

Client: **DARE NORTHERN LTD**

**PRELIMINARY ARBORICULTURAL IMPACT REPORT
FOR THE PROPOSED DEVELOPMENT
AT LLUESTY HOSPITAL HOLYWELL**

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PRELIMINARY ARBORICULTURAL IMPACT REPORT
LLUESTY HOSPITAL HOLYWELL

1.0 SITE OVERVIEW

- 1.1 Llesty Hospital founded in 1838 as Holywell Union Workhouse was managed initially by Clwyd and Deeside Hospital Management and finally by Conwy and Denbighshire NHS Trust until its closure in March 2008.
- 1.2 The original complex was added to in the early C20 with a brick-built structure to accommodate American servicemen and in its later years with additional buildings to service physiotherapy and geriatric functions at the Hospital. The more historic structures are now listed buildings.
- 1.3 To the South-West of the buildings complex is a steeply sloping grassed area of approximately 0.9Ha bounded by the B5121 to the West and The Beeches development to the South. The upper part of this area is outwith the development application boundary as shown on Wardell Armstrong drawing NT10144/005.
- 1.4 Tree cover on Site is principally peripheral and historic additions to earlier planting have largely perpetuated this principle.
- 1.5 The most recent planting appears to have accommodated limited efforts to improve the amenity value of trees and shrubs within the Site.
- 1.6 Selected trees on the boundary with The Beeches are protected by Tree Preservation Orders (TPO) as noted in the Schedule at Section 7.0. Orders affecting the Site are presently under review.

2.0 SCOPE OF SURVEY

- 2.1 Record trees within the Site boundary and others under separate ownership which may be of relevance.
- 2.2 The Report will identify senescent trees, those affected by pathogens, or other disease organisms and structural faults which may render them hazardous.
- 2.3 Record where appropriate species, age, status and development allocating each to one of the four categories listed in the quality cascade chart of BS 5837.2005:Trees in Relation to Construction Recommendations (APPENDIX A)
- 2.4 Trees to be categorized into Principal Trees, where crown spread is accurately plotted, and Subsidiary or Other Trees where it is only indicative (Wardell-Armstrong drawing NT10144/005)
- 2.5 Outline an immediate management programme including a summary of works which may be required to accommodate a development.

3.0 CAVEAT

- 3.1 Considerations and observations are made principally from arboricultural perspectives in order that the Report may be utilized as a foundation document for consideration with any subsequent development submissions, the scope of which may affect some trees whose condition is satisfactory.
- 3.2 The current outline development proposals involve the demolition of the more recent Hospital buildings and the retention of listed structures (Architectural drawing Space Designed Solutions Ltd 0808.08.02)
- 3.3 The content of the Report remains valid for a period of 36 months from the date of inspection.

4.0 DATE OF INSPECTION
25 MARCH 2008

5.0 **NOMENCLATURE**

Ash	FRAXINUS excelsior	AH
Beech	FAGUS sylvatica	BE
Cherry	PRUNUS avium	CH
Cypress	X CUPRESSOCYPARIS leylandii	CY
Elm	ULMUS procera	EL
Holly	ILEX aquifolium 'Aureo marginata'	HO
Horse Chestnut	AESCLUS hippocastanum	HC
Sycamore	ACER pseudoplatanus	SY
Whitebeam	SORBUS aria	WH
Yew	TAXUS baccata	YE

Scrub

Blackthorn	PRUNUS spinosa	BL
Elder	SAMBUCUS nigra	ED
Hawthorn	CRATAEGUS monogyna	HA

6.0 **AGE CLASSIFICATION**

Immature	0-10years	IMM
Semi-mature	10-50years	SM
Mature	50-70years	M
Over-mature	70+years	OM

7.0 **TREE DETAIL**

Numerical identification of Principal and Subsidiary Trees as shown on Wardell-Armstrong dwg. NT 10144/005. Trees annotated as Other Trees are marked only indicatively. Trees outwith the defined development area are also separately identified.

