NS 2 FRESHWATER PEARL MUSSEL SUB-BASIN MANAGEMENT PLANS

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

September 2009

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INTRODUCTION

In order to assess the hydromorphological alterations within the Dawros 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 6th and 7th 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 Dawros 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 Dawros RHAT assessments were carried out throughout the catchment.

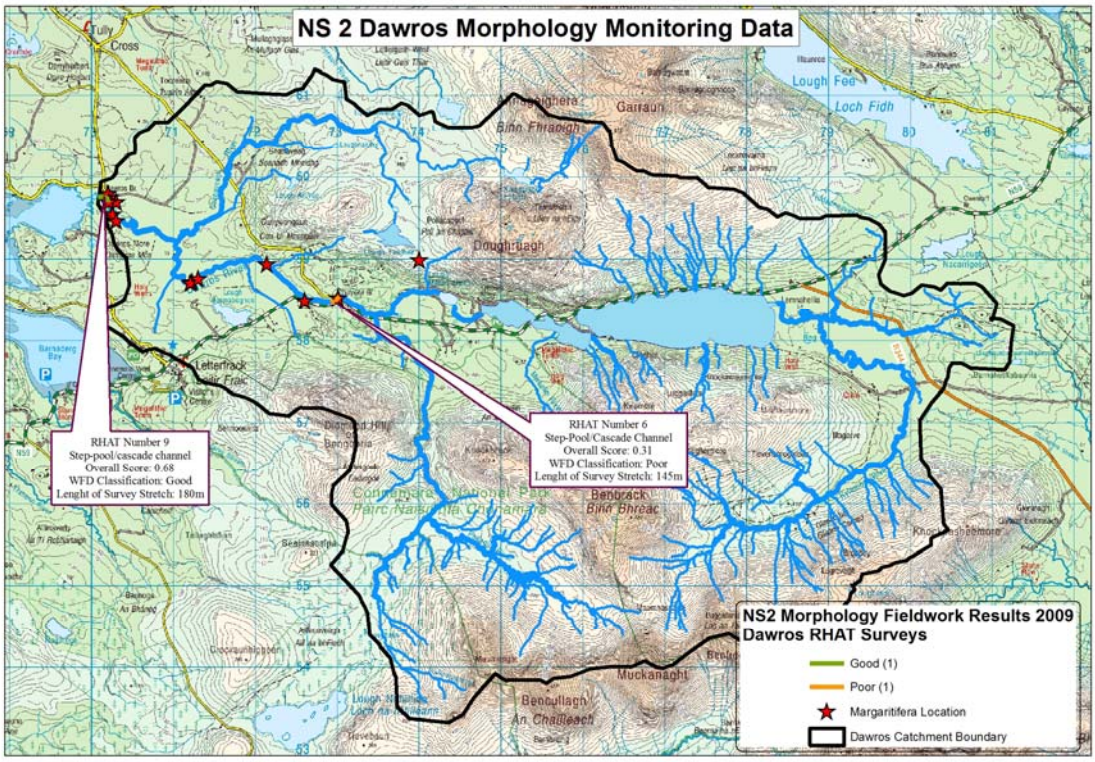

Figure 1 Morphology RHAT Assessment Locations

(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

Two RHAT surveys were carried out throughout the Dawros catchment. The results of these surveys can be found in the electronic appendix. Both RHAT surveys were carried out within the vicinity of pearl mussel locations. One was deemed to be at poor status and one at good status in the lower reaches of the catchment on the main channel of the Dawros River. RHAT number 6 commenced just upstream of Tullywee bridge. The stretch which was surveyed is directly opposite a large quarry site which was found to be active on the day in which surveys were undertaken. A large perforated pipe was found entering the channel containing high levels of fine sandy silt from the Quarry which is located across the road (N59). Quarry dust and effluent can cause problems with silt pollution.

