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**David L Walker
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MICHAEL CUNNINGHAM ARCHITECTS

**ASSESSMENT FOR
MINERAL POTENTIAL**

**ON LAND AT
HOME FARM, LLAY
NEAR WREXHAM**

APRIL 2014

Final 14.04.14

REPORT TITLE: Assessment for Mineral Potential on Land at Home
Farm, Llay, Near Wrexham

CLIENT: MCA

REPORT DATE: April 2014

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REPORT REF: L35/I/LLAY

FILE REF: L35

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Appendix 2	Copy of Pre Application Diagram of Proposals
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Appendix 4	Coal Authority Report re 51000306015001 dated 4 June 2013
Appendix 5	Extract of Cuesta Consulting Limited Report

SECTION I INTRODUCTION

I.1 Scope of Report

I.1.1 Michael Cunningham Architects (the applicant) are developing an outline planning application to Wrexham County Borough Council (the Council), seeking approval for the development of up to 370 houses with supporting land uses on land at Home Farm, Llay ("the site").

I.1.2 The planning application will be accompanied by a full range of assessments including a comprehensive review of housing policy, proving the need for the proposal.

I.1.3 As part of pre-application engagement, the applicant approached the Council who provided a comprehensive list of requirements. A copy of the letter (dated 5 December 2013) is reproduced at Appendix I.

I.1.4 Within the letter specific provisions related to minerals are noted as follows

Minerals

"Approximately half of the site lies within an area safeguarded from development in order to prevent potentially valuable mineral reserves being sterilised (Policy MW9).

Although there is no borehole data for the site, borehole data from the wider locality together with the fact that there has been extraction of sand and gravel nearby suggests that there are economically viable mineral resources under the site.

Further investigation is needed to be undertaken to establish the quality of the sand and gravel under the site location it will then be necessary to consider what the implications of prior extraction would be in relation to the intended development (land levels, timescales for development etc) and what level of prior extraction would be appropriate taking all this into account.

Development of this site will also potentially sterilise mineral resources beyond the site boundary given that current policy advises extraction occurs at least 100m from sensitive development such as housing. This will also need to be taken into account. Boreholes taken from within the site along with existing borehole data could potentially be used to establish the extent of the loss of sand and gravel deposits if undeveloped land adjacent to the proposal site cannot be accessed.

If this site is to be developed it seems probable that there would be some sterilisation of mineral resources both under the site as well as adjacent land. Permission is only likely to be granted if it can be demonstrated that there is a clear need and substantial benefit arising from the development that outweighs the harm resulting from the loss of important mineral resources."

I.1.5 David L Walker Limited has been commissioned to prepare a report addressing the concerns of the Council. In particular the report will assess the following:

- (i) the potential mineral resource available;
- (ii) the viability of recovery; and

(iii) the mineral value.

1.1.6 This report will therefore consider the site setting in a range of contexts that will provide a baseline. Published literature will be referenced in order to provide a detailed picture of the likely geology at the site and based on this a resource assessment will be undertaken which takes into account the aforementioned baseline setting, and a range of nominal standoffs from existing built development and ecological constraints to derive an estimated resource tonnage on site. It should be noted at the outset that the assessment will utilise desk top evidence only.

1.1.7 The report will then go on to assess the potential for recovery in both an environmental, planning, financial and commercial context.

1.1.8 Based on the above, the report will summarise the potential for viable sand and gravel (mineral) at the site and whether or not the deposits are “exploitable” under the relevant planning policy.

1.2 Summary of Proposals

1.2.1 The site covers an area of 15.86 hectares (39.19 acres) of agricultural land and farmstead. The application proposes the clearance of some of the farm buildings and ancillary land uses with the main residential premises (situated outside the site boundary) remaining in situ.

1.2.2 The remainder of the site will be developed into a housing-led development, with open green space. Table 1 below confirms the split of land uses.

Proposed Use	Area in Hectares
Housing	11.86
Open/Green Space	4.00

Table 1: Summary of Proposed Land Uses

1.2.3 The pre application diagram for the proposed development is reproduced at Appendix 2 and shows a concentration of green space around the periphery of the site, with the proposed housing split across nine plots. This plan is illustrative only and is subject to continued development.

1.2.4 The developers are aiming to provide approximately 370 dwellings varying from apartments, 2-3 bedroom houses and 4-5 bedroom houses. A detailed breakdown of the housing types and numbers will be developed in consultation with Wrexham Council.

SECTION 2 SITE SETTING

2.1 General

- 2.1.1 The site is located north of the village of Llay, approximately 3 km north of Wrexham (refer to Plan L35/01). Access to the site is via the B5373 (Gresford Road).
- 2.1.2 The site can access the strategic road network in the form of the A458 by using the B5102, the junction of which with the B5373 is in the north-west corner of the site.
- 2.1.3 The site is located in a primarily rural setting, although other land uses in the vicinity include:
- The village of Llay;
 - Llay Industrial Estate; and
 - Ballswood Quarry.
- The village of Llay itself is the main constraint to any potential minerals development in the vicinity of the site, along with other residential premises on Home Farm and at Maes y Rhedyn.
- 2.1.4 The site extends over 15.86 hectares (39.19 acres) and comprises a farm with fields and a car parking area associated with Home Farm. Most of the site is in open pasture, bounded by hedges and fences.
- 2.1.5 The northern elements of the site are situated at an elevation of c 87.5 m AOD in the north-west of the site, falling to 79.5 m AOD on the southern perimeter.

2.2 Landscape

- 2.2.1 The site is located directly to the north of the village of Llay in a wider landscape which has been affected by historic mineral extraction activity. The local landscape Character Guidance issued by the Council confirms the site as being in Area 8 generally comprising a “lowland terrace”.
- 2.2.2 Mineral extraction in the form of sand and gravel, limestone and coal have all left local and wide scale character impacts noted as being a key characteristic in the area.
- 2.2.3 In terms of sensitivity, the guidance indicates that the landscape in the area is **“highly vulnerable to further sand and gravel quarrying”**, with potential **“irreversible loss of character ...”**.
- 2.2.4 Screened views into the site are available from the north of the B5102, in particular in the proximity of the roundabout with the B5373. Similarly, screened views into the site are available off the B5373. Only partial glimpses of the site are available off Gegin Lane to the South.
- 2.2.5 The premises at Maes y Rhedyn located south of the site also have open views into the site, although located at a slightly lower topographic level.

