

Havant Thicket Reservoir Project

Environmental Statement Volume 4 – Appendices

Appendix 9 Biodiversity

Appendix A9. 20: Pipeline Botanical Survey Report

Portsmouth Water Ltd.

21/05/24

Atkins Doc No.: HTR-ATK-XX-XX-RP-Z-0086

Atkins Revision No.: C01

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This document has 23 pages including the cover.

Document history

PW Revision	Status	Purpose description	Originated	Checked	Reviewed	Authorised	Date
C01	A1	Revised ES Submission	AR	LR	AR	AR	21/05/24

Client signoff

Client	Portsmouth Water Ltd.
Project	Havant Thicket Reservoir Project
Job number	5218618
Client signature/ date	

Contents

Chapter	Page
1. Introduction	4
1.1. Terms of reference	4
1.2. The scheme	4
1.3. The site	5
1.4. Scope of the assessment	5
2. Methodology	6
2.1. Survey area	6
2.2. Surveyor competency	6
2.3. Vegetation sampling	6
2.4. Analysis	7
2.5. Limitations	7
3. Results 9	
3.1. Vegetation descriptions	9
3.2. High lawn	9
3.3. Thicket lawn	13
4. Discussion	17
4.1. High lawn	17
4.2. Great Copse field	17
4.3. Thicket lawn	17
4.4. Summary of Habitats within Shaft 8 / Section 9	18
Appendices	19
Appendix A. MAVIS Coefficients of Similarity	20
Appendix B. Legislation table	22

Tables

Table 1-1 – Surface work locations along the Pipeline Scheme (numbered from south to north)	5
Table 2-1 – Percentage cover with Domin values	7
Table 3-1 – NVC frequency table for MG10a <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture community	9
Table 3-2 – NVC frequency table for MG10a <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush pasture community	11
Table 3-3 – NVC frequency table for MG6b <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> , <i>Anthoxanthum odoratum</i> sub-community	12
Table 3-4 – NVC frequency table for MG9 <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> community	13
Table 3-5 – NVC frequency table for MG5a <i>Cynosurus cristatus</i> - <i>Centaurea nigra</i> community	15
Table A-1 - Coefficients of similarity for quadrats Q1, Q18	20
Table A-2 - Coefficients of similarity for quadrats Q2, Q4, Q5, Q7, Q17	20
Table A-3 - Coefficients of similarity for quadrats Q9, Q10, Q11, Q14, Q16	20
Table A-4 - Coefficients of similarity for quadrats Q3, Q6, Q8, Q12	21
Table A-5 - Coefficients of similarity for quadrats Q13, Q15	21

1. Introduction

1.1. Terms of reference

- 1.1.1. AtkinsRéalis (formerly Atkins Limited) was commissioned to undertake a botanical survey of Staunton Country Park (SCP) and Great Copse field in connection with the installation of a pipeline between the Bedhampton Springs at the Bedhampton pumping station and the Havant Thicket Reservoir.
- 1.1.2. The Scheme is located near Havant, Portsmouth, as shown on Figure 9.6 in the Environmental Statement (ES) Volume 3 (hereafter referred to as the Site).
- 1.1.3. A number of potential priority habitats were identified within SCP, during an initial UK Habitat (UKHab) Classification walkover survey undertaken between January and March 2023. The results are presented within Appendix A9.16: Pipeline Ecological Update¹. Following these observations, further botanical survey to establish a baseline to inform the assessment and help design mitigation measures, was undertaken, as stipulated in Appendix A9.17: Pipeline Ecological Management and Monitoring Plan².
- 1.1.4. This report summarises the details of the botanical surveys undertaken, including the methods used and results of the surveys.

1.2. The scheme

- 1.2.1. The objective of the Havant Thicket Reservoir Scheme is to provide a new resource to supply drinking water in the water-stressed South East of England, while maximising the community and environmental benefits of a new raw water reservoir.
- 1.2.2. The reservoir, when constructed, will be filled with surplus water drawn from the Bedhampton Springs at the Bedhampton pumping station. This will be when flows are at their highest in winter via a new pipeline, and will provide water supplies to Portsmouth Water customers in the summer months as required. The Scheme will also enable additional water to be supplied to Southern Water. Southern Water has a forecast deficit in water resources in the Hampshire area, created by the reduction in abstraction from the internationally designated River Itchen and the nationally designated River Test, as agreed with the Environment Agency (EA).
- 1.2.3. As well as augmenting water supplies and increasing the resilience of water resource management in the South East, the reservoir would provide a new recreational resource adjacent to one of the more deprived areas in South East Hampshire, in a location which the community can access on foot, by bike, or through existing bus routes. It also offers further opportunities to improve the wider footpath, cycleway and bridleway networks in the area. More than 29,500 people live within reasonable walking distance of the Site (1.5 km) and 120,000 people live within reasonable cycling distance (4.5 km).
- 1.2.4. The Scheme would provide a new wetland habitat and associated area for nature conservation. The proximity of the reservoir to the internationally important Langstone and Chichester Harbour means that it may be used as a safe retreat for qualifying bird species when there is disturbance in the Harbour Special Protection Area (SPA) and Special Area of Conservation (SAC). The construction of the reservoir will result in substantial reductions in nutrient loads to the harbour.
- 1.2.5. The proposed pipeline would transfer water from Bedhampton Springs to fill the reservoir in the winter and draw water off for treatment and supply when needed in the summer. It would also be used for emergency drawdown should the reservoir levels need to be reduced in emergency conditions, in accordance with the EA safety guidance.
- 1.2.6. The Scheme is allocated in the adopted Havant Borough Council (HBC) and East Hampshire District Council (EHDC) Local Plans. Further information and details can be found in the Planning Statement, which accompanies the planning applications.
- 1.2.7. The details of the Scheme, as they are currently understood, are shown on Figure 9.6 Site location in ES Volume 3.

