Extension to Wood Lane Quarry,

Ellesmere Sand And Gravel Spunhill Ellesmere Shropshire SY12 0HY

14/0589/MAW

Grounds for Objection

- Effect on local landscape, habitats and wildlife

Report to Welshampton and Lyneal Parish Council

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Executive summary

1. The Proposals reports commissioned by the Tudor Griffiths Quarry Company contain **significant errors and substantial omissions,** and, because of this, wrongly conclude that the Zone 4 quarry extension will have no deleterious consequence to the local landscape and environment. These inaccurate reports appear to have misled some of the statutory consultees into supporting their interpretation.

2. **Geology, geomorphology, landscape and soils.**
   The proposed Zone 4 extension will destroy the natural geomorphology of one third of the glacial landscape between Cole Mere and White Mere (Figure1), a well-visited and typical part of the nationally recognised Meres & Mosses Nature Improvement Area the Meres & Mosses Landscape Partnership Area and the Meres & Mosses National Character Area.
   It will replace a very visible rolling hillside, which flows down into a peat-filled valley, which feeds water into Cole Mere, with a steep-sided crater, as in Wood lane Quarry Zone 3. This will leave the ancient valley peatlands between Colemere Farm and the canal, (historically and hereafter called the **White Moss peatlands**), high and dry leading to their probable shrinkage and collapse, which in turn could affect flow in their ditch network and therefore Cole Mere.
   Quarrying away of most of the sand and gravel reserve of this nationally important landscape in such a sensitive location should not be permitted. This example of the relationship of the geomorphology of the landscape with its ancient post-glacial habitats should be preserved.

   The Zone 4 Proposal Reports ignore their own evidence of the existence of the White Moss peat body (Figure 2), erroneously concluding that the valley wetlands sit on boulder clay. As such, the Reports do not to assess the effect on this deep peat body of quarrying the peat away at the north-east corner of Zone 4, depriving the peatland of surface and subsurface water flow from the Zone 4 slope, placing the peats next to a deep crater or stacking bunds on them. They conclude there will be no detrimental impact of the proposals on the local valley wetlands. Evidence from other local peatlands on sand would certainly contradict this.
   The deleterious effect of draining this deep peatland on flood prevention, carbon storage and archaeological and historic records preserved within the peat has not been assessed.

3. **Hydrology**

   3.1. **Catchments and Groundwater flow**
   There is considerable variation in the catchment shown for Colemere in available reports, from 8km2 (Hydrogeology report) to 178ha (ECUS, 2001), so estimates

given of the percentage effect of the extraction and restoration proposals on groundwater, surface and subsurface flow presented in the Hydrogeology report may be substantially under-estimated.

The Hydrogeology report appears to demonstrate that current quarrying operations have not affected groundwater levels within the current Wood Lane Quarry Zones 1-3. On this basis it unfoundedly extrapolates that there would similarly be no effect of quarrying in Zone 4 on the groundwater feeding Cole Mere, despite a completely different direction and hydraulic gradient of groundwater flow in Zone 4, which, in contrast to the existing quarry, actually lies within the surface water catchment of Cole Mere.
The report also concludes, without evidence, that there is no interaction of the White Moss peatland with groundwater. The lack of data means an assessment cannot be made of the effects of quarrying Zone 4 on groundwater below this peatland and in turn that flowing to Cole Mere.

3.2. **Surface and subsurface water flow.**

The Hydrogeology report does not reflect Natural England's assessment of the importance of surface and subsurface water flow in the maintenance of the Meres and Mosses and their supporting wetlands, in this case, the peatlands connected to Cole Mere. The Hydrogeology report dismisses the amount and importance of surface and subsurface runoff into the White Moss peatland. After quarrying, the runoff into the peatland from the majority of the 18ha of Zone 4 will be lost, almost all being redirected instead into the proposed adjacent new wetland, yet the predicted reduction in flow in the White Moss ditch system and the consequences of this for Cole Mere are not quantified in the Hydrogeology report or assessed in the Ecology report.

The Hydrogeology report also misrepresents the direction and consequently the amount of surface water flow from the Zone 4 slope into the White Moss peatland (Figure 3), and makes no analysis of the effect of digging a 6-7 m-deep crater alongside these deep peats on the flow of water to "Woodland near Colemere" Local Wildlife site, the valley bottom peatlands or Baysil Fen (collectively the White Moss peatland).

At the moment, the high water levels in the Zone 4 peatland are controlled by inputs from Zone 4 and a small area upstream of Colemere Farm, and the level of the culvert under the canal, not as the Hydrogeology report states, from springs.. After quarrying most input from Zone 4 will have been removed and the effective controlling invert level will be 6m lower in the base of the adjacent new wetland. Shrinkage of this deep peatland could stop flow towards Cole Mere, and would result in a loss of stored carbon and a loss to the archaeological and historical

record contained in the peat.

Drainage of part of a continuous deep peatland such as White Moss, can affect water levels in the peat body hundreds of metres away, so the “Woods near Colemere” Local Wildlife Site should not be considered immune from or “upstream” of the Proposals, yet the Proposals reports make no assessment of the effects of quarrying on it.

3.3. **Climate.** The local climate is such that small changes in hydrology could dramatically affect water balances in locally and nationally important sites. The loss of carbon stored in the White Moss peatland has not been assessed, as its existence has largely been ignored in the Proposal reports.

3.4. **Drainage network**. The White Moss peatland is part of the peatland complex which has formed in the meltwater channels running into Cole Mere. Drainage ditches cut to drain these peats, enshrined in piped culverts during the building of the Shropshire Union Canal feed the water from the Zone 4 peatlands directly under the canal into a brick coffer (Figure 5) and immediately into pipes leading to Little Mill and thence into the main inflow into Cole Mere next to the site of the Least water lily at its last location in England.

The Hydrogeology report’s incorrect assumptions that the White Moss drainage network flows out into the marsh north of the canal has led to an inadequate assessment of the effect of the proposals on the quantity and quality of inflow into the Little Mill pond and Cole Mere.

The Ecological report did not realise that the White Moss ditch flowed into Cole Mere so concluded that the proposals would not affect the internationally important wetland and, as such, did not consider any effect on the Least Water Lily or any of the other biota of Cole Mere.

3.5. **Water Framework Directive.** The Environmental Impact Assessment Report completely missed that Cole Mere is a Water Framework Directive site and as such did not carry out the **required** analysis of the effect of the proposals on this, the site most likely to be affected. Not being listed in the report, this appears to have led to the Environment Agency comments on the proposals similarly failing to recognise the omission.

4. **Effect on habitats and species**.

4.1. **Effect on Nationally Important sites.**
The effects of another decade of continued pollution from dust from wagons leaving the Quarry’s main road entrance on White Mere, an internationally important wildlife site , has been inadequately assessed, as pointed out by Natural England in their objection to the Proposals.

The effect of the Proposals on the hydrology and biota of the internationally important site of Cole Mere and its Least water lily has not been assessed.

4.2. **Effect on Local Important Wildlife Sites**

The ecological value and hydrological vulnerability of the White Moss peatland with its Local Wildlife Site was grossly underestimated in both the field survey and desk studies of the Ecology report, which does not even acknowledge that there is deep peat under the low valley pastures. "Woodland near Colemere" Local Wildlife Site was excluded from its surveys and from its considerations
The Ecology Report's conclusions that the low lying wet pastures and ditch at the base of the slope were of site importance only are incorrect. At least 9.6 ha of Biodiversity Action Plan habitats there, viz. fen, and willow and alder carr wet woodland and species-rich ditches, with 9 Shropshire Wetland Axiophytes (important wetland species of local distinctiveness), and several locally uncommon species are likely to be damaged by the proposals.

The Environmental Impact Assessment did not mention any effect of the proposals on "Woodland near Colemere" Local Wildlife Site and did not mention the Zone 4 peat. More regard was paid to potential effects of reduction in flow and pollution on the marshland Local Wildlife Site north of the canal because the Reports mistakenly thought the White Moss drain outflowed into it. Instead these effects would be transmitted directly to Little Mill upper pond and Cole Mere.

The Proposal reports state that the restoration scheme "will have a positive impact in Nature Conservation terms and will enhance the site in terms of additional potential for habitat over and above what is currently present".
The primeval White Moss peatland is valuable as a carbon sink, for its potential archaeological significance and historical ecology and as supporting habitat of the flora and fauna of its species rich ditch and adjacent species rich fen and carr of Baysil Fen and Woodland Near Colemere Local Wildlife Sites and ultimately Cole Mere SSSI. A smaller new wetland, created to maximise sand extraction, is inadequate mitigation for the damage to these valuable existing habitats.

In December the Wildlife Trusts pledged to try to ensure the effective protection of Local Wildlife Sites and to combat the development pressures that threaten these sites. In response to the Proposals, Shropshire Wildlife Trust sought "Assurance that water balance will be maintained in the valley area of marshy grassland."

4.3. **Effect on Protected species.** Shropshire Council's scoping document specifically requested information on great crested newts and water voles on and

near the application area. Both inadequate reports and no data at all, combined with a constant undervaluing of the White Moss habitats and the misunderstanding of the surface water connection of Zone 4 to Cole Mere, led to the incorrect conclusion that the Proposals would not affect protected species.

In the Proposal reports and at public meeting held by the Quarry Company, conflicting information has been given about degree of the naturalness of the proposed restoration scheme and also the amount of public disturbance to which the site would be subjected, which could in turn affect the value of the proposed new wetland and protected species. This ranges from intensive to extensive grazing and a site secluded from the public to a new site with car park for dog walkers!

5. **Policy Context** There appears to be a clear conflict between Shropshire Council's adopted policies to protect its Meres & Mosses landscape, to protect its local and international biodiversity and to protect residual carbon in archaic peatlands with its need for sand and gravel and its identification of Zone 4 as its preferred location in the county for sand and gravel extraction
   The proposals will adversely affect the ecological, geological and hydrogeological value of part of the Meres and Mosses Area. The proposed mitigation of creation of a new wetland will be at the expense of a larger ancient wetland and the species therein and there may be effects on Cole Mere as well.
   The proposals conflict with the policies in Shropshire Council Local Plan Core Strategy (SC, 2011), Policy CS6 Sustainable Development and Design Principles and Policy CS17 – Environmental Networks, Shropshire Council's "Site Allocations and Management of Development (SAMDev) Plan ", Shropshire Biodiversity Action Plan for peatlands, and the aims and objectives of the Meres & Mosses Natural Character Area, Landscape Partnership and Nature Improvement Area (NIA) to which Shropshire Council are party. They also conflict with the aims of the Wildlife Trusts expressed in "The Status of Local Wildlife Sites 2014".
   In particular, the Proposals do not comply with any of the requirements nos. 1-6 made in the selection of Wood Lane Quarry Extension North as a preferred site for sand and gravel extraction in Shropshire, made in the SAMDev Plan (SC 2011).

6. **Conclusion.** Overall on the basis of the absence and mis-assessment of information about the habitats and species of the Proposals area and its setting, the Ecology Report and Executive Summary incorrectly conclude, "No direct or indirect impacts upon statutory or non-statutory ecologically designated sites or important undesignated habitats have been predicted. The potential impacts to species are considered to be of low significance."
   All of the Proposal reports appear to either minimise or totally ignore the deleterious effect the proposals will have on the White Moss peatland complex and the species contained therein, and barely assess the potential effects on the ecology of Cole

Mere and its associated wetlands.

In summary, the Zone 4 proposals will undoubtedly damage the County's landscape, peat resource, Biodiversity Action Plan habitats and species and may impact on internationally important sites and protected species. The proposed extraction should not occur in this sensitive location.

The Proposals do not comply with Shropshire Council's policies for environmental and landscape protection, particularly with the requirements of its SAMDev Plan for designating Wood lane Quarry Extension North as a preferred site for the extraction of sand and gravel.

It is recommended that Welshampton, Lyneal and Colemere Parish Council should object to the Proposals on the environmental grounds given in this report.

1. **Introduction and references**.

1.1. **The author** Dr Joan Daniels is a peatland ecologist of over 40 years of experience, currently Natural England and Natural Resources Wales' Senior Reserve Manager for Fenn's, Whixall & Bettisfield Mosses National Nature Reserve and a participant in the Meres & Mosses Landscape Partnership and Nature Improvement Area. She is a resident in Colemere, and, having made a personal objection to Shropshire Council about the Proposals, was asked on 17 December 2014 by Welshampton, Lyneal and Colemere Parish Council to prepare, in her private capacity, a report summarising the damage likely to be cause to the landscape, habitats and species of the parish by the Zone 4 proposals. This report expresses her personal views only.

