NS 2 FRESHWATER PEARL MUSSEL SUB-BASIN MANAGEMENT PLANS

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

September 2009

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INTRODUCTION

In order to assess the hydromorphological alterations within the Gearhameen 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 21st 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 Gearhameen 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”.

3.0 RESULTS

Figure 1 indicates where the Gearhameen RHAT assessments were carried out throughout the catchment.

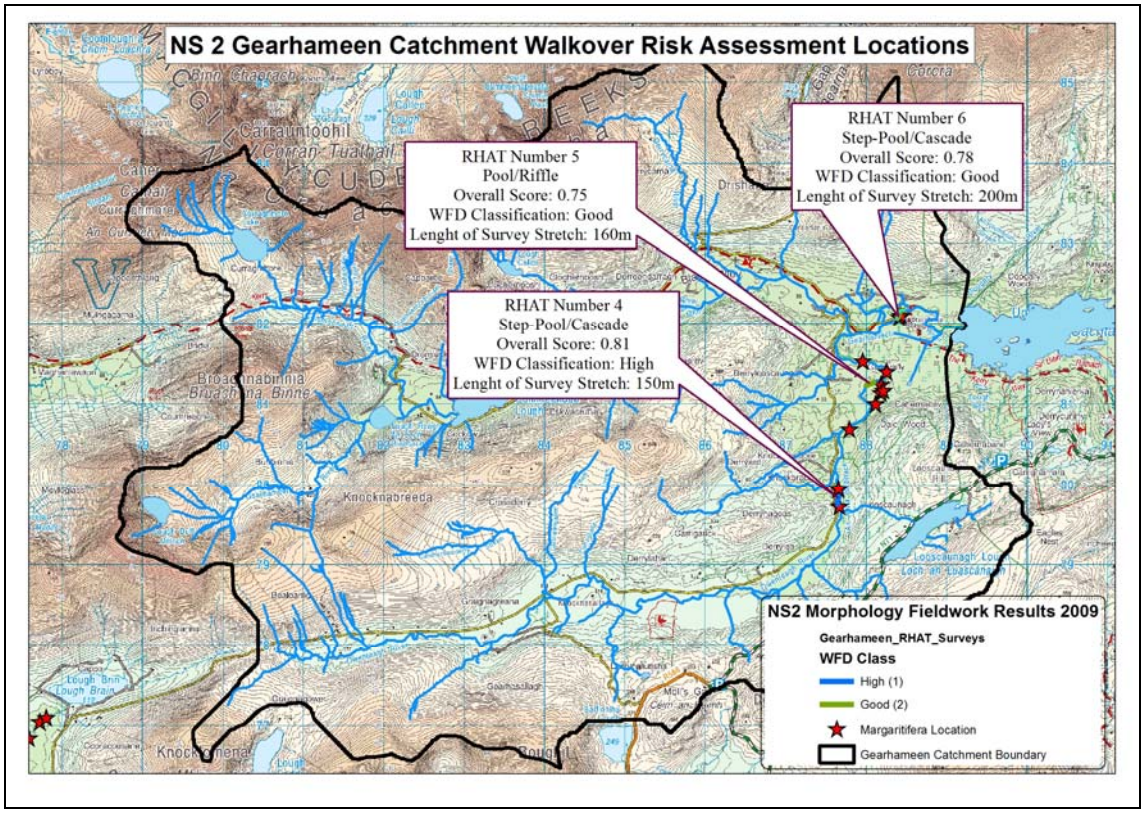


Figure 1 Morphology RHAT Assessment Locations

(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

Three RHAT surveys were carried out throughout the Gearhameen catchment. The results of these surveys can be found in the electronic appendix. Two were deemed to be at good status, one in the lower reaches of the catchment (RHAT number 6) on the Gearhameen before it flows into Upper Lough below the confluence with the Owenreagh. The second good status reach was located at the lower end of the Owenreagh (RHAT Number 5). Despite the classification of good status (from a morphological point of view) at RHAT number 5 a continuous cover of silt and algae was found along this stretch with dead mussels evident along the banks. Both the bank structure and stability together with the bank vegetation scored quite low along this reach as high levels of bank erosion and slumping was recorded.