¹ AtkinsRéalis (2024). Havant Thicket Reservoir: Appendix A9.16 Pipeline Ecological Update

² AtkinsRéalis (2024). Havant Thicket Reservoir: Appendix A9.17 Pipeline Ecological Management and Monitoring Plan

1.3. The site

- 1.3.1. The Pipeline Scheme extends from the Bedhampton pumping station, northwards through the Leigh Park housing estate in Havant under roads and open spaces. It runs north/north-east adjacent to Hermitage Stream and Riders Lane Stream before heading north-west through Staunton Country Park. The pipeline then crosses into the footprint of the reservoir itself.
- 1.3.2. The Pipeline Scheme comprises seven underground-only work locations (the drilled sections) and ten surface work locations, collectively referred to as ‘the Site’ in this report. The surface works comprise of eight Shafts, and two Sections where the pipeline will be installed via open-cut methodology. The location of each surface work location is detailed in Table 1-1. The surface work location ID will be used to reference the specific surface works locations, where required, throughout the report.

Table 1-1 – Surface work locations along the Pipeline Scheme (numbered from south to north)

Surface work location ID	Central Ordnance Survey National Grid Reference (OSNGR)
Bedhampton site/Shaft 1	SU 70557 06332
Shaft 2	SU 70700 06893
Shaft 3	SU 70863 07175
Shaft 4	SU 71123 07331
Emergency Discharge Chamber	SU 71009 07562
Shaft 5	SU 71183 07793
Shaft 6	SU 71291 08166
Shaft 7	SU 71611 08293
Shaft 8	SU 71832 08741
Section 9	SU 71717 08900
Section 10	SU 71123 09746

- 1.3.3. The habitats present throughout the Site (surface works locations only) comprise broadleaved mixed and yew woodland, including wet woodland and lowland mixed deciduous woodland, other neutral and modified grassland, dense scrub and tree lines intersected by rivers and streams (Hermitage or Riders Lane Stream). At the northern end of the Pipeline Scheme, the Site intersects Staunton Country Park, which includes various designations within its boundary and continues into the reservoir site, which formerly comprised other neutral grassland, purple moor grass and rush pasture and lowland mixed deciduous woodland, but has since been replaced with an active construction site for the main Havant Thicket Reservoir scheme.

1.4. Scope of the assessment

- 1.4.1. A desk study and UKHab Classification walkover survey were undertaken between January and March 2023. The surveys identified two priority habitats (purple moor grass and rush pasture, and wet woodland) within High Lawn and Thicket Lawn Sites of Importance for Nature Conservation (SINC)¹. Both High Lawn and Thicket Lawn SINC, and priority habitats, are due to be impacted by the construction activities required at Shaft 8/Section 9. As such, as detailed in Appendix A9.17¹, a botanical survey was undertaken to support the assessment and the development of mitigation approaches and the reinstatement strategy. In addition to the two SINC, a further area of potential botanical interest was highlighted by stakeholders and is referred to as ‘Great Copse field’ located immediately to the north of Great Copse ancient woodland. This area will be used temporarily for construction access and working area for the culvert upgrade beneath Middle Park Way, and has been included in the further botanical survey.

- 1.4.2. This report presents the results of the detailed vegetation survey undertaken on 26th-27th July and 7th September 2023 for High Lawn SINC, Thicket Lawn SINC and Great Copse field.

2. Methodology

2.1. Survey area

- 2.1.1. High Lawn and Thicket Lawn SINC are present within Staunton Country Park and were surveyed in their entirety, despite extending beyond the redline boundary of the Pipeline Scheme, to account for the zone of influence of the Pipeline Scheme in relation to priority habitats. Great Copse field was surveyed in its entirety also (grassland habitats only).
- 2.1.2. The Survey Area is shown Figure 9.8 in Volume 3.

2.2. Surveyor competency

- 2.2.1. The surveys were led by a surveyor who has been assessed as 'accomplished' in habitat survey following the Chartered Institute of Ecology and Environmental Management (CIEEM) competency framework³, and holds a Botanical Society of Britain and Ireland (BSBI) Field Identification Skills Certificate (FISC) Level 5⁴.

2.3. Vegetation sampling

- 2.3.1. The baseline detailed vegetation survey was carried out using the National Vegetation Classification (NVC) system and in accordance with current survey guidelines (Rodwell 1991⁵, Rodwell 1992⁶ and Rodwell 2006⁷). The NVC provides a standardised system for classifying and mapping semi-natural vegetation communities and ensures that surveys are carried out to a consistent level of detail and accuracy.
- 2.3.2. Surveyors identified areas of similar vegetation (homogeneous stands) within grassland and rush pasture that could be classified as separate communities using the NVC system. Using their professional judgement, the surveyors identified sampling points in areas considered to be representative of the homogeneous stand.
- 2.3.3. At each sampling point, a square sampling plot (quadrat) was marked out, within which the presence and abundance of each plant species was recorded. All quadrats measured 2 x 2 m within the various habitat types. A total of 18 quadrats were surveyed, ten within High Lawn, seven within Thicket Lawn, and an additional quadrat in Great Copse field. Of the 18 total quadrats, 11 were sampled within the Pipeline Scheme boundary.
- 2.3.4. Within each quadrat, an estimation of the cover of each species identified was made. Cover was taken as the vertical projection on to the ground of the extent of the living parts of the species. It was estimated using the Domin Scale⁷, which groups percentage cover into ten ranges, with a value (1-10) given as the estimate of percentage cover (see Table 2-1). The sampling process generated a list of plant species and associated Domin values for each quadrat sample.

