

To: Planning Department, Oxford City Council

Date: 19 October 2015

**Objection to Planning Application 13/01555/CT3
Land East Of Warren Crescent Oxford Oxfordshire OX3 7NQ.**

Erection of 10 x 3-bed dwellings (use class C3) together with associated car parking, cycle and bin storage. Diversion of public footpath. (Amended plans and description)

The site proposed for development is referred to as Site 60 and by the name ‘Warren Meadow’, which is at present an amenity used by local people. The Lye Valley adjacent to it contains an SSSI wetland of international rarity and importance and a Local Wildlife Site wetland, which is improving towards SSSI standard with the help of BBOWTs Wild Oxford project and many local volunteers who love the site. It is Oxford’s most ancient habitat and is only now, with Council and volunteer assistance, recovering from years of neglect; it is flourishing.

The Friends of Lye Valley object to the amended planning application for this major development. It cannot be regarded a ‘sustainable development’ for the reasons which are made clear below.

- A. Effect on Hydrology of the area: lack of SuDS success evidence, impact on fen wetlands
- B. Validity of the quoted ‘Precedent for development’
- C. Control over the proposed development: ‘Right to Buy’ and enforcement of Restrictive Covenants
- D. Loss of green space for informal recreation in Warren Meadow
- E. Inaccurate information as to ecological importance of Warren Meadow and Wildlife Corridor status
- F. Policies which should protect Warren Meadow/Site 60 and the Lye Valley SSSI.
- G. Adverse Effect on Landscape Character and Green Setting
- H. General points
- I. The Council’s Legal obligation for development
- J. Site visit request
- K. Summary and Conclusions

(Three Appendices give further details on the above points.)

- A. Effect on Hydrology of the area: lack of SuDS success evidence, impact on fen wetlands**

It is a condition of this application that it should be **proved beyond any doubt** that the proposed development will have no adverse effect on the SSSI fen **in perpetuity**.

“Planning permission will only be granted for residential development at Warren Crescent if it can be proven that there would be no adverse impact upon the groundwater flow and the Lye Valley SSSI”.

Although both Natural England and BBOWT withdrew their objections, the **conditions attached to their withdrawals have not been demonstrably met**. These include **proof that the SuDS will work in perpetuity** and a Plan B (required by BBOWT) should the development go ahead and damage to the fen result.

Dr Judy Webb has already submitted her criticisms of the SuDS mitigation scheme of infiltration of paving and roof run-off water proposed by Peter Brett Associates LLP – see **Appendix 1** of this document. This is a **design that is an unproven experiment, the first of its kind, anywhere**. We contend that there is considerable doubt that this will work.

Regarding the SuDS evidence presented: no valid examples have been given of SuDS using a swale to control the water flow and adjust critical water chemistry into such a rare habitat as the Lye Valley Fen. We note this company (PBA) takes no responsibility for the success or failure of their design.

The examples of ‘successful’ SuDS case studies provided as evidence by PBA were **neither the same nor sufficiently similar to be comparable to the Lye Valley**. Dr Judy Webb’s analysis and critique of them, demonstrating how they do not provide the required evidence, can be found in **Appendix 2** of this document. Crucially, not one of these examples was studied for a long enough period and none of them monitored wildlife before and after the installation of the SuDS to demonstrate no damage.

However well designed a system might be, hydrology is complex and SuDS in practice do not always work in the beneficial way intended. For example, the infiltration SuDS at Milham Ford Nature Park for the Harberton Heights development here in Oxford resulted in **the loss of rare plant (bee orchid) species**, which the mitigation was intended to protect, as a result of the production of excess water of the wrong chemistry. Expensive remedial drainage measures were necessary to correct the SuDS failure and **the orchids have still not returned to the site**.

Has the Council made a Risk Assessment and costed possible remediation in the eventuality of the SuDS failure in this Warren Crescent scheme?

Friends of Lye Valley asked which authority would be responsible for maintaining the demanding and expensive programme of SuDS maintenance advised by Peter Brett Associates. According to Oxford City Council, since this is a major development of 10 houses, it is Oxfordshire County Council. However, according to the County Council it would be the ‘developer’ i.e. the City Council and then the owners. In this ‘pass the parcel’ situation – and given the severe financial constraints on councils and families – is it likely that either authority would commit themselves to maintaining these expensive SuDS **in perpetuity** as required by Natural England? As an example of *part* of what is required (see the SuDS maintenance schedule provided by PBA) the permeable paving in this development is required to be **suction-swept** (with a machine like a wet and dry VAX) to remove dust, silt, leaves, moss, lichen and plants from the gaps between the pavers **at least twice a year**. Not all clogging material can be removed by this, so every 20 years the whole paving may need **replacing** to ensure full permeability.

In the light of the **complete uncertainty over the functioning of the mitigation SuDS in perpetuity**, the Warren Crescent development is unsustainable and should not go ahead.

B. Validity of the ‘Precedent for Development’ statement

Much is made in supporting documents of the fact that planning permission for the site was originally granted in 2002 and it is said that this ‘**sets a precedent for development**’. We maintain that no real precedent was set because the 2002 permission was achieved **in ignorance of the following important facts**:

- i) Warren Meadow (Site 60) is clearly within the rainwater catchment and infiltration area of the Lye Valley SSSI fen springs. This catchment was calculated only in **2007** by Dr Curt Lamberth in respect of the proposed development of Southfield Golf Course. A street map showing the rainwater catchment area of the Lye Valley fen is on the FoLV website at <http://www.headington.org.uk/lyevalley/about/index.html> Development within the rainwater catchment area was not permitted on the golf course – nor should it be on Warren Meadow (Site 60).
- ii) The extreme rarity of the habitat of alkaline fen vegetation present, designated as ‘M13b’ in the National Vegetation Classification (NVC). This only became known in **2013** (Tratt, R., Parnell, M., Eades, P. and Shaw, S. (2013) Development of inventories for Annex 1 habitats ‘Alkaline Fens’ and ‘Transition Mires & Quaking Bogs’ in England. Report to Natural England)

**Prior decisions made in ignorance of facts are not valid.
The ‘development precedent’ for this site does not actually exist.**

C. Control over the proposed development: ‘Right to Buy’ and enforcement of Restrictive Covenants

At the East Oxford Area Planning Committee meeting City Councillors specifically asked for information as to whether Right to Buy would apply to the development. **We are informed that Right to Buy would indeed apply** and the properties could be let immediately after purchase – presumably at a higher rent. The City Council would lose any control over activities in the gardens, which would be potentially damaging to water infiltration and the adjacent fens.

It was reported in the press that sales of Right to Buy properties may not result in the City Council receiving the resulting income. So the sacrifice of the Lye Valley’s flora and fauna and an important local amenity may not even result in a financial gain for the Council.

