Naphill Common Ponds Survey 2013

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to Friends of Naphill Common

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1 Introduction

1.1 This survey was commissioned by the Friends of Naphill Common and funded by the Chilterns Conservation Board. The authors carried out preliminary inspections and laid refugia for detecting reptiles in the autumn of 2012. Five visits were made in the spring of 2013 (March to May) carrying out general observations, flora survey, mapping of each pond, checking refugia, torching at night for amphibians, setting up egg-laying strips for newts and inspecting the latter, and setting bottle-traps for adult newts. The use of bottle-traps was carried out under licence from Natural England by Holly Bennett (registration number: CLS02553). Both the egg-laying strips and the bottle-traps added significantly to newt records because unassisted observation was limited by conditions at many of the ponds (treacherous muddy bottoms, fallen branches, limited vegetation for egg-laying, etc). Bottle-traps were left over a single night and removed early the following morning to limit the danger of casualties (of which there were happily none).

Three visits were made in August 2013 by Tony Marshall to complete the flora survey, sample invertebrates from the water and in the vicinity of each pond, and make other observations. A total of 232 species was recorded (see Appendix I). The flora survey was intended to be exhaustive of all plants in the ponds and in their immediate vicinity, but plants further than two metres from the banks were ignored. The survey of amphibians is similarly exhaustive. The invertebrates recorded, on the other hand, must be treated as a sample of the species using the ponds and their immediate vicinity, as observations depend on season, light conditions at the time, and casual use of the habitat by non-aquatic species. Extensive netting was carried out at various times, however, so most of the aquatic species should have been recorded.

The Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) provided past records for Naphill Common. Particular ponds were rarely identified in these records and it was not generally possible to distinguish species recorded at or near ponds from those seen elsewhere, although assumptions might be made in the case of species known to be dependent on water or wet conditions. A total of 40 man-hours was spent on the field surveys; a further 20 hours was spent on analysis and report-writing.

1.2 We are grateful for the assistance and help given by BMERC (who provided records free for the benefit of a charitable body), Trevor Hussey and Neil Fletcher.

Photo 1: Inserting canes with egg-laying strips

Photo 2: Refuge sheet for checking reptiles

2.0 General condition of the ponds

2.1 The origin of the ponds on Naphill Common is varied, but most were deliberately constructed with puddled mud and stone rubble bases so as to hold water through the year for watering stock when these were held on the common. (Exceptions are dealt with under later descriptions of individual ponds.) At this time, and probably up until the early 20th century, the common was more or less open heathland with scattered trees and clumps of scrub. Since then the common has become forested and all the ponds are considerably shaded and subject to rapid silting up with rotting leaf-litter.

Even so, the ponds, along with major rides, provide almost the only light open areas needed for many species to survive. They are also the major source of moisture for a range of creatures, apart from some marshy patches along the rides. The ponds are therefore associated with much higher levels of biodiversity than the common generally. The afforestation of the common has eliminated many previously common heathland species and others endure in small quantity (eg heather, juniper). Even the ponds have lost many species previously recorded as they became too dark and overgrown. When regularly in use the ponds would have held clearer, more open water, with stock and man keeping down bankside scrub and overgrowth of the dominant pond vegetation. Even the most favourable ponds could now best be described as vegetated swamps, although in many years, such as in 2013, most of them continued to hold a decent depth of water (often under mats of vegetation). Where ponds are small and more shaded they may become less thickly vegetated, but are too dark for most plants and fauna, and are subject to excessive depths of rotting leaves. In most cases the water is slightly acidic, as is to be expected on heathland soils, although there were a couple of interesting exceptions dealt with under the individual ponds below.

2.2 While the ponds are oases of biodiversity, they are far from rich in either plants or creatures. Those that survive are either associated with swampy, shallow water with high levels of detritus, or are more adaptable. Details are provided in the descriptions of each pond, as each has its individual character. It is interesting here, however, to consider what changes may have occurred in the species using the ponds compared to past records. While we recorded purely terrestrial species that were found in the close vicinity of each pond, such species in past records for Naphill Common generally would not all be expected to occur at the ponds, so that it is impossible to say which ones might have been lost. While we can say which of the present species had never been recorded on the Common before, these are mainly in poorly recorded families (eg spiders) and had almost certainly always been present. The only meaningful comparison is therefore for the aquatic species and those associated with wet conditions. Even this comparison is prone to errors if some of the Common records included Pickups Pond (outside the wooded common and not part of the present survey) or Mannings Pond (on Downley Common but close to Naphill Common), as many recorders were not precise about locations.

2.3 Summary of groups and species identified

2.3.1 174 wetland species were identified in records supplied by BMERC for Naphill Common. Only 33 of these were seen during the present survey. As some families are easier to survey thoroughly than others, a large shortfall is to be expected, so it is most helpful to look at these species in groups, so that the thoroughness of the survey can be taken into account.

Groups likely to have been thoroughly searched in our survey were amphibians, plants, aquatic beetles, aquatic bugs and molluscs. Of five amphibians recorded, four were rediscovered. The exception was the common toad *Bufo bufo*. This had last been recorded in 2008, but may have been recorded away from water, as toads spend most of the year outside ponds. They may therefore be breeding in ponds in gardens or elsewhere nearby (eg Pickups). It is very unlikely to

have been overlooked in our extensive surveys, so that one can be sure that it is not breeding in any of the survey ponds. With this one exception, all the expected amphibians were currently present, with palmate newts and frogs being by far the most frequent. It is common in acidic areas for palmate newts to be the dominant newt species. Both smooth newts (2 ponds) and great crested newts (one pond) were in relatively small numbers. Great crested newt, which is a protected species because it is endangered in some parts of Europe (but not in Britain), like the toad, is fussier about water quality than other amphibians, so that there is some concern that this species could be lost if the pond environments are not improved.

Photo 3: Palmate newt in Dew Pond

2.3.2 Of 80 plants associated with wetland recorded on Naphill Common, only 15 were found in or by the ponds in our survey. This is a very disappointing result, as it means a large drop in diversity despite the fact that there is rampant plant growth in some of the ponds. A few vigorous species are tending to monopolise the space. The rarest of the survivors, small sweet-grass *Glyceria declinata*, cyperus sedge *Carex pseudocyperus*, blinks *Montia fontana* and various-leaved water-starwort *Callitriche platycarpa*, are now limited to one pond each and (in the case of the first two) small numbers of individuals. Narrow buckler-fern *Dryopteris carthusiana* was, however, still to be found at two ponds. Unlike the first three, this species is not aquatic and its marshland habitat still persists in various parts of the common. As ponds silt up it may even expand its population. From Daisy Pond in particular there has been a loss of starfruit *Damasonium alisma* (last seen 1995), lesser marshwort *Apium inundatum*, water purslane *Lythrum portula*, and alternate water-milfoil *Myriophyllum alterniflorum* (all last recorded in 1999). The last three species may however have been introduced when this pond and Mannings Pond on Downley Common were restored in the early 1990s to rehabilitate starfruit and may never have been native to the common. They were recorded also from Mannings Pond and had disappeared from there by the time of its 2012 survey. Other rare plants apparently lost may also have been unsuitable introductions at various times that failed to become established (eg the hybrid between common spotted and southern marsh orchids recorded in 1971 - obviously not native as neither of its parents has been recorded here). As for starfruit, which is on the verge of extinction in this country, it needs special conditions of shallow bare pond-edges that were only sustainable at the time when stock were regularly using the ponds. Its seed is long-lasting and it may re-appear should Daisy Pond at some time be completely re-excavated, only to be apparently lost again quite soon afterwards. The dominant plants currently present are common water-starwort *Callitriche stagnalis*, sweet-grass *Glyceria fluitans*, soft rush *Juncus effusus*, and common and least duckweeds *Lemna minor* and *L. minuta* (the latter an alien species now well-established in the area). Yellow iris *Iris pseudacorus* also has a major presence in three ponds.

