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John Morris Arboricultural Consultancy

Tree Risk Assessments

Trees, Planning & Development

Expert Witness

Arboricultural Clerk of Works

Government Support

Client: Quintain Developments Ireland Ltd
Site: Portmarnock Phase 1D

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**ARBORICULTURAL
IMPACT ASSESSMENT &
METHOD STATEMENT**



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Purpose of Document

This report provides an assessment of trees on land owned by Quintain Developments Ireland Ltd in accordance with the guidelines outlined in BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations*.

It provides an overview of the constraints and opportunities posed by trees on or within influencing distance of the site and demonstrates how existing trees have influenced the development proposal.

It includes:

- A **Tree Schedule** that provides information for each tree;
- A **Tree Constraints Plan** that illustrates the location and constraints posed by trees;
- An **Arboricultural Impact Assessment** that considers the impacts of the proposed development to those trees, including proposals for arboricultural mitigation and improvements;
- An **Arboricultural Method Statement** that outlines how retained trees will be protected during construction, and;
- A **Tree Impact & Protection Plan** that illustrates the impact of the proposal upon trees and protection measures that should be adopted during construction.

The information contained within this report allows An Bord Pleanála to assess tree related issues associated with the development proposal.

Executive Summary

The proposed development (Phase 1D), generally comprises: -

- 172no. residential units consisting of 22no. duplexes and 150no. houses ranging in heights between 1.5 and 3 storeys.
- Provision of public open space including Skylark Park and extension to Railway Linear Park and Townland Boundary Linear Park.
- Vehicular access to serve the development is proposed off the existing / under construction access points on roads serving the St. Marnock's Bay development.
- A new vehicular road is proposed to serve the proposed development which will connect with Moyne Road. The permanent road includes the provision of a new junction with Moyne Road and SuDS features to control surface water run-off.
- Upgrade of existing temporary foul water pumping station and storage tank to increase capacity.
- All associated and ancillary site development, infrastructural, landscaping and boundary treatment works.

A tree survey of the site was undertaken in accordance with BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations* independently and without knowledge of any future development proposals. The survey identified six groups of trees and three hedgerows which have been categorised as follows:

0 of high arboricultural quality	(Category A)
2 of moderate arboricultural quality	(Category B)
7 of low arboricultural quality	(Category C)
0 of poor arboricultural quality	(Category U)

The design and layout of the site has been influenced by local planning policy in relation to trees, as detailed in The Fingal Development Plan (2017-2023), Portmarnock South Local Area Plan (2013) and The Forest of Fingal – A Tree Strategy for Fingal'.

The aim has been to include those arboricultural features that are capable of providing a substantial future contribution, in terms of their amenity, landscape and ecological value, and those that contribute to the existing landscape character of the local area. The aim has also been to preserve and incorporate hedgerows in recognition of the importance they hold in the local landscape, particularly those that demarcate historic townland boundaries.

The requirement for vehicular sightlines and access points to enable connectivity and movement around the development will result in the minor loss of small areas of hedgerow, however the extent and frequency of these removals is limited to that which is necessary to enable the development to function holistically.

To mitigate the removal of these arboricultural features, a landscape plan submitted as part of the application proposes a diverse mix of new trees and vegetation across the site to function in harmony



with the existing natural infrastructure and new built environment. This new planting will include a diverse mix and age of predominantly native trees and vegetation that will significantly increase species diversity and canopy cover in the local landscape. The location of the planting has been strategically positioned to enhance and complement existing hedgerows and provide connectivity to hedgerows in the wider local landscape for visual amenity and ecological value. This approach will ensure that removals have a short-term impact, with new planting providing immediate benefits that will significantly improve upon the pre-development baseline.

The following measures are required to ensure the protection of retained trees during construction:

- Tree Protective Fencing
- Construction Exclusion Zones



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DOCUMENT TITLE	DOCUMENT REFERENCE
TREE SCHEDULE	21-252-01
TREE CONSTRAINTS PLAN	21-252-02
TREE IMPACT & PROTECTION PLAN	21-252-03

1. INTRODUCTION

Instruction

- 1.1. Instruction was received from Quintain Developments Ireland Ltd on 09th September 2021 to undertake a tree survey and prepare an arboricultural report in connection with a planning application for the construction of a residential development comprising 172no. units with public open space, vehicular access, vehicular road and all associated site works including services, infrastructure, landscaping and boundary treatments at St Marnock's Bay in Portmarnock (hereinafter referred to as 'the Site').

Scope

- 1.2. The survey has been carried out in accordance with BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations*.
- 1.3. The information collected during the survey has been used in the preparation of this report in connection with a planning application.

