / Dippers / Kingfishers /

Sewage fungus / Diatomaceous algae / Oil / Cladophora / Vaucheria / Dumping / Silt on Substrate

Other comments:

_____

** Circle as appropriate E - extensive. ** Tally as appropriate. LB - left bank / RB - right bank*

RHAT RIVER HYDROMORPHOLOGY ASSESSMENT TECHNIQUE

Field Assessment of Morphological Condition

River Name _____ Site Code _____ Date _____

If river in spate ignore 3 and 4 but deduct individual scores from overall if either feature not visible. Greyed boxes may be scored but note why in Comments/Notes.

	Bedrock	Cascade / Step-pool	Pool-riffle-glide	Lowland Meandering
1. Channel form and flow types	4	4	4	4
2. Channel vegetation	4	4	4	4
3. Substrate condition	4	4	4	4
4. Barriers to continuity	4	4	4	4
5. Bank structure & stability L+R	4	4	4	4
6. Bank vegetation L+R	4	4	4	4
7. Riparian land cover L+R	4	4	4	4
8. Floodplain connectivity L+R	4	4	4	4
TOTAL	32	32	32	32
Hydromorph Score *				
WFD class **				

* Hydromorph score - Assessment score = Maximum Possible score

** WFD Class
> 0.8 = high
>0.6 – 0.8 = good
>0.4 – 0.6 = moderate
>0.2 - 0.4 = poor
< 0.2 = bad.

SHEET 5

NOTES

APPENDIX 2

PHOTOGRAPHS

Photographs of site locations and catchment pressures on the Leannan River and tributaries 2009. All field work photographs can be found in the accompanying electronic appendix.

Overall Risk * uses the “one out all out” principle

Site No.	Catchment Name	Location	X	Y	Photo No.	Bank Erosion	Diffuse Nutrient	Diffuse Silt	Field Drainage	Outfalls	Abstraction	Barriers to Migration	Current Riparian Zone	Overall Risk*	Pressure/Photo Details
1	Leannan	Kilmacrennan Bridge	214521	420000	1	High	Medium	High	Low	High	Low	Low	High	High	Bridge structure looking downstream
1	Leannan	Kilmacrennan Bridge	214521	420000	2	High	Medium	High	Low	High	Low	Low	High	High	Bank clearance and infilling, shop units to be built
1	Leannan	Kilmacrennan Bridge	214521	420000	3	High	Medium	High	Low	High	Low	Low	High	High	Filling on bank
1	Leannan	Kilmacrennan Bridge	214576	420070	4	High	Medium	High	Low	High	Low	Low	High	High	
1	Leannan	Kilmacrennan Bridge	214576	420070	5	High	Medium	High	Low	High	Low	Low	High	High	Bank construction
1	Leannan	Kilmacrennan Bridge	214542	420002	6	High	Medium	High	Low	High	Low	Low	High	High	Twin outfalls under road
1	Leannan	Kilmacrennan Bridge	214542	420002	7	High	Medium	High	Low	High	Low	Low	High	High	Ditch dug to river from outfalls
1	Leannan	Kilmacrennan Bridge	214521	420000	8	High	Medium	High	Low	High	Low	Low	High	High	
2	Leannan	Lurgy River	214945	421120	1	High	High	High	High	Low	Low	Low	Medium	High	Land drainage - silty pond with ditch entering river
2	Leannan	Lurgy River	214945	421120	2	High	High	High	High	Low	Low	Low	Medium	High	Site of new house
2	Leannan	Lurgy River	214898	421086	3	High	High	High	High	Low	Low	Low	Medium	High	Animal trampling
2	Leannan	Lurgy River	214945	421120	4	High	High	High	High	Low	Low	Low	Medium	High	Bridge looking upstream, banks bare, fence is at bank
2	Leannan	Lurgy River	214945	421120	5	High	High	High	High	Low	Low	Low	Medium	High	Ditch entering river, high suspended solids
2	Leannan	Lurgy River	214945	421120	6	High	High	High	High	Low	Low	Low	Medium	High	Scum on grass in channel?
2	Leannan	Lurgy River	214945	421120	7	High	High	High	High	Low	Low	Low	Medium	High	Hedges / trees cleared on bank beside road