Photo 4: Narrow buckler-fern

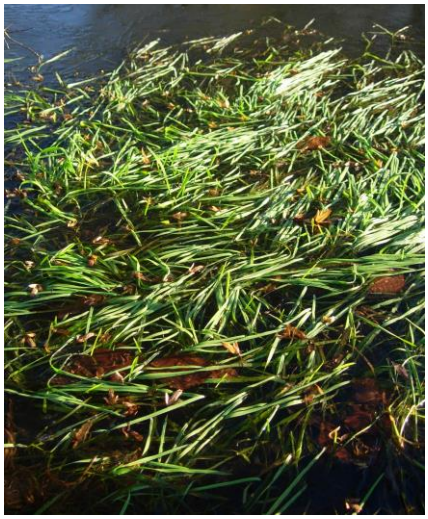

Photo 5: Sweet-grass

2.3.3 Of 26 aquatic and marshland beetles recorded at various times, just three were refound in 2013. Two of these, *Anacaena lutescens* and *Hydrobius palustris*, were present in most of the ponds and abundant. The third *Hydrobius fuscipes* was only discovered in Daisy Pond. All water-beetles associated with clear open water have been lost. At the same time, one less common water-beetle not previously recorded, *Hydroporus memnonius*, was frequently found in ponds other than Daisy, and it is significant that this addition to the fauna is associated with shallow water over substantial leaf-litter, thus being indicative of the gradual silting-up of these ponds.

2.3.4 The situation with respect to water-bugs is very similar, with the loss of eight out of ten species, including all submerged species, the only ones recorded being the two pond-skaters *Gerris gibbifer* and *Gerris lacustris*, the second being common everywhere and the first common in acid districts. Being surface-feeders these bugs are less dependent on water-quality than the others. On the other hand, a few new records were made among this group of insects, which may not have been thoroughly surveyed before. The most significant, because it is a true aquatic bug and uncommon, is the water cricket *Velia caprai* found just at Shipwash Pond. Also uncommon is the small yellow-green plant-hopper *Notus flavipennis* found at Dew and Small Ponds. The plantbug *Psallus haematodes* was also found on willow at Daisy Pond; although not aquatic, it is dependent on willows growing in wet areas. There were two plant-hoppers abundant on water-plants at most of the ponds - the bright blue-green *Cicadella viridis* and the small brown-and-white hopper with reduced wings *Conomelus anceps*, associated with sweet-grass and soft rush respectively. Like the plants, these two made up in quantity for what may have been lacking in variety.

2.3.5 Of seven water-snails recorded in the past, four were refound. One of these was the alien introduction *Planorbarius corneus* at Daisy Pond, the largest of our aquatic gastropods. The other three are significantly all associated with swampy conditions rather than more open water - marsh pond snail *Lymnaea palustris*, lake orb mussel *Musculium lacustre*, and common ramshorn *Planorbis planorbis*. Three new records were also made (thus no net loss). Two of these were also swamp inhabitants - keeled ramshorn *Planorbis carinatus* (dependent on water never drying up) and horny orb mussel *Sphaerium corneum*. The exception was the pea mussel *Pisidium pulchellum*, which was only found at Dew and Small Ponds (cf *Notus flavipennis* above), which prefers clean basic water.

Photo 6: *Planorbarius corneus*

2.3.6 The above are the only groups where fairly firm conclusions can be drawn. There are few aquatic birds likely to be found on such ponds. Moorhen and mallard had been recorded in the past, but as long ago as 1981 and 1890 respectively!! Although we saw no evidence of moorhen, we can confirm that mallard has survived in the intervening 123 years and is now common! Of course if there is a patch of water big enough to hold one duck, there is always a high probability of finding a mallard sat in it. This only goes to confirm that casual records are not entirely reliable for monitoring fauna - obviously nobody has felt that a mallard was significant enough to inform BMERC.

2.3.7 Of six wetland mosses previously recorded, two were refound, the purely aquatic *Riccia fluitans*, abundant in five ponds, and the variable forklet-moss *Dicranella varia* of marshland. The latter was only found at Small Pond. We did not thoroughly survey the mosses and it is likely that some like *Polytrichum commune* were merely overlooked rather than missing. On the other hand one new (common) species was recorded - ringless hook-moss *Warnstorfia exannulata*.

2.3.8 Crustaceans are never well recorded and the only ones in the BMERC records were fairy shrimp *Chirocephalus diaphanus*, last recorded in 1940, and the alien freshwater shrimp *Crangonyx pseudogracilis*, which is even more common than ever and has completely eradicated the native shrimp across both Naphill and Downley Commons. The fairy shrimp depends on shallow temporary water-pools and light open conditions. We saw no evidence of suitable habitat on the common and it is very unlikely to occur. If it had survived it would almost certainly have been recorded since 1940 because it is a conspicuous species, even if it appears only for a very short period.

2.3.9 Although we recorded none of the 21 flies employing ponds or wetland that had previously been recorded, this is not surprising, as the systematic recording of this group would require much more time, so we cannot say anything about possible losses in this group. We did, however, record five new wetland flies for the Common. These were: *Cerodonta iraeos*, which mines the leaves of yellow iris; the hoverfly *Helophilus pendulus*, common around ponds everywhere; *Palloptera arcuata* which inhabits open wet areas within woodlands; *Ptychoptera lacustris*; and the cranefly *Tipula melanoceros*.

2.3.10 There are few aquatic moths, of which ringed china-mark *Parapoynx stratiolata* was the only one recorded before (in 2009). Again it was not possible to search systematically for moths, but we did see the small china-mark *Cataclysta lemnata* not recorded before for Naphill Common.

2.3.11 We saw just one dragonfly using the ponds, the common southern hawker *Aeshna cyanea*, just one of the seven recorded in other years. No doubt there must be other species visiting these ponds from time to time, although the dark conditions at most of these ponds are not much to their liking. Similarly, there must be several caddis flies present, although only one has been recorded in the past - *Mystacides longicornis* - and we saw just the common *Limnephilus lunatus*. Dragonfly, mayfly and caddis larvae were not found during netting and these groups of insects, although possibly present, do not seem to be frequent, perhaps because of restricted aquatic fauna on which to prey.

2.3.12 Although not recorded previously we found two sawflies whose larvae feed on marsh plants - *Eutomostethus gagathinus* and *Selandria serva*. On the sweet-grass was the sawfly *Eutomostethus ephippium*, although this also uses grasses of dry land.

2.3.13 Of the four aquatic worms recorded, we could confirm just one, the leech *Helobdella stagnalis*, but they were not searched for systematically. The only freshwater isopod, the water slater *Asellus aquaticus*, was refound, although only at one pond, Daisy.

2.3.14 No wetland spiders had so far been recorded. We noted *Theridion tinctum* and the harvestman *Lacinius ephippiatus*, but there are many other species that could be recorded by an appropriate specialist. Similarly there were no previous springtail records, but *Isotoma riparia* is abundant on these ponds. While not a wetland species, the common fungus parasitising grasses, ergot *Claviceps purpurea*, was abundant on sweet-grass wherever this occurred in the ponds.