Site

- 1.4. The site is located in Old Portmarnock. It is bound by residential dwellings at St Marnock's Bay and Station Road to the north, Coast Road to the east, Moyne Road to the south and a railway track to the west. The site is currently accessible via Station Road to the north.

2. TREE SURVEY

Site Visit

- 2.1. The tree survey was undertaken on 27th September 2021.
- 2.2. Details of the survey methodology and assessment criteria can be found in Appendix 1.
- 2.3. A copy of the survey data can be found in the Tree Schedule (Ref: 21-252-01) attached to this report.
- 2.4. The extent of the tree survey has been marked on the Tree Constraints Plan (TCP) (Ref: 21-252-02) attached to this report
- 2.5. The tree survey considered all trees that have the potential to be impacted by any development proposal including those outside the application area, but within influencing distance.
- 2.6. The above ground constraints posed by canopy spread are plotted as a continuous line around the tree and shaded in the corresponding BS5837 retention category colour, whilst the below ground constraints posed by the Root Protection Area (RPA) have been plotted as a continuous magenta line with the text RPA inscribed.
- 2.7. The purpose of the tree survey was to provide guidance to the design team on the constraints and opportunities posed by trees to inform the design and layout of the Site.
- 2.8. The results of the survey allow the opportunity to balance the retention of significant trees against the opportunity to enhance the existing tree stock through proactive management.

2.9. A summary assessment of the tree quality is contained in Table 1.

Table 1. Overview assessment of tree quality.

	Category A	Category B	Category C	Category U	Total
Trees	0	0	0	0	0
Groups	0	0	6	0	6
Hedges	0	2	1	0	3
Total	0	2	7	0	9

Description of trees

- 2.10. The main arboricultural features of the Site include dense mixed species hedgerows and groups of trees that separate land to create a patchwork of connecting fields. These hedgerows are typical of local area and contribute to the character of the local landscape (**Figure 1 & 2**).
- 2.11. The hedgerows include native species such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), Ash (*Fraxinus excelsior*), Elm (*Ulmus minor*), Goat willow (*Salix caprea*), Dog rose (*Rosa canina*) and spindle (*Euonymus europaeus*), whilst groups of trees arising from hedgerows include Ash and Elm.
- 2.12. These trees and hedgerows provide visual amenity in the local landscape, enclosure and privacy to the Site and offer ecological value in terms of green corridors and connectivity to surrounding trees and hedgerows in the wider landscape.



Figure 1. Dense mixed species hedgerow around field boundary.



Figure 2. Dense mixed species hedgerow around field boundary.

3. ARBORICULTURAL PRINCIPLES

Trees and Development

- 3.1. Trees provide a multitude of economic, environmental and social benefits to individuals and communities including (but not limited) to visual amenity and landscape value, ecosystem services and habitats for local wildlife. Trees can also hold historic and cultural importance by providing links to the past that create a sense of place and belonging.
- 3.2. They are living, self-optimising, mechanical organisms that grow in and react to the environment in which they are located and are capable of being wounded or infected by objects or other organisms that can cause a decline in health or result in death.
- 3.3. Development proposals that will impact trees should consider the value and contribution made by those trees, the impacts of development activity upon their health and an assessment of future conflicts that may arise between trees and the development proposal.

Below Ground Constraints

- 3.4. Soils contain organic and mineral material, air and water that provides a medium essential for root growth.
- 3.5. The physical properties of soils including texture, porosity and bulk density can greatly impact

the availability of water, nutrients and oxygen in the soil available to support the function and growth of tree roots.

- 3.6. Protection of the soil environment in which trees grow is therefore essential to ensure tree vitality.
- 3.7. Tree roots provide support and anchorage and allow the uptake and transport of water, nutrients and oxygen for tree function and growth. Roots are commonly found in the upper 600-1000mm of soil, however depth can vary significantly depending on soil and local site conditions. Typically, tree root systems comprise a network of lateral roots that provide structural support and smaller fibrous roots that function in the uptake of water, nutrients and oxygen.

Impacts of Construction & Development

- 3.8. The processes of construction including the movement of machinery and equipment near trees can cause soil compaction that can starve roots of oxygen and water, resulting in tree decline or death. Increasing ground levels near trees can cause similar impacts, whilst belowground soil excavations can damage root bark or lead to root severance and impair structural stability. Further impacts include (but are not limited to) contamination of soils by toxic substances such as cement or chemicals and root desiccation due to inadequate protection during exposure.