Publications referred to below. References for reports referred to are listed in section 10 below. The names NonTechnical Summary, The Proposals s1-4, Landscape and Visual Impact, Soils, Ecology, Hydrology, Environmental Impact Assessment and Historical reports are used to refer to the reports submitted by the Tudor Griffiths Group in their application for planning permission for Zone 4- no 14_04589_MAW, collectively refered to as the Proposals Reports, as listed in section 10.

2. Relationship of Features of Interest to Zone 4 and the White Moss Peatland

2.1. **Scale of the Proposals**. Figure 1 shows the scale of the Zone 4 extraction proposal in relationship to the remaining natural landform between White Mere and Cole Mere. Zone 4 (19.85 ha) is bounded on its southern side by Colemere Lane which separates it from the rest of the Wood Lane quarry complex, the Shropshire Union Canal Llangollen Branch to the north, a watershed to the west, and a northwest – southeast trending valley feature to the east and north east.

2.2. **Relationship of sites**. Figure 2 shows the locations of the 2 Sites of Special Scientific Interests (SSSIs)/ Ramsar wetlands of International Importance and 4 Local Wildlife Sites (LWS) in relationship to Zone 4, and also the peat body which lies along the eastern and north –east of Zone 4 both within and adjacent to Zone 4.

In various reports and the proposal reports and planning submissions, parts of this valley has been variously referred to including as the "Woodland near Colemere" Local Wildlife Site (in the south), wet pasture, the low valley wetlands, and Baysil fen and carr (in the north) and Colemere Farm Wetland. On the 1839 Colemere field map, the name White Moss appears at the southern end of the valley where the "Woodland near Colemere" LWS meadows and carr now lie**, so in this report the name "White Moss peatland" is used for the entire peat body along the whole eastern and north-eastern edge of Zone 4,** from Colemere Farm in the south to the canal in the north**.** The peatland with its

unreclaimed southern Moss is shown in Charles Sinker's 1962 classic study of north Shropshire Meres and Mosses.

2.3. **The proposals**. Zone 4 covers approximately 19.85 Ha (Figure 1) The proposal is to carry out quarrying and associated soil management activities on approximately 12.8 ha of the Zone 4 area (the approximate boundary of the extraction area, copied from the Phasing plans, is shown on Figure 2). The proposal consists of mineral extraction to the Zone 4 area, followed by some infilling and ultimately restoration back to grazing pasture land with some planting of broadleaf woodland to the periphery and a newly created wetland habitat with ephemeral edges and deeper central area.

3. Geology, geomorphology, landscape and soils

3.1. Geology

Solid geology is of no consequence to the Zone 4 proposals, as it is blanketed by thick glacial drift.

Drift geology is shown on the Hydrogeology report Appendix 1 Figure 3.2 Drift geology. White Mere sits on glacial bolder clay. The whole of the area from Blake Mere to Cole Mere and to Wood Lane Quarry is shown as glacial sands and gravels with peat bodies including the strip of peat along the White Moss valley bottom.

Despite this evidence, and **on the basis of no stratigraphical investigations** of the valley bottom at all, the drainage network, which in Shropshire is usually a reflection of having been installed to drain peat, was interpreted as indicating that the valley was underlain by boulder clay.

Paragraph 2.3.4 of the Hydrogeology report states "In the wider area around the quarry complex, where clays are present close to the surface, a higher density of surface drainage features are seen relative to areas underlain by sand and gravel."

Paragraph 2.3.5 states "in depressions within the fluvioglacial deposits there are localised patches of alluvium and peat where drainage is poor, often associated with the presence of shallow low permeability deposits (clays and silts)."

This misinterpretation arises from the Hydrogeology report Appendix 2, Paragraph 2.2.3 which states "The drainage in the immediate area (of Zone 4) appears to be largely controlled by the presence or otherwise of low permeability soils at or close to the surface. Where boulder clays are present drains can be observed on the OS 1:25,000 map and are absent where granular deposits (sands & gravels) are present. And this is again repeated in Paragraph 3.3.2 of Appendix 2 "This ditch and the marshy areas in the base of the valley (eg around Baysil Wood) are not now considered to be continuity with groundwater and instead are an expression of the presence of low permeability soils (eg boulder clay)."

This error is carried forward into the Environmental Impact Statement wich states

in Paragraph 4.2.2 “It is a feature of the wider area around Zone 4 that where Glacial Tills (Boulder Clay) are present near the surface this is evidenced by a network of drainage ditches, which can be seen on the OS 1:25,000 map”. This assumption that the valley wetlands were underlain by boulder clay allowed the Proposal reports mistakenly to conclude that there would be little effect on this area by quarrying in Zone 4.

3.2. **Geomorphology and Landscape**

The Meres & Mosses Landscape Character Area covers the Cheshire, North Shropshire and Staffordshire Plains. The Meres and Mosses Landscape Project area covers the westerly most cluster of wetland sites in the Meres and Mosses Character Area and runs from Ellesmere and Crose Mere, through Whitchurch, and north to Chapel Mere at Cholmondley Castle. It sits within the Nature Improvement Area which runs from Oswestry to Whitchurch and north to Nantwich.

The Meres & Mosses Partnership Scheme is working to **preserve,** enhance and raise awareness of this precious landscape. Partners involved include: Butterfly Conservation, Canal and River Trust, Cheshire Wildlife Trust, Environment Agency, Harper Adams University, Natural England, RSPB, Shropshire Rural Community Council, and crucially, Shropshire Council and Shropshire Wildlife Trust.

3.3. Soils

The Meres & Mosses Plan for Cole Mere (ECUS 2001) states that peat comprises 20% of the surface water catchment for Cole Mere and 541u Ellerbeck soils the rest.

The Quarry’s Soils report was based on auger borings, one of which, no 5, was down in the White Moss peatland.

Its agricultural land classification map shows the bulk of the higher areas of the slope to be covered by grade 2 land, the very top and lower areas of the slope to be covered by grade 3a and 3 b land and the parts of Zone 4 in the valley to be covered by grade 4 land. The grade 4 land is listed as being 16% of the area surveyed, 3ha, but the Zone 4 boundary used in the Soils report is incorrect, excluding the circular “amphitheatre” area of peat half way down the submitted boundary of Zone 4, where screening bunds are proposed to be stacked.

Paragraph 1.3.3 states “The survey … identified three soil types. The first comprises sandy loam or sandy silt loam topsoil over similar textured subsoil overlying sand and gravel. The second comprises topsoil sitting direct on sand and gravel with an occasional transitional layer of loamy sand. The third soil type, **which is not affected by the development** is saturated peaty land at the lowest level close to the canal.”

Paragraph 4.2 again mentions the peat “To the north the land falls steeply towards the Shropshire Union Canal onto a level plain comprising peat bog.”

The soil unit map splits the peatland in Zone 4 into Soil Unit 2 and Soil Unit 3. Section 5 states “Wetness is the most limiting factor in soil mapping Unit 3, the deep peaty soil, which is limited to permanent pasture. Although the soil profile of the deep fibrous peat could not be described because of saturation, the dominant vegetation indicates very poor drainage. Again it states “**this area will not be affected by gravel extraction**.” This ignores any effect of extracting the adjacent area on drainage of this peat.
However the northern third of Soil Unit 2 also includes deep peatland, though the report states “Soil Mapping Unit 2 comprises topsoil directly overlying sand and gravel with an occasional transitional layer of loamy sand. All these soils are limited by droughtiness to grade 3a, but at two locations the slope is a greater limiting factor downgrading to 3b and 4.” This peat is within the excavation area contradicting the conclusion of para 1.3.3 of the report above that the grade 4 soil (peat) would not be affected by the development.

The rest of the Soil report, dedicated to ensuring the good handling of soils by making recommendations on limiting damage to soils by the operations, **makes no analysis of any effect of the proposed quarrying on the peat soils.**
The effect of the restoration proposals to stack soil bunds on the deep peat, which would probably destroy its stratigraphy, is not assessed.

The Proposals s1-4report makes no reference to the excavation area cutting into the peat body and in Section 6 and 7, all reference to screening bunds makes no mention of stacking them on deep peat. The Non technical summary states “All the soil resources will be sustainably used, retaining as many functions as possible”. This certainly does not apply to the peat soil within and adjacent to Zone 4.

In 2010, the Relict Mosses of Cheshire, Shropshire and Staffordshire survey (Natural England 2010) found deep peats exceeding 1m depth along most of the White Moss peatland (see sites 13-19 on Figure 4. On 18/1/15 J & R Daniels found that most of the valley peats were in excess of 2m, see Figure 4. **The actual depth of these peats and the substrate below and around them should be quantified so the detrimental effects of adjacent Zone 4 drainage can be assessed.**

4. Hydrology

4.1. Catchments

The surface water catchment shown in the Hydrogeology report (Fig A, Appendix 2), measuring 7-8 km2, altered from the 4km2 noted in paragraph 2.9 of Appendix 1, is very different area from that shown in the Meres and Mosses

Conservation Plan for Cole Mere (ECUS 2001). The latter shows a much smaller area, probably what the Hydrogeology refers to as the microcatchment for Cole Mere, assessing the actual area contributing surface water to the water body at ca 178 ha. This sets the Zone 4 size of 18ha as being a much proportion of Cole Mere's catchment – ca 10%.

4.2. **Groundwater**

Colemere apparently receives between 61 and 80% of its water from groundwater (ECUS 2001), so any effects of the quarrying on groundwater could be significant.

The Hydrogeology report Appendix 2 states that "Approximately similar levels are observed across Zone 4 in the deep piezometer installations, although a slight decline from around 83 mOD in the west to around 82 mOD in the east of the Zone 4 area". Water levels in Colemere are ca 85m OD.

The Hydrogeology report concludes that current quarrying operations have not affected groundwater levels within the current Wood Lane Quarry Zones 1-3 and so, apart from the loss of some water in evaporation during excavation and removed in the product, there would similarly be no effect on the groundwater feeding Cole Mere. However not only is the current quarry outside the immediate surface water catchment for Cole Mere, but also the inferred direction of groundwater flow in Zones 1-3, and therefore possibly the hydraulic gradient, is in a completely different direction from that in Zone 4. (The Hydrogeology report postulates that groundwater from Zones 1-3 flow to the SSE and ESE (fig 4.2 Hydrogeology report Appendix 1), as opposed to Zone 4 which is shown as flowing to the north-east.)

The Hydrogeology report presents no borehole stratigraphy or hydrological information for the White Moss peatland, basing all its conclusions for the hydrological effects of the excavation on this area on it's boreholes up on the slopes above. Their observations on the direction of groundwater flow from Zone 4 north-east to Cole Mere merit re-scrutiny. (Figure 4.3, Hydrogeology report Appendix 1).

The Hydrogeology report paragraph 4.2.3 states "there are also marshy areas associated with Baysil Wood and the potential effects (Mild Severity) of changing groundwater flow patterns on these surface water features were therefore considered in the environmental assessment." However the Environmental Impact assessment does not refer to this area.

4.3. **Surface and subsurface flow**

Surface and subsurface water flow from the Zone 4 slope, buoyed up by the

groundwater table, has, over thousands of years, allowed ca11 ha of deep peatland to develop on the sand and gravel at the base of the Zone 4 slope, now at an elevation of ca 89 -90m OD (Figure 2).

4.3.1. Removal of surface water flow. No hydrological monitoring has been carried out in the valley bottom. The Hydrogeology report does not appear to acknowledge the existence of peat between the base of the Zone 4 slope and the ditch, which forms the eastern and northern boundary of Zone 4. It does not appear to quantify at all the amount of runoff into the peatland. As the slope is Ellerbeck soils, this should be 15% of the rainfall (ECUS, 2001).
The Hydrogeology report does refer to a reduction in flow in the ditch after quarrying, but does not quantity this.
In the Conclusions section 5 of the Hydrogeology report, repeated in the Non technical Summary, it states "Groundwater levels are approximately 3 metres below the base of the ditch to the north of the site. Proposals to work the Zone 4 quarry below the water table will therefore not impact on the surface water drainage system."
However in order to quarry below the water table they will dig a crater next to the peatland depriving it of virtually **all** of its surface and subsurface flow.

