



# Representations

Warrington Borough Council Local Plan Review:  
Regulation 18 Consultation

For: Majornet Ltd

16-453

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## 1. Introduction

- 1.1 Emery Planning are instructed by Majornet Ltd to prepare and submit representations to the Regulation 18 Consultation currently being conducted by Warrington Borough Council.
- 1.2 The representations are submitted in the form of this statement, which assesses the strategic element of the consultation before going on to promote our client's specific interests in the borough as part of the call for sites exercise. The formal response forms are also submitted.
- 1.3 We address each relevant question as set out in the Regulation 18 Consultation Standard Response Form in turn. Many of the questions are intrinsically linked which results in some overlapping in our responses. We have only responded to questions relevant to our client's interests.

## 2. Regulation 18 Consultation

- 2.1 As stated above, this section of the statement addresses the questions as set out in the Regulation 18 Standard Response Form. Each relevant question is addressed below.

### **Question 1 - Do you have any comments to make about the Council's evidence base?**

- 2.2 We do not provide a full response to this question, as the evidence base is integrally linked to our response to the topic specific questions below.

### **Question 2 - Do you consider the assessment of Housing Needs to be appropriate?**

- 2.3 In broad terms we consider that the assessment broadly takes into account the components of OAN required by the PPG.
- 2.4 We would have had significant concerns about certain elements of the Mid Mersey SHMA had a requirement in the order of 839 per annum been taken forward, as it failed to fully take account of several components of the OAN, in particular the alignment with economic growth and insufficient uplift to address affordability. However the addendum SHMA paper seeks to properly align the OAN with employment growth, and therefore in principle we consider that

the approach is reasonable. We do however have some issues over how the OAN has been aligned with economic growth. We address these in our response to Question 4.

- 2.5 We note that a more comprehensive update of the SHMA is to be undertaken 'in due course'. The 2014-based household projections have been available since July 2016, and we would therefore urge the Council to update the SHMA as soon as possible. Nevertheless although the 2014-based projections will change the starting point, it will still be necessary to take into account all of the other components of the OAN, and critically align the OAN with economic growth.

#### **Question 4 - Do you consider the alignment of Housing Needs and Job's Growth to be appropriate?**

- 2.6 We broadly welcome the council's revised approach and acknowledgement that there is an acute need for housing to accommodate future growth in the borough. However, whilst the revised identified requirement of 984 as set out in the published SHMA Addendum document is a welcome update to the previous SHMA, the OAN identified may still insufficient to meet the needs of the borough over the plan period. It is considered that there are potential flaws in the methodology, particularly relating to the relationship between the proposed jobs growth and the amount of housing required to deliver it.
- 2.7 Our client's main concern is that the chosen jobs growth figure is extremely conservative. The Review of Economic Forecasts and Housing paper prepared by Mickledor provides information on how the projected employment growth figure of 27,280 as identified in the preferred Devolution Deal policy trend has been reached. If past trend data between 1992 and 2014 continues throughout the plan period, it indicates an increase of 36,175 jobs between 2016 and 2037. Considering that past data is inclusive of the worst economic recession since records began, it is unrealistic to expect future growth to be below past trends.
- 2.8 We note that the Economic and Development Needs Study considers different scenarios to establish the OAN for employment land. The report considers the amount of land required to meet the jobs growth projected from the Devolution Bid, but discounts this approach in favour of projecting forward past take-up rates:

*However, the market assessment and a review of the historic trends in employment change and land take up (see Section 8.0) suggest that these forecasts underestimate land needs significantly. **The preferred forecasting***

***method is therefore a projection forward of past take-up rates that considers both strategic and local needs.***

- 2.9 It is therefore apparent that the Economic and Development Needs Study considers that land for significantly more than 31,000 jobs needs to be provided in Warrington.
- 2.10 Notwithstanding, even if the Devolution Bid is accepted as the basis for determining the OAN, it is apparent that Warrington has significantly outperformed other parts of the region in terms of delivering employment land and jobs growth. This reflects the strategically significant location of Warrington, in particular having regard to its connections to the M6, M56 and M62. This adds further weight to the trend based growth figures, which in our view could actually be exceeded through the Devolution Bid and Northern Powerhouse projects.
- 2.11 The Northern Powerhouse jobs growth figure put forward in the Mickledor report is plainly not realistic. The increase in jobs growth suggested in the Northern Powerhouse Independent Economic Review is for the entire Northern Powerhouse area, and has been taken completely out of context in applying that figure for Warrington. However the reality is that despite the context of the Northern Powerhouse, Warrington is seeking a jobs growth figure substantially lower than past trends.
- 2.12 We therefore consider that the chosen jobs growth figure is too low and does not meet the Government's requirement to 'plan positively'.
- 2.13 The Mickledor paper continues to apply a series of calculations to the jobs growth figure to each a housing requirement. In our view there are a number of issues with the approach taken that should be resolved before the plan is progressed any further.
- 2.14 The first calculation is to take account of net in-commuting. The paper states:
- "The commuting statistics for Warrington (Census 2011) show net in-commuting to Warrington and that total employment in the town only represents 88% of the total workforce size of the town. As a result, to maintain the commuting rates at the same level the total employment growth can be multiplied by 0.88."*
- 2.15 In principle, we consider that it is correct to assume that commuting ratios will remain constant throughout the plan period. However, if Warrington is to continue to rely on a significant amount of in-commuting to meet its jobs growth, there needs to be a greater understanding of

which neighbouring authorities are over-providing housing (and therefore a surplus of workers) against its own projected jobs growth figures. The duty to co-operate must be fulfilled, and cross boundary working should be fully documented so that it can be understood how this issue is being addressed.

2.16 The next calculation reduces the number of required workers by assuming that 3% will be filled by people working two jobs. The paper states:

*“The number of people with two jobs in Warrington is estimated by GL Hearn at 3.1%. Therefore 96.9% of the employment growth should be counted for the purposes of calculating the required change in the workforce.”*

2.17 This calculation appears to assume that every person holding two jobs in the borough is filling two full-time roles. This is highly unlikely. It is possible that a number would hold one full time and one part time position, but it seems more likely that the vast majority of this 3.1% would hold two part time positions. It is therefore not clear how this would translate to a full time equivalent figure. Furthermore, it is possible that there is some double counting with the changes accounted for to the economic activity rates, as discussed below.

2.18 The paper assumes that there will be an increase in economic activity of 10.55% from the existing employment base, which has resulted in a further discounting of projected number of employees needed to fill the jobs growth. However we consider that this proposed increase in economic activity is flawed. We have been involved in numerous Local Plan examinations in recent years where economic activity has been considered, but this is usually in the context of a small section of the population; for example the Cheshire East Local Plan Inspector rejected the Council's proposed reliance on an increase in economic activity rates in persons aged over 65.

2.19 A breakdown by age groups is provided at table 1 of the SHMA addendum:

**Table 1: Changing Economic Activity Rates**

	Age	Warrington	
		2014	2037
Males	16-24	56.7%	61.5%
	25-34	85.0%	92.5%
	35-49	88.8%	97.2%
	50-64	76.0%	86.2%
	65+	14.0%	16.5%
Females	16-24	61.2%	66.4%
	25-34	84.1%	96.0%
	35-49	86.5%	98.4%
	50-64	67.5%	81.2%
	65+	9.6%	11.7%

Source: GLH eam

2.20 It is clear that the Council is relying upon a very significant increase in economic activity rates across a number of different groups. This depresses the need for new employees and thus dwellings. For example, the economic activity rates for males and females in the 35-49 age group is expected to rise from 88.8% and 86.5% to 97.2% and 98.4% respectively. Similar increases are seen in the 25-34 category. This is a staggering increase, especially when it is considered that many persons in these categories will be having children, and it is reasonable to expect that at least one parent may stop working. The age 50-64 category is also expecting increases above 10%. It is not clear what the evidential basis for this is, whether it has been accepted in other Local Plan examinations, and whether this has been sense-checked. But notwithstanding, even if the figures are accepted, it is not clear how they translate into a full time equivalent figure such that 10.55% of future jobs growth will be met from this source.

2.21 In summary, we have serious concerns over the selection of the jobs growth figure, and the methodology used for aligning this with the OAN. We consider that the methodology used seriously under-estimates the number of workers required to fill the projected jobs growth. As a consequence the OAN may be significantly higher than the figure of 984 per annum as identified in the SHMA addendum.

**Question 5 - Do you consider the assessment of Land Supply to be appropriate?**

2.22 No.

2.23 The Urban Capacity Study states that the recent SHLAA exercise has confirmed a capacity of 15,226 new homes, which is disaggregated as follows:

- 10,806 units identified through the SHLAA exercise.
- 7,176 units within identified 'Masterplanned' regeneration areas within Warrington Town Centre and Inner Warrington (-3,715 units that had been identified through the SHLAA process).
- 960 windfall allowance.

2.24 In the first instance, the capacity assessment confirms our points made elsewhere within this Statement that a substantial amount Green Belt will need to be released in order for the Council to meet their objectively assessed development needs in accordance with the Framework.

2.25 Almost half of the urban capacity confirmed by the Council relates to land identified within the inner areas of Warrington for regeneration. Although we welcome the delivery of such regeneration areas, which the Council has envisaged coming forward for development for many years, there is no indication within the Urban Capacity Study of the very significant risks that such sites may fail to deliver over the plan-period and other adverse consequences of reliance upon such sites.

2.26 The delivery of sites within the 'Masterplanned Areas' of inner Warrington is very challenging and this reflected in the fact that many of the sites identified have been allocated for development in previous iterations of the local plan (e.g. Arpley Meadows in the UDP 2006). For such large sites, complex land ownership issues need to be addressed with potential referral to compulsory purchase order legislation, and substantial initial outlay required in terms of new infrastructure requirements.

2.27 There is no indication that any detailed feasibility or viability work has been carried out into the vast majority of the sites listed as 'Warrington Waterfront Development Agency', which equates to 7,176 dwellings. The draft masterplan drawing at Appendix 1 is not accompanied by any supporting detailed evidence or analysis, and it is not clear whether this masterplan has been formally endorsed by the Council. Certain sites within the inner 'Masterplan Area' have been assessed by the Council through the SHLAA process. However, this exercise has only highlighted the very significant challenges in delivering such sites with a number being noted as undevelopable over the plan-period at this time. For instance, we would draw attention to the

Arpley Meadows and Central Park areas of the 'Masterplan Area', which are collectively identified for 2,263 dwellings as follows:

- SHLAA 1541: 646 houses (first houses delivered 2027/28)
- SHLAA 1633: 1,105 houses (first houses delivered 2027/28)
- SHLAA 1715: 250 houses (first houses delivered 2020/21)

2.28 The SHLAA assessments for each of these three sites confirms that there are fundamental delivery issues with further investigatory works required in terms of ground conditions, site access, hazardous installations, infrastructure, amenity issues in terms of surrounding land uses and ownership and tenancy. Parts of the sites in question fall within Flood Zones 2/3 meaning that residential development, which is particularly vulnerable to flooding, may not be compatible on large parts. This raises serious question marks over the suitability of including any of the sites within the Land Capacity Study in the first instance. Notwithstanding our concern about the very risk of non-delivery or slippage, none of these three sites could be delivered within the short-term.

2.29 The site with the earliest anticipated delivery timescale is '1715' relating to Spectra Building and Drivetime Golf Range. Notwithstanding the general deliverability issues summarised above, this specific site is wholly dependent upon the delivery of a new bridge over the River Mersey. Although it is understood that funding may be forthcoming for the bridge, there remain very complex land ownership issues to resolve. It is understood from a recent Warrington Council Executive Board meeting (October 2016) that initial discussions with the relevant landowners are only now taking place and that it is likely that the Council will need to utilise its Compulsory Purchase powers with the potential for very lengthy delays. There has already been significant slippage in the delivery of this scheme with planning permission for the bridge in question having initially been anticipated for January 2016 with full acquisition of all of the necessary land by December 2016.

2.30 The delivery of the two remaining sites at Arpley Meadows identified above is reliant upon the delivery of further, uncommitted bridges over the River Mersey. It is understood that the costs associated with the delivery of the necessary bridges would exceed £100m. Aside from the unknown nature of the bridge infrastructure required, the delivery of these sites is even made complex by the significant number of landowners involved and the site being intersected by the West Coast Mainline and the Arpley Chord.

2.31 Even on the basis of the Council's optimistic assumptions, the SHLAA confirms the following number of houses over the plan-period up to 2037:

- SHLAA 1541: 522 houses 2027/28 – 2036/37
- SHLAA 1633: 522 houses 2027/28 – 2036/37
- SHLAA 1715: 250 houses 2020/21 – 2024/25

2.32 Notwithstanding the Council's optimistic assumptions about delivery rates, the above totals 1,294 dwellings over the plan-period meaning that the urban land capacity for Warrington identified by the Council should be reduced by 969 across these three sites alone. It is also highly unlikely that multiple housebuilders would be delivered such high numbers of houses on sites adjacent to one another within this part of the housing market.

2.33 We have general concerns about a lack of critical analysis of the sites within the SHLAA anticipated to come forward for development. There remain optimistic and unjustified lead-in times and build rates, in terms of past rates identified at Appendix 4 of the SHLAA, and there does not appear to be allowance for demolitions/clearance based upon historic trends.

2.34 The Urban Capacity Study must acknowledge that the reliance upon sites within the inner areas of the Borough, many of which have fundamentally deliverability issues, risks: a) significant slippage or non-delivery over the plan-period; b) not enough sites cannot be delivered within the short-term in order to boost housing land supply in accordance with the Framework; c) such a strategy would fail to meet the Borough's housing and economic needs generally as discussed elsewhere. The number of dwellings that must be identified within the Green Belt is therefore much greater than that suggested through the Urban Capacity Study.

### **Question 6 - Do you consider that Green Belt land will need to be released to deliver the identified growth?**

2.35 Yes.

2.36 It is apparent from the evidence base that a significant amount of Green Belt will now need to be released in order to meet the objectively assessed housing and employment needs. This need provides the exceptional circumstances required for Green Belt release.

- 2.37 The Green Belt in Warrington has not been reviewed in full for a significant period of time, during which development needs have not been met and adverse housing market signals have been allowed to perpetuate.
- 2.38 Paragraph 84 of the Framework requires that when drawing up or reviewing Green Belt boundaries, local planning authorities should take account of the need to promote sustainable patterns of development. They should consider the consequences for sustainable development of channelling development towards urban areas inside the Green Belt boundary, towards towns and villages inset within the Green Belt or towards locations beyond the outer Green Belt boundary.
- 2.39 In the case of Warrington, there would be very significant adverse social and economic consequences of not providing sufficient land to meet the objectively assessed needs. Warrington's neighbours (such as Cheshire East and Cheshire West) have recently prepared their own Local Plans, including Green Belt release, and are unlikely to be in a position to meet any of Warrington's need. Therefore it is apparent that the Green Belt around Warrington will need to be comprehensively reviewed and redrawn to provide land for development.
- 2.40 It appears that our view above is aligned with the Council. However where we take issue with the consultation paper is the quantum of Green Belt release required. The Scope and Contents document indicates that land for approximately 5,000 dwellings will need to be found in the Green Belt. For reasons set out elsewhere within these submissions, we consider that this figure substantially under-estimates the amount of land that will need to be released from the Green Belt.

### **Question 7 - Do you consider the three identified Strategic matters being the appropriate initial focus of the Local Plan review?**

- 2.41 Whilst we agree that the matters identified are the main issues, we consider that they necessitate a full review of the Local Plan. The amount of land required for housing and employment goes to the very heart of the Local Plan, and has wide ranging implications for the vast majority of its policies.

### **Question 8 - Do you agree that further land will need to be removed from the Green Belt and safeguarded for future development needs beyond the plan period?**

2.42 Yes.

2.43 Paragraph 83 of the Framework requires that when Green Belt boundaries are established or reviewed, authorities should consider the Green Belt boundaries having regard to their intended permanence in the long term, so that they should be capable of enduring beyond the plan period.

2.44 Paragraph 85 states that when defining boundaries, local planning authorities should where necessary, identify in their plans areas of 'safeguarded land' between the urban area and the Green Belt, in order to meet longer-term development needs stretching well beyond the plan period. They should also satisfy themselves that Green Belt boundaries will not need to be reviewed at the end of the plan period.

2.45 Therefore national policy is clear on the need to provide for safeguarded land. In Warrington, it is clear that the borough will continue to be a focus for development, and it is therefore critical that sufficient safeguarded land is provided to meet needs stretching well beyond the period.

2.46 How much safeguarded land is needed in practice was considered in detail at the Cheshire East Local Plan examination, which is now reaching its final stages. In summary, sufficient safeguarded land should be provided to ensure that the current requirement could be carried forward to the next plan period (i.e. 2037 to 2057) without the need for Green Belt release. In practice the minimum requirement is to provide a similar amount of safeguarded land to the amount of Green Belt being released for development in this plan period. Ideally more should be provided, to allow flexibility for higher growth and to increase the permanence of the Green Belt.

### **Question 9 - Do you consider it appropriate to include Minerals and Waste and Gypsy and Traveller needs in the scope of the proposed Local Plan review?**

2.47 Yes.

2.48 These matters are integral to the plan and should be considered together. For example, there may be conflict between mineral protection policies and releasing land for development. Furthermore, if Green Belt land needs to be released to meet the needs for housing and employment land, it is entirely possible that Green Belt land will also be needed to meet the needs of gypsies and travellers. It would be inappropriate to review the Green Belt now, and potentially have to release further Green Belt land in the future.

### **Question 11 - Do you consider the Spatial Distribution and Site Assessment Process at Appendix 2 to be appropriate?**

2.49 No.

2.50 It is considered that there should be further stages and options in the event of the answer to “*has sufficient additional capacity been identified within the existing urban area and green field sites outside of the Green Belt to meet development needs?*” being ‘yes’. The key question of “*are there exceptional circumstances to justify the release of Green Belt land?*” should be considered even if the answer is yes. There is an overarching need to provide the right housing type and distribution of housing for the borough, and the distribution should not be completely led by the supply.

2.51 In order to achieve the best possible outcomes, the process should be changed from the current iterative process to a more responsive model that takes the need to deliver the right type of housing in the right locations into consideration throughout the entire process. A key example of why the suggested methodology does not work can be seen in the relationship between the boxes entitled “*confirm preferred spatial distribution*” and “*assessment of individual site*”. These issues should be interrelated, as an assessment of individual sites could lead to a further review of spatial distribution once all constraints are identified. The proposed methodology does not allow for this.

### **Question 12 - Do you agree with the assessment of Local Plan Policies at Appendix 1?**

2.52 We consider that a full review of the Local Plan is required. The amount of land required for housing and employment goes to the very heart of the Local Plan, and has wide ranging implications for the vast majority of its policies.

### **Question 13 - Do you consider the proposed 20 year Local Plan period to be appropriate?**

- 2.53 We consider the proposed 20 year plan period to be appropriate in this instance. There may be significant slippage in the preparation and adoption of this plan. It is therefore prudent for the authority to extend the usual timeframe of 15 years to 20.

### **Question 14 - Having read this document, is there anything else you feel we should include within the 'Preferred Option' consultation draft, which you will be able to comment on at the next stage of consultation?**

- 2.54 We consider that details of the housing land supply and trajectory should be included. It will be critical that the plan can deliver a 5 year supply, and a supply of housing land across the plan period. The plan will also need to have flexibility built in, which in practice means allocating significantly more land than the minimum requirement.
- 2.55 This completes our representations from a strategic perspective. We now submit specific sites for consideration as part of the call for sites exercise.

## **3. Call for Sites submissions**

- 3.1 Emery Planning is instructed to promote a number of parcels of land for development around the settlement of Lymm. These parcels are described in detail below. The completed 'Call for Sites' forms are also enclosed with these representations.
- 3.2 Our client has land interests in four parcels of land to the eastern part of Lymm; two are located to the north of the Bridgwater Canal (Parcel A and Parcel B) and two are located to the south of the Bridgwater Canal.

### **Parcel A (Land known as Tanyard)**

- 3.3 This site equates to an area 4.38ha in size. The location plan is appended at **EP1**. There is a masterplan drawing showing the delivery of 52 houses at **EP2**.

