NS 2 FRESHWATER PEARL MUSSEL SUB-BASIN MANAGEMENT PLANS

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

September 2009

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INTRODUCTION

In order to assess the hydromorphological alterations within the Clady 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 1**

2.0 METHODOLOGY

Sampling was carried out on the 27th 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 Clady 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 Cladyed 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”.

3.0 RESULTS

Figure 1 indicates where the Clady morphology and catchment walkover risk assessments were carried out throughout the catchment.

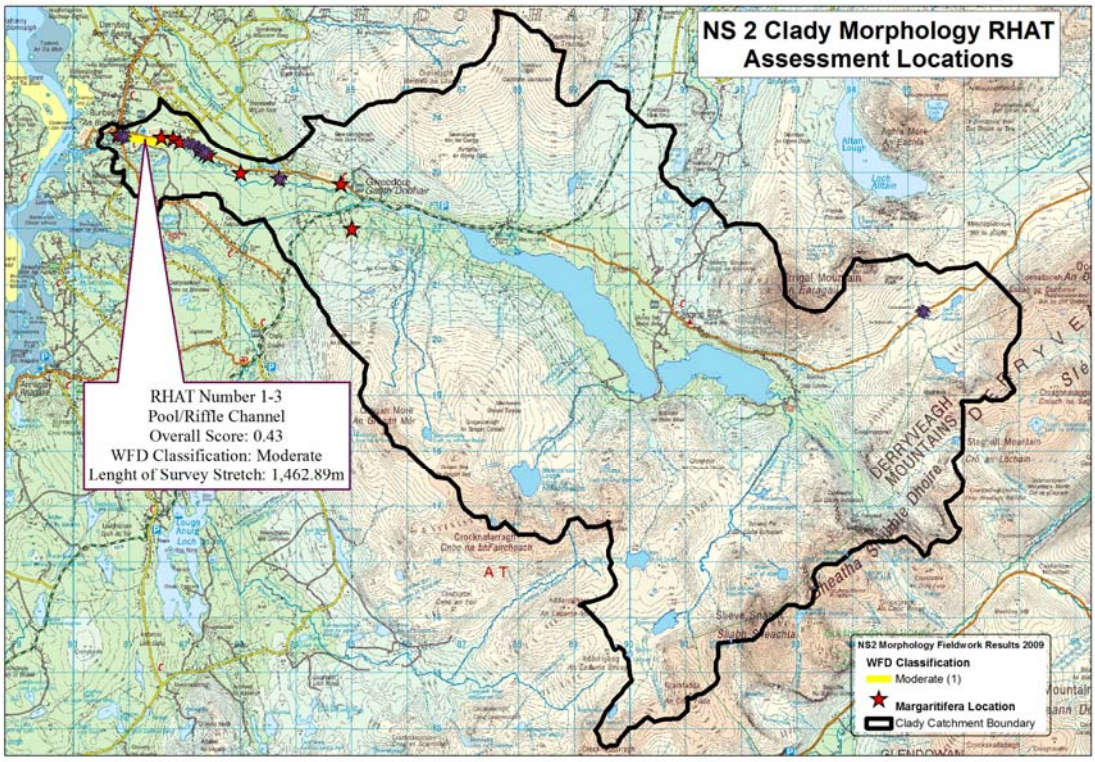


Figure 1 Morphology RHAT Assessment Locations

(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

One extended RHAT survey was carried out within the Clady catchment. This was over a 1,463 metre stretch within the vicinity of the pearl mussel population and habitat. This stretch was deemed to be at moderate status scoring 0.43. This was largely a pool/riffle/glide river type. All attributes scored between 1 and 2 out of a possible 4 except for the bank structure and stability which scored slightly above this at 2.5. Both the bank and channel vegetation scored only 1 out of 4 largely due to the presence of greater than expected amounts of filamentous green algae along the survey stretch for a river of this type together with the poor bank side vegetation. Overall this stretch was found to have a number of morphological pressures acting on it. Resectioning and reinforcement were recorded along the left bank together with embankments on both the left and right banks. Three bridges were found along this stretch ranging from major to

minor. Many alien and invasive species include Rhododendron, Himalayan Balsam, Japanese Knotweed and Gunnera were all noted along the survey stretch also giving us an indication of disturbance in the past.

Plate 3.1 Representative photographs from reach:

<table>
<tr>
<td>RHAT 1 -3 Photo 5 Poor Substrate condition
  </td>
<td>RHAT 1 – 3 Photo 10
  </td>
</tr>
<tr>
<td>RHAT 1-3 Photo 12 along end section of survey stretch new bridge within SAC boundary
  </td>
<td>RHAT 1-3 Photo 14 along end section of survey stretch, excessive potamogetan growth
  </td>
</tr>
</table>

Details in relation to photographs are tabulated in Appendix 2.

3.1 Catchment Walkover Risk Assessment Results

A total of eleven sites were surveyed in the Clady sub-basin catchment, with a risk assessment carried out at four of these sites (7 stopping points). **Figure 3.2** outlines the stopping point locations in addition to the High to Low Risk Assessment from the Catchment Walkover Risk Assessments. All four assessed sites were recorded as high risk; meaning no medium or low risk sites were recorded within this catchment. **Figure 3.3** outlines the percentage of sites classified at high risk together with the number of stopping points throughout the catchment.