The Dawros catchment contains one quarry (Guys Quarry) which lies adjacent to a river stretch with known populations of pearl mussels as per **Figure 2.**

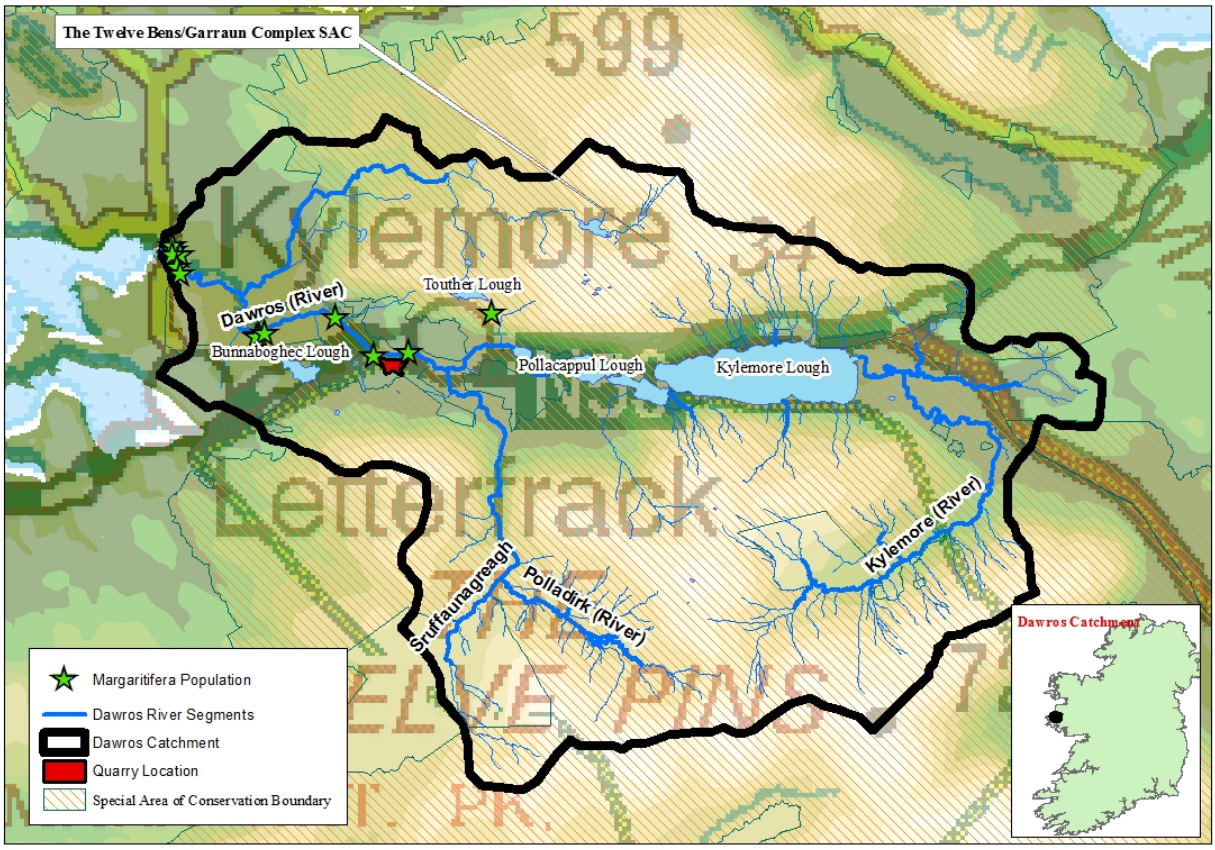

Figure 2 Location of Quarries within Dawros Catchment

Following consultation with the Western River Basin District Technical Conservation Committee it was established that Galway County Council have recently purchased this quarry and are currently using it as a storage facility. Large trucks were noted entering and exiting the site on the day in which the survey took place. As run off from this site was noted together with the fine silts entering the Dawros River from the perforated pipe a full site assessment is needed.

The channel is a step-pool/cascade system which scored well only for channel form and flow type as the natural form of the river has not been altered. The remaining attributes all scored zero except for barriers to continuity which scored 2, again which is quite low giving the stretch an overall score of 0.3 (Poor Status). The substrate condition is very poor with greater than 50% silt coverage recorded along this stretch. The channel vegetation also scored very low as the levels of filamentous algae greatly exceeds the values which would be expected for a river of this typology. The greatest pressure on

this channel is from the quarry activities which are located on the opposite side of the road from the river. Significant site works were taking place on the day in which surveys were undertaken. The weather conditions were extremely poor with high winds and heavy rainfall. This further exacerbated the pressure coming from the quarry as large quantities of run off were visible exiting from the site and flowing across the road. Also, many large trucks and heavy machinery were entering and exiting the site with silty material washing from the tyres. The bounding wall on the site has also been cleared and altered as is evident from the extensive coverage of Gunnera along the stretch. Rhododendron was also found along both banks for the entire length of this stretch which can cause significant problems for the natural bank side vegetation.