- 2.2.6 The final landscape and visual receptor is footpath ROW No. 5 which forms the eastern perimeter of the site (refer to Plan L35/02).

2.3 Ecology

- 2.3.1 No survey work has been completed for the site as yet, but review of available resources confirms that there are grasslands, a pond and potentially important hedgerows on site
- 2.3.2 There are no designated assets on the site.
- 2.3.3 In terms of local assets, there are only limited assets in the area, which is afforded policy protection; however none are on or in close proximity to the site.

2.4 Hydrology

- 2.4.1 The site is located in the wider catchment of the River Alyn, which is located some 870 m to the south-east of the site.
- 2.4.2 The River Alyn is mainly characterised by a well defined terrace system which limits the extent of the floodplain. The site is therefore located in Flood Zone I.
- 2.4.3 In a hydrogeological context, most of the site is located on an outcrop of glacial till, underlain by glacial sand and gravel. The sand and gravel attain a Secondary A aquifer status, with the underlying coal measures also attaining the same classification. The principal aquifer system associated with the Kinnerton Sandstone Formation is located in close proximity to the north-east.
- 2.4.4 In terms of groundwater levels, nearby drilling logs suggest that the aquifer is located some 20-25 m below ground levels.

2.5 Archaeology and Cultural Heritage

- 2.5.1 No desk based assessment was identified as being required in support of the application (refer Appendix I).
- 2.5.2 There are no known statutory or non-statutory designated assets located on or in proximity to the site.
- 2.5.3 Historic OS mapping indicates that the site has remained in farming use through the late 19th, the 20th and the early 21st centuries, with only minor changes in field sub-division. Mapping does indicate very localised mineral extraction, with small ponds and sand pits located proximity to the site.

2.6 Utilities

- 2.6.1 No site specific utilities searches have been undertaken to date. Some assets will be available to the buildings at Home Farm.
- 2.6.2 A search using the linesearch internet resource has confirmed that there are no major electricity, oil or gas transmission assets on or in proximity to the site.

2.7 Summary

2.7.1 The preceding sub-sections have set about defining a baseline in the event that a mineral resource is identified. The baseline would then be taken into account to create a recovery scheme that is sympathetic to the surrounding environs.

2.7.2 At this stage it is considered that the following features are of key relevance in a minerals context:

- (i) the site is in close proximity to the village of Llay;
- (ii) the properties at Home Farm and Maes y Rhedyn will remain in situ;
- (iii) the site has a reasonable access of Gresford Road;
- (iv) Footpath ROW 05 is on the eastern boundary of the site; and
- (v) there are secondary A aquifer deposits in site.

SECTION 3 GEOLOGY

3.1 Regional Geology

- 3.1.1 The geology in the area of Wrexham is illustrated and characterised on British Geological Survey (BGS) Map No. 121. The memoir for the sheet is split into two parts with Part 1 (Lower Palaeozoic and Lower Carboniferous Rocks) dated 1927, and Part 2 (Coal Measures and Lower Formations) published in 1928.
- 3.1.2 This subsection will also consider the content of "The Mineral Resource Maps of Wales" publication, an open report prepared by the BGS ("the MRI report").
- 3.1.3 The information published in the MRI report provides an indicative indication of the lateral extent of mineral resources within the County. It is noted that the identified extent of the Glacial Sand and Gravel Deposits is across a considerable area. This is confirmed by the extent of the Mineral Consultation Area defined by the Council.
- 3.1.4 The MRI report confirms the development of the geology in the area over a 340 million year period, and confirms the mineral resources available in each of the identified formations. Wrexham has a rich history associated with the recovery of mineral resource, in particular coal, limestone and sand and gravel. It is the latter two resources that now form the bulk of the County's mineral resource output.

3.2 Local Geology

- 3.2.1 The geology of the immediate area around the site is better defined on BGS Map No. 121. A 1:10,000 geological map has been obtained, an extract of which is reproduced at Appendix 3.

Solid Geology

- 3.2.2 Review of Sheet 121 and the 1:10,000, confirms that the site is located (in a solid geology context) on the sub crop of the Salop Formation. This series is indicative of much of the solid geology sub cropping beneath the unconsolidated resource across the area east of Llay.
- 3.2.3 The Formation comprises a series of Mudstones, Sandstones and Conglomerates, deposited during the late Carboniferous Period. The formation is part of the wider Warwickshire Group which can attain a full thickness of over 1,000 m, although in the vicinity of the site it is much less than this.
- 3.2.4 The site has been subject to a Coal Authority report (refer Appendix 4) which confirms that five seams have been worked at depths between 660 m - 970 m below ground level. These deposits will have been worked from Llay Colliery. Due to the aforementioned Salop Formation, there are no shallow coal deposits that have been or could be recovered by open cast methods.

Drift Geology

- 3.2.5 In consideration of the drift geology, Mineral Assessment Report 61 (the Sand and Gravel Resources of the County North of Wrexham) is of key relevance. This makes

reference to historic sand and gravel working in the area and includes reference to local BGS boreholes. Historic mineral extraction is also noted on the BGS mapping at the following locations:

- Ballswood Quarry;
- Singret Quarry;
- Rockery Sand Pit; and
- Workings off Llay Road.

3.2.6 This historic mineral extraction activity has also led to mineral investigation activity in the locality, including at:

- Cae Mawr directly east of the site; and
- Ballswood Quarry, located south-east of the site.

3.2.7 This information has been collated and reviewed by Cuesta Consulting Limited. A copy of the review is presented at Appendix 5. In summary, the report confirms that:

- The deposits at the site form part of the “Wrexham delta-terrace”: this is a “coarsening upwards” sequence with glacial silts at the base, overlain by a thick unit of fine to medium-grained sands, which in turn is overlain by glacio-fluvial sands and gravels. The latter are generally interpreted as alluvial fan deposits, built up on top of the original delta. This is an important distinction in terms of the commercial viability of the deposits involved;
- These units are generally separated by gradational rather than sharp boundaries, although in some boreholes there are layers of clay in between the lower sands and the upper sands and gravels;
- Within the resource block as a whole, and taking the lower sands and the upper sands and gravels together, the deposits are massively dominated by sand, with gravel being encountered to any significant extent only within the uppermost unit; and
- The deposits have previously been worked at Bank Farm, to the north (now a completed landfill site) and at Singrett Farm to the south-east (restored to grazing and woodland). They continue to be worked at Ballswood Quarry, which adjoins the Singrett Farm site, to the east.