³ <https://www.cieem.net/competency-framework>

⁴ The Field Identification Skills Certificate (FISC) is a test that determines botanical skill level run by the Botanical Society for Britain and Ireland (BSBI). Levels range from 1 (beginner) to 5 (professional), with 6 being awarded in exceptional case. Level 4 is the expected minimum level required for consultants undertaking botanical surveys.

⁵ Rodwell, J.S. (ed.) (1991) *British Plant Communities. Volume 1. Woodlands and scrub*. University Press: Cambridge.

⁶ Rodwell, J. S. (ed.) (1992) *British Plant Communities. Volume 3. Grassland and montane communities*. University Press: Cambridge.

⁷ Rodwell, J.S. (2006) NVC Users' Handbook. JNCC: Peterborough.

Table 2-1 – Percentage cover with Domin values

Domin Value	Percentage Cover	Median Percentage Cover used for MAVIS analyses (see section 2.4)
1	<4 % / few individuals	1 %
2	<4 % / some individuals	2 %
3	<4 % / many individuals	3 %
4	4-10 %	7 %
5	11-25 %	18 %
6	26-33 %	30 %
7	34-50 %	44 %
8	51-75 %	63 %
9	76-90 %	83 %
10	91-100 %	96%

2.4. Analysis

- 2.4.1. In line with Rodwell (2006)⁷, a combination of analysis techniques were used to determine NVC communities.
- 2.4.2. NVC communities were identified by surveyor experience using keys and written descriptions presented in NVC plant community references^{5,6}. Following the initial identification, determination of NVC communities was verified using the computer programme Modular Analysis of Vegetation Information System (MAVIS)⁸, which uses a similarity algorithm to indicate the ten NVC communities and sub-communities that align most strongly between quadrat data and community profiles in the NVC database. Due to the range in percentage cover attributed to each Domin value, the median percentage within the Domin value range for each was inputted into MAVIS. The conversion for these percentages is shown in Table 2-1 above.
- 2.4.3. The coefficient of similarity generated by MAVIS (calculated as a percentage) was used to improve the confidence with which data collected could be assigned to a particular NVC community. Coefficients below 40% were considered to represent particularly poor fits, while coefficients of 50% or over were considered particularly good fits. Where the coefficients were between 40% and 49%, NVC communities were assigned based on the professional judgement of the surveyor; as described above.

2.5. Limitations

- 2.5.1. This section identifies any limitations to the survey and provides an explanation as to the effect of these on the vegetation classification.
- 2.5.2. Botanical surveys are limited by factors which affect the presence of plants such as the time of year and weather conditions. Therefore, the survey has not produced a complete list of plants and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the survey has been undertaken during the period when most grassland species are conspicuous and identifiable. Although a fully exhaustive list cannot be guaranteed, it is considered unlikely that any protected, notable or key community indicator species would have been missed.
- 2.5.3. While NVC is the accepted good practice classification system, no vegetation classification system can fully describe the variability of natural habitats⁹. However, the NVC should be seen as a first approximation with regard to vegetation communities and is used as a working tool for the description, assessment and study of vegetation. Therefore, although NVC does not account for

⁸ Smart, S., 2016. Modular Analysis of Vegetation Information System (MAVIS). DART Computing & Centre for Ecology & Hydrology.

⁹ Rodwell, J.S. (ed.) (2006) *National Vegetation Classification: Users' handbook*. University Press: Cambridge.

some of the variability, it is the best system available and, therefore, this limitation is not considered significant.

- 2.5.4. Due to time constraints, and the mosaic of habitats within the Survey Area, only 18 quadrats were surveyed. This resulted in a number of habitat parcels only being sampled by two or three quadrats, providing a small dataset relative to typical NVC surveys. This lack of detailed survey information can result in low MAVIS similarity coefficients which indicates low confidence in the chosen community. However, the NVC analysis incorporates surveyor judgement and previous botanical survey data for this site^{10,11}, with the MAVIS results taken as quantitative evidence. Where the MAVIS results have returned low-confidence similarity scores, surveyor judgement has taken priority.

¹⁰ Hampshire Biodiversity Information Centre (2017). Survey Summary: High Lawn

¹¹ Hampshire Biodiversity Information Centre (2017). Survey Summary: Thicket Lawn

3. Results

3.1. Vegetation descriptions

- 3.1.1. The Shaft 8/Section 9 working area is largely split between two fields in Staunton Country Park; High Lawn and Thicket Lawn. The topography, and resulting habitat type, is very different between these two fields, the results have therefore been presented as such. The grassland at Great Copse field has been grouped with High Lawn, due to the similarity in grassland habitat type.
- 3.1.2. The NVC habitat map, including quadrat locations, is presented Figure 9.8 in Volume 3. The full table of coefficients of similarity returned by MAVIS, for each habitat type, is presented in Appendix A.