RHAT number 6 was carried out in the vicinity of Lord Brandon's cottage. A five arched stone bridge spans the channel at this point with 6 in channel abutments and slightly alters the flow of the channel. Scouring and loss of habitat was recorded on the left bank at the bridge. Excessive filamentous algae and siltation was recorded along the length of the survey stretch with the substrate condition attribute scoring quite low as a result. Some amenity grassland management is carried out along both banks but also sheep are allowed to freely graze along the survey stretch with no fencing of the channel. The channel can freely connect with the floodplain which is evident from the trash line which was recorded approximately 2.5m from the left bank.

The third RHAT survey (RHAT Number 4) was carried out further up along the main channel of the Owenreagh River in the vicinity of the pearl mussel location and was classified as being at high status. At the beginning of the survey stretch rooted macrophytes which you would not expect to find in this type of step-pool/cascade type channel were recorded such as *Potamageton* sp. and *Nuphar lutea* these were found to be covered in filamentous algae. (Site 4, Photos 7 & 8). The substrate condition was found to again contain high levels of siltation. In regards the riparian cover, stands of coniferous forest were recorded along the lower end of the survey stretch with very little buffer zone. (Site 4, Photo 12).

Representative photographs from reach:

RHAT 4 – Site 4 Photo 7	**RHAT 4 – Site 4 Photo 12**
	

RHAT 5 – Site 5 Photo 3 	**RHAT 5 – Site 5 Photo 8** 
RHAT 6 – Site 6 Photo 6 	**RHAT 6 – Site 6 Photo 15** 

Details in relation to photographs are tabulated in Appendix 2.

3.1 Catchment Walkover Risk Assessment Results

A total of twelve sites were surveyed in the Owenreagh sub-basin catchment, with a risk assessment carried out at ten of these sites (two stopping points). Figure 2 outlines the stopping point locations in addition to the High to Low Risk Assessment from the Catchment Walkover Risk Assessments. Seven high risk sites were recorded out of the ten that were assessed. The remaining three sites were recorded as medium risk, meaning no low risk sites were recorded within this catchment. Figure 3 outlines the percentage of sites classified at high and medium risk together with the number of stopping points throughout the catchment. The most common high risk categories identified were:

- Erosion – evident at 46% of high risk sites.
- Current Riparian Zone – evident at 46% 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. Within the Gearhameen the current riparian zone is another considerable pressure within the catchment. Within the Gearhameen catchment the main cause of a high risk from the riparian zone is:

- Inadequate fencing on one or more banks in areas of grazing – this has led to increased animal trampling and as such overall erosion. In addition impacts from diffuse nutrient and diffuse silt are considerably increased since animals have such close contact with the channel.
- A lack of buffer or tree-line along areas of improved grassland and forestry- this has resulted in an increase in the impact of diffuse nutrient and diffuse silt as there is no buffer to reduce the impacts of these pressures.

As can be seen from Figure 4 just over 40% of sites which were deemed to be at high risk were due to the pressures identified in thee current riparian zone.