### The site context and relevant planning history

- 3.4 The site is located immediately to the south of Rushgreen Road. It is bounded by a Sainsbury's Local Retail Store and Rushgreen Road to the northern boundary, a greenfield site within our client's ownership to the western boundary and the settlement boundary for Lymm beyond, the Bridgewater Canal to the southern boundary and a planted line of trees/hedgerow and fields beyond to the eastern boundary.
- 3.5 Although the site historically accommodated a horticultural nursery/garden centre, it is now wholly utilised for commercial purposes and has been used as such for many years. There are a wide range of commercial operators on the site including builders yard, storage and distribution uses, workshop, office and gymnasium uses. Much of the site benefits from the grant of planning permission or a certificate of lawfulness for commercial use, including the following:
- 2012/20834 - Certificate of lawful use or development re: buildings/polytunnels/glasshouses (lawfulness of the buildings only rather than uses) - Approved 20/12/2012.
  - 2012/20833 - Retrospective change of use of redundant horticultural building to storage of vehicles – Approved 06/03/2012.
  - 2012/20832 - Retrospective change of use of redundant horticultural building to storage and distribution of stone/marble tiles - Approved 06/03/2013.
  - 2012/20831 - Retrospective change of use of horticultural building to mixed use consisting of storage, gym and dog training facility - Approved 06/03/2013.
  - 2010/17069 – Certificate of lawful use or development for 1) Builders-yard, hardstanding and building; 2) B1/B8 Industrial units x 3; 3) Caravan storage; 4) Horticultural building with ancillary retail – Approved 14/04/2011.
- 3.6 The image below shows the range of commercial uses on the site and the extent of the previously-developed land (highlighted blue). The existing buildings are of poor quality with unsightly areas of open storage and extensive areas of hardstanding. The unsightly nature of the site as it presently exists was acknowledged by the Council through the Committee report for planning application 2014/24228 (see further below):



- 3.7 Access to the site is via Rushgreen Road and comprises a 6m wide access road, 6m junction radii and achievable visibility splays of 2.4m x 90m to the right and 2.4m x 76m to the left. The existing access was granted planning permission by the Council in 2003 (LPA ref: 2003/00375) and it was assessed through the Transport Statement prepared by SCP for planning application 2014/24228. The assessment carried out SCP demonstrated that the access is capable of accommodating vehicle movements equivalent to 56 two-way flows at peak hour as a minimum without any junction improvements necessary.
- 3.8 The Council granted planning permission for a substantially sized commercial building, equating to over 2,000sqm floorspace, and associated large car park for 56 vehicles and the retention of existing commercial buildings on the site in 2014 (LPA ref: 2014/24228). This permission remains extant. The grant of this planning permission established that there are no technical constraints to the redevelopment of the site (e.g. contaminated land, highways, drainage and flooding all found to be acceptable). The approved site layout drawing is at **EP3**.
- 3.9 Our client has been in pre-application discussions with the local planning authority for many months for bringing a residential scheme forwards on this site and discussions are ongoing (LPA ref: PR2016/03448). This further indicates the availability and deliverability of this site for residential development.

Landscape impact and ecology

3.10 Tyler Grange, landscape architects, were instructed by our client in 2014 to prepare an Overview Landscape & Visual Assessment of the site for planning application 2014/24228. Although prepared two years ago, their assessment is summarised as follows:

- the site does not feel particularly rural;
- much of the site is enclosed by mature, well-established hedgerows and tall conifer belts;
- the site is relatively flat and does not conform with a 'Rolling Landscape' characteristic as noted in the relevant Warrington BC Landscape Character Assessment (LCA) and it displays very few characteristics of the 'Lymm & Red Sandstone Escarpment' LCA;
- the existing boundary vegetation restricts views beyond the site and towards the open countryside;
- the site is not considered to be of particularly high landscape quality;
- the site is located to the periphery of an existing settlement and has a developed use defining its character;
- the local landscape in this area has evolved with a mixture of uses making it more susceptible to change;
- the site and local landscape sensitivity is assessed as being Minor.

3.11 See the Tyler Grange assessment at **EP4**.

3.12 Our client also recently instructed new ecology surveys to be carried out on the site, which demonstrate that there are no ecological constraints to the redevelopment of the site. See the Amphibian Survey Report and Ecological Appraisal Report, both prepared by Ascerta last year, at **EP5**. These reports are suitable for the submission of a planning application with immediate effect.

Green Belt assessment

3.13 We provide a summary Green Belt assessment with due regard for the main purposes of including land within the Green Belt as set out at paragraph 80 of the Framework below:

Main purpose	Summary assessment
<b>To check unrestricted urban</b>	The site comprises a number of poor quality buildings and unsightly areas of hardstanding and open storage. It is enclosed by existing built

<p><b>sprawl</b></p>	<p>development to the north with a large Sainsbury's Local development and housing, the defensible and readily recognisable Bridgewater Canal to the south, a field within our client's ownership to the western boundary (also being promoted for residential/commercial development and referred to as 'Area 2') and a field to the eastern boundary.</p> <p>The development would be considered as a logical extension of the urban area. It is contained by defensible and readily identifiable features to the northern and southern boundaries and is well enclosed by existing planting, which could be supplemented.</p> <p>The impacts would be no greater than presently is the case with the site being previously developed and in operation for commercial purposes.</p>
<p><b>To prevent neighbouring towns merging into one another</b></p>	<p>The site is both physically and visually contained with limited inter-visibility across the wider open countryside by virtue of the existing boundary treatment.</p> <p>The redevelopment of the previously developed site for housing would have no perceptible impact on the surrounding landscape or views across the Green Belt.</p> <p>Lymm and Oughtrington are already seen within the context of the continuous form of built development along the Rushgreen Road frontage. The degree of perceived merging of the two settlements would be no greater than it presently is.</p> <p>The impacts would be no greater than presently is the case with the site being previously developed and in operation for commercial purposes.</p>
<p><b>Safeguarding the countryside from encroachment</b></p>	<p>Any visual encroachment into the wider countryside would be negligible with the retention of the strong framework of vegetation.</p> <p>Again, the site is contained by defensible and readily identifiable features to the northern and southern boundaries and is well enclosed by existing planting, which could be supplemented.</p> <p>The impacts would be no greater than presently is the case with the site being previously developed and in operation for commercial purposes.</p>
<p><b>Preserve the setting and special character of historic towns</b></p>	<p>The site does not play any role in providing an important setting or approach for either Lymm or Oughtrington.</p>

3.14 The release of our client's area of land for housing would comprise a logical small-scale residential development that would relate well to the existing built-up area of Lymm and Oughtrington.

3.15 The Green Belt review undertaken by AECOM on behalf of the Council assesses Parcel A as part of a much wider parcel of land (ref: LY16). Given the very specific characteristics our client's site, which is previously developed and in use for commercial purposes, Parcel A should be assessed on a standalone basis. There is no indication through the AECOM assessment that it has had due regard for the precise nature of Parcel A e.g. there is no recognition of the site being previously developed and the existing strong vegetation framework. The remainder of parcel LY16 is fundamentally different to our client's land interest in character and contribution to the Green Belt. Even on such a wide scale, the AECOM assessment summarises that development would be well contained and the openness and permanence of the Green Belt would not be threatened.

3.16 Paragraph 84 of the Framework states that when drawing up or reviewing Green Belt boundaries local planning authorities should take account of the need to promote sustainable patterns of development. We undertake an assessment below of our client's land with regard to the three roles of sustainable development as set out at paragraph 7 of the Framework:

- Economic: New housing development is required across the Borough to include areas of the designated Green Belt in order to ensure that the Borough has a stable workforce in terms of ability and age profile. The construction of new houses would also create construction jobs in the short term, and once occupied, new residents would boost householder spending on goods and services within the surrounding area. New housing development would also generate a New Homes Bonus for the Council.
- Social: Paragraph 7 of the Framework states that one of the requirements is the supply of housing to meet the needs of present and future generations. The release of our client's site for new housing development would help to ensure that the identified housing needs of the Borough in terms of market and affordable housing are met.
- Environmental: The site is highly locationally sustainable with easy and convenient access to a wide range of local services and public transport options (e.g. bus services along Rushgreen Road, walking distance to Lymm centre, immediately adjacent to a Sainsbury's Local). The site is located at the edge of Lymm, which is suitable for major new housing developments in terms of infrastructure requirements. The site as it presently exists is unsightly with poor quality buildings and extensive areas of hardstanding and open storage. The release of our client's site for housing would relieve the development pressure on more environmentally sensitive greenfield and Green Belt land across the Borough.

3.17 The release of our client's site from the Green Belt for new housing development as part of the Local Plan Review is considered to be fully justified with due regard for paragraphs 82 to 85 of the Framework. The substantial housing needs of the Borough comprise the 'exceptional circumstances' necessary to justify the release of our client's land for residential development.

- 3.18 Furthermore, the same landowner owns land immediately to the west (see Parcel B below). The two sites could come forward as a comprehensive and masterplanned manner in order to meet housing needs with Parcel A being 'Phase 1' and Parcel B being 'Phase 2'.
- 3.19 Finally, in terms of employment land it is noted that the site has been assessed through the Warrington Economic Development Needs Study 2016. Tanyard is not noted as being a potential 'Key Site' for employment purposes. Although the site benefits from extant planning permission (LPA ref: 2014/24228), the purpose of this planning application was to amalgamate the existing unsightly buildings with no increase in employment floorspace as acknowledged through the report; this approved scheme has not proven to be viable/feasible for a number of reasons. The Local Plan Review represents an opportunity to redevelop such poorly performing sites for alternative uses whilst protecting and expanding identified 'Key Sites' and other much better located sites across the Borough.

Local Plan Inspector's Report 1998

- 3.20 The Local Plan Inspector's Report for the Warrington Local Plan assessed Parcels A and B (see below for Parcel B) as part of 'Area of Search 15' (ref: PINSM/Q0640/429/1 – see **EP6** for the relevant sections). The Inspector recommended that the site be 'safeguarded' for future development needs on the basis of the limited contribution that the land makes to the main purposes of including land within the Green Belt, which would be outweighed by the benefits of meeting future development needs. Although the Council did not pursue the Inspector's recommendation, the same points made in the report remain relevant and we copy certain paragraphs below:

*Para. 3.AS15.3 - The northern side is surrounded on 3 sides by housing and associated development; it is gently undulating and is virtually all at a noticeably lower level than the canal.*

*Para. 3.AS15.4 - The extent and depth of development around the northern section creates a noticeable sense of containment; the low-lying nature of the ground and the various belts of trees within and around this part of the site enhance this effect. From many public vantage points this section is seen against the backdrop of buildings which has a marked urbanising influence on these immediate surroundings.*

*Para. 3.AS15.5 - On this basis there seems to be no compelling reason why the northern section needs to be kept permanently open; **certainly any limited Green Belt value, which by virtue of its openness, it may be deemed to***

**possess is far outweighed by the advantages of its allocation for safeguarding for possible longer-term development purposes** (our emphasis).

*Para. 3.AS15.6 - ..... It would be well integrated with the surrounding area of it particularly along the southern bank. Development to the east and west already extends along the canalside; what I am proposing would be entirely consistent with this established pattern.*

*Para. 3.AS15.11 - .... Yet along the southern side of Rushgreen Road there is virtually continuous development and visually there is no impression of any significant gap...In my opinion Oughtrington has the appearance of, and functions as, an outlying part of Lymm with which it is linked physical, and apparently, socially.*

Deliverability

- 3.21 Our client's land falls within single ownership with no third party agreement necessary in order to bring residential development forward on the site. Subject to the land being released from the Green Belt, our client's site is 'deliverable' within the short-term for new housing development for the purposes of paragraph 47 of the Framework.

The submitted masterplan

- 3.22 Our client has instructed their architects to prepare the enclosed masterplan for how this site could come forward for residential development for approximately 52 dwellings. See the drawing at **EP2**.
- 3.23 The number of houses totals approximately 19,000 cubic metres in terms of volume, which roughly equates to the existing built form on the site on a like-for-like basis. The impacts on the openness of the Green Belt would therefore be no greater than the site as it presently exists. The submitted plan also shows the following:
- an attractive central area of public open space and a canalside area of public open space;
  - areas of greenspace, gardens and public open space resulting in a substantial decrease in the extent of hardstanding across the site;
  - the removal of the existing unsightly buildings and the rationalisation of the existing site through the provision of well-designed new houses;
  - the existing pond and broadleaved woodland to the northern part of the site would be retained as part of the public open space provided;

- the housing density would be graduated such that it is at a lower density as you move away from Rushgreen Road and towards the canal;
- the potential for an attractive green corridor walkway linking the canal towpath to the north with Rushgreen Road to the south with benefits for existing residents within the wider area;
- retention and strengthening of existing boundary screening vegetation; and
- a potential link to the adjacent land, which also falls within our client's ownership and is being promoted for development as a logical extension to the existing urban area of Lymm.

3.24 The quantum of residential development shown on the enclosed masterplan shows a scheme pursuant to the sixth bullet point of paragraph 89 of the Framework (i.e. the redevelopment of previously developed land). A higher quantum of residential development could potentially be delivered on the site through the proposed allocation in the Local Plan Review.

### **Parcel B (Land adjacent to Mardale Crescent (west) and Tanyard (east))**

3.25 This site equates to an area 3.53ha in size. The location plan is appended at **EP7**.

3.26 The site falls wholly within our client's ownership and there is no requirement for any third party agreements to bring the site forwards for residential development. Vehicular access could be gained to the site via the existing established access road serving the adjacent commercial site to the east, which is wholly within our client's ownership and control (Parcel A above - Tanyard).

3.27 The site could either come forward for residential development in isolation and utilising the existing access off Rushgreen Road, or otherwise come forward alongside our client's other site at Parcel A (Tanyard). We have referred to Parcel A effectively being 'Phase 1' given that pre-application discussions are advanced for a residential development on that site and Parcel A could be redeveloped pursuant to the sixth bullet point of paragraph 89 of the Framework regardless of a site allocation in the emerging local plan.

3.28 Given the very specific characteristics our client's site, which is previously developed and in use for commercial purposes, Parcel A should be assessed on a standalone basis. There is no indication through the AECOM assessment that it has had due regard for the precise nature of Parcel A e.g. there is no recognition of the site being previously developed and the existing strong vegetation framework. The remainder of parcel LY16 is fundamentally different to our

client's land interest in character and contribution to the Green Belt. Even on such a wide scale, the AECOM assessment summarises that development would be well contained and the openness and permanence of the Green Belt would not be threatened.

3.29 We provide a summary Green Belt assessment with due regard for the main purposes of including land within the Green Belt as set out at paragraph 80 of the Framework below:

Main purpose	Summary assessment
<p><b>To check unrestricted urban sprawl</b></p>	<p>The development would be considered as a logical extension of the urban area.</p> <p>The site is contained by defensible and readily identifiable features to all boundaries with the existing settlement boundaries and residential development to the northern and western boundaries, the commercial previously developed site known as Tanyard to the east (see Parcel A above) and the canal to the south.</p>
<p><b>To prevent neighbouring towns merging into one another</b></p>	<p>The site is both physically and visually contained with limited inter-visibility across the wider open countryside by virtue of the existing boundary treatment and the enclosure of the site by built development and the Bridgewater Canal.</p> <p>Lymm and Oughtrington are already seen within the context of the continuous form of built development along the Rushgreen Road frontage. The degree of perceived merging of the two settlements would be no greater than it presently is.</p> <p>Furthermore, the residential development of this site would be seen as infilling between extensive areas of built development to the side boundaries.</p>
<p><b>Safeguarding the countryside from encroachment</b></p>	<p>Any visual encroachment into the wider countryside would be negligible with the retention of the strong framework of vegetation.</p> <p>Again, the site is contained by defensible and readily identifiable features to all site boundaries.</p>
<p><b>Preserve the setting and special character of historic towns</b></p>	<p>The site does not play any role in providing an important setting or approach for either Lymm or Oughtrington.</p>

3.30 The release of our client's area of land for housing would comprise a logical small-scale urban extension that would relate well to the existing built-up area of Lymm and Oughtrington.

- 3.31 Similar to the points made above, the Council's scale of assessment for parcel 'LY16' through the AECOM assessment is considered to be much too large and does not consider the site-specific nature of our client's site, which is fundamentally different to the remainder of the parcel of land in question. Our client's land is wholly enclosed by residential development to the north and west, commercial development at Tanyard to the east and the defensible boundary of the Bridgewater Canal to the south. Even on such a wide scale, the AECOM assessment summarises that development would be well contained and the openness and permanence of the Green Belt would not be threatened.
- 3.32 The same comments as those made earlier with respect to Parcel A and paragraphs 82-85 of the Framework again apply to Parcel B. The release of our client's site from the Green Belt for new housing development as part of the emerging local plan is considered to be fully justified. The substantial housing needs of the Borough comprise the 'exceptional circumstances' necessary to justify the release of our client's land for residential development.
- 3.33 Again, see the same comments made earlier for Parcel A with respect to the Local Plan Inspector's Report 1998; the same points apply for Parcel B as the two parcels of land were assessed by the Inspector together as part of 'Area of Search 15'. This further emphasises the suitability of this site to be released from the Green Belt in order to meet unmet and future development needs. See **EP6**.

### **Parcel C (Land off Pepper Street and Sutch Lane)**

- 3.34 See the location plan at **EP8**.
- 3.35 This site is approximately 1.7ha, and is capable of supporting approximately 50 units. It forms a logical urban extension to Lymm. It is well contained by the Bridgewater Canal to the north, residential development to the west and Ravensbrook School and a caravan storage site to the south. The site is not constrained by flood risk.
- 3.36 The site is highly sustainable, and is well related to local infrastructure and amenities, including highway networks, schools and convenience stores.
- 3.37 We acknowledge that the site is greenfield land within the Green Belt, and on that basis it is not currently deliverable. It is our view that the site serves no purposeful Green Belt function. On this basis it is our view that the site should be removed from the Green Belt. Furthermore, paragraph

84 of the Framework states that when “reviewing Green Belt boundaries, local authorities should take account of the need to promote sustainable patterns of development”. It is our view that this site should be allocated in the Local Plan Review due to its sustainable attributes.

3.38 The Green Belt review undertaken by AECOM on behalf of the Council assesses Parcel C as part of parcel of land ref: 'LY17' and is noted as making a strong contribution to the Green Belt, primarily on the basis of the site being well connected on three sides by the countryside. However, the assessment makes no reference to the extensive commercial caravan storage to the southern boundary of the site and this adds to a sense of containment. We cannot agree that the southern boundary enjoys a strong affinity to the countryside and consider that the final assessment of the site making a 'strong' contribution to the Green Belt is not based on a thorough assessment of the site's characteristics.

### **Parcel D (Land south of Sutch Lane)**

3.39 See the location plan at **EP9**.

3.40 This site is approximately 9ha in area and is capable of supporting up to 270 dwellings. The site is bounded to the north by the Bridgewater Canal, to the east by Oughttrington Lane, to the south by open fields and to the west by residential and commercial development. We are proposing this site for consideration on the same basis as Parcel C, as it shares many of the same characteristics and is adjacent. Whilst it is not as well contained as Parcel C, it is in a sustainable location despite its current open countryside location.

3.41 The Green Belt review undertaken by AECOM on behalf of the Council assesses Parcel C as part of parcel of land ref: 'LY19' and is noted as making a strong contribution to the Green Belt. However, our client's parcel represents a small part of the much wider parcel of land assessed by AECOM. The residential development of this site would relate well to the overall pattern of built development and it would not extend further eastwards than the existing settlement boundaries with residential development to the north at Rushgreen and to the south beyond Lymm High School.

## 4. Summary and conclusions

- 4.1 There is an acknowledged need to release Green Belt in the borough. However we consider that the Council has underestimated the amount of housing that needs to be delivered on Green Belt sites. Notwithstanding, the Council will need to ensure that the plan is flexible. In practice this means identifying a supply of housing significantly in excess of the minimum requirement, in order to provide sufficient contingency for the plan to deal with rapid change.
- 4.2 Our client has put forward a number of Green Belt parcels around Lymm for development. These sites are deliverable subject to a policy change, and it is considered that their allocation for development would represent sustainable development in accordance with the Framework.

## 5. Appendices

**EP1** – Location Plan and completed Call for Sites Form (Parcel A).

**EP2** – Masterplan (Maybin Architects) drawing showing the delivery of 52 houses (Parcel A).

**EP3** – Approved site layout drawing for planning application 2014/24228) (Parcel A) N.B. This drawing will be sent separately to this Statement.

**EP4** – Tyler Grange Overview Landscape and Visual Impact Assessment (Parcel A). N.B. This document will be sent separately to this Statement.

**EP5** – Ascerta Amphibian Survey Report and Ecological Appraisal Report (Parcel A). N.B. These documents will be sent separately to this Statement.

**EP6** – Local Plan Inspector's Report 1998 relating to Parcels A and B and recommending that both parcels be 'safeguarded' for future development needs.