The most common high risk categories identified from the four sites which were risk assessed were as follows:

- Erosion – evident at 100% of high risk sites,
- Diffuse Silt – evident at 75% of high risk sites

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. Locations where pressures were evident in the field which were not highlighted through the desk based assessment were also noted as stopping points. These points were not selected prior to fieldwork, they were opportunistic as the catchment drive through was taking place. The pie chart in **Figure 3.3** indicates the percentage of stopping points also.

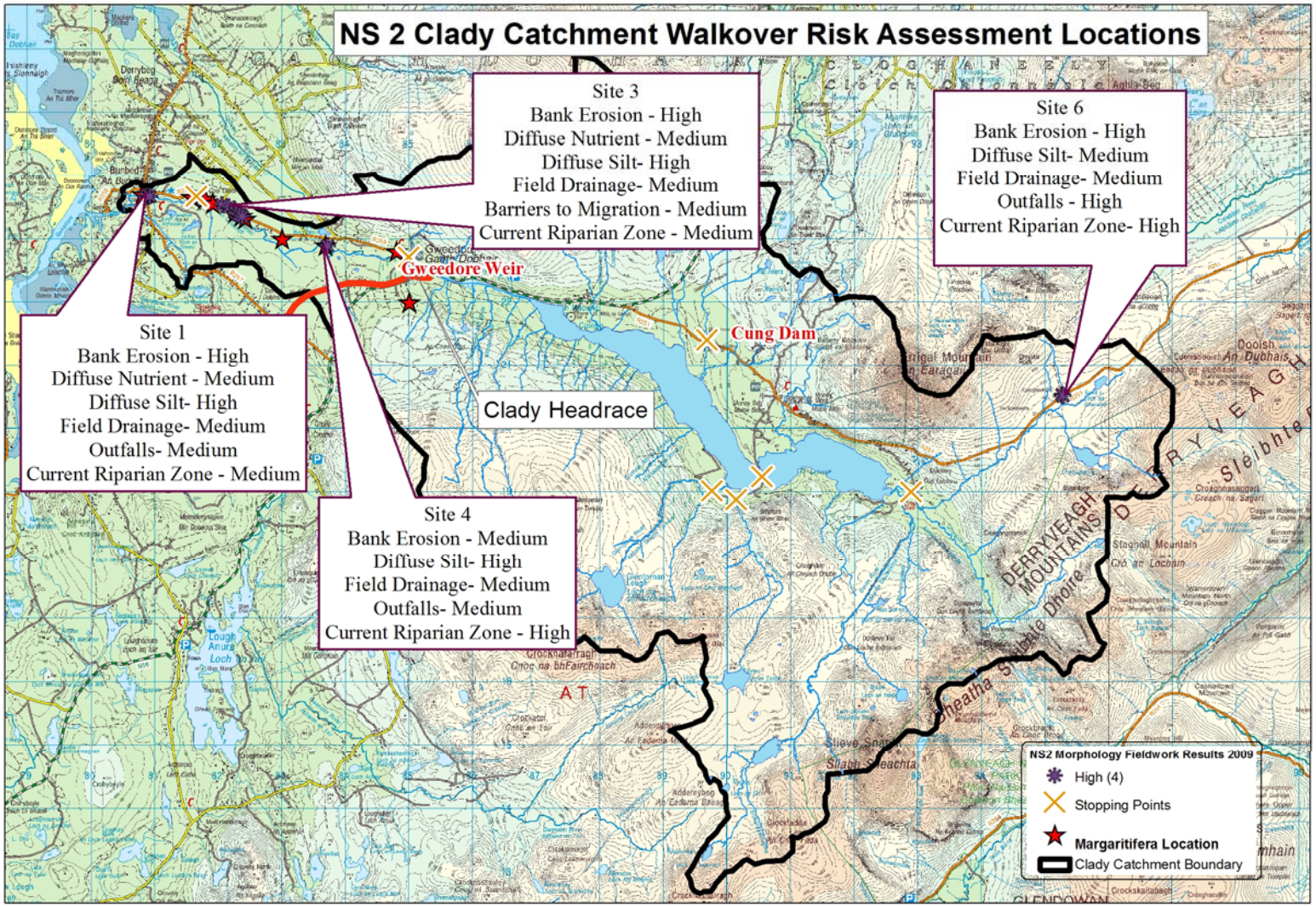
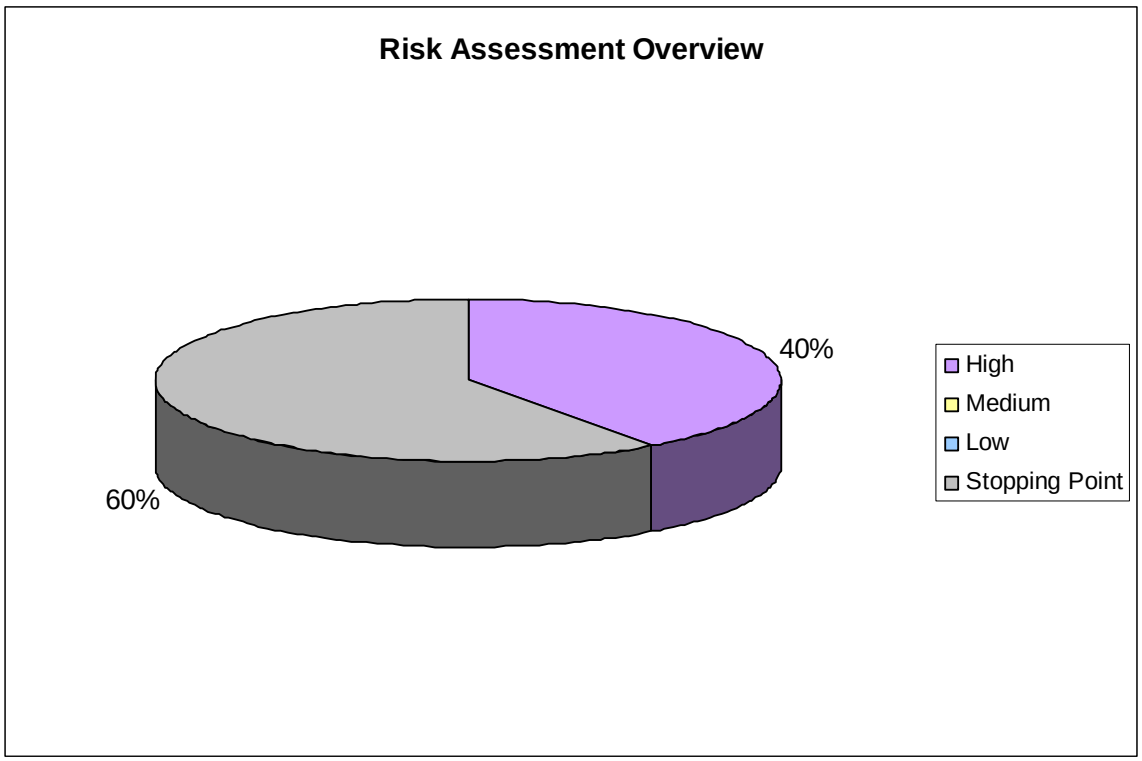