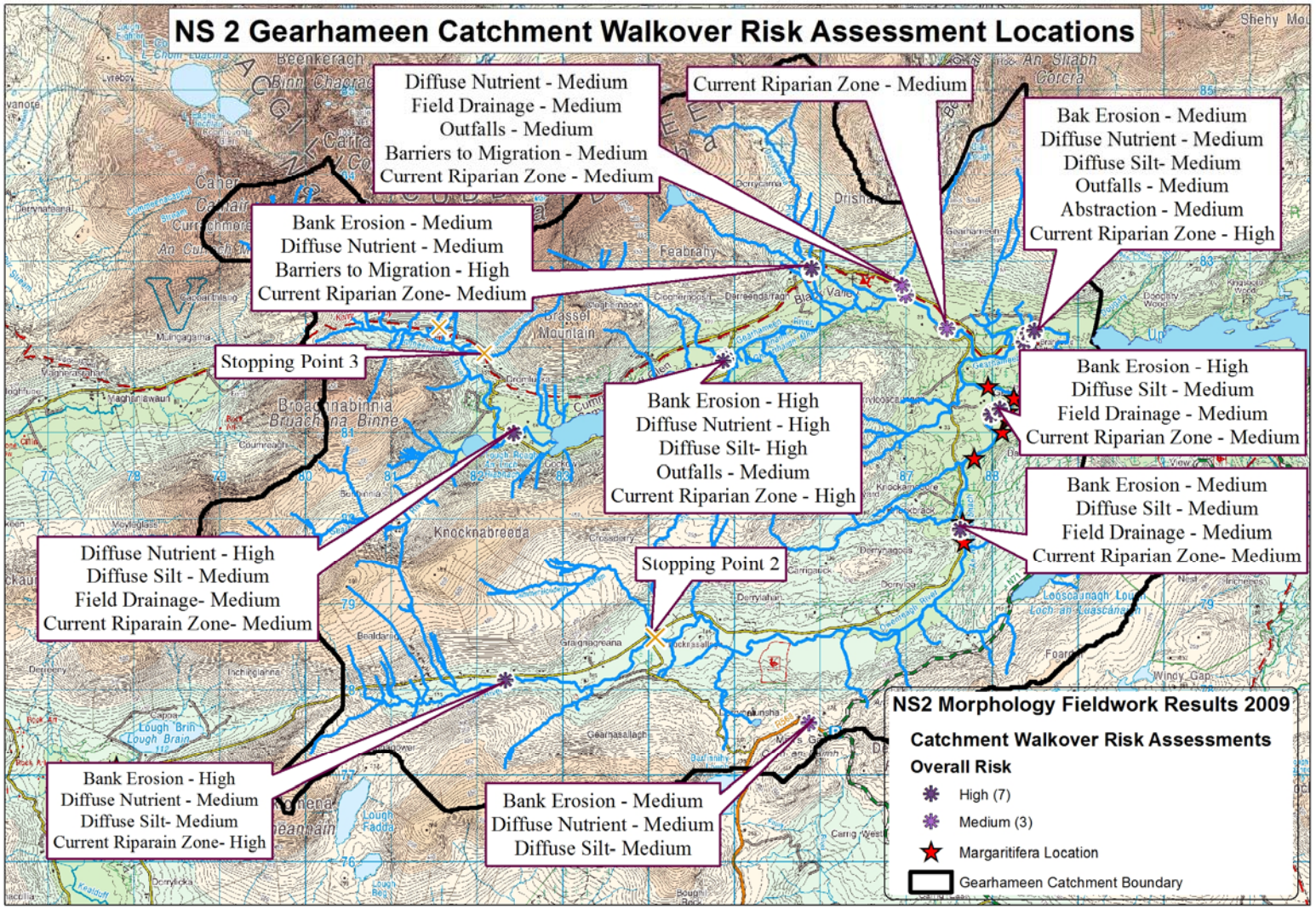


Figure 2 Locations of Catchment Walkover Risk Assessments and Stopping Point