Whatever covenants the City Council wished to impose either on tenants or on subsequent owners, it would, in practice, be impossible to enforce them. With 6ft-high solid fencing on the brink of the steep-tipped embankment, officers would be unable to see – or even stand safely to see – the gardens. Barbeques on paving, paving stones along the grass to the washing lines, Wendy houses, greenhouses, poly-tunnels, sheds, sandpits and paddling pools – all would contribute to reducing the rainwater catchment area contrary to the requirement made that the gardens will remain green and permeable, as demanded by Natural England.

Other problem activities include: people washing their cars on the drives, accidentally dropping antifreeze or oil, or even washing bicycles with washing up liquid and applying lubricant, plus fertilizers/weed killers on lawns and flower beds – all would go from paving into the swale and the ground. Since the SuDS swale is permeable, these harmful chemicals would inevitably pollute the Lye Valley fen.

Apparently ‘harmless’ rubbish, such as grass cuttings and garden waste, thrown over the back garden fences would add too much nitrogen to the fen immediately downslope and result in increase of invasive reeds and loss of rare wild flowers. This is another form of pollution. **There can be no covenants against this.**

Subsequent owners, who may live overseas and let the properties on the open market, may be unwilling to meet the SuDS maintenance cost – let alone ensure that the work is carried out and inspected on the regular basis as set out by Peter Brett Associates.

D. Loss of green space for informal recreation in Warren Meadow

New information: if this proposed development goes ahead, the local residents of **Town Furze estate will have lost over 80% their green informal leisure space that was originally designed into the development.** Of the areas designated as children’s play area in the 1953 plans **only one** remains as open green space. A second has gone as a tarmaced play-park for the under 5s (another under 5s play-park is on Girdlestone Road). Permission to develop (for housing) the third children’s play area was granted in 2007. We note that it was not developed at the time planning permission to build on Warren Meadow/Site 60 was granted in 2002.

If the Warren Crescent proposed development is allowed, only one local green informal play space, plus a small residual corner of Warren Meadow (unsuitable for ball games and with a public footpath running through) will remain. Yet the proposed development of 10x 3-bed houses could add another 20-30 children to the estate – and where would they play? There is ample provision for the under 5s but precious little for the 6+ age group – or for adults.

Does the Council wish to curtail the physical activity of its young children by depriving them of suitable places to play? Is this in line with the Council’s Health and Well-Being policies? (Section 7 of the Green Spaces Strategy) or with the Sites and Housing DPD? And in the light of increasing levels of childhood obesity?

Section A3 of the Sites and Housing DPD sets out policies to make sure all residential developments are well-designed, respect the character of the area **and respect the quality of life for existing local people.’**

This development would be contrary both to the spirit and letter of this policy.

Policy CS21 states: Planning permission will only be granted for development resulting in the loss of existing sports and leisure facilities, if alternative facilities can be provided **and if no deficiency is created in the area.**

This development would indeed create a severe deficiency in the area – a point which has not been made or addressed hitherto.

Furthermore, the Inspector’s notes state:

The Core Strategy (CD5.1, Policy CS2) seeks to focus development on previously-developed land (PDL) but allows for the loss of greenfield sites only if a need for the development of the land can be demonstrated, **and if the open space is not required for the well-being of the community.**

No evidence that the open space is not required for the well-being of the community has been presented. Nor has justification been provided for development in this particular location that outweighs the cost to the community and the nearby SSSI fens.

The City Council has set a target of maintaining **5.75 hectares of green space per 1,000 population**. Headington already has less green space and is more densely populated than most areas of Oxford. The emerging Neighbourhood Plan specifically seeks to retain Headington's public access green space, and green setting, **particularly in the proximity of an SSSI or where there may be damage to an SSSI**. We understand that the City Council should take into account the emerging Neighbourhood Plan. The most in-depth consultation of Headington residents, students and employees showed that **'Conserve green spaces and increase biodiversity and public access' was top of the list of local concerns**.

Friends of Lye Valley are circulating a petition, hosted by the City Council's e-petition page and with a link from the News tab of the Friends of Lye Valley website, to support the retention of Warren Meadow/Site 60 as public access green space. *Details are given in a separate document*. We would ask the Committee to take this petition into consideration when making their decision.

While the petition against this development was being circulated door-to-door in Town Furze estate, it became clear that residents, especially children, were unaware of this proposed development and were horrified at the prospect of losing their green space. Children (boys and girls) regularly play ball games on Warren Meadow/Site 60 after school and local residents told of picnics, snowmen-building and 'just sitting' there.

The majority of Town Furze local residents live in social housing as shown on the City Council's Indicators of Social Deprivation 2011 chart. A wealthier area might have registered Warren Meadow (Site 60) as a Town Green, having had free access to it since the estate was built in 1954. Does the Council consider that less wealthy areas should have less green space than wealthier ones?

'Poor people in cities, whether in the US or elsewhere, have systematically less access to green space and recreational facilities, and this has a direct impact on health'. 'Stuffed and Starved' by Raj Patel¹.

E. Inaccurate information as to ecological importance of Warren Meadow and Wildlife Corridor status

We point out that information provided to East Area Planning Committee Councillors as to the biodiversity of the site, taken from the EIA Screening Opinion Letter of 1 July 2013 is incorrect and misleading:

'This report has concluded that the development is unlikely to lead to any adverse ecological impacts either within the boundary of the development or the adjacent SSSI due to the site being dominated by special [sic – should be 'species'] poor heavily managed habitat with low intrinsic ecological value; none of the invertebrate species associated with

¹ *Stuffed and Starved: The Hidden Battle for the World Food System*, [Raj Patel](#), 2008, p. 277.

the SSSI depend on the application site; and it is unlikely that the application site would develop any ecological interest similar to that found within the SSSI in the future.'

Recent research by Dr Webb has shown that the development would break an important wildlife corridor for vertebrates and invertebrates living in the Lye Valley. This would be **contrary to the Council's CS12 policy of maintaining and even increasing wildlife corridors.**

A wildlife survey report on Warren Meadow is attached to this document (Appendix 3). The application site is a green corridor which is used by badgers for foraging (latrines present) and is most likely a sunny, warm, route for viviparous lizards moving freely from the known breeding site of the Town Furze allotment to the known breeding site of the grassy triangle at the end of Heath Close above the SSSI fen. Breaking this green corridor would disadvantage both species. Mobile invertebrate species breeding in the adjacent fen wet peat have been noted feeding on common flowers at Warren Meadow. **Contrary to the statement made in the** EIA Screening Opinion Letter of 1 July 2013 this site could easily have a very important ecological role in supporting rare insects of the adjacent SSSI and LWS if more common nectar flowers are encouraged. This is because the fen has few nectar sources. Gardens nearby do not supply appropriate flowers.