4.3.2. Underestimation of the importance of surface and subsurface flow. The Hydrogeology report, Paragraph 2.5.6, states that "due to the presence of sands and gravels the majority of the rainfall onto the Zone 4 area which is not lost to evapotranspiration, soaks into the ground and enters the groundwater system. The groundwater levels under the site are around 84 mOD which is several metres below the invert of the ditch which drains the base of the small valley in which Zone 4 is situated.
In Paragraph 3.3.3 of Appendix 2 of the Hydrogeology report, it states that "The presence of granular soils at or near the surface of the Zone 4 area means that there is little surface run-off to the ditch to the north east. No evidence of surface water flows (eg small ditches or springs) were observed on site running off the Zone 4 area into the ditch at the base of the valley."
Paragraph 4.2.3 of the Environmental Impact Assessment states (on the basis of no soils or core information) "The drainage pattern in the base of this valley is considered to be an expression of the relative distribution of low permeability clays and sandy deposits. The main ditch in the base of the valley feature receives runoff from those areas where the clays are at the surface; primarily in the base of the valley and from the north (Baysil Wood). Currently, the ditch receives very little run-off from the Zone 4 area, except in high intensity rainfall events where some contribution can be expected".
No evidence of clay is presented and no mention of deep peat made.
Paragraph 4.1.13 of Appendix 2 states "Creation of a bowl shaped landform within Zone 4 will slightly reduce the amount of surface water run-off from this

part of the site, which would otherwise (as currently) flow into the drain system immediately to the north." This contradicts Paragraph 3.3.3 above. In Paragraph 4.2.4, it states that there is no hydraulic connection between the groundwater under Zone 4 and the local surface water features.

All of the above statements minimise the effect of surface flow and do not acknowledge the existence of subsurface flow in feeding Cole Mere and its associated wetlands. Natural England's objection to the Proposals (Natural England, 2014) gives a very different interpretation of the functioning of the Meres and Mosses and their associated wetlands, with a much greater reliance on surface and subsurface flow.
This is confirmed in the Meres & Mosses Plan for Cole Mere (ECUS 2001), which concluded that Cole Mere receives subsurface groundwater flow from the glacial sands and gravels, in times of high water level conditions.

4.3.3. Effect of perched water tables. In the Hydrogeology report paragraph 2.6.8, it notes that varied groundwater levels are noted within the superficial deposits in Zone 4, with some boreholes indicating a higher, perched watertable at >90 m OD, where clay bands are encountered and a main water table beneath the site at a level of around 84 m OD. No analysis is made of the effect of these in preventing down-flow of water into the deeper groundwater and increasing subsurface flow towards the valley peatland.

4.3.4. Direction of surface water flow. In the Zone 4 Hydrogeology report, the figure "Surface water system adjacent to Zone 4" incorrectly shows most of the surface water flow occurring to the north-east towards the Baysil wood canal culvert, (in reality plotting an uphill flow). Simple observation of the landform and map contours shows that a very substantial proportion (more than 50%) of the slope drains eastwards into the White Moss peatland (Figure 3). After quarrying, the hydraulic gradient towards the peatland will be reversed away from the peatland, and surface water flow will occur westward into the bottom of the excavation.
The Proposal s1-4 report, paragraph 6.3.19, states that the restored area will have a range of slope gradients between 1:3.5 and 1:4.5 on the western and south-western sectors, extending to a 1:10 on the south-eastern and northern sectors. "This will enable the existing low lying pasture land beyond the Site boundary to merge with the restored landform to create a gradual slope towards the restored wetland area". In reality this will be a steep drop from the White Moss peatland into the adjacent new wetland.
The Proposals Report appear to make no analysis of the effect of digging a 6-7 m-deep crater alongside them on hydrology of the "Woodland near

Colemere" Local Wildlife site, the valley bottom peatlands or Baysil Fen, ie the White Moss peatlands.

4.3.5. The potential for pollution of the White Moss ditch network is mentioned in Paragraph 4.2.8 "During the Zone 4 soil stripping and perimeter bund formation activities there is a potential during periods of high rainfall for surface waters with a high suspended solid content to flow down into the valley area. This can be mitigated by utilising temporary surface water catchment ditches where necessary to slow the flow down and settle out any suspended solids." This could affect the hydrology of the peatland especially if ditches are dug into it.

4.4. **Drainage pattern**

The Hydrogeology and ecology reports also appear to contain significant errors about the connection between the surface water flow from Zone 4 and Cole Mere, which appear to have influenced their conclusions on the effect of the Proposals.

4.4.1. Meltwater channels and drainage ditches

The White Moss peatland fills a narrow south- north orientated depression, a side valley off the west-east orientated peat-filled meltwater channel linking Blake Mere with Cole Mere. "Blake Mere, Kettlemere and the SU canal" and the "Marshland near Shropshire Union Canal, Colemere" are also Local Wildlife sites (Figure 2).

Originally the surface and subsurface water flow from the Zone 4 slope would have flowed down into the White Moss peatlands depression then north and east into Cole Mere. Drainage ditches, which were cut in to the Blake Mere to Cole Mere peatland and White Moss during the agricultural revolution (1796 estate map), have been enshrined in piped culverts during the building of the Shropshire Union Canal in the early 1800s (Figures 1 and 2). Water now flows through a culvert under the road at Colemere Farm, north through the White Moss valley peatland and under the canal through a culvert pipe at Baysil Wood (originally on the 1839 field map named Base Hill Wood) and immediately to Little Mill and Cole Mere.

4.4.2. Incorrect source of water and control on White Moss water levels.

The Hydrogeology report Appendix 2 paragraph 3.3.2 states, "the surface water run-off system immediately north of Zone 4 is controlled by a small ditch in the base of the south-east to north-west trending valley feature, which takes water from a spring at approx. NGR SJ 432 325 in Colemere (although this may be a concealed drain). The ditch is fed by other springs from the northern part of the valley and Baysil Wood – see Figure E." Figure E does not show any springs. These three "springs" are not springs, but only the upstream ends of drains installed to drain the peatlands which are generally

full because of poor drainage of the ditch network (personal observation and personal communication with Mr A Sheppard, long-standing tenant of the land).

The level of the culvert under the canal and current ditch management mean that the ditches running through the wetland are full in winter and there is lots of surface water standing on the peat. Summer levels are also high (ca 20cm lower).

At the moment, water levels in the Zone 4 peatlands are controlled by inputs from Zone 4 and the small area upstream, and the level of the culvert under the canal. After quarrying most input from Zone 4 will have been removed and the effective controlling invert level will be 6m lower in the base of the adjacent new wetland.

4.4.3. Incorrect route for water

The Hydrogeology report wrongly states that this ditch from Zone 4 flows into the marsh north of the canal, so minimising the effects of reduction in water flow and also potential pollution caused by the Zone 4 quarrying on Cole Mere.

Paragraph 2.5.5 states “The ditch runs north under the canal to a low lying marshy area which in turn drains eastwards back under the canal and eventually into Cole Mere” and paragraph 4.1.3 states “that slippage could potentially block the watercourse and/or introduce “fines” (clay and silt) which can adversely affect the ecological environment. The watercourse at risk in this case is the small drainage ditch adjacent to the northern boundary of the site and the small marshy area to the north of the canal **into which the ditch drains**.”

Similarly, the Hydrogeology report Appendix 2 paragraph 3.3.4 states “the ditch drains north-westwards to a culvert beneath the Shropshire Union Canal at NGR SJ 4250 3335, through which it discharges into an area of marshland immediately north of the canal. This area also receives drainage from Blake Mere via a ditch running along the northern side of the canal. The total catchment area for the marshland, which includes Blake Mere and Zone 4, is estimated at some 150 Ha, with the proposed area of quarrying in Zone 4 comprising less than 9% of that.“

These figures are incorrect and irrelevant, as the ditch does not flow into the marshland, but into a brick coffer and is immediately piped towards Cole Mere (Figure 5). This error is repeated in paragraph 4.2.6 of the Environmental Impact Assessment and in paragraph 4.2.7, which concludes “It is conservatively estimated that less than 1% of the surface water flow to the marshland arises from the Zone 4 working area” because of the input from its catchment and Blake Mere. In fact, it no water from Zone 4 enters the marshland.

Paragraph 4.1.4 again states “During and after the quarry operations most of the rainwater falling on the Zone 4 area, which is not lost to evapo-transpiration will infiltrate the quarry floor and enter the groundwater system. This will ultimately enter Cole Mere so it is not envisaged that the Zone 4 activities affect the water level or contribution to Cole Mere. However, a slightly reduced flow within the drain system is to be expected which will in turn very slightly affect the water inputs to the marshland area to the north of the canal. The impacts are not considered to be significant particularly as this marshy area also receives surface water from the larger catchment around Blake Mere to the north. The reduction in the run-off only occurs during periods of heavy rainfall and in these conditions the marshland area will receive adequate input from the rest of the catchment.”
In fact the effects of reduced flow will be transmitted directly to the Little Mill upper pond and to Cole Mere. The Hydrogeology report makes no mention of the effect of this reduced flow on the White Moss peatlands or on Cole Mere.

When the flow from the White Moss peatland ditch flows under the canal into the brick coffer, it is joined by a negligible flow from a canal-side ditch from Blake Mere (Appendix 1, Paragraph 2.10 of the Hydrogeology report wrongly states that there is no outflow from Blake Mere) and is then immediately piped eastward alongside the canal, and back under the canal into the top pond at Little Mill. A larger flow of unknown origin joins it in the second Little Mill pond, and then both flow into Cole Mere very near to the site of the Least Water Lily. Thus the outflow from Zone 4 contributes directly into the main, albeit artificial, inflow into Cole Mere

On the basis of its mis-understanding that the water flows out in to the northern marshland, the Hydrogeology report, repeated in the Nontechnical summary, concludes “The assessment undertaken has shown that the proposed quarrying activities will have no adverse impact either on the flow of water to Cole Mere or to the quality of water that enters it”.

The Ecological report mistakenly states that the ditch at the base of the Zone 4 slope flows into the canal rather than into Cole Mere, so concluded that the proposals could not affect the internationally important wetland and as such does not consider any effect on the least Water Lily at its last site in England.

4.5. **Climate and water balance.**

The local climate is such that small changes in hydrology could dramatically affect water balances in locally and nationally important sites. The 30 year average rainfall for the adjacent Fenn’s Moss NNR to 2011 is 732mm, according with the Hydrogeology report’s MORECS data.

In the Hydrogeology report, paragraph 5.10 states that the water losses caused by producing the new open water body shows that an average annual loss in water entering the site from direct rainfall of some 91mm/year, based on annual ppt of 726mm, so a 12.5% reduction. If the excavated material is drained on site not on Zone 1-3, losses to product would be ca 5-8% of the site.
These reductions are portrayed as small in relationship to the groundwater feeding Cole mere, but their effects on the adjacent peatland are not assessed.

4.6. **Water Framework Directive water bodies.**

The Environmental Impact Assessment Report identified 3 water bodies, as Water Framework Directive water bodies - the Llangollen Canal, the unnamed tributary to the River Roden and Secondary Mudrocks & Drift Wem Paragraph 2.2.4 states "To be compliant with WFD objectives the scheme should not
:• cause deterioration of the status of any body of surface water or groundwater;
• prevent the protection, enhancement or restoration of any surface water body or groundwater (including achieving a balance between abstraction and recharge).
The report completely missed that Cole Mere is a Water Framework Directive site no. GB30935079. Consequently here has been virtually no assessment of this requirement for Cole Mere.

5. Habitats and species

5.1. **Designated sites**

Three sites of international nature conservation importance occur within a 2 km radius of Zone 4. These are Colemere, Whitemere and Clarepool Moss, all of which are Sites of Special Scientific Interest (SSSIs) and component sites of the Midland Meres and Mosses Ramsar Site (Phases 1 and 2).

5.1.1. White Mere White Mere appears to be perched on boulder clay (Hydrogeology report fig 3.2). The effects of a continuation of pollution from dust from wagons leaving the Quarry's main road entrance, currently inadequately controlled by the Quarry company (personal communication, Natural England), was not raised covered their reports, although it was highlighted in Natural England's response to the consultation.

5.1.2. Cole Mere. The internationally important site of Cole Mere has a direct surface and groundwater water connection to Zone 4.
Natural England's diffuse water pollution plan (AMEC, 2014) summarised the site "Cole Mere SSSI – a 48.19ha designated site includes one of the largest of the Shropshire meres (at 27.5ha and with a maximum depth of 11.5m). Cole Mere has an almost complete fringe of woodland, some plantation but patches of semi-natural alder carr occur as well. The water body contains the

last lesser yellow water-lily (*Nuphar pumila*) population in England. Also included within the SSSI are sizable areas of species-rich marshy and neutral grassland. The site is a Local nature reserve.

Cole Mere is part of the Midland Meres and Mosses Ramsar site, and is thus part of an internationally-important series of wetland sites. The whole site qualifies under criterion 1a as a particularly good example of a natural or near-natural wetland characteristic of the region, and under criterion 2a by (1) supporting a number of rare species of plant associated with wetlands, and (2) by containing an assemblage of invertebrate, including several rare wetland species (ECUS, 2001). Least water lily at its only English site is noted.

The Cole Mere surface water catchment is contained within the wider River Dee surface water catchment. However, the main source of water in the mere itself is groundwater (estimated to be 61-82% of the water present), being drained from an estimated catchment covering 10.5km², **with flow entering the mere from the glacial sand and gravel aquifer during high water level conditions** (ECUS, 2001). The main inflow to the SSSI itself is from a small stream to the west of the mere (includes output from Zone 4). The main outflow (which is artificial) is located to the east of the mere. Site currently fails its target for phosphorus and for Dissolved Oxygen and is currently at Poor Overall and Poor Ecological Status."

