Haweswater Aqueduct Resilience Programme

Chapter 9A - Appendix 9A.4

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United Utilities

Environmental Statement

Haweswater Aqueduct Resilience Programme

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TEP Limited
Genesis Centre
Birchwood Science Park
Warrington
WA3 7BH
Tel: 01925 844004
Fax: 01925 844002
E-mail: tep@tep.uk.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved

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Appendix A. National Vegetation Classification Survey Report Areas 1 and 2

1. NVC Technical Appendix

1.1 Introduction

1) TEP was appointed by United Utilities to complete an Ecological Impact Assessment (EcIA) for the Haweswater Aqueduct Resilience Programme - Proposed Marl Hill Section. The EcIA is required to inform an Environmental Impact Assessment (EIA) and support production of the Environmental Statement (ES).

2) A series of ecological surveys was undertaken to complete the EcIA. This Appendix is one of a series of Ecological Technical Reports (ETRs) produced to support the EcIA. This ETR documents the methods and findings of the National Vegetation Classification (NVC) surveys undertaken by Bowland Ecology.

1.2 Summary of Findings

3) Two areas (Area 1 and Area 2, located within and immediately adjacent to the Bonstone Compound access route) were subject to NVC survey during July 2020.

4) Area 1, located within and immediately adjacent to the western end of the Bonstone Compound access route, is an area of grasslands that predominantly comprises MG9 *Holcus lanatus – Deschampsia cespitosa* grassland with areas more consistent with MG9a *Holucs lanatus - Deschampsia cespitosa*, *Poa trivialis* sub-community, with areas of wetter rush dominated M23a *Juncus effuses/acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community and small pockets of M27c *Filipendula ulmaria – Angelica sylvestris* mire and MG13 *Agrostis stolonifera - Alopecurus geniculatus* grassland around the wetter scrapes which themselves have affinities with S19 *Eleocharis palustris* swamp and other sedge dominated communities. The grassland has areas of moderately high species diversity with communities typical of damper conditions within hollows and around the scrapes and pools. The sedge and rush elements of this pasture is moderately species rich with a moderate diversity of herbaceous species, particularly around the pools, scrapes and damper areas. The sedge mire is considered to be a Habitat of Principal Importance (HPI) for biodiversity conservation. The M23a rush-pasture, S19 swamp and MG13 grassland may also be HPI.

5) Area 2, located within and immediately adjacent to the eastern end of the Bonstone Compound access route, is an area of moderately species rich upland hay meadow, that was previously managed as an improved/semi-improved pasture (high levels of nutrient inputs) but is currently being managed with low levels/no nutrient inputs, in a way that is improving the species diversity and increasing the botanical value of the grassland. The frequency of yellow rattle (*Rhinanthus minor*) within the grassland is reducing the dominance of grasses, and allowing the herbaceous content to increase. It is also more species rich than most characteristic MG6 grasslands and largely lacks *Lolium perenne* which is a constant species of MG6 grasslands. The MG6d sub community *Lolium perenne – Cynosurus cristatus* grassland, *Fillipendula ulmaria* subcommunity is a more species rich subcommunity of MG6 grasslands, which is more consistent with this grassland. The MG6 grassland has until relatively recently managed as an improved/semi-improved pasture and is not considered to be a HPI.