2.3.15 Finally, we saw a grass snake *Natrix natrix* swimming in Daisy Pond, a species that had surprisingly not been recorded on the Common before according to BMERC records.

Photo 7: Grass snake

3.0 The Ponds

(Uncommon species indicated with *, new records for Naphill Common with ^.)

3.1 Two Dells

No recording was carried out at this site, as water was never present at any time of the year. These two pits have no puddled base and therefore were never ponds (as the name intimates). Nor do they seem to be old extraction pits for clay or stone, as the sides are too steep. It seems likely that they are small swallow-holes that sometimes occur in the Chilterns where underground water dissolves underlying chalk and the overlying clay collapses into the chasm. This would explain both their general form and the fact that they do not retain water.

3.2 Daisy Pond

Photo 8: Daisy Pond, April

3.2.1 This was by far the outstanding pond on the Common for biodiversity, exceeding all the others in numbers of species of amphibians/reptiles, invertebrates, plants, and aquatic species of all groups. It also had more uncommon species than any other pond. It is one of the largest and most open to light of the ponds and always maintains some depth of water, even if this may not always be evident because of the mat of sweet-grass covering much of the surface. The fact that this was a light sunny spot (at least in the centre of the pond) attracted a number of woodland species like silver-washed fritillary* *Argynnis paphia*. The bottom, however, is very muddy and this limits the range of aquatic creatures. The shallow end has many fallen branches and the banks are mainly too shaded by scrub. A remnant of heathland gorse *Ulex europaeus* at one end is struggling for lack of light and is largely dead. This needs surrounding young tree growth removing.

3.2.2 This pond was most notable in the past for being one of the few recent sites in Britain for the endangered starfruit *Damasonium alisma* and was restored in the early 1990s by Natural England with this as the target species. It was last seen here in 1995 and current conditions are not suitable for it. Unfortunately, this plant demands a very specific habitat of well-lit unvegetated mud in the draw-down zone of the pond (underwater in winter but exposed in the summer), conditions which once would have been maintained by cattle grazing the common. The seed is long-lasting and will almost certainly survive in the mud and the plant can be expected to return in the event of any future restoration of the pond by excavation and clearance, as long as a shallow draw-down zone is left, but in only two or three years it would vanish again as the banks become vegetated. Apart from annual maintenance by volunteers to keep vegetation down and trample the shallow end, it would not be possible to maintain the conditions for this plant's continued appearance.

3.2.3 The pond as it is now, however, is an important habitat for a number of species. Grass snakes*, palmate newts, frogs and great crested* newts are all present. The last is a protected species and a licence would be needed before carrying out any restoration. It is present in quite small numbers and conditions are probably not ideal. As the pond becomes increasingly choked with

plants and muddy sediment builds up, a time will come in the not too distant future when conditions no longer favour great crested newt, so that restoration may need to be considered in five to ten years' time.

Photo 9: Great crested newts caught by bottle trap at Daisy Pond – 19.05.13

3.2.4 The aquatic flora is dominated by floating crystalwort *Riccia fluitans* (a bryophte), floating sweet-grass *Glyceria fluitans*, yellow iris *Iris pseudacorus*, lesser spearwort *Ranunculus flammula*, blinks* *Montia fontana*, soft rush *Juncus effusus,* and both common and least duckweeds *Lemna minor* and *L. minuta*. Most notable are scattered plants of cyperus sedge* *Carex pseudocyperus*, the only pond in which it grows on the common. Blinks is also locally uncommon and both plants may have been introduced during the last restoration. Blinks, lesser spearwort and, to a lesser extent, sweet-grass are important plants for egg-laying by great crested and palmate newts.

3.2.5 Water-beetles included *Hydrobius fuscipes, Hydroporus palustris,* and *Hydroporus striola^*. Five water-beetles previously recorded here were not refound, probably because the pond has become more marshy in the intervening 15 years and is no longer suitable for more open water species. The common freshwater shrimp in the pond, as in others on Naphill and Downley Commons, is the alien species *Crangonyx pseudogracilis*. This seems to have eliminated the native shrimp and may have been introduced into this and Mannings Pond inadvertently during restoration for the starfruit, when a number of plant species not native to the commons were also introduced (perhaps deliberately) but mostly did not survive [lesser marshwort, water purslane, alternate water-milfoil]. The leech *Helobdella stagnalis* and the water slater *Asellus aquaticus* were plentiful. Water-snails were *Lymnaea palustris* (marsh pond snail), *Musculium palustre* (lake orb mussel), *Sphaerium corneum* (horny orb mussel), *Planorbis carinatus* (keeled ramshorn), *Planorbis planorbis* (common ramshorn) and the alien *Planorbarius corneus* (great ramshorn), which may be another introduction at the time of the last restoration. The cinnamon sedge caddis-fly^ *Limnephilus lunatus* has aquatic larvae.

On the rushes were lots of *Scirtes hemisphaericus^* beetles and the rove beetles *Stenus cicindeloides^* and *S. tarsalis^*. The yellow iris is mined by the fly *Cerodonta iraeos^*. while the moth-fly *Pericoma blandula^* and the cranefly *Tipula melanoceros^* are abundant on the pond vegetation. Plant-hoppers were also abundant on the marsh plants - *Cicadella viridis*, *Cixius nervosus^* and *Conomelus anceps*. Sawflies were also frequent, their larvae feeding on the marsh plants - *Eutomostethus ephippium^* on the sweet-grass and *E. gagathinus*^* on rushes and sedges. Among spiders etc using these plants was the harvestman *Lacinius ephippiatus*^*.

Although unconnected to the aquatic environment, the uncommon plantbug *Dicyphus constrictus*^ was discovered on hemp-nettle on the banks of the pond.

3.2.6 While the range of species using the pond was restricted, those present were usually abundant and indicate a thriving eco-system based on shallow acid water, plenty of vegetation, and (away from the banks) plenty of light. The immediate work required for Daisy involves removal of surrounding scrub and tree saplings (leaving the gorse), and increasing the amount of open water by removing at least $10m^2$ of aquatic vegetation each year until 50% of the pond is clear of vegetation.

3.3 Willow Pond

Photo 10: Willow Pond

3.3.1 This was another large well-lit vegetated pond like Daisy, although in other respects it was quite dissimilar. In origin it would seem to have been an extraction pit for Denner Hill stone, a few boulders of which have been left *in situ* from when the work was abandoned as no longer economic. Since then it seems that the bottom clay has been puddled and laid with small stones in order to create a viable pond, although this may have happened by chance. It holds less water than Daisy in midsummer and there are many fallen branches and even trees. The banks have an interesting terrestrial flora, including abundant wood-sorrel *Oxalis acetosella* at the south end and hairy wood-rush *Luzula pilosa* on the east side, while the west side has more varied marsh vegetation (wavy bittercress *Cardamine flexuosa*, square-stalked willowherb *Epilobium tetragonum*) than the other ponds. More plant species were recorded here than at any other pond except Daisy. These included, most notably, narrow buckler fern* *Dryopteris carthusiana* (which likes wetter spots than common buckler fern) and small nettle *Urtica urens*.

3.3.2 Palmate newt and common frog were present.

3.3.3 The aquatic vegetation consists of floating crystalwort *Riccia fluitans*, yellow iris *Iris pseudacorus*, and the five plants occurring in almost all of the ponds (common water-starwort *Callitriche stagnalis*, sweet-grass *Glyceria fluitans*, soft rush *Juncus effusus*, and the two duckweeds *Lemna minor* and *minuta*).