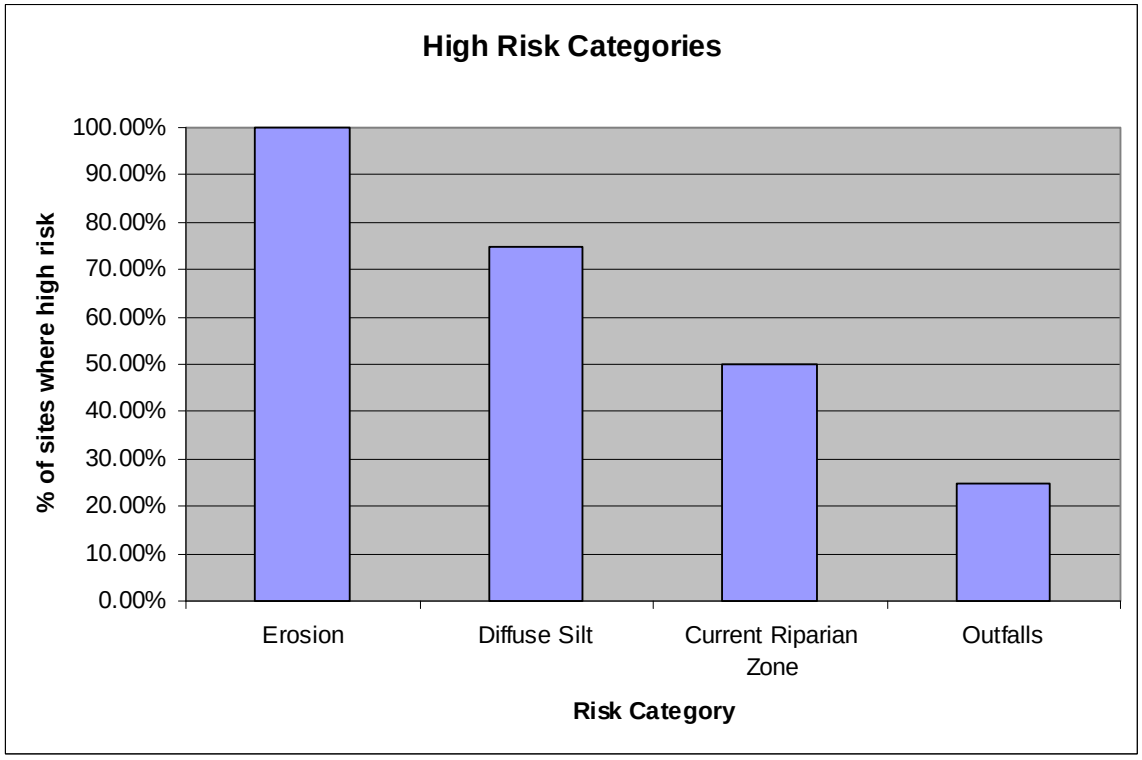
Figure 3.2 Location of Stopping points and Catchment Walkover Risk Assessments