3.2.8 It is notable that the BGS mapping infers that the glacial till outcrops across the north-west part of the site, whereas the glacial sand and gravel crops in the south-east part of the site. However, reference to internet borehole resources and data presented in the Cuesta report (refer Appendix 5), confirms that the extent of glacial till is much larger than mapped, with boreholes LLAY 5, LLAY 6, CM 11 and CM 14 all showing considerable depths of till beyond the boundary shown on the BGS mapping. The inferred extent of these deposits is plotted on to Plan L35/03.

3.2.9 The data presented in the Cuesta Report (refer Appendix 5) and within MAR 61 infers that the average overburden thickness will be of the order of in excess of 5 m. This is a significant depth in relation to the mineral thickness at a 1:1 ratio, and removal and handling of such depths is only considered to be economic as part of large extraction scheme where space is available to negate double handling costs.

- 3.2.10 The data presented in the Cuesta report (refer Appendix 5) infers a mineral depth comprising the coarser upper levels of the Wrexham Terrace deposit only at circa 6 m (refer to Section 3.3 below).

3.3 Site Specific Geology

- 3.3.1 This subsection will concentrate specifically on the economic factors of a minerals scheme, specifically:

- (i) overburden extent and depths;
- (ii) mineral thickness; and
- (iii) mineral quality.

Overburden Extent and Depths

- 3.3.2 The BGS Mapping and site investigation data shown reviewed in Appendix 5 confirms the potential for significant depths of glacial till and overburden over the entirety of the site. Paragraph 3.2.9 above has confirmed that the extent of these deposits is actually much larger than mapped. The inferred extent of the overburden materials is shown on Plan L35/03.

- 3.3.3 Review of the available borehole information would suggest average depths of around 5 m, which is considerable when considering the size of the site and potential extraction area.

(ii) Mineral Thickness

- 3.3.4 The mineral at the site comprises the Wrexham Delta Terrace formation which commonly attains an upper and lower sub division. The upper sub division comprises a series of coarser materials, whilst the lower sub divisions comprises generally finer materials with little to no stone content.

- 3.3.5 The borehole data available suggests that the lower unit is subject to significant variation in depth, and for the purposes of this report is not considered as a mineral resource.

- 3.3.6 The upper sub division again is variable in its vertical extent, being influenced by the glacial till which covers much of the deposit. The borehole data available suggests anything up to 11 m of sand and gravel on site; however closer scrutiny of the borehole logs and other examples of the deposit in proximity to the site (such as Singret and Ballswood Quarries) reveals that the coarser material does not form part of the general matrix of the deposit, and is mainly constrained in channel features.

- 3.3.7 As discussed in Section 3.2 above, an average depth of circa 6 m is taken to be a more representative average for the mineral thickness.

(iii) Mineral Quality

- 3.3.8 The quality controls on supplying aggregates, in particular to concreting specifications, are very constrained. The grain size distribution and chemical composition of a sand and gravel deposit are therefore key in determining viability.
- 3.3.9 The deposit at Llay comprises a series of fine-medium sands with fine-medium gravels in constrained channel sequences. The latter observation is key, as it means that gravel and other coarse aggregates are devoid from the bulk of the deposit.
- 3.3.10 Borehole Logs SJ35NW43 and SJ35NW48 (refer Appendix 5) include a review of the grain size distribution. Borehole 43 contains next to no gravel content, whereas Borehole 49 contains a much more significant gravel fraction (averaged at 49%).
- 3.3.11 Of interest is the reference to volcanic sediments and coal/lignite, both of which are considered to be contaminants in the processing of raw feed materials for use in concreting specifications.

SECTION 4 RESOURCE ASSESSMENT

4.1 Recovery Scheme

- 4.1.1 Section 3.3 established the spatial distribution and thickness of potential mineral (i.e. sand and gravel) resources within the site.
- 4.1.2 A basic recovery scheme has been developed providing a theoretical extraction limit, which takes into account the following:
- standoffs to boundaries and limits of extraction;
 - proximity of roads;
 - location of residential amenity (i.e. Llay Village and properties at Home Farm itself and Maes y Rhedyn);
 - location of public rights of way; and
 - landscape and visual factors.
- 4.1.3 Using these conservative stand-offs, a 8.94 ha extraction area could be available within the site, of which only 5.08 ha is located within the Mineral Consultation Area. The latter area only is considered for the resource estimation. The extent of the area is shown on Plan L35/04.

4.2 Resource Estimation

- 4.2.1 Owing to the low level of investigation data, only the mean thickness method has been considered in this instance, with the figures being approximately weighted based on the data available.
- 4.2.2 A tonnage factor of 1.65 tonnes/cubic metre has been used in the estimates. Owing to the depth of working, two benches could be required to recover any mineral (refer to Section 6).
- 4.2.3 In consideration of the 5.08 hectare area, the data presented in boreholes LLAY 5, LLAY 6, SJ35NW43 would suggest an average mineral depth of around 6 m. The in situ mineral resource is therefore estimated at 0.5 million tonnes.
- 4.2.4 However, when consideration is given to the practicalities of extraction, i.e. the need to batter off the overburden and mineral deposits and taking into account materials left in the deposit, it is estimated that a more realistic resource estimate (i.e. pre-processing) is only 390,000 tonnes.

4.3 Sterilised Minerals

- 4.3.1 Whilst much of the scheme will be covered by residential development, some elements will comprise retained open/green space that will not sterilise the minerals. When these areas are considered (refer to Plan L35/5) the actual extraction area could reduce to some 3.3 hectares.
- 4.3.2 If this were considered to be the case, the minerals within the development site that would not be sterilised would amount to some 170,000 tonnes, nearly half of the total resource.

Off Site Impacts

- 4.3.3 In consideration of the impacts on mineral resources beyond the site boundary, these only exist to the east of the site. The use of green/open space buffers along the majority of this perimeter actually means that large amounts of the typical 100 m buffer zone are contained within the site.
- 4.3.4 Furthermore, by applying the same stand-offs to ROW 05 of 15 m, more of the buffer zone is taken up, such that beyond the 15 m stand-off the area of sterilised mineral would only amount to some 2 hectares or 200,000 tonnes, which is a negligible impact in a wider landbank figure of over 20 million tonnes (refer Section 5.2 below).