2	Leannan	Lurgy River	214869	421069	8	High	High	High	High	Low	Low	Low	Medium	High	Bank erosion from past trampling and also recent high water levels
3	Leannan	Ballyclone Bridge	216466	421919	1	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216466	421919	2	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216466	421919	3	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216466	421919	4	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216424	421868	5	High	Medium	Medium	High	High	Low	Low	Medium	High	Animal trampling
3	Leannan	Ballyclone Bridge	216424	421868	6	High	Medium	Medium	High	High	Low	Low	Medium	High	Scum on grass?
3	Leannan	Ballyclone Bridge	216376	421842	7	High	Medium	Medium	High	High	Low	Low	Medium	High	Ditch entering river
3	Leannan	Ballyclone Bridge	216376	421842	8	High	Medium	Medium	High	High	Low	Low	Medium	High	Marshy land being drained
3	Leannan	Ballyclone Bridge	216510	421960	9	High	Medium	Medium	High	High	Low	Low	Medium	High	Downstream of bridge, digger tracks up to bank
3	Leannan	Ballyclone Bridge	216510	421960	10	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216510	421960	11	High	Medium	Medium	High	High	Low	Low	Medium	High	Nettles covered in silt after floodwater receded
3	Leannan	Ballyclone Bridge	216517	421968	12	High	Medium	Medium	High	High	Low	Low	Medium	High	Culvert (500mm concrete pipe), discharged water now stagnant after water level
3	Leannan	Ballyclone Bridge	216517	421968	13	High	Medium	Medium	High	High	Low	Low	Medium	High	Just upstream of culvert - ditch with hardcore material placed on bed

3	Leannan	Ballyclone Bridge	216517	421968	14	High	Medium	Medium	High	High	Low	Low	Medium	High	
3	Leannan	Ballyclone Bridge	216510	421960	15	High	Medium	Medium	High	High	Low	Low	Medium	High	Dumping near river
3	Leannan	Ballyclone Bridge	216668	421707	16	High	Medium	Medium	High	High	Low	Low	Medium	High	Old landfill site on R249
3	Leannan	Ballyclone Bridge	216668	421707	17	High	Medium	Medium	High	High	Low	Low	Medium	High	Opposite side of road from landfill, some dumping here
3	Leannan	Ballyclone Bridge	217793	421979	18	High	Medium	Medium	High	High	Low	Low	Medium	High	Fishing boat access
3	Leannan	Ballyclone Bridge	217866	421604	19	High	Medium	Medium	High	High	Low	Low	Medium	High	Overview of river just upstream of Lough Fern
4	Leannan	Drumman Bridge	219015	421885	1	High	Low	Medium	High	High	Low	Low	High	High	Land very marshy, horse poaching, culverts present.
5	Leannan	Tully Bridge	219671	421051	0	High	Medium	Medium	Medium	Low	Low	Low	Medium	High	Japanese Knotweed, newly built home with associated reinformcement for house & garden
6	Leannan	Skerry	214812	422803	0	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Cattle poaching, grazing & Forestry
7	Leannan	Goldrum Bridge	212814	422555	0	Medium	Medium	Low	High	Low	Low	Low	Medium	High	Concrete rubble beisde drainage ditch which feeds into channel
8	Leannan	Casheleenan	212436	424767	0	Medium	Medium	Medium	High	Low	Low	Low	Medium	High	Twin culverts, land drainage, straw placed as silt trap
9	Leannan	An Chamabhainn	211149	424619	0	Low	Low	High	Medium	High	Low	Low	Medium	High	Quarry
10	Leannan	Fawns Bridge	211321	422958	0	High	Medium	High	High	Low	Low	Low	Medium	High	Channelised, river deepened, siltation &