RHAT number 9 was carried out at Dawros Bridge. This is a lowland meandering system with some large pools. Overall the stretch scored good as the channel form and vegetation have not been altered. Although it was quite difficult to assess the substrate condition on the day due to the adverse weather conditions finer sediments were noted within pools and interstices as is expected for a river of this type. Due to the typology of this stretch the river will not interact regularly with its floodplain and therefore this attribute is not scored however, the riparian landcover is scored and was found to be quite poor with cut over peat, land drains and cleared areas along the banks.

Representative photographs from reach:

RHAT 6 Quarry outfall to river channel	**RHAT 6 Step-pool/cascade channel**
	

RHAT 9	RHAT 9
	

Details in relation to photographs are tabulated in Appendix 2.

3.1 Catchment Walkover Risk Assessment Results

A total of nine sites were surveyed in the Dawros sub-basin catchment, with a risk assessment carried out at all nine of these sites. **Figure 2** outlines the locations of the High to Low Risk Assessment results from the Catchment Walkover Risk Assessments. Seven high risk sites were recorded out of the nine that were assessed. The remaining two 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 throughout the catchment. One particular assessment which highlights the extreme damage which has occurred within this catchment is site 5. This assessment was undertaken along the Polladirk River which is fed from the Connemara National Park. Coillte felling had taken place in this location in the past with measures taken by them to avoid damage to the bank side vegetation and channel. However, during the week commencing August 11th 2008 the removal of the bankside vegetation within the Coillte property and removal of debris from the river was carried out, without the prior knowledge or permission of Coillte, by Galway Co. Council. It seems this was in order to prevent damage due to the flash flood to the public road bridge nearby.
(Coillte harvesting had ceased at the time of the Galway Co. Council work in view of the flood warning it (Coillte) received from the Fisheries Board.).

Site 5 Roading along Polladirk River where bank side vegetation has been removed	**Site 5 Forestry upstream of river, felling on right bank, associated roading.**
	

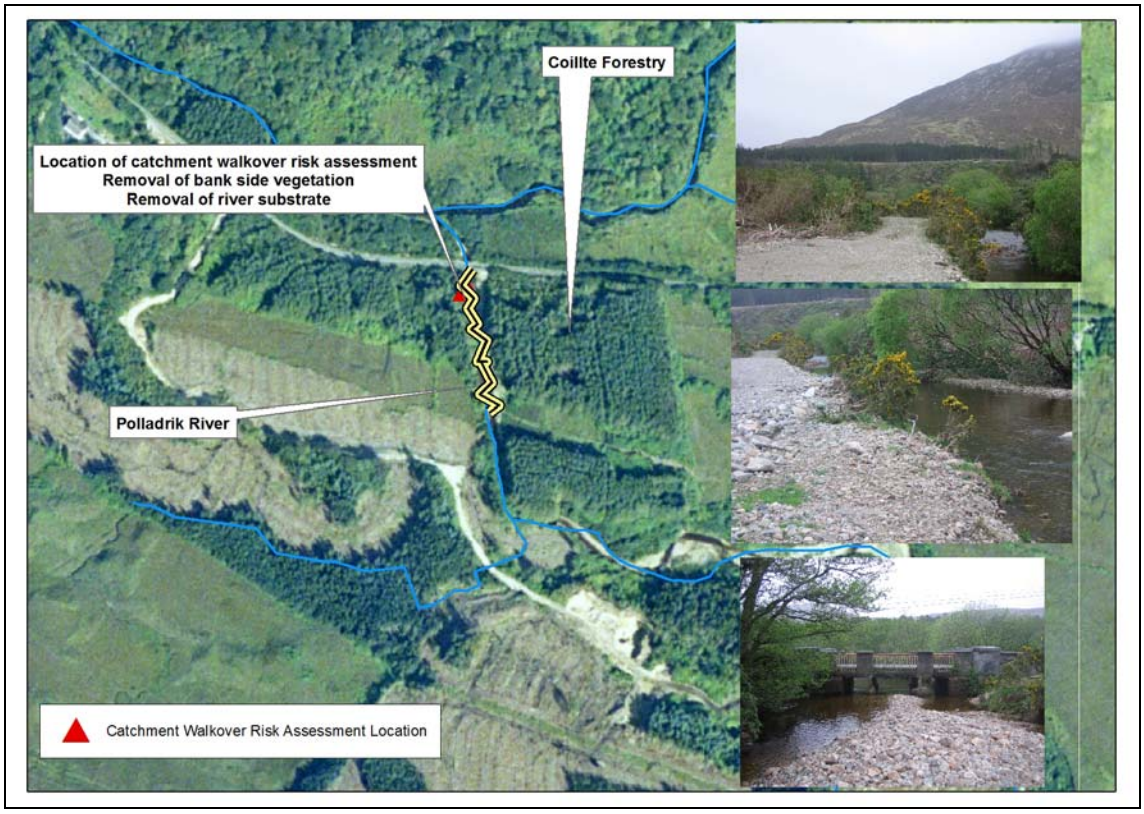

Figure 3 Aerial overview of Polladirk River where bank side and in channel vegetation removal was recorded