Figure 3.3 Risk Assessment Overview



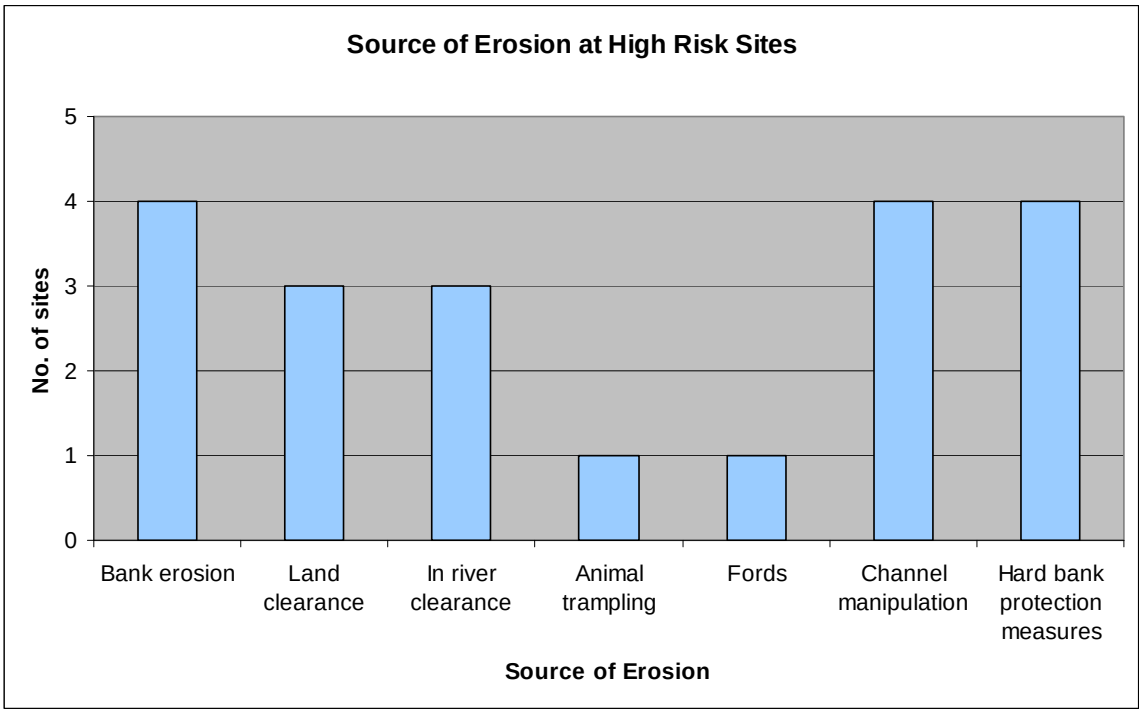
The break-down of pressure categories identified as high risk are outlined in **Figure 3.4**

Figure 3.4 Breakdown of High Risk Categories



The most common sources of erosion were bank erosion, channel manipulation and bank protection measures each of which were evident at all four high risk sites. A break-down of the individual sources of erosion at high risk sites is given in **Figure 3.5**

Figure 3.5 Source of Erosion at high risk sites



The most common sources of diffuse silt at high risk sites are construction, housing and infilling; other sources of diffuse silt identified at high risk sites are illustrated in **Figure 3.9** below.

Figure 3.6 Sources of Diffuse Silt at High Risk Sites

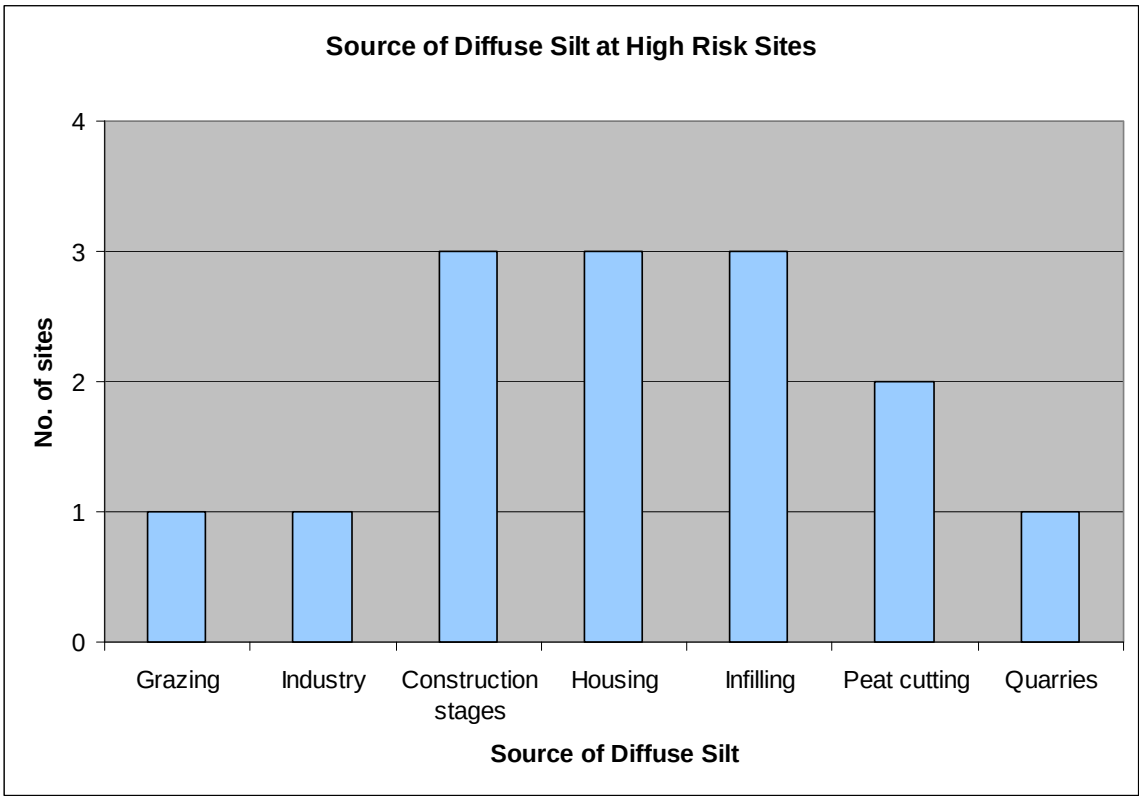


Plate 3.2 & 3.3 are sites which were surveyed as part of the catchment walkover risk assessments. These images provide an indication of the overgrazing on peat soils and animal access to the river channel in the vicinity of the pearl mussel populations.