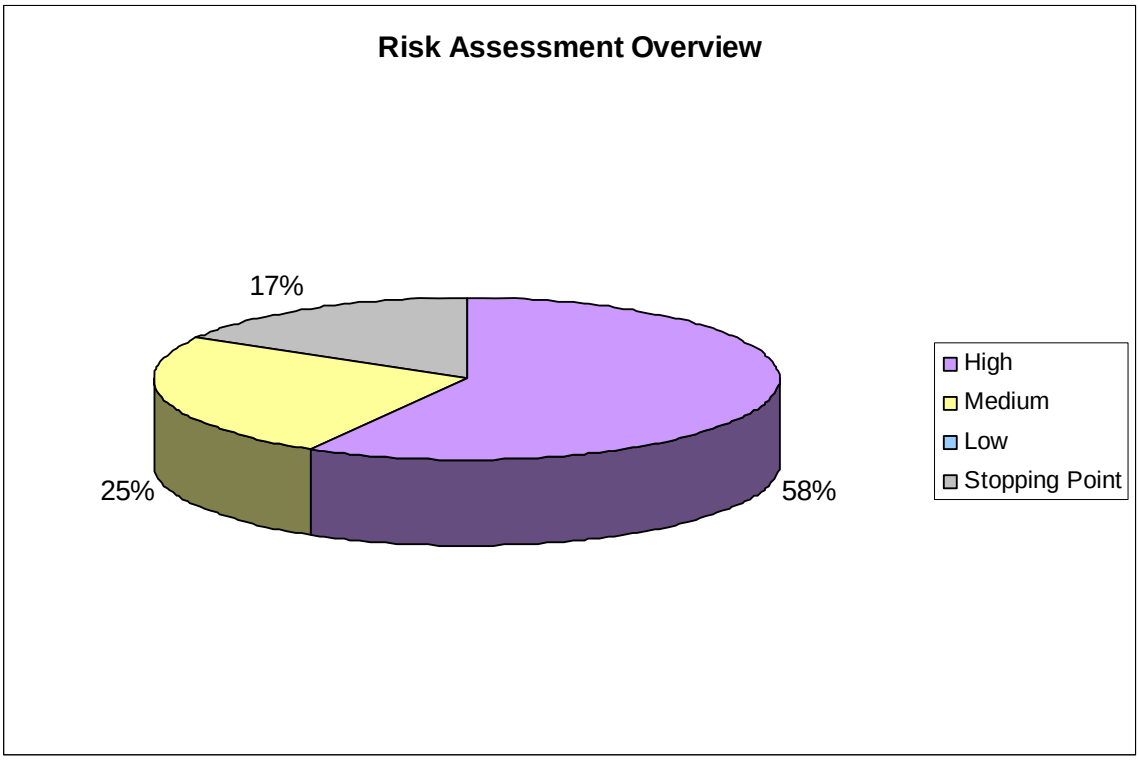


Figure 3. Risk Assessment Overview

The break-down of pressure categories identified