3.3.4 Aquatic fauna include the shrimp *Crangonyx pseudogracilis*, but otherwise no special species not present at most of the other ponds.

3.3.5 The fallen tree-trunk and the boulders have an interesting developing flora of mosses and lichens and add to the diversity of the pond environment.

3.3.6 The open light conditions attract incidental insects like butterflies, dragonflies and the striking lacewing *Drepanepteryx phalaenoides**, a once rare species apparently becoming more widespread but still seldom seen.

Photo 11: *Drepanepteryx phalaenoides*

3.3.7 Little maintenance appears to be needed here at present apart from cutting a minor amount of bankside scrub, removal of branches from the water and extracting some of the sweet-grass dominating some parts. The major fallen tree, however, is best left *in situ*. The pond is gradually silting up with leaf litter and some re-excavation should be contemplated in a few years' time.

Photo 12: The stones at Willow pond provide good extra habitat

3.4 Shipwash Pond

Photo 13: Shipwash Pond

3.4.1 This formerly large pond has become clogged with leaf-litter and is now too shallow and dark (almost drying up in summer) to maintain a good aquatic community. It had fewer aquatic/wetland species than any other pond apart from Ash and fewer plants than most ponds. The name and the original shape (with a promontary from one end, giving it a kidney-shape) indicate that its primary purpose was for washing sheep, which would have passed regularly along the nearby old drove road. The promontory was used to bring the sheep to the central, deepest, part of the pond.

3.4.2 More invertebrates were recorded than at any other pond than Daisy, but these were almost all terrestrial species, particularly associated with the surrounding beech and oak trees. They included the uncommon gall-midge*^ *Phegomyia fagicola* that causes galls on beech leaves. This was, however, the only pond where water cricket*^ *Velia caprai* was found, a species that is quite uncommon these days.

3.4.3 Only one amphibian was present (palmate newt), but not in the numbers supported by most other ponds.

3.4.4 The aquatic vegetation is sparse and consists of floating crystalwort *Riccia fluitans* apart from the generally common species.

3.4.5 An important relict heathland community occurs on the rather bare banks around the NE edge that get the most sun. Here are heather* *Calluna vulgaris*, sheep's fescue *Festuca ovina*, red fescue *F. rubra*, and hairy woodrush *Luzula pilosa*. These plants support insects like the small moth *Neofaculta ericetella*^ swept from the heather and the bee-fly *Bombylius major*.

3.4.6 Abundant holly *Ilex aquifolium* overgrowing the edge of the pond needs to be removed as far as possible, which will allow more light. The pond also needs excavating to remove the accumulated leaf-mould and restore the original depth, keeping the original shape if at all possible. There is little that would be lost by such restoration. The only concern is the survival of the water-cricket, for which reason it would be advisable to excavate part of the pond one year and the rest the next, thus always maintaining some undisturbed aquatic habitat. A shallow edge should be provided for amphibian access, but the current warm banks with the relict heathland community should not be disturbed during the restoration process. This community, once dominant over the

common, is now so endangered that even this little should be preserved. It would help this little community to grow if more extensive scrub clearance were to be carried out in the surrounding area to make it as light as possible.

3.5 Ladyhorse Pond

Photo 14: Ladyhorse Pond

3.5.1 This is another fairly large pond, clearly created purposely as a stock pond, having a firm stony bottom, although accumulation of leaf-litter can make it treacherous to enter. No significant species were recorded here.

3.5.2 Both palmate and smooth newts were found here (the latter otherwise found only at Dew Pond). The number of palmates was large - 50 were obtained from ten bottle-traps.

3.5.3 The surrounding vegetation here is very restricted (the lowest of all the ponds, equal to Dew), but the aquatic vegetation includes floating crystalwort *Riccia fluitans* like the other larger ponds, yellow iris *Iris pseudacorus* and lesser spearwort *Ranunculus flammula* (otherwise only at Daisy) which is presumably the reason why it is particularly attractive to the newts. (The same conditions may also have helped attract the southern hawker dragonfly *Aeshna cyanea* observed here.) An old beech tree provides the only significant habitat in the immediate surroundings.

3.5.4 This is another pond that is ripe for restoration by digging it out to its original depth, as it supports very few species in its present state. The fallen branches in particular need to be removed and, as usual, surrounding scrub removed as far as possible. Restoration should be carried out during the newts' terrestrial phase, ideally in early autumn, although some may still be present at all times, in which case it would be best to net as many as possible and return them after excavation. Some of the original aquatic vegetation (especially the lesser spearwort) should be preserved for re-introduction, this being important for amphibian eggs.

3.6 Ash Pond

Photo 15: Ash Pond

3.6.1 Another original stock pond, this had the most limited community of all and was the only one to have no evidence of amphibians, being dark, bare of aquatic vegetation and excessively polluted by rotting leaves. The only significant species was narrow buckler fern* *Dryopteris carthusiana*, a woodland fern of wet places. There was also wood-sorrel *Oxcalis acetosella*.

3.6.2 If re-excavated and cleared of surrounding scrub this pond should provide a similar habitat to the other ponds and soon attract amphibians (although it will be necessary to introduce some water-plants for egg-laying, best removed from other ponds on the common to avoid introducing alien species from other regions - eg lesser spearwort, water-starwort). Care should be taken, however, to avoid damage to that part of the surrounding area currently supporting narrow buckler fern.

3.7 The basic ponds – Small Pond and Dew Pond

The soils of Naphill Common are derived from acid clays, which was why it once supported a typical heathland community. Two ponds, however, Dew and Small, had signs of having somewhat basic water. In both cases the water is very clear. It seems likely, therefore, that both of these originated in natural springs emerging from chalk underlying the clays. This makes them rather special and they are also least likely to dry up of all the common ponds.

3.7.1 Small Pond, despite its diminutive size compared to all the other ponds, held a greater variety of aquatic species and more significant species than any pond other than Daisy. It also supported two amphibians, common frog and palmate newt, both populations being healthy in numbers. Species of non-acidic habitats found here included variable forklet-moss *Dicranella varia*, the plant hopper *Notus flavipennis**^, and the pea mussel *Pisidium pulchellum**^. It was the only pond to have various-leaved water-starwort* *Callitriche platycarpa*, small sweet-grass* *Glyceria declinata* or pale persicaria *Persicaria lapathifolia*. It was also the only pond where we saw Borrer's male-fern* *Dryopteris borreri* growing on one bank, although this disappeared at some time during the year, perhaps an unfortunate by-product of clearance of bank vegetation, of which there were signs of some activity (showing the importance of surveying for what is present before undertaking clearance work). Hairy woodrush *Luzula pilosa* grows on the banks (otherwise only at Shipwash and Willow), although this is a general ancient woodland plant that might be found anywhere where there are relatively dry banks and plenty of light.

Photo 16: Small Pond

Photo 17: Dew Pond

3.7.2 Dew Pond is larger and naturally shallow, it being possible to walk across on its stony bottom without water getting much above knee height. It is much lighter than the other ponds, with no shading vegetation close to the edge. A large old pollard beech close by provides a significant ecological community of its own in terms of fungi and invertebrates. Both palmate and smooth newts occur here, the former in good numbers. (Although populations of these newts are often mixed, the palmate tends to be commonest in acid water, and the smooth tends to have a bias towards basic water, as in this case.) The aquatic vegetation includes floating crystalwort *Riccia fluitans*. This is the only pond where we recorded the marshland rove beetle *Philonthus decorus*^, and it shared the plant hopper *Notus flavipennis**^ and the pea mussel *Pisidium pulchellum**^ with Small Pond. The last was particularly abundant. The open conditions attracted butterflies and dragonflies in the sun.