3.2. High lawn

Rush pasture

- 3.2.1. Patches of rush pasture were recorded throughout High Lawn, largely present on poorly drained soils at the base of a major slope within the field.
- 3.2.2. The NVC analysis¹² indicates that this is a MG10 *Holcus lanatus*-*Juncus effusus* rush-pasture community, with a similarity coefficient of 47.06%. The community is characterised by the dominance of soft rush, Yorkshire fog and creeping bent, which were all present within the quadrats. A similarity coefficient of 50.00 % was returned for the soft rush-dominated MG10a sub-community. Table 3-1 below gives the Domin score (1 to 10) for each species across the five quadrats sampled in this habitat. Blue fill in the table indicates an absence of species.

Table 3-1 – NVC frequency table for MG10a *Holcus lanatus*-*Juncus effusus* rush-pasture community

Common name	Scientific name	Sample (quadrat number)				
		Q2	Q4	Q5	Q7	Q17
Creeping bent	<i>Agrostis stolonifera</i>	7	4	5	2	4
Yorkshire fog	<i>Holcus lanatus</i>	6	4	4	2	4
Clustered dock	<i>Rumex conglomeratus</i>	1	2	2	2	2
Sharp-flowered rush	<i>Juncus acutiflorus</i>	10	10	4	9	
Greater bird's-foot-trefoil	<i>Lotus pedunculatus</i>	3	8	7	6	
Hairy sedge	<i>Carex hirta</i>	7	4	7	5	
Meadow foxtail	<i>Alopecurus pratensis</i>	4		6	2	7
Creeping cinquefoil	<i>Potentilla reptans</i>	3		4	3	5
Velvet bent	<i>Agrostis canina</i>	4	4	5		2
Common sorrel	<i>Rumex acetosa</i>	1	2	2	4	
Sweet vernal-grass	<i>Anthoxanthum odoratum</i>	2	6	2		
Meadow buttercup	<i>Ranunculus acris</i>		2	2	1	
Soft rush	<i>Juncus effusus</i>			8		6

¹² NVC is determined using a combination of keys, studying descriptions and MAVIS, as well as surveyor judgement.

Common name	Scientific name	Sample (quadrat number)				
		Q2	Q4	Q5	Q7	Q17
Hairy sedge	<i>Carex hirta</i>			4		8
Common mouse-ear	<i>Cerastium fontanum</i>			1	1	
Bramble	<i>Rubus fruticosus</i>	1				1
Meadow fescue	<i>Festuca pratensis</i>					5
Red fescue	<i>Festuca rubra</i>				5	
Common bent	<i>Agrostis capillaris</i>				4	
Tufted hairgrass	<i>Deschampsia cespitosa</i>					4
Meadow barley	<i>Hordeum secalinum</i>					4
Common bird's-foot trefoil	<i>Lotus corniculatus</i>			4		
Field horsetail	<i>Equisetum arvense</i>	2				
Compact rush	<i>Juncus conglomeratus</i>			2		
Hard rush	<i>Juncus inflexus</i>	2				
Rough meadow-grass	<i>Poa trivialis</i>				2	
Silverweed	<i>Potentilla anserina</i>				2	
Creeping buttercup	<i>Ranunculus repens</i>		2			
Rye brome	<i>Bromus secalinus</i>				1	
Crested dog's-tail	<i>Cynosurus cristatus</i>			1		
Common couch	<i>Elymus repens</i>			1		
Creeping jenny	<i>Lysimachia nummularia</i>	1				
Lesser stitchwort	<i>Stellaria graminea</i>				1	

- 3.2.3. Isolated parcels of inundated rush pasture are present within High Lawn, comprising a single patch located downstream of a wet woodland at the south of Shaft 8, and a patch to the east of High Lawn (outside of the Pipeline Scheme boundary). Water mint, Yorkshire fog, creeping buttercup and clustered dock were recorded in both quadrats. The habitat type within quadrat 18 is likely a product of the surrounding topography, which experiences greater inundation than other MG10a parcels throughout High Lawn.
- 3.2.4. As well as MG10a, quadrat 1 has similarity to the M27c *Filipendula ulmaria*-*Angelica sylvestris* mire *Juncus effusus*-*Holcus lanatus* sub-community. This community is typically recorded in moist soils, largely protecting from grazing, at the base of flushes or bordering slow-moving streams. These conditions are comparable to those recorded within the area surrounding quadrat 1, however, the lack of survey data results in low confidence and, therefore, cannot be accurately distinguished from the surrounding MG10a communities.
- 3.2.5. Table 3-2 below gives the Domin score (1 to 10) each species across the two quadrats sampled in this habitat. Blue fill in the table indicates an absence of species.

Table 3-2 – NVC frequency table for MG10a *Holcus lanatus*-*Juncus effusus* rush pasture community