4.4 Assumptions and Caveats

- 4.4.1 In undertaking this set of resource (i.e pre processing) estimations the following has been assumed:
- a tonnage factor of 1.65/cuM;
 - stand-offs as set out in Section 4.1 above; and
 - that all the deposit would need to be recovered via two benches to allow full depth recovery.
- 4.4.2 In addition, the estimations have been provided with an error margin of +/- 10%.
- 4.4.3 This is significantly higher than most estimations of this type, but is applicable due to the paucity of borehole evidence available.

SECTION 5 PLANNING VIABILITY

5.1 Introduction

- 5.1.1 Having established the precedence of potentially economic mineral (i.e. sand and gravel) deposits, it is necessary to review adopted and emerging planning policy with regard to sterilisation policies and the potential minerals supply outlook within the County during the next plan period.
- 5.1.2 It is stated government advice that indigenous mineral resources should be developed within the broad objectives of encouraging competition, promoting economic growth and assisting the creation and maintenance of employment. Accordingly the advice stretches so far as to say that mineral resources should be safeguarded from inappropriate development to assist in the adherence of these broad objectives.
- 5.1.3 Such sentiments are replicated in national, regional and local planning policy. This section of the report will ascertain if the site should be safeguarded, and if it is, what the potential is for the site being developed as a minerals operation from a planning perspective. In doing so the following will be reviewed:
- Wrexham Unitary Development Plan;
 - The Emerging Wrexham Local Development Plan.

5.2 Wrexham Unitary Development Plan

- 5.2.1 The Wrexham Unitary Development Plan (“UDP”) was adopted on 14 February 2005 and remains in full effect. The UDP includes a broad range of policy criteria consistent with the status of Wrexham as a Unitary Authority.
- 5.2.2 The Proposals Map attached to the UDP confirms within Insert No. 4 that elements of the site are included within an area for the protection of Mineral Resources to which Policy **MW9** applies. The Mineral Buffer Zone associated with Ballswood Quarry is located some 450 m east of the site. No other allocations are understood to apply.
- 5.2.3 Section 1 provides the context for the plan, whilst Sections 2 and 3 set out the overarching strategy, which is predicated on guidance provided by the Welsh Assembly. Section 3 articulates the planning strategy which is underpinned by the principles of sustainable development. Policy **PS9** provides the strategic context for land banking policy, but it is notable that safeguarding and minerals protection is not articulated at a strategic level.
- 5.2.4 Minerals and Waste Policy is articulated in Section 11 of the UDP. The section notes the importance of mineral extraction to the Borough, but also notes the potential for impact that can be generated by such schemes. Policies **MW1** and **MW2** provide the strategic governance of minerals and specifically sand and gravel working in the area. The current land bank within North Wales sub region (encompassing Wrexham, Flintshire and Denbighshire) stands at around 21 million tonnes (or 23.2 years). This is an estimate figure based on the fact that at 15 April 2008 the landbank stood at 27 million tonnes and the annual apportionment is 1.2 million tonnes per annum.

- 5.2.5 Paragraph 11.3 of the plan confirms that the deposits at Barras/Cora Farm, Ballswood, Llay and Hafod all contain substantial permitted reserves. The policy position is the recovery of these reserves and/or viable extensions in advance of any new deposits (such as that potentially present at the site) elsewhere. The landbank figure identified above clearly show that there is not a need for the mineral resource at Llay and that deposits are reasonably available elsewhere for the foreseeable future. If the housing scheme were delayed to fit in with the landbank figures, it would create an unsustainable delay for this sustainable extension to the village of Llay.
- 5.2.6 Policy **MW9** provides for the Protection of Mineral Resources and states the following:
- “Resources of sand and gravel, and clay will be safeguarded from non-mineral development in order to prevent the sterilisation of unworked minerals deposits. The identification of mineral resource areas gives no presumption in favour of the working of any deposits. Within such areas non-mineral development will be strongly resisted unless a resource assessment (or other information) is provided to demonstrate that no exploitable reserves exist within the development site. Where non-mineral development which materially prejudices minerals resources is granted planning permission on land holding minerals deposits, provision should be made for the prior removal of mineral deposits.”*
- 5.2.7 The key element here is that evidence should be provided that shows “that no exploitable reserves exist within the development site”. The term “exploitable” for the purposes of this report takes into account the environmental, practical and financial elements of recovering the mineral. Section 4 of this report above has identified that the deposit within the site is largely concealed by glacial till and is only of a limited extent. The practical ability to recover the minerals is questionable and there would be limited to no financial/commercial benefit. Section 6 below will consider the viability of such a proposal and confirm if the deposit is actually exploitable.
- 5.2.8 Even if it were assumed that the recovery of the deposit was practically and financially viable and therefore exploitable, the environmental impact would be significant, in particular on the local community of Llay, most notably because it would increase the delivery timescales of the housing development from the 16 month period currently envisaged to something more like 40-60 months to enable the recovery of the minerals and restoration of the original land surface. This would create conflict with Policy **GDPI** (specifically parts a), c) and f)).
- 5.2.9 The capacity of the road network in the vicinity of Llay to be able to accommodate the increased HGV activity that would be necessary to restore the site would create conflicts with Policy **GDP2** and create an unnecessary financial burden on the developer of the Home Farm site through additional planning obligations.
- 5.2.10 Section 5 sets out the Environmental and Conservation policies for the Borough. Whilst many of the ecological, landscape and soil resource impacts will be experienced during the development of the wider project, the scope for noise and dust impacts is increased significantly by the additional burden of mineral extraction and restoration activity.
- 5.2.11 The extent of the safeguarding area on the proposals map appear to be based on BGS mapping (refer Appendix 3), and specifically the mapped outcrop of glacial till and

glacial sand and gravel resources. Based on evidence presented in Section 3.2 above it is proposed that the extent of the safeguarded area should have been plotted to the east of the site boundary (refer to plan L35/04) because the sand and gravel deposits within the site are entirely concealed beneath glacial till and are therefore not easily or reasonably exploitable.

5.3 Emerging Wrexham Policy

- 5.3.1 The Council had nearly reached a stage of adoption with the LDP; however the plan was withdrawn in March 2012. A new delivery agreement has been agreed during January 2013. The policy and candidate sites process is very early in development and is not considered relevant in the context of this document.