3.7.3 Both of these ponds are in good shape and the special ecological communities based on their clean basic water are distinct and add to the biological diversity of the common ponds. Neither require any conservation work in the near future, apart from scrub removal when this eventually becomes necessary.

4.0 Summary of recommendations

4.1. Scrub clearance. This is the most prevalent need for most of the ponds. The health of these ponds is dependent on the amount of light they get. In their heyday they were part of an open common. Clearance of the whole common back to open conditions with scattered trees and small areas of scrub, allowing the re-growth of heather, juniper and gorse, would be the most advantageous policy to restore biodiversity, returning to the formerly established heathland ecosystem. This would be the only way of retrieving many of the species that have now disappeared (such as the fairy shrimp, starfruit). It would only be viable, however, if a suitable grazing regime could also be established to maintain the more open conditions.

In the context of this survey it is only feasible to consider what might be done up to 7-10m from each pond. The largest mature trees, although they create much shade and leaf litter, are important habitats in their own right (invertebrates, bats, fungi). They would also be costly and difficult to fell. Clearance should therefore concentrate on removing all holly, tree saplings, and smaller trees up to whatever size is deemed feasible. Lower plants like bramble and bracken could usefully be reduced at the same time, but will return very quickly, and they at least provide some cover for amphibians moving between ponds. Removal of tall scrub and trees will provide more light, encouraging a greater range of aquatic species and terrestrial species that require access to sunny spots. It will also reduce the rate of accumulation of leaf litter in the ponds, although this will always be a problem in a woodland environment. At the same time it is important not to be too "tidy", as larger logs and stones can provide important refuges for several species, including the amphibians. Much brash might be left in piles as further shelter, but some may need to be taken away and disposed, whether burned in an area where no damage can be caused or composted. For the construction of amphibian and reptile refuges see Appendix II.

Clearance is indicated particularly around Daisy (where a stand of gorse at one end should be left to regenerate when shading trees have been removed), Willow, Shipwash and Ash. In the case of Shipwash more extensive clearance of woody species from the heather patch and well beyond it would provide a chance for this remnant heathland community to survive and expand.

4.2 Pond clearance. It is not necessary to remove all litter from ponds. Bottles and cans are potentially dangerous because they can trap amphibians. Branch litter should be removed if excessive, but a small amount provides emergence and pitching platforms. The odd fallen trunk or large log is best left *in situ*, as it may provide important underwater refuges, as well as a platform for mosses and ferns that like a humid atmosphere. Such clearance is indicated at Daisy and Willow. Both these ponds, particularly Willow, would also benefit from pulling out some of the aquatic vegetation, namely sweet-grass and yellow iris, although it should be remembered that these ponds have developed important "swamp" communities to which extensive vegetation is crucial, so that major clearance is to be avoided. In particular, at Daisy, it is important not to remove any of the clumps of cyperus sedge. A circulating pattern of clearing sweet-grass in different parts of each of the ponds in successive years would be ideal, aiming always to keep an area of open water among the more thickly vegetated areas.

In light of the sighting of a grass snake at Daisy Pond, it is recommended that where vegetation is cleared from and around Daisy Pond, it is used to create hibernation and egg laying sites for grass snakes. A possible location for these could be near to the ride created by the National Grid around the neighbouring pylons. See Appendix II for details.

4.3 Pond restoration. Complete excavation of a pond should be avoided where there is still a varied community of amphibians, invertebrates and plants, but will always become necessary at some stage in the inevitable silting up process. This currently applies to Shipwash, Ladyhorse and Ash. The last in particular is straightforward, with no species that require protection. In this case a little water-starwort and lesser spearwort should be planted in the bare mud after excavation, removing these plants from other ponds on the common that have plenty (Daisy in the case of the spearwort).

Shipwash has remnants of an aquatic community and should be tackled half at a time in two successive years. Care needs to be taken not to disturb the NE edge and its remnant heathland community of plants, so removed mud, if not taken away, should be deposited on the other sides. While not vital ecologically, the former peninsula into the pond might be restored for its historical interest, completely clearing it of woody species and building it up with some of the excavated mud, but care needs to be taken because of its proximity to the heather bank close by. As in the other two cases excavation should remove as much mud and leaf-litter as possible right

down to (but not piercing) the hard puddled bottom (marked by stones). It is good practice to use as much as possible of this mud to build up banks, as it is likely to retain seeds of some aquatic plants and may even have resting stages of some invertebrates. In doing so it is important to ensure that there remain some shallow edges for easy amphibian access and for semi-emergent plants.

In the case of Ladyhorse, the excavation should be undertaken in the autumn in a single year. Prior to digging out, the whole pond should be netted for newts that may remain and these should be returned after work has ceased. Similarly some of the extant aquatic plants should also be taken out and put aside to be returned.

In all three ponds it will probably be necessary to use a mechanical digger, as it would take a lot of hand labour. Care would be needed in the case of Shipwash that the machine does not obtrude on the NE banks, always working from the opposite side. Scrub clearance from the surrounds will need to be undertaken before a machine can be introduced.

After excavation ponds should be monitored in the subsequent year for returning species. Although the rare starfruit has only been recorded at Daisy, it is possible that it once grew at other ponds as well, and the most likely time to observe it would be the year following excavation.

Ponds always follow a natural succession from open water to closed vegetation and ultimately drying out. Each stage (except the final one) is important for different aquatic communities. Where there are several ponds in close proximity it is possible to restore ponds at different times to ensure that each one is in a different successional stage, maximising the variety of aquatic life across them. In the case of Naphill Common, Willow, Ladyhorse, Shipwash and Ash provide a possibility of such an organised succession. Ash, as the closest of these ponds to finality, would be restored in the first year. Shipwash might be restored in the next year or the one after, Ladyhorse two years after that, with Willow completing the series in 7-10 years time.

5.0 REFERENCES

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Appendix I

Recorded species in 2013 (wetland species in bold)