3.2 Road and Bridge Construction Adjacent to River

The construction of an access road, associated embankment and bridge crossing, within the vicinity of pearl mussels is evident as shown by **Plate 3.4.** This site was investigated further through the catchment walkover risk assessment where the bridge and road embankment was found to be constructed from loose hardcore material. The risk of material reaching the river is significant at this location.

Plate 3.4 Detailed aerial imagery showing extensive construction both in and adjacent to the river within the Fawnboy Bog/Lough Nacung SAC

The construction of a new bridge to provide access to a newly built house across the river from the road is shown on **Plate 3.5**

Plate 3.5 New bridge construction within the Clady catchment

Damage to mussel habitat is already evident from erosion and ponding below the bridge due to scour at the pier which does not clear span the river bank habitat. Excessive macrophyte growth together with dead mussels was found at this point along the survey stretch. This bridge and access road was constructed within the Fawnboy Bog/Lough Nacung SAC without prior consent from NPWS. Planning permission was granted for the construction of the dwelling house, septic tank together with the construction of the bridge as part of the new road at Dore by Donegal CoCo.

Regulation of Future Engineering Activities

The River Basin Management Plans outline all of the required (or basic) measures currently in place in Ireland (Table 6.1 of the Clady Sub-Basin Management Plan). These measures are required by law and apply to all waters. Many required measures are under existing EU Directives, but the WFD stipulates extra required measures which must also be implemented. *'Control on physical modifications to surface waters'* is one of these extra required measures. The RBMP Programmes of Measures for Morphology recognised the need for a prior authorisation or registration based system to manage

future engineering activities near rivers and lakes (Shannon IRBD 2008, Freshwater Morphology POMS Study, Final Report).

National technical studies on the impact of physical modifications on fresh and marine waters (www.wfdireland.ie/docs) identified apparent gaps in existing authorisation systems. A Ministerial decision on the need for new regulations creating a registration and authorisation system is required.

These controls will account for the assessment requirements of the Habitats Directive within the decision making process. If permission is granted, stringent binding rules or conditions will be attached to the license, in accordance with the Freshwater Morphology Code of Practice and Protected Areas requirements. The potential for impeding fish migration will also be a key factor in impact assessment.

A Freshwater Morphology Web Based tool has been developed which is driven by a Morphology Database. This tool supports decision making in authorisation systems by assessing pressure extent and risk to water body status. Damage to mussel populations, in combination with other impacts both during construction and operation will be considered in the assessment. Currently this web based tool is held and operated by the EPA. If an authorisation process is rolled out Local Authorities should be given access to this tool. Therefore structures within rivers may be subject to controls in future.

3.3 Point Source Pressures

Point Discharges

Point sources discharging nutrients, such as wastewater treatment plants, can contribute very significant nutrient and organic loads to rivers.Quarry dust and effluent can cause problems with silt pollution and, in some cases, lime pollution. Landfills and landfill leachate can be sources of surface and groundwater contamination that can find pathways to the river. Storm water drainage can be a source of silt and pollutants.

Waste Water Treatment Plants

A review was undertaken of the available information on municipal and industrial discharges by the South Western River Basin District Project (SWRBD) and an assessment carried out as to whether any river waterbodies were considered to be at risk from point sources under a number of circumstances. Within the Clady catchment we then assessed all monitoring information together with pearl mussel status above and below any WWTP and prioritised those which we deemed to have a significant adverse effect on the pearl mussel population or its habitat. Following this prioritisation process no WWTPs within the Clady catchment were deemed to have a significant adverse affect on the pearl mussel or its habitat.

While no WWTP within the Clady catchment was found to have issues in relation to its assimilative capacity or future loading, the agglomeration of Gweedore was found to have issues in relation to the number of one off houses which are not connected to a sewerage network. Donegal County Council is investigating the connection of all septic tank systems to a new sewerage network which will assist in improving the water quality along the main Clady River. They should also install appropriate treatment for the town.

Quarries

The Clady catchment contains nine quarries of which four are adjacent to a river stretch which has been classified as a *"current stretch"* i.e. where pearl mussel most likely occurs according to best professional judgement. The remaining quarries lie upstream within the catchment with one small quarry also located between Lough Nacung and Dunlewy Lough as per **Figure 3.7& 3.8.**

The potential risk from quarry dust, effluent or pollution incidents was investigated further at those quarries which could potentially impact the freshwater pearl mussel and its habitat largely within Meenderrygamph and Clois Claidí junction. A joint survey of the quarries which are in close proximity to the pearl mussel populations located within the Clady was carried out by Donegal CoCo, NPWS and the Northern Regional Fisheries Board. Of those quarries within the Meenderrygamph area a site visit was carried out at Gillespie's quarry. Planning for this quarry has expired as of the start of 2009. An application to renew the discharge licence was submitted to Donegal CoCo but has since been withdrawn. The owners of this quarry have been informed that a Habitats Directive Article (6) Appropriate Assessment would be required as part of any planning permission application or discharge licence renewal. This Appropriate Assessment would need to include a hydro-geological investigation in order to ensure no possible discharge to the Clady as rock seams might be factor in the movement of quarry water within this area.