															scouring
11	Leannan	Termon	211919	422156	0	High	Medium	Medium	High	Low	Low	Medium	High	High	Bank reinforced, deposition, new sports ground on river bank
12	Leannan	Lurgy River DS l. Mnafin	210978	420434	0	High	Medium	High	Medium	Low	Low	Low	High	High	Cattle poaching, erosion, boulders placed
13	Leannan	Kilmacrennan WWTP	214182	420486	0	High	High	Medium	Low	High	Low	Low	Medium	High	WWTP outfall, bank reinforced and rubble behind.
14	Leannan	Bulluba River	198187	415170	0	Low	Low	Low	Low	Low	Low	Low	Low	Low	Some sporadic dumping of rubbish, historical peat cutting
15	Leannan	Owenbeg River	202301	413368	0	Low	Low	Low	Low	Low	Low	Low	Low	Low	Small abstraction , low risk
16	Leannan	Sruhancam (DS of Quarry)	206870	413736	0	High	Medium	High	High	Low	Low	Low	High	High	Quarry, land drains newly cut into river
17	Leannan	Drumbologe Bridge	208171	413209	0	Medium	Medium	Low	Medium	Medium	Low	Low	Low	Medium	Moss covered substrate.
18	Leannan	Gartan Bridge	206818	416987	0	Medium	Low	Low	Low	Low	Low	Medium	Low	Medium	Pub water supply, weir present,
19	Leannan	Leannan (Cottian)	213338	419130	0	Medium	Medium	Medium	Medium	Low	Low	Medium	Medium	Medium	Bare bank, poached, stone weir, dumping/campfire on bank
20	Leannan	Stopping Point	212341	417153	0										Culvert, cleared land, stagnant algae water.
21	Leannan	Dromore Bridge	212447	417647	0	High	Medium	High	High	Low	Low	Medium	High	High	Bank erosion, animal trampling, drainage ditch
22	Leannan	Bellaned Bridge	211376	416409	0	High	Medium	High	High	Low	Low	Low	High	High	Floodplain infilling, animal trampling, bank erosion, excessive trampling.

23	Leannan	Barrack Bridge (Drumcavan	209517	415969	0	Low	Medium	Low	Low	Low	Low	Low	Low	Medium	stream entering from fish farm
24	Leannan	Gortalaban	213935	415464	0	Low	Medium	Low	Low	Low	Low	Low	Low	Medium	Culvert entering river with steady discharge
25	Leannan	Ellistrin	217258	416385	0	Low	Medium	Low	Low	Low	Low	Low	Low	Medium	
26	Leannan	Barrack Bridge (Barrack)	218377	418942	0	High	High	Medium	Medium	Low	Low	Low	Medium	High	Housing beside river, site raised.

Appendix 3 – Catchment Walkover Risk Assessment Survey Sheet

Sheet 1: Catchment Walkovers	Version 1. 07/04/2009
Tributary/Main Channel*	
Site Identification	
River Name	Site Code
Water Body ID	Start U/S or D/S*
First site IGR	Last site IGR
Bank surveyed from L/R/In-channel*	
Photograph details include IGR or approximate location.	

* Select as appropriate

	Present?					
	Yes	No		Grid Reference of specific pressure	No.of Photographs	Comments
Source of Erosion						
Bank erosion						
Land clearance						
In river clearance						
Arable ploughing						
Animal trampling						
Fords						
Channel manipulation						
Hard bank protection measures						
Other sources						
Overall Risk	High	Medium	Low			
Diffuse Nutrient						
Arable						
Grazing						
Improved grassland						
Silage						
Forestry						
Housing						
Industry and associated works						
Other sources						
Overall Risk	High	Medium	Low			
Diffuse Silt						
Arable						
Grazing						
Over-grazing						
Improved grassland (Re-seeding)						
Forest						
Silage						
Industry						
Construction stages						
Housing						
Infilling						
Peat cutting						
Quarries						
Other sources						
Overall Risk	High	Medium	Low			

	Present?					
	Yes	No		Grid Reference of specific pressure	No.of Photographs	Comments
Current Riparian Zone						
Fencing						
Buffer						
Tree line at bank						
Tree line buffer						
Plantation with no buffer						
Urbanisation						
Flood protection						
Marshy land						
Landuse at bank						
Other sources						
Overall Risk	High	Medium	Low			
Field Drainage						
Ditch managed						
Ditch unmanaged						
Drainage on high slope						
Drainage on low slope						
Land drainage (perforated pipes)						
Other sources						
Overall Risk	High	Medium	Low			
Outfalls						
Industrial discharges						
Storm drains						
Culvert outfalls						
Other sources						
Overall Risk	High	Medium	Low			
Abstractions						
Small						
Large						
Overall Risk	High	Medium	Low			
Barriers to migration						
Culverts						
Bridge aprons						
Weirs						
Stone weirs						
Other sources						
Overall Risk	High	Medium	Low			