as high risk are outlined in Figure 4

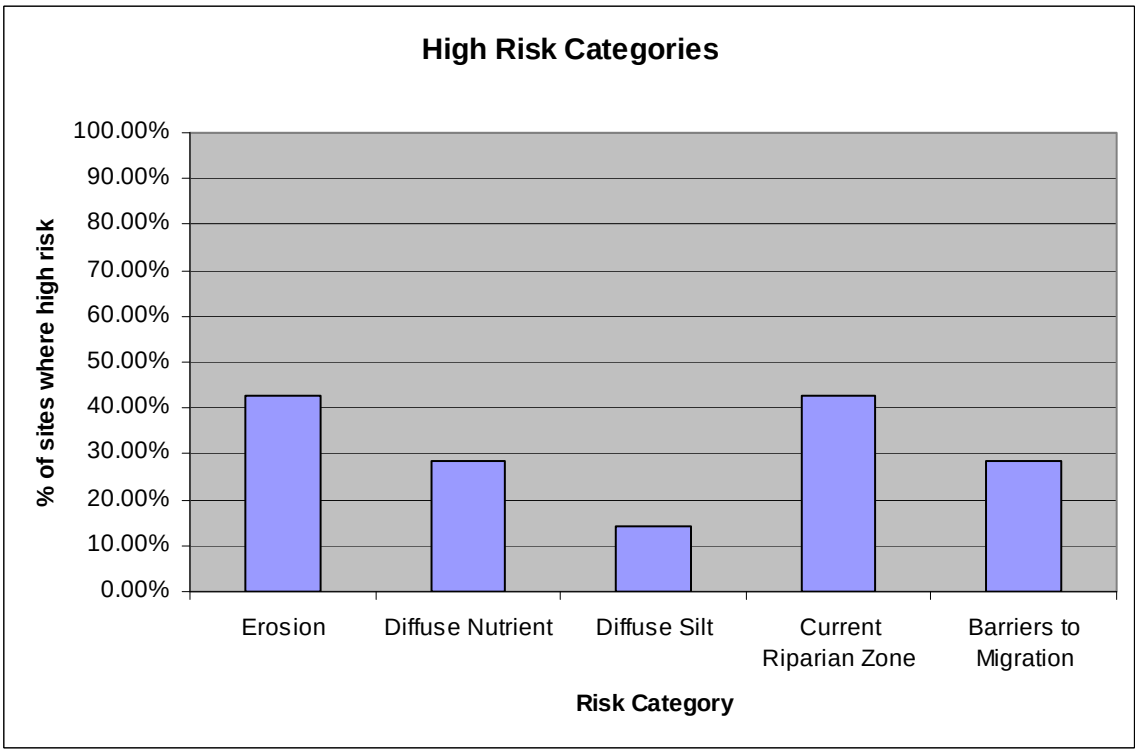
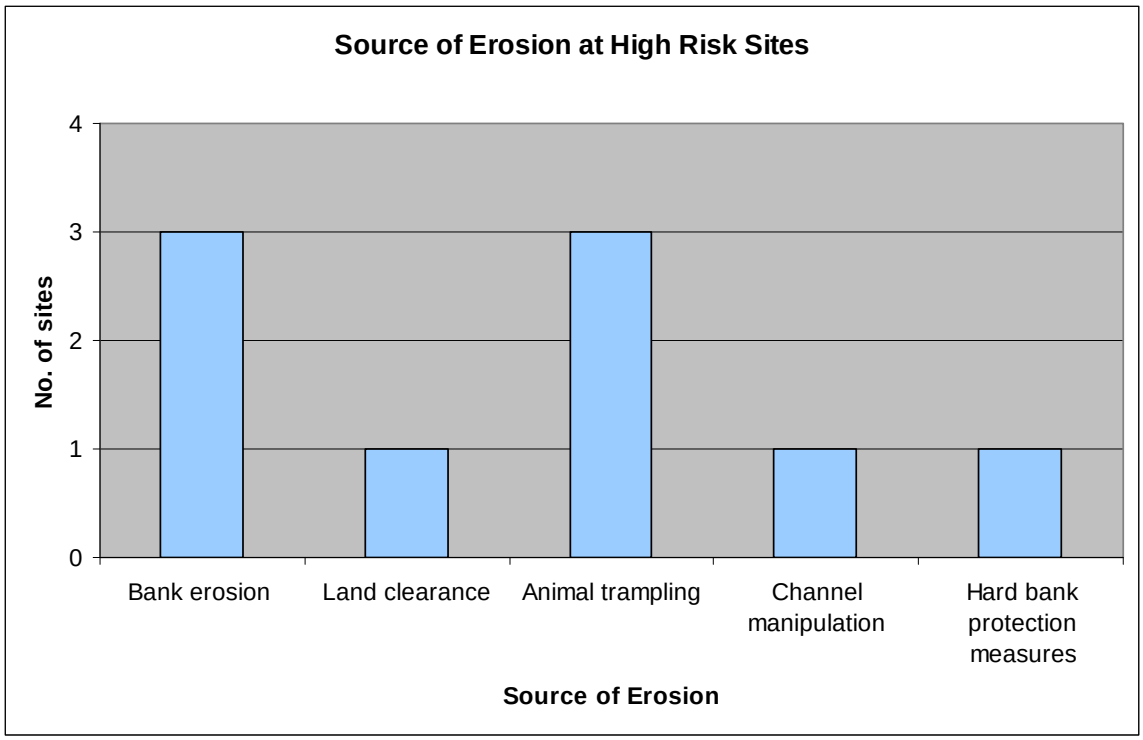