Amphibia	***Lissotriton helveticus***	**Palmate newt**
Amphibia	***Lissotriton vulgaris***	**Smooth newt**
Amphibia	***Rana temporaria***	**Common frog**
Amphibia	***Triturus cristatus***	**Great crested newt**
Araneae	*Meta mengei*	
Araneae	*Tetragnatha montana*	
Araneae	*Theridion tinctum*	
Aves	***Anas platyrhynchos***	**Mallard**
Aves	*Erithacus rubecula*	Robin
Aves	*Milvus milvus*	Red kite
Aves	*Parus major*	Great tit
Aves	*Turdus merula*	Blackbird
Bryophyta	*Campylopus flexuosus*	Rusty swan-neck moss
Bryophyta	***Dicranella varia***	**Variable forklet-moss**
Bryophyta	*Dicranoweissia cirrhata*	Common pincushion moss
Bryophyta	*Dicranum scoparium*	Broom fork-moss
Bryophyta	*Grimmia pulvinata*	Grey-cushioned grimmia
Bryophyta	*Kindbergia praelonga*	Common feather-moss
Bryophyta	*Lepidozia reptans*	Creeping fingerwort
Bryophyta	*Mnium hornum*	Swan's-neck thyme-moss
Bryophyta	***Riccia fluitans***	**Floating crystalwort**
Bryophyta	***Warnstorfia exannulata***	**Ringless hook-moss**
Coleoptera	***Anacaena lutescens***	**Water-beetle**
Coleoptera	*Anaspis maculate*	
Coleoptera	*Cantharis rufa*	Soldier beetle
Coleoptera	*Carabus violaceus*	Violet ground-beetle
Coleoptera	*Cis boleti*	
Coleoptera	*Crepidodera ferruginea*	Leaf-beetle
Coleoptera	***Cyphon variabilis***	**Water-beetle**
Coleoptera	***Hydrobius fuscipes***	**Water-beetle**
Coleoptera	***Hydroporus memnonius***	**Water-beetle**
Coleoptera	***Hydroporus palustris***	**Water-beetle**
Coleoptera	***Hydroporus striola***	**Water-beetle**
Coleoptera	*Meligethes aeneus*	
Coleoptera	*Notiophilus biguttatus*	Ground beetle
Coleoptera	*Oulema melanopus*	Cereal leaf-beetle
Coleoptera	***Philonthus decorus***	**Rove beetle**
Coleoptera	*Propylea 14-punctatus*	14-spot ladybird
Coleoptera	*Pterostichus madidus*	Ground beetle
Coleoptera	***Scirtes hemisphaericus***	
Coleoptera	*Sitona lineatus*	Weevil
Coleoptera	*Staphylinus olens*	Devil's coach-horse
Coleoptera	***Stenus bifoveolatus***	**Rove beetle**
Coleoptera	***Stenus cicindeloides***	**Rove beetle**
Coleoptera	***Stenus tarsalis***	**Rove beetle**
Collembola	***Isotoma riparia***	**Springtail**
Crustacea	***Crangonyx pseudogracilis***	**Freshwater shrimp**

Diptera	*Amauromyza labiatarum*	
Diptera	*Aulagromyza hendeliana*	
Diptera	*Bombylius major*	Bee-fly
Diptera	***Cerodonta iraeos***	
Diptera	*Cheilosia pagana*	Hoverfly
Diptera	*Chirosia histricina*	
Diptera	*Chromatomyia lonicerae*	
Diptera	*Chromatomyia periclymeni*	
Diptera	*Episyrphus balteatus*	Hoverfly
Diptera	*Eristalis pertinax*	Drone-fly
Diptera	*Eristalis tenax*	Drone-fly
Diptera	*Hartigiola annulipes*	
Diptera	***Helophilus pendulus***	**Hoverfly**
Diptera	*Melanostoma scalare*	Hoverfly
Diptera	*Myathropa florea*	Hoverfly
Diptera	***Palloptera arcuata***	
Diptera	*Pericoma blandula*	Moth-fly
Diptera	*Phegomyia fagicola*	
Diptera	*Phytoliriomyza hilarella*	
Diptera	*Phytomyza ilicis*	Holly leaf-miner
Diptera	*Platycheirus albimanus*	Hoverfly
Diptera	*Polystepha malpighii*	
Diptera	***Ptychoptera lacustris***	
Diptera	*Sarcophaga carnaria*	Flesh-fly
Diptera	*Syrphus ribesii*	Hoverfly
Diptera	***Tipula melanoceros***	**Cranefly**
Diptera	*Tipula oleracea*	Cranefly
Diptera	*Tipula verna*	Cranefly
Flora	*Agrostis capillaris*	Common bent
Flora	*Agrostis stolonifera*	Creeping bent
Flora	*Arrhenatherum elatius*	False oat-grass
Flora	*Arum maculatum*	Lords & ladies
Flora	*Betula pendula*	Silver birch
Flora	***Callitriche platycarpa***	**Various-leaved water starwort**
Flora	***Callitriche stagnalis***	**Common water starwort**
Flora	*Calluna vulgaris*	Heather
Flora	***Cardamine flexuosa***	**Wavy bittercress**
Flora	***Carex pseudocyperus***	**Cyperus sedge**
Flora	*Carex remota*	Remote sedge
Flora	*Cerastium fontanum*	Common mouse-ear
Flora	*Chamerion angustifolium*	Rosebay
Flora	*Circaea lutetiana*	Enchanter's nightshade
Flora	*Corylus avellana*	Hazel
Flora	*Crataegus monogyna*	Hawthorn
Flora	*Deschampsia cespitosa*	Tufted hair-grass
Flora	*Digitalis purpurea*	Foxglove
Flora	*Dryopteris borreri*	Borrer's male fern
Flora	***Dryopteris carthusiana***	**Narrow buckler fern**
Flora	*Dryopteris dilatata*	Broad buckler fern
Flora	*Dryopteris filix-mas*	Male fern
Flora	*Epilobium tetragonum*	Square-stalked willowherb

Flora	*Fagus sylvatica*	Beech
Flora	*Festuca ovina*	Sheep's fescue
Flora	*Festuca rubra*	Red fescue
Flora	*Galeopsis bifida*	Bifid hemp-nettle
Flora	*Galeopsis tetrahit*	Common hemp-nettle
Flora	*Galium aparine*	Cleavers
Flora	*Geranium robertianum*	Herb Robert
Flora	*Geum urbanum*	Wood avens
Flora	*Glechoma hederacea*	Ground-ivy
Flora	***Glyceria declinata***	**Small sweet-grass**
Flora	***Glyceria fluitans***	**Sweet-grass**
Flora	*Hedera helix*	Ivy
Flora	*Holcus lanatus*	Yorkshire fog
Flora	*Holcus mollis*	Creeping soft-grass
Flora	*Hyacinthoides non-scripta*	Bluebell
Flora	*Ilex aquifolium*	Holly
Flora	***Iris pseudacorus***	**Yellow iris**
Flora	***Juncus effuses***	**Soft rush**
Flora	*Lapsana communis*	Nipplewort
Flora	***Lemna minor***	**Common duckweed**
Flora	***Lemna minuta***	**Least duckweed**
Flora	*Lonicera periclymenum*	Honeysuckle
Flora	*Luzula pilosa*	Hairy woodrush
Flora	*Milium effusum*	Wood millet
Flora	***Montia fontana***	**Blinks**
Flora	*Oxalis acetosella*	Wood-sorrel
Flora	***Persicaria lapathifolia***	**Pale persicaria**
Flora	*Pteridium aquilinum*	Bracken
Flora	*Quercus robur*	Pedunculate oak
Flora	***Ranunculus flammula***	**Lesser spearwort**
Flora	*Ranunculus repens*	Creeping buttercup
Flora	*Rubus fruticosus*	Bramble
Flora	*Rubus idaeus*	Raspberry
Flora	*Rumex acetosa*	Common sorrel
Flora	*Rumex sanguineus*	Wood dock
Flora	***Salix caprea***	**Goat willow**
Flora	*Schedonorus giganteus*	Giant fescue
Flora	***Solanum dulcamara***	**Bittersweet**
Flora	*Sorbus aucuparia*	Rowan
Flora	*Stachys sylvatica*	Hedge woundwort
Flora	*Stellaria media*	Common chickweed
Flora	*Taraxacum agg.*	Dandelion
Flora	*Taxus baccata*	Yew
Flora	*Torilis japonica*	Upright hedge parsley
Flora	*Ulex europaeus*	Gorse
Flora	*Urtica dioica*	Common nettle
Flora	*Urtica urens*	Small nettle
Flora	*Veronica hederifolia*	Ivy-leaved speedwell
Fungi	*Claviceps purpurea*	Ergot
Fungi	*Ganoderma australe*	Southern bracket
Fungi	*Piggotia coryli*	
Fungi	*Rhopographus filicinus*	