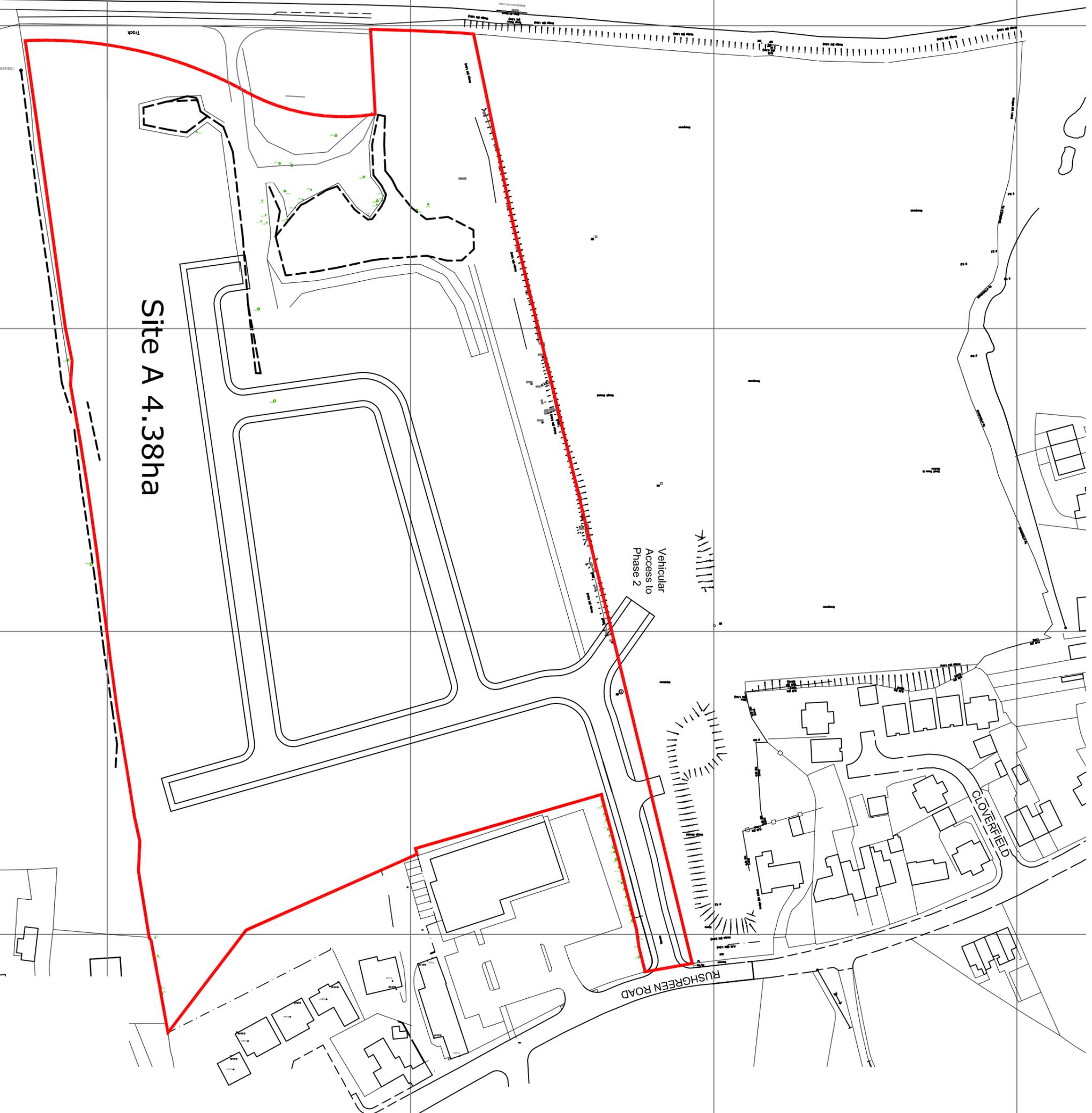
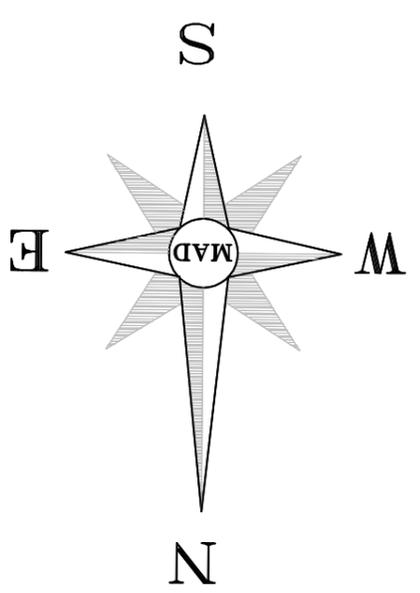
**EP7** – Location Plan and completed Call for Sites Form (Parcel B).

**EP8** – Location Plan and completed Call for Sites Form (Parcel C).

**EP9** – Location Plan and completed Call for Sites Form (Parcel D).

PURPOSE OF ISSUE      DISCUSSION

All dimensions shall be verified by the Contractor on site prior to work commencing and relevant notes being placed. Do not scale from this drawing and only work to written dimensions. Any discrepancies to be brought to the attention of the Contract Administrator for instructions prior to proceeding.



Site A 4.38ha

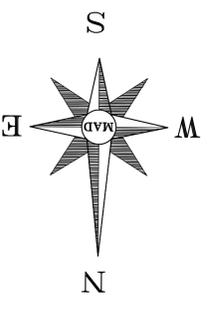
# Maybin Architectural Design

PROJECT: DEVELOPMENT SITES  
LYMM  
DRAWING: SITE A  
Hatherlow House  
Hatherlow  
Romiley  
Stockport  
SK6 3DY

DATE	DRAWN BY:	CHECKED BY:
Nov 16	ARC	CPM
SCALE:	DRAWING NO:	REV:
1:1250	1056-OP-SK20	

Tel: 0161 494 2800  
Fax: 0161 406 7444  
email:cpmaybin@btinternet.com

BRIDGEWATER CANAL



House Type	Beds	Floor area	Volume	Number
A	2	64 m <sup>2</sup>	213.6 m <sup>3</sup>	12
B	3	91.9 m <sup>2</sup>	303.25 m <sup>3</sup>	4
C	2/3	131.7 m <sup>2</sup>	452 m <sup>3</sup>	4
D	3	105 m <sup>2</sup>	370.6 m <sup>3</sup>	22
E	4	171.6 m <sup>2</sup>	528.1 m <sup>3</sup>	10
<b>Total</b>				<b>52</b>

Retension of boundary planting with new native planting to supplement gaps forming dense green corridor link between Rushgreen Road and the Canal

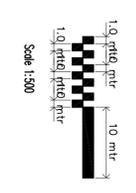
Potential Link

Retension of boundary planting with new native planting to supplement gaps forming dense boundary screening

Public Open Space

Public Open Space  
Potential Canal Access

Retension of boundary planting with new native planting to supplement gaps forming dense boundary screening



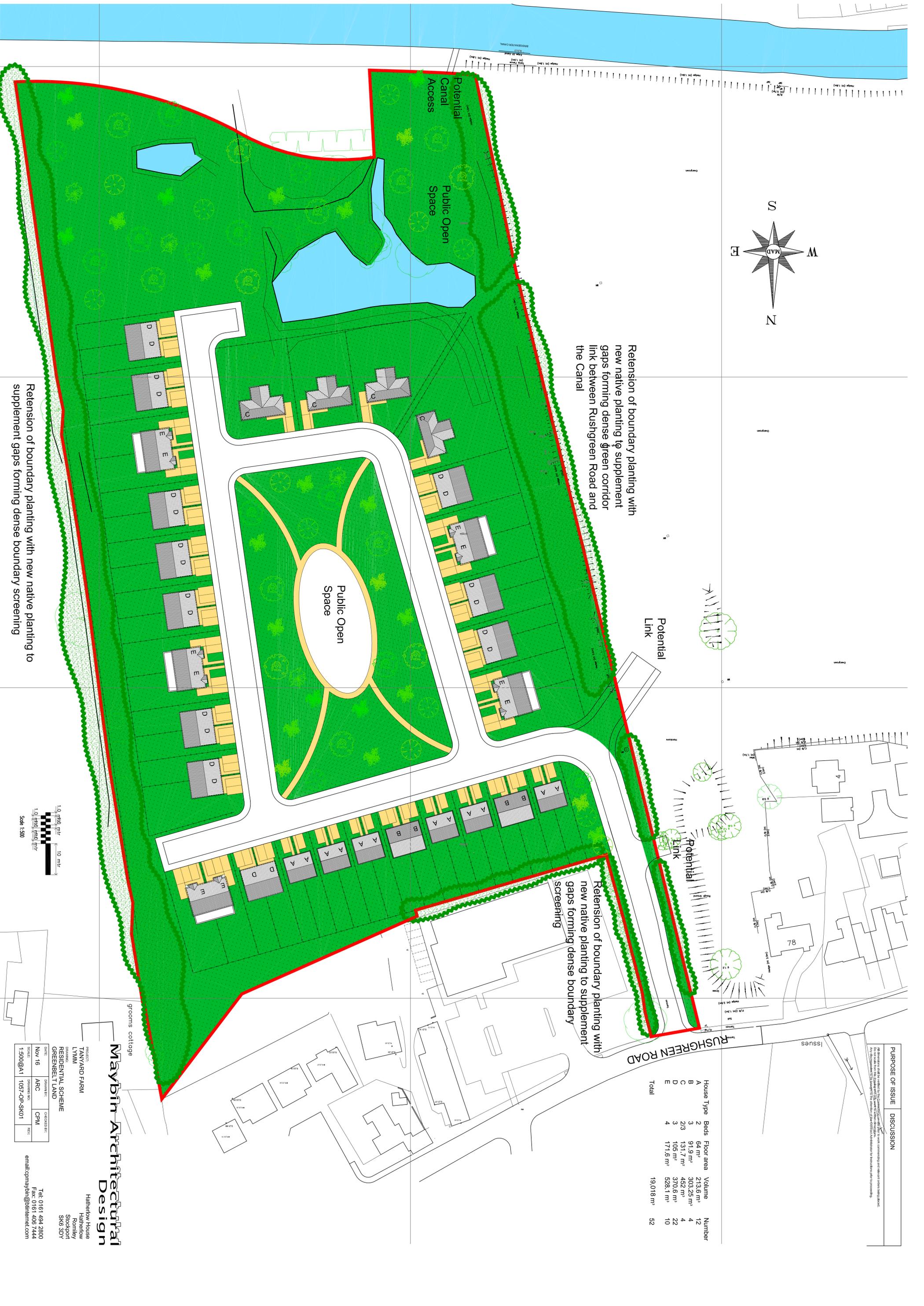
**Maybin Architectural Design**

PROJECT: TANYARD FARM  
DRAWING: RESIDENTIAL SCHEME GREENBELT LAND  
DATE: NOV 16  
SCALE: 1:500

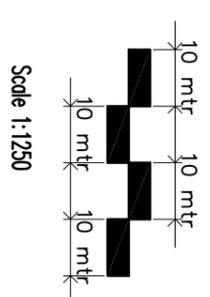
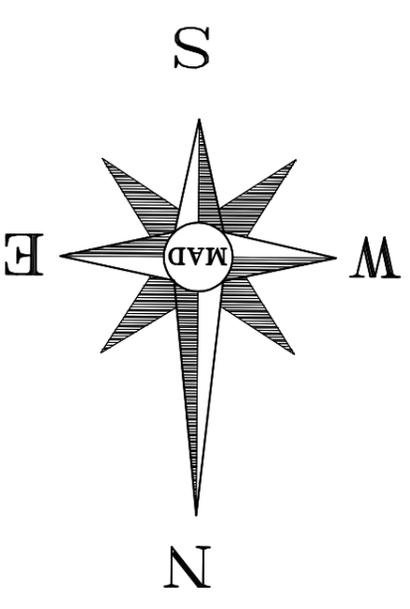
DESIGNED BY: LYMM  
DRAWN BY: ARC  
CHECKED BY: CPW  
REV:

Hatherlow House  
Hatherlow  
Romiley  
Stockport  
SK6 3DY

Tel: 0161 494 2800  
Fax: 0161 406 7444  
email: cpw@maybin.com



All dimensions shall be verified by the Contractor(s) on site prior to work commencing and relevant orders being placed. Do not scale from this drawing and only work to written dimensions. Any discrepancies to be brought to the attention of the Contract Administrator for instructions prior to proceeding.



PROJECT:  
TANYARD FARM  
LYMM  
DRAWING:  
DEVELOPMENT SITE  
B1/B8/D2 UNITS

**Maybin Architectural Design**

Hatherlow House  
Hatherlow  
Romiley  
Stockport  
SK6 3DY

DATE: May 14  
SCALE: 1:1250

DRAWN BY: ARC  
DRAWING NO.: 1001-SK10

CHECKED BY: CPM  
REV: K

Tel: 0161 494 2900  
Fax: 0161 406 7444  
email:cpmaybin@btinternet.com

# Tanyard Farm, Lymm

## Overview Landscape & Visual Assessment

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### 1.0 Introduction

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- 1.1 This overview note has been compiled by Tyler Grange LLP (TG) in response to comments from the Case Officer in relation to the planning application reference - 2014/24228 (Tanyard Farm Estate, Rushgreen Road, Lymm, Cheshire WA13 9PR). In relation to 'Visual Impact' the Officer commented that:

*"There is still concern in respect of how visible the building would be within the wider landscape. I suspect with the retention of more trees and the introduction of new planting, that there is scope to help contain and accommodate the building without it being overly prominent when viewed from the surrounding countryside and from nearby residential property, but this is not reasonably clear from the information currently available. Some form of Landscape Assessment and / or photographs is required to demonstrate that the building would not be prominent above and between existing trees."*

- 1.2 The application is for Outline Planning Consent associated with the demolition of existing buildings and erection of replacement building (Use Classes B1/B8/D2) and associated works to include car parking. The proposed site layout plan (see **Appendix 1**) demonstrates the rationalisation of the current site with the demolition of several buildings and the erection of one single building that would be of a smaller footprint (-30%) but of a slightly larger volume (+9%), relative to those buildings identified for demolition. The new building would be 5.5m in height and 3,251sqm in footprint. The existing trees that screen the western boundary would be retained and the planting to the far eastern boundary (associated with land also controlled by the applicant) would also be supplemented with new native planting to further filter views towards the proposed development.
- 1.3 Desktop analysis and preliminary fieldwork were first undertaken in October 2013, in order to advise an initial strategy for the proposed mixed development of the site. This work has been updated in October 2014.
- 1.4 This report should be read alongside **Plan 1: Landscape Analysis & Site Context (1897/P04)**, **Plan 2: Landscape Character (1897/P05)** and **Plan 3: Visual Analysis & Photoviewpoint Locations (1897/P06)**, as well as the accompanying **Photoviewpoints 1-12 (1897/P07)**.
- 1.5 The work does not constitute a full Landscape and Visual Impact Assessment (LVIA), but provides an overview of the existing landscape and visual context, with a commentary on likely development effects.



## 2.0 Site Context

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- 2.1 Lymm is a large village and civil parish within the Warrington borough of Cheshire, in North West England. It is situated approximately 4.5 miles east of Warrington, 1.8km east of the M6 and 2.6km north of M56. The Bridgewater Canal runs through Lymm and north of Lymm is the Manchester Ship Canal. The civil parish of Lymm incorporates several hamlets, of which the site is located between Rushgreen to the east and Statham to the west. The parish of Lymm had a population of 10,552 recorded in the 2001 census.
- 2.2 Lymm is a historic village with a rich variety of house types. It is inset into the Green Belt and predominantly surrounded by agricultural land. Most of the approach roads leading to the Village Centre reflect its rural origins, as they are bordered with fields, open spaces or hedgerows of native species. The Village is situated on the boundary of the borough of Warrington, six miles from the town centre, close to Cheshire's border with Greater Manchester, while the Merseyside conurbation is ten miles to the West.
- 2.3 Lymm village centre is a designated Conservation Area, notable for its historic buildings, both listed and unlisted (locally important). The village architecture mostly dates from the 19th century with some exceptions.
- 2.4 The wider site (including other land within control of the applicant) is located to the north east of Lymm (between Lymm and Oughtrington) and comprises open grassland to the west and an existing plant nursery (Lymm Nursery) to the east. To the south is an area of open storage, scrub and scattered trees associated with connecting waterbodies. A framework of vegetation, including taller conifer shelterbelts also divide the site (see **Plan 1**).
- 2.5 To the immediate south is the Bridgewater Canal, to the west and north existing residential development associated with the outer edges of Lymm and Oughtrington, along with Rushgreen Road (A6144). To the north is the Rushgreen Garage and Service Station.
- 2.6 The application site itself is centred on national OS grid reference SJ 68997 87612 and extends to approximately 1.66 hectares. As established above, it is situated on previously developed lane, including poly tunnels, open storage, parking, plant storage and access track.
- 2.7 The land is relatively flat, situated from approximately 15-20m Above Ordnance Datum (AOD) with a gradual incline to the south, towards the canal.

## 3.0 Existing Landscape Character Context

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### National & District Landscape Character Areas

- 3.1 At a national level the site is located with the Natural England NCA Profile 60 'Mersey Valley'. At a district level, the site is considered to represent 'Red Sandstone Escarpment' Character Type (LCT 13 as set out within the Warrington Borough Council Landscape Character Assessment 2007). The LCT boundaries are illustrated on **Plan 2**.
- 3.2 More specifically, the site is located within 'Area 3.C – Lymm', with the following description:

*"The boundaries of the area are formed by the Massey Brook basin to the west; the Warrington Borough boundary to the south and east and by the Bridgewater Canal to the north. The land again falls generally to the north but is of a more rolling and undulating nature*



occasionally with back falls to the south. The agriculture is a balance of both pastoral and arable farming.

The streams passing through the area are more branched than in the adjoining areas, with tributaries running parallel to the ridge line. Stream valleys are generally shallow with only Bradley Brook forming a steep sided valley passing through Lymm and in the vicinity of Lymm Dam.

The area's topography creates an intimate landscape, often self-enclosed by woodlands and hedgerow trees. Views from the area are therefore less extensive with few internal views of note. Lymm water tower and St Peter's Church, Oughtrington are exceptions, forming local landmarks. To the east of Lymm, around Oughtrington, the landscape is more open and land less dissected by streams.

Vegetation in the area generally is notably vigorous and healthy, particularly when compared with the rest of Warrington Borough. Hedgerows and hedgerow trees appear more luxuriant, larger and more well-formed and include a more diverse range of species, including chestnut, lime, beech and willow, to accompany the more universally found common oak."

3.3 Furthermore, in terms of objectives for good design, the Warrington Borough Council Landscape Character Assessment sets out the landscaping expectations associated with any new development. These are set out below:

- *"Ensure high quality environments in which to live and work through excellent landscape designs in new developments;*
- *Ensure the design of new landscapes feature at an early stage in the design process to ensure they are well integrated into new developments;*
- *Ensure biodiversity and geological features are conserved and enhanced through landscape improvements;*
- *Promote the health and wellbeing of the community through new landscape schemes;*
- *Promote quality landscape schemes which are sensitive to the locality and provide local distinctiveness; and*
- *Ensure that the design of new landscapes do not increase fear of crime or give rise to criminal behaviour."*

#### **Site Character and Sensitivity**

3.4 The key characteristics of the 'Lymm & Red Sandstone Escarpment' Character Area are defined as being:

- *"Smaller scale, more intimate rural landscape;*
- *Luxuriant hedgerow trees with diverse range of species;*
- *Rolling landscape;*
- *Restricted views; and*
- *Strong feeling of high landscape quality"*



- 3.5 When looking at the site specifically against the attributes of the Warrington Borough Council Landscape Character Assessment (LCA) the following observations are noted:
- Although the site is of a smaller scale, it lacks the intimate feel described in the LCA, the site also does not feel particularly rural as it is previously developed;
  - Much of the site is enclosed by mature, well-established hedgerows and tall conifer belts; however, it does not have the diversity and quality of species as outlined in the LCA;
  - As previously described, in paragraph 2.7 of this note, the site is relatively flat at approximately 15-20m AOD, and therefore does not conform to the more characteristic 'Rolling Landscape' characteristic associated with the LCA;
  - The well-established, scattered vegetation within the application site and the wider site boundaries does generally restrict views towards the open countryside, although there are some distant glimpsed views to the north and in association with the elevated topography to the south; and
  - As the site is currently developed and used as a garden nursery comprising open storage, sheds, poly tunnels, hard standing and uncharacteristic boundary vegetation it would not be considered to be a particularly high landscape quality.
- 3.6 Overall, the site is located on the periphery of an existing settlement and has a developed use defining its character. It is evident that the local landscape in this area has evolved, with a mixture of uses, making it more susceptible to change.
- 3.7 The site and local landscape sensitivity to change is therefore considered as being Minor, as a non-designated parcel of land with an established adjacent residential influence and existing developed use. The extent of surrounding visual screening affords further tolerance to change, as set out further in Section 4.0.