Common name	Scientific name	Sample (quadrat number)	
		Q1	Q18
Water mint	<i>Mentha aquatica</i>	8	7
Yorkshire fog	<i>Holcus lanatus</i>	7	7
Creeping buttercup	<i>Ranunculus repens</i>	4	2
Clustered dock	<i>Rumex conglomeratus</i>	4	2
Common nettle	<i>Urtica dioica</i>	2	2
Hairy sedge	<i>Carex hirta</i>		6
Hard rush	<i>Juncus inflexus</i>		6
Watercress	<i>Nasturtium officinale</i>	6	
Floating sweet-grass	<i>Glyceria fluitans</i>	5	
Gypsywort	<i>Lycopus europaeus</i>		5
Meadow fescue	<i>Festuca pratensis</i>		4
Soft rush	<i>Juncus effusus</i>	4	
Creeping bent	<i>Agrostis stolonifera</i>	3	
Hoary willowherb	<i>Epilobium parviflorum</i>		3
Creeping jenny	<i>Lysimachia nummularia</i>		3
Common sorrel	<i>Rumex acetosa</i>		2
Remote sedge	<i>Carex remota</i>	1	
Creeping thistle	<i>Cirsium arvense</i>		1
Marsh thistle	<i>Cirsium palustre</i>	1	
Meadowsweet	<i>Filipendula ulmaria</i>		1
Square-stalked St. John's Wort	<i>Hypericum tetrapterum</i>	1	
Sharp-flowered rush	<i>Juncus acutiflorus</i>	1	
Meadow vetchling	<i>Lathyrus pratensis</i>		1
Water pepper	<i>Persicaria hydropiper</i>	1	
Silverweed	<i>Potentilla anserina</i>		1
Bittersweet	<i>Solanum dulcamara</i>	1	
Bog stitchwort	<i>Stellaria alsine</i>	1	

Wet woodland

- 3.2.6. A seasonal stream runs through the woodland to the south of High Lawn, creating wet to waterlogged soil, this soil profile gives rise to a willow-dominated canopy. The species found within the field layer of the woodland are largely listed within quadrat 1 (paragraph 3.2.3). The species

comprise marsh thistle, meadowsweet, nettle and water mint, all of which are species characteristic of a swamp or fen community, which is often associated with wet woodland.

- 3.2.7. A parcel of marshy woodland within Thicket Lawn consists of a mix of willow, elm, oak and poplar, which suits the profile of wet woodland.
- 3.2.8. The species present within both woodlands are indicative of the NVC wet woodland community W1 *Salix cinerea-Galium palustre*.

Grassland

- 3.2.9. A large proportion of High Lawn is dominated by heavily grazed pasture, found on moist but freely drained soil. Great Copse field, outside of High Lawn, is also very similar but is regularly mown rather than grazed. The NVC analysis¹² indicates that the grassland is MG6 *Lolium perenne-Cynosurus cristatus*, which is the major permanent pasture type found in lowland Britain.
- 3.2.10. Sweet vernal-grass is present in all four quadrats which indicates the MG6b *Anthoxanthum odoratum* sub-community with a similarity coefficient of 59.24%. The presence of common sorrel and red fescue is typical of this community, however, common bird's-foot trefoil is not usually consistent with this sub-community but is with the typical MG6a *Lolium-Cynosurus* grassland sub-community. Table 3-3 below gives the Domin score (1 to 10) for each species across the four quadrats sampled in this community. Blue fill in the table indicates an absence of species.

Table 3-3 – NVC frequency table for MG6b *Lolium perenne-Cynosurus cristatus*, *Anthoxanthum odoratum* sub-community

Common name	Scientific name	Sample (quadrat number)			
		Q3	Q6	Q8	Q12
Red fescue	<i>Festuca rubra</i>	3	5	4	7
Common bird's-foot trefoil	<i>Lotus corniculatus</i>	4	3	4	4
Sweet vernal-grass	<i>Anthoxanthum odoratum</i>	1	4	2	1
Common sorrel	<i>Rumex acetosa</i>	2	2	2	2
Perennial ryegrass	<i>Lolium perenne</i>	1		2	8
Yorkshire fog	<i>Holcus lanatus</i>	5	5	6	
Meadow buttercup	<i>Ranunculus acris</i>	2	2	2	
Common bent	<i>Agrostis capillaris</i>		8	9	
Cat's-ear	<i>Hypochaeris radicata</i>		7		1
Common bent	<i>Agrostis capillaris</i>	3			5
Pignut	<i>Conopodium majus</i>		2	1	
Ribwort plantain	<i>Plantago lanceolata</i>		2		1
Velvet bent	<i>Agrostis canina</i>	8			
Tormentil	<i>Potentilla erecta</i>			7	
Hairy sedge	<i>Carex hirta</i>	5			
Pill sedge	<i>Carex pilulifera</i>		5		
Crested dog's tail	<i>Cynosurus cristatus</i>	5			
White clover	<i>Trifolium repens</i>	5			
Meadow foxtail	<i>Alopecurus pratensis</i>	4			
Cock's-foot	<i>Dactylis glomerata</i>			4	

Common name	Scientific name	Sample (quadrat number)			
		Q3	Q6	Q8	Q12
Creeping cinquefoil	<i>Potentilla reptans</i>	4			
Red clover	<i>Trifolium pratense</i>	3			
Common knapweed	<i>Centaurea nigra</i>				2
Meadow barley	<i>Hordeum secalinum</i>	2			
Hard rush	<i>Juncus inflexus</i>	2			
Field wood-rush	<i>Luzula campestris</i>				2
Corky-fruited water-dropwort	<i>Oenanthe pimpinelloides</i>	2			
Creeping cinquefoil	<i>Potentilla reptans</i>				2
Lesser stitchwort	<i>Stellaria graminea</i>		2		
Dandelion	<i>Taraxacum officinale</i>				2
Yarrow	<i>Achillea millefolium</i>		1		
Agrimony	<i>Agrimonia eupatoria</i>	1			
Bittercress	<i>Cardamine hirsuta</i>				1
Creeping thistle	<i>Cirsium arvense</i>			1	
Timothy	<i>Phleum pratense</i>			1	
Pedunculate oak	<i>Quercus robur</i>		1		
Lesser stitchwort	<i>Stellaria graminea</i>				1
Red clover	<i>Trifolium pratense</i>			1	
Germander speedwell	<i>Veronica chamaedrys</i>		1		