SSSI designated interest features include Least water-lily *Nuphar pumila*

The Conservation objectives for the site (Natural England 2008) include "to maintain the least water-lily *Nuphar pumila* in favourable condition, Three populations recorded in 1996 but appears to have declined to one by 2004. It lists increased siltation as a threat. Conservation objectives also include: "To maintain and where relevant, improve water quality of all surface water inflows"

Cole Mere is hyper-eutrophic and affected by guanotrophy and bird grazing and has cyano bacteria blooms when the mere destratifies. (ECUS, 2001) The Water Framework Directive Assessment (EA 2012) concludes that Cole Mere is eutrophic and this is likely to be the cause of failure for all failing elements of their assessment and recommends source apportionment should be carried out, so recognising the effects of inputs on the failure of the water body to reach favourable status.

This emphasises the vulnerability of the site to changes in water quality and quantity which could arise from the Zone 4 proposals, particularly as the

inflow from the proposals is near to the site of the least water lily. This has been inadequately assessed in the Proposal reports.

5.2. **Local Wildlife sites**

There are 4 local Wildlife Sites near Zone 4:

5.2.1. "Wood near Colemere" Local Wildlife Site (1998) sj 42978, 32839 (Shropshire no 629) The peaty meadow and willow carr wet woodland immediately north of Colemere Farm at the south end of the **White Moss peatland.**

5.2.2. "Near Shropshire Union Canal Colemere" Local Wildlife Site (1998) sj 42443, 33470 (Shropshire no 374). Marshy grassland and willow carr on peat north of the canal, between Blake Mere and Cole Mere.

5.2.3. Blakemere, Kettle Mere and Shropshire Union Canal" Local Wildlife Site (1998) SJ 41748, 33922 (Shropshire no 038).

5.2.4. "Wood Lane reserve" Local Wildlife Site (Shropshire no 625) Interestingly paragraph 4.2 of Hydrogeology report Appendix 2 states "the high level current bird reserve pools will lose their water after the quarry stops pumping so only zone 3 and 4 will have pools".

5.2.5. Baysil Fen and peatlands running north from "Wood near Colemere" north-west to the canal along the base of the proposals slope. (This has been proposed as a local wildlife site, Natural England, personal communication).

5.3. **White Moss peatland habitats**

The wetland habitats present on the White Moss peat divide in to four main habitats. These have been mapped in the Relict Moss Survey (Hayes, 2010) although Baysil fen communities appear to have now expanded further north-westwards.

5.3.1. <u>Willow and alder carr.</u>

This wet woodland is confined to the centre of southern end and the centre north of the valley. Alders also grows along the ditch on the southern side of the "amphitheatre" which protrudes two thirds of the way down the western margin of the peat body.

The Quarry's Ecology report does not cover the southern carr, but describes the Baysil Fen carr in Target note 17: "Where the topography is lower (TN 17b) carr woodland is present dominated by alder and willow, with marsh marigold (*Caltha palustris*), bulrush, marsh cinquefoil (*Potentilla palustris*) and hemlock water dropwort (*Oenanthe crocata*) all occurring".

The Relict Mossland Report (Hayes, 2010) described the southern carr as being inundated willow carr with Iris, water violet and cowbane but doesn't give a separate species list from that in the swamp and ditches (see below), the bulk of the area being so inundated with a marginal moat, as to be inaccessible. Water horsetail is also present. It appears to be the same sort of undisturbed extremely wet habitat as Sweatmere and would repay further investigation, particularly for invertebrates.

5.3.2. Bulrush swamp and ditches

This habitat is found in the drainage network running through the valley (Figure 2), with wider areas outside the ditches to the south-east of the southern carr and near the central ditch in the Baysil Fen area.

The Ecology report describes the ditch in the centre of the valley in Target note 20 as "A densely vegetated ditch which flows to the north east before **joining the Shropshire Union Canal**. (This is incorrect). Reedmace is locally frequent, and occurs together with great willowherb (*Epilobium hirsutum*), greater bird's foot trefoil (*Lotus pedunculatus*), angelica (*Angelica sylvestris*), water dock (*Rumex hydrolapathum*), meadowsweet (*Fillipendula ulmaria*), brooklime (*Veronica beccabunga*), marsh bedstraw (*Galium palustris*) and occasional ragged robin (*Lychnis floscuculi*)."

The Relict Moss land Report (Hayes,2010) found "an impressive series of ditches that probably warrants survey of its aquatic invertebrates." It recorded a much more extensive list of species with:

Abundant or locally abundant Water Violet *Hottonia palustris*, Ivy-leaved Duckweed *Lemna trisulca*, Greater Bird's-foot Trefoil *Lotus uliginosum ,* Broad-leaved Pondweed *Potamogeton natans*, and Reedmace *Typha latifolia*

Occasional Water-plantain *Alisma plantago-aquatica*, Marsh Thistle *Cirsium palustre* , Marsh Willowherb *Epilobium palustre*, Articulate Rush *Juncus articulates,* Soft Rush *Juncus effusus*, Branched Bur-reed *Sparganium erectum*, Bog Stitchwort *Stellaria alsine* and Common Nettle *Urtica dioica*

frequent or locally frequent Nodding Bur-marigold *Bidens cernua*, Cowbane *Circuta virosa*, Water Horsetail *Equisetum fluviatile*, Sweet Float-grass *Glyceria fluitans*, Gypsywort *Lycopus europaeus*, Water-pepper *Polygonum hydropiper*,

rare (only a few specimens found) Angelica *Angelica sylvestris*, Tufted Hair-grass *Deschampsia caespitose*

5.3.3. Wet rush pasture

This covers most of the White Moss peatland valley floor and was saturated with much standing water at the time of the Quarry's Ecology report survey and on the visit by the author on17 & 18 January 2015.

The Ecology report describes this habitat in Target note 11 (the Amphitheatre area) as "Semi-Improved Grassland. The area is predominantly species poor, closely grazed, grassland. The exception is an area of marshy grassland dominated by tufted hair-grass (*Deschampsia caespitosa*) and soft rush, creeping buttercup, lesser spearwort (*Ranunculus flammula*) and silverweed (*Potentilla anserina*)", and in Target note 18 as "Semi-improved Acid Grassland/Marshy Grassland Mosaic south of Baysil Fen The transition to marshy grassland is marked by a dominance of rushes (mostly soft rush with some jointed rush *Juncus articulatus*), with frequent tufted hair grass, and occasional marsh foxtail (*Alopecurus geniculata*), crested dog's tail (*Cynosurus cristatus*), lesser spearwort, cuckooflower (*Cardamine pratensis*) and marsh thistle".

The Relict Moss land Report (Hayes 2010) again recorded a greater number of species:

Abundant Creeping Bent *Agrostis stolonifera* and Red Fescue *Festuca rubra* and Common Sedge *Carex nigra*,

occasional Marsh Thistle *Cirsium palustre*, Articulate Rush *Juncus articulatus,*

frequent or locally frequent Tufted Hair-grass *Deschampsia caespitosa*, Yorkshire Fog *Holcus lanatus*, Soft Rush *Juncus effusus*, Creeping Buttercup *Ranunculus repens*

and rare (only a few specimens found) Oval Sedge *Carex ovalis*, Yellow Vetchling *Lathyrus pratensis*,Lesser Spearwort *Ranunculus flammula*

5.3.4. Species-rich Fen

This covers the peat spur north and east of the central ditch all along the south of Baysil Wood (Figure 4 sites 15 and 16, and the north-western fields on the west of the central ditch (Figure 4, sites 11 and 12).

The Ecology report describes Baysil Fen NE in Target note 21 as "Ruderal and Scrub Mosaic An unmanaged field with a mosaic of vegetation including stands of false oatgrass and nettle, together with scattered willow scrub of 1 to 2m in height. " Target note 17 "Where the topography is lower (TN 17b) carr woodland is present dominated by alder and willow, with marsh marigold (*Caltha palustris*), bulrush, marsh cinquefoil (*Potentilla palustris*) and hemlock water dropwort (*Oenanthe crocata*) all occurring" would also cover part of the fen area.

The Relict Mossland survey (Hayes, 2010) described the area as being of much higher ecologically value, as being “species-rich fen with much meadowsweet *Filipendula ulmaria*, ragged robin *Lychnis flos-cuculi* and marsh bedstraw *Lotus uliginosus* and localised carr, from which the polar crop had been virtually all removed. Cowbane *Circuta virosa*, and marsh cinquefoil *Potentilla palustris* were important features.
the survey lists
Abundant Hairy Willowherb *Epilobium hirsutum*, Soft Rush *Juncus effusus*, Minute-leaved Duckweed *Lemna minuta*, Sallow *Salix cinerea*,
Occasional Marsh-marigold *Caltha palustris*, Narrow Buckler-fern *Dryopteris carthusiana* , Broad Buckler-fern *Dryopteris dilatata*, Acute-flowered Rush *Juncus acutiflorus*, Ragged Robin *Lychnis flos-cuculi*, Poplar *Populus* sp., Pedunculate Oak *Quercus robur*, Lesser Spearwort *Ranunculus flammula*, Skullcap *Scutellaria galericulata*, Marsh Ragwort *Senecio aquatilis*, Reedmace *Typha latifolia*, Common Nettle *Urtica dioica*
Frequent Alder *Alnus glutinosa*, Angelica *Angelica sylvestris*,Common Sedge *Carex nigra*, Bottle Sedge *Carex rostrata*, Cowbane *Circuta virosa,* Marsh Thistle *Cirsium palustre*, Tufted Hair-grass *Deschampsia caespitosa*, Meadowsweet *Filipendula ulmaria*, Articulate Rush *Juncus articulatus*, Greater Bird’s-foot Trefoil *Lotus uliginosum*, Gypsywort *Lycopus europaeus*, Marsh Cinquefoil *Potentilla palustris*, Bramble *Rubus fruticosus*,
Rare (only a few specimens found Lady Fern *Athyrium filix-femina*, Purple Moor-grass *Molinia caerulea,*

The Proposal s1-4 Report only mentioned 2 BAP habitats, Baysil and Burns Woods - Lowland deciduous Mixed Woodland., failing to list the 9.5 ha of Biodiversity Action Plan habitats fen, swamp and carr in the White Moss peatland.

Paragraph 9.100 of the Ecology report stated “The Phase 1 survey did not record the presence of a notable flora or vegetation communities of conservation value within the less intensively farmed parts of the site (i.e. marshy grassland at TN 18)".

The species information listed above from the Relict Mossland Survey clearly contradicts this, indicating that **the White Moss peatlands contain a valuable flora of county level importance**.

5.4. Species information

5.4.1. Plants. The Shropshire Wildlife Trust (SWT) data map in their response to the Proposals indicates the location of Least water lily close to the inflow from Zone 4 to Cole Mere.
The data for the Quarry’s Ecology report obtained from SWT had no records for the White Moss Complex, but in the SWT response to the planning application, they also show only one mammal and two significant plant

records for the White Moss complex, the two plant records being historical records of cowbane.

However the Relict Mosses of Shropshire report (Hayes, 2010) lists **9 Shropshire wetland axiophytes**, species of County level significance, an empirical measure for sites of nature conservation interest,(Lockton et al, 2008,) present in the White Moss peatland, viz. Bottle Sedge *Carex rostrata*, Cowbane *Circuta virosa*, Marsh Cinquefoil Potentilla palustris , Nodding Bur-marigold *Bidens cernua*, Narrow Buckler-fern *Dryopteris carthusiana*, Nodding Bur-marigold Bidens cernua, Purple Moor-grass Molinia caerulea, Sallow Salix cinerea, Skullcap Scutellaria galericulata and Water Violet *Hottonia palustris*.

This clearly contradicts the conclusions of paragraph 9.100 of the Ecology report which stated “The Phase 1 survey did not record the presence of a notable flora … of conservation value within the less intensively farmed parts of the site (i.e. marshy grassland at TN 18)".

5.4.2. Great Crested Newts (GCNs)

The Ecology report relied on Surveys by SLR in 2011 which found “the presence of a medium-sized metapopulation associated with four ponds in and near to Colemere village”. It did not assess the ditches in the White Moss peatland. The Ecology report field survey only visited one pond, the Upper pond at Little Mill, mistakenly concluding (paragraph 9.3.3). “Due to being fed by the nearby Canal, the pond has been colonised by large numbers of stickleback fish which will predate the immature stages of amphibians so no newts recorded.” Paragraph 9.8.4 referred to the only record of a GCN being a dead one on Wood lane Nature reserve main wildfowl pool.

