A417 Missing Link
TR010056

6.4 Environmental Statement Appendix 8.25 Tufa-forming Springs: Selection of Potential Compensation Sites

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A417 Missing Link

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6.4 Environmental Statement
Appendix 8.25 Tufa-forming Springs: Selection of Potential Compensation Sites

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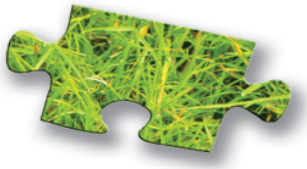
VEGETATION SURVEY & ASSESSMENT

A417 MISSING LINK SCHEME

TUFA-FORMING SPRINGS
SELECTION OF POTENTIAL COMPENSATION SITES

January 2021



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1. INTRODUCTION

1.1 Scope of Work and Objectives

Surveys undertaken for Arup (Pilkington, 2020) identified a tufa-depositing spring whose vegetation was an example of the M37 *Palustriella commutata - Festuca rubra* spring community, and the Annex 1 habitat *H7220 Petrifying springs with tufa formation (Cratoneurion).* This spring rises along Norman's Brook near the Air Balloon Roundabout and would be directly impacted by the proposed A417 Missing Link Scheme.

A search was subsequently undertaken for other tufa-depositing hydrological features that are close to the proposed road alignment but that would not be impacted by it. This report summarises the outcome of the survey and identifies feature-specific enhancement measures that would help to compensate for loss of the tufaceous spring associated with Norman's Brook.

2. METHODOLOGY

A report of a water feature survey completed by Mott Macdonald Sweco on behalf of Highways England in 2018 and 2019 was consulted alongside 1:25000 Ordnance Survey mapping to identify springs and small watercourses with potential to form tufaceous deposits in the area. Six were visited and assessed on 8th of December 2020 by Sharon Pilkington, a professional botanist, bryologist and vegetation ecologist with 20 years' experience of botanical assessment.

Each hydrological feature, given a reference from A to G, was assessed in terms of its floristic composition. Where significant tufa deposits were present, an assessment of the broad condition of the feature was made and opportunities for improvement and enhancement were identified.

3. RESULTS

Locations of hydrological features A to G are shown in Figures 1.1 and 1.2 and described in the sections below, with particular reference made to condition and similarity to the M37 *Palustriella commutata - Festuca rubra* spring community.

Botanical nomenclature used in this report follows Stace (2019) for vascular plants and Hill et al. (2008 as amended) for bryophytes.

3.1 Tufa-depositing Springs

3.1.1 Feature B

Feature type: Single streambank spring forming a tufa fan
Location: east of Crickley Hill Farm (within Fly Up 417 Bike Park) at SO 92530 15488
Photograph: Plate 1

Description

This is a small but actively depositing tufaceous spring rising on the eastern bank of a small stream at the edge of secondary stream corridor woodland. The distance from the spring to the point where it meets the stream in a low tufa step is approximately 12m. It is approximately 5m across at this point. There has been significant deposition of tufa and fan deposits are estimated to be mostly around 0.5m deep.

Vegetation growing on the fan is sparse but characterised by the presence of three bryophytes: *Cratoneuron filicinum*, *Pellia endiviifolia* and *Conocephalum conicum*.

Condition

Although the water feeding this feature is clearly supersaturated with calcium carbonate, there is no *Palustriella commutata*, which suggests that the spring may on occasion cease flowing and/or that there is insufficient ambient light. It is therefore a poor example of the M37 *Palustriella commutata - Festuca rubra* spring community.

Enhancement

- Feature B would benefit from the removal of the remains of a fence (wooden posts and wire) that have fallen on to it, as well as other dead wood remains on the surface of the tufa fan.
- Its vegetation would also benefit from more light reaching the tufa and therefore selective cutting back of scrub and trees immediately to the south (downhill of the fan) is recommended.

Plate 1. Tufa fan at SO 92530 15488

3.1.2 Feature E

Feature type: Tufa-depositing woodland spring
Location: Birtlands Grove, within Bushley Muzzard, Brimpsfield SSSI at SO 94251 13391
Photographs: Plate 2 and 3

Description

This small tufa-forming spring is one of several rising within this small Site of Special Scientific Interest; it is the only one in woodland. It rises below an Ash *Fraxinus excelsior* tree at the base of a slope and 10m from a fence. The fence excludes livestock and ensures that the spring has not been poached like others in the adjacent SSSI; its intact tufa deposits support a thriving population of *P. commutata*. Other species present include *Brachythecium rivulare*, *P. endiviifolia* and *C. filicinum*. Near the fence the water fans out into a shallow pool with Common Reed *Phragmites australis* before exiting the wood as a small stream.