3.3. Thicket lawn

Damp grassland

- 3.3.1. The grassland recorded throughout Thicket Lawn is found on permanently moist soils, which appear to be subject to periodic flooding and/or poor-drainage. Tufted hair-grass is dominant, as well as Yorkshire fog, cock's foot and false oat-grass. The grassland is managed by a late-season hay cut and, therefore, there is not the grazing pressure as is in High Lawn.
- 3.3.2. The NVC analysis¹² indicates that the grassland is an MG9 *Holcus lanatus-Deschampsia cespitosa* community, with a similarity coefficient of 58.64 %. This community is characterised by an abundance of tufted hair-grass and Yorkshire fog. Red fescue, meadow foxtail, cock's-foot and meadow buttercup were recorded in local abundance or high frequency, which is typical for this community. Table 3-4 below gives the Domin score (1 to 10) for each species across the five quadrats sampled in this habitat. Blue fill in the table indicates an absence of species.

Table 3-4 – NVC frequency table for MG9 *Holcus lanatus-Deschampsia cespitosa* community

Common name	Scientific name	Sample (quadrat number)				
		Q9	Q10	Q11	Q14	Q16
Creeping cinquefoil	<i>Potentilla reptans</i>	8	8	6	6	7

Common name	Scientific name	Sample (quadrat number)				
		Q9	Q10	Q11	Q14	Q16
Yorkshire fog	<i>Holcus lanatus</i>	4	4	2	2	6
Hairy sedge	<i>Carex hirta</i>	4	4	2	2	4
Meadow vetchling	<i>Lathyrus pratensis</i>	3	4	2	1	2
Tufted vetch	<i>Vicia cracca</i>	2	3	2	1	2
Tufted hair-grass	<i>Deschampsia cespitosa</i>	5		5	6	7
Common bent	<i>Agrostis capillaris</i>	7	4	5		3
Compact rush	<i>Juncus conglomeratus</i>	2	4		2	6
Meadow foxtail	<i>Alopecurus pratensis</i>		5	7	7	
Red fescue	<i>Festuca rubra</i>	6	5	5		
Common bird's-foot-trefoil	<i>Lotus corniculatus</i>	6	5	5		
Hoary ragwort	<i>Jacobaea erucifolia</i>	1	6	2		
Common sorrel	<i>Rumex acetosa</i>	2		2		5
Cock's-foot	<i>Dactylus glomerata</i>	4		4	4	
Sweet vernal-grass	<i>Athoxanthum odoratum</i>	2	4	2		
Sneezewort	<i>Achillea ptarmica</i>	2	1	4		
Meadow buttercup	<i>Ranunculus acris</i>	2	2	2		
Greater pond sedge	<i>Carex riparia</i>				5	9
Common knapweed	<i>Centaurea nigra</i>		8	1		
Hard rush	<i>Juncus inflexus</i>				6	1
Creeping thistle	<i>Cirsium arvense</i>				2	5
Corky-fruited water-dropwort	<i>Oenanthe pimpinelloides</i>		4	2		
Tall fescue	<i>Schedonorus arundinacea</i>		2	4		
Meadow barley	<i>Hordeum secalinum</i>		1	3		
Meadow fescue	<i>Schedonorus pratensis</i>		2	2		
Creeping buttercup	<i>Ranunculus repens</i>				1	2
False oat-grass	<i>Arrhenatherum elatius</i>	4				
Greater bird's-foot-trefoil	<i>Lotus pedunculatus</i>					4
Blackthorn	<i>Prunus spinosa</i>	4				
Clustered dock	<i>Rumex conglomeratus</i>				4	

Common name	Scientific name	Sample (quadrat number)				
		Q9	Q10	Q11	Q14	Q16
Soft rush	<i>Juncus effusus</i>				2	
Lesser stitchwort	<i>Stellaria graminea</i>			2		
Agrimony	<i>Agrimonia eupatoria</i>			1		
Dropwort	<i>Filipendula vulgaris</i>				1	
Sharp-flowered rush	<i>Juncus acutiflorus</i>	1				
Yellow loosestrife	<i>Lysimachia vulgaris</i>				1	
Field rose	<i>Rosa arvensis</i>	1				
Bramble	<i>Rubus fruticosus</i>				1	

Lowland meadow

- 3.3.3. Two habitat parcels recorded in Thicket Lawn have species indicative of grassland that has been subject to previous hay-meadow treatment. No species dominates, with many similar species between both parcels of scarce or occasional frequency.
- 3.3.4. The NVC analysis¹² indicates that the grassland is an MG5a *Cynosurus cristatus*-*Centaurea nigra* grassland, *Lathyrus pratensis* sub-community. The similarity coefficient produced by MAVIS is 36.24 %, which indicates low confidence. However, the community has been assigned based on surveyor judgement and in reference to a previous botanical survey¹¹. Red fescue, crested dog's-tail and common bent are abundant, as well as Yorkshire fog present in lower abundance. Table 3-5 below gives the Domin score (1 to 10) for each species across the two quadrats sampled in this habitat. Blue fill in the table indicates an absence of species.