The most common high risk categories identified were:

- Current riparian zone – evident at 86% of high risk sites,
- Field Drainage– evident at 71% 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. Figure 3 outlines the percentage number of sites at High and Medium risk.

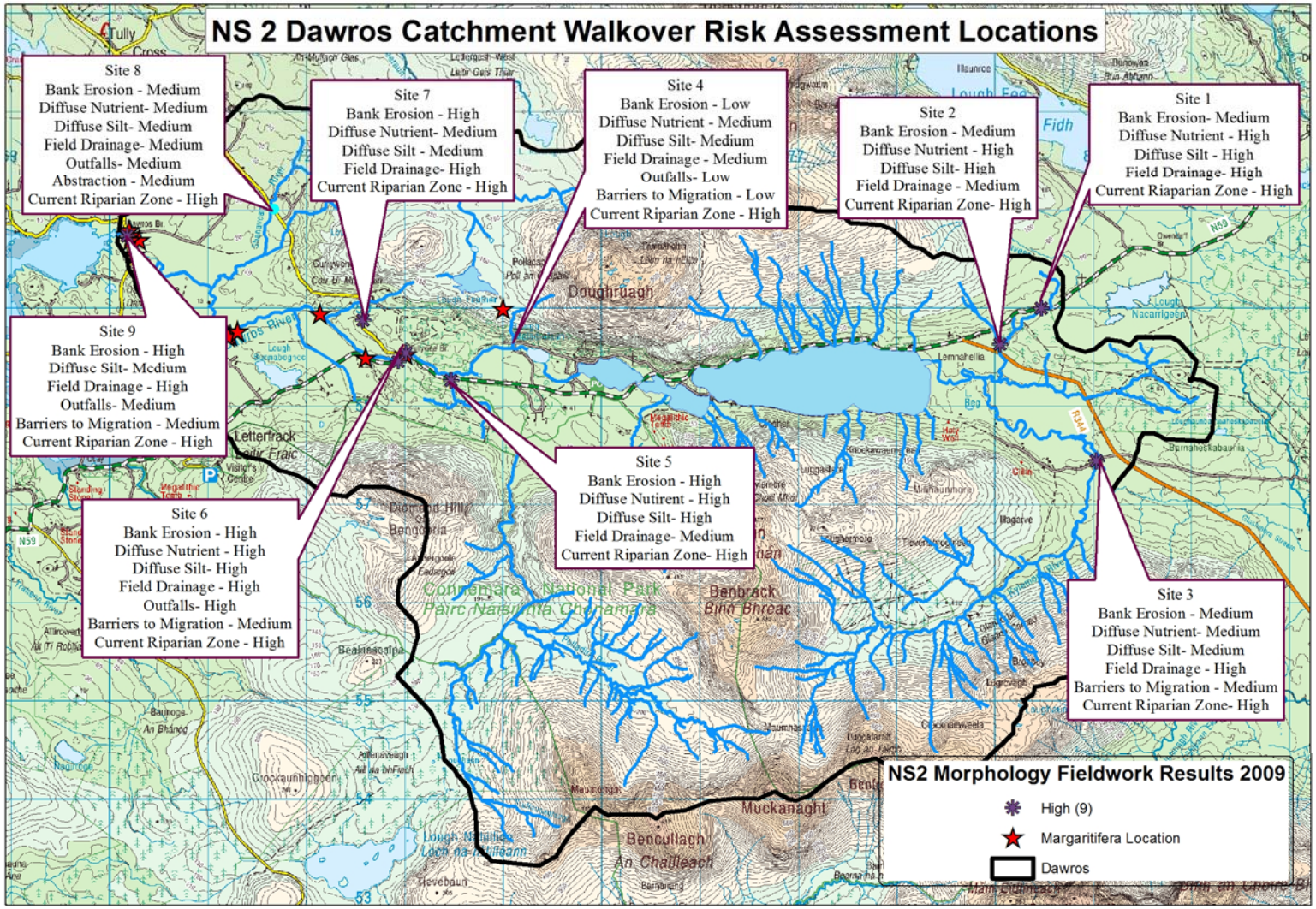

Figure 4 Location of Stopping points and Catchment Walkover Risk Assessments

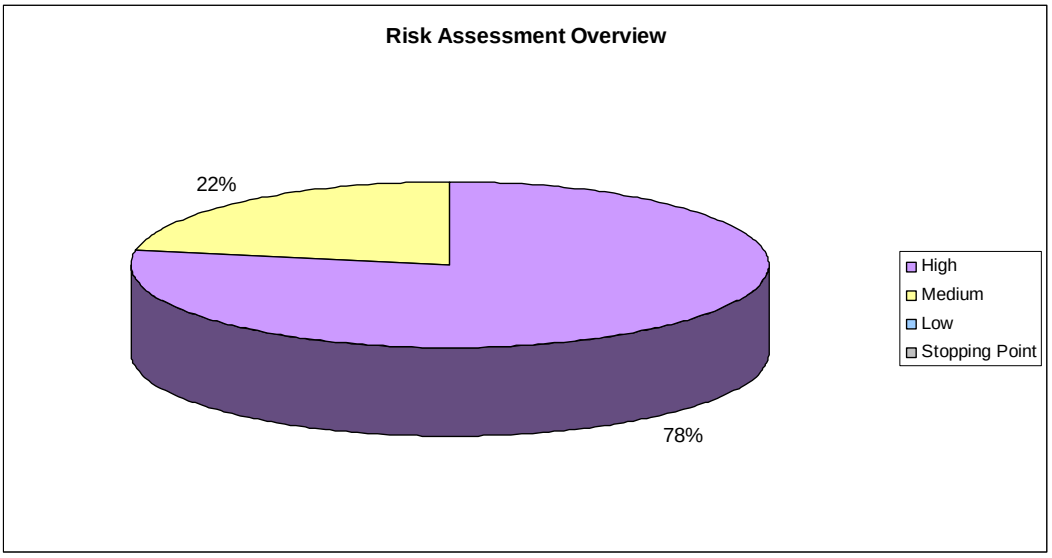

Figure 5 Risk Assessment Overview

The break-down of pressure categories identified as high risk are outlined in Figure 3