5.4 National Policy

- 5.4.1 Mineral Planning Policy Wales (December 2000) ("MPPW") provides the policy context for minerals development in the country. The guidance is taken into account during the preparation of local policy by the Council. Part of the document articulates general guidance for minerals development; one of the key elements within this is that *"mineral workings should avoid any adverse environmental or amenity impacts; where this is not possible working needs to be carefully controlled"*.

- 5.4.2 Safeguarding Policy is articulated in the key objectives/principles of sustainable mineral development. Paragraph 13 confirms the importance of safeguarding, and confirms that safeguarding *"does not necessarily indicate an acceptance of working but that the location and quality of the mineral is known, and that the environmental constraints associated with the extraction have been considered."* This report provides the appropriate detail in this regard.

- 5.4.3 Paragraph 14 provides a hierarchical approach to minerals extraction, with the following degrees of allocation:

- specific sites;
- preferred areas;
- areas of search; and
- other areas.

In this instance, the site is located with an Area of Search type policy. Reserves can only be accessed in such areas where existing resources cannot meet a shortfall in supply nor can extensions to existing sites. With reference to Section 5.3 above, it is notable that the supply provision in the North Wales sub region (and Wrexham itself) is considerable, with no additional reserves likely as being required for a period in excess of ten years.

- 5.4.4 The document goes on to provide guidance on potential impacts on designated assets and important resources such as soils and water, before considering localised environmental impacts (refer Paragraph 34 of the MPPW). Paragraph 40 articulates the use of Buffer Zones to reduce conflict between mineral workings and other forms of development. Such a policy is in place under the Wrexham UDP and provides for 100 m buffer zones which would be applied to any minerals scheme at the site.

Further guidance on the use of such zones is articulated in Technical Guidance appended to the National Policy.

- 5.4.5 The document goes on to consider best practice in respect of transportation, restoration and after use, which is again supplemented by Technical Guidance.

5.5 Conclusions

- 5.5.1 It is clear from both central government advice and adopted and emerging development plan policies that:

- minerals (including sand and gravel) are an important indigenous resource;
- they should wherever practicable be safeguarded and not unnecessarily sterilised;
- it is in the national interest to safeguard mineral resources which are or may become economically important, from any other development that would sterilise those deposits;
- the extent of the safeguarding area in the proximity of the site is not accurate relative to borehole evidence;
- Wrexham has for many years been one of Wales' biggest minerals producers;
- the sand and gravel landbank in the North Wales sub region is well above requirements, with no identified shortfall;
- sand and gravel production in Wrexham makes a substantial contribution to the local and regional economy; and
- the Alyn Valley contains some of the best reserves of sand and gravel in the County, in an area with reasonable communications and a flat landscape.

SECTION 6 VIABILITY

- 6.1 Policy MW9 of the Wrexham UDP requires evidence to show that **“no exploitable reserves exist within the development site”**. For the purposes of this assessment, the term “exploitable” is linked into the viability of a scheme which can be considered under three separate headings, as follows:

- environmental viability;
- practical viability; and
- financial viability.

Addressing each in turn.

Environmental Viability

- 6.2 Section 4 above confirmed the presence of a potential 8.94 hectare extraction area within the site, of which only 5.07 hectares is located within the safeguarding area to which Policy MW9 applies. The potential extraction area was designed using appropriate stand-offs to nearby sensitive receptors.
- 6.3 The amenity-based impact associated with recovering the deposit is likely to be acceptable. However it would be necessary to erect large storage mounds to accommodate all of the overburden resource from the mineral deposit. This would create an unacceptable level of additional landscape impact, albeit on a temporary basis.
- 6.4 There would also be a requirement to erect and operate an on-site mineral processing facility. It is assumed that the mineral could not be exported off site as it would be counter to the sustainable use of the minerals. The processing plant would need to be located at and just below current ground levels within the 100 m stand-off area from residential development. Even with the use of best practice mitigation techniques, it is unlikely that the mineral could be processed without creating adverse noise and dust effects on local receptors.
- 6.5 Furthermore, the plant would require ancillary facilities in the form of lagoons/water treatment systems to process the mineral. The presence of lignite and other contaminants within the deposit requires another washing process to ensure that the processed mineral complies with the required standards for use as aggregate or concreting aggregate. A mains source of water would not be available and the potential for the aquifer to derive the required quantities is also questionable as the Coal Measures are likely to contain contaminated groundwater.
- 6.6 The landscape, soils and ecological impacts are not considered relevant under this context, as the impacts would also be felt by the proposed housing development.

Practical Viability

- 6.7 The practical viability is associated with the ability of an operator to recover the mineral deposit. The presence of overburden materials of over 5 m depth within such a small area creates significant materials handling problems and potentially the need for vast quantities of double, even triple, handling.

- 6.8 The need to recover the deposit in accordance with the Approved Codes of Practice defined in the Quarrying Regulations 1999 would sterilise approximately 22% of the in situ mineral resource.
- 6.9 The maximum width of the potential extraction area is only 200 m, and more commonly only 150 m, which is very constrained to allow safe limits of working for heavy plant movements.
- 6.10 Allied to the above, the practical space available to site the “as raised” stockpile, plant and product stockpiles required in support of processing, leads to a further tier of impracticality.
- 6.11 The recovery of the mineral resource could create a void space of around 240,000 m³ (assuming that all the minerals were to be extracted) which would need to be filled to allow the reinstatement of original ground levels and therefore the development of the wider project.
- 6.12 This would require a further level of regulation and the importation of a large volume of materials over a very small period of time, so as not to delay the implementation schedule for the project. Even if such restoration materials were available (which is considered unlikely in such an area), then they would be unlikely to be imported quickly enough to allow the development of the scheme in a timely manner.