Condition

Its vegetation is an intact example of the M37 *Palustriella commutata - Festuca rubra* spring community. Tufa is actively forming, and the lack of disturbance has promoted accretion.

Plate 2. Tufaceous spring at SO 94251 13391

Enhancement

- As the spring is on the edge of the wood and faces south-east, it receives quite a lot of light which is important to certain tufa-forming bryophytes especially *P. commutata*. Hard pruning of a small

Elder *Sambucus nigra* bush that is growing in the tufa (lower arrow, Plate 3) would help to prevent any increase of shading.

- A substantial colony of Common Ivy *Hedera helix* is growing on a near-horizontal branch a few metres to the south of the tufa (upper arrow, Plate 3) and this will to some extent block daylight. It is recommended that the ivy is pruned back as much as possible. However, no cutting back of any trees, shrubs or climbers immediately to the north or east of the tufaceous spring should be undertaken; a Field Maple *Acer campestre* a few metres away supports a small population of *Pylaisia polyantha*, which is a Nationally Scarce epiphytic moss.

Plate 3. Locations of Elder and Common Ivy to prune back (arrowed)

3.1.3 Feature G

Feature type: Tufaceous seepage on bank in pasture
Location: Below Briery Hill Copse at SO 94491 13510
Photograph: Plate 4

Description

Feature G is situated at the base of a west-facing scrubby bank in grazed pasture. A single spring with low flow rises within a consolidated block of tufa and trickles out a few metres into the pasture before disappearing below ground (Plate 4). The spring is open to livestock and the tufa block and surrounds are poached and eroded. The feature lacks *P. commutata* but does support a strong population of *Eucladium verticillatum*, a small moss also often found in tufa-depositing springs. *C. filicinum* and *P. endiviifolia* are also present.

Condition

Although it is clear that this spring has actively accreted tufa in the past, it currently appears to be vulnerable to seasonal drying and may no longer be actively depositing. It is also in shade below scrub and damaged by livestock which visit it to drink and perhaps shelter so its condition is currently poor.

Enhancement

- Feature G would benefit primarily from exclusion of livestock by fencing to prevent further damage.
- Furthermore, cutting back of the mature Hawthorn *Crataegus monogyna* on the bank just to the south would allow much more light to the spring and encourage more diverse vegetation.

Plate 4. Tufaceous spring at SO 94491 13510

3.2 Other Hydrological Features

Several other hydrological features were visited and found to be not, or barely, tufa-depositing. These are therefore unsuitable for compensation work to offset the loss of the tufaceous spring at Norman's Brook. Each is briefly described below, with photographs included in Appendix I.

3.2.1 Feature A

Feature type: Spring and small stream
Location: Crickley Hill Farm (within Fly Up 417 Bike Park) at SO 92189 15492
Photograph: Plate A1 (taken close to spring)

Description

A small spring rises in scrub to form a small headwater stream which flows downhill and northward in a small deepening gully to join Norman's Brook near the farm buildings. Its channel is deeply shaded by topography and overhanging trees and it lacks tufa deposits.

3.2.2 Feature C

Feature type: Two woodland springs
Location: Grove Farm, east of, at SO 94605 14931 (midpoint)
Photograph: Plate A2.1 and A2.2

Description

Feature C comprises two small springs (C1 and C2) rising at the lower end of a small Ash-dominated valley. The springs are approximately 20m apart and feed the same small stream. The larger spring (C2) has a strong flow of water and supports populations of bryophytes on stones in the water. The community is dominated by *Platyhypnidium riparioides*, *B. rivulare* and small amounts of *C. filicinum*, suggesting the water is moderately basic and nutrient-enriched. There are no tufa deposits in the spring or the stream below.

The second spring (C1) rises in the valley bottom in an intermittently wet and leaf-choked channel. It has low bryophyte cover of the same species as C2. Both springs are deeply shaded by the tree canopy above.

3.2.3 Feature D

Feature type: Unclear
Location: Shab Hill, east of, at SO 93181 15831
Photograph: Plate A3

Description

It is unclear where Feature D is located. There is a concrete pool at the head of the valley providing drinking water for livestock, but the source of this water is uncertain. The pool has an overflow which feeds an intermittent stream (dry at the time of survey) running downslope to the north at the edge of the woodland block. No tufaceous deposits were found to be present.

In the valley bottom, there is scant evidence of the two springs shown on 1:25000 Ordnance Survey maps except for an indistinct seepage in a small ditch. There is also a pipe carrying water that discharges into a small stream channel (Plate A3) and this may come from a hidden capped spring nearby.