Appendix A. National Vegetation Classification Survey Report Areas 1 and 2

1. Project Details			
Project Name:	Haweswater Aqueduct Resilience Programme	Project Number:	**80061155**
Written:	Matt Clifford, *Senior Ecologist*	Approved:	Alice Helyar, *Principal Ecologist*
Report reference:	TR4 NVC Report Area 1 and 2	Date:	14/07/2020
2. Project Drawings			
3. National Vegetation Classification Survey Methods			
Surveyors:	Matt Clifford		
Survey date:	6th July 2020		
Method:	The field surveys provide detailed vegetation community and habitat descriptions including identification of the communities and sub-communities of the National Vegetation Classification (NVC) present. Detailed species lists are produced for all NVC communities identified. Vegetation communities are assessed by quadrat survey and identified to NVC community. In each habitat type, homogenous vegetation types are identified, and randomly placed quadrats recorded within carefully chosen representative stands. The size of the recorded quadrats (2 x 2m) followed the methodology outlined in the NVC users' manual (2006). Quadrat samples recorded the presence of all higher plant and bryophyte species within the quadrat using Domin[1] scores. In addition, species that were present in a particular stand but not found within the quadrat, were recorded as 'outsiders'. Vascular plant names follow Stace (2010), bryophyte names follow Smith (2004). Digital photographs of representative features were taken and locations of quadrat samples, target notes, and vegetation boundaries were recorded in the field on a tablet GIS with inbuilt GPS nominally accurate to ± 5 m. Quadrat samples have been first analysed individually using the CEH Modular Analysis of Vegetation Information System (MAVIS). The outputs from MAVIS have been used in conjunction with the published community accounts in Rodwell (1999.) in order to assign the sampled vegetation to particular plant communities. However, it should be noted that the chosen community or sub-community was not necessarily that with the highest MAVIS coefficient, and the surveyor's previous experience of these types of wetland vegetation was used in the final determination. It should be noted that the mapped boundaries between different vegetation types are indicative only, whereas in reality there are often very gradual transitions between the types.		
Weather Conditions:	Cloud cover (5/8), sunny spells, Wind Beaufort F4, 14°C, dry.		
Limitations:	No limitations to the survey.		

[1] Domin scale (*sensu* Dahl & Hadac 1941; see Rodwell 1991, p6):
1: <4% cover, with few individuals. **2:** <4% cover, with several individuals. **3:** <4% cover, with many individuals. **4:** 4-10% cover. **5:** 11-25% cover. **6:** 26-33% cover. **7:** 34-50% cover. **8:** 51-75% cover. **9:** 76-90% cover. **10:** 91-100% cover.

4. NVC Survey Results	
TR4 Area 1	
Description	An area of grasslands that predominantly comprises MG9 *Holcus lanatus – Deschampsia cespitosa* grassland with areas more consistent with MG9a *Holucs lanatus-Deschampsia cespitosa, Poa trivialis* sub-community, with areas of wetter rush dominated M23a *Juncus effuses/acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community and small pockets of M27c *Filipendula ulmaria – Angelica sylvestris* mire and MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland around the wetter scrapes which themselves have affinities with S19 *Eleocharis palustris* swamp and other sedge dominated communities. The grassland has areas of moderately high species diversity with communities typical of damper conditions within hollows and around the scrapes and pools. The sedge and rush elements of this pasture is moderately species rich with a moderate diversity of herbaceous species, particularly around the pools, scrapes and damper areas. The scheme should avoid impacts to the areas with higher species diversity, notably around the pools and scrapes, (which also provide habitat for a range of other faunal species) and within the damper hollows.
TR4 Area 2	
Description	An area of moderately species rich upland hay meadow, that was previously managed as an improved/semi-improved pasture (high levels of nutrient inputs) but is currently being managed with low levels/no nutrient inputs, in a way that is improving the species diversity and increasing the botanical value of the grassland. The frequency of yellow rattle (*Rhinanthus minor*) within the grassland is reducing the dominance of grasses, and allowing the herbaceous content to increase. It is also more species rich than most characteristic MG6 grasslands and largely lacks *Lolium perenne* which is a constant species of MG6 grasslands. The MG6d sub community *Lolium perenne – Cynosurus cristatus* grassland, *Fillipendula ulmaria* subcommunity is a more species rich subcommunity of MG6 grasslands, which is more consistent with this grassland. Continued management as an upland hay meadow with low levels of inputs should, in the long-term, result in a species rich hay meadow, and move towards a more diverse grassland consistent with MG5 communities. It is advised that the scheme avoids significant adverse impacts to this area of grassland, provide protection to the grassland and soils should impacts be anticipated and reinstate any damage with a medium term management plan in place.