Financial Viability

- 6.13 The modern day minerals industry is based on a high level of return ratio. One of the key inputs into this ratio is the overburden: mineral ratio, which is a basic characterisation of a minerals deposit. The ratio at the site is of the order of 1:1.
- 6.14 Such a ratio is not considered economically feasible, especially where space is constrained, and materials handling costs would therefore be elevated.
- 6.15 The typical processing cost would be increased by the need to utilise bespoke equipment to wash the lignite content to provide an aggregate suitable for use on site
- 6.16 There would be professional technical and regulatory costs associated with securing planning, permitting and non planning consent approvals, all necessary to affect a minerals recovery scheme. If this were solely a minerals development scheme then the mineral operator would assess the “risk costs” (i.e. preparation of the planning applications etc including cost for technical studies) to determine whether or not a reasonable return could be achieved. For example, if only 170,000 tonnes were likely to be extracted then costs of circa 60p per tonne would be incurred, which is quite a high cost per tonne when considered against such a small mineral resource.
- 6.17 In summary, the financial viability at pre-extraction of minerals at such a site is not possible, especially given the nature of the deposit on site, and the size of the resource.

Summary

6.18 In summary therefore:

- the environmental impacts associated with processing the mineral and restoring the land to original levels would be unacceptable;
- the size of the site leads to practical limitations which mean that the deposit could not practicably be recovered in a safe and timely manner;
- the nature of the geology, allied to the level of professional and regulatory costs to operate such a site, would be prohibitive; and
- the financial risk inherent with a minerals application would be unlikely to provide a return.

6.19 It is therefore proposed that no exploitable resources exist within the site and that the recovery of any of the minerals pre-development would create unsustainable delays to the development timescale and be prohibitive to the entire development.

SECTION 7 SUMMARY AND CONDITIONS

- 7.1 Michael Cunningham Architects (the applicant) are developing an outline planning application to Wrexham County Borough Council (the Council), seeking approval for the development of up to 370 houses with supporting land uses on land at Home Farm, Llay ("the site").
- 7.2 The planning application will be accompanied by a full range of assessments including a comprehensive review of housing policy, proving the need for the proposal. As part of pre-application engagement, the applicant approached the Council who provided a comprehensive list of requirements, one of which related to the potential sterilisation of mineral at the site.
- 7.3 David L Walker Limited has been commissioned to prepare a report addressing the concerns of the Council. In particular the report will assess the following:
- (i) the potential mineral resource available;
 - (ii) the viability of recovery; and
 - (iii) the mineral value.
- 7.4 Section 2 of the report confirmed the baseline setting with the following features of key relevance:
- (i) the site is in close proximity to the village of Llay;
 - (ii) the properties at Home Farm and Maes y Rhedyn will remain in situ;
 - (iii) the site has a reasonable access of Gresford Road;
 - (iv) Footpath ROW 05 is on the eastern boundary of the site; and
 - (v) there are secondary A aquifer deposits in site.
- 7.5 Section 3 of the report considers the regional, local and site specific geology of the site. The relevant minerals resource is the Wrexham Delta Terrace sand and gravel deposits which are overlain by glacial till material.
- 7.6 It is notable that the BGS mapping infers that the glacial till outcrops across the north-west part of the site, whereas the glacial sand and gravel crops in the south-east part of the site. However, reference to internet borehole resources and other data sources indicates that the extent of glacial till is much larger than mapped, with considerable depths of till beyond the boundary shown on the BGS mapping.
- 7.7 Section 4 of the report provides a resource assessment of the deposits within the site. A basic recovery scheme has been developed providing a theoretical extraction limit, which takes into account the following:
- standoffs to boundaries and limits of extraction;
 - proximity of roads;
 - location of residential amenity (i.e. Llay Village and properties at Home Farm itself and Maes y Rhedyn);
 - location of public rights of way; and
 - landscape and visual factors.

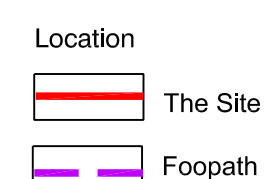
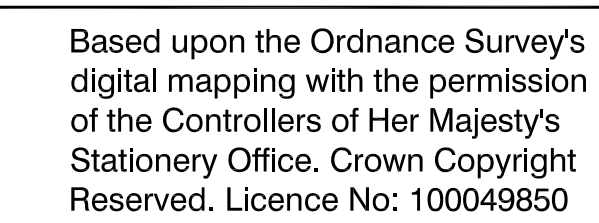
- 7.8 A 5.08 hectare area, has been delineated with an average mineral depth of around 6 m. The in situ mineral resource is therefore estimated at 0.5 million tonnes. However, when consideration is given to the practicalities of extraction, i.e. the need to batter off the overburden and mineral deposits and taking into account materials left in the deposit, it is estimated that a more realistic resource estimate (i.e. pre-processing) is only 390,000 tonnes.
- 7.9 Section 5 considers the planning viability of a minerals related scheme of the site and concludes the following:
- minerals (including sand and gravel) are an important indigenous resource;
 - they should wherever practicable be safeguarded and not unnecessarily sterilised;
 - it is in the national interest to safeguard mineral resources which are or may become economically important, from any other development that would sterilise those deposits;
 - the extent of the safeguarding area in the proximity of the site is not accurate relative to borehole evidence;
 - Wrexham has for many years been one of Wales' biggest minerals producers;
 - the sand and gravel landbank in the North Wales sub region is well above requirements, with no identified shortfall;
 - sand and gravel production in Wrexham makes a substantial contribution to the local and regional economy; and
 - the Alyn Valley contains some of the best reserves of sand and gravel in the County, in an area with reasonable communications and a flat landscape.
- 7.10 Finally the environmental, practical and financial viability of recovering an "exploitable" mineral resource if considered in Section 6. The section confirms that:
- the environmental impacts associated with processing the mineral and restoring the land to original levels would be unacceptable;
 - the size of the site leads to practical limitations which mean that the deposit could not practicably be recovered in a safe and timely manner;
 - the nature of the geology, allied to the level of professional and regulatory costs to operate such a site, would be prohibitive; and
 - the financial risk inherent with a minerals application would be unlikely to provide a return.
- 7.11 **It is therefore proposed that no exploitable resources exist within the site and that the recovery of any of the minerals pre-development would create unsustainable delays to the development timescale and be prohibitive to the entire development.**