7.1 **PRINCIPAL TREES**

TREE	SPECIES	AGE/ CLASS	HEIGHT	CROWN SPREAD	GIRTH	COND	DETAIL
P01	AH	OM	16.6m	NS20.0m EW16.5m	360cm	Poor	One sided crown to South. Branch systems incomplete. Significant deadwood. Bud size and frequency reduced for species. Bordered in elevated position by metalled road to North. 3.5m from North elevation of Old Chapel. <i>Category R</i>
P02	AH	SM	11.5m	NS3.5m EW5.0m	-----	Fair	One sided crown. Branch systems complete. Bud size and frequency reduced for species. Located 0.5m from South elevation of Old Chapel. Interfering with building structure. <i>Category R</i>
P03	HO	SM	3.9m	NS4.0m EW4.0m	180cm	Fair	Small ornamental tree. Branch systems incomplete. Some grass maintenance damage to lower mainstem and surface roots. <i>Retention Category A1</i>

P04	HC	M	15.0m	NS8.0m EW12.0m	290cm	Fair	Twin stem at 6.0m. Branch systems incomplete. One sided crown to North. Bud size and frequency reduced for species. Significant deadwood. Ivy covered. Included in TPO 177(2008) <i>Retention category C1</i>
P05	HC	M	15.0m	NS8.0m EW12.0m	285cm	Fair	Branch system complete. One sided crown to West. Bud size and frequency reduced for species. Significant deadwood. Ivy covered. Included in TPO 177(2008) <i>Retention category C1</i>
P05A	SY	M	16.0m	NS8.5m EW10.0m	280cm	Poor	Branch systems incomplete. Bud size and frequency reduced for species. Established lower mainstem damage from fire. In separate ownership. <i>Category R</i>
P05B	HC	M	16.0m	NS8.0m EW12.0m	296cm	Poor	Branch systems incomplete. Bud size and frequency reduced for species. Bacterial wetwood. Established lower mainstem damage from fire. In separate ownership. <i>Category R</i>
P06	HC	M	16.6m	NS3.5m EW8.5m	280cm	Fair	Branch systems incomplete. One sided crown to South. Bud size and frequency reduced for species. Ivy covered. Included in TPO 177(2008) <i>Retention category C1</i>
P07	YE	SM	6.6m	NS9.0m EW8.0m	-----	Fair	Branch systems incomplete. One sided crown. Needle colouration and size normal for species. <i>Retention category B1</i>
P08	HC	M	15.5m	NS6.0m EW10.0m	180cm	Fair	Branch systems incomplete. Bud size and frequency reduced for species. Historic inappropriate limb removal. Ivy covered. Some surface rooting to East. Included in TPO 177 (2008) <i>Retention category C1</i>
P09	HC	M	15.0m	NS7.0m EW13.0m	170cm	Poor	Branch systems incomplete. One sided crown to South and West. Bud size and frequency reduced for species. Historic inappropriate limb removal. Mainstem tissue stress. Minor cavities on mainstem. Included in TPO 177 (2008) <i>Category R</i>