The descriptions of Warren Meadow/Site 60 in City Council reports have consistently been misleading and derogatory eg '*This site is currently used as vacant open space with one corner previously being used as garaging.*' In fact, it is a beautiful swathe of grass, bordered by trees - with a tidy litter bin, well-maintained by the City Council, fronting the Lye Valley. **The images in the Wildlife Report (Appendix 3) clearly show this.**

F. Policies which should protect Warren Meadow/Site 60 and the Lye Valley

We note the following aims of the **Biodiversity Strategy 2015-2020:**

'Objective 1: To act as a responsible landowner and manager for the purpose of conserving and enhancing biodiversity'.

We ask the Council to implement this policy in respect of Site 60/Warren Meadow.

This proposed development would be contrary to many aspects of the Council's **Core Strategy** which states:

'Greenfield land will not be allocated for development if any part of the development ... would cause harm to a site designated for its ecological value [i.e. the nearby Lye Valley SSSI] (CS2) and International and national sites must be protected from any development that may have an adverse impact 4.4.1, p75'

The development 'may have an adverse impact' on the Lye Valley SSSI. In fact, it almost certainly will do.

Policy CS12 Biodiversity: 'Development will not be permitted that results in a **net loss of sites and species of ecological value.**'

These policies should protect the Lye Valley and prevent this proposed development, if the City Council would apply them. Such damage would surely result from this development.

If City Councillors decide to allow the Warren Meadow to remain public access green space, the Friends of Warren Meadow would like to work with them to increase its ecological value in line with the City Council's Biodiversity Action Plan while, maintaining the central green kick-about space as a local amenity. This enhancement plan is already available and has been submitted to the council.

G. Adverse effect on landscape character and green setting

We endorse Natural England's comment that the impact of this major development on local landscape character has not been assessed or addressed. (NE Letter 2 Aug 2013).

The footpath through the bottom of the Lye Valley next to the Lye Brook is very popular with walkers for its green setting, natural feel and tranquillity. '**You would not know you were in the city**' is a comment we hear. This proposed development will produce an undesired urban visual intrusion on the green setting of this footpath.

The proposed development, taller than its adjacent houses and nearer to the valley than to those houses, would rise above its 6ft board fences facing the Lye Valley and be clearly visible following the removal of the crack willows in the valley as part of the Wild Oxford Project. This would be worse in winter with the lack of leaves on trees and exacerbated, if the line of field maples at the top of the bank were reduced or removed (undesirable leaf fall and shade in gardens?). This would create an immediate and adverse impact upon the natural feel and tranquillity of the popular Lye Valley footpath, spoiling for ever its secluded atmosphere. **This is contrary to the aims expressed in the Local Plan 4.4 Areas of Special Character and the Policy GSP5 of the emerging Headington Neighbourhood Plan which seeks to preserve the green getting of Headington.**

H. General points

The City Council has a duty of care for its assets, which includes **not harming the interests of future generations**. The Lye Valley SSSI, which is owned and is the responsibility of Oxford City Council, is too rare a habitat to gamble with by permitting this development which may cause harm. It comprises **1.5 hectares of only 19 hectares of this high quality alkaline fen found in the whole of England (19 hectares - just a bit less than South Park area)**. As losses of this rare habitat continue elsewhere in the country, the Lye Valley's importance and value to people can only increase with time, therefore the utmost degree of precaution over anything that will affect it should apply.

I. Does Oxford City Council have a legal obligation to develop this site?

Despite inclusion in the Adopted Local Plan, we understand that there is no legal imperative to develop this site. We would ask that the City Council explore the means of safeguarding it in the future – by designation as Local Green Space as suggested in the Petition – or by some other means or designation.

J. Site visit request

We ask that the East Area Planning Committee visit the site prior to the EAPC meeting to decide for themselves whether Warren Meadow is indeed ‘a patch of grass with very little amenity value’ (Oxford City Council report to Inspector) to see the close proximity to the Lye Valley SSSI and Local Wildlife site and to appreciate the visual intrusion of the proposed development on the Lye Valley’s green setting.

K. Summary and Conclusion

In short, we hold that the application should not be approved as it is an unsustainable development, the conditions for its approval have not been met, the risk to the Lye valley fens is too great and the damage to landscape character, green setting and loss of a valued public amenity green space has not been justified.

We would ask the Committee to take the Friends of Lye Valley’s petition into consideration when making their decision.

Yours sincerely

Friends of Lye Valley Committee:

Dr Judy Webb, Chair, Ecological Consultant, 2 Dorchester Court OX5 2JT

Heather Armitage, MA (Oxon) Secretary, 50 St Anne’s Road, OX3 8NL

Dr Terry Wood, Treasurer, 50 St Anne’s Road OX3 8NL

Steve Woolliams, HNC in Applied Biology, 103 Dene Road OX3 7EQ

Appendix 1 Critique of Peter Brett Associates’ SuDS for Warren Crescent

Appendix 2 Critique of SuDS evidence examples provided by PBA

Appendix 3 Warren Meadow JW wildlife survey report, including images of Warren Meadow and attached table of species recorded to date

APPENDIX 1

Warren Crescent Proposed Affordable Housing

Critique of SUDS Mitigation designed by
Peter Brett Associates LLP

by Judith A Webb BSc, PhD

Profile

I have been working as a Freelance Ecologist for the last 11 years. Prior to that I worked as a Biology Science Teacher (23 years) and an Environmental Forensic Scientist (9 years). I am Chairman of Friends of Lye Valley (FLV) – just one of my many ecological roles locally and nationally. See <http://judithwebb.weebly.com/>

My PhD (1977) was on the vegetational history of 3 alkaline fens in Southern Scotland that are now National Nature Reserves. I have studied and recorded alkaline fen wildlife (plants, invertebrates, fungi) and water quality locally for the last 11 years. I am regularly consulted by the local branch of Natural England and by Oxford City Council about fen management in Oxfordshire. I have a particular research interest in Cothill Fen SAC, a local alkaline fen site of European importance, where my investigations have revealed serious water-quality issues for the springs resulting from nitrate pollution and the consequent detrimental effects on fen vegetation.

Summary

In my professional opinion, the proposed Warren Crescent housing development with the PBA-designed SUDS mitigation in place would be likely to result in the following damaging consequences to the Lye Valley SSSI and LWS wetlands:

- Springs in the west side of SSSI could become 'flashier' – alternating high and low flows, high flows after heavy rainstorms, thus disadvantaging rare plants
- Springs in the west side of SSSI could produce less calcium (lime) and thus less essential tufa after heavy rainstorms, disadvantaging rare plants
- Springs in the west side of SSSI could produce higher phosphate and nitrate, disadvantaging rare plants
- Springs in the west side SSSI could be contaminated by chemicals dumped in the swale (used engine oil, paint, etc) - unknown effect on chemistry and rare plants
- Springs in the LWS immediately down the bank from the development could suffer reduced flow and altered chemistry. This would prejudice their eventual remediation to quality alkaline fen plant communities of SSSI standard (this work has already started in the Wild Oxford project in association with BBOWT)

The fact is that the SUDS mitigation proposal put forward here has not been tried and proved effective **in any other situation** where the water quality and chemistry need to be protected in a rare calcareous alkaline valley-head spring fen habitat.