Plan L35/01

Location Plan

Plan L35/02

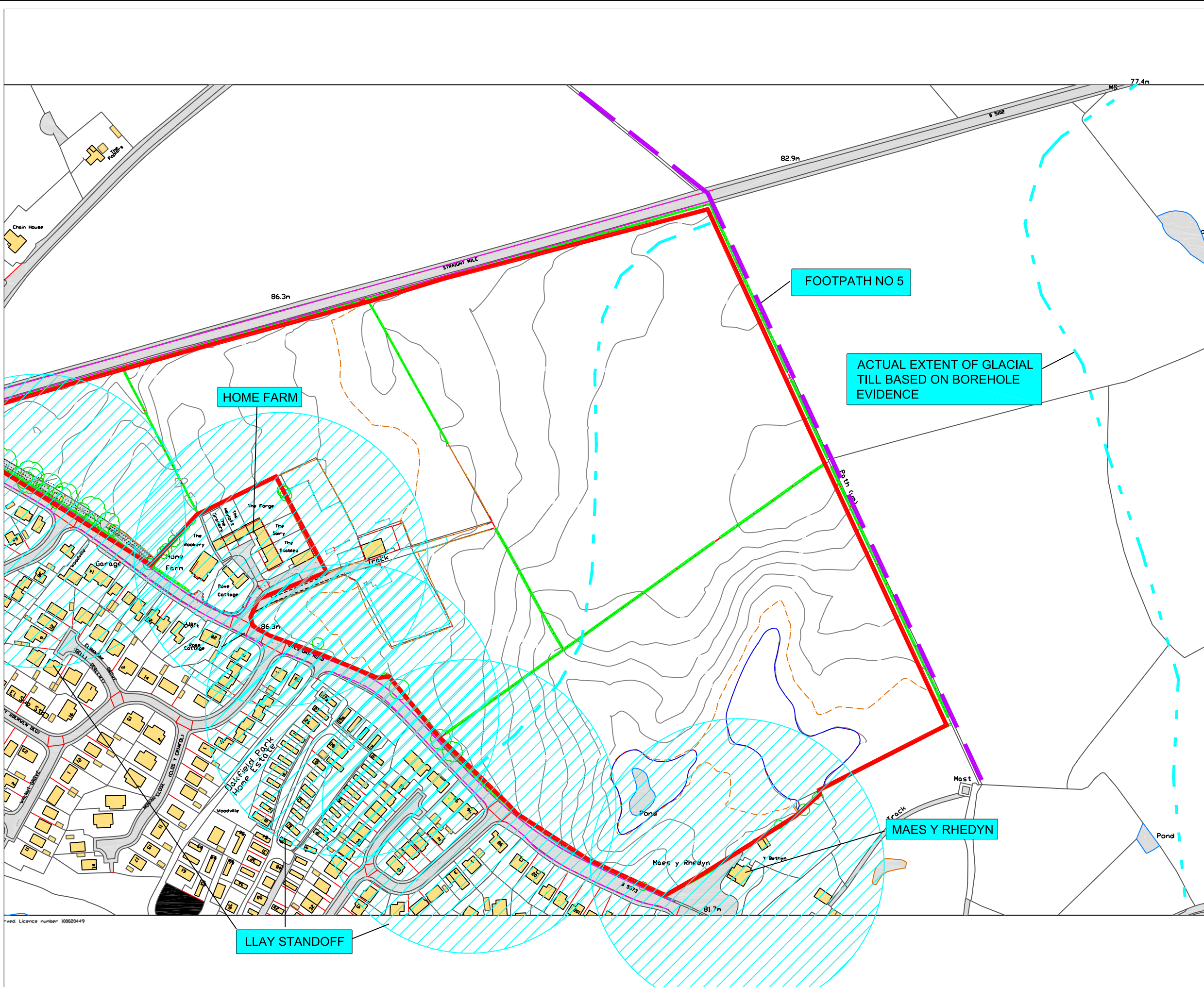
Site Plan



Tel: 01246 431 749 Fax: 01246 431 863
Email: headoffice@dlwalker.net

Plan L35/03

Constraints Plan



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Location

- The Site
- Mineral Safeguarding Area
- Buffer Zone to Sensitive Receptors
- Footpath

Michael Cunningham
Architects

Location
Home Farm, Llay

Title
Constraints Plan

Drg.No. L35/3	Scale 1:2,500@A3	Date 04/14
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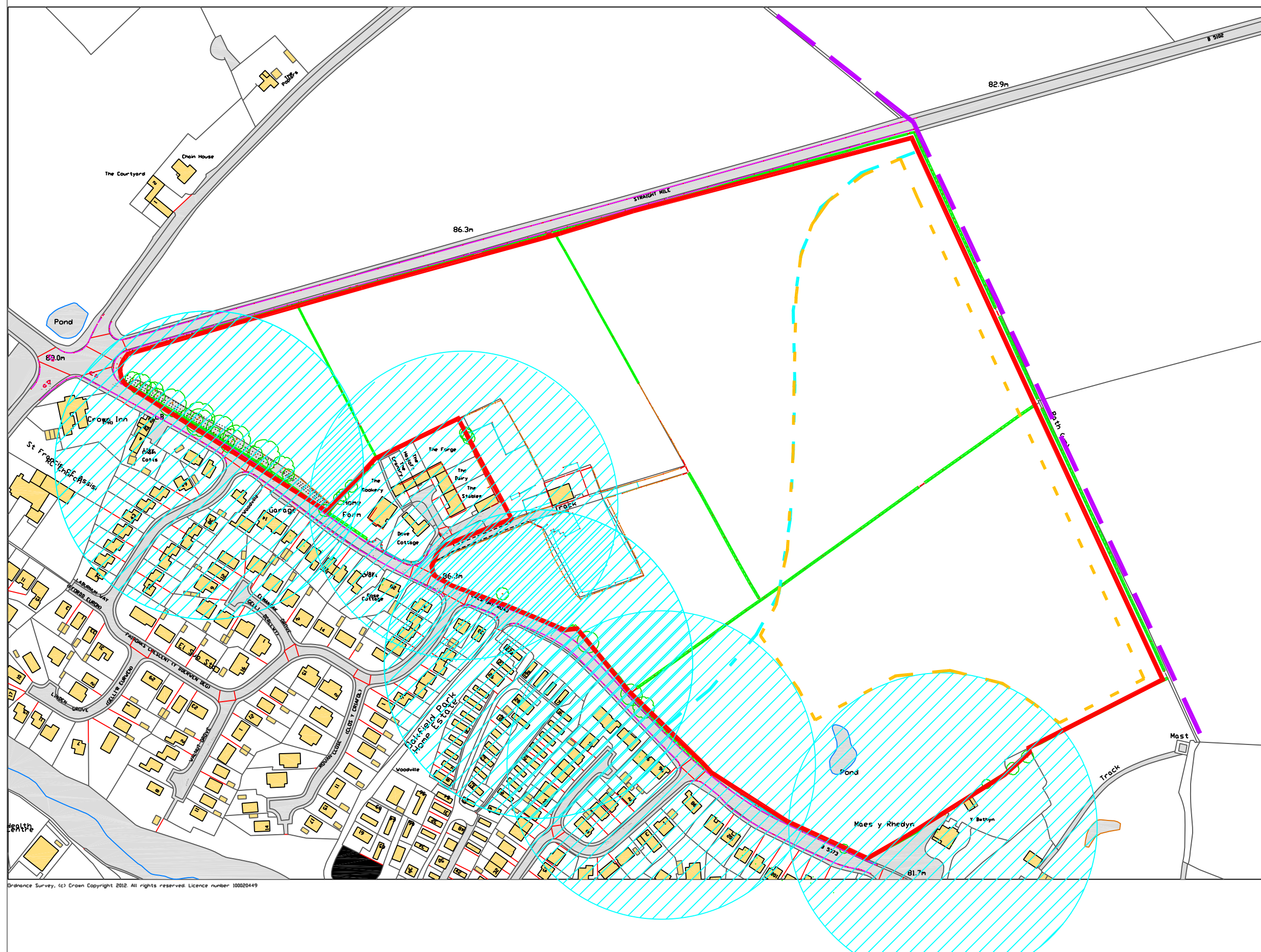
David L Walker
Limited