Summary of NVC Survey Results

Analysis of Quadrats

Quadrat number	NVC community (closest match)	NVC community description (closest match)	Goodness of fit
TR4 Area 1			
Q4-8	MG9	The majority of the area comprises MG9 *Holcus lanatus – Deschampsia cespitosa* grassland, with *Deschampsia cespitosa* being a constant, generally becoming dominant where the ground is flatter and drier (for example to the far east and far west) resulting in lower botanical diversity. However, the species composition varies throughout. Rushes and sedges increase in damper areas, with some areas having a moderate species diversity. MG9a *Holucs*	MG9a: 56.98

		lanatus-Deschampsia cespitosa, Poa trivialis sub-community occurs in ungrazed stands on moister soils where *Deschampsia cespitosa* has become more dominant; therefore, some areas of the survey area have affinities with MG9a.	
	 		
Q9-11	M23a	Where the ground becomes wetter, rushes gradually replace *Deschampsia cespitosa* and has affinities with M23a *Juncus effuses/acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community. A variety of *Juncus* species occur, however, *J. acutiflorus* is generally the most frequent and sedges are generally constant throughout, giving the area a diverse species composition consistent with this fen community. This community is typically found where moist, reasonably rich soils occur in situations protected from grazing. It occurs, as in this case, around flushes and in damp hollows and is commonly occurring. M23a is the typical sub-community of northern England.	M23a: 60.67
			
Q12	M23a	A mostly dry ditch comprising frequent to abundant tall wetland herbs such as *Filipendula ulmaria* and rushes. The habitat does not follow the ditch in its entirety and opens out slightly to the north, grading into damp MG9 habitat.	M27c: 41.60 M23a: 40.20

			
	S19	Very small area of *Eleocharis palustris* swamp occurs around both seasonal pools. No quadrat required.	N/A
			
	MG13	Grassland around the scrapes that dry out during prolonged periods without rain, holding water at the time of survey. Frequent to abundant *Alopecurus geniculatus* and *Agrostis stolonifera*; with frequent to abundant sedges and rushes around the margins and to the south. The habitat has been disturbed to form the scrapes and is therefore immature in development and does not fit well with NVC communities. It appears to be characteristic of MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland which typically occurs on silty soils, kept moist and sometimes water logged by periodic inundation with fresh water. It often occurs as fragmentary stands around pools, as in this case, in lowland pastures, especially when there is livestock poaching.	N/A
			

	Small sedge mire (undescribed NVC mire variant)	Small area dominated by sedges, including *Carex echinata* and *Carex viridula ssp oedicarpa.* Does not fit an assigned NVC community.	N/A
			
TR4 Area 2			
Q1-Q3	MG6d	An upland hay meadow, that was previously managed with improvement (high levels of nutrient inputs) but is currently being managed with low levels/no nutrient inputs, in a way that is improving the species diversity and increasing the botanical value of the grassland. The frequency of yellow rattle (*Rhinanthus minor*) within the grassland is reducing the dominance of grasses, and allowing the herbaceous content to increase. The grassland has affinities with MG6 grassland, although it is more species rich than most grasslands characteristic of MG6 and largely lacks *Lolium perenne* which is a constant species of MG6 grasslands. The MG6d sub community *Lolium perenne – Cynosurus cristatus* grassland, *Fillipendula ulmaria* subcommunity is a more species rich subcommunity of MG6 grasslands, which is more aligned with the species composition within the field.	MG6d: 60.98
	 		