It would be an experiment with an unpredictable outcome.

Introduction and Background

The proposed Warren Crescent housing development (**Oxford City Council Planning application 13/01555/CT3**) is within the rainwater catchment of the springs upon which the Lye Valley alkaline fen SSSI and LWS areas depend. See information on the Lye Valley habitat and spring catchments at <http://www.headington.org.uk/lyevalley/about/index.html>

Planning Policy Documents relevant to this proposed development:

A. Sites and Housing plan 2011-2026, Adopted Feb 2013, page 112, see box with final Policy SP60, Warren Crescent:

'Policy SP 60 Warren Crescent. Planning permission will only be granted for residential development at Warren Crescent if it can be proven that there would be no adverse impact upon surface and groundwater flow and the Lye Valley SSSI. Development proposals should be accompanied by an assessment of groundwater and surface water. Development proposals must incorporate sustainable drainage with an acceptable management plan'

B. From the Inspector's notes (Point 3) on her examination of the soundness of the above Sites and Housing Plan. Main Matter 7, The Soundness of the Sites Allocated in the South West and South East of Oxford. Site SP62 Warren Crescent.

Here the wording is stronger. I actually attended this part of the hearings and voiced my fears for the Lye Valley SSSI. Note in Point 6.5, page 3, of this document:

'The SPRA notes that the site can be allocated in the Sites and Housing Plan only if a groundwater study demonstrates beyond doubt that the development of this site would not cause a detrimental impact on the SSSI.'

So '**Proof, beyond doubt**' is clearly required that there would be no damage to the Lye Valley SSSI, which is adjacent to this proposed development site. I have strongly objected to this housing development at every opportunity at previous planning stages because I think it would cause damage to the SSSI.

After initially objecting to this proposed housing development, Natural England subsequently withdrew their objection (with stringent conditions that included a requirement that covenants be attached) on the basis that there was a SUDS mitigation plan.

Peter Brett Associates failed to attend an important site meeting between myself, other members of Friends of Lye Valley and Richard Hawkes, Senior Asset Manager for Oxford City Council, in the Lye Valley on 1 April 2014, when all issues and concerns relating to the SUDS mitigation proposal were fully discussed. No reply to my frequently expressed concerns has yet been received from PBA.

My scepticism is fuelled by **my personal, direct, experience of the failure of a similar SUDS mitigation scheme** designed for preservation of wet, high-calcium, low-nutrient grassland with orchids and rare fungi at Milham Ford Nature Park in Oxford in relation to the Berkeley Homes Harberton Heights housing development nearby. Orchids and fungi were not preserved because, despite the mitigation scheme, the water chemistry changed.

The following discussion aims to show that there is considerable uncertainty and thus **doubt** that the SUDS mitigation scheme devised by consultants Peter Brett Associates LLP for this proposed housing would deliver water of the right volume and **right chemical quality** to keep the SSSI alkaline calcareous fen in an undamaged condition **in perpetuity**.

It also aims to show that Natural England's withdrawal of its objection was hasty and based on insufficient knowledge and evidence of the actual situation. The following points are presented after lengthy discussions with chemist and hydrologist Dr Curt Lamberth, who calculated the catchment of the SSSI fens for Oxford City Council in 2007.

The Warren Crescent housing proposal plans and SUDS Mitigation final design I refer to is described in the following document produced by Peter Brett Associates LLP (PBA):

Warren Crescent Development, Headington, Oxford, Assessment of Potential Impacts on the Lye Valley SSSI Stage 3 - Assessment (Updated) Project Ref: 27920/006 Document: R002/rev1, dated June 2013 - accessible on [Oxford City Council's Planning website](#) as:

13_01555_CT3-FLOOD_RISK_APPENDIX_6_-_STAGE_3_UPDATE_REPORT_FINAL-378171.pdf

See, in particular, **Figure 2** towards the end of the document for the SUDS design:

Proposed Outline Surface Water Drainage

Appendix 6, Drawing number 27920/005/003, by Peter Brett Associates.

Microdrainage design of Swale Model Details: ©1982-2011 Micro Drainage Ltd.

The first point I wish to make is that the decision on this proposed housing development should not be made in ignorance of the **extreme rarity of the calcareous alkaline fen habitat at risk**.

This is a European Level Priority Habitat. A recent assessment by Natural England (Alkaline Fen inventory for England, 2013, ref 1) states that the 'M13' fen vegetation community in the Lye Valley North Fen SSSI holds about 1 hectare of the mere 19.1 hectares of this habitat that remain in the whole of England.

As a guide, 19.1 hectares is a smaller area than South Park in Oxford.

I have serious concerns that the SUDS design featuring the permeable paving and water retention and infiltration swale would make matters *worse* for the water quantity and quality supplied to the important fen areas, (note these are not all in the SSSI, some are outside it in the Local Wildlife Site). **There is no way that this proposed housing development could cause zero damage to the adjacent fen with these mitigation hydrological structures.** 'Mitigation', of course, merely means *reduction* of damage, not elimination of any damage. Note that Natural England removed their objection to this development not because they believed there would be no damage, but because they thought it possible that the damage might be minimal with the SUDS, **if their stringent conditions were adhered to in perpetuity**. I think the damage would be more than minimal.

Peter Brett themselves accept this point. Their report, pages 12 & 13, **4.3.2 Water Quality**, states:

'Surface Water Drainage: Although the surface water discharge options considered would not in themselves represent any significant change from the current greenfield flow conditions, they may represent a change to the quality of the waters arising from the Site and hence may represent a potentially adverse effect on the Lye Valley SSSI.

Although the discharge options would include treatment components appropriate for discharging to highly sensitive waters, the development of the Site for residential use would lead to an increased risk of contamination from activities such as illegal discharges and spillages of used oils or sewage. Notwithstanding this observation, given that Oxford County Council, as the lead flood authority, have a duty to adopt all SuDSs which drain two properties and above, then provided appropriate maintenance is carried out then the increased risk of adversely affecting the quality of the waters entering the Lye Valley would, at worst, be very low'.

Even a low risk to such a rare and threatened habitat is unacceptable. Who could ensure that 'appropriate maintenance' would be carried out in perpetuity? This in an area where fly-tipping and dumping of toxic chemicals (paint, used engine oil) happens regularly already, and the swale might attract more of this. **There is no possible remediation or 'un-doing' of any pollutant contamination of an aquifer which feeds springs.**

Specific Points

1. Quantities and distribution of water supply to fen areas in SSSI with suggested SUDS in place

The first point to be clear on is that the springs feeding the SSSI fen, which is to the south-west of this proposed development, **have currently an excellent water volume flow and do not need augmentation with increased flow** (there is a suggestion in the PBA document that increased flow here would 'help'). Also there is currently **excellent water chemistry** here, as evidenced by large quantities of whitish tufa (calcium carbonate, calcite, more properly 'travertine') formation on the vegetation. Location of the highest spring relevant here is SP 54757 05887. The high tufa formation binds any free phosphate and locks it away in an unavailable form, so that the flow is very low phosphate, ideal for the rare plants. Water flow under the proposed housing, PBA states, would be generally in a south-east direction through the ground towards the Lye Brook.