Albion House 89 Station Road
Eckington Sheffield S21 4FW

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Plan L35/04

Resource Block

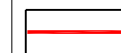


GRID
NORTH

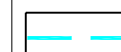


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Location



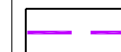
The Site



Mineral Safeguarding Area



Buffer Zone to Sensitive Receptors



■ Foopath



Resource Block

Michael Cunningham
Architects

	Location
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Home Farm, Llay

	Title
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Resource Block

Drq.No.

L35/04

	Scale
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1:2,500@A3

Date

04/14

David L Walker
Limited

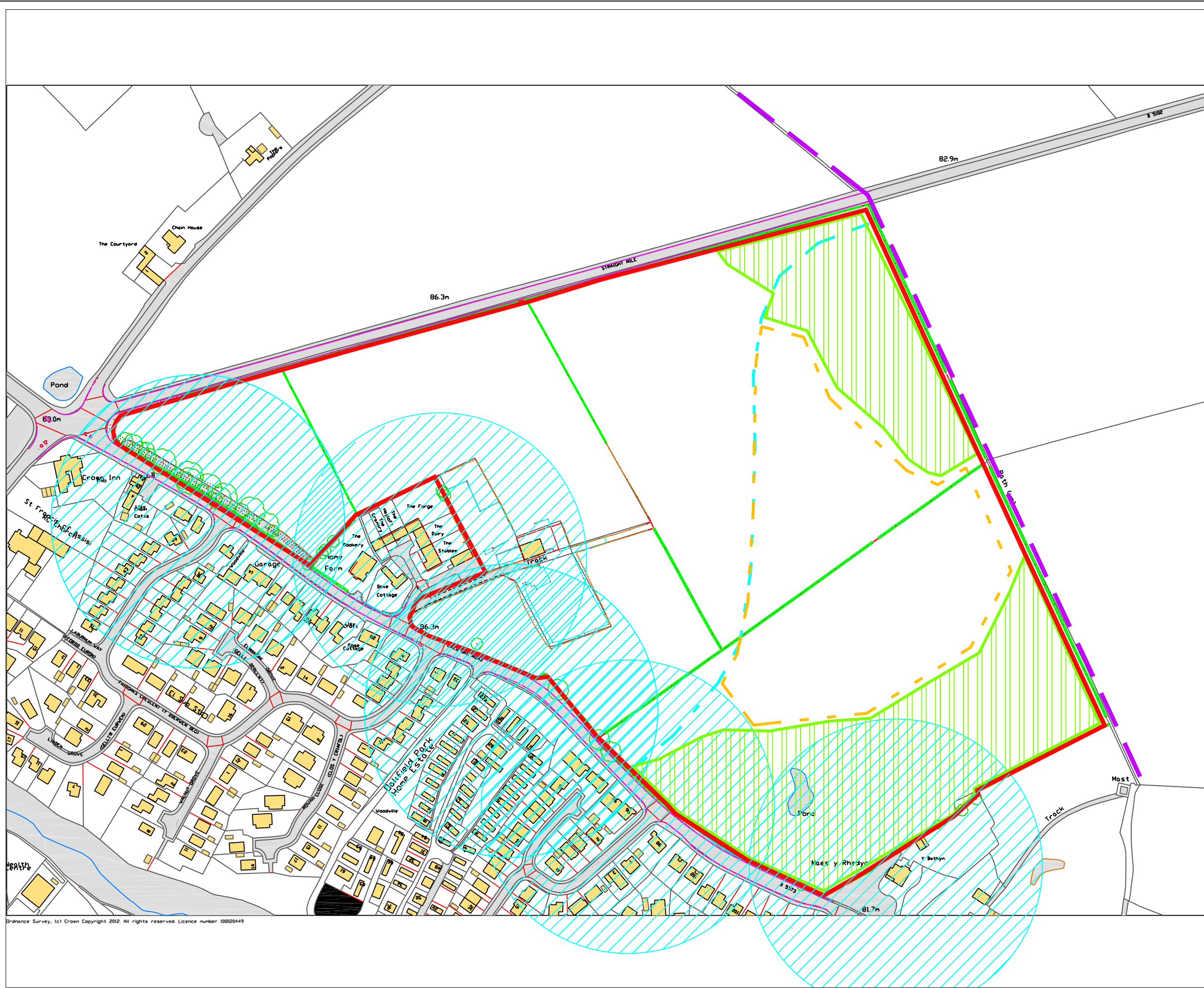
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Plan L35/05

Sterilised Areas

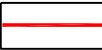
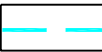
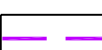


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Location

-  The Site
-  Mineral Safeguarding Area
-  Buffer Zone to Sensitive Receptors
-  Foopath
-  Modified Resource Block
-  Open Space

Michael Cunningham
Architects

Location
Home Farm, Llay

Title
Sterilised Areas

Drg.No.	Scale	Date
L35/05	1:2,500@A3	04/14



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