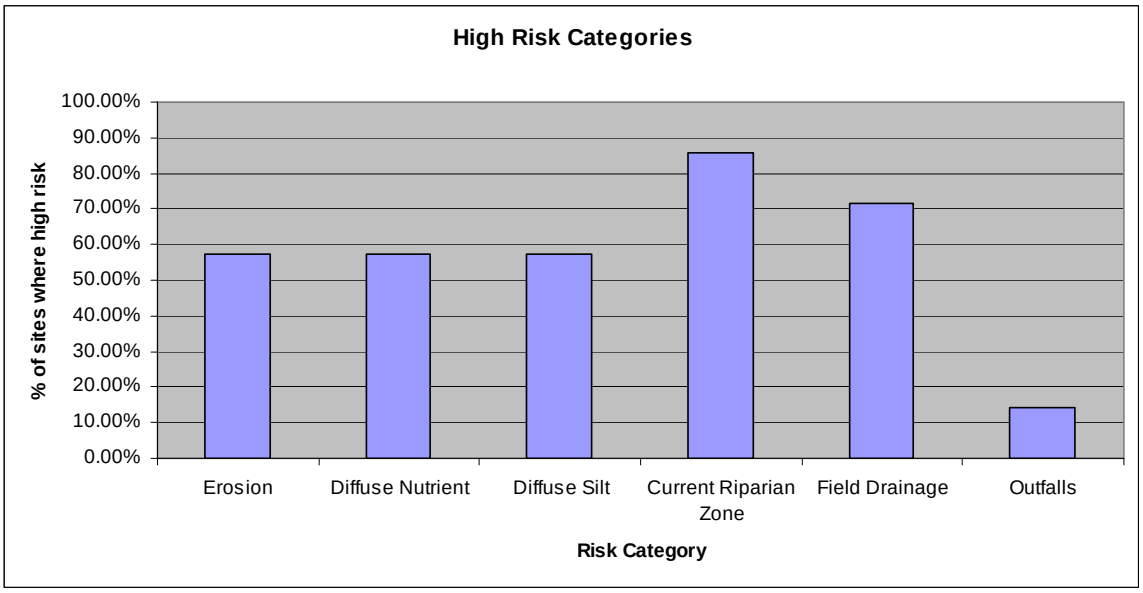

Figure 6 Breakdown of High Risk Categories

It is evident that the current riparian zone category is also a major risk within this catchment, however this pressure generally relates to how a poor riparian zone can intensify other pressures e.g. increased erosion from animal trampling caused by poor fencing. Quantitative statistics do not successfully display the pressures created by a poor riparian buffer as they are linked with other pressure categories. The main issues identified within this catchment which lead to a high risk riparian zone were:

- By far the greatest pressure on the current riparian zone is a lack of fencing. No fencing is present at any of the six sites high risk for current riparian zone many of which have open access for sheep. This has intensified the pressure of erosion from trampling on banks and poaching, increased nutrient enrichment from animals being within or very close to the channel and increased silt within channel from exposed soil on banks;
- An insufficient buffer caused by complete lack of riparian buffer along parts of the channel, particularly when land use at bank is grazing. This has caused increases in diffuse nutrient and silt as there is no effective buffer.

The main source of field drainage was drainage on a high slope which was evident at five high risk sites within the catchment; the other sources of high risk field drainage are shown below.

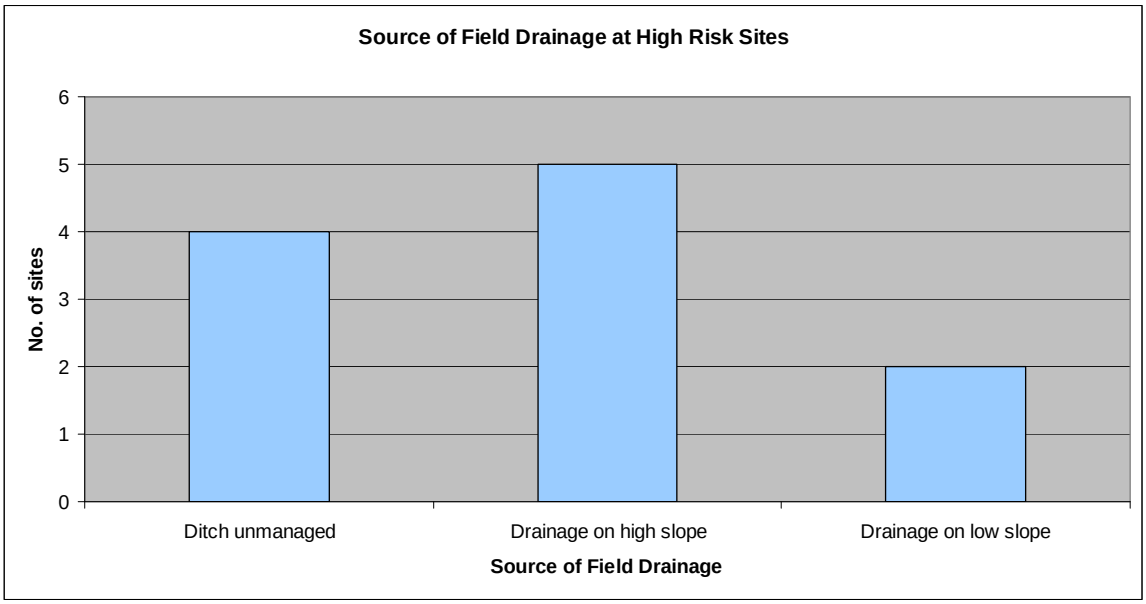

Figure 7 source of field drainage pressure at high risk sites

4.0 CONCLUSIONS

From a morphological point of view the Dawros sub-basin catchment is in poor condition, with several high risk sites located throughout the catchment, even in upstream locations in the catchment. The lack of effective riparian zone is intensifying pressures within the catchment, particularly in relation to fencing of agricultural land. Three risk assessments were carried out in locations where Freshwater Pearl Mussel populations are known to exist, with two of these being classified as high risk and one as medium 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 Dawros 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	Dawros	Tributary	79475	259007	1	Medium	High	High	High	Low	Low	Low	High	High	Looking upstream, no buffer on left bank. Tree line buffer right bank
1	Dawros	Tributary	79475	259007	2	Medium	High	High	High	Low	Low	Low	High	High	Grazing sheep on RB
1	Dawros	Tributary	79475	259007	3	Medium	High	High	High	Low	Low	Low	High	High	Fontinalis in stream
1	Dawros	Tributary	79475	259007	4	Medium	High	High	High	Low	Low	Low	High	High	Side land drain feeding into tributary
1	Dawros	Tributary	79475	259007	5	Medium	High	High	High	Low	Low	Low	High	High	Small farm operating on right and left bank of tributary
1	Dawros	Tributary	79475	259007	6	Medium	High	High	High	Low	Low	Low	High	High	Rhodedendron growing all along tributary
1	Dawros	Tributary	79475	259007	7	Medium	High	High	High	Low	Low	Low	High	High	Looking down stream from bridge, clear felling in background
1	Dawros	Tributary	79475	259007	8	Medium	High	High	High	Low	Low	Low	High	High	Alder at bridge
1	Dawros	Tributary	79475	259007	9	Medium	High	High	High	Low	Low	Low	High	High	Clear felling RB
1	Dawros	Tributary	79475	259007	10	Medium	High	High	High	Low	Low	Low	High	High	Clear felling RB
1	Dawros	Tributary	79475	259007	11	Medium	High	High	High	Low	Low	Low	High	High	Clear felling RB