Table 3-5 – NVC frequency table for MG5a *Cynosurus cristatus*-*Centaurea nigra* community

Common name	Scientific name	Sample (quadrat number)	
		Q13	Q15
Creeping cinquefoil	<i>Potentilla reptans</i>	10	6
Red fescue	<i>Festuca rubra</i>	5	7
Velvet bent	<i>Agrostis canina</i>	6	5
Compact rush	<i>Juncus conglomeratus</i>	6	4
Common bent	<i>Agrostis capillaris</i>	4	5
Meadow foxtail	<i>Alopecurus pratensis</i>	4	5
Meadow fescue	<i>Festuca pratensis</i>	5	4
Common knapweed	<i>Centaurea nigra</i>	1	5
Hoary ragwort	<i>Jacobaea erucifolia</i>	4	4
Sweet vernal grass	<i>Anthoxanthum odoratum</i>	4	3
Yorkshire fog	<i>Holcus lanatus</i>	4	2
Tufted hairgrass	<i>Deschampsia cespitosa</i>	1	4
Greater bird's-foot-trefoil	<i>Lotus corniculatus</i>	3	3
Common sorrel	<i>Rumex acetosa</i>	2	1

Common name	Scientific name	Sample (quadrat number)	
		Q13	Q15
Tufted vetch	<i>Vicia cracca</i>	2	1
Meadow vetchling	<i>Lathyrus pratensis</i>	1	1
Hairy sedge	<i>Carex hirta</i>	5	
Meadow barley	<i>Hordeum secalinum</i>		5
Sneezewort	<i>Achillea ptarmica</i>		4
Hard rush	<i>Juncus inflexus</i>		4
Agrimony	<i>Agrimonia eupatoria</i>		2
Glaucous sedge	<i>Carex flacca</i>		2
Corky-fruited water-dropwort	<i>Oenanthe pimpinelloides</i>		2
Bulbous buttercup	<i>Ranunculus bulbosus</i>		1

4. Discussion

4.1. High lawn

- 4.1.1. A total area of approximately 3.6 ha was classified using the NVC as MG10a *Holcus lanatus*-*Juncus effusus* rush pasture. This community is characteristic of strongly impeded drainage in a wide range of soils of varying pH throughout the British lowlands. Much of the MG10 rush pasture was recorded at the base of a slope, where surface water run-off collects. This kind of vegetation is widely distributed in pastures, often grazed between clumps of rushes which can strongly affect the vegetation. It is common to see a patchwork of isolated clumps of MG10 rush pasture, amidst a background of preferentially grazed MG6 *Lolium perenne*-*Cynosurus cristatus* grassland.
- 4.1.2. This patchwork is evident within High Lawn, with the dominant community recorded being MG6b *Lolium*-*Cynosurus* grassland, *Anthoxanthum odoratum* sub-community at a total area of approximately 7.9 ha. The grassland has been heavily grazed, which can strongly affect the vegetation, evident by the low abundance of crested dog's-tail and perennial ryegrass recorded. The MG6b *Anthoxanthum odoratum* sub-community is indicative of somewhat more acidic soils, where pastures have been derived from MG5 *Cynosurus*-*Centaurea* meadows.
- 4.1.3. Two small patches of rush pasture (Q1, Q18) were also recorded as the MG10a *Holcus*-*Juncus* rush pasture, however, differ largely in species composition to the other MG10a parcels due to the surrounding topography causing periodic inundation. Elements of the M27c *Filipendula ulmaria*-*Angelica sylvestris* mire *Juncus effusus*-*Holcus lanatus* sub-community is present within Q1. Whilst this community would suit the conditions within this area of High Lawn, the M27c community cannot be accurately assigned due to the lack of survey data for this habitat type.
- 4.1.4. It is likely that the habitat to the south of High Lawn at Q1 is influenced by the waterlogged soils that have given rise to the wet woodland. The field layer associated with wet woodland is often a typical swamp or fen community which would explain the influence of the M27c mire community. It is likely that this habitat is in transition from a mire community to rush pasture where it grades from the wet woodland to the wider, less waterlogged, field.

4.2. Great Copse field

- 4.2.1. Similarly to the grassland within High Lawn, the grassland within Great Copse field was classified as MG6b *Lolium*-*Cynosurus* grassland, *Anthoxanthum odoratum* sub-community, comprising a total area of approximately 0.7 ha. Unlike High Lawn, the grassland has not been heavily grazed but is managed by regular mowing, as the field is used recreationally for dog walking. The habitat in this field is homogenous, with the MG6b grassland type the only habitat recorded within this area.

4.3. Thicket lawn

- 4.3.1. A total area of approximately 7.1 ha was classified using the NVC as MG9 *Holcus lanatus*-*Deschampsia cespitosa* grassland. The community found within the Pipeline Scheme boundary in Thicket Lawn is largely homogenous, with five quadrats spread throughout the field consistently recording MG9-typical species such as tufted hair-grass, Yorkshire fog and false oat-grass. The grassland is highly characteristic of permanently moist, gleyed and periodically inundated circumneutral soils that is widespread throughout the British lowlands. In the centre of this grassland is a single parcel of isolated wet woodland, likely influenced by the surrounding, damper habitat type.
- 4.3.2. Two parcels of lowland meadow priority habitat were recorded towards the north of Thicket Lawn, outside of the Pipeline Scheme boundary. The species found within the quadrats are indicative of the MG5a *Cynosurus cristatus*-*Centaurea nigra* grassland *Lathyrus pratensis* sub-community. MG5

grasslands are listed in various sources as a corresponding NVC grassland type for lowland meadow priority habitat^{13,14,15}.