P10	CH	OM	16.5m	NS13.0m EW14.0m	-----	Poor	Branch systems incomplete. Historic traumatic limb loss. Bud size and frequency reduced for species. Ivy covered. Infected by TAPHRINA cerasi (see text para 11.3). Used as fixing for fencing line wires. Included in TPO (Delyn BC 1991) <i>Category R</i>
P11	CH	OM	16.5m	NS11.0m EW14.0m	370cm	Poor	Branch systems incomplete. Historic lightning strike. Bud size and frequency reduced for species. Mainstem cavities. Tissue stress with some bulging and hazard beams. Significant decay on mainstem. Ivy covered. Included in TPO (Delyn BC 1991) <i>Category R</i>
P12	SY	OM	18.7m	NS11.0m EW13.0m	390cm	Poor	Twin stem at 3.5m. Included bark at stem bifurcation. Bud size and frequency reduced for species. Located on limestone spoil-heap. Associated with understorey of ED and HA scrub <i>Retention category C1</i>
P13	AH	M	15.4m	NS5.0m EW5.0m	130cm	Poor	Twin stem at 3.5m. Included bark at stem bifurcation. Bud size and frequency reduced for species. Historic traumatic limb loss. Infected by INONOTUS hispidis. (see text para 9.1) <i>Category R</i>
P14	AH	M	16.0m	NS9.0m EW10.0m	170cm	Poor	Branch systems incomplete. Ash canker. Inappropriate pruning to clear overhead electricity conductors. Poor callus re-growth at points of target pruning. <i>Category R</i>
P15	AH	M	14.5m	NS15.0m EW13.5m	-----	Poor	Originally Tri-stem. Branch systems incomplete. Inappropriate pruning and stem removal to clear overhead electricity conductors. Ivy covered. Stem confluence at ground level. Tissue stress. <i>Category R</i>
P15A	AH	M	16.0m	NS9.0m EW10.0m	165cm	Good	Branch systems complete. Bud size and frequency normal for species. Crown development becoming top-heavy. <i>Retention category B2</i>

P16	SY	SM	15.8m	NS6.0m EW8.0m	----	Poor	Multistem. Branch systems incomplete. Bud size and frequency reduced for species. Ivy covered. <i>Category R</i>
P17	AH	M	15.0m	NS4.0m EW3.0m	128cm	Poor	Etiolated specimen. Single stem remains from traumatic failure of multistem tree. Significant lean to North West. Ivy covered. <i>Category R</i>
P18	SY	SM	15.0m	NS13.0m EW13.5m	120cm	Poor	Etiolated. Bud size and frequency reduced for species. <i>Category R</i>
P19	AH	SM	12.4m	NS4.0m EW4.5m	125cm	Poor	One sided crown to North. Etiolated with top-heavy crown. Surmounting low stone wall. Bud size and frequency reduced for species. Ivy covered. P16-P19 associated with scrub and understorey of AH BL CH EL ED HA. Ground Ivy (HEDERA spp) throughout understorey. <i>Category R</i>

7.2 SUBSIDIARY TREES

TREE	SPECIES	AGE/CLASS	COND	DETAIL
T01	SY	SM	Fair	Multistem. Epicormic re-growth from felled tree. <i>Category R</i>
T02	CH	SM	Poor	One sided crown. Historic traumatic limb loss. Bud size and frequency reduced for species. Significant deadwood. <i>Category R</i>
T03	WH	SM	Fair	One sided crown. Inadequate branch structure. <i>Category R</i>
T04	CH	SM	Poor	Distorted crown. Bud size and frequency reduced for species. <i>Category R</i>
T05	SY	SM	Poor	Bud size and frequency reduced for species. Ivy covered. <i>Category R</i>
T06	SY	SM	Poor	Multistem. Bud size and frequency reduced for species. Distorted crown. Ivy covered. <i>Category R</i>
T07	CH	SM	Poor	Distorted crown. Bud size and frequency reduced for species. Ivy covered. Significant deadwood. <i>Category R</i>
T08	CH	SM	Poor	Twin stem. Bud size and frequency reduced for species. Ivy covered. <i>Category R</i>