## 4.0 Existing Visual Circumstances

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### Visibility of the Site

- 4.1 Visually the site is relatively well enclosed due to the surrounding established landscape framework and adjacent, more recently developed residential context to the south west. Representative photoviewpoints are illustrated on **Plan 3**.
- 4.2 The approximate extent of the visual envelope (VE) is set out below (the extent of perceived inter-visibility to and from the site):
- To the immediate north of the application site, views are restricted by mature boundary vegetation between the site and Rushgreen Garage & Service Station. From the wider site within client ownership, the more recent 2 and 3 storey development associated with Rushgreen Road can be seen. Beyond, the topography and scattered farmland copse plantations filter views increasing the capacity of the landscape to absorb sensitive re-development;
  - To the east, the residential development further east at Rushgreen is heavily filtered by layers of intervening field boundary and small woodland copse vegetation;



- To the south, views are filtered by the scattered vegetation associated with the connected waterbodies, whilst more distant views extend towards the existing 2 and 3 storey developments on more elevated ground to the south of the Bridgewater Canal and the well-vegetated route of the bridleway along Sutch Lane (Lymm BR31). Some glimpsed views exist to the south east towards the spire associated with St Peter's Church; and
- To the west, immediate views are restricted by mature boundary, including the taller conifer trees. Some sections are gappy and there are glimpsed views through the residential properties associated with Fletchers Lane and Thirlmere Drive.

### **Principal Visual Receptors and Sensitivity**

- 4.3 The visual receptors identified that may experience some change in view or visual amenity as a result of the development of the site have been set out below, with reference to their broad categorisation and associated sensitivity.

#### *Private Residential Properties & Settlement Edge*

- 4.4 It is generally accepted and set out within the Guidelines for Landscape and Visual Impact Assessment – 3rd Edition, that views from residents at home are considered most susceptible to change. However, it is important to note that such views are private and more sensitive in relation to rooms occupied during daylight hours. Residential receptors are therefore categorised as being of High sensitivity or Moderate where views are from upper floors, oblique, at greater distances, filtered or influenced by an existing residential context.
- 4.5 Because the site is associated with an existing use (with some structures visible to residents) and has a good degree of visual containment, the number of residential receptors affected is reduced.
- 4.6 The residents immediately adjoining the site to the north and west will experience some degree of change, as assessed below in Section 5.0.

#### *Public Rights of Way (PRoW)*

- 4.7 As identified on **Plan 3** there is a network of public footpaths surrounding the site, but no routes traversing or directly adjoining the site. This type of receptor is also considered to be of High sensitivity and therefore an important consideration in the context of visual impact assessment.
- 4.8 The recreational paths considered in this overview assessment, experiencing filtered, transient views towards the site include:
- Lymm FP43 – Bridgewater Canal Towpath;
  - Lymm FP34 – South of Rushgreen Road;
  - Lymm FP30 - Cotebrook
  - Lymm BR31 – Pepper Street; and
  - Lymm BR46 – Reddish Lane Track.



#### *Transport Infrastructure / Local Highways*

- 4.9 The site is located in close proximity to Rushgreen Road (A6144) to the north and the connecting Reddish Crescent.
- 4.10 The sensitivity of views from local transport corridors are considered to be Minor and views will be transient and glimpsed, in association with the existing point of vehicular access.

#### *Commercial Premises & Other Buildings*

- 4.11 The adjoining commercial receptor located to the immediate north of the site is the Rushgreen Garage & Service Station. As a contained use where occupants have a focus on other activities, the sensitivity is considered to be Minor.
- 4.12 Further to the south east is the Grade II Listed St. Peter's Church. As a heritage asset, the sensitivity is uplifted to High. There is no inter-visibility with the Conservation Area to the west.

### **5.0 Landscape Opportunities & Constraints (Strategy)**

---

- 5.1 In response to the desktop and fieldwork undertaken, a landscape strategy response has been set out as guidance for the appropriate development of the site. The landscape principles are to be used in association with the proposed development as inherent mitigation includes:
  - The retention of the existing boundary vegetation to the east and west, with native planting used to supplement gaps;
  - Existing planting to be retained in association with the access track, with additional native screen planting provided to reinforce the separation with the Rushgreen Garage & Service Station;
  - A scheme of native and ornamental landscaping to be implemented to soften the proposed parking areas and also to screen the service road, refuse and storage area; and
  - The retention of the off-site vegetation to the south associated with the connected waterbodies.

### **6.0 Summary of Likely Landscape Character and Visual Effects**

---

- 6.1 This section sets out a summary impact assessment to determine the likely magnitude of effect associated with the proposed development and the resultant residual effects at year 15, once any mitigation planting has begun to mature.

#### **Predicted Landscape Character Effects**

<b>Magnitude of Change Criteria</b>	<b>Commentary of Effects</b>
Scale / size of proposals	Small scale B1/B8/D2 development on previously developed site (in the context of the wider LCA and locality). The scheme demonstrates the rationalisation of the current site with the demolition of several buildings and the erection of one



Magnitude of Change Criteria	Commentary of Effects
	single building that would be of a smaller footprint (-30%) but of a slightly larger volume (+9%), relative to those buildings identified for demolition. The new building would be 5.5m in height and 3,251sqm in footprint.
Components to be lost as a result of proposals	Loss of existing open storage, nursery facilities, parking areas, poly tunnels and glass houses, as well as limited sections of internal planting / conifer belts.
Duration of change	Temporary construction impacts. Permanent / long-term change following development of the site.
Perceptual changes	The loss of a somewhat derelict and disjointed nursery facility with a single unit, associated parking and landscaping. Height parameters have been restricted to assimilate the building into the landscape, particularly when considered against the retention and strengthening of the existing boundary vegetation.
The degree to which the proposal fits with existing character	The proposal utilises a previously developed site at the settlement edge and does not result in the loss of notable, valuable or rare features. The development would be considered characteristic when considered against the current baseline context.
Contribution proposal makes to the landscape (i.e. virtue of good design)	The development proposals will enable a sense of order to be returned to the site with the provision of new native planting and phased removal of the uncharacteristic conifer belts.

- 6.2 In response to the consideration of the above criteria and the predicted changes to the site, the magnitude of change upon the 'Lymm & Red Sandstone Escarpment' LCA is considered to be Minor.
- 6.3 Whilst there will be an alteration to the mass and form of the existing site, the introduction of the proposed development is not uncharacteristic in terms of the existing developed context; and would not harm the character of the wider LCA.
- 6.4 Such impacts are to be mitigated through the retention and enhancement of the site boundary landscape framework with the re-introduction of more characteristic native planting.
- 6.5 With reference to the sensitivity of the LCA and the magnitude of change associated with the proposed development at the settlement edge, it is judged that the overall significance of landscape effects would be Minor Adverse at-worst.

### **Predicted Visual Effects**

Visual Receptor	Receptor & Magnitude of Change	Residual Effects & Commentary (at Year 15)
Private Residential Properties & Local Listed Buildings	R01 – Properties on Cloverfield  Medium	Minor Adverse – some views through boundary vegetation will remain towards the proposed development; however, it wouldn't be viewed as uncharacteristic and at 5.5m high would be largely screened.

Visual Receptor	Receptor & Magnitude of Change	Residual Effects & Commentary (at Year 15)
<p>High Sensitivity</p> <p>(Less sensitive where the existing amenity is influenced by urban detractors or where distance and context reduces inter-visibility)</p>	<p>R02 - off Rushgreen Road</p> <p>Minor</p>	Neutral – with the exception of access alterations, little perceived change will be visible given the off-set.
	<p>R03 - off Rushgreen Road</p> <p>Negligible</p>	Neutral - with the exception of access alterations, little perceived change will be visible given the off-set.
	<p>R04 - Properties on Fletchers Lane</p> <p>Medium</p>	Minor Adverse – some rear visibility towards the proposed development will remain; however, it wouldn't be viewed as uncharacteristic and at 5.5m high would be largely screened.
	<p>R05 - Properties on Mardale Crescent &amp; Watercress Farm</p> <p>Medium</p>	Minor Adverse - some views through boundary vegetation will remain towards the proposed development; however, it wouldn't be viewed as uncharacteristic and at 5.5m high would be largely screened.
	<p>R06 - Properties on Cyril Bell Close</p> <p>Minor</p>	Neutral – limited intervisibility, where upper storey views are available the visual context would not alter to any great extent, particularly as the boundary planting continues to mature.
	<p>R07 – Rushgreen House &amp; Grooms Cottage</p> <p>Minor</p>	Minor Adverse - some views through boundary vegetation will remain towards the proposed development; however, it wouldn't be viewed as uncharacteristic and at 5.5m high would be largely screened. Some enhancement in visual context may also be experienced through the removal of the existing nursery buildings and improved boundary planting.
	<p>R08 - Properties on Dyers Lane &amp; Dyers Close</p> <p>Negligible</p>	Neutral – limited inter-visibility and the proposed development would not be seen as conspicuous or uncharacteristic. The additional boundary planting would also offer greater segregation of Dyers Lane from the site.
	<p>R09 – Rush Gardens</p> <p>Medium</p>	Minor Adverse – some rear views through boundary vegetation will remain towards the proposed development; however, it wouldn't be viewed as uncharacteristic. Some enhancement in visual context may also be experienced through the removal of the existing nursery buildings and improved boundary planting.
	<p>R10 – Properties on the corner between Rushgreen Road &amp; Reddish Crescent</p> <p>Negligible</p>	Neutral - with the exception of access alterations, little perceived change will be visible given the off-set.

Visual Receptor	Receptor & Magnitude of Change	Residual Effects & Commentary (at Year 15)
Principal Listed Buildings  High Sensitivity  (Less sensitive where the existing amenity is influenced by urban detractors or where distance and context reduces inter-visibility)	H01 – St Peters C of E Church  Negligible	Neutral - with the exception of access alterations, little perceived change will be visible given the off-set.
PRoW and Recreational Routes  High Sensitivity  (Less sensitive where the existing amenity is influenced by urban detractors or where distance and context reduces inter-visibility)	P01 – Trans Pennine Trail (Lymm BR46)  Minor	Neutral – limited inter-visibility given the extent of intervening vegetation. The proposed height parameters would also enable the proposed development to be screened by the proposed additional boundary planting.
	P02 – Lymm FP34  Negligible	Neutral - little perceived change will be visible given the off-set and the placement of new boundary planting.
	P03 – Lymm FP43 (Tow Path)  Minor	Minor – glimpsed and intermittent views from the towpath, where the development would be viewed beyond the intervening vegetation. The overall context and enjoyment of the canal corridor would not be affected.
	P04 – Lymm BR31 (Sutch Lane)  Minor	Neutral – heavily filtered recreational route resulting in little perceived change.
	P05 – Lymm FP30  Negligible	Neutral – overall appearance of the scheme within a panoramic scene would be inconspicuous.
Leisure / Recreation  High Sensitivity	B06 – Bridgewater Canal  Minor	Neutral - glimpsed and intermittent views from the towpath, where the development would be viewed beyond the intervening vegetation. The overall context and enjoyment of the canal corridor would not be affected.
Principal Transport Routes  Minor Sensitivity	T01 – Rushgreen Road & Reddish Crescent  Negligible	Neutral - with the exception of access alterations, little perceived change will be visible given the off-set.
Private Business Premises & Publically Assessable Commercial Uses  Minor Sensitivity	C01 – Rushgreen Garage and Service Station  Minor	Neutral – the orientation and operation of the service station would suggest that lower sensitivity receptors would experience little change in visual context given the placement of the completed development, particularly once the new boundary planting had matured.

Visual Receptor	Receptor & Magnitude of Change	Residual Effects & Commentary (at Year 15)
(Less sensitive where the existing amenity is influenced by urban detractors or where distance and context reduces inter-visibility)		

- 6.6 It is evident that most receptors will experience very little change (neutral) in amenity and outlook, largely as a result of the intervening vegetation and height parameters of the proposed development that easily enable the unit to be screened. It is also important to note that the existing site context provides greater ability to absorb visual change, even offering enhancement to some views through the replacement of the current nursery structures and implementation of new native planting.
- 6.7 Some change in amenity will be experienced for the closest residential and recreational receptors; however, views of open countryside will not be lost as a result of the proposed development. Whilst residents in the three storey development on Cyril Bell Close to the south of the site will experience a change in amenity, existing views across the open grassland towards the site are already influenced by a residential and developed backdrop. Likewise, users of the Bridgewater Canal will have some glimpsed and intermittent views from the towpath, where the upper reaches of the development would be viewed beyond the intervening vegetation. However, the overall context and enjoyment of the canal corridor would not be affected.

## 7.0 Conclusion

---

- 7.1 This overview LVIA establishes that whilst the site is located within the 'Lymm & Red Sandstone Escarpment' LCA, it contains very few of the key attributes. It is a discreet parcel of land located on the periphery of an existing settlement and already has a developed use defining its character. It is evident that the local landscape in this area has evolved, with a mixture of uses making it more susceptible to change. The proposed development would not result in the loss of any rare or notable features, and the site is not covered by a qualitative landscape designation. Opportunities exist to enhance the internal and boundary planting through the re-introduction of native species and the removal of the current open storage, scattered buildings, poly tunnels and conifer belts associated with the nursery use.
- 7.2 The assessment highlights that whilst there will be an alteration to the mass and form of the existing site, the introduction of the proposed development is not uncharacteristic in terms of the existing developed context; and would not harm the character of the wider LCA. With reference to the sensitivity of the LCA and the magnitude of change associated with the proposed development at the settlement edge, it is judged that the overall significance of landscape effects would be Minor Adverse at-worst.
- 7.3 Visually, the descriptive analysis and accompanying photoviewpoint sheets demonstrate that the site has a relatively small visual envelope (VE), with inter-visibility restricted by existing built form and the local framework of vegetation. The boundary vegetation performs a decent function at present in terms of enclosing parts of the site; however, the strengthening of boundaries and introduction of additional internal planting would offer improved containment.

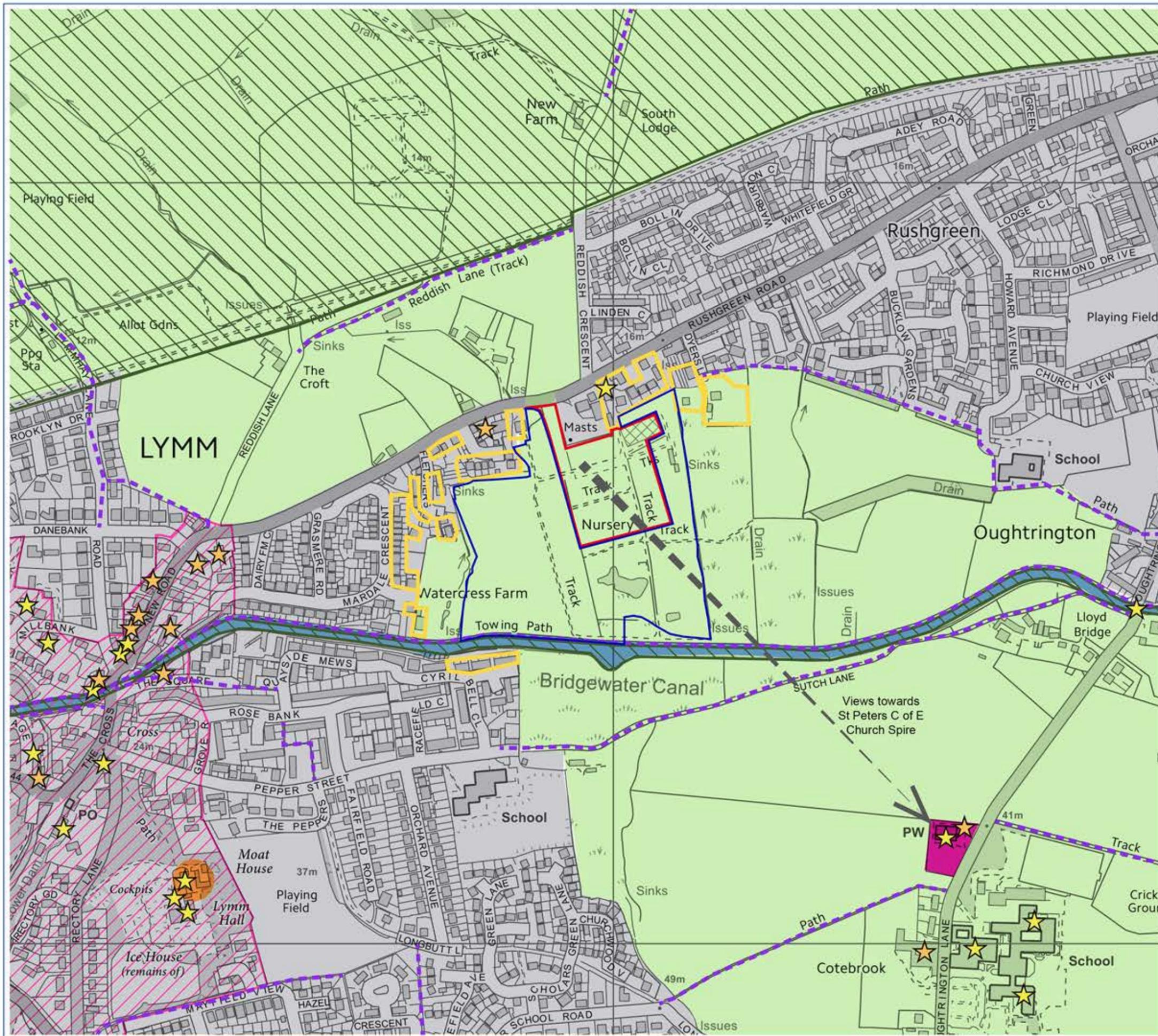


- 7.4 Most receptors will experience very little change (neutral effects) in amenity and outlook, and the proposed height parameters of the development would easily enable the B1/B8/D2 unit to be screened. Some change in amenity will be experienced for the closest receptors; however, views towards the site are already influenced by a residential and developed backdrop. Therefore, the assessed visual context would not be affected or harmed by the proposed development
- 7.5 To represent a significant impact, the development as proposed would have to cause substantial loss or unacceptable alteration to a number of valued components of landscape, including the introduction of elements that are both visually intrusive and uncharacteristic. Having undertaken a structured overview assessment, it is concluded that this is not the case and the scheme would not warrant refusal on landscape grounds.