Root Protection Areas

- 3.9. In accordance with BS5837, the Root Protection Area (RPA) indicates the notional minimum area of ground around a tree deemed to contain sufficient roots and rooting volume to avoid adverse physiological or structural impairment and to support future tree function, growth and health.
- 3.10. The RPA is calculated in accordance with Section 4.6 of BS5837 and is summarised in Appendix 2.
- 3.11. The RPA is plotted as a continuous circle centred on the base of the stem, however where pre-existing site conditions such as the presence of built structures, changes in topography, soil type and structure or past management are likely to act as barriers, or alter normal distribution, BS5837 allows modifications to the shape of the RPA can be made based upon sound arboricultural assessment.
- 3.12. The default position should be that no development works occur inside RPAs, however in accordance with BS5837 when there is an overriding justification, it may be appropriate to implement specialist methods of construction or technical solutions that will reduce or eliminate the impact to roots and soil environments.
- 3.13. Additionally, where an area of RPA is lost, it should be demonstrated that the tree can remain viable with the area lost from encroachment compensated elsewhere contiguous with its RPA, based on the species, age, condition and past management of the tree, pre-existing site conditions and nature of operations proposed is undertaken.

Above Ground Constraints

- 3.14. Tree stems and crowns can restrict the availability of space on a development site that may result in conflicts between trees and the new built environment. The design and layout of a site should take into consideration the presence of tree canopies, as well as individual species characteristics and future growth requirements in order to create a harmonious relationship between trees and the new built environment.

4. PLANNING POLICY, STATUTORY & NON-STATUTORY CONSIDERATIONS

Planning Policy

- 4.1. The National Planning Framework ‘Project Ireland 2040’ and National Development Plan (2018-2027) underpin planning policy across Ireland. These documents recognise the need to manage future growth in a planned, productive and sustainable way.
- 4.2. At the heart of Green Infrastructure Planning is to protect, preserve and enhance national capital by:
- “protecting and valuing important and vulnerable habitats, landscapes, natural heritage and green spaces”.*
- 4.3. The Site falls within the jurisdiction of Fingal County Council (FCC), which has a statutory obligation to ensure that provision is made for the protection of trees, woodlands and hedgerows under the Local Government Planning and Development Act (2000), through implementation of a Development Plan. The current plan for Fingal is the **Fingal Development Plan (2017-2023)**, however the Portmarnock South Local Area Plan 2013 (as Extended) is also understood to be a key consideration in relation to the Site.
- 4.4. The Fingal Development Plan (2017-2023) provides guidance for trees in relation to proposals of development as follows:

Fingal Development Plan 2017-2023

Chapter 3 | Placemaking

Objective PM64

“Protect, preserve and ensure the effective management of trees and groups of trees”.

Chapter 8 | Green Infrastructure 8

Objective GI16

“Set targets in the Green Infrastructure Strategy for the provision of different green infrastructure elements in urban areas, such as trees in urban areas and green roofs in town centres, so that a net gain in green infrastructure is achieved over the lifetime of this Development Plan”.

Chapter 9 | Natural Heritage

Objective NH27

“Protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character and ensure that proper provision is made for their protection and management”.

Principles for Development

“Existing tree belts should be retained and managed and older stands of trees restocked. Roadside hedging should be retained and managed. Proposals necessitating the removal of extensive field and roadside hedgerows or trees should not be permitted. Strong planting schemes using native species, to integrate development into these open landscapes, will be required”.

Chapter 12 | Development Management Standards

Tree Policy

“Trees provide both valuable amenity and wildlife habitat. Visually they add to an area, softening the impact of physical development on the landscape while also fulfilling an important role in the improvement of air quality in urban areas and providing wildlife habitats. ‘The Forest of Fingal –A Tree Strategy for Fingal’ sets out the Council’s policy for street tree planting, management and maintenance”.

Objective DMS77

“Protect, preserve and ensure the effective management of trees and groups of trees.

Objective DMS78

“Ensure during the course of development, trees and hedgerows that are conditioned for retention are fully protected in accordance with ‘BS5837 (2012) Trees in relation to the Design, Demolition and Construction – Recommendations’ or as may be updated”.

Objective DMS79

“Require the use of native planting where appropriate in new developments in consultation with the Council”.

Objective DMS80

“Ensure trees, hedgerows and other features which demarcate townland boundaries are preserved and incorporated where appropriate into the design of developments”.

Objective DMS81

“Consider in tree selection the available rooting area and proximity to dwellings or business premises particularly regarding shading of buildings and gardens”.

Objective DMS82

“Promote the planting of large canopy trees on public open space and where necessary provide for constructed tree pits as part of the landscape specification”.

Objective DMS83:

“Ensure roadside verges have a minimum width of 2.4 metres at locations where large trees are proposed and where necessary provide for constructed tree pits as part of the landscape specification. Road verges shall be a minimum of 1.2 metres wide at locations where small canopy trees are proposed”.