References

J. S. Rodwell (Ed.) (1991). *British Plant Communities: Volume 2, Mires and Heaths*. Cambridge University Press

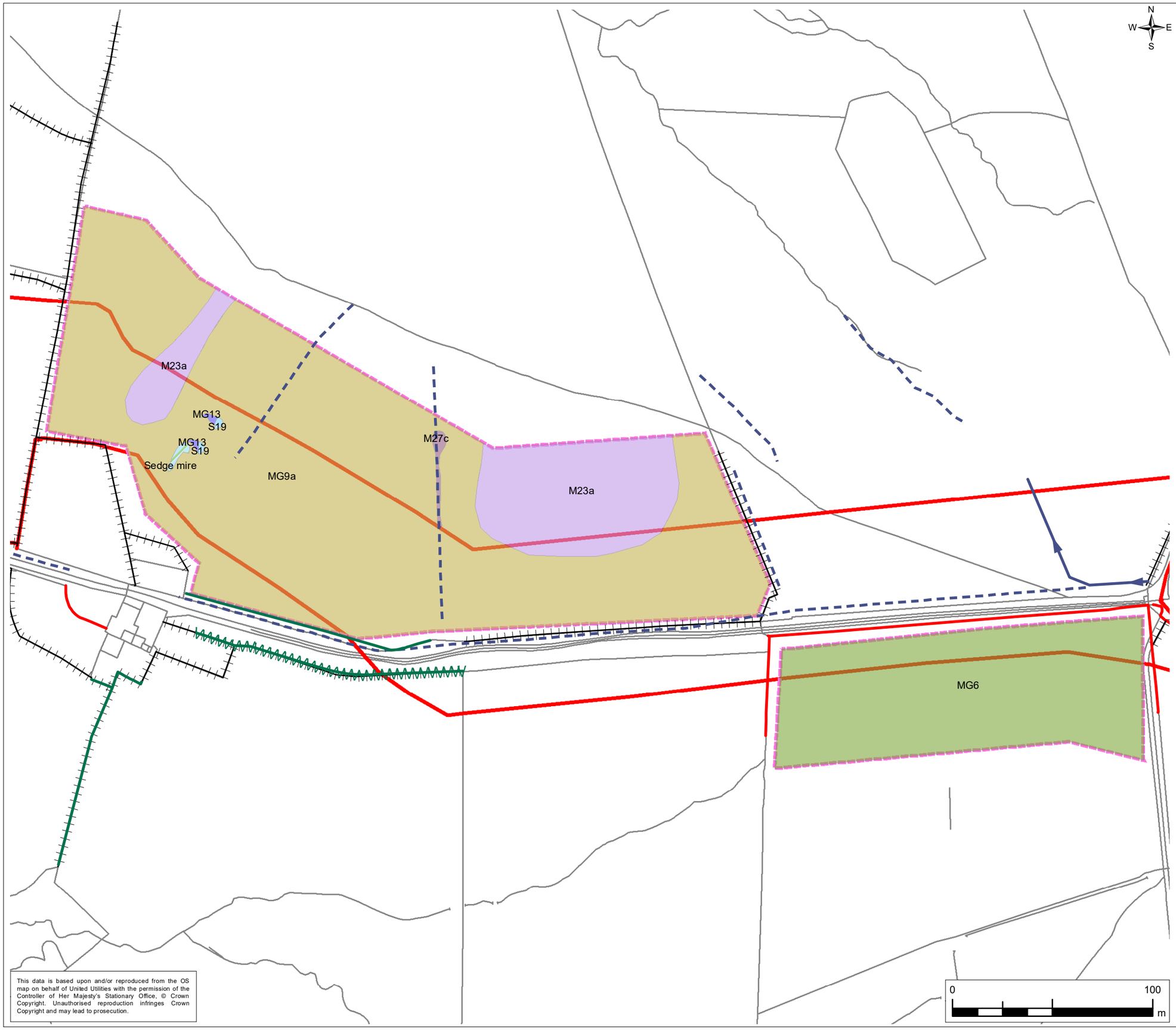
Rodwell, J.S. (2006) NVC Users' Handbook, JNCC