2	Dawros	Tributary	79053	258642	1	Medium	High	High	Medium	Low	Low	Low	High	High	Looking D/S from road, narrow tributary fast flowing. No buffer, no tree line
2	Dawros	Tributary	79053	258642	2	Medium	High	High	Medium	Low	Low	Low	High	High	Peat/Blanket bog along both banks
2	Dawros	Tributary	79053	258642	3	Medium	High	High	Medium	Low	Low	Low	High	High	Open to sheep grazing. No fencing.
2	Dawros	Tributary	79053	258642	4	Medium	High	High	Medium	Low	Low	Low	High	High	Tributary culverted under road

2	Dawros	Tributary	79053	258642	5	Medium	High	High	Medium	Low	Low	Low	High	High	Unimproved grassland on both banks
2	Dawros	Tributary	79053	258642	6	Medium	High	High	Medium	Low	Low	Low	High	High	Mature forestry on LB. Some Rhodendendron
3	Dawros	Tributary	80034	257444	1	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Looking D/S
3	Dawros	Tributary	80034	257444	2	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Bridge apron - loss of habitat
3	Dawros	Tributary	80034	257444	3	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Clear span bridge
3	Dawros	Tributary	80034	257444	4	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Very clean cobble substrate in channel.
3	Dawros	Tributary	80034	257444	5	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Desertion on meander
3	Dawros	Tributary	80034	257444	6	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Grazing without fencing on both banks
3	Dawros	Tributary	80034	257444	7	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Looking U/S from bridge
3	Dawros	Tributary	80034	257444	8	Medium	Medium	Medium	High	Low	Low	Medium	High	High	Land drain joins tributary only at this point. There is filamentous algae here. None present anywhere else.
4	Dawros	Tributary	74090	258643	1	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Bridge at D/S end
4	Dawros	Tributary	74090	258643	2	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Tributary U/S of bridge
4	Dawros	Tributary	74090	258643	3	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Culverted under road with natural stone bridge
4	Dawros	Tributary	74090	258643	4	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Tunnelling effect both U & D/S
4	Dawros	Tributary	74090	258643	5	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Very clean substrate, no silt
4	Dawros	Tributary	74090	258643	6	Low	Medium	Medium	Medium	Low	Low	Low	High	Medium	Excessive Rhododendron U & D/S
5	Dawros	Tributary	73473	258260	1	High	High	High	Medium	Low	Low	Low	High	High	Clear felling on RB
5	Dawros	Tributary	73473	258260	2	High	High	High	Medium	Low	Low	Low	High	High	Clear felling upstream
5	Dawros	Tributary	73473	258260	3	High	High	High	Medium	Low	Low	Low	High	High	More silt clearance than clear felling perhaps to clear