Simply put, isn't it obvious that collecting all the rainwater that should have gone into the ground in one area (which, after the development, could be covered by housing and paving) and piping it into a different area to the south-west (to the swale) would partially deprive the valuable calcareous springs in the area immediately down the south-east bank from the housing (in the LWS) and potentially overload the calcareous springs in the SSSI area to the south-west nearest the swale?

There is no geological borehole data from the area of the site that would be under the swale and actually adjacent to the SSSI fen springs and therefore no accurate knowledge of how fast or slow collected run-off water might be expected to penetrate the ground and emerge in the nearby springs normally.

Extrapolation from the three boreholes (BH1001-BH1003) carried out to the north east (under the area of proposed houses) seems rather unreliable due to complex geology – variable amounts of layers of Beckley Sands and Corallian limestone – but calculations of water movement under the site, based on these boreholes, indicate that it is **very slow at the moment** (from PBA report page 11:

'groundwater flow velocities are between about 0.8 and 5.0x10⁻⁸ m/s, corresponding to between about 0.25 and 1.5 m per annum'

So, water might normally (undeveloped site) take nearly a year to move the 100–200m or so underground from the northern limit of the proposed housing to the area of the proposed swale. **If the proposed development took place, collecting all the roof and paving area run-off and piping it to the swale would, instead, cause water that should have taken up to a year to get to that point to arrive there and enter the ground within only hours.** PBA quote a 6-hour rainstorm producing 69.7m³ of rainwater and state that the swale would hold this and release it over days into the ground.

If there is extra volume to the SSSI springs, this might be thought by a lay person to be 'good' and 'improve things' but this is far too simplistic a view.

Extra volume would cause the over-loaded nearest spring to become 'flashier', i.e. more prone to sudden short-duration excess water flow. But the fen vegetation of highest ecological value is National Vegetation Classification category M13, which is adapted to **constant low spring flow, not intermittent low then high flow**, so 'flashiness' is likely to cause vegetation change. Overloading might cause erosion as well.

Overloading would be most likely to happen after a sudden heavy rainstorm. Maybe too much water that is just rainwater and not saturated with calcium (dissolved lime) would flood the spring. Overloading with water that contains insufficient calcium or too much pollution, such as high phosphate, would change the plant community from the present high-value one to a common enriched wetland of much lower ecological value. High phosphate input could result from car washing with detergents on the permeable pavement.

Let us be clear on this point: more water of the wrong sort (wrong chemistry) to the SSSI springs could be as great a disaster as less water.

2. Water Quality (Chemistry) to the SSSI

A calcareous, alkaline, fen ecosystem is **critically dependent on the correct water chemistry** to provide ideal conditions for the rare flora. PBA report P 9 describes this important point accurately in reporting their spring analysis:

'in general the groundwater is hard with approximately 370 mg/l hardness as CaCO₃ giving rise to a high conductivity of about 0.7 mS/cm'

Indeed, water issuing needs to be 'hard' with approximately 300 to 400 mg/l hardness as CaCO₃ giving rise to a high conductivity of 600 to 850 uS. It also needs to be (and this is critical to fen vegetation) very low in soluble reactive phosphate, with values typical of Headington springs from soluble reactive phosphate ranging from 0.1 to 0.6 mg/l (information from report of Lamberth, C. 2007, Reference 2).

In the Lye Valley there are **22 plant species rare in Oxfordshire** (See <http://www.headington.org.uk/lye valley/about/index.html>)

The interactions are complex, but to take just one example: the rare and beautiful marsh helleborine orchids require high calcium, alkaline pH, water and are dependent on particular fungi to associate with the seeds for successful germination and growth. These fungi thrive only in an environment **very low in nitrate and phosphate**. If either of these nutrients increases, the fungi cannot grow and dependent orchids therefore cannot germinate.

Phosphate is the most critical chemical and phosphate levels are normally kept incredibly low in the spring water by the formation of chalky, limy 'tufa' (hard deposits like stone or fur in a kettle). As spring water issues and is exposed to the air, the high amounts of dissolved calcium in the water precipitate out as hard stone-like calcium carbonate (lime encrusts all the vegetation). In this lime-forming reaction, any phosphate in the water is locked away in the deposited lime, keeping the water phosphate level incredibly low and favouring fungi and orchid growth. Without sufficient calcium in the water, the phosphate 'locking-away' would not happen adequately and phosphate levels might rise to disadvantage the fungi the orchids need. Alternatively, if higher-than-normal phosphate levels were to contaminate the spring water, the tufa-depositing process might not be able to lock it all away, thus allowing phosphate levels in the soil around the orchids to rise to fungi-damaging levels.

The SUDS proposed would deliver **water volume** to the SSSI fen springs but what would the **quality** of that water be? If the water were polluted and, very importantly, if it did not have the right chemistry, then damage would ensue to the plant community receiving this water in the fen. Water emerging from the springs needs to be supersaturated with lime salts and extremely low in nitrate and phosphate.

The current SUDS designs feature calcareous aggregates under the permeable paving in front of the houses plus a layer of limestone gravel in the bottom of the swale so that run-off water percolating through this on its way into the ground would pick up calcium from the limestone (which is chemically calcium carbonate). **How thick would these aggregate limestone layers have to be to produce output water of sufficient calcium and bicarbonate to replicate what this water would have picked up, had it been allowed naturally to infiltrate and pass through a soil profile with growing plants and the underground geology?** No detail is given.

If the limestone layer were too thin or the stone size too large, there would be a big risk that run-off water would just pass through far too quickly to pick up any useful amounts of calcium and bicarbonate.

Also, above the limestone there would have to be a soil layer with actively growing marsh vegetation to generate **enough CO₂** to make the water **acid enough** to dissolve the calcium from the limestone in sufficient quantity before exiting the swale into the ground.

Would the chemistry achieved by infiltration through a normally-vegetated soil profile followed by travelling through underground rocks for a year be adequately replicated by the function / installation of the permeable paving and swale?

Extract from a letter from the application officer, **Andrew Murdoch**, regarding the need for Ecological Impact Assessment - see document on [Oxford City Council's Planning website: 13_01555_CT3-EIA_SCREENING_OPINION-1381290.pdf](#)

'The use of calcareous aggregates within the formation of ground below the permeable paving and as a basal lining to the swale will act to modify the groundwater chemistry towards that of the underlying spring water.'

This admission that the SUDs would act only to **'modify the groundwater chemistry towards that of the underlying spring water'** says it all.

'*Modifying towards*' is so vague that it is clear the chemistry produced might just not be good enough when dealing with a site with critical water chemistry upon which the health of the habitat depends.