Figure 4 Breakdown of High Risk Categories

The most common sources of erosion within the catchment were banks erosion and animal trampling each was evident at three high risk sites. The other sources of erosion at high risk sites are outlined below.

Figure 5. Sources of Erosion at High Risk Sites



Site 3 was located along the main Owenreagh channel towards the top of the catchment. Heavy sheep grazing was evident along the entire length of the Owenreagh main channel with cattle and sheep noted in the channel between sites 2 and 4. No fencing was recorded on the left bank in the fields which contained sheep. The level of bank erosion which is occurring as a result and increasing the levels of silt entering the channel is evident in Site 3, Photos 9 & 10. Site 6 which was located in the vicinity of Lord Brandon's Cottage has a small abstraction located on the right bank. This was confirmed by Guerin Engineering as the abstraction for Lord Brandon's Site.

Site number 8 was located on a tributary of the Gearhameen near the Black Valley. Sheep grazing was evident on the surrounding slopes with little to no fencing. The tributary is culverted (Site 8, Photo 4, 5 & 6) using 4 circular culverts under the road from where the river flows down into the main Gearhameen river. At the outlet from the culvert the river substrate has a thick film of filamentous algae covering the boulders and cobbles. A small national school is located on the right bank just upstream of the road culvert. Where the

tributary joins the main channel both the left and right bank are heavily grazed with no fencing along either bank. (Site 8, Photo 7). Site 9 was on the Derrycarna River which is a large tributary of the Gearhameen which flows down from the Macgillycuddy Reeks. The bridge structure on this tributary would cause a barrier to migration. Downstream of the bridge filamentous algae is found covering the substrate together with significant pockets of fine silt. The right bank has undergone some embankment in the past with bank erosion also evident upstream of the bridge. Site 10 is just below Cummeenduff Glen at the outlet from Cummeenduff Lough on the main channel of the Gearhameen. Two large storm drains have recently been installed at this point to take the flow in times of flood which is evident from the trash line. The entire length of the Gearhameen from the outlet of Cummeenduff Lough to just above the confluence with the Owenreagh (approximately 2.5km) contains coniferous plantation with little to no buffer on the right bank. This stretch lies within the Black Valley above the pearl mussel population which is located at Lord Brandon's cottage. The channel substrate at this point is covered by a blanket of macrophytes and filamentous algae. The banks are also highly eroded due to the power of the river downstream of the bridge. Upstream of this site and the bridge is a large area of peat which has been burnt in the past and is now being grazed by sheep. Downstream of Lough Reagh again large areas are heavily grazed by sheep with very little fencing or fencing in need of repair. Unmanaged drains were recorded at this point which contained excessive amounts of filamentous green algae. (Site 11, Photo 4). Beyond Lough Reagh along the Cummeenduff River and its surrounding slopes overgrazing is evident on both sides. One stopping point was located in this area where improved grassland, morphological alterations including drainage and overgrazing was recorded.

3.1.1 Point Source Pressures

Quarries

One quarry, **Moll's Gap Quarry**, was recorded as active at the top of Moll's Gap on the verge of the R568 where it joins the N71. This quarry is on a steep slope which drains into the main Owenreagh channel upstream of a pearl mussel location.

Site 1 Photo 1 	**Site 1 Photo 2** 
Site 1 Photo 3 	**Site 1 Photo 4 Owenreagh valley across the road from Quarry** 

3.1.2 Fords

One significant Ford was recorded within the catchment at Site 6. This Ford has significant vehicular access with the landowner entering the channel on the right bank crossing the approximately 12 metre wide channel and exiting a little downstream on the left bank. Although the pearl mussel records are located upstream of this location the presence of the ford is still a significant pressure within the catchment.

Ford entry point Site 6, Photo 10	Ford exit point Site 6, Photo 12
	

CONCLUSIONS

The Owenreagh sub-basin catchment appears to be in a relatively poor condition from a morphological point of view, seven of the ten risk assessments were recorded as high risk and the remaining three were medium risk. Three of the high risk sites are located in areas where Freshwater Pearl Mussel populations have been recorded. High risk sites are located throughout the catchment including the upper reaches. Diffuse nutrient, overgrazing , peat extraction and forestry are the main pressures leading to the overall poor condition of the catchment as these pressures are noted from the very top of the catchment down to the lower reaches.

The impacts on the aquatic environment caused by overgrazing of lands are increased flashiness and nutrient load to rivers, which in turn causes:

- Loss of riparian zone due to overgrazing
- Excessive bank erosion
- Sediment deposition in watercourses
- Over-widening of channel / braided channels

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 Gearhameen 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	Gearhameen	Confluence of Cummeralooderry & Glasheengariff	85866	77617	1	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Active on road side sign for Moll's gap quarry
1	Gearhameen	Confluence of Cummeralooderry & Glasheengariff	85866	77617	2	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Road to quarry
1	Gearhameen	Confluence of Cummeralooderry & Glasheengariff	85866	77617	3	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Quarry mounds
1	Gearhameen	Confluence of Cummeralooderry & Glasheengariff	85866	77617	4	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Black Valley, Owenreagh Catchment across the road from quarry
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	1										Looking upstream from bridge
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	2										Looking downstream from bridge
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	3										Fenced back approx 2.5m from right bank
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	4										Landuse -sheep grazing on peat bog on right bank
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	5										Bridge structure
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	6										Filamentous algae on cobbles at bridge
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84010	78592	7										Very silty substrate
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84026	78649	8										Coniferous forest set back approx. 15m from right bank upstream of bridge see map