The cluster of quarries near Clois Claidí junction was also investigated. While none of these quarries are currently active any proposal to re-commence operations here must be subject to a discharge licence, and/or planning control through Donegal CoCo. All applications should also include a Habitats Directive Article (6) Appropriate Assessment.

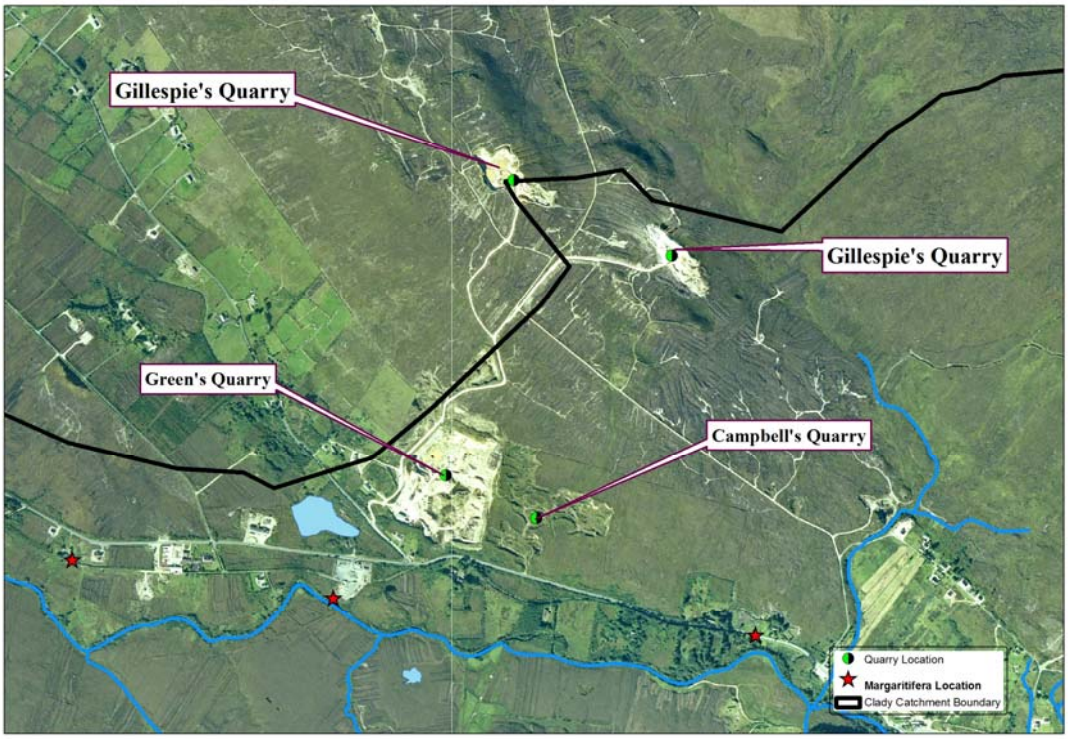


Figure 3.7 Location of Quarries adjacent to Freshwater Pearl Mussel locations

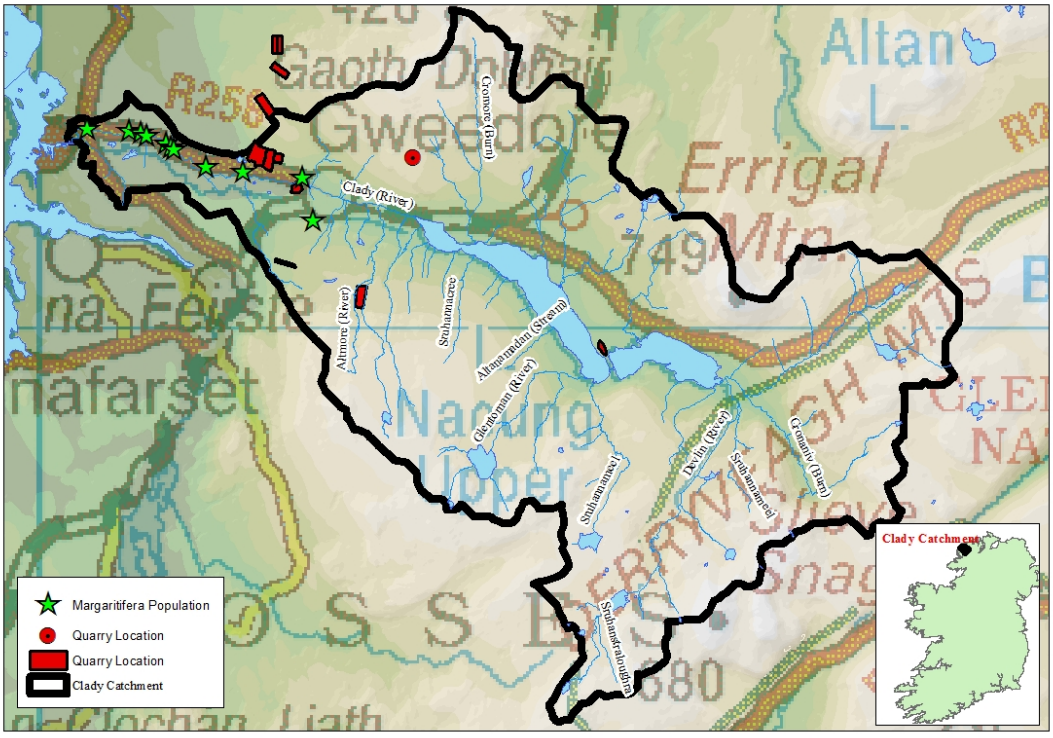


Figure 3.8 Location of Quarries within and adjacent to the Clady Catchment

The pressures outlined above all have the ability to negatively affect the status of the freshwater pearl mussel. In some cases, a single pressure alone may be enough to cause a kill or ongoing chronic effects, but in most cases it is the combination of the negative effects of a number of pressures that are acting together to leave the freshwater pearl mussel habitat in unfavourable condition. It is unlikely that the effect of every diffuse source of pollution can be totally removed. Therefore, it is not possible to choose a subset of pressures to act on; steps must be taken to reduce every pressure, until the cumulative effect of all the reductions is a sustainable habitat for the freshwater pearl mussel and all the other species that it protects thanks to its umbrella and keystone status in its habitat. This is the essence of the precautionary principle under which the Habitats Directive must be implemented.

4.0 CONCLUSIONS

The Clady sub-basin catchment is in a relatively poor condition from a morphological point of view with high risk erosion and diffuse silt apparent throughout the catchment including locations in the upper reaches. This illustrates the extent of risk to the Freshwater Pearl Mussel populations within this catchment. Three risk assessments were undertaken in locations where Freshwater Pearl Mussel populations are known to exist, with all three classified as being at high risk.

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 Clady 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	Clady	Main Channel: Clady Bridge	180876	423666	1	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Looking downstream from bridge
1	Clady	Main Channel: Clady Bridge	180876	423666	2	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Looking upstream from bridge
1	Clady	Main Channel: Clady Bridge	180869	423646	3	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Works investigate
1	Clady	Main Channel: Clady Bridge	180869	423646	4	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Live pearl mussels centre of channel
1	Clady	Main Channel: Clady Bridge	180909	423663	5	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Poor channel substrate
1	Clady	Main Channel: Clady Bridge	180909	423663	6	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Location of live mussels
1	Clady	Main Channel: Clady Bridge	180918	423669	7	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Dumping on left bank from bank top
1	Clady	Main Channel: Clady Bridge	180924	423666	8	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Live mussels on left bank covered in sewage fungus.
1	Clady	Main Channel: Clady Bridge	180924	423666	9	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Numberous bad ones
1	Clady	Main Channel: Clady Bridge	180924	423666	10	High	Medium	High	Medium	Medium	Low	Low	Medium	High	Structure of bridge from underneath
Stopping point 7 / Site 2	Clady	Main Channel: West of Cois Claidi	181664	423665	1										Looking downstream from starting point