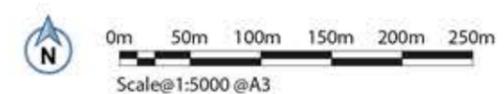
Jonathan Berry BA(Hons) DipLA CMLI AIEEMA M.Arbor.A

**Plans & Appendices:**

- Plan 1: Landscape Analysis and Site Context (1897/P04)
- Plan 2: Landscape Character (1897/P05)
- Plan 3: Photoviewpoint Locations and Visual Analysis (1897/P07)
- Photoviewpoints 1-12 (1897/P07)
- 
- Appendix 1: Maybin Architectural Design - Planning Layout



- KEY:**
- Application Site Boundary
  - Other Land in Client Ownership
  - Bridgewater Canal
  - Dwellings with potential views of the site
  - St. Peters C of E Church
- Listed Buildings**
- ★ Listed Buildings
  - ★ Local List Parish Order
- Local Plan Core Strategy**
- LPCS CS5 OSS Green Belt
  - LPCS QE8 Conservation Areas
  - LPCS CS6 Strategic Green Links
  - LPCS CC1 Inset and Green Belt Settlement
  - LPCS MP3 Active Travel Greenway Network
  - LPCS QE8 Ancient Monuments



Project Tanyard Farm, Lymm

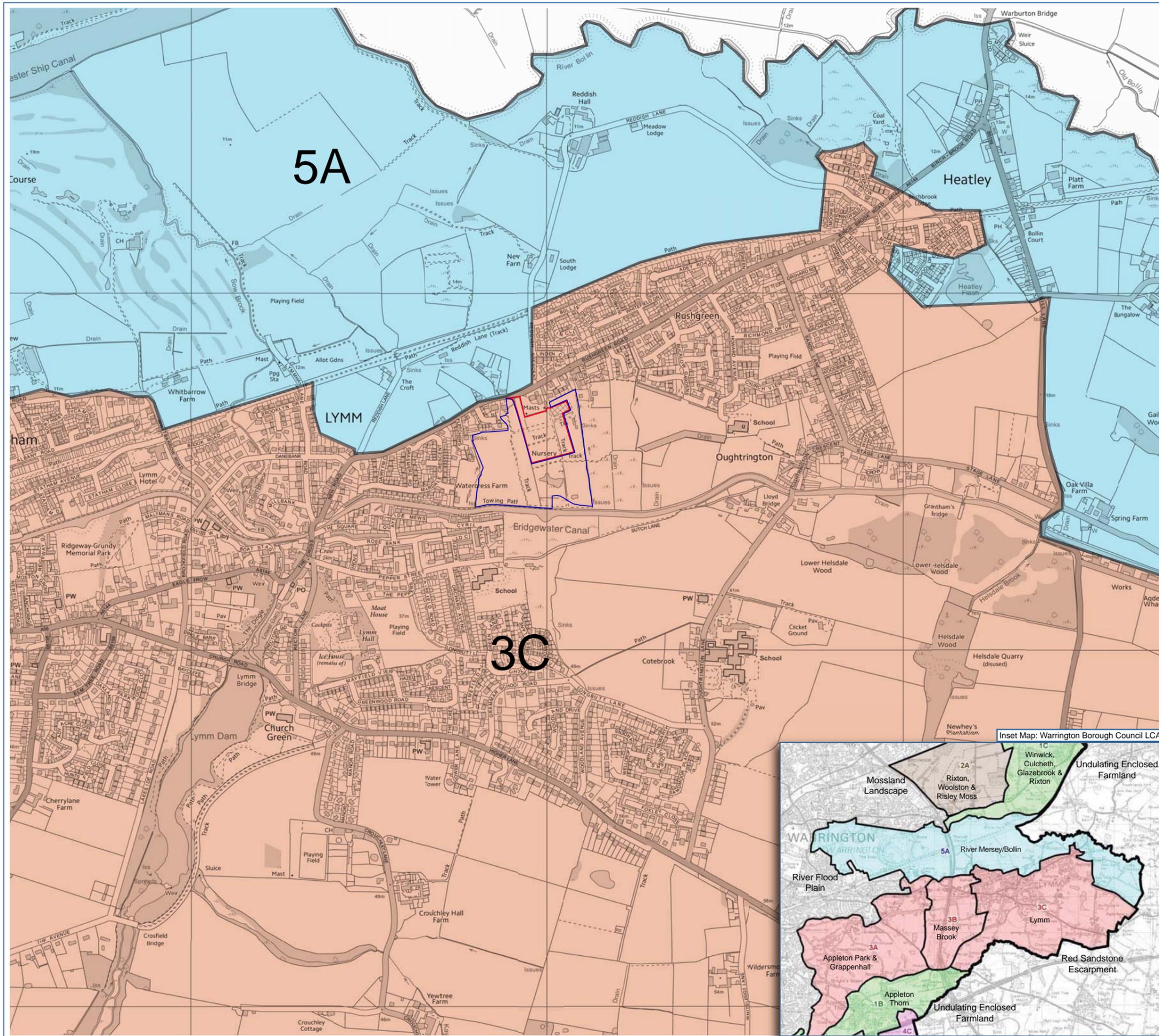
Drawing Title **Plan 1: Landscape Analysis and site context**

Scale As Shown (Approximate)

Drawing No. 1897/P04

Date October 2014

Checked JBLG

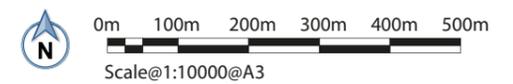
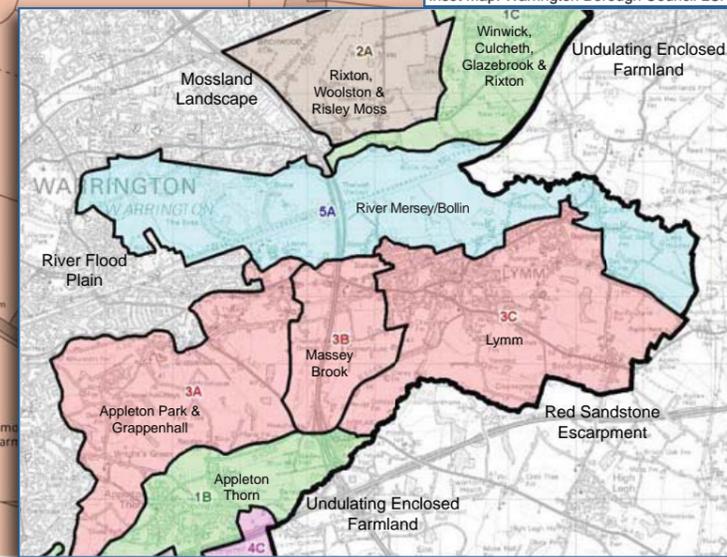


**KEY:**

- Application Site Boundary
- Other Land in Client Ownership
- Type 3: Red Sandstone Escarpment Area 3.C - Lymm
- Type 5 River Flood Plain Area 5.A - River Mersey/Bollin

*Note:  
The entire study area as illustrated lies within National Character Area 60 Mersey Valley*

Inset Map: Warrington Borough Council LCA



Project Tanyard Farm, Lymm

Drawing Title **Plan 2: Landscape Character**

Scale As Shown (Approximate)

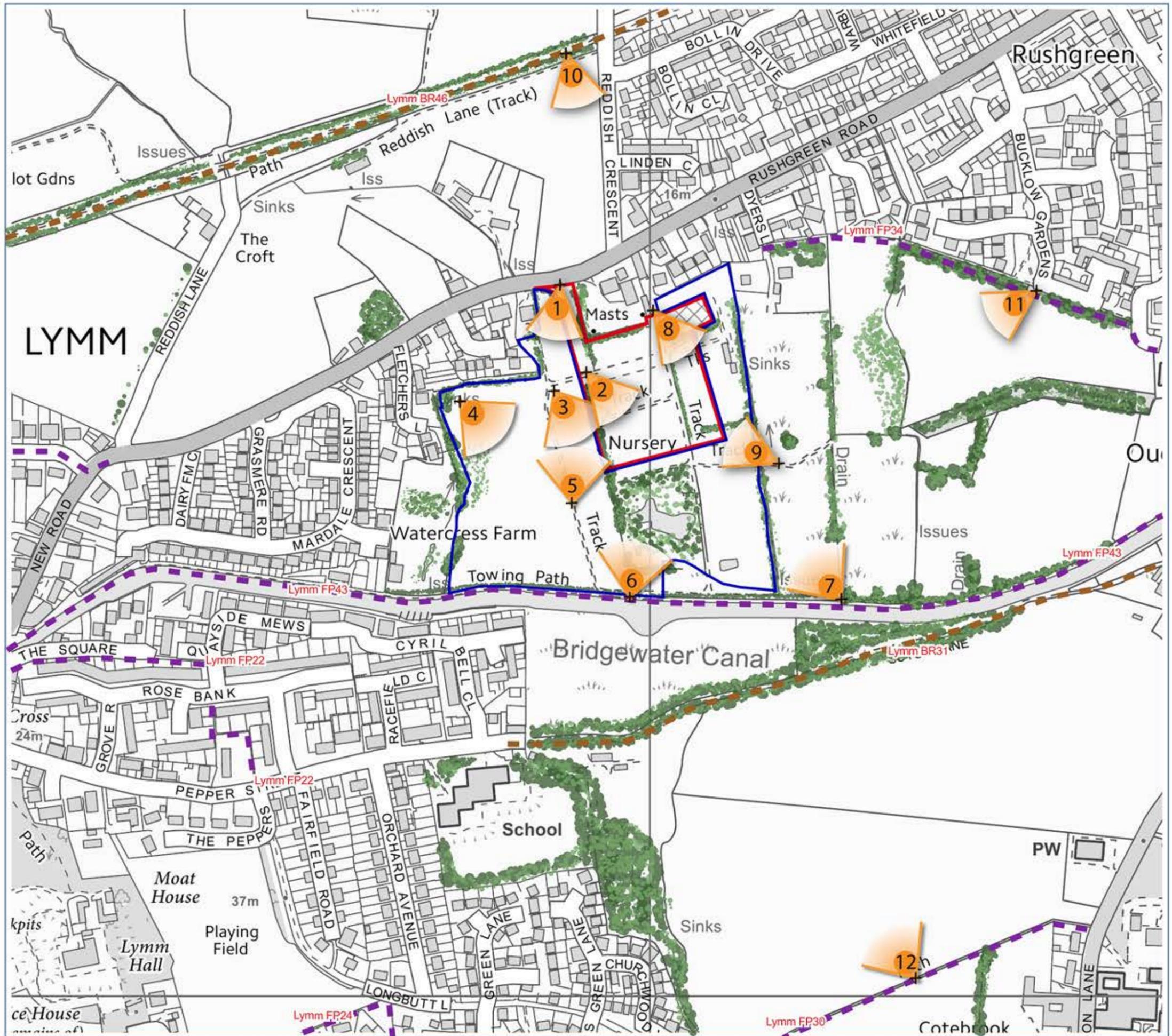
Drawing No. 1897/P05

Date October 2014

Checked JB/LG



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T: 01625 525731 E: info@tylergrange.co.uk W: www.tylergrange.co.uk



- KEY:**
- Application Site Boundary
  - Other ILnd in Client Ownership
  - Photoviewpoint Location
  - Principal trees and hedgerows restricting visibility



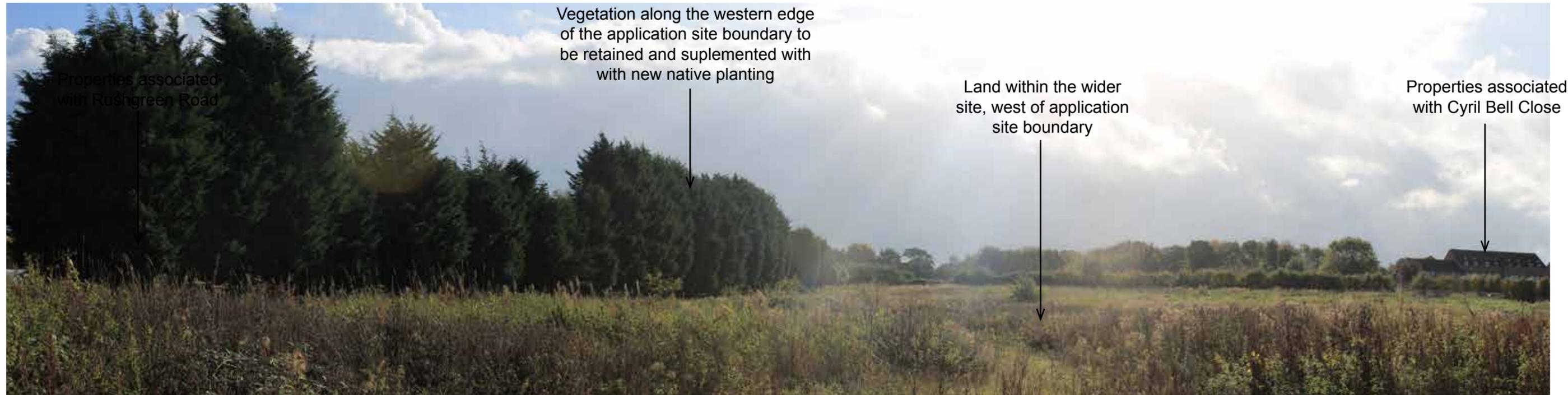
Project	Tanyard Farm, Lymm
Drawing Title	<b>Plan 3: Photoviewpoint Locations and Visual Analysis</b>
Scale	As Shown (Approximate)
Drawing No.	1897/P06
Date	October 2014
Checked	JBLG



**Photoviewpoint 1:** View from Rushgreen Road on the northern site boundary at the entrance to the existing Nursery, facing south west.



**Photoviewpoint 2:** View from the track just within the application site boundary, facing south east



**Photoviewpoint 3:** View from within the blue line boundary, approximately 20m from the application site boundary, facing south.



**Photoviewpoint 4:** View from within the blue line boundary, approximately 125m from the application site boundary, facing south east.



Properties associated with Rushgreen Road

Vegetation along the western edge of the application site boundary to be retained and supplemented. The vegetation will largely screen the proposed unit.

**Photoviewpoint 5:** View from within the blue line boundary, approximately 90m from the application site boundary, facing north.



Vegetation along the western edge of the application site boundary to be retained. The gaps will be supplemented with new native planting.

**Photoviewpoint 6:** View from Public Right of Way, Tow Path (ref: Lymm FP 43) approximately 130m from the application site boundary, facing north east.



**Photoviewpoint 7:** View from Public Right of Way, Tow Path (ref: Lymm FP 43) approximately 190m from the application site boundary, facing north west.



**Photoviewpoint 8:** View from northern site boundary facing south.



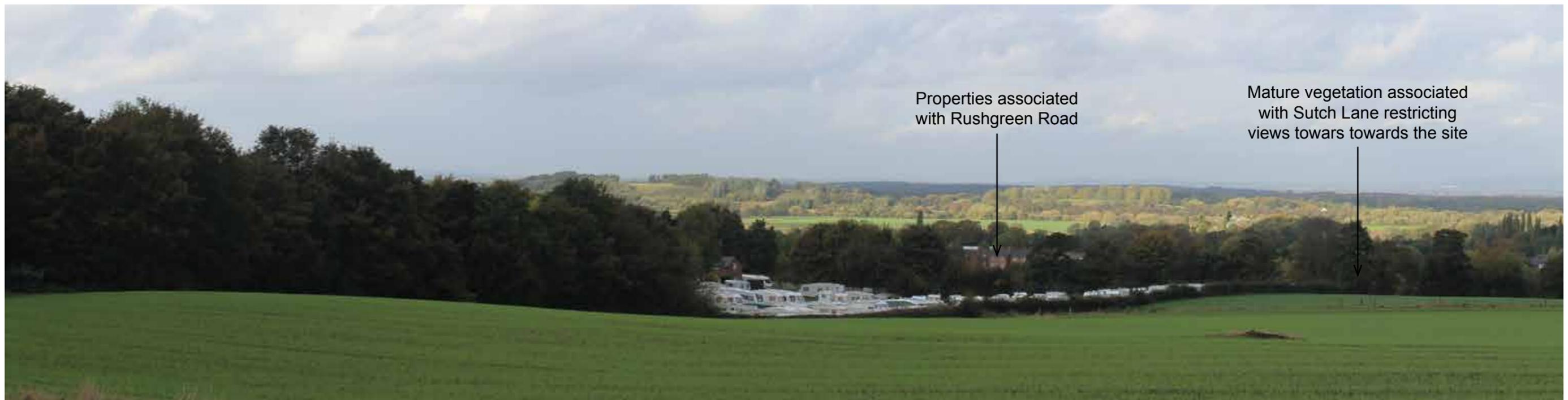
Photoviewpoint 9: View from publicly accessible track to the east of the site facing south west.



Photoviewpoint 10: View om Reddish Lane, part of the Trans Pennine Trail, Public Right of Way (ref: LymmBR46) approximately 230m from the application site boundary, facing south.



**Photoviewpoint 11:** View from Public Right of Way (ref: LymmFP34) approximately 320m from the application site boundary, facing south west

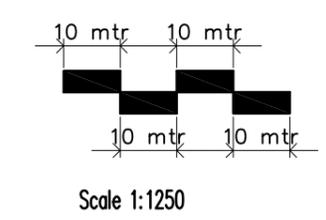
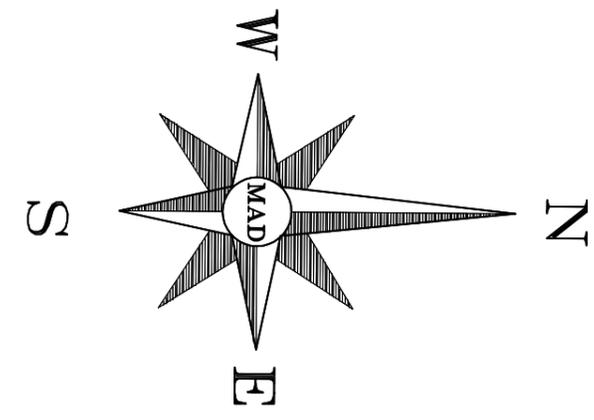


**Photoviewpoint 12:** View from Public Right of Way (ref: LymmFP30) between Longbutt Lane and St Peter's Church of England, approximately 470m from the application site boundary, facing north west.



## **Appendix 1: Maybin Architectural Design – Planning Layout**

PURPOSE OF ISSUE	PLANNING
<small>All dimensions shall be verified by the Contractor(s) on site prior to work commencing and relevant orders being placed.  Do not scale from this drawing and only work to written dimensions.  Any discrepancies to be brought to the attention of the Contract Administrator for instructions prior to proceeding.</small>	



# Maybin Architectural Design

PROJECT:  
TANYARD FARM  
LYMM  
DRAWING:  
DEVELOPMENT SITE  
B1/B8/D2 UNITS

Hatherlow House  
Hatherlow  
Romiley  
Stockport  
SK6 3DY

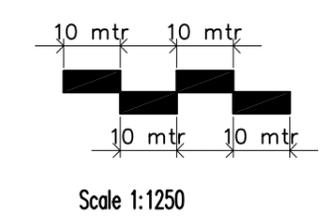
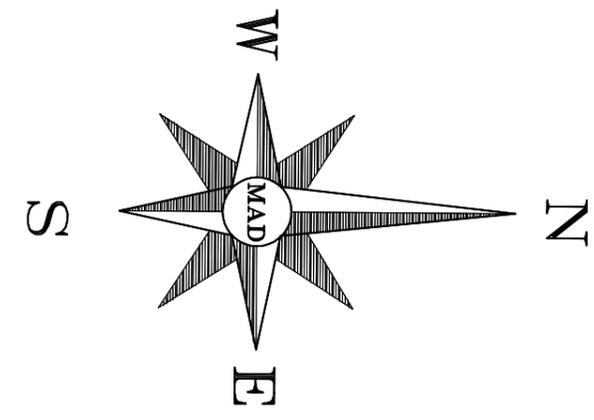
DATE:	DRAWN BY:	CHECKED BY:
May 14	ARC	CPM
SCALE:	DRAWING NO:	REV:
1:1250	1001-SK10	F

Tel: 0161 494 2800  
Fax: 0161 406 7444  
email: cpmaybin@btinternet.com



B1/B8/D2  
UNITS  
3,251 sq.m  
35,000sq.ft  
82 Cars  
1 per 40sq.m

PURPOSE OF ISSUE	PLANNING
<small>All dimensions shall be verified by the Contractor(s) on site prior to work commencing and relevant orders being placed. Do not scale from this drawing and only work to written dimensions. Any discrepancies to be brought to the attention of the Contract Administrator for instructions prior to proceeding.</small>	



3 -	1050 sq.m	3675 cu.m
6 -	429 sq.m	1501 co.m
9 -	1323 sq.m	3969 cu.m
11 -	644 sq.m	2576 cu.m
12 -	390 sq.m	1365 cu.m
14 -	810 sq.m	3240 cu.m
	4,646 sq.m	16,326 cu.m

# Maybin Architectural Design

PROJECT:  
TANYARD FARM  
LYMM

DRAWING:  
LOCATION PLAN INDICATING  
BUILDINGS TO BE DEMOLISHED

DATE:	DRAWN BY:	CHECKED BY:
July 14	ARC	CPM
SCALE:	DRAWING NO:	REV:
1:1250	1001-SK12	C

Hatherlow House  
Hatherlow  
Romley  
Stockport  
SK6 3DY

Tel: 0161 494 2800  
Fax: 0161 406 7444  
email: cpmaybin@btinternet.com

# Ascerta

Landscape, Arboricultural & Ecological Solutions  
for the Built Environment

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## Amphibian Survey Report

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Tanyard Farm  
Lymm  
Cheshire

---

June 2015

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Revision	Date	Description

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**Tanyard Farm, Lymm, Cheshire**

**Amphibian Survey Report**

**For**

**Majornet Ltd  
PO BOX 64  
Lymm  
WA13 0FX**

**05 June 2015**

<b>Field Work by</b>	Dr Rosalind King MCIEEM and Mr Neil Everett GradCIEEM
<b>Document Author</b>	Mr Neil Everett GradCIEEM
<b>Technical Review</b>	Dr Rosalind King MCIEEM
<b>QA Review &amp; Approval</b>	Alistair McLeod

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Appendix 1           Drawing P.328.13.02 *Surveyed Water body Location*

Appendix 2           Habitat Suitability Index and Environmental DNA (eDNA) Results

Appendix 3           P.328.13 Ascerta Consulting Report on Amphibian Survey Tanyard Farm,  
Lymm August 2013

Appendix 4           WC1067 *Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5: Technical Advice Note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford (Biggs J, et al 2014).*

## EXECUTIVE SUMMARY

Ascerta was instructed to carry out a great crested newt (*Triturus cristatus*) survey at the proposed development at Tanyard Farm, Lymm, Warrington.

The site was visited on 6<sup>th</sup>-7<sup>th</sup> May and 11<sup>th</sup>-12<sup>th</sup> May 2015 by Dr Rosalind King MCIEEM (Great crested newt (GCN) survey licence number 2015-9641-CLS-CLS) and Neil Everett BSc (Hons) Grad CIEEM. At this time environmental DNA (eDNA) sampling and traditional presence / absence surveys for great crested newt were carried out.

There were no great crested newts found in the waterbodies and ditches surveyed and eDNA testing returned a negative result for GCN eDNA.

It is therefore considered that great crested newts are not using the waterbodies or habitats on the site. The works proposed will not be detrimental to the maintenance of the population of great crested newt at a favourable conservation status in their natural range. Great crested newts therefore need no further consideration within the planning application.

Smooth newt, common toad and common frog were recorded during the surveys carried out in 2013. Frog tadpoles were recorded in pond P1 and ditch D1 during the surveys carried out in May 2015. Smooth newts were recorded in P3. As three species of amphibian were recorded within pond P1, it is therefore a Habitat of Principal Importance. Pond P1 will be retained within the proposals.