Recently GCN have been found in Little Mill garden adjacent to Baysil Wood (26.1.15 K Harris). The Environment Agency in their comments on the Proposals stated “Slow flowing, or static ditches can support newts and the boundary of the planning application borders these ditches”. This contradicts Paragraph 9.162 of the Ecology report which stated “The application site has been assessed as being of negligible value as a terrestrial habitat for amphibians including GCN during their land phase.”

The undisturbed lightly grazed complex of habitats in the White Moss peatland is similar to others supporting GCN locally, eg the Marl Allotment, Whixall.

5.4.3. Water voles

Paragraph 9.38 of the Ecology report states no other follow-on surveys in respect of species were deemed necessary to inform this EcIA, despite being requested in the Shropshire Council scoping document to survey water voles. The ditch network looks ideal for water voles.

5.4.4. Breeding birds of conservation concern

Paragraph 9.36 of the Ecology report makes no mention of the potential for breeding waders in the valley wetland, mentioning only hedgerow birds. Snipe were seen there by Natural England in their visit of December 2015, and snipe have often been seen there in the breeding season by the grazing tenant, (personal communication). Paragraph 9.136 stated “No habitats or features occur which it is considered could support bird species of conservation concern”, despite the presence of rush pasture and undisturbed willow carr at both ends of the valley.

5.4.5. Reptiles

Paragraph 9.138 is incorrect in stating no suitable habitats, such as significant areas of undisturbed rough grassland, scrub or woodland, occur within the application site, as this typically describes the north-west corner of Baysil fen. Paragraph 9.139 states “Due to the lack of suitable habitats for reptiles no further surveys have been recommended to inform this EcIA, and. Paragraph 159, ”The habitats present within the application site have been assessed as having negligible potential to support reptiles.”
Rank grassland, swamp and fen are present in Zone 4 near Baysil fen, and there is ideal habitat for reptiles in “Woodland near Colemere” adjacent to Zone 4. Grass snake have been sighted at nearby Cole Mere.

5.4.6. Bats.

The White Moss complex was acknowledged to be an important foraging area for bats.

6. Effect of excavating Zone 4

6.1. Geomorphology, landscape and soils.

6.1.1. Geomorphology.The proposed Zone 4 extension will destroy the natural geomorphology of one third of the glacial landscape between Cole Mere and White Mere (Figure 1), a well-visited and typical part of the nationally recognised Meres & Mosses Nature Improvement Area and Landscape Partnership Area, to which Shropshire Council and Shropshire Wildlife Trust are party.

6.1.2. Landscape.The excavation will replace a very visible rolling hillside, which flows down into a peat-filled valley, water from which flows into Cole Mere, with a steep-sided crater, as in Zone 3. In the Non Technical Summary it states “The restoration scheme …will have a range of slope gradients which will enable the existing low lying pasture land beyond the Site boundary to merge with the restored landform to create a gradual slope towards the restored wetland area.” In reality this will be a very steep 1in 10 slope, falling

6m down to the new pool.
This will, in all likelihood, drain the ancient valley peatlands of White Moss leading to their probable shrinkage and collapse, which in turn would affect flow in the ditch which leads into Cole Mere.

6.1.3. Soils.

The Hydrogeology report appears to completely ignore its own mapped evidence (Figure 3.2 Appendix 1 Drift geology) of the existence of the White Moss peat body all along the base of the Zone 4 slope, erroneously concluding that the valley sits on boulder clay, (which might have partially protected the wetland, if it had a perched water table). The Soils Report makes no assessment to any effect of quarrying on the peatland soil away on the north-east corner of Zone 4, or to any effect of depriving the peats of surface water run in, or siting them next to a deep crater.
The Environmental Impact Assessment and the Non-Technical Summary do not acknowledge the presence of deep peats adjacent to the excavation.
In summary, without foundation, these reports all conclude there will be no detrimental impact of the proposals on the local valley wetlands.

At Shropshire Wildlife Trust's nearby Wem Moss (Gyopari 1990, Bennet 1991, Reiley et al 1986 and water Management Consultants 2009), it has been shown that a 2 m deep boundary ditch cut through into the sand which underlies the southern dome of the Moss has caused serious drying out of this peatland SSSI. A much worse effect could be expected here if the White Moss peatlands are cut into and sit immediately next to a crater with a water level 6-7m lower than their surface, and which would deprive them of almost all of their surface and subsurface water inflow.

The Environment Agency (ESI 2007) has also been so concerned about the effect of abstraction on Fenn's Moss, a peatland similarly sitting on glacial sand and gravel, that it commissioned an extensive Review of Consented Abstractions, acknowledging that the water levels in the sand are supported by the groundwater table in the underlying sands.

Also on Fenn's Moss, the effect of cutting the Fenn's Moss Main Drain down into the sand has caused a major collapse of the peat bog forming an obvious "valley", running from sj 47388 35891 to sj47929 36322, a drainage effect that extends several hundreds of metres from the drain. It is possible that a similar drawdown could occur here from the reversal of hydraulic gradients caused by quarrying Zone 4 sands alongside the peatland.

6.2. **Hydrology**

6.2.1. Groundwater

The Hydrogeology report appears to show that current quarrying operations have not affected groundwater levels within the current Wood Lane Quarry Zones 1-3. Appendix 1paragraph 6.2, concludes “Cole Mere is dependent on groundwater inputs and can be regarded as an expression of the local water table. However it has not been impacted by the quarry operations to date and consequently it can be expected that this waterbody will not be affected in the future.” However, because the direction of groundwater flow, and presumably also the hydraulic gradient, are shown as being different in Zone 4, it is difficult to extrapolate that the loss of some water in evaporation during excavation and removed in the product would similarly cause no effect on the groundwater feeding Cole Mere.

The lack of borehole stratigraphy or hydrological information for the White Moss peatland makes an interpretation of the effects of the quarrying on the groundwater below this area difficult to assess as there is no information as to the interaction of the peat and the groundwater table .

Paragraph 6 of Appendix 1 of the Hydrogeology report set the effect of increasing evapotranspiration in context of the groundwater flow to Cole Mere, “the estimated catchment for Cole Mere is some 4km2 and consequently the calculated recharge area is some 1.7% of the catchment area”. However as the actual surface microcatchment for Colemere is 178 ha (ECUS) that increases the proportion dramatically.

6.2.2. Surface and subsurface flow

No assessment is made in the Hydrogeology report of the effects of on the White Moss peatland of quarrying through and removing the clay layers in the Zone 4 sands higher up the slope, which are resulting in higher, perched watertables at >90 mOD, and which may be reducing infiltration to the deeper ground water table and increasing subsurface flow towards the valley peatland.

Under the Zone 4 proposals, the northern part of the White Moss peatland, at an elevation of ca 89 -90m OD (Figure 2), will apparently in part be quarried away, the central “amphitheatre” area will be used for stacking of storage bunds, and the entire White Moss peatland will be left immediately next to the edge of a deep crater containing a new wetland with a water level at ca 84m OD, 6 m lower.

After quarrying, virtually all surface and subsurface water flow currently occurring towards the peatland will stop, and the hydraulic gradient will be reversed towards the bottom of the excavation. The Proposal s1-4 Report, paragraph 6.3.19, describes the creation of a 1 in 10 slope from the White Moss peatland into the adjacent new wetland, some of the steepest slopes in the restoration scheme. .The Hydrogeology report appears to make no analysis of the effect of digging this 6-7 m-deep crater alongside the valley floor on the "Woodland near Colemere" Local Wildlife site, the valley bottom peatlands or Baysil Fen.

With a continuous deep peatland such as White Moss, drainage to one end can affect water levels hundreds of metres away, so the "Woods near Colemere" carr woodland and peaty pasture are likely to be affected by the Zone 4 crater, 250m away, and cannot be considered to be "upstream" of the proposals. Although protected by Colemere Farm, this site may already be being affected by the quarrying in the adjacent Zone 3, but no monitoring is being carried out.
Paragraph 9.176 of the Ecology report concludes "Development proposals would not adversely affect any non-statutory sites as there are none within the likely zone of influence". This is not considered to be correct.

In their comments on the Proposals, Natural England does not accept that ground water and surface water are independent in Zone 4.

6.2.3. Reduction in flow in the White Moss ditch.

After quarrying the runoff into the peatland from the majority of the 18ha of Zone 4 will be lost, almost all running instead into the new wetland. The Hydrogeology report appears to make no quantification of the stated reduction in flow in the ditch and the consequences of this for Cole Mere. The Environmental Impact Assessment Paragraph 4.5.2 states that surface water from rainfall onto Zone 4 will either be infiltrate naturally through the granular soils or enter the newly created wetland habitat. The Ecology report makes no assessment of the impact of this reduction in flow on either the ditch flora or the biota of Cole Mere.

6.2.4. Drainage network

Because the Hydrogeology report appears to contain significant errors about the connection between the surface water flow from Zone 4 and Cole Mere, it appear to inaccurately assess the effect of the Zone 4 excavation on Cole Mere. Because it assumes that the ditch from Zone 4 flows into the marsh north of the canal, rather than immediately being piped eastward into the top pond at Little Mill, then into Cole Mere very near to the site of the Least Water

Lily, the impact of changes in flow is not adequately explored.

Similarly as the Ecology report mistakenly assumes that the ditch at the base of the Zone 4 slope flows into the canal rather than into Cole Mere, it does not assess whether the proposals might affect the internationally important wetland or the least water lily.

6.2.5. Water Framework Directive. Because the Environmental Impact Assessment Report completely missed that Cole Mere is a Water Framework Directive site it appears to have carried out virtually no analysis as to the effect of the proposals on this, the most likely to be affected WFD site. Without a detailed analysis of the effects on Cole Mere, Paragraph 5.2.1 stated ”No further mitigation measures are required as the scheme is designed to avoid adverse impacts on the water environment” and paragraph 6.2.2 “The assessments above have concluded that the development would not prevent the WFD status objectives for these waterbodies from eventually being reached; and that therefore the development would be compliant with the Water Framework Directive objectives”.
This is clearly inadequate.

6.3. Habitats and species

6.3.1. Nationally and internationally important sites. The effects of another probable 10 to 15 years of pollution from dust from wagons leaving the Quarry’s main road entrance, currently inadequately controlled (personal communication, Natural England), was not raised in their reports, although it was highlighted in Natural England’s response to the consultation.

The effect of the proposals on the internationally important site of Cole Mere and its least water lily was not considered in the Ecology report probably because it incorrectly concluded that there was no hydrological surface water connection between Zone 4 and Cole Mere. Based on this, the Proposal s1-4 report states (paragraph 7.6.9) that “the Site will not cause adverse impact on protected sites”. The Environmental Impact Assessment does not mention the least water lily.
In summary, the effect of the Proposals on these sites appears to be inadequately assessed

6.3.2. Local Wildlife Sites.
Paragraph 9.148 in the evaluation section of the Ecology report states, ”The nearest non-statutory County Wildlife Site (CWS) is the Wood Lane SWT Nature Reserve” and makes no mention of “Woodland near Colemere”.
The Environmental Impact Assessment did not mention any effect of the

proposals on “Woodland near Colemere” Local Wildlife Site, only mentioning the adjacent Wood Lane Quarry Local Wildlife Site.

As the ecological value and hydrological vulnerability of the adjacent White Moss peatland with its Local Wildlife Site “Woodland near Colemere” was substantially underestimated both in the Ecology report field survey and desk study, its assessment of the impact of quarrying Zone 4 on Local Wildlife Sites is inaccurate and underestimated. The effects on the adjacent “Woodland near Colemere” Local Wildlife Site were not assessed at all.

Substantial areas of Biodiversity Action Plan habitats in the White Moss peatlands - a site with 9 Shropshire Wetland Axiophytes and several locally uncommon species and with high restoration potential, are likely to be badly damaged by the Zone 4 proposals.

6.4. Protected species

Shropshire Council’s scoping document specifically requested information on great crested newts and water voles on and near the application area.
The Ecology report relied for information about great crested newts on a report that did not cover the ditch system and carrs in the White Moss peatland and did not assess water voles. It is likely that both species will be present in the White Moss peatland. The effect of the predicted lowered flow in the ditches not been correctly assessed on these species.

The Ecology similarly inadequately assessed the effect of drainage of the peatland on birds of conservation concern or reptiles.

The Executive Summary unjustifiably concludes, “The potential impacts to species are considered to be of low significance based on the findings of the desk study, habitat-based surveys and specific surveys for bats.

In the Proposal reports, the amount of public disturbance to which the restored site would be subjected is contradictory. Increased use could add to the disturbance of protected species in the currently little disturbed White Moss peatland. The Non technical summary states “The Proposals to increase the cultural value of the site post restoration could include a greater level of public access”. This was repeated at the Quarry’s public meeting at Welshampton in December 2014 when Mr Stuart Lawrence proposed leaving the access track in place and creating a new car park and encouraging dog walkers.