3. Water Volumes and Quality (Chemistry) to the LWS springs and fen areas

PBA do not seem to know that there are valuable calcareous spring/fen areas outside the SSSI and to the north of it in the LWS (immediately down the bank to the south east of the proposed development). This is despite presenting water analysis data on these springs – quoting from page 11, last para:

'The three springs observed towards the base of the embankment along the boundary of the site (see Figure 4) flow directly into the Lye Brook and are therefore lost as base flow to the calcareous fen habitat which is further downstream to the south east. However, adopting SuDS drainage in the south east of the proposed development area offers the opportunity to provide a greater degree of infiltration for groundwater recharge that could benefit the adjacent SSSI habitat in this area providing water quality is considered.'

There are several points that are wrong with this statement:

The springs in the first underlined section **do not flow directly to the Lye Brook, they supply peaty tufa-forming areas of former calcareous alkaline fen** that is eminently remediable to high

quality fen, thus their water is **not lost as base flow to the calcareous fen habitat**. The adjacent SSSI springs discussed in the second underlining are **already very strong springs**, they have **no need of greater infiltration and ground water re-charge to augment their flow, so no benefit (as previously discussed)**.

The remediation of these LWS calcareous springs to high quality alkaline fen by scrub removal is already under way as part of the local Wildlife Trust/Oxford City Council '**Wild Oxford**' Project. The success of this grant-funded project depends on there being good spring flow with appropriate high-calcium water. Springs in the LWS immediately down the bank from the development could suffer reduced flow and altered chemistry as a result of the SUDS mitigation. This would prejudice their eventual remediation to the target SSSI standard fen vegetation.

So, in conclusion, my view is that this hydrological mitigation SUDS design of permeable paving and infiltration swale is an example of something which '*sounds as though it might work*' because the water is passed through limestone - but the limestone layer installed might prove completely insufficient and the rainwater might pass through it too quickly to achieve the desired water chemistry. Not to mention the problem of protection from pollution and the difficulty and cost of maintenance of permeable paving and swale FOREVER. It also ignores the valid need of the calcareous springs in the LWS.

It would be a risky experiment, and a habitat of this rarity and national (international) importance should not be subjected to it.

REFERENCES

1. Tratt, R, Parnell, M., Eades, P. & Shaw, S. (2013)

Development of Inventories for Annex 1 habitats 'Alkaline Fens' and 'Transition Mires & Quaking Bogs' in England. Final draft report to Natural England.

2. Lamberth, C. (2007)

'Investigation of the possible hydrological effects on the Lye Valley Sites of Special Scientific Interest and the riparian zones of the Lye and Boundary Brooks as a result of development on Southfield Golf Course'.

SHLAA Report to Oxford City Council (PDF) available at:

<http://www.oxford.gov.uk/Direct/72511FINALAssessmentofhydrologicalimpactofdevelopmentonLyeValleySSSI.pdf>

APPENDIX 2

Warren Crescent – SuDS Case Studies supplied by Peter Brett Associates (PBA) to Oxford City Council Corporate Property (Richard Hawkes) by letter on 11 October 2013

Critique by J A Webb 6 October 2015

Summary

The essence of the Warren Crescent proposed SuDS design by PBA is that paving and roof rainwater from the proposed housing area be directed via a pipe system to a swale with a limestone gravel, highly permeable base, to allow run-off water to penetrate the base into the underground aquifer in order to continue to supply the springs emerging in the SSSI and LWS fen areas adjacent. Pollutants would be removed and the depth of limestone in the swale base is supposed to adjust the chemistry of the run-off rainwater to that required by the fen supplied by the nearby springs.

The spring water at emergence needs **high alkalinity and a very high concentration (super-saturation) of dissolved lime (calcium bicarbonate) and very low concentrations of nitrate and phosphate**. This chemistry ensures high alkalinity and the essential continued deposition of TUFA (lime) in the fen and the consequent health of the complex and rare community of species to be found in the NVC M13b community.

Whether the design is good enough to perform this required exacting role is uncertain because **this design for this purpose has never been tried before, it is a first-try experiment**.

None of the three case studies presented by PBA demonstrate that the above proposal will function as required and certainly not that it will function *in perpetuity*. They are thus not 'evidence' that there will be no damage to the fen SSSI from the Warren Crescent development

The supplied case studies:

- are NOT designed for infiltration (key requirement for Lye Valley)
- are NOT designed for chemical change of rainwater to high calcium and alkalinity (key requirement for Lye Valley)
- do NOT demonstrate removal of some important pollutants such as phosphate (key requirement for the Lye valley, which is the lowest of the low phosphate ecosystem).

As for oil and other hydrocarbon removal:

PBA supply a SuDS maintenance schedule for the Warren Crescent proposed system in **Table 1**. It is noted that in this table there is no mention of regular checking and replacement of an **oil filter** in the pipe to the swale. This is essential. Costs of all this SuDS maintenance in Table 1 are not mentioned and need to be supplied. Of course, such an oil filter (designed to remove oil coming from cars on the permeable paving) would be ineffective in reducing contamination from deliberate fly-tipping of used engine oil dumped directly into the unlined swale in any case. Deliberate dumping of contaminating chemicals will not be prevented by any of the design features. This type of activity is already recorded for adjacent to this site, and it would be unrealistic to assume it will cease.

Detailed Comment on Case Studies supplied by PBA:

Yes, these three case studies involve permeable paving and swales or interception ponds but **none of them** addresses the key issue at Warren Crescent, namely sufficient infiltration of uncontaminated water to an aquifer and critical chemical modification of the water infiltrated towards super-saturated with lime. These SuDS Case study examples are focused on peak water-flow reduction and the filtering out of pollutants such as hydrocarbons and heavy metals. With these aims, they are recorded, in the **short time** they have been studied, to work reasonably well in both tasks.

I note phosphate is not a pollutant that was assessed. Phosphate from detergents in car washing is a concern for the Warren crescent system because the alkaline fen receptor is a critically low phosphate-dependent ecosystem. The ponds in these case studies are either on clay or are lined, so little or zero infiltration is designed to occur and the pollutants they trap are never likely to enter groundwater.

Therefore they are just not comparable situations/solutions. These case study SuDS are not required to perform the same function as is needed for the Warren Crescent proposed SuDS system.

COMMENTS ON THE INDIVIDUAL CASE STUDIES AFTER READING THE REFERENCES GIVEN:

Gartloch Hospital, Glasgow (information from University of Abertay)

The main concern was run-off contamination during temporary construction phase. After construction, SuDS train of ponds is designed only to manage reduction of pollution and lower peak water flow to reduce flooding. This supplies an SSSI, but it is an output into a large water body of a loch and a portion of a fen is referred to as well. Because of the large volume of the receiving water body, even if the SuDS did not completely clean the water, contaminants would be diluted in the large water body. A fen marginal to a loch is likely to be a completely different type from the calcareous alkaline tufa fens in the Lye Valley and unlikely to need the same critical water chemistry.