Fungi	*Uncinula adunca*	Powdery mildew
Hemiptera	*Anthocoris nemorum*	Plantbug
Hemiptera	*Capsus ater*	Plantbug
Hemiptera	***Cicadella viridis***	**Plant hopper**
Hemiptera	*Cixius nervosus*	Plant hopper
Hemiptera	***Conomelus anceps***	**Plant hopper**
Hemiptera	*Dicyphus constrictus*	Plantbug
Hemiptera	***Gerris gibbifer***	**Pondskater**
Hemiptera	***Gerris lacustris***	**Pondskater**
Hemiptera	*Javasella pellucida*	Plant hopper
Hemiptera	***Notus flavipennis***	**Plant hopper**
Hemiptera	*Palomena prasina*	Green shield-bug
Hemiptera	*Philaenus spumarius*	Cuckoo-spit bug
Hemiptera	*Phylloxera glabra*	Oak aphid
Hemiptera	*Phytocoris longipennis*	Plantbug
Hemiptera	***Psallus haematodes***	**Plantbug**
Hemiptera	*Stenodema laevigata*	Plantbug
Hemiptera	***Velia caprai***	**Water cricket**
Hirundinea	***Helobdella stagnalis***	**Leech**
Hymenoptera	*Bombus terrestris*	Buff-tailed bumble-bee
Hymenoptera	*Eutomostethus ephippium*	Sawfly
Hymenoptera	***Eutomostethus gagathinus***	**Sawfly**
Hymenoptera	*Myrmica ruginodis*	Ant
Hymenoptera	*Neuroterus anthracinus*	
Hymenoptera	*Neuroterus numismalis*	
Hymenoptera	*Neuroterus quercusbaccarum*	
Hymenoptera	***Selandria serva***	**Sawfly**
Hymenoptera	*Vespula vulgaris*	Common wasp
Isopoda	***Asellus aquaticus***	**Water slater**
Lepidoptera	*Aglais urticae*	Small tortoiseshell
Lepidoptera	*Aphantopus hyperanthus*	Ringlet
Lepidoptera	*Argynnis paphia*	Silver-washed fritillary
Lepidoptera	***Cataclysta lemnata***	**Small china-mark moth**
Lepidoptera	*Cydia splendana*	
Lepidoptera	*Dyseriocrania subpurpurella*	
Lepidoptera	*Gonepteryx rhamni*	Brimstone
Lepidoptera	*Idaea aversata*	Riband wave
Lepidoptera	*Inachis io*	Peacock
Lepidoptera	*Incurvaria masculella*	
Lepidoptera	*Incurvaria pectinea*	
Lepidoptera	*Maniola jurtina*	Meadow brown
Lepidoptera	*Neofaculta ericetella*	
Lepidoptera	*Pararge aegeria*	Speckled wood
Lepidoptera	*Parornix anglicella*	
Lepidoptera	*Parornix devoniella*	
Lepidoptera	*Parornix fragivora*	
Lepidoptera	*Phyllonorycter harrisella*	
Lepidoptera	*Phyllonorycter maestingella*	
Lepidoptera	*Phyllonorycter messaniella*	
Lepidoptera	*Phyllonorycter quercifoliella*	
Lepidoptera	*Pieris brassicae*	Large white

Lepidoptera	*Pieris napi*	Green-veined white
Lepidoptera	*Pleuroptya ruralis*	Mother-of-pearl moth
Lepidoptera	*Polygonia c-album*	Comma
Lepidoptera	*Stigmella nylandriella*	
Lepidoptera	*Stigmella roborella*	
Lepidoptera	*Stigmella tityrella*	
Lepidoptera	*Timandra comae*	Blood-vein moth
Lepidoptera	*Tischeria ekebladella*	
Lichens	*Cladonia coniocraea*	
Lichens	*Cladonia macilenta*	
Lichens	*Evernia prunastri*	
Mammalia	*Myotis nattereri*	Natterer's bat
Mammalia	*Pipistrellus pipistrellus*	Common pipistrelle
Mecoptera	*Panorpa communis*	Scorpion-fly
Mollusca	*Aegopinella nitidula*	Smooth glass snail
Mollusca	*Arion ater*	Great black slug
Mollusca	*Limax maximus*	Great grey slug
Mollusca	***Lymnaea palustris***	**Marsh pond snail**
Mollusca	***Musculium lacustre***	**Lake orb mussel**
Mollusca	***Pisidium pulchellum***	**Pea mussel**
Mollusca	***Planorbarius corneus***	**Great ramshorn**
Mollusca	***Planorbis carinatus***	**Keeled ramshorn**
Mollusca	***Planorbis planorbis***	**Common ramshorn**
Mollusca	***Sphaerium corneum***	**Horny orb mussel**
Mollusca	*Tandonia budapestensis*	Budapest slug
Neuroptera	*Drepanepteryx phalaenoides*	Lacewing
Neuroptera	*Micromus variegatus*	Lacewing
Odonata	***Aeshna cyanea***	**Southern hawker**
Opiliones	***Lacinius ephippiatus***	**Harvestman**
Opiliones	*Mitopus morio*	Harvestman
Reptilia	***Natrix natrix***	**Grass snake**
Trichoptera	***Limnephilus lunatus***	**Cinnamon sedge caddis-fly**

APPENDIX II Construction of shelters for amphibians & reptiles

Brash and logs cut can be put into piles to create improved cover and structure near each pond. A mixture of sizes and shapes should be used. These piles will benefit amphibians and reptiles and should be placed in the sunnier areas and within existing vegetation where cover is immediately adjacent. The two diagrams below are suggested designs (photo 18 & 19). There is no need for the piles to be tightly packed throughout the structure; however, the core can be compact with the outer layers laid on more loosely. Try to locate these piles away from areas of high public access to reduce the risk of disturbance, vandalism or arson. Materials can be partially buried or anchored with wire secured to larger logs. Maintenance of the brash piles involves adding material from ongoing site maintenance as the pile decomposes. Removed pond vegetation, such as rushes and reeds, can be used in creating egg laying sites for grass snakes.