- 4.3.3. The MAVIS results returned a similarity coefficient of 42.49 % for the MG4 *Alopecurus pratensis-Sanguisorba officinalis* grassland, higher than returned for the MG5a community. It is difficult to accurately classify this habitat type due to the low sampling frequency, which skews the frequency values of species abundance between quadrats. However, as per section 2.5.4 (Limitations), surveyor judgement and previous botanical data^{10,11} contributed to the NVC analysis where there was any doubt to the NVC type assigned. Whilst MAVIS had higher confidence in the MG4 community, the absence of great burnet within the quadrats and previous botanical data led the surveyor to assign the habitat as MG5a.

4.4. Summary of Habitats within Shaft 8 / Section 9

- 4.4.1. There is a mosaic of habitats throughout Staunton Country Park, and variation between Thicket Lawn and High Lawn. However, the habitats found within the Pipeline Scheme boundary of Shaft 8 are largely homogenous. Comprising MG9 *Holcus-Deschampsia* grassland to the north, and MG10a *Holcus-Juncus* rush pasture or MG6b *Lolium-Cynosurus* grassland to the south.
- 4.4.2. Two parcels of wet woodland are present, one within High Lawn and one within Thicket Lawn. The revised 2011 JNCC priority habitat description for wet woodland¹⁶ include W1 *Salix-Galium* woodland as a corresponding NVC woodland type for the priority habitat wet woodland.
- 4.4.3. No purple moor-grass and rush pasture priority habitat was recorded during the NVC survey. This habitat type is classified as M26 *Molinia caerulea-Crepis paludosa* mire, none of which was recorded during the survey. Whilst a limited number of quadrats were used for certain habitat types, for example the MG5a community, the habitat within the Pipeline Scheme boundary was adequately sampled. The similarity coefficients for each habitat type within the Pipeline Scheme boundary were between 47-59 %, which indicates high confidence in the chosen community.

4.5. Report validity

- 4.5.1. In the event of scope or programme changes or if works do not commence within 12 months of the date of this report, then updates to the surveys may be required to ensure the validity of the data, as per CIEEM guidance¹⁷.

¹³ Maddock, A. (ed) (2008). UK Biodiversity Action Plan: Priority Habitat Descriptions - Lowland Meadows.

¹⁴ Jefferson, R.G., Smith, S.L.N. & MacKintosh, E.J. (2019). Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 3 Lowland Grasslands. Joint Nature Conservation Committee (JNCC), Peterborough. <https://data.jncc.gov.uk/data/cf50f420-1b38-4253-89f8-1cb7ba010f27/SSSI-Guidelines-3-LowlandGrasslands-2019.pdf> Accessed 28/09/2023

¹⁵ UKHab Ltd (2023). UK Habitat Classification Version 2.0

¹⁶ Maddock, A. (ed) (2011). UK Biodiversity Action Plan: Priority Habitat Descriptions

¹⁷ CIEEM (2019) Advice Note on the Lifespan of Ecological Reports and Surveys

Appendices



Appendix A. MAVIS Coefficients of Similarity

Table A-1 - Coefficients of similarity for quadrats Q1, Q18

NVC Community/Sub-community	Coefficient of Similarity
M28	42.17
MG10b	41.75
MG10	41.61
OV26c	41.2
OV26	40.63
MG10a	40.6
MG9	40.26
M28b	39.24
MG9a	38.61
M27c	37.4

Table A-2 - Coefficients of similarity for quadrats Q2, Q4, Q5, Q7, Q17

NVC Community/Sub-community	Coefficient of Similarity
MG4c	50.06
MG10a	50
MG9	47.92
MG10	47.06
MG8v2	47.01
MG9a	45.79
MG8b	45.48
M23a	45.03
MG4d	44.67
MG10b	44.28

Table A-3 - Coefficients of similarity for quadrats Q9, Q10, Q11, Q14, Q16

NVC Community/Sub-community	Coefficient of Similarity
MG9	58.64
MG9b	55.45
MG9a	52.3
MG4c	52.29
MG4v2	49.07
MG4b	47.38
MG4d	46.99

NVC Community/Sub-community	Coefficient of Similarity
MG7C	41.59
MG8a	41.31
MG8v2	41.15

Table A-4 - Coefficients of similarity for quadrats Q3, Q6, Q8, Q12

NVC Community/Sub-community	Coefficient of Similarity
MG6b	59.24
MG6d	57.53
MG5a	57.32
MG5	56.51
U4b	55.64
MG4b	55.17
MG4v2	54.53
MG6	52.75
MG5c	51.71
MG5b	51.52

Table A-5 - Coefficients of similarity for quadrats Q13, Q15

NVC Community/Sub-community	Coefficient of Similarity
MG4c	42.49
MG4b	42.21
MG4v2	41.52
MG9	39.74
MG8a	39.35
MG9b	39.31
MG4a	37.64
MG6d	37.11
MG5a	36.24
MG4d	36.06

Appendix B. Legislation table

Site Designation	Legislation	Protection	Guidance
Local Sites (e.g. County Wildlife Sites, Sites of Importance for Nature Conservation)	There is no statutory designation for local sites.	Local sites are given protection through policies in the Local Plan.	Development proposals that would potentially affect a local site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Guidance documents: The National Planning Policy Framework (Department for Communities and Local Government, July 2021), with particular reference to Policy 15, and the joint Circular.



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