T09	CH	SM	Poor	Suppressed specimen. One sided crown. Bud size and frequency reduced for species. Ivy covered. <i>Category R</i> T02-T09 have to their South West a semi-mature Cypress hedge outwith the Site ownership. This has caused distortion to crown structures but the hedging has value as a screen.
T10	CH	SM	Good	Twin stem at 1.7m. Included bark at bifurcation. Bud size and frequency reduced for species. Subjected to inappropriate historic pruning. <i>Retention Category A1</i>
T11	YE	SM	Good	Compact tree with good form. <i>Retention Category A1</i>
T12	CY	SM	Fair	Group 3 No trees creating screening at North West end of Cypress hedging. <i>Retention Category A1</i>
T13	EL	SM	Fair	Multistem. Epicormic re-growth from old stump. <i>Category R</i>
T14	AH	SM	Fair	Small suppressed tree. Bud size and frequency normal for species. Distorted by proximity to P12. <i>Category R</i>
T15	EL	SM	Fair	Multistem. Epicormic re-growth from old stump. <i>Category R</i>
T16	EL	SM	Fair	Multistem. Epicormic re-growth from old stump. Recently inappropriately pruned for overhead electricity conductor clearance. <i>Category R</i>
T17	CY	SM	Fair	Group 18 No trees as linear screen for water tank. <i>Retention category B1</i>
T18	EL	SM	Poor	Multistem. Epicormic re-growth from felled tree. <i>Category R</i>
T19	BE	SM	Fair	Small tree with good form. Significant lower mainstem damage from animal browsing with good callus re-growth. <i>Retention category A1</i>
T20	BE	SM	Fair	Small tree with good form. Lower mainstem damage from animal browsing with good callus re-growth. <i>Retention category A1</i>
T21	BE	SM	Fair	Small tree with good form. Bud size and frequency reduced for species. Lower mainstem damage from animal browsing with good callus re-growth. <i>Retention category A1</i>

8.0 IDENTIFIED FAULT IMPLICATIONS

- 8.1 Included bark Bark inclusions act like cracks in having no resistance to tensile strength and little resistance to shear stress. They can lead to the tearing apart of forks and branch crotches or to the propagation of cracks if they occur in the main stem buttress

- zone. Greatly influential in the potential for failure in the crown structure and the degree of 'bending stress' on the members of the union at which included bark is identified.
- 8.2 Bud size and frequency reduction Generally an indication of a poor percentage of absorptive root regeneration resulting in inadequate moisture and nutrient uptake. Eventually may lead to the loss of root/soil molecule cohesion creating instability and a potential for wind-throw. Early effects can be the traumatic loss of branches.
- 8.3 Hazard beams The longitudinal splitting of stems or branches as well as root flare regions is described in engineering terms as a hazard beam, since the internal stresses created do not induce a growth response in the cambium. These stresses sometimes induce cracking but the cracks tend to be self limiting in length due to the development of inward transverse pressure at their tips. The adaptive growth of wood may produce ribs along the cracks which are rarely completely occluded. Stems or branches may traumatically fail as a consequence of the longitudinal splitting directly or from the ingress of decay organisms into the split.

9.0 IDENTIFIED WOOD DECAY ORGANISMS

- 9.1 INONOTUS hispidus A white rot and soft decay organism generally found on living trees. Attacks the main stem and thick branches of broadleaf trees particularly Ash. When present trees are progressively susceptible to brittle fractures of branch systems and main stems.

10.0 MECHANISM OF DECAY ORGANISMS

- 10.1 Wood decaying fungi degrade the internal cellular structure of the tissue of main stem branches and root systems according to their particular method of spread. There may not always be external signs to aid detection. The fungi maybe parasitic or saprophytic
- 10.2 Three types of wood decay can be distinguished.
- a. Brown rot In the early stages of brown rot there is a rapid break-down of cell walls leading to a great reduction in the tensile strength of the wood. In the final stage the wood crumbles into a brown powder with little or no tensile strength.
- b. White rot The fungi causing white rot generally create a progressive degradation with pockets of rot associated with patches of healthy wood. As a consequence the wood first becomes brittle (danger of brittle fracture) before it finally becomes fibrous and ductile (danger of ductile fracture)
- c. Soft rot The fungi causing soft rot initially degrades wood strength leading to shrinkage and cracking; in the final stages the remaining wood becomes brittle producing a likelihood of traumatic fracture.