3.2.4 Feature F

Feature type: Two woodland springs
Location: Briery Hill Copse at SO 94518 13586 (midpoint)
Photograph: Plate A4

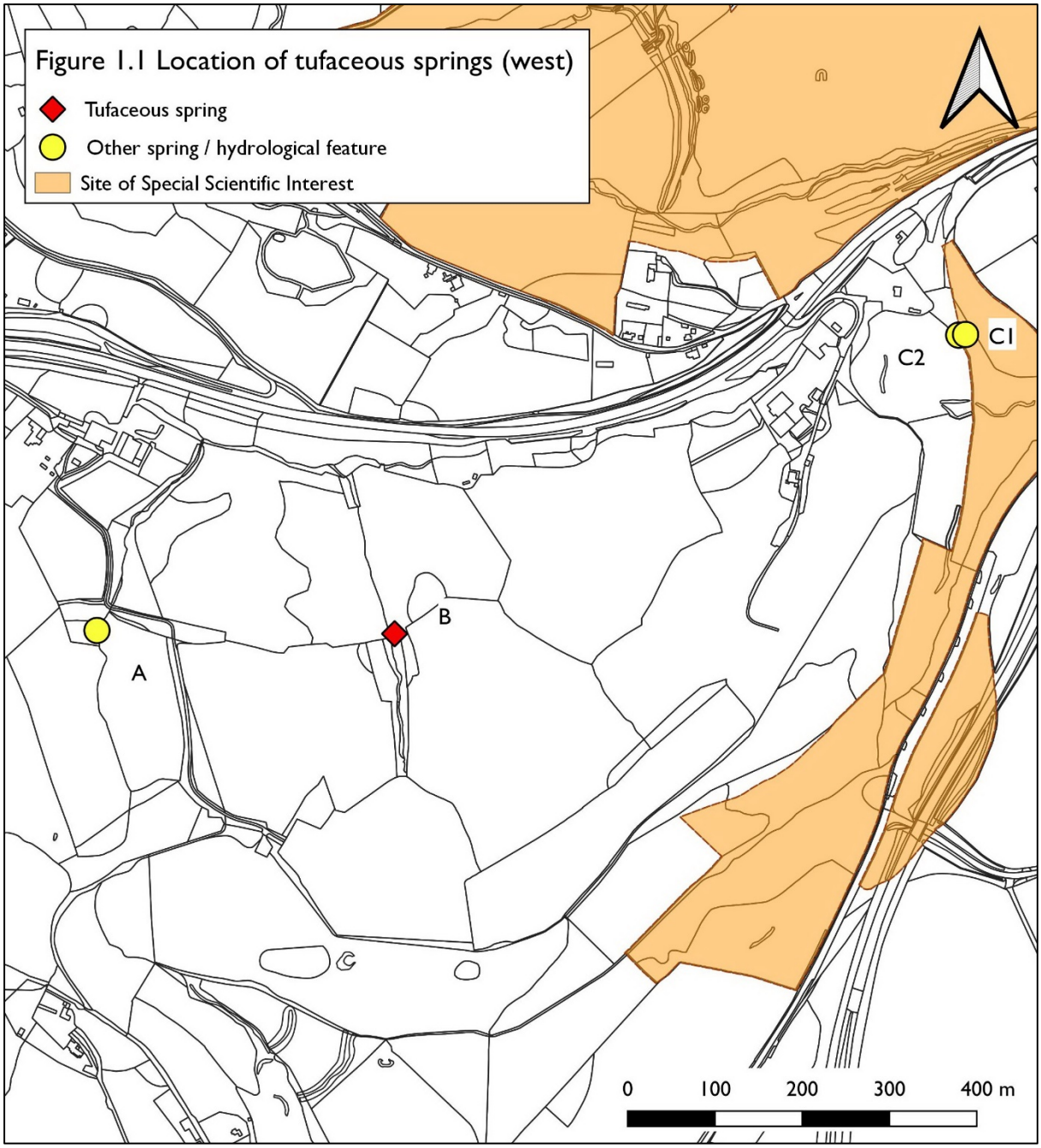
Description

This feature comprises two small springs (F1 and F2) approximately 10m apart in deeply shaded secondary Ash woodland. They join to form a small seasonally flowing stream that runs down through pasture into the valley below. Despite rising only 80m from a tufa-depositing spring (Feature G), only a few ooids occur on stones and twigs in the streambed below F1. Surrounding vegetation indicates that soils in this area are quite enriched; it is characterised by abundant Opposite-leaved Golden-saxifrage *Chrysosplenium oppositifolium*, Common Nettle *Urtica dioica* and Yellow Archangel *Lamiastrum galeobdolon* subsp. *montanum*.