Appendix A: Raw Quadrat Data

Quadrat ID	1	2	3	4	5	6	7	8	9	10	11	12
Current species name	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**	**Domin**
Achillea ptarmica								1				
Alopecurus geniculatus				1								
Agrostis capillaris	4	3	4	2	2		2					
Agrostis stolonifera	2	1						3		2	2	
Anthoxanthum odoratum	5	6	5	2	2	3	4	4	5		2	3
Brachythecium rutabulum						2	2			2	1	1
Briza media						2						3
Calliergon cuspidatum				1	3					2		
Cardamine pratensis	2	1				1			2	1		
Carex viridula subsp.oedocarpa												
Carex echinata						4					3	
Carex flacca											1	
Carex nigra	2	4										
Carex ovalis	1	2	2			3			4			
Carex panicea					3					2		4
Cerastium fontanum	3	2	2								1	2
Cirsium arvense							2					
Cirsium palustre					2			2		3		3
Cynosurus cristatus	4	5	5			4	3	1	2	2	2	
Deschampsia cespitosa				9	7	7	8	7	6	4	4	2
Epilobium palustre					1					2		
Equisetum arvense	1		1	1					1			
Festuca rubra agg.	7	4	5	2	2		2		2		3	
Filipendula ulmaria												7
Galium palustre					2	3		5		3	2	3
Holcus lanatus	8	7	6	5	5	4	7	7		5	3	4

Hypochaeris radicata	2											
Juncus acutiflorus								8	8	6	7	
Juncus bulbosus												
Juncus conglomeratus				1		5	2	2	1		2	1
Juncus effusus				3			2				2	3
Juncus inflexus					4					2		3
Lathyrus pratensis						3						
Lolium perenne			2									
Lotus pedunculatus								4		3	4	
Mentha aquatica												7
Molinia caerulea					2	1						4
Myosotis arvensis	1		2									
Phleum pratense sens.lat.	1		3									
Plantago lanceolata	7	5	6									
Poa trivialis				5	3		5	4	3			
Potentilla erecta								2	2		2	
Prunella vulgaris	3	4	3									
Ranunculus acris	5	3	5						2	2		
Rhinanthus minor	3	2										
Rhytidiadelphus squarrosus	2							3		2		
Rumex acetosa	4	4	4									
Taraxacum agg.	2	3	3						3			
Trifolium pratense	4	3	3				4			2		
Trifolium repens						3			3			
Vicia cracca												
Viola palustris									3		2	

FIGURE ?.?



Legend

- TR4 Feb 2020 ecology survey boundary
- NVC areas Feb 2020

NVC Habitats

- M23a
- M27c
- MG13
- MG6
- MG9a
- S19
- Sedge mire

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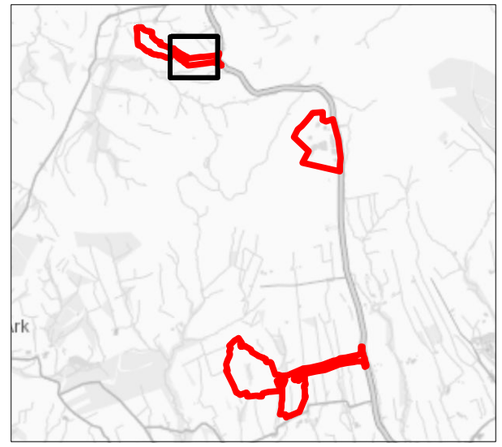

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JULY 20	Initial Issue	LB	MC	LB	AH

bowland ecology

Client: United Utilities

Project: HAWESWATER AQUEDUCT RESILIENCE PROGRAMME

Drawing Title: NVC SURVEY AREAS 1 & 2
PROPOSED MARL HILL SECTION
SHEET 1 OF 1

Drawing Status: DRAFT

Scale @ A3	1:1,827	DO NOT SCALE
Jacobs No.	B27070CG	
Client No.		

Drawing No.: BOW167_HARP_NVC_TR4_ 2020