11.0 ADDITIONAL IDENTIFIED DISEASES

- 11.1 Ash canker This infection is as a consequence of bacterial action and results in the killing of areas of bark creating lesions which gradually enlarge to form a 'target' canker, which creates a hole in the tissues of the twig or branch. The uniform distribution of stress is then interrupted causing mechanical weakness. Girdling of branches by canker may cause snapping, some developments are also associated with axial cracking.
- 11.2 Bacterial wetwood An initially brown watery liquid seeps out of bark cracks or wounds on trunks or limbs. The flux penetrates into the wood. When moist it appears slimy and when dry it may appear chalky. Exudations from the lower stem may indicate root disease. Die-back of branches or yellowing wilted foliage will result from the bacterial activity.
- 11.3 TAPHRINA cerasi

The fungus perennates as a mycelium in buds and twigs producing dense clusters of small live or dead twigs. Leads to reductions in vigour from reduced flowering, leaf production and early defoliation.

12.0 MECHANICAL FACTORS

- 12.1 Etiolation The development of a top-heavy crown particularly where part or whole extends beyond the general tree canopy significantly influences the 'sail-effect' of the crown. This likely consequence of exposure to strong winds is traumatic failure either by branch snapping or windthrow. This phototropism produces a weak tree as a consequence of the overriding of mechanical principles.
- 12.2 Bulge-wood Unusual dents or bulges, frequently accompanied by cracks may indicate some internal cellular collapse and as such are an indicator of decay rather than a defect in their own right. Bulges due to the partial failure of very thin-walled cavities must be distinguished from local thickening of the stem (bottle-butt) which can develop so as to counteract excessive flexure due to decay. Compensatory thickening also occurs in stems that have undergone partial failure in the form of fibre-buckling and appear as pronounced tyre-like bulges. After such developments there is no increased risk of failure. In some cases the wood on the compression side of a stem or branch may show a wave-like formation on the underside, rather than a distinct point of buckling.
- 12.3 Pruning Incorrect historic pruning regimes have been employed, leading to some deformity and significantly the creation of circumstances encouraging the ingress of disease organisms.

13.0 HABITAT INTERPRETATION

- 13.1 No rare or notable species were observed on the occasion of inspection.
- 13.2 A comprehensive ecological survey has been conducted by AMEC Earth and Environmental (UK) Ltd to produce a database for the Site.

14.0 MANAGEMENT APPRAISAL

- 14.1 Those trees with specific structural faults which are either extensive or particularly advanced present immediate hazards and should be considered for removal.
- 14.2 Trees influencing structural integrity of buildings should be pruned or removed to allow stabilization of the sub-soil matrix.
- 14.3 Trees with etiolated or distorted crowns create hazards. Windthrow or traumatic failure threat increases. Resolutions by pruning may be neither practical nor successful, particularly where they are in groups.
- 14.4 Trees with a life expectancy of less than 10 years should not be considered for retention. This would include trees beyond the immediate development boundary where there is a perceived hazard.

15.0 MANAGEMENT SPECIFICS

- 15.1 Both Principal and Subsidiary trees have been assessed using the quality cascade chart of BS 5837.2005: 'Trees in Relation to Construction' and that assessment is represented on Wardell-Armstrong drawing NT10144/005
- 15.2 A total of 16 No trees within the application site have been categorised for removal on arboricultural grounds as have a further 4 No likely to affect the development.
- 15.3 Removal of T02-T09 is necessary to prevent further physical damage to that part of the adjacent Cypress hedging which is under separate ownership.
- 15.4 Significant deadwood over 25mm diameter where identified should be removed to relieve a perceived hazard.
- 15.5 More comprehensive management is beyond the scope of this foundation Report.