Overall, the Proposal reports appear to either minimise or totally ignore the likely destruction of the White Moss peatland complex and the species contained

therein and barely assess the potential effects on the ecology of Cole Mere and its associated wetlands.

7. Relevant policies for the protection of Features of Interest.

Policies given in italics, comments in normal font.

7.1. Shropshire Council Local Plan Core Strategy (SC, 2011)

Policy CS6 Sustainable Development and Design Principles *will be achieved by: "safeguarding natural resources including geology, minerals, soil and water".*

Peat is a mineral and the White Moss peat will not be safeguarded by this development

Policy CS17 – Environmental Networks states*: "Development will … protect, enhance, expand and connect Shropshire's environmental assets, to create a multifunctional network of natural … resources. This will be achieved by ensuring that all development:*

• Protects and enhances the diversity, high quality and local character of Shropshire's natural … environment, and does not adversely affect the visual, ecological and geological…values and functions of these assets, their immediate surroundings or their connecting corridors;

This Proposals will damage high quality diverse habitat of local distinctiveness, a connecting peatland corridor to Cole Mere.

• Contributes to local distinctiveness, having regard to the quality of Shropshire's environment, including landscape, biodiversity and heritage assets, such as the Meres and Mosses;

The proposals will damage a Local Wildlife Sites, a biodiverse peatland, the prehistory and history recorded in the peats, and possibly the biota of Cole mere.

• Does not have a significant adverse impact on Shropshire's environmental assets and does not create barriers or sever links between dependant sites;

The proposals will destroy and damage part of Shropshire's peat asset, its wetland axiophyte flora and possibly its protected species, and will sever the current connection between Cole Mere and its relates wetland.

7.2. Shropshire Council's "Site Allocations and Management of Development (SAMDev) Plan " contains section Schedule MD5a: Phase 1 Site Allocations Point 2 which states: *"The effects of the development on hydrology will be a key consideration requiring the submission of detailed measurements and analysis to give an accurate understanding of issues and allow the development of avoidance or mitigation measures".*

The Non Technical Summary document states "The assessment undertaken has shown that the proposed quarrying activities will have no adverse impact either on the flow of water to Colemere or to the quality of water that enters it". However as can be seen from the evidence above that this assessment appears to be

unsubstantiated and invalid so should be disregarded.

Requirements specified in the SAMDEV regard to the Wood Lane North extension include:

1. The requirement for a Habitats Regulations Assessment.

The errors and omissions in the proposals reports mean that the necessary evidence has not been provided to enable the Council to make an adequate assessment of the proposals on the Nationally important site of Cole Mere.

2. *The requirement for detailed measurements and analysis to enable the hydrological effects of the proposals to be assessed.*

There is no data for hydrology of the White Moss peatland and much of the other hydrological data is erroneous or inadequate, so the hydrological effects of the proposals can not adequately be assessed.

3.*Requirement for assessment and mitigation measures to control dust, sediment and pollution.*

Natural England and the Environment Agency's responses highlight inadequacies in this regard. Mistakes about the drainage network invalidate the conclusions in the Proposals reports.

4.*Requirement for assessment and mitigation of the effect on priority habitats and protected species.*

The errors and omissions in the Proposals reports mean this requirement has not been met.

5.Requirement for the site restoration scheme to deliver wildlife and recreational benefits and to benefit Cole Mere.

The proposed restoration scheme will alter hydraulic gradients for Coe mere and its supporting wetlands. The varying proposals re recreation could negate any ecological value of the new wetland.

6.Assessment and mitigation measures on heritage assets

The Proposal Reports make no assessment of the damage to heritage assets in the peat of the White Moss area.

7.3. Shropshire Biodiversity Action Plan for peatlands (SBP, 2008) objectives, signed up to by Shropshire Council, include:

A. Protect all peat bogs by ensuring no further loss or degradation.

The proposals will destroy and damage 11 ha of peat

B. Increase the extent of peatland through restoring degraded areas.

The White Moss peatland has been identified as having very high restoration potential. This will be destroyed by the proposals.

C. Maintain and enhance existing peatlands through appropriate management.

The Zone 4 extraction will degrade and prevent maintenance of this ancient White Moss peatland.

7.4.. Meres & Mosses Natural Character Area, Landscape Partnership and Nature Improvement Area (NIA).

7.4.1. Natural Character Area

.Zone 4 and the area shown in Figure 1 lies wholly within NCA Profile: 61 Shropshire, Cheshire and Staffordshire Plain (NE556), and in Natural Area 27. *Key characteristics of the NCA include: Diversity of wetland habitats includes internationally important meres and mosses comprising lowland raised bog, fen, wet woodland, reedbed and standing water, supporting populations of a host of rare wildlife, including some species of national and international importance.*

The effect of the Proposals on the internationally important site of Cole Mere and White Mere and their supporting wetlands has not been adequately assessed.

7.4.2. Meres & Mosses Nature Improvement Area

NIAs aim to create 'better-connected habitats at a landscape scale, providing space for wildlife to thrive and adapt to climate change'. The Lawton committee selected the Meres & Mosses as one of only 12 Nature Improvement Areas in the country to implement the proposals of the Lawton Review. The Zone 4 proposal lies within the Meres and Mosses NIA, but unfortunately runs contrary to all the principles of the NIAs:

(*a) Improve the quality of current sites by better habitat management*

The proposals will have a negative impact on the natural hydrological basin of Cole Mere SSSI.

(b) Increase the size of current wildlife sites

The Proposals will encroach on existing wildlife sites.

(c) *Enhance connections between, or join up, sites, either through physical corridors, or through 'stepping stones'*

The Proposals will erode the existing corridor of wetland through the White Moss peatland which is linked to Cole Mere SSSI.

(d) *Create new sites*

The new pond proposed will be at the expense of existing sites, designated and undesignated, by interference with the hydrology, water quality and encroachment on the habitat.

(e) *Reduce the pressures on wildlife by improving the wider environment, including through buffering wildlife sites*

The Proposals will increase pressures on wider environment by a development that takes place within the catchment of existing sites.

In conclusion, the proposals negate all of the aims of the Meres & Mosses NIA.

7.5. The Meres & Mosses Landscape Partnership Scheme is working "to preserve, enhance and raise awareness of this precious landscape".
The Meres and Mosses Wetland Landscape Partnership Action Plan 2011–2016' seeks: *"a landscape featuring a mosaic of thriving wetlands, including lakes, rivers, ponds and marshes that are a vital resource for wildlife and greatly valued by people."*
Its Outcomes include:
- *A major increase in the area, quality and connectivity of wetland habitats.*
The Proposals would decrease the connectivity of wetland habitats.
- *A significant increase in numbers and distribution of priority wildlife species and re-colonisation by lost wildlife.*
The proposals will damage priority wildlife species
- *More rivers and wetlands reconnected to their floodplains.* The Proposals will damage the supporting wetlands for Cole Mere..
- *Wetlands acting increasingly as carbon stores.*
The proposals will damage the carbon stored in the Zone 4 peatlands
- *Greater community engagement and involvement in our work across the Meres and Mosses.*
- *Creating more places with opportunities for people to connect with nature.*
The Wood lane Quarry currently offers adequate provision for this engagement. Making provision for a difference audience, dog walkers, would severely limit the potential of any mitigation from the creation of a new wetland.

7.6. "The Status of Local Wildlife Sites 2014". Launched by the Wildlife Trusts in December, the survey, found that more than 11% of 6,590 Local Wildlife Sites monitored in the period 2009 – 2013 were lost or damaged. **They reported that they urgently need more resources to ensure the effective protection of Local Wildlife Sites and to combat the development pressures that threaten these sites.**
The Proposals will damage a Local Wildlife site and its supporting peatland.

In their response to the consultation, amongst many other clarifications the local branch of Shropshire Wildlife Trust sought *"Assurance that water balance will be maintained in the valley area of marshy grassland."*

The proposal will deleteriously affect the water balance in the White Moss peatland.

8. **Limitations in objections to the proposals by Agencies/others as a result of misinformation and omission in Proposal reports**

8.1. Natural England only comment on issues affecting nationally and internationally designated site, pointing out that a Habitats Regulations Assessment will be required.. They refer consideration of County level and non-designated sites and

protected species back to the Local Planning Authority.
The Proposals reports do not appear to contain adequate information for the Planning authority to make this assessment.

8.2. Environment Agency comments on the Proposals

In their Summary they state "**Based on the information and assessment provided in the Hydrogeological Impact Assessment (HIA) and the EIA, including addendum reports,** the applicant has demonstrated that the water environment will not be adversely impacted."
Section 3 above highlights many areas in which the Proposals Reports were misleading in regard particularly to surface and subsurface water flow, and so the Agency may have been mis-led.
They state "We have considered the potential water quality impact upon the small surface watercourse/ ditch channel to the east/ north-east of the Zone 4 extension area. The ES concludes that long term groundwater level monitoring carried out shows there is no hydraulic connection between the groundwater under Zone 4 and this ditch. Therefore, we are in agreement that this ditch is more likely to receive its water from rainfall and is unlikely to be affected by quarry extension activities." This contradicts Natural England's conclusions in their objection to the proposals.

Again based on inadequacies in the Ecology report pointed out above, the Agency concludes "Whilst the majority of the biodiversity issues appear to be satisfactorily addressed in the EIA…." This is clearly not the case for the assessment of the flora of the White Moss peatland and the potential effect of the Proposals on Least water lily.

The Agency did however pick up the inadequate assessment of the proposals on great crested newts and water voles.
Because the Proposal reports made no mention of deep peats, the Agency stated "We would also recommend that further mitigation measures in the form of swales be included on the land between the quarrying zone and the ditch. This is linked to the surface water (flood risk) comments below. This feature should be created to ensure that any surface water runoff from the site is not washed directly into the ditches."
This action could disturb the deep White Moss peats.

The Environmental Impact Assessment Report's failure to list Cole Mere as a Water Framework Directive Water body appears to have led to the Environment Agency comments on the proposals similarly failing to recognise the omission.

So, basing their comments purely on the incorrect and inadequate information presented in the Proposal reports, the Agency concluded "Notwithstanding the

above, to assist your decision making, based on the groundwater conditions and HIA the proposals are unlikely to have a significant impact upon the conservation status of Cole Mere" and "There would be a net positive environmental benefit in constructing the suggested wetland feature."
As explored above, these conclusions merit re-examination.

9. Conclusions

The Proposals Reports commissioned by the Tudor Griffiths Quarry Company appear to contain significant errors and substantial omissions, and to wrongly conclude that the Zone 4 quarry extension will have no deleterious consequence to the local landscape and environment. These reports appear to have misled some of the statutory consultees into supporting their interpretation.

9.1. Geology, geomorphology ,landscape and soils**.**

The proposed Zone 4 extension will destroy the natural geomorphology of one third of the glacial landscape between Cole Mere and White Mere.
Quarrying away of most of the sand and gravel reserve of this nationally important landscape in such a sensitive location should not be a suitable land use policy. Instead this example of the geomorphology of the landscape, with the ancient post glacial habitats within it, should be considered to be worth preserving.

The Hydrogeology report appears to completely ignore its evidence of the existence of the White Moss peat body all along the base of the Zone 4 slope, nowhere referring to the existence of this deep peatland, and erroneously concluding that the presence of the local drainage network means that the area sits on boulder clay. This error, totally unsubstantiated, is repeated again and again in subsequent Proposal reports.
Although the Soils report briefly mentions deep peat and peat bog in Zone 4, it then makes no reference whatever to any effect on the peat of quarrying it away, or depriving it of surface water run-in, or siting it next to a deep crater. The Soil report's finding of peat is not referred to in any of the other Proposals reports. As a result, the Environmental Impact Assessment and the Non-Technical Summary mistakenly conclude there will be no detrimental impact of the proposals on the local valley wetlands.

At Shropshire Wildlife Trust's nearby Wem Moss, and nearby Fenn's Moss National Nature Reserve, the damage caused to peatlands by draining underlying and adjacent glacial sand and gravels is well documented and points to the likelihood of damage to the White Moss peatlands by these proposals.

9.2. **Hydrology**

9.2.1. Catchments

The different reports available show different surface water catchments for Cole Mere (Hydrogeology report; ECUS,2001) so the assessments of the percentage changes caused by the quarrying on reduction in contribution to groundwater, surface water flow and subsurface water flow are minimised by the larger catchment portrayed in the Hydrogeology report and may therefore be substantially underestimated.

9.2.2. Groundwater

The Hydrogeology report concludes that current quarrying operations have not affected groundwater levels within the current Wood Lane Quarry Zones 1-3 and so, apart from the loss of some water in evaporation during excavation and removed in the product, there would similarly be no effect on the groundwater feeding Cole Mere. Differences in the surface water catchment, the inferred direction and hydraulic gradient of groundwater flow mean this conclusion should be re-examined

A lack of borehole stratigraphy or hydrological information for the White Moss peatland, mean that extrapolations from the boreholes up on the slopes above cannot safely be applied to the White Moss area.