															Rhodedendron
5	Dawros	Tributary	73473	258260	4	High	High	High	Medium	Low	Low	Low	High	High	Clean Substrate
5	Dawros	Tributary	73473	258260	5	High	High	High	Medium	Low	Low	Low	High	High	Riparian zone and banks removed.
5	Dawros	Tributary	73473	258260	6	High	High	High	Medium	Low	Low	Low	High	High	Mid channel bar
5	Dawros	Tributary	73473	258260	7	High	High	High	Medium	Low	Low	Low	High	High	Substrate & Site clearance impacting river
5	Dawros	Tributary	73473	258260	8	High	High	High	Medium	Low	Low	Low	High	High	Falling trees due to undermining of banks
6	Dawros	Main Channel	73016	258551	1	High	High	High	High	High	Low	Medium	High	High	Gunnera along quarry boundary starting at 172936 258450
6	Dawros	Main Channel	73016	258551	2	High	High	High	High	High	Low	Medium	High	High	Quarry at road side
6	Dawros	Main Channel	73016	258551	3	High	High	High	High	High	Low	Medium	High	High	Quarry
6	Dawros	Main Channel	72935	258461	4	High	High	High	High	High	Low	Medium	High	High	Quarry
6	Dawros	Main Channel	72935	258461	5	High	High	High	High	High	Low	Medium	High	High	Large black perforated pipe coming across under road from quarry & draining to river. Alot of fine silt in pipe
6	Dawros	Main Channel	72935	258461	6	High	High	High	High	High	Low	Medium	High	High	Large black perforated pipe coming across under road from quarry & draining to river. Alot of fine silt in pipe
6	Dawros	Main Channel	72935	258461	7	High	High	High	High	High	Low	Medium	High	High	Large black perforated pipe coming across under road from quarry & draining to river. Alot of fine silt in pipe

7	Dawros		72576	258880	1	High	Medium	Medium	High	Low	Low	Low	High	High	Site clearance possible source of silt
7	Dawros		72576	258880	2	High	Medium	Medium	High	Low	Low	Low	High	High	Looking D/S of bridge
7	Dawros		72576	258880	3	High	Medium	Medium	High	Low	Low	Low	High	High	Heavy poaching from cattle of RB D/S of bridge
7	Dawros		72576	258880	4	High	Medium	Medium	High	Low	Low	Low	High	High	U/S of bridge, alot of silt in stream
7	Dawros		72576	258880	5	High	Medium	Medium	High	Low	Low	Low	High	High	Silt in channel
8	Dawros	Tributary	71667	260009	1	Medium	Medium	Medium	Medium	Medium	Medium	Low	High	Medium	Looking U/S of bridge
8	Dawros	Tributary	71667	260009	2	Medium	Medium	Medium	Medium	Medium	Medium	Low	High	Medium	Landuse U/S
8	Dawros	Tributary	71667	260009	3	Medium	Medium	Medium	Medium	Medium	Medium	Low	High	Medium	Looking D/S
8	Dawros	Tributary	71667	260009	4	Medium	Medium	Medium	Medium	Medium	Medium	Low	High	Medium	Tree line buffer D/S
8	Dawros	Tributary	71667	260009	5	Medium	Medium	Medium	Medium	Medium	Medium	Low	High	Medium	Land drain D/S bridge
9	Dawros		70180	259734	1	High	Low	Medium	High	Medium	Low	Medium	High	High	Looking D/S
9	Dawros		70180	259734	2	High	Low	Medium	High	Medium	Low	Medium	High	High	Bridge (Dawros) new
9	Dawros		70180	259734	3	High	Low	Medium	High	Medium	Low	Medium	High	High	Cascades looking D/S
9	Dawros		70180	259734	4	High	Low	Medium	High	Medium	Low	Medium	High	High	New (major) & old bridge
9	Dawros		70180	259734	5	High	Low	Medium	High	Medium	Low	Medium	High	High	Abstraction?
9	Dawros		70180	259734	6	High	Low	Medium	High	Medium	Low	Medium	High	High	Abstraction?
9	Dawros		70180	259734	7	High	Low	Medium	High	Medium	Low	Medium	High	High	Abstraction?
9	Dawros		70180	259734	8	High	Low	Medium	High	Medium	Low	Medium	High	High	Siltation (heavy)
9	Dawros		70180	259734	9	High	Low	Medium	High	Medium	Low	Medium	High	High	Outfall RB
9	Dawros		70180	259734	10	High	Low	Medium	High	Medium	Low	Medium	High	High	Land drain RB
9	Dawros		70180	259734	11	High	Low	Medium	High	Medium	Low	Medium	High	High	New bridge from D/S
9	Dawros		70180	259734	12	High	Low	Medium	High	Medium	Low	Medium	High	High	Site clearance work D/S of LB on new bridge
9	Dawros		70180	259734	13	High	Low	Medium	High	Medium	Low	Medium	High	High	Old bridge, bedrock bank
9	Dawros		70180	259734	14	High	Low	Medium	High	Medium	Low	Medium	High	High	Artificial substrate
9	Dawros		70180	259734	15	High	Low	Medium	High	Medium	Low	Medium	High	High	Undercutting fast flow

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			