2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84026	78649	9										Looking downstream from bridge natural bank erosion
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84026	78649	10										Filamentous algae on cobbles
2	Gearhameen	Main Channel confluence with Cummeralooderry Stream	84026	78649	11										Looking downstream from bridge
3	Gearhameen	Main Channel: South West of Graignagreana	82334	78112	1	High	Medium	Medium	Medium	Low	Low	Low	High	High	Inflowing tributary heavily silted up
3	Gearhameen	Main Channel: South West of Graignagreana	82334	78112	2	High	Medium	Medium	Medium	Low	Low	Low	High	High	Deposition on right and left bank
3	Gearhameen	Main Channel: South West of Graignagreana	82334	78112	3	High	Medium	Medium	Medium	Low	Low	Low	High	High	Filamentous algae & silt on inflowing tributary
3	Gearhameen	Main Channel: South West of Graignagreana	82334	78112	4	High	Medium	Medium	Medium	Low	Low	Low	High	High	Right bank erosion
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	5	High	Medium	Medium	Medium	Low	Low	Low	High	High	Left bank erosion
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	6	High	Medium	Medium	Medium	Low	Low	Low	High	High	Left bank erosion, right bank deposition
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	7	High	Medium	Medium	Medium	Low	Low	Low	High	High	Left bank erosion very high
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	8	High	Medium	Medium	Medium	Low	Low	Low	High	High	Filamentous algae on cobbles
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	9	High	Medium	Medium	Medium	Low	Low	Low	High	High	Trampling on right bank, no fencing for sheep. Grazing & entering river all along reach
3	Gearhameen	Main Channel: South West of Graignagreana	82415	87109	10	High	Medium	Medium	Medium	Low	Low	Low	High	High	Trampling on right bank, no fencing for sheep. Grazing & entering river all along reach
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	1	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Looking upstream from starting point
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	2	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	First cascade at upstream end
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	3	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	First cascade with forest in background left bank
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	4	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Looking downstream from stop

4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	5	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	First cascade
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	6	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Fencing in bad repair, sheep grazing up to and in channel
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	7	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Rooted macrophytes in pool
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	8	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Rooted macrophytes with algae
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	9	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Inflowing drain / run off
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	10	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Second cascade
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	11	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Third cascade looking upstream
4	Gearhameen	Main Channel: East of Knockbrack	87631	79877	12	Medium	Low	Medium	Medium	Low	Low	High	Medium	High	Third cascade looking downstream
5	Gearhameen	Main Channel: Gallavally	87986	81206	1	High	Low	Medium	Medium	Low	Low	Low	Medium	High	One dead mussel
5	Gearhameen	Main Channel: Gallavally	87986	81206	2	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Two dead mussels look more recently dead
5	Gearhameen	Main Channel: Gallavally	87986	81206	3	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Starting point
5	Gearhameen	Main Channel: Gallavally	87986	81206	4	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Starting point looking upstream
5	Gearhameen	Main Channel: Gallavally	87986	81206	5	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Dead mussels
5	Gearhameen	Main Channel: Gallavally	88020	81248	6	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Land drain (unmanaged left bank)
5	Gearhameen	Main Channel: Gallavally	87986	81206	7	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Looking downstream end point
5	Gearhameen	Main Channel: Gallavally	88090	81269	8	High	Low	Medium	Medium	Low	Low	Low	Medium	High	Slumps
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	1	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Looking upstream at starting point
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	2	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Left bank at starting point
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	3	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Overhanging / fallen trees
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88399	82080	4	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Possible abstraction on right bank confirmed by Guerin Engineering abstraction for Lord Brandon's Cottage

6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	5	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Connection with floodplain very good evidence of trashline approx 2.5m from left bank
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	6	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Major bridge 6 abutments in channel
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88397	82142	7	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Land drain on left bank
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	8	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Scouring & loss of habitat caused by bridge on left bank
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88419	82158	9	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Set back fencing begins approx 0.5m
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88482	82183	10	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Entrance on right bank source of silt
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	11	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Ford
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	12	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Ford
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	13	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Mid-channel island
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	14	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Mid-channel island
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	15	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Left channel
6	Gearhameen	Gearhameen River at Lord Brandon's cottage	88495	82187	16	Medium	Medium	Medium	Low	Medium	Medium	Low	High	High	Right channel
Stopping point 1	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	1										Confirmed no barrier to migration
Stopping point 1	Gearhameen	Gearhameen River at Lord Brandon's cottage	88370	82058	2										Confirmed no barrier to migration
7	Gearhameen	Gearhameen River North West of Lord Brandon's cottage	87478	82215	1	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Looking upstream from bridge
7	Gearhameen	Gearhameen River North West of Lord Brandon's cottage	87478	82215	2	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Overhanging trees on left and right bank
7	Gearhameen	Gearhameen River North West of Lord Brandon's cottage	87478	82215	3	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Looking downstream from bridge, bedrock and rhododendron
7	Gearhameen	Gearhameen River North West of Lord Brandon's cottage	87478	82215	4	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Sheep grazing on left bank fenced off approx 2m back, river splits in two at this point two bridges