4. CONCLUSIONS

Three of the hydrological features that were assessed in the current work were found to have potential for enhancement as tufa-depositing springs, to varying degrees. Any habitat improvement work should be relatively simple to achieve, primarily through reduction of encroaching scrub and trees to allow more light to the springs. Its objective will be to maintain/encourage development of the kind of tufaceous vegetation that can be regarded as the M37 *Palustriella commutata - Festuca rubra* spring community.

The other hydrological features that were assessed were not (or barely) tufa-depositing and would not therefore be appropriate sites for compensation.



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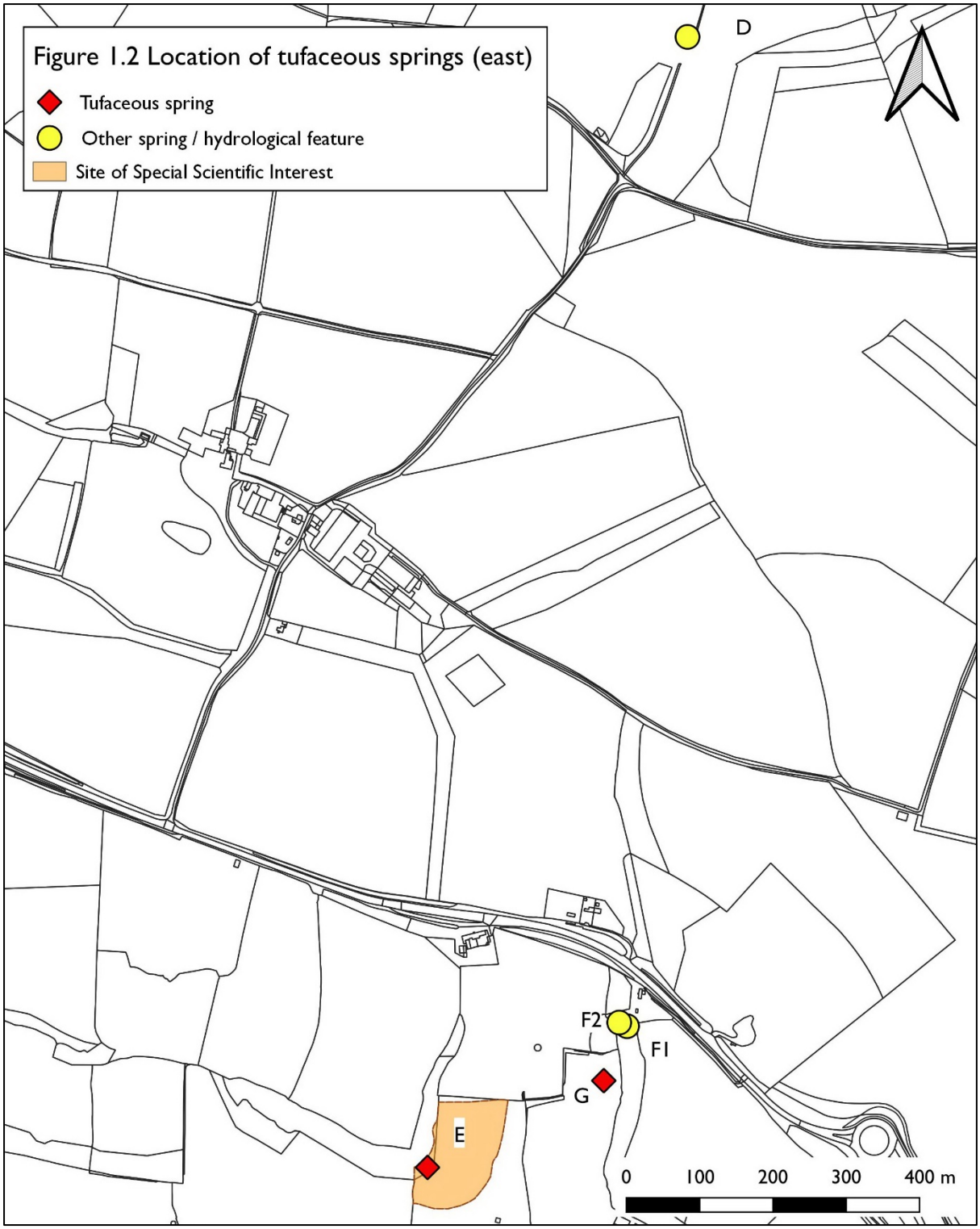

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APPENDIX I. PHOTOGRAPHS OF UNSUITABLE HYDROLOGICAL FEATURES

Plate A1 – Feature A

Plate A2.1 – active spring at SO 93178 15830 (Feature C2)

Plate A2.2 – intermittent spring at SO 93186 15831 (Feature C1)

Plate A3 – outflow from potentially hidden capped spring (Feature D)

Plate A4 – woodland spring at SO 94523 13585 (Feature F1)