9.2.3. Surface and subsurface flow.

Under the Zone 4 proposals, the White Moss peatland will be deprived of surface and subsurface water flow from the Zone 4 slope, will be quarried into, damaged by stacking screening bund soils, and will suffer a reverse hydraulic gradient with water being drawn down into the 6m lower new adjacent wetland. The Hydrogeological report incorrectly states that this will not affect the wetlands.
The Hydrogeology report does not reflect Natural England's assessment of the importance of surface and subsurface water flow in the maintenance of the peatlands feeding Cole Mere.

The Hydrogeology report does not quantify the effect of possible redirection of infiltration by clay bands at ca 90m OD in the higher Zone 4 drift deposits towards the White Moss peatlands, nor any reduction of subsurface water flow into the peatland which could be caused by quarrying these bands away.

The Hydrogeology report appears to misrepresent the direction of surface water flow in Zone 4, showing a predominant flow to the NNE so missing the valley peatlands, whereas the landform and mapped contours shows that over half of the of the slope drains eastwards into the White Moss peatland . After quarrying, not only will the peatland be deprived of most of its inflow

from the slope, but the hydraulic gradient of surface and subsurface flow will be reversed away from the peatland into the bottom of the excavation. The Proposal Reports appear to make no assessment of the effects of this on the peats or their biota.

With a continuous deep peatland such as White Moss, drainage to one end can affect water levels hundreds of metres away, so the “Woods near Colemere” carr woodland and peaty pasture cannot be considered to be “upstream” of and therefore immune to the proposals.

9.2.4. Climate and water balances. The local climate is such that small changes in hydrology caused by the excavations could substantially affect water balances in locally and nationally important sites.

The Hydrogeological report mistakenly assumed that the valley peatlands were spring fed. At the moment, water levels in the Zone 4 peatlands are controlled by inputs from Zone 4 and a small area upstream, and the level of the culvert under the canal. After quarrying most input from Zone 4 will have been removed and the controlling “invert level” will be 6m lower in the base of the adjacent new wetland. The Hydrogeology report appears to underestimate the amount of surface and subsurface flow off the Zone 4 slope and does not quantification the expected reduction in flow in the ditch and the consequences of this for the peatland or for Cole Mere. The Ecology report makes no assessment of the impact of this reduction in flow on either the ditch flora or the biota of Cole Mere.

9.2.5. Drainage networks.The White Moss peatland fills a narrow south- north orientated depression, a side valley off the west- east orientated peat-filled meltwater channel linking Blake Mere with Cole Mere. Drainage ditches in these peatlands have been enshrined in piped culverts during the building of the Shropshire Union Canal. Water now flows through a culvert under the road at Colemere Farm, through the White Moss valley peatland and under the canal through a culvert pipe at Baysil Wood (originally Base Hill Wood) into a brick coffer and is immediately piped back under the canal into Little Mill and thence into Cole Mere.
In concluding that the ditch from Zone 4 flows out into the marsh north of the canal, the Hydrogeology report inadequately assesses the effects of reduction in flow or pollution on Little Mill Upper pond or Cole Mere.

The Ecological report concluded that the proposals could not affect Cole Mere, not realising the Zone 4 ditch flowed directly into it, and as such did not consider any effect on the least Water Lily at its last site in England or other SSSI features.

9.2.6. Water Framework Directive Assessment.

The Environmental Impact Assessment Report missed that Cole Mere is a Water Framework Directive site and as such carried out no analysis as to the effect of the proposals on this, the most likely to be affected site. Its conclusions that "the development would not

• cause a deterioration in any quality element of the water body classification;

• prevent the WFD status objectives for the waterbodies from eventually being reached; and that therefore the development would be compliant with the Water Framework Directive objectives" are ill founded in excluding Cole Mere.

9.3. **Habitats and species**

9.3.1. Nationally Important Sites

The effects on White Mere of continued pollution from dust from wagons leaving the Quarry's main road entrance, was not raised in the Dust and Ecology reports. This omission has been highlighted in Natural England's response to the consultation.

The effect of the proposals on the internationally important site of Cole Mere and its Least water lily was not considered in the Ecology report which mistakenly concluded that there was no hydrological surface water connection between Zone 4 and Cole Mere.

9.3.2. Local Wildlife Sites. The ecological value of the White Moss peatland, with its Local Wildlife Site, "Woodland near Colemere" and Baysil fen was substantially underestimated in the field survey of the Ecology report, which focussed on bats and the largely dry species-poor extraction site, and completely excludes the adjacent "Wood near Colemere" Local Wildlife Site. Its conclusions that the low lying wet pastures and ditch at the base of the slope were of site importance only are contradicted by Natural England's Relict Mosses Survey report (Hayes, 2010). The latter identified rushy, peaty grassland, with 9.6 ha of Biodiversity Action Plan (BAP) habitats - fen, and willow and alder carr wet woodland and species-rich ditches, with 9 Shropshire Wetland Axiophytes (important wetland species of local distinctiveness. Several locally uncommon species were found to occur widely including cowbane *Circuta virosa*, water violet *Hottonia palustris*, and marsh cinquefoil *Potentilla palustris*, and to a lesser extent, purple moor-grass *Molinia caerulea*.

The Environmental Impact Assessment did not mention any effect of the proposals on "Woodland near Colemere" Local Wildlife Site.

The desk study of the Ecology report obtained species records from

Shropshire Wildlife Trust, giving abundant records for Cole Mere and Wood Lane Quarry but none from the White Moss peatland and its local Wildlife site.

9.3.3. Protected species.

Shropshire Council's scoping document specifically requested information on great crested newts and water voles on and near the application area. The Ecology Report's assessment for great crested newts was based on a report that did not cover the ditch system and carrs in the White Moss peatland. Their misapprehension that the upper pond at Little Mill was fed by the canal re-inforced that the newts would not occur there, negated by recent finds.

No water vole surveys were conducted, despite the ditch systems appearing to be ideal water vole habitat.

Surveys of birds of conservation concern which have been seen on the area such as snipe and of reptiles such as grass snake similarly were not conducted, only for bats, which used the peatland for foraging.

In the Proposal reports, there is conflicting information about the naturalness of the proposed restoration scheme and the amount of public disturbance to which the site would be subjected, which could add to the disturbance of protected species in the currently little disturbed White Moss peatland.

Overall the Ecology report's conclusions that the Zone 4 proposals would not affect protected species are unjustified.

9.4. Overall assessment of Impacts on habitats and species.

On the basis of this absence and mis-assessment of information about the proposals area and its setting, soils and drainage patterns, habitats and species, the Ecology report and the Non Technical Summary incorrectly conclude, "No direct or indirect impacts upon statutory or non-statutory ecologically designated sites or important undesignated habitats have been predicted," and "The assessment undertaken has shown that the proposed quarrying activities will have no adverse impact either on the flow of water to Cole Mere or to the quality of water that enters it".

They state "In summary, the development of the proposed phase for mineral extraction is not predicted to have any significant or long term adverse ecological effects." "This (the restoration scheme) will have a positive impact in Nature Conservation terms and will enhance the site in terms of additional potential for habitat over and above what is currently present".

As shown above, the Proposal reports barely assess the potential effects of the Zone 4 extraction on the ecology of White Mere and Cole Mere and appear to either minimise or totally ignore the almost certain destruction of the White Moss peatland complex, its flora, fauna, its role as a carbon sink, its potential archaeological significance and historical ecology and its role as supporting habitat of the species rich ditch and adjacent species rich fen and carr of Baysil Fen and Woodland Near Colemere Local Wildlife Sites and ultimately the Cole Mere SSSI.

9.5. **Policies**

There appears to be a clear conflict between Shropshire Council's adopted policies to protect its Meres & Mosses landscape, to protect its local and international biodiversity and to protect residual carbon in archaic peatlands with its need for sand and gravel and its identification of Zone 4 as its preferred location in the county for sand and gravel extraction.

The proposals will adversely affect the ecological, geological and hydrogeological value of part of the Meres and Mosses Area. The proposed mitigation of creation of a new wetland will be at the expense of a larger ancient wetland and the species therein and there may be effects on Cole Mere as well.

The proposals conflict with the policies in Shropshire Council Local Plan Core Strategy (SC, 2011), Policy CS6 Sustainable Development and Design Principles and Policy CS17 – Environmental Networks, Shropshire Council's "Site Allocations and Management of Development (SAMDev) Plan ", Shropshire Biodiversity Action Plan for peatlands, and the aims and objectives of the Meres & Mosses Natural Character Area, Landscape Partnership and Nature Improvement Area (NIA) to which Shropshire Council are party.
They also conflict with the aims of the Wildlife Trusts expressed in "The Status of Local Wildlife Sites 2014".
In particular, the Proposals do not comply with any of the requirements no.s 1-6 made in the selection of Wood lane Quarry as a preferred site for sand and gravel extraction in Shropshire made in the SAMDEV (SC 2011).

9.6. **Overall conclusions**

This proposed Zone 4 development will be damaging to Shropshire's geomorphology, locally important habitats, flora and fauna and peat resource and is likely to damage Shropshire's protected species and internationally important designated sites. The Proposals do not comply with Shropshire's policies for environmental and landscape protection.

It is recommended that Welshampton and Lyneal Parish Council should object to the Proposals on the environmental grounds given above.

10. **References - Planning Proposal documents**

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The proposed development s1-4 report 14_04589_MAW-SECTION_1-4-2241467 Jane Spence Planning 2014
Chapter 1 Introduction and site description
Chapter 2 Planning and development context
Chapter 3 Need and alternatives
Chapter 4 The proposed development

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Historical Report 14_04589_MAW-SECTION_12-2241477
Pleydell Smithyman 2014 Tudor Griffiths Group Zone 4 Extension, Wood Lane Quarry Assessment Of The Impact On Historic Setting, Cultural Heritage And Landscape

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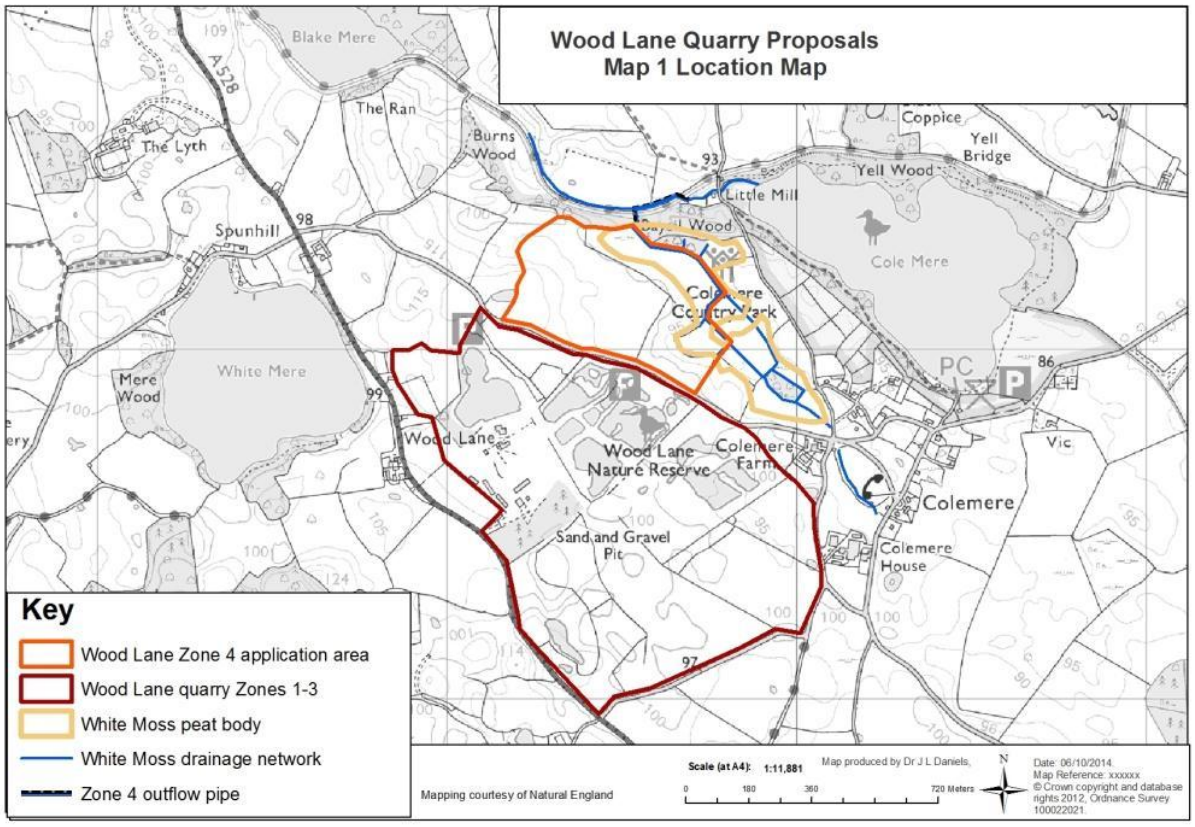
Figures