16.0 DEVELOPMENTAL IMPLICATIONS

- 16.1 Whilst management has considered both the elimination of perceived hazards and amenity value amelioration, cognizance needs to be given to the implications of the proposed development (Architectural dwg Space Designed Solutions Ltd 0708.08.02)
- 16.2 In the interests of mechanical integrity, proximity to building elevations and/or parking areas may require removal of some of the Principal trees and the few subsidiary trees suitable for retention.
- 16.3 The removal of Subsidiary trees adjacent to the Cypress hedging between the development and The Beeches is necessary to improve the circumstances of the hedging, prevent further physical damage and ensure its continuation as an effective screen.
- 16.4 The structural integrity of the former Chapel, adjacent to the application boundary, is likely to be prejudiced without the removal of P01 and P02. Development apart, the desirability of removing these two trees is confirmed in the Schedule.
- 16.5 Integration of T10, T11 and T21 into the current development scheme is practicable providing adequate protection is afforded during construction and appropriate post-construction management is implemented.
- 16.6 Built development as proposed does not directly impact on several Principal trees categorized for removal, including those subject to TPO; it may be possible to retain some of these, at least in the short term, despite their low arboricultural value.
- 16.7 Irrespective of condition or categorization, none of the existing trees in the higher south west part of the site conflicts with the current development proposal.

17.0 TREE CONSTRAINTS PLAN

- 17.1 When development proposals are confirmed a tree constraints plan (TCP) would be prepared to illustrate the effect that mature height and crown and root spread of retained trees may have on the proposed layout.
- 17.2 The influence that trees may have on a proposed site layout can be properly and objectively considered with accuracy once appropriate consideration has been given to removals identified from the tree quality assessment.
- 17.3 Such consideration then permits the sympathetic interaction of development and retained tree cover without one either seeking to dominate or unduly influence the other.
- 17.4 Consideration of constraints would include identification of root protection areas (RPA) for retained trees.
- 17.5 RPA's seek to prevent irreversible damage to root systems either during construction or following, when introduced structures and existing trees need to interact.
- 17.6 Removals may assist this process where some improvement in the availability of moisture and nutrients occurs.
- 17.7 RPA's are frequently mis-represented either by extent or shape and should be finalized only once all relevant factors are known. Guidelines are contained within BS5837.2005: a précis is at APPENDIX B

18.0 SUMMARY CONCLUSION

- 18.1 The general amenity value of trees present is particularly low, principally as a consequence of the limited species spectrum and the ability to mix sympathetically, but also because of poor form and development. Trees in the immediate environs of the Site make a significantly higher contribution.
- 18.2 Removal of mature trees is always a matter of consequence but in this instance considered to be unavoidable. The absence of an historic management regime has

- created a circumstance where removal of Principal trees has to be advocated in order to relieve perceived hazards and minimize future deterioration.
- 18.3 Through the vehicle of a re-planting scheme and further management of remaining existing trees the amenity signature would be enhanced by the creation of uneven aged tree cover and increased potential as a varied wild-life habitat. This would significantly reduce the impact of scheduled removals.
 - 18.4 Opportunities would also be presented for these replacements to create diversity of species and variety of effect.
 - 18.5 Protection of trees to be retained, should a development programme be implemented, should closely follow the guidelines identified in BS5837.2005: Trees in Relation to Construction-Recommendations. Some relevant extracts are highlighted at APPENDICES B, C and D. Preparation of a Tree Protection Plan (TPP) before works commence is recommended.
 - 18.6 Arboricultural operations should be carried out within the guidelines of BS3998: Recommendations for Treework.

19 REFERENCE SOURCES

- D LONSDALE - Principles of Tree Hazard Assessment and Management
- R G STROUTS - Diagnosis of Ill-Health in Trees
- C MATTHECK - Body Language of Trees
- BS 5837.2005 - Trees in Relation to Construction – Recommendations

20 RELEVANT DRAWINGS

- *Arboricultural Assessment* Wardell Armstrong dwg NT10144/005
- *Site Appraisal* Wardell Armstrong dwg NT10144/003
- *Site Plan as Proposed: Masterplan* Space Designed Solutions dwg 0708.08.02