In order to meet the requirements of national and local legislation the following is recommended:

1. Appropriate management of pond P1 for the long term to maintain the conditions favourable for the amphibian species currently present within the pond;
2. Control of duckweed and invasive species such as Japanese knotweed and Himalayan balsam to improve the pond and surrounding habitats for amphibians. Control of invasive species can be carried out over the spring and summer, but as the species are near water, this restricts certain control methods. Methods should be detailed within an Invasive Species Management Plan;
3. Relocation of the smooth newt population within P3 to P1 if this habitat is to be lost during the newt breeding season;
4. Any pond works to P1 should be carried out over winter so as not impact on amphibians breeding within the pond;
5. Any terrestrial works such as rubble pile removal, should be carried out between February and April when the amphibians are more likely to be within the pond and not within the rubble refugia.

## 1.0 Introduction

Ascerta has been instructed by Majornet Ltd to carry out an amphibian survey at a proposed development at Tanyard Farm, Lymm, Cheshire (hereafter referred to as the site). The site OS grid reference is SJ 690 875.

The surveys were conducted by Dr Rosalind King MCIEEM (great crested newt survey licence number 2015-9641-CLS-CLS) and Neil Everett BSc (Hons) Grad CIEEM on 6<sup>th</sup>-7<sup>th</sup> May and 11<sup>th</sup>-12<sup>th</sup> May 2015. The surveys were carried out in accordance with *Great crested newt mitigation guidelines (English Nature 2001)* and *Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5: Technical Advice Note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford (Biggs J, et al 2014)*. This report presents the results of the surveys and includes recommendations for further actions where applicable in order to satisfy current wildlife legislation and in order to achieve our client's objectives.

The site had previously been surveyed for great crested newts by Ascerta. The surveys were conducted by David Pollard BSc (Hons.) between 29<sup>th</sup> May and 13<sup>th</sup> June 2013. The findings of this survey are presented in the Ascerta Amphibian Survey Report, August 2013 (Appendix 3).

## 2.0 Objectives

Our client's objectives are to determine if great crested newts are present on the site so as to identify suitable mitigation as required during any future potential development of the site.

Our objectives are as follows:

- Update previous amphibian surveys carried out on the site;
- Provide recommendations to assist our clients in achieving their objectives whilst satisfying current wildlife legislation.

### 3.0 Relevant Legislation

The great crested newt is fully protected under the Wildlife and Countryside Act, 1981 (as amended) and the Conservation (Natural Habitats, &c.) Regulations, 2010 (as amended 2012). This legislation makes it an offence to:

- Deliberately (or intentionally) kill, injure or capture (or take) a great crested newt, or great crested newt egg or eft;
- Deliberately (intentionally) damage or destroy any breeding site or resting place (i.e. pond, refuge, hibernaculum);
- Deliberately or recklessly obstruct access to any breeding site or resting place;
- Deliberately, intentionally or recklessly disturb a great crested newt, in particular disturbance which is likely to:
  - impair the ability of the great crested newt to survive, breed, reproduce, or to rear or nurture young;
  - impair the ability of the great crested newt to hibernate or migrate; or
  - significantly affect the local distribution or abundance of great crested newts

The great crested newt is a Species of Principal Importance under Section 74 of the Countryside and Rights of Way Act, 2000 and was a UK Biodiversity Action Plan priority species.

The great crested newt is listed as a Species of Principal Importance under section 41 of the NERC Act, and is a material consideration in planning decisions. Planners require relevant, up to date information from ecological surveys in order to assess the effects of a proposed development on biodiversity as Councils have a statutory obligation under section 40 of the NERC Act to consider biodiversity conservation in the determination of planning applications.

## 4.0 Survey Methods

### 4.1 Desk Study

A review of ponds within 250m of the application site the site has been undertaken using the Multi-Agency Geographic Information for the Countryside (MAGIC) and the Natural England websites.

A review of UK and Local priority species known to occur in the region of the site has been undertaken using the Joint Nature Conservation Committee website and local records from Cheshire RECORD.

### 4.2 Field Survey

Two survey visits were made to the site. Environmental DNA (eDNA) samples were collected on the first visit (6<sup>th</sup> May 2015) prior to placing the bottle traps. The water bodies on site were assessed to determine the Habitat Suitability Index (HSI) to ascertain likelihood of great crested newts using the water bodies on site for breeding.

#### Great Crested Newt Habitat Suitability Index (HSI)

Water bodies (P1, P2 and P3) and ditches (D1, D2 and D3) were assessed for suitability as great crested newt breeding habitat. The HSI assessment followed the method described by Oldham *et al.* (2000) as updated by ARG UK (2010), involving an assessment of each water body against ten suitability indices:

- Location of the pond within the context of Britain;
- Total surface area of the pond;
- Pond drying (based on both local knowledge and field evidence);
- Water quality;
- Percentage perimeter shaded;
- Presence or absence of waterfowl;
- Presence or absence of fish;
- Number of water bodies situated within 1km;
- Suitability of terrestrial habitat; and
- Percentage of macrophyte cover.

The HSI is calculated using an equation producing a single number between 0 and 1. The value provides an indication of whether the water body is likely to support a population of great crested newts. The lower the Index the less likely the location is to support a breeding population. Ponds are classed as Poor, Below Average, Average, Good or Excellent habitat suitability based on this value. More detailed surveys for great crested newts are usually only considered necessary on ponds with an Average or above suitability to support a great crested newt breeding population.

## 4.0 Survey Methods (Continued)

### Great Crested Newt Presence / Absence Survey

The great crested newt survey followed the methods set out by English Nature (2001) and Biggs et al, 2014, making use of the following survey methods where appropriate for each water body (in brackets) on the site:

- Great crested newt eDNA sampling (P1);
- Bottle trapping using traps made from 2 litre plastic bottles (P1, P3, D2, D3);
- Egg search where suitable vegetation exists (P1, P3, D2, D3);
- Torch survey using a CluLite SmartLite 1,000,000 candlepower torch (P1, P3, D1, D2).

### Great Crested Newt eDNA Sampling

The eDNA sampling followed the methods detailed in WC1067 Biggs et al, 2014 (Appendix 4).

## 4.3 Limitations

Turbidity of the water and duckweed cover prevented torching of some of the ponds and ditches on different occasions, but did not prevent bottle trapping, egg searching or sampling for eDNA. One of the ditches (D1) was too shallow to be bottle trapped but could be torched. Water body P2 had no standing water and was not considered to be suitable great crested newt breeding habitat so was not surveyed.

Water body P3 was a recently excavated scrape in a grassy field and had not been subject to surveys in the past (2013). Only one survey visit was undertaken at P3, however due to the size and nature of the water body it could be fully surveyed for newts.

Access was not possible to some areas of the ponds due to the steepness of the bank and vegetation cover but a sufficient number of bottle traps could be placed to sample the ponds and ditches on site. Therefore it is not considered that these restrictions limit the conclusions of the report.

## 5.0 Survey Results

### 5.1 Desk Survey

#### Review of Previous Surveys

The site had previously been surveyed by Ascerta Consulting Ltd. The surveys were conducted by David Pollard BSc (Hons.) between 29<sup>th</sup> May and 13<sup>th</sup> June 2013 (Class licence WML-CL08). No great crested newts were recorded during this survey. Common frog and common toad tadpoles were recorded in pond 1 during the survey.

Sticklebacks (*Gasterosteus aculeatus*) were found to be present in Pond P1. Sticklebacks are known to be predators of small newt larvae and compete for food for larger larvae and adults. The report concluded that the pond was sub optimal for GCN and that “*the development would not have a detrimental impact on GCN populations in the wider landscape*”.

#### Review of Biological Record Data

Biological records obtained from Cheshire local record centre RECORD returned no records of GCN within 1km buffer of the site

### 5.2 Field Survey

Table 1 below provides a description of the waterbodies on the site. They are marked on plan P.328.13.02 in Appendix 1. The HSI calculations are presented in Appendix 2.

**Table 1 : Waterbody Descriptions.**

Waterbody	Aquatic Habitat Description	HSI Score
Pond 1 (P1)	The pond is surrounded by goat willow, hawthorn and silver birch with bramble on the banks in places. Bulrush is growing within the pond and along the margins. The pond had a covering of duckweed which is dense in some parts. Building rubble has been used to form a bund to the north and west of the pond which is overgrown with tall ruderal vegetation. Indian balsam is also growing around the pond.	0.76 (Good)
Pond 2 (P2)	This is overgrown with vegetation including goat willow, bulrush, common nettle and willowherb. The pond did not have any water within it, although a muddy area indicated it holds water occasionally.	0.44 (Poor)
Waterbody (P3)	The waterbody is formed in a scrape between two grass covered bunds. There is a hair algae bloom within the water. The floor of the pond is covered with grass and the pond may not hold water throughout the year.	0.54 (Below Average)
Ditch (D1)	This ditch has clear, shallow (less than 5cm deep) water slowly running through it. The banks of the ditch are overgrown with willow and tall ruderal, species including common nettle, broad-leaved dock and bramble.	0.44 (Poor)
Ditch (D2)	The ditch has bramble and tall ruderal species growing along the banks and is shaded by trees which include oak and hawthorn. Patches of floating sweetgrass are growing within the water. The ditch has discarded rubbish within it.	0.44 (Poor)
Ditch (D3)	This ditch is densely colonised with duckweed.	0.43 (Poor)

## 5.0 Survey Results (Continued)

The HSI scores indicated that pond P1 was the most likely pond for great crested newts, if present in the area, to use as a breeding site. Therefore eDNA sampling was only undertaken at this pond. The other water bodies were not considered suitable for eDNA sampling either due to their low HSI scores or as they were too shallow to sample without risk of contaminating the water with sediment.

In order to confirm the results of the eDNA survey, and to ensure sufficient surveys could be fitted in within the great crested newt survey season should the eDNA results come back positive, two traditional presence / absence surveys were undertaken at Pond 1. These surveys were also undertaken on P3, D1, D2 and D3, although only 1 bottle trapping survey was undertaken at P3 and D3. Pond 2 was not included within the surveys due to the lack of water and the dense encroaching vegetation. The off-site pond (to the west of the site) that was not included in the previous survey due to the presence of large fish and little or no vegetation was also not surveyed. This pond now falls outside the 250m buffer zone as the site boundary has been amended.

No great crested newts were recorded during the presence / absence survey. The maximum number of smooth newts recorded during the surveys was 9 within water body P3.

Tadpoles were recorded in pond P1 and ditch D1. The survey results are presented in table 2 and table 3.

Weather conditions during the eDNA sampling and the presence / absence surveys were as follows:

- 6<sup>th</sup> May 2015 evening 10°C - 7°C, wind Beaufort scale F3 gentle breeze gusting to F4 moderate breeze, dry with 7/8 cloud cover.
- 7<sup>th</sup> May 2015 morning 10°C, wind Beaufort scale F1 light air, earlier light showers with 8/8 cloud cover.
- 11<sup>th</sup> May 2015 evening 17°C - 11°C, wind Beaufort scale F2 light breeze, mild with 5/8 cloud cover clearing.
- 12<sup>th</sup> May 2015 morning 12°C, wind Beaufort scale F2 light breeze, sunny with odd light rain shower, 7/8 cloud cover.

## 5.0 Survey Results (Continued)

### Great Crested Newt Presence / Absence Survey Results

**Table 2: Survey results 6<sup>th</sup> and 7<sup>th</sup> May 2015 (great crested newt GCN, smooth newt SN).**

Water body	Number of Traps	GCN Trapped	GCN Eggs	GCN Torch	Other Newts Trapped	Other newts Torch	Eggs	Other species
Pond (P1)	26	None	None	None	2 adult (male) SN 1 adult (female) SN	3 unidentified small news (not GCN) 1 adult (male) SN 1 adult (female) SN	None	Tadpoles, great diving beetle, mayfly larvae
Water body (P3)	Not surveyed	-	-	-	-	-	-	-
Ditch (D1)	Too shallow to trap	n/a	None	No suitable vegetation	n/a	None	No suitable vegetation	Tadpoles
Ditch (D2)	5	None	None	None	None	None	None	Snails and leeches
Ditch (D3)	Not surveyed	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table 3: Survey results 11th May 2015 (great crested newt GCN, smooth newt SN).**

Water body	Number of Traps	GCN Trapped	Eggs	Torch	Other Newts Trapped	Other newts Torch	Eggs	Other species
Pond (P1)	25	None	None	Unsuitable for torching due to duckweed cover	3 adult (male) SN	Unsuitable for torching due to duckweed cover	None	Tadpoles, great diving beetle
Water body (P3)	3	None	None	None	None	6 adult (male) SN 3 adult (female) SN	SN	None
Ditch (D1)	Too shallow to trap	n/a	None	None	None	None	None	Tadpoles
Ditch (D2)	5	None	None	None	None	None	None	Snails and leeches
Ditch (D3)	2	None	None	Unsuitable for torching due to duckweed cover	None	Unsuitable for torching due to duckweed cover	None	None

## 5.0 Survey Results (Continued)

### Great Crested Newt eDNA Sampling

Water samples from pond P1 were collected to test for great crested newt eDNA by Dr Rosalind King (a suitably licensed ecologist) on 6<sup>th</sup> of May 2015. No other eDNA samples were taken as the other waterbodies on the site were not of sufficient size or depth to sample effectively for eDNA and had low HSI scores indicating they were less likely to be used by great crested newts for breeding.

The eDNA samples returned a negative result for great crested newt. These results are shown in Appendix 2. On receipt of the negative GCN eDNA result, bottle trapping was not continued, as a negative eDNA result collected between 15<sup>th</sup> April and 30<sup>th</sup> of June is accepted as evidence of low probability of great crested newts being present by Natural England for planning applications.

## 6.0 Conclusions & Recommendations

There were no GCN noted during the two traditional surveys and the eDNA test returned a negative result for the presence of GCN eDNA. It is therefore considered that the works proposed will not be detrimental to the maintenance of the population of great crested newt at favourable conservation status in their natural range. Great crested newts need no further consideration for the current planning application.

The site does support populations of smooth newt, common toad (a UK BAP species) and common frog. Common toad and common frog were recorded during the survey carried out of pond 1 in 2013. Tadpoles were also recorded in pond P1 and ditch D1 during the surveys carried out in May 2015. Smooth newts were recorded in water body P3.

As pond P1 supports three species of amphibian, it is classified a Habitat of Principal Importance. However, it will be retained within the proposals, with the potential for enhancement and more appropriate management. More detailed recommendations for ensuring protection of amphibians and pond habitat during and after site works are provided within Ascerta Update Ecological Appraisal Report, June 2015. In summary, these include:

1. Appropriate management of pond P1 for the long term to maintain the conditions favourable for the amphibian species currently present within the pond;
2. Control of duckweed and invasive species such as Japanese knotweed and Himalayan balsam to improve the pond and surrounding habitats for amphibians. Control of invasive species can be carried out over the spring and summer, but as the species are near water, this restricts certain control methods. Methods should be detailed within an Invasive Species Management Plan;
3. Relocation of the smooth newt population within P3 to P1 if this habitat is to be lost during the newt breeding season;
4. Any pond works to P1 should be carried out over winter so as not impact on amphibians breeding within the pond;
5. Any terrestrial works such as rubble pile removal, should be carried out between February and April when the amphibians are more likely to be within the pond and not within the rubble refugia.

## 7.0 References

ARG UK (2010) *Advice Note 5: Great Crested Newt Habitat Suitability Index* English Nature (2001) *Great Crested Newt Mitigation Guidelines*;

Biggs J et al (2014). *Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5: Technical Advice Note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

English Nature (2001) *Great crested newt mitigation guidelines*. Available at: <http://publications.naturalengland.org.uk/publication/810429> [Accessed 26/05/2015].

Joint Nature Conservation Committee (JNCC). *The UK Biodiversity Action Plan (UK BAP)* [online] Available at: [www.jncc.defra.gov.uk/page-5155](http://www.jncc.defra.gov.uk/page-5155) [Accessed 26.05.2015].

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) *Evaluating the suitability of habitat for the great crested newt (Triturus cristatus)*. Herpetological Journal, Vol. 10 pp.1

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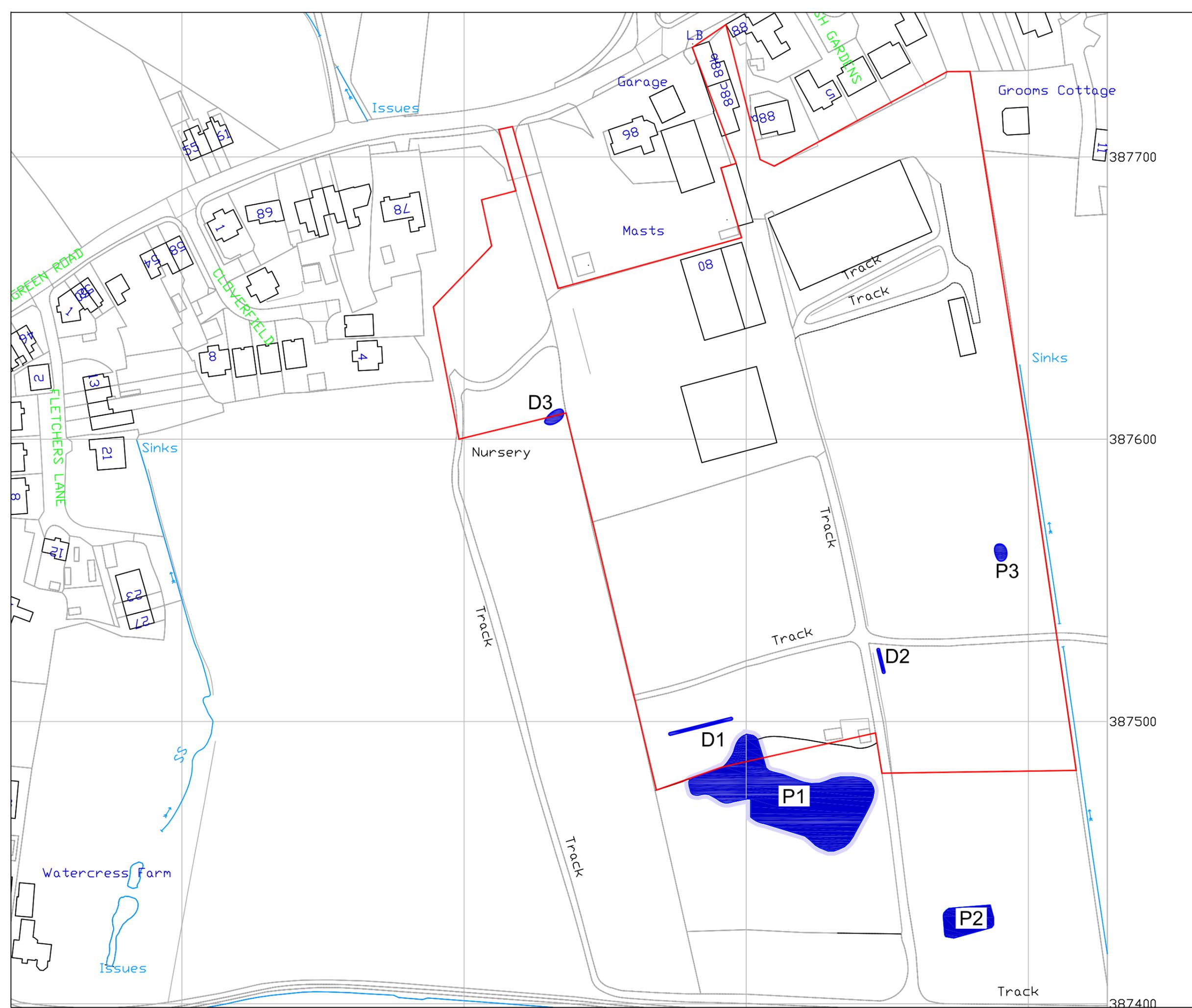
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# Appendix 1

KEY

 P1 Pond and ditch location

 Red line boundary



REV	DESCRIPTION	DATE
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 Arena Developments