Wood Lane Quarry Proposals
Map 1 Location Map
Blake Mere
The Ran
Burns Wood
The Lyth
Spunhill
Coppice
Yell Bridge
Yell Wood
Little Mill
Cole Mere
White Mere
Mere Wood
Wood Lane
Wood Lane Nature Reserve
Colemere Farm
Sand and Gravel Pit
Colemere
Colemere House
Vic
PC
Key
Wood Lane Zone 4 application area
Wood Lane quarry Zones 1-3
White Moss peat body
White Moss drainage network
Zone 4 outflow pipe
Mapping courtesy of Natural England
Scale (at A4): 1:11,881
Map produced by Dr J L Daniels,
Date: 06/10/2014.
Map Reference: xxxxxx
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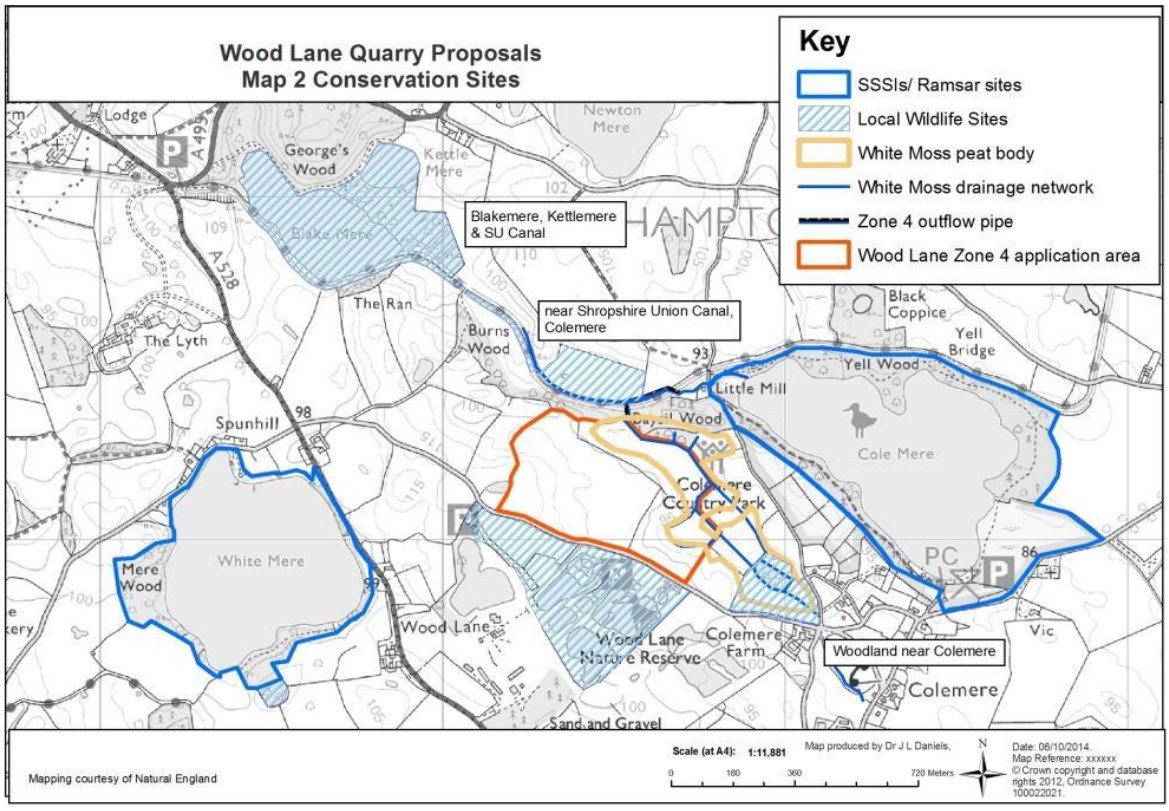
Wood Lane Quarry Proposals
Map 2 Conservation Sites
Key
SSSIs/ Ramsar sites
Local Wildlife Sites
White Moss peat body
White Moss drainage network
Zone 4 outflow pipe
Wood Lane Zone 4 application area
Blakemere, Kettlemere & SU Canal
near Shropshire Union Canal, Colemere
Woodland near Colemere
George's Wood
Kettle Mere
Newton Mere
Lodge
A495
A528
The Ran
Burns Wood
The Lyth
Spunhill
Black Coppice
Yell Bridge
Yell Wood
Little Mill
Cole Mere
White Mere
Mere Wood
Wood Lane
Wood Lane Nature Reserve
Colemere Farm
Sand and Gravel
Colemere
Vic
PC
Mapping courtesy of Natural England
Scale (at A4): 1:11,881
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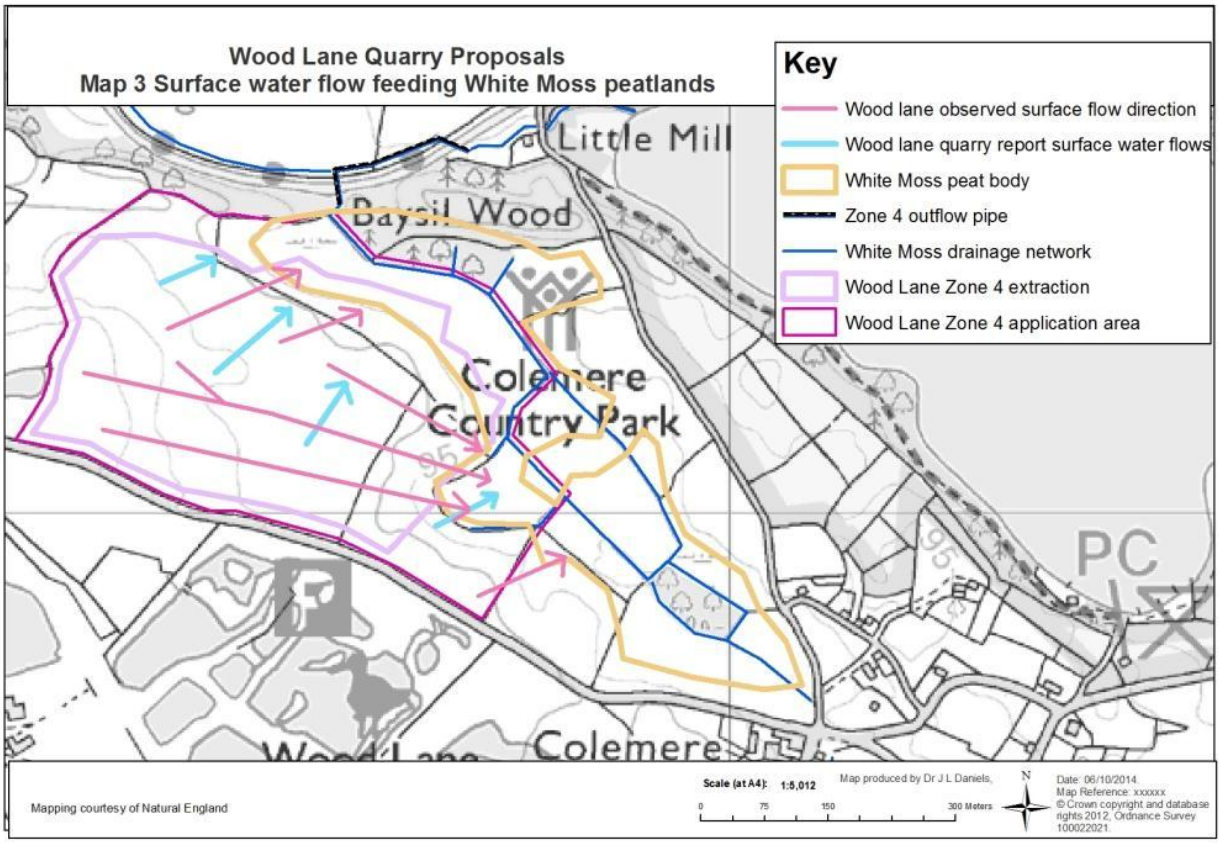
Wood Lane Quarry Proposals
Map 3 Surface water flow feeding White Moss peatlands
Key
Wood lane observed surface flow direction
Wood lane quarry report surface water flows
White Moss peat body
Zone 4 outflow pipe
White Moss drainage network
Wood Lane Zone 4 extraction
Wood Lane Zone 4 application area
Little Mill
Baysil Wood
Colemere Country Park
Colemere
Mapping courtesy of Natural England
Scale (at A4): 1:5,012
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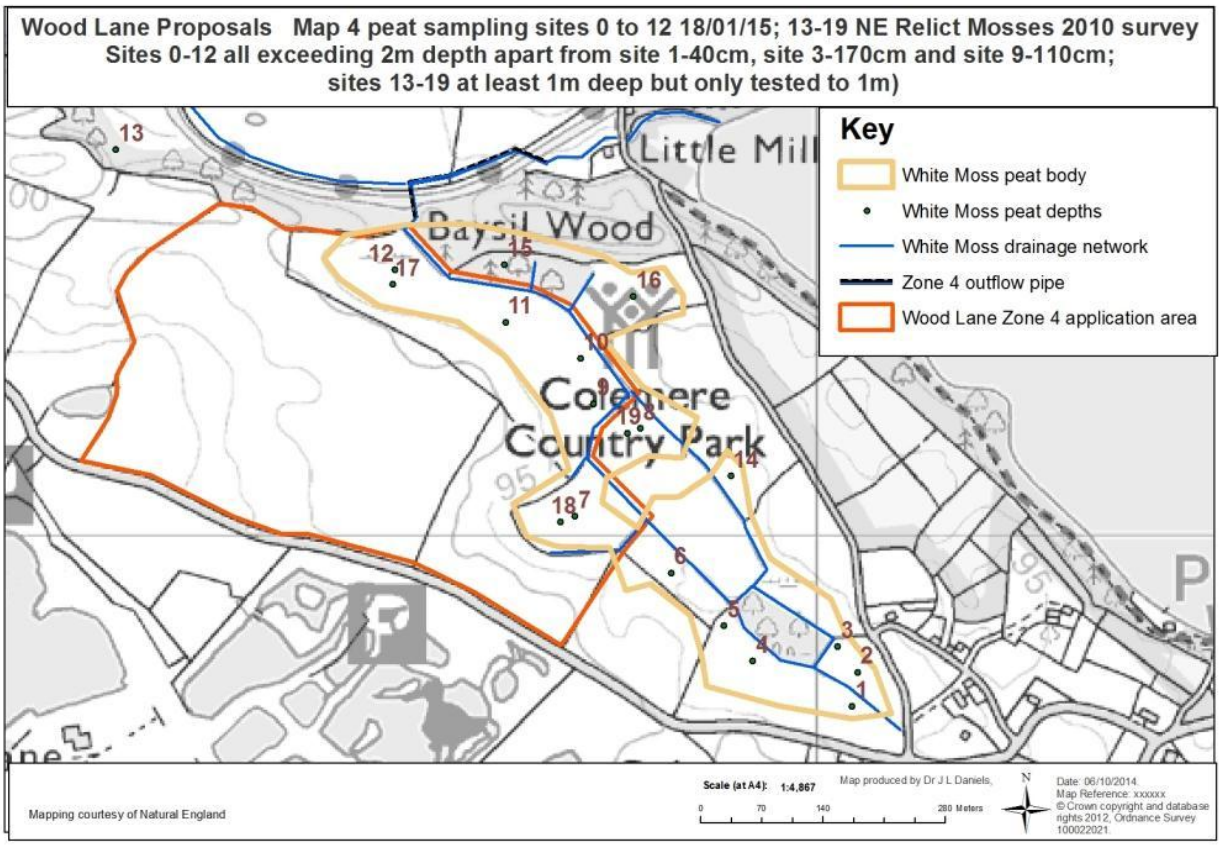
Wood Lane Proposals Map 4 peat sampling sites 0 to 12 18/01/15; 13-19 NE Relict Mosses 2010 survey
Sites 0-12 all exceeding 2m depth apart from site 1-40cm, site 3-170cm and site 9-110cm;
sites 13-19 at least 1m deep but only tested to 1m)
Key
White Moss peat body
White Moss peat depths
White Moss drainage network
Zone 4 outflow pipe
Wood Lane Zone 4 application area
Little Mill
Baysil Wood
Colemere Country Park
Mapping courtesy of Natural England
Scale (at A4): 1:4,867
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Figure 5 Brick coffer at sj 42533 33405