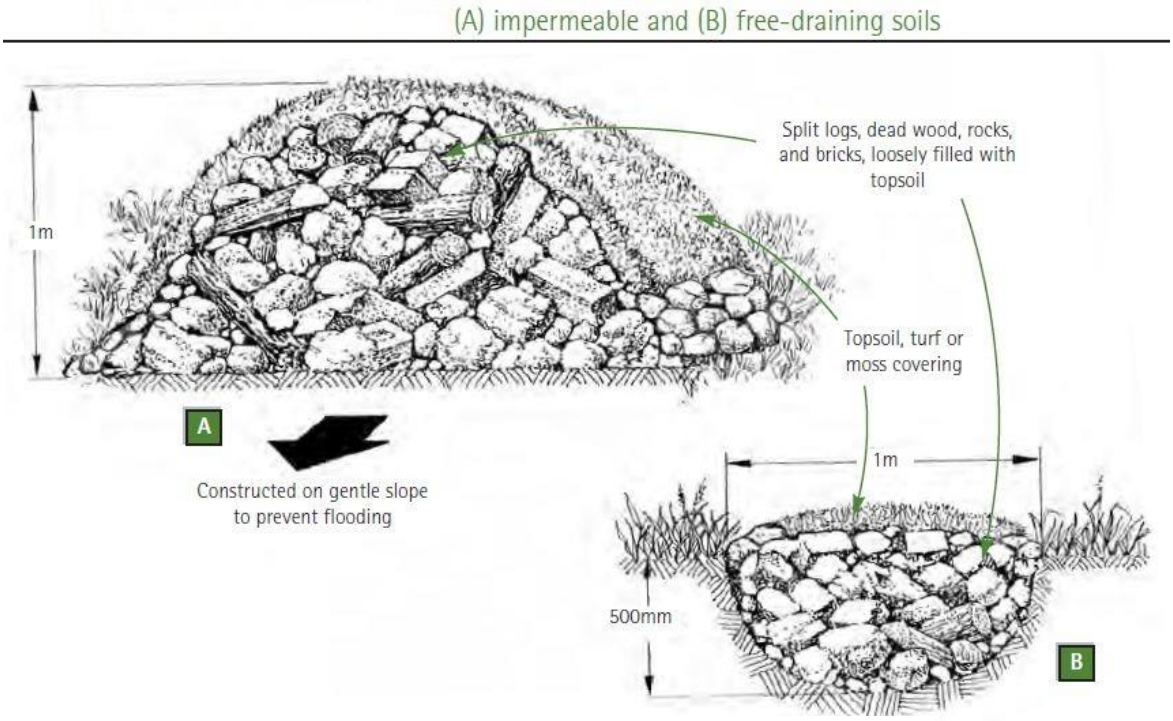

Photo 18: Amphibian refuge design for different soils.
(Langton et. al 2001)

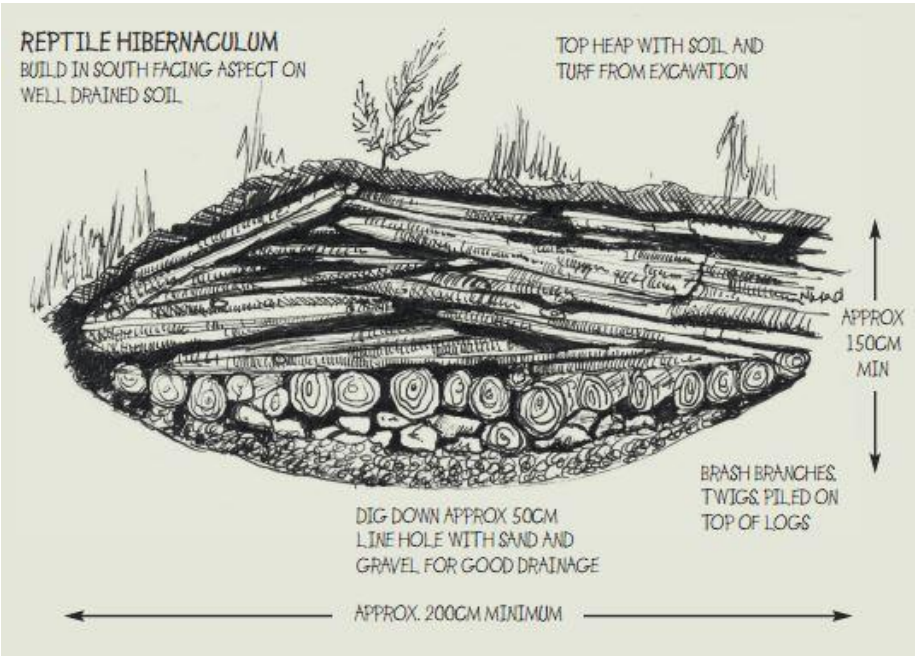

Photo 19: Reptile hibernaculum. (HART)

Heaps of decaying organic material are perfect for grass snakes eggs as the heat from decomposition incubates the eggs. Heaps of manure, composted grass cuttings, sawdust, garden waste and cut reeds are all good materials to use. Larger heaps of vegetation are usually more successful than small heaps. The smallest volume should measure $1m^3$, but if you are able to create a heap larger than that straight away, then that is ideal.

Locating several egg-laying sites in both full sun and partial shade can ensure that, whatever the weather over the course of the incubation period, some eggs should hatch. Individual females tend to return to the same egglaying site year after year. The National Grid cleared a large area around their pylons close to Daisy Pond, there may be suitable locations beside this ride. The heaps do not need to be adjacent to ponds. If the surrounding scrub or tree cover grows up and creates substantial shading, it should be cut back. Heaps should also be connected to vegetation that provides secure cover for adult and hatchling snakes moving to or from the site. Decomposing vegetation causes local soil enrichment, so egg-laying heaps should be constructed in locations where this will not create a problem.

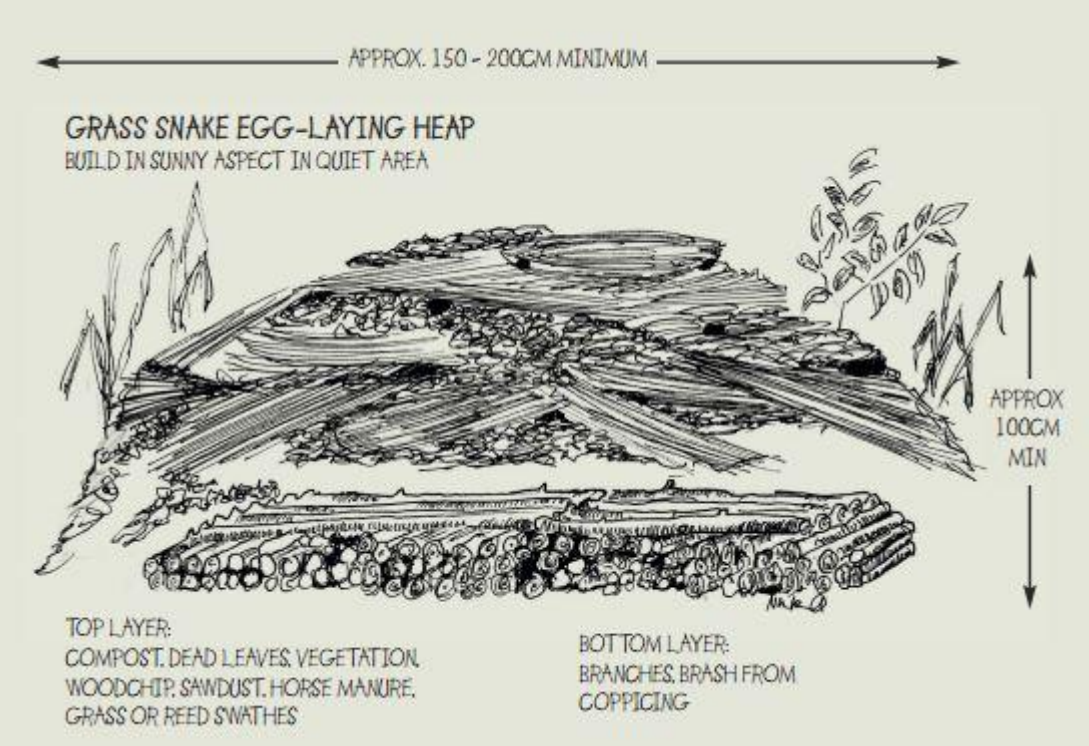

Photo 20: example of grass snake egg laying site.
Source: HART

It is necessary to replenish sites with fresh material or regularly create new egg-laying sites. Months to avoid interfering with the heaps are June – September inclusive. Slow worms and grass snakes could use the heaps to hibernate in so avoidance during the winter months November – March is advised. Replenishment is therefore best done April, May and October only; this may only be necessary every two years, but depends on the rate of decomposition.

It can take several years for grass snakes to start laying eggs in a newly created heap. To check if a heap is being used, either check around the heap in late August and September for hatchlings, or carefully dismantle the heap in October to check for egg shells, before reconstructing the heap.