The SuDS treatment chain uses **lined** ponds, as they are described as **retention ponds**. The soil at the site is described as 'sandy clay', which would not allow much infiltration in any case, so maybe the ponds are unlined, but in any case they are designed to **hold water** and **not infiltrate it**.

Infiltration into the ground is not the aim, merely cleaning run-off to a lake, therefore it is not comparable to the Warren Crescent SuDS design, where the key feature is infiltration and the consequent production of a particular water chemistry high in lime to supply a spring. Unlined swale puts aquifer at risk of pollution, unlike in this case study.

Hopwood motorway Service area, M42, near Bromsgrove Worcestershire (information from University of Coventry)

Installed 2000. Run off from car parks and a roof. Key role is pollutant removal only. All interception ponds have artificial membrane liners covered with 30cm topsoil. No infiltration. Contractors visit every 2 weeks. Silt and oil interceptor not maintained for 18 months and became blocked. Now maintained by specialist contractor every 6 months.

Sediment needs removal from ponds every 3 years – this contaminated sediment taken offsite, taking pollutants away. Pollutants thus not allowed into the ground.

Infiltration into the ground is not the aim, it is not comparable to the Warren Crescent SuDS design where the key feature is infiltration and the consequent production of a particular water chemistry high in lime to supply a spring. An unlined swale puts aquifer for Lye Valley at risk of pollution, unlike in this case study.

Lamb Drove, Cambourne, Cambridgeshire provided by Susdrain

Residential housing development on clay. SuDS not adopted and maintained by Cambridgeshire County Council, yet (at the time the report was published on line). Functioning monitored for only 3 years 2008-2011. SuDS reduced peak flows and reduced hydrocarbon and heavy metal concentrations. No phosphate measures. Unlikely much infiltration happening or of importance **as on clay**. One of aims to reduce new storm sewer connection from the developments and thus save £30 per household per year.

Infiltration into the ground is not the aim, it is not comparable to the Warren Crescent SuDS design where the key feature is infiltration and the consequent production of a particular water chemistry high in lime to supply a spring. Unlined swale puts aquifer at risk of pollution, unlike in this case study.

APPENDIX 3

Warren Meadow (land east of Warren Crescent) Wildlife Survey Report

Dr Judith A Webb
October 2015



Two views of Warren Meadow taken on 1st August 2013, from the north end looking southwest, flats of Heath Close overlook the site in background. Note the football to the right (below the flats) in the lower photograph, this area is frequently used for informal kick-about by children. Trees to the left are the outgrown hedge-line which is the junction to the Lye Valley LWS/LNR/SSSI.

Introduction and background

This open green space abuts the Lye Valley Local Wildlife Site (LWS)/Local Nature Reserve (LNR) to the east and the Lye Valley Site of Special Scientific Interest (SSSI) to the south-west. To the west are the curve of Warren Crescent road with blocks of flats and the similar flats on Heath Close. The green space is used for informal recreation and as a kick-about area by older children.

Survey data, presented in the Appendix, are from visits on 01.08.2013, 08.06.2014 and 25.09.2015. Most plants will have been identified on site from these visits, but the biodiversity of animals, especially invertebrates, in the area will not be adequately covered without more work.

The area centre is SP5480 0598. It is a linear green strip running from SP54756 05891 on the bank immediately above the SSSI fen to SP 54830 06059 immediately south of Town Furze allotments. A footpath crosses the site from the Town Furze allotment area to the top of the Lye Valley at the end of Heath Close.

It comprises a regularly closely-mown green sward with occasional ornamental trees (ash, Swedish whitebeam, ornamental pear, field maple) and marginal areas of planted shrubs (cotoneaster, pyracantha, variegated holly) along with bramble and elderberry bushes.

A large patch, approx. 20m x 5m, of ground elder and some nettles is to be found behind the fence towards the Town Furze allotments at the northern end of the site and partially adjacent to a small area with concrete, which used to have garages and is now used for parking.

The tree line along the site boundary to the east was originally planted as a mixed hedge of field maple, hawthorn and cherry in the 1970s, when the fence was erected there to limit fly tipping down the adjacent bank into the valley. There was a failure by the council to maintain this feature as a hedge by regular cutting. Consequently the field maples, being the fastest growing species, have come to dominate and have shaded out most of the hawthorns and cherries. The result is a linear feature of mostly mature field maple trees.

It is known that historically this area of land used to slope down gently towards the Lye Brook margin, but when the Town Furze estate was built in 1954, quantities of building rubble were deposited here on the slope and levelled. The result is a level area which is now green and, beyond the line of field maple trees, an artificially very steep, tipped-rubble, embankment leads into the valley.

Survey Results, wildlife using the site

The mown sward would probably have been originally sown with a general hardwearing seed mix suitable for play areas and this is reflected in the frequency of perennial rye-grass and white clover today.

However, the area has developed some diversity of common wildflowers like dandelion, common daisy, yarrow, plantains, dove's-foot crane's-bill, creeping buttercup and meadow buttercup, slender speedwell and germander speedwell with rare dog violets next to the tree/hedge line.

Towards the line of field maple trees, garlic mustard, wood avens and ground ivy are seen with locally frequent cow parsley. Cow parsley is a good spring flower food source for all spring insects.

Ground elder (there is a patch to the northern end), whilst an undesired weed in gardens, is an extremely valuable food source for pollinators. It was seen here on 08.06.2014 covered in insects feeding on the flowers - honey bees, two sorts of bumble bees, solitary bees, solitary wasps, deadwood-breeding hoverflies, a deadwood-breeding wasp beetle and hoverflies known to have larvae that need to breed in wet peat in the fen adjacent (*Chrysogaster solstitialis*).

As regards other food sources for pollinators, the ornamental pear and Swedish whitebeam trees will have flowers valuable to insects in spring and the white beam produces orange fruits useful to berry-feeding birds in the autumn.



Warren Meadow - abundant flowers of ground elder, covered in insects, (Chrysogaster solstitialis, fen-breeding hoverflies) on 08.06.2014



*More insects using the ground elder flowers on 08.06.2014
Myathropa florea (deadwood breeding hoverfly), wasp beetle, Clytus arietis (breeds in dead wood), Cuckoo bumble bee and honey bee.*

A Badger latrine area was noticed at SP54825 06009 at the base of the fence under the field maple trees on 25.09.2015. There is a known badger sett (burrow) on the bank to the SSSI just beyond the southern end of Warren Meadow. Characteristic badger turf diggings excavated whilst food-searching were also seen around a group of young ash trees on the same date. This whole green area is likely to be used by badgers for foraging and as a corridor from the sett in the Lye Valley, to the south, to the Town Furze allotments, to the north. Moles use the site as indicated by a number of fresh molehills.