8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	1	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Looking upstream from bridge
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86947	82724	2	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Land drain entering on right bank
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	3	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Looking downstream from bridge
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	4	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Stream culverted under road 4 circular culverts
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	5	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Algae on substrate
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	6	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Algae on substrate
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86995	82603	7	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Where tributary joins main channel left and right bank grazed, no fencing
8	Gearhameen	Gearhameen River South of Gentleman's Rock	86953	82722	8	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Forestry on LB of main channel
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85884	82883	1	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Bridge structure - Barrier to migration
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85884	82883	2	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Looking downstream from bridge
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85884	82883	3	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Concrete substrate for bridge structure
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85884	82883	4	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Looking upstream from bridge
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85884	82883	5	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Embankment on right bank
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85898	82909	6	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Incoming tributary
9	Gearhameen	Inflowing to Gearhameen River-Derrycarna River	85898	82909	7	Medium	Medium	Low	Low	Low	Low	High	Medium	High	Bank erosion upstream of bridge on right bank with a lot of silt in it
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84893	81880	1	High	High	High	Low	Medium	Low	Low	High	High	Two storm drains beside each other, no flow in them, recently installed for times of flooding

10	Gearhameen	Gearhameen River East of L. Cummeenduff	84893	81886	2	High	High	High	Low	Medium	Low	Low	High	High	Looking downstream from bridge
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84893	81886	3	High	High	High	Low	Medium	Low	Low	High	High	Bridge structure
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84902	81860	4	High	High	High	Low	Medium	Low	Low	High	High	Forestry on right bank, no buffer
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84902	81860	5	High	High	High	Low	Medium	Low	Low	High	High	Bank erosion on right bank
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84902	81860	6	High	High	High	Low	Medium	Low	Low	High	High	Macrophyte & Filamentous green algae growth
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84902	81860	7	High	High	High	Low	Medium	Low	Low	High	High	Very deep peat caused by eroding power of river downstream of bridge
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84902	81860	8	High	High	High	Low	Medium	Low	Low	High	High	Excessive filamentous algae growth on substrate
10	Gearhameen	Gearhameen River East of L. Cummeenduff	84872	81834	9	High	High	High	Low	Medium	Low	Low	High	High	Second bridge
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	1	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Looking upstream from bridge
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	2	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Looking downstream from bridge
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	3	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Bridge structure
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	4	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Unmanaged land drain full of filamentous green algae, 10m upstream of bridge on right bank
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	5	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Fenced off but no buffer
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	6	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Left bank landuse is peat
11	Gearhameen	Gearhammen River below L. Reagh	82431	80987	7	Low	High	Medium	Medium	Low	Low	Low	Medium	High	Right bank landuse is rough unimproved grassland
Stopping point 2	Gearhameen	Confluence of Cummeenduff River & Glashankilleen Streams	81537	82230	1										Landscape,perforated pipe present, sheep grazing on slopes
Stopping point 2	Gearhameen	Confluence of Cummeenduff River & Glashankilleen	81537	82230	2										Landscape,perforated pipe present, sheep grazing on slopes

		Streams													
Stopping point 2	Gearhameen	Confluence of Cummeenduff River & Glashankilleen Streams	82109	81910	3										Perforated pipe present, sheep grazing on slopes
Stopping point 2	Gearhameen	Confluence of Cummeenduff River & Glashankilleen Streams	82109	81910	4										Perforated pipe present, sheep grazing on slopes
Stopping point 2	Gearhameen	Confluence of Cummeenduff River & Glashankilleen Streams	82109	81910	5										Farm at end point, perforated pipe present, sheep grazing on slopes

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			