Stopping point 7 / Site 2	Clady	Main Channel: West of Cois Claidi	181664	423665	2										Looking upstream from starting point
Stopping point 7 / Site 2	Clady	Main Channel: West of Cois Claidi	181664	423665	3										A lot of rooted macrophyte in centre of channel
Stopping point 7 / Site 2	Clady	Main Channel: West of Cois Claidi	181664	423665	4										Side channel, drain on right bank
Stopping point 7 / Site 2	Clady	Main Channel: West of Cois Claidi	181664	423665	5										Bridge structure
3	Clady	Main Channel: South of Cois Claidi	182062	423538	1	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Looking upstream from starting point
3	Clady	Main Channel: South of Cois Claidi	182062	423538	2	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Bridge structure
3	Clady	Main Channel: South of Cois Claidi	182062	423538	3	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Looking downstream from starting point
3	Clady	Main Channel: South of Cois Claidi	182062	423538	4	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Channel morphology
3	Clady	Main Channel: South of Cois Claidi	182167	423503	5	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Sheep grazing, No fencing from right bank looking upstream
3	Clady	Main Channel: South of Cois Claidi	182257	423431	6	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Mid-channel island
3	Clady	Main Channel: South of Cois Claidi	182266	423415	7	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Temporary bridge structure, barrier to migration causing scouring and ponding
3	Clady	Main Channel: South of Cois Claidi	182266	423415	8	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Temporary bridge structure, barrier to migration causing

															scouring and ponding
3	Clady	Main Channel: South of Cois Claidi	182279	423420	9	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Filamentous green algae & sewage fungus all over substrate
3	Clady	Main Channel: South of Cois Claidi	182309	423385	10	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Unmanaged land drain
3	Clady	Main Channel: South of Cois Claidi	182333	423374	11	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Potomageton in channel just downstream of bridge
3	Clady	Main Channel: South of Cois Claidi	182333	423374	12	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Bridge structure
3	Clady	Main Channel: South of Cois Claidi	182333	423374	13	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Filamentous green algae on myriophyllum
3	Clady	Main Channel: South of Cois Claidi	182333	423374	14	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Potomageton at bridge
3	Clady	Main Channel: South of Cois Claidi	182333	423374	15	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Dead mussels on right bank at bridge x2
3	Clady	Main Channel: South of Cois Claidi	182333	423374	16	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Dead mussels on right bank at bridge x3
3	Clady	Main Channel: South of Cois Claidi	182379	423358	17	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Looking upstream from bridge
3	Clady	Main Channel: South of Cois Claidi	182379	423358	18	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Looking downstream from bridge
3	Clady	Main Channel: South of Cois Claidi	182379	423358	19	High	Medium	High	Medium	Low	Low	Medium	Medium	High	Endpoint
4	Clady	Main Channel: North of Dore	183719	422885	1	Medium	Low	High	Medium	Medium	Low	Low	High	High	Peat cutting on left bank