PROJECT:  
 Tanyard Farm, Lymm

DRAWING TITLE:  
 Surveyed Waterbody Locations

SCALE: 1:1250@A3	DRAWN BY: CP	DRAWING No: P.328.13.02	REV: -
DATE: 07/05/2015	CHKD BY: NE		

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## Appendix 2

### Great Crested Newt Habitat Suitability Index Calculations

Pond Number	P1	P2	P3	D1	D2	D3
<p><b>Geographic location.</b> The three Geographic regions are based on the known distribution of the species and are defined as Optimal, Marginal or Unsuitable.</p> <p style="text-align: right;"><b>S1 Value:</b></p>	optimal  1	optimal  1	optimal  1	optimal  1	optimal  1	optimal  1
<p><b>Pond Area</b> The optimum size is 400-800m<sup>2</sup> with ponds smaller or larger than this the HSI score is reduced.</p> <p style="text-align: right;"><b>S2 Value:</b></p>	1183  0.92	24  0.05	10  0.02	8  0.02	14  0.03	12  0.02
<p><b>Pond Permanence</b> The optimum is that a pond rarely dries rather than never drying. One of four categories based on the number of likely dry years in ten is assigned.</p> <p style="text-align: right;"><b>S3 Value:</b></p>	Never  0.90	Annually  0.10	Sometimes  0.50	Sometimes  0.50	Annually  0.10	Annually  0.10
<p><b>Water Quality</b> Although adults are relatively tolerant of pollution, the gill-breathing larvae are not. As such the score increases with water quality and one of four categories of oxygenation and obvious pollution based on invertebrate indicators are assigned.</p> <p style="text-align: right;"><b>S4 Value:</b></p>	moderate  0.67	bad  0.01	moderate  0.67	bad  0.01	bad  0.01	bad  0.01
<p><b>Pond Shading</b> Perimeter shading of the pond can increase the nutrient level and enhance productivity, however excess shading can cause an increase in organic content and cause eutrophication. The optimum amount of shade is 0-60% with the HSI score decreasing beyond this.</p> <p style="text-align: right;"><b>S5 Value:</b></p>	40  1.00	100  0.20	0  1.00	95  0.30	85  0.50	80  0.60

Pond Number	P1	P2	P3	D1	D2	D3
<p><b>Presence of Waterfowl</b></p> <p>High densities of waterfowl can damage aquatic vegetation and are detrimental to water quality owing to nutrient enrichment. One of four categories is assigned depending on the impact of waterfowl.</p> <p style="text-align: right;"><b>S6 Value:</b></p>	minor 0.67	absent 1	absent 1	absent 1	absent 1	absent 1
<p><b>Presence of Fish</b></p> <p>Some fish predate and/or compete with newt larvae. One of four categories is assigned depending on likelihood and species present: Major, Minor, Possible or Absent.</p> <p style="text-align: right;"><b>S7 Value:</b></p>	minor 0.33	absent 1.00	absent 1.00	absent 1.00	absent 1.00	absent 1.00
<p><b>Local Pond Density</b></p> <p>GCN populations are not considered to be viable with a pond density of less than 0.7 ponds per km<sup>2</sup>. The number of ponds within 1km are recorded.</p> <p style="text-align: right;"><b>S8 Value:</b></p>	2 0.56	2 0.56	2 0.56	2 0.56	2 0.56	2 0.56
<p><b>Local Amount of Suitable Terrestrial Habitat</b></p> <p>GCNs are also reliant on good terrestrial habitat. Four categories are assigned depending on the availability and extent of suitable terrestrial habitat: good, moderate, poor or none.</p> <p style="text-align: right;"><b>S9 Value:</b></p>	moderate 0.67	moderate 0.67	moderate 0.67	moderate 0.67	moderate 0.67	moderate 0.67
<p><b>Macrophyte (aquatic plant ) Cover</b></p> <p>Macrophytes provide cover, food for prey and egg laying material, although large density restricts vital GCN behaviour e.g. Courtship. 70-80% macrophyte cover is optimal with the HSI score falling above and below this amount.</p> <p style="text-align: right;"><b>S10 Value:</b></p>	60 0.91	100 0.80	30 0.61	0 0.31	20 0.51	10 0.41
<b>HSI Score</b>	0.76	0.44	0.54	0.44	0.44	0.43
<b>Natural England Classification</b>	Good	Poor	Below Average	Poor	Poor	Poor



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Sample/Report ID: 2015-442

Condition on Receipt: Good

Visual Inspection of Volume: Passed

Client Identifier: Tanyard P1

Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 12/05/15

Material Tested: DNA extracted from pond water samples

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Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	19/05/15

---

Report Prepared by:

Dr Helen Rees

Report Issued by:

Dr Ben Maddison

Signed:

Signed:

Position:

Senior Research Scientist

Position:

Team Leader: Biotechnology

Date of preparation:

19/05/15

Date of issue:

20/05/15

*Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.*

## Appendix 1: qPCR GCN eDNA analysis results breakdown

### q-PCR GCN eDNA analysis Results

Experimental Samples	Number of Positive Replicate Reactions*
Extraction Blank	0 of 12
Tanyard P1	0 of 12
Controls	Number of Positive Replicate Reactions*
Negative PCR Control (Nuclease Free Water)	0 of 4
Positive Control GCN DNA 10 <sup>-1</sup> ng/μL	4 of 4
Positive Control GCN DNA 10 <sup>-2</sup> ng/μL	4 of 4
Positive Control GCN DNA 10 <sup>-3</sup> ng/μL	4 of 4
Positive Control GCN DNA 10 <sup>-4</sup> ng/μL	4 of 4
Inhibition Control	Number of Positive Replicate Reactions at Expected C <sub>t</sub> value <sup>†</sup>
Inhibition Control	2 of 2
Degradation Control	
Expected rate of decay	None expected within time frame
Actual rate of decay	Within Limits

\* A sample is considered as positive for great crested newt if any of the replicates are positive.

<sup>†</sup> If the expected C<sub>t</sub> value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

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## Appendix 3

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## Amphibian Survey

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Tanyard Farm, Lymm,  
Cheshire

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August 2013

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## **1.1 Introduction**

- 1.2** Ascerta Consulting Ltd has been instructed to carry out an amphibian survey at a proposed development site at the Tanyard Farm Site, Lymm, Cheshire.
- 1.3** The surveys were conducted by David Pollard BSc (Hons.) between 29<sup>th</sup> May and 13<sup>th</sup> June 2013.
- 1.4** This report presents the results of the surveys and includes recommendations for further actions where applicable in order to satisfy current wildlife legislation and in order to achieve our client's objectives.
- 1.5** Reference should be made to the Report on Ecological Issues by Ascerta Consulting Ltd dated August 2013, which contains a plan of the site indicating the location of the ponds and water bodies surveyed.

## **2.0 Relevant legislation**

- 2.1** Great crested newts (GCN) are fully protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). They are also European Protected Species under Schedule 2 of the Conservation of Habitats and Species Regulations 2010.

### 3.0 Survey Methodology

- 3.1 Great crested newt (GCN) surveys comprise a series of intense surveys of all water bodies within 250m of site.
- 3.2 Guidelines<sup>1</sup> state that at least three methods (from netting, torching, bottle trap and egg searching) should be used for initially four visits. If GCN are found to present in any of the water bodies surveyed, then a further two surveys are necessary to determine population size. Weather recordings and water temperature were taken during the surveys, the details of which can be found within Table 3.1 below.

Survey Date	Air Temperature	Water Temperature	Weather
29 <sup>th</sup> May	14°C	7°C	Warm and sunny
4 <sup>th</sup> June	11°C	5°C	Showery and cloudy
8 <sup>th</sup> June	13°C	6°C	Warm overcast
13 <sup>th</sup> June	12°C	5°C	Warm and sunny

*Table 3.1 Survey Dates, Weather Conditions and Water Temperatures*

### 4.0 Limitations

- 4.1 Great Crested Newt surveys should preferably be carried out between April and June, therefore these surveys are borderline sub optimal. However, given the fact that early Spring was one of the coldest on record, GCN reproduction in ponds was likely to have been delayed, therefore the timing of the surveys is considered to be acceptable in this instance.

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<sup>1</sup> Natural England (2001) Great Crested Newt Mitigation Guidelines

## 5.0 Results

5.1 The GCN survey concentrated on the large on-site pond and the small stream. The smaller on site pond was disregarded due to the lack of water and encroaching vegetation and the off-site pond was disregarded due to the presence of large fish and little or no vegetation.

The survey results are presented in Table 5.1 and Table 5.2.

Date	GCN	Eggs	Other Newts	Eggs	Other species
29 <sup>th</sup> May 2013	-	-	-	-	Frog and toad tadpoles, sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
4 <sup>th</sup> June 2013	-	-	-	-	Frog and toad tadpoles, sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
8 <sup>th</sup> June 2013	-	-	-	-	Frog and toad tadpoles, sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
13 <sup>th</sup> June 2013	-	-	-	-	Frog and toad tadpoles, sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles

*Table 5.1 Survey Results for the Large Pond*

Date	GCN	Eggs	Other Newts	Eggs	Other species
29 <sup>th</sup> May 2013	-	-	-	-	Sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
4 <sup>th</sup> June 2013	-	-	-	-	Sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
8 <sup>th</sup> June 2013	-	-	-	-	Sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles
13 <sup>th</sup> June 2013	-	-	-	-	Sticklebacks, inverts included hog louse, mayfly larvae, daphnia and dysticid beetles

*Table 5.2 Survey Results for the Small Stream*

## **6.0 Conclusions and Recommendations**

- 6.1** There were no GCN noted in the ponds surveyed and it is not considered that any were missed due to the late survey time table. At this point it has to be noted that the frog and toad tadpoles observed did not exhibit the level of development one would normally associate with this time of year. In previous years surveys during late May and early June, frog tadpoles were observed to have rear legs with front legs forming and the toad tadpoles had rear legs. During this survey they were only developing limbs by the time of the last survey towards the middle of June. This lack of development would appear to indicate that the unseasonably cold spring has delayed amphibian reproduction this year. Another factor could be water temperature; despite the relatively warm air temperature the water temperature was cold due to shading and the covering of duckweed.
- 6.2** The presence of sticklebacks (*Gasterosteus aculeatus*) is an indicator that this pond is sub optimal for GCN due to the fish being a predator of smaller newt tadpoles and a competitor for food for larger newt tadpoles and adults.
- 6.3** The results of the survey indicate that the proposed development of the site will not have any detrimental impact on GCN populations in the wider landscape.

## **7.0 References**

English Nature (2001) *Great crested newt mitigation guidelines*. Available at: <http://publications.naturalengland.org.uk/publication/810429> [Accessed 08/07/2013].

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## Appendix 4

# Analytical and methodological development for improved surveillance of the Great Crested Newt

WC1067

## Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA



**This report should be cited as:**

Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

**Version Control**

Document date: 30 September 2014

Version Number: 1.1

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## 1. Scope of document

Environmental DNA (eDNA) is nuclear or mitochondrial DNA that is released from an organism into the environment. Sources of eDNA include secreted faeces, mucous, and gametes; shed skin and hair; and carcasses. In aquatic environments, eDNA is diluted and distributed in the water where it persists for 7–21 days, according to the detection limits of qPCR approaches and associated fragment sizes, and depending on environmental conditions (Biggs et al. 2014). Recent research has shown that the DNA from a range of aquatic organisms can be detected in water samples at very low concentrations using qPCR (quantitative Polymerase Chain Reaction) methods.

This document provides technical advice for laboratories and field staff collecting and analysing samples for qPCR analysis of great crested newt (*Triturus cristatus*) environmental DNA. The document:

- Sets out the standards required
- Sets out field and laboratory approaches for screening the presence/absence of the great crested newts
- Is designed to deliver a consistent approach, and hence comparable data, between laboratories for use in decision making.

Deviations from this protocol will need to demonstrate equivalence.

This document is based mainly on research undertaken during Defra project WC1067 “Analytical and methodological development for improved surveillance of the great crested newt” (Biggs et al. 2014). We advise that this report is used as a reference document for those carrying out great crested newt surveys using the methods described here.

## 2. Quality assurance and quality control

The methods described in this technical advice note are designed to reduce as far as possible the risk of field or laboratory generated false positive and false negative results. Quality control measures must be extended to sample collection, preservation and handling, as well as laboratory protocols, since assurances of sample quality will prove critically important to the avoidance of false negatives.

The field of aquatic eDNA is developing rapidly and it is likely that, as methods evolve, appropriate updates will need to be made to the processes detailed in this technical advice note.

### 2.1 Laboratory standard

Laboratories undertaking eDNA analysis should be able to demonstrate adequate quality assurance standards. Typically these will comprise a documented quality management system which would usually follow, or be equivalent to, the outline of ISO/IEC 17025 standard.

Ultimately it may be necessary to develop a proficiency testing scheme for eDNA analysis to enable the identification of laboratories certified as achieving the appropriate level of proficiency with the eDNA methods. At present a proficiency testing scheme for eDNA is not available because an appropriate proficiency testing methodology has not been established. Further research and development work will be needed to establish such a scheme.

In the meantime, agencies and organisations may wish to include samples from ponds known to support great crested newt and samples from sites known to be free from great crested newts to validate sampling programmes.

## 2.2 Sample acceptance

The laboratory analysing eDNA water samples should have a standard and documented sample acceptance procedure in place. This should include:

- Date and time of sample receipt
- Sample condition (i.e. has the sample container been damaged in any way)
- A visual verification of the sample volume (to detect any leakages)
- A note to confirm appropriate handling in transit (e.g. courier packaging intact).

The receiving laboratory should transfer the sample number to the sample acceptance record at this point.

## 2.3 Stability of field sampling kits

The stability of field sampling kits should be assessed through the use of an appropriate artificial DNA marker to check for unexpected decay of DNA between sampling and sample analysis. Details of the marker used, expected rates of decay and actual decay rates should be published alongside eDNA results for the target species. The marker can be chosen by the laboratory or the marker used in WC1067 can be purchased from Spygen.

## 2.4 Outcome required

Biggs et al. (2014) achieved a Limit of Quantification of  $3 * 10^{-3}$  ng/L: at present there is no evidence that great crested newt eDNA can be quantified with precision and accuracy below this level. Failure to achieve detection at this limit will lead to increased risk of false negative results for sites where great crested newt occur at low density. There should be no detection of closely related species. In the case of the great crested newt in the UK, the risk is mainly of detecting the Italian crested newt (*Triturus carnifex*) which is present at a few of locations. The primers and probe were also tested on tissue samples of marbled newt (*Triturus marmoratus*). None of these samples were amplified, confirming the suitability of the primer pair and probe for the great crested newt. The primers and probe also did not bind with the DNA of other UK native newts (smooth and palmate newt) which are in the genus *Lissotriton*.

## 2.5 Identification of risks of false positives and false negatives

There are risks of both false positives and false negatives in eDNA analysis (Darling and Mahon, 2011). Errors can occur in both field and laboratory stages of the work. Given the test's sensitivity it appears that the main risk from contamination will be from false positives.

The main risks, and their mitigation for great crested newt eDNA work, are:

- (i) Molecular assay design: mitigated in research and development phase of primer and probe design. Salt free primers should be used. The quality of the primer and of the PCR mix is assured by the standards.
- (ii) Laboratory quality control: mitigated by laboratory design and process control.
- (iii) Sampling design: mitigated by site selection procedures in field monitoring programmes.
- (iv) Uncertainty in the relationship between presence of target DNA and presence of viable target organisms: mitigated partially by research so far undertaken, and by future research increasing knowledge of great crested newt eDNA.

Table 1 summarises information on situations which may have an increased risk of generating false negatives and false positives, and potential ways to mitigate these risks. For the field sampling protocol, the risk of contamination may be greater for specialist contractors undertaking large numbers of great crested newt surveys compared to volunteers making infrequent visits to a small number of sites.

**Table 1. Risk, and mitigation, of false positives and false negatives**

Risk factor	Mitigation
<b>Field-based false positives</b>	
Cross contamination between sites (due to equipment, clothing etc.).	Ensure that there is no contact between contaminated material and the water being preserved in the sampling process.
Inflows, bringing eDNA from sites with newts into unoccupied ponds. Note that there is so far little evidence that this is a significant problem but it is a theoretical possibility.	This risk cannot be eliminated at present and its extent is not understood. Where ponds have inflows, survey teams will have to make judgements about the likely impact of any inflow. However, the majority of great crested newt ponds lack substantial inflows. The presence/absence of inflows, and whether they are wet or dry at the time of survey should be recorded in field notes.
Aquatic animals (e.g. herons, water voles) transferring newt DNA between sites (e.g. in faeces, in water trapped in fur)	This risk cannot be eliminated and the extent to which it occurs is currently unknown. Further research will be required to assess whether this is a significant risk, although at present it seems likely to be small.
<b>Field-based false negatives</b>	
Low numbers of newts	This risk is minimised by following good field protocol. Note that at present the minimum number of newts that can be detected in different waterbodies is not known. However, ponds with torch counts of zero animals in the breeding season, where newts were known to be present, have provided positive eDNA results in the breeding season.
Very wide, shallow drawdown zones may increase the likelihood of collecting water samples in areas where there has been no newt activity even though the pond is currently occupied.	To access deeper water areas it is possible that the water sampler could be added to a long pole. It is important not to enter the water as sediments will be disturbed which may contain historical great crested newt DNA. Further research data on sediment DNA is likely to be available within 6-12 months to refine understanding of this issue. In all water depths it is necessary to gently stir the water throughout its depth, without disturbing sediments, as eDNA is believed to sink. It is advisable to avoid sampling very shallow water (less than 5-10 cm deep) as it may be difficult to avoid stirring up sediment in these areas.
There is evidence that DNA is less likely to be detected in water taken from densely packed mats of vegetation; either because of a lack of newt activity or because of the difficulty of sample collection in these areas.	Avoid sampling in these areas: sample from water in areas where vegetation is suitable for egg-laying and open water areas suitable for displaying.
There is evidence that eDNA is less likely to be detected if the whole pond perimeter is not sampled.	Every effort should be made to access 20 sites around the pond for sampling. Sites where 80-90% of pond margins were accessed achieved 99.3% detection rates. Attaching the sampling ladle to an extension pole may be an option for reaching a wider range of areas. Effective cleaning of the extension pole between sites is essential. The pole must be kept separate from any equipment that is in contact with newts.

**Table 1 (cont). Risk, and mitigation, of false positives and false negatives**

Risk factor	Mitigation
<b>Laboratory false positives</b>	
Contamination of eDNA sampling kits.	Mitigation is largely ensured by good laboratory design, set-up and processes, particularly separation of the sample preparation room from all other stages of the process.
Contamination during DNA amplification.	Mitigation is largely ensured by physical separation of the different stages of the PCR process, use of dedicated equipment and lab coats for each stage and a uni-directional work flow from clean to DNA contaminated rooms.
The risk of contamination in the laboratory is likely to be greatest when larger numbers of samples (>20) and multiple batches of samples are handled.	Mitigation is largely ensured by good laboratory design, set-up and processes. It is to be expected that handing of smaller batches of samples (i.e. <20 samples), in single trials, will be easier than larger throughput operations.
<b>Laboratory false negatives</b>	
Very low eDNA concentrations.	Samples with DNA amounts below the Limit of Detection will generate false negatives. It is not currently possible to mitigate this risk.

## 2.6 Laboratory specifications

### 2.6.1 How the laboratory should be set up

The set-up of an eDNA laboratory should broadly follow the outline below. Note that this is not a detailed specification for building a laboratory: rather it provides guidance on the standard which is needed.

Successful eDNA work has so far been undertaken both in laboratories designed to standards established over the last 20 years for ancient DNA (aDNA) work (Knapp et al., 2012), and in more conventional DNA labs. There is as yet no evidence available to evaluate whether these different set-ups produce different results.

The main principles of the laboratory set-up should be (PHE, 2013):

- **Physical separation of pre and post-PCR work:** to prevent amplified DNA from contaminating samples there should be physical separation of pre and post PCR stages of the work. This should include separation of the area where sampling kits are prepared.
- **Unidirectional workflow:** The arrangement of activities in the rooms should be unidirectional to reduce potential for contamination. This can be achieved by physically having one room leading to another or by set working practices.

Two potential layouts of facilities based on existing constructed systems are exemplified below (Figure 1). The simpler design has some recognised limitations which are noted in the figure. Good results are known to have been produced in higher specification laboratories. The main features of the designs are:

- **Reagent preparation clean room:** a clean DNA free room is needed for the preparation of field sampling kits. Samples containing DNA should never be brought into this room and no DNA extractions or PCRs are performed in this room<sup>1</sup>.
- **Nucleic acid extraction room:** the only area where DNA extractions are performed, and an area where PCR products and stocks of cloned material have not been handled.
- **Amplification room:** this is the area where PCR machines are housed.

The schematic designs shown in Figure 1 fulfil these criteria.

### 2.6.2 Appropriate precautions to avoid laboratory contamination

As PCR products are ubiquitous in post-PCR laboratories it is important to make sure that no consumables or equipment for the DNA facility have been sourced from laboratories which undertake post-PCR amplification analysis.

Full body suits have been adopted by some eDNA laboratories for work in the sample kit preparation room and the eDNA sample preparation room, including full body suit, face masks, face shields and hairnets. In other rooms disposable laboratory coats are sufficient. Dedicated clean room shoes are useful to reduce carry-over contamination. Wearing two pairs of gloves will prevent exposure of skin when changing gloves. However, not all laboratory managers consider 'suited-up' necessary, preferring separation of staff as the contamination control method (i.e. staff do not move between pre- and post-PCR laboratories). Those working with full body suits regard this approach as good practice for rare DNA work which generally reduces the amount of DNA present in the rooms to very low levels. Face masks reduce the breathing out of DNA which has been inhaled outside the clean rooms.