Viviparous lizards and slow worms are known to breed immediately north of Warren Meadow in Town Furze allotments and immediately south of the meadow in a grassy triangle area at the end of Heath Close. As lizards will not cross through cold shady conditions such as are found on the tipped embankment, the warm sunny base of the hedge line is quite likely a route between the two breeding population areas for both reptiles.

Summary

Only common flowers and shrubs are found on site currently and the close mowing limits flowering in the majority of the sward. Uncut margins are, however, useful flower sources for insects. The ornamental pear and Swedish whitebeam trees, shrubs, cow parsley and the large patch of ground elder flowers present good feeding opportunities for important pollinators and for some of the insects breeding in dead wood and the waterlogged peat and tufa of the fen wetland adjacent.

If the site were enhanced by further marginal sowing of nectar-rich wildflowers, it would undoubtedly offer greater support to the life cycles of insects breeding in the adjacent fen and develop much more ecological importance. The site is a wildlife corridor and foraging area for badgers and probably slow worms and viviparous lizards with populations to the north and the south.



Warren Meadow from Warren Crescent, children playing football in the distance

Attached - Warren Meadow species records 2014 / 2015

A table of some species recorded from the Warren Meadow to date

Warren Meadow (land east of Warren Crescent) Wildlife Survey Report
Warren Meadow species records 2014 / 2015

Dr Judith A Webb October 2015

Key: A abundant, D dominant, F frequent, LA locally abundant, LF locally frequent, O occasional, R rare FP Flowering plant

Scientific name	Common name		Date	Abund/ nos.	Map ref	Comment
<i>Acer campestre</i>	Field maple	FP	25.09.2015	1 tree but frequent in hedge line	SP548 059	
<i>Achillea millefolium</i>	Yarrow	FP	25.09.2015	LA	SP548 059	
<i>Aegopodium podagraria</i>	Ground elder	FP	08.06.2014	Patch 5 x 20m near fence	SP54829 06037	
<i>Alliaria petiolata</i>	Garlic mustard	FP	25.09.2015	R	SP548 059	
<i>Anthriscus sylvestris</i>	Cow parsley	FP	25.09.2015	LF	SP548 059	
<i>Arrhenatherum elatius</i>	False oat	FP	08.06.2014	LF	SP54829 06037	
<i>Ballota nigra</i>	Black horehound	FP	25.09.2015	R	SP548 059	
<i>Bellis perennis</i>	Common daisy	FP	25.09.2015	F	SP548 059	
<i>Cerastium fontanum</i>	Common mouse-ear	FP	25.09.2015	O	SP548 059	
<i>Cotoneaster</i> sp	Cotoneaster	FP	25.09.2015	O	SP548 059	
<i>Dactylis glomerata</i>	Cock's foot grass	FP	25.09.2015	O	SP548 059	
<i>Fraxinus excelsior</i>	Ash	FP	25.09.2015	9 trees	SP548 059	
<i>Galium aparine</i>	Cleavers	FP	25.09.2015	O	SP548 059	
<i>Geranium molle</i>	Dove's foot cranesbill	FP	25.09.2015	F	SP548 059	
<i>Geum urbanum</i>	Wood avens	FP	25.09.2015	O	SP548 059	
<i>Glechoma hederacea</i>	Ground elder	FP	25.09.2015	O	SP548 059	
<i>Holcus lanatus</i>	Yorkshire fog	FP	25.09.2015	R	SP548 059	

08

Key: A abundant, D dominant, F frequent, LA locally abundant, LF locally frequent, O occasional, R rare FP Flowering plant

Scientific name	Common name		Date	Abund/ nos.	Map ref	Comment
Lamium album	White dead-nettle	FP	25.09.2015	R	SP548 059	
Lapsana communis	Nipplewort	FP	25.09.2015	R	SP548 059	
Leontodon autumnalis	Autumnal hawkbit	FP	25.09.2015	O	SP548 059	
Lolium perenne	Perennial ryegrass	FP	25.09.2015	F	SP548 059	
Plantago lanceolata	Ribwort plantain	FP	25.09.2015	F	SP548 059	
Plantago major	Greater plantain	FP	25.09.2015	O	SP548 059	
Pyracantha sp	Firethorn	FP	25.09.2015	O	SP548 059	
Pyrus sp	Ornamental pear tree	FP	25.09.2015	3	SP548 059	
Ranunculus acris	Meadow buttercup	FP	25.09.2015	O	SP548 059	
Ranunculus repens	Creeping buttercup	FP	25.09.2015	F	SP548 059	
Rosa canina	Dogrose	FP	25.09.2015	R	SP548 059	
Rubus fruticosus agg.	Bramble	FP	25.09.2015	O	SP548 059	
Rumex obtusifolius	Broad leaved dock	FP	25.09.2015	O	SP548 059	
Sorbus sp cf intermedia	Cf Swedish whitebeam	FP	25.09.2015	4 mature	SP548 059	
Taraxacum sp.	Dandelion	FP	25.09.2015	F	SP548 059	
Trifolium repens	White clover	FP	25.09.2015	A	SP548 059	
Urtica dioica	Common nettle	FP	25.09.2015	O	SP548 059	
Veronica chamaedrys	Germander speedwell	FP	25.09.2015	LF	SP548 059	
Veronica filiformis	Slender speedwell	FP	25.09.2015	O	SP548 059	
Viola sp.	A dog violet	FP	25.09.2015	R	SP548 059	

Key: A abundant, D dominant, F frequent, LA locally abundant, LF locally frequent, O occasional, R rare FP Flowering plant

Scientific name	Common name		Date	Abund/ nos.	Map ref	Comment
Agaricus sp	A mushroom	Fungus	25.09.2015	3 caps	SP548 059	
Myathropa florea	A hoverfly	Fly	08.06.2014	1	SP54829 06037	Feeding on ground elder flowers
Chrysogaster solstitialis	A hoverfly	Fly	08.06.2014	5	SP54829 06037	Feeding on ground elder flowers
Talpa europaea	Mole	Mammal	25.09.2015	Sign - fresh molehills	SP548 059	
Meles meles	Badger	Mammal	25.09.2015	Sign - one latrine area	SP54825 06009	Near to fence line
Andrena cineraria	Ash grey mining bee	Bee	08.06.2014	5	SP54829 06037	Feeding on ground elder flowers
Andrena/colletes	An unidentified solitary bee	Bee	08.06.2014	1	SP54829 06037	Feeding on ground elder flowers
Apis mellifera	Honey bee	Bee	08.06.2014	4 workers	SP54829 06037	Feeding on ground elder flowers
Bombus vestalis	Vestal cuckoo bumble	Bee	08.06.2014	1q	SP54829 06037	Feeding on ground elder flowers
Bombus lucorum agg.	White-tailed bumble	Bee	08.06.2014	1q	SP54829 06037	Feeding on ground elder flowers
Clytus arietis	Wasp beetle	Beetle	08.06.2014	1	SP54829 06037	Feeding on ground elder flowers