4	Clady	Main Channel: North of Dore	183719	422885	2	Medium	Low	High	Medium	Medium	Low	Low	High	High	Peat cutting on left bank
4	Clady	Main Channel: North of Dore	183719	422885	3	Medium	Low	High	Medium	Medium	Low	Low	High	High	Managed drain adjacent to depot of Donegal County Council
4	Clady	Main Channel: North of Dore	183719	422885	4	Medium	Low	High	Medium	Medium	Low	Low	High	High	Main Channel at end of depot
4	Clady	Main Channel: North of Dore	183719	422885	5	Medium	Low	High	Medium	Medium	Low	Low	High	High	Upstream peat cutting & forestry
Stopping point 1	Clady	Main Channel: Near Gweedore	184991	422694	1										Looking downstream
Stopping point 1	Clady	Main Channel: Near Gweedore	184991	422694	2										Forestry upstream
Stopping point 1	Clady	Main Channel: Near Gweedore	184991	422694	3										Inflowing tributary from meenderrygamph
Stopping point 1	Clady	Main Channel: Near Gweedore	184991	422694	4										Forestry set back at main channel
Stopping point 8 / Site 5	Clady	Main Channel:At Confluence in Gweedore	184996	422705	1										Looking downstream from bridge
Stopping point 8 / Site 5	Clady	Main Channel:At Confluence in Gweedore	184996	422705	2										Poaching on right bank downstream from bridge
Stopping point 8 / Site 5	Clady	Main Channel:At Confluence in Gweedore	184996	422705	3										Upstream shading of channel
Stopping point 8 / Site 5	Clady	Main Channel:At Confluence	184996	422705	4										Upstream shading of channel

		in Gweedore													
6	Clady	Inflowing Tributary to Dunlewy Lough	195269	420523	1	High	Low	Medium	Medium	High	Low	Low	High	High	Culvert entering stream from left
6	Clady	Inflowing Tributary to Dunlewy Lough	195269	420523	2	High	Low	Medium	Medium	High	Low	Low	High	High	Confluence of culvert with managed ditch
6	Clady	Inflowing Tributary to Dunlewy Lough	195269	420523	3	High	Low	Medium	Medium	High	Low	Low	High	High	Culvert under road
6	Clady	Inflowing Tributary to Dunlewy Lough	195288	420509	4	High	Low	Medium	Medium	High	Low	Low	High	High	Other side of road
6	Clady	Inflowing Tributary to Dunlewy Lough	195288	420509	5	High	Low	Medium	Medium	High	Low	Low	High	High	Peat on left bank, eroded
6	Clady	Inflowing Tributary to Dunlewy Lough	195288	420509	6	High	Low	Medium	Medium	High	Low	Low	High	High	Natural drainage on left of road which feeds into culvert
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	1										Looking downstream from road bridge
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	2										Looking upstream from road bridge
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	3										Beech tree line on left bank upstream of bridge
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	4										Land drain on right bank entering at bridge
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	5										Silty substrate
Stopping point 2	Clady	Devlin River: East of Dunlewy	192898	418993	6										Bridge structure

		Lough													
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	7										Ponding leading into drain
Stopping point 2	Clady	Devlin River: East of Dunlewy Lough	192898	418993	8										Point where rivers enter lake
Stopping point 3	Clady	Between Dunlewy Lough & L. Nacung Upper	190551	419235	1										Upper lake
Stopping point 3	Clady	Between Dunlewy Lough & L. Nacung Upper	190551	419235	2										Lower Lake
Stopping point 3	Clady	Between Dunlewy Lough & L. Nacung Upper	190551	419235	3										Grazing, According to Fiona Kelly stopping point 3 first structure has no regulating functionality
Stopping point 4	Clady	Inflowing Tributary to L. Nacung Upper	190143	418872	1										Looking upstream from road bridge
Stopping point 5	Clady	Glentornan River flowing into L. Nacung Upper	189766	419014	1										House built near the lake
Stopping point 5	Clady	Glentornan River flowing into L. Nacung Upper	189766	419014	2										Inflowing tributary behind the house
Stopping point 6	Clady	Inflowing Tributary to L. Nacung Upper at Bunaninver Bridge	189687	421399	1										Looking downstream
Stopping point 6	Clady	Inflowing Tributary to L. Nacung	189687	421399	2										Looking upstream

		Upper at Bunaninver Bridge													
Stopping point 6	Clady	Inflowing Tributary to L. Nacung Upper at Bunaninver Bridge	189687	421399	3										Peat -active on right bank
Stopping point 6	Clady	Inflowing Tributary to L. Nacung Upper at Bunaninver Bridge	189687	421399	4										Peat -spread upstream on left bank

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			