To reduce the risk of DNA contamination regular bleaching of the laboratory should be undertaken weekly. qPCR work should be undertaken inside a cabinet with UV light and in a room which is also lit by UV light outside the cabinet; to control aerosol DNA. Although UV lights are widely recommended for decontamination they need to be high power and close enough to the surface for decontamination to be effective and only then for low level contamination - cleaning and liquid decontamination is more effective (for detailed discussion see Champlot et al., 2010). They are also used in some laboratories to keep levels of environmental DNA low, including UV irradiating the facility when it is not in use.

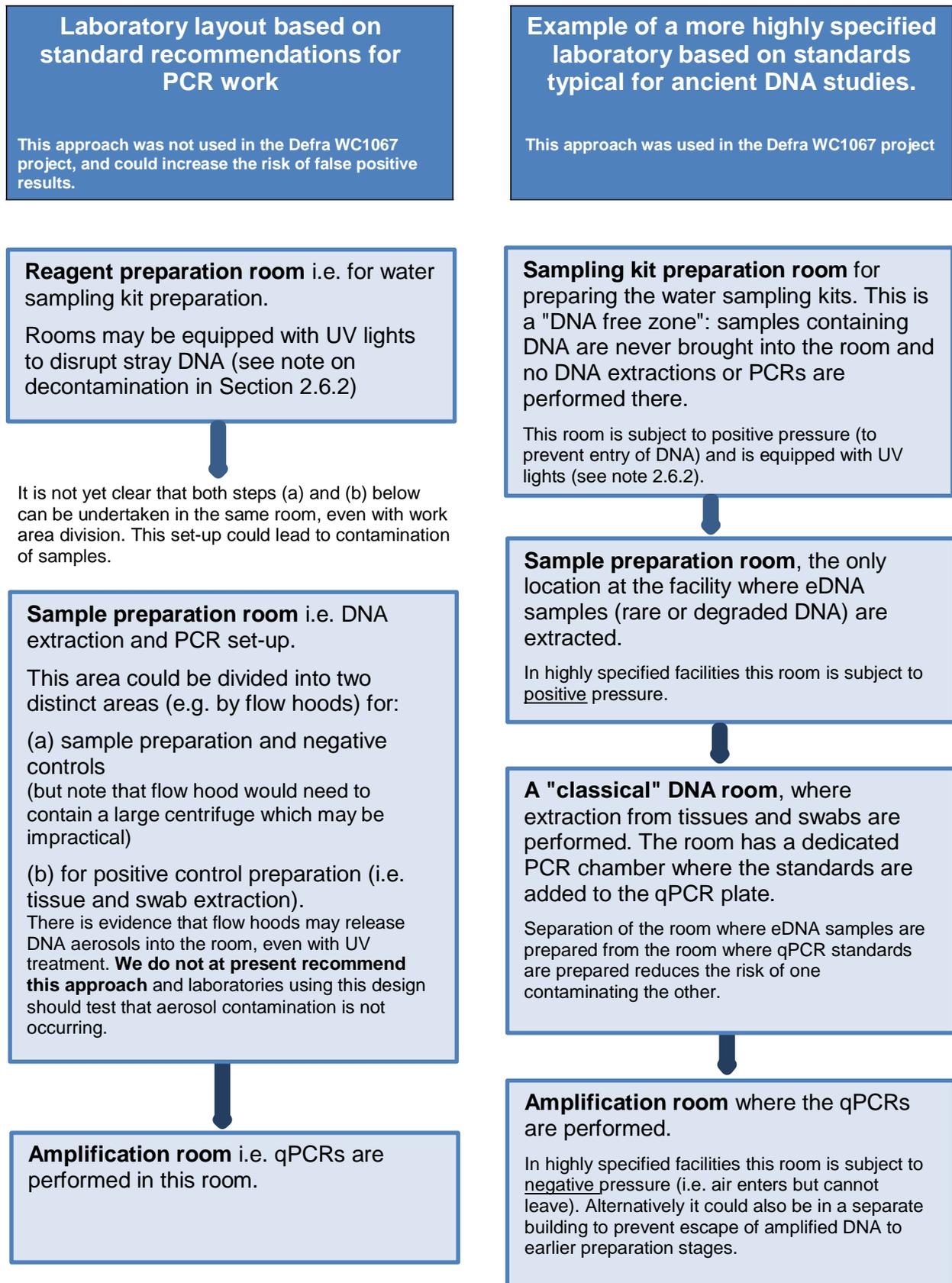
Dedicated laminar flow hoods and fume hoods for DNA extraction and manipulation can reduce the risk of contamination still further. However, note that laminar flow hoods and fume hoods can under some circumstances make contamination worse by circulating contaminating aerosols around the laboratory. Most PCR hoods either do not have air flow, or are used switched off, providing a dedicated work station that is contained and can be easily decontaminated.

Further useful features are a positive pressure system and HEPA-filtered air conditioning. Some teams regard positive and negative pressure as desirable features to control contamination effectively. However, others suggest that procedural aspects are more important. At present it is not possible to tell which of these positions is correct. The more stringent standards of ancient DNA workers normally include positive / negative pressure and several successful laboratories working with eDNA have used this set-up. However, other groups have produced published results (e.g. Pilliod et al., 2013) without such systems. A highly specified laboratory (e.g. a forensic laboratory) may also have dedicated staff for each area because people are a major source of contamination. Vestibules with shoe/coat changing are effective techniques to prevent transfer of DNA in a highly specified laboratory, but can be adopted less expensively in less well specified laboratories by having dedicated shoes and coats for each laboratory.

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<sup>1</sup> It is possible that a Class II cabinet in a non-DNA free room could be used for this step. If this approach is used it would be advisable for laboratories to demonstrate that this process did not lead to contamination of sample test kits. Cabinets are at risk of contamination from DNA aerosols which can be present in DNA laboratories even with UV lighting.

**Figure 1. Examples of laboratory specifications proposed or in use for eDNA work.**



### 3. Field protocol

Field sampling should be undertaken by a suitably trained and experienced great crested newt surveyor (trained volunteer or professional). At present it is believed that eDNA water sampling does not disturb newts enough to justify the procedure being licensed by the national regulatory authority.

A single visit to the target pond should be made between mid-April and June, during the newt breeding season. eDNA samples can be collected at any time of day and in any reasonable weather conditions, including light rain. It may be best to avoid heavy rain as this makes sampling more difficult and might increase the risk of cross contamination (e.g. splashing of mud which could contain great crested newt DNA from wet ground). There is evidence that unpreserved amphibian eDNA decays slightly more quickly in full sun than shaded conditions, becoming undetectable after 8 and 11 days respectively (Pilliod et al., 2014), but as long as samples are preserved the impact on detection should be slight.

#### 3.1 Sampling equipment

The field sampling equipment used by Biggs et al. (2014) has five components (Figure 2):

- A sterile 30 mL ladle
- A sterile self-supporting Whirl-Pak plastic bag with 1 L capacity
- A sterile 10 mL pipette to resample the pond water
- Six sterile 50 mL centrifuge tubes containing preservative (Absolute Ethanol (200 Proof), Molecular Biology Grade, Fisher BioReagents (Product Code: 10644795), sodium acetate and other markers)
- Two pairs of sterile gloves.

**Figure 2 Sampling equipment used for eDNA water samples by Biggs et al. (2014)**



Kits can be stored at room temperature before use in an appropriate solvent store, consistent with Home Office regulations, and should be used within about two weeks of receipt. The time between kit receipt and use should be noted (see Section 5.1). Use one kit per pond up to an area of 1 ha. Beyond this, use an additional kit per hectare. However, note that as yet there is no practical experience of the effectiveness of kits used on ponds greater than 1 ha in area. Note that sampling techniques are still developing rapidly in this field and alternative preservatives to ethanol are currently being sought.

### **3.2 Field water sample collection protocol**

The field sampling protocol should follow the steps outlined below. Gloves should be worn at all times during the sampling process, replacing the gloves between sample collection from the pond and pipetting into the sterile sub-sample tubes. Samples should be collected without entering the water, i.e. the surveyor stands only on the pond bank or muddy pond edges. This prevents disturbance of the substrate and may limit cross-contamination.

#### **Stages of field sampling protocol**

- Step 1 Identify where 20 samples will be taken from the pond. The location of sub-samples should be spaced as evenly as possible around the pond margin, and if possible targeted to areas where there is vegetation which may be being used as egg laying substrate and open water areas which newts may be using for displaying.
  - Step 2 Open the sterile Whirl-Pak bag by tearing off the clear plastic strip c 1cm from the top (along the perforated line), then pulling the tabs. The bag will stand-up by itself.
  - Step 3 Collect 20 samples of 30 mL of pond water from around the pond (see 1 above) using the ladle (fill the ladle), and empty each sample into the Whirl-Pak bag. At the end the Whirl-Pak bag should be just under half full (600 mL).
- NOTE: Before each ladle sample is taken, the pond water column should be mixed by gently using the ladle to stir the water from the surface to close to the pond bottom without disturbing the sediment on the bed of the pond. It is advisable not to sample very shallow water (less than 5-10 cm deep).
- Step 4 Once 20 samples have been taken, close the bag securely using the top tabs and shake the Whirl-Pak bag for 10 seconds. This mixes any DNA across the whole water sample.
  - Step 5 Put on a new pair of gloves to keep the next stage as uncontaminated as possible.
  - Step 6 Using the clear plastic pipette provided take c15 mL of water from the Whirl-Pak bag and pipette into a sterile tube containing 35 mL of ethanol to preserve the eDNA sample (i.e. fill tube to the 50 mL mark). Close the tube ensuring the cap is tight.
  - Step 7 Shake the tube vigorously for 10 seconds to mix the sample and preservative. This is essential to prevent DNA degradation. Repeat for each of the 6 conical tubes in the kit. Before taking each sample, stir the water in the bag to homogenize the sample - this is because the DNA will constantly sink to the bottom.
  - Step 8 Empty the remaining water from the Whirl-Pak bag back into the pond.
  - Step 9 The box of preserved sub-samples is then returned at ambient temperature immediately for analysis. If batches of samples are collected and stored prior to analysis they should be refrigerated at 2-4° C. Kits can be stored for up to one month in a refrigerator before analysis. It is not necessary to freeze samples. Freezing may damage storage bottles, which can lead to leaking during transit, and also unnecessarily increases costs by requiring refrigerated transport. The length of time eDNA samples are stored in a refrigerator prior to analysis should be recorded and passed on to the analysing laboratory. Use an appropriate labelling system to ensure that the kits are supplied with a unique reference number.

## 4. Laboratory protocol

### 4.1 Introduction

This section describes the laboratory protocol for analysis of eDNA samples. It is assumed that laboratory staff are familiar with the techniques for using the proprietary products specified.

It is important that the analysing laboratory has no prior knowledge of whether sites being tested do or do not have newts. Samples should be identified only by a unique reference number which contains no site identifying information.

### 4.2 Analytical methods

#### Primers and probes

Great crested newt (*Triturus cristatus*) DNA should be amplified using the primers and probes listed in Appendix 2. They amplify a fragment of the mitochondrial cytochrome oxidase I gene (cytb). It may be desirable for laboratories undertaking analyses to demonstrate that these primers and probes have been tested *in vitro* against real great crested newt tissue (which can be collected by external swabbing), and *in situ* from real ponds with great crested newts (unless they have already undertaken eDNA work with great crested newts). There are a number of amphibian biologists around the UK who have licenses to swab newts and they can be contracted to do this work. An alternative approach to standardisation is to purchase synthetic DNA.

#### Water

Water used in eDNA analysis should be ultrapure water for molecular biology grade, which can either be purchased or made in the laboratory, using proprietary equipment.

#### 1. DNA extraction

DNA should be extracted using the DNA Blood and Tissue kit (Qiagen®) following the manufacturer's instructions.

**Step 1** For each sample from a site, the six subsamples per site should be centrifuged at  $14000 \times g^1$ , for 30 minutes, at 6 °C and the supernatant discarded.

**Step 2** 360 µL of ATL Buffer from the DNeasy Blood & Tissue Extraction Kit (Qiagen®) is added to the first tube, the tube is vortexed for several minutes (time depends on degree of film accumulation on tubes) and the supernatant poured into the second tube. This operation is repeated for all the six tubes, resulting in the 6<sup>th</sup> tube containing the ATL buffer that has been vortexed sequentially in each of the six sample tubes. Vortexing is needed to remove films of DNA which become attached to the tubes at high centrifuge speeds. Flicking the tube or pipetting have not been found sufficiently vigorous to remove these films. Other kits may be suitable for this step but would need to be evaluated, perhaps as part of a proficiency testing process.

**Step 3** The supernatant in the sixth tube, containing the DNA concentrated from all 6 subsamples, is transferred to a 2 mL tube and the DNA extraction performed following the manufacturer's instructions. The DNA extraction should be performed in the room or laboratory area dedicated for degraded DNA samples.

**Step 4** An extraction control should be performed at the same time to monitor possible

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<sup>1</sup>The centrifugation speed suggested originally by Ficetola et al. (2008) was 5500 x g. Internal tests made by Spygen indicated that better results were found with the highest centrifugation speed, which led to the adoption of 14,000 x g for the Great Crested Newt DNA extraction.

laboratory contamination. The extraction control is undertaken using an 11<sup>th</sup> tube containing buffers alone and no sample (i.e. no alcohol mix and no pond water). Note that the quality of the alcohol (i.e. absence of DNA contamination) is assessed with the negative controls in the field. These can be either out of range sites where great crested newts are definitely absent or sites within the newt's range where there is high certainty that newts are absent. If no negative field sites are available in a study, a different approach may be needed. In the analytical process the extraction control sample is, from Step 4 onwards, processed as a normal sample.

Additional control samples may be added to the process depending on where it is believed contamination may be originating.

## 2. qPCR

Step 5 DNA inhibition should be tested by adding a known amount of an artificial gene to the sample and running qPCR in duplicate. If a different than expected  $C_t^2$  value is observed in a least one replicate, the sample should be considered inhibited. In this instance dilute the sample twice before amplification with great crested newt primer and probes.

Step 6 qPCR analysis. Each sample should be run in 12 replicates. A dilution series of *T. cristatus* DNA, ranging from  $10^{-1}$  ng  $\mu\text{L}^{-1}$  to  $10^{-4}$  ng  $\mu\text{L}^{-1}$  (increments  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$ ,  $10^{-4}$ ) and measured using a Nanodrop ND-1000 or equivalent, should be used as a qPCR standard. The qPCR standards are made using DNA extracted from great crested newt tissue samples, and the quantification made on extracted DNA before the dilution. Samples should be run on a BIO-RAD® CFX96 Touch real time PCR detection system or equivalent.

Note that the standards are the positive controls for qPCR in this approach (i.e. assuring that the method successfully detects DNA when present). Negative controls are provided by one extraction blank, which is run with 12 replicates, as a normal sample, and with four qPCR negative controls which also run during the qPCR step, using ultrapure water for molecular biology grade.

Step 7 The quantitative PCR is performed in a final volume of 25  $\mu\text{L}$  made up from:

- 3  $\mu\text{L}$  of template DNA
- 12.5  $\mu\text{L}$  of TaqMan® Environmental Master Mix 2.0 (Life Technologies ®)
- 6.5  $\mu\text{L}$  of ddH<sub>2</sub>O
- 2  $\mu\text{L}$  of primer (1  $\mu\text{L}$  each of primer 10  $\mu\text{M}$  TCCBL and TCCBR)
- 1  $\mu\text{L}$  of probe (2.5  $\mu\text{M}$  TCCB Probe)

Step 8 The PCR is performed under thermal cycling at 56.3 °C for 5 minutes and 95 °C for 10 minutes, followed by 55 cycles of 95 °C for 30 seconds and 52°C for one minute.

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<sup>2</sup>( $C_t = C_t$  threshold value, the number of PCR cycles after which amplification becomes exponential)

## 5. Data recording and reporting

Accurate detailed records of the sites surveyed should be kept by the commissioning ecologists for reporting, reference and auditing purposes.

### 5.1 Sampling information

Sampling kits should be identified by a unique identifying code when provided to field ecologists. All site information should be associated with this unique number. Laboratory staff do not need further site reference information.

The commissioning ecologists should maintain records which include:

- Site name
- Nearest settlement (provides double check against grid reference errors)
- County (provides double check against grid reference errors)
- Time between receipt of sampling kit and date of sampling
- Date of sampling
- Personnel collecting sample
- Ordnance Survey grid reference, ideally to 1 m (i.e. a 12 figure grid reference)
- Site maps showing locations of sites
- Percentage of pond perimeter that is accessible for survey
- Data on inflows, and whether these were wet or dry at the time of survey
- If available, data on presence and number of great crested newt recorded during eDNA collection to help with further assessment / refinement of this technique
- Information on any difficulties experienced during sample collection.

### 5.2 Laboratory data

The laboratory should maintain records which include:

- Personnel involved identified
- Date of kit preparation
- Duration of storage of samples once returned from the field
- Dates of analysis
- Details on type and any degradation of the marker DNA in sample kits
- A record of any modifications to standard operation procedures of laboratory equipment.

Standard laboratory data should be maintained by the laboratory.

Information on sample inhibition should be reported with the reporting of positive or negative DNA results.

At present there is no intention to archive eDNA samples although this may become necessary in the future.

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## Appendix 1. Frequently asked questions about eDNA sampling from volunteer and non-specialist surveyors

### **What is eDNA?**

eDNA in the case of larger organisms, is DNA that is collected from the environment in which an organism lives, rather than directly from the plants or animals themselves. In aquatic environments, animals including amphibians and fish, shed cellular material into the water via their saliva, urine, faeces, skin cells etc. This DNA may persist for several weeks, and can be collected through a water sample, and analysed to determine if target species of interest have been present in the waterbody.

### **Why must surveyors remain out of the pond?**

There is a considerable risk of contaminating your pond sample by bringing in Great Crested Newt DNA in mud and water from other areas on your boots and equipment. This is a real risk: DNA can remain on surfaces even after they have been dried, and can persist in soil for many years. There are recorded examples of eDNA cross-contaminating pond water samples from surveyor's boots.

### **Why are sampling points spread around the pond?**

Existing data shows that eDNA can be very patchy depending on where the animals have been. By sampling in many areas you considerably increase your chance of collecting their DNA successfully.

### **Why is the water column mixed before sampling?**

DNA 'sinks' and so will often be present in larger amounts close to the pond bottom. However, it is important not to collect sediment because it is currently thought that DNA may persist in the sediment for substantially longer than in the water column. If you collect sediment, there is a risk your sample might show a false positive indicating great crested newts were present recently, when in fact this was a long time in the past.

### **Why is such a large volume of water collected?**

In this methodology we collect a larger volume of water than previous methods have recommended (e.g. Thomsen et al. 2012). Our experience indicates that collecting a larger volume of water than was taken by Thomsen et al. (2012) is important to the success of the method.

### **Does it matter if I get things like duckweed, algae or zooplankton in my sample?**

No, small amounts don't matter. However try not to collect bottom sediment in the sample, because the DNA can be absorbed by sediment and may give false positive results (see above).

### **What happens if I spill the preservative - or the sample tube itself**

If you spill some of the preservative from one of the tubes, just add proportionally less water from your pond sample. The samples from all six tubes are later combined for the laboratory analysis, so it's not disastrous if some sample is lost.

### **Will samples degrade in the post?**

The preservative (alcohol) in the sample bottle will slow, but not eliminate, degradation of any DNA. Keeping the samples refrigerated also slows this process. The rate of decay during posting at ambient temperatures will be faster, but it will not be sufficient to degrade the sample completely.

### **What evidence is there to support the use of this technique?**

Defra project WC1067 has demonstrated the effectiveness of environmental DNA in the detection of Great Crested Newts. In detailed field studies eDNA detected Great Crested Newts 99.3% of the time in ponds where they were known to occur. When used by volunteers surveyors, eDNA detected Great Crested Newts at 91% of ponds where they were known to be present. No false positives were recorded from sites either outside or within the known range of the newt.

## Appendix 2 Details of primers and probes

Primers are salt free and HPLC-purified.

<b>Primer</b>	<b>Sequence (5'-3')</b>	<b>Fragment</b>	<b>Gene</b>
TCCBL	CGTAAACTACGGCTGACTAGTACGAA	81	Cyt-b
TCCBR	CCGATGTGTATGTAGATGCAAACA	81	Cyt-b
<b>Probe</b>			
TCCB	CATCCACGCTAACGGAGCCTCGC	81	Cyt-b

### Degradation control

A length of artificial DNA is added to the samples to assess post-sampling degradation. This DNA does not have an analogue in the natural world so it can clearly be separated from all DNAs that can be sampled in the field. The structure of the molecule is commercially confidential to Spygen so is not reproduced in this guide. Laboratories may either design their own synthetic DNA or purchase material from Spygen.

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