- 4.5. The Portmarnock South Local Area Plan 2013 (as Extended) provides guidance in relation to trees and hedgerows as follows:

Portmarnock South Local Area Plan 2013 (as Extended)

Objective GI 9

“Protect existing trees, hedgerows, townland boundaries and watercourses which are of amenity, historic or biodiversity value and ensure that proper provision is made for their protection and management in future development proposals in accordance with the Green Infrastructure and Landscape Strategy”

Section 5 Green Infrastructure

5.3.2 Tree and Hedgerow

“While it is recognised that development sometimes necessitates the loss of trees and hedgerows for sound planning reasons, this should be minimised and where removed should be compensated and replaced on site. In general, the retention of trees and hedgerows is critical in protecting the positive attributes of landscape character and heritage features of the plan lands. The hedgerow network provides a high degree of compartmentalisation and visual enclosure within the plan area. The compartments created will also be beneficial in defining urban character areas or neighbourhoods within the residential development area.

“Therefore, reflecting and in compliance with the Fingal Development Plan policies and objectives, it is an objective of this LAP to ensure trees and

hedgerows and in particular those hedgerows which demarcate historic townland boundaries are preserved and incorporated into the design of future development schemes [See Figure 5.2(i) Townland boundaries]. It is acknowledged that breaks in hedgerows will be required for pedestrian and vehicular access. Where pedestrian bridges/ vehicular bridge(s) are required over the existing watercourse, they shall be aesthetically pleasing, safe and inviting, designed to a high architectural specification.”

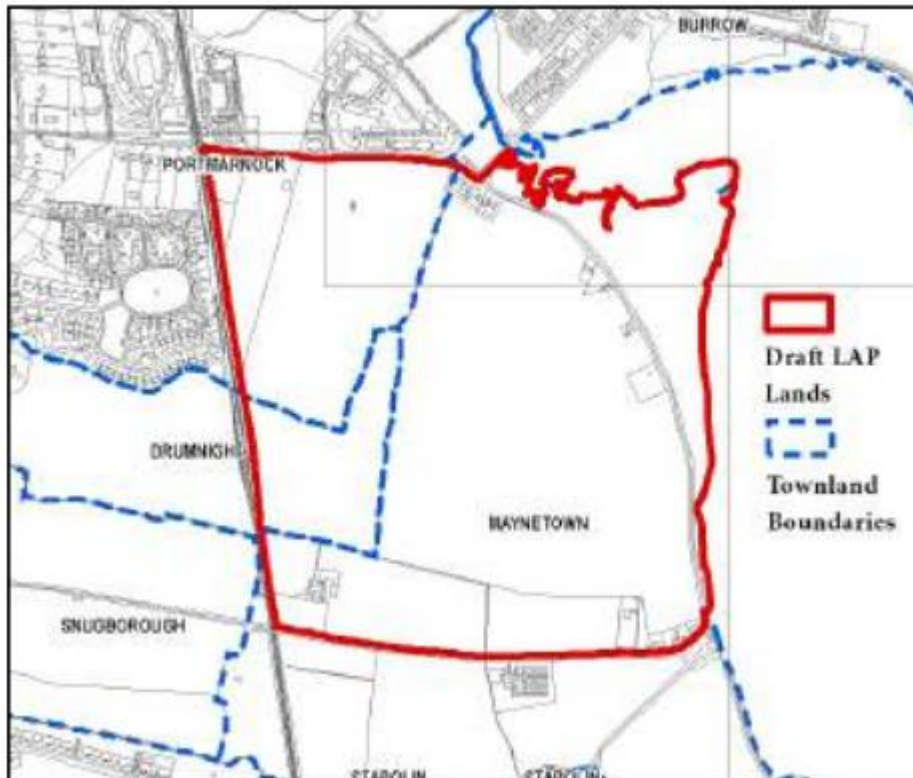


Figure 5.2 (i). Townland boundaries (Source: Portmarnock South Local Area Plan 2013).

Objective GI 18

“Ensure trees, hedgerows and other features which demarcate townland boundaries are preserved and incorporated into the design of developments.”

Objective GI 19

“Protect, preserve and ensure the effective management of trees and groups of trees”.

Objective GI 20

“Implement a scheme of tree and hedgerow protection measures, in compliance with British Standard 5837- 2005, ‘Trees in relation to Construction’ and in agreement with Fingal County Council, prior to commencement of development. The scheme of protection measures to be

maintained in place until effective completion of all construction works.”

Objective GI 21

“Require the use of native planting where appropriate in new developments in consultation with the Council. Indigenous, non-invasive species should be considered to provide habitat for locally occurring fauna ensuring, at a minimum, there should be no net loss of the tree and hedgerow resource.”

- 4.6. ‘The Forest of Fingal – A Tree Strategy for Fingal’ (new strategy in public consultation until 28th March 2021) is also a key consideration where trees are impacted by proposals of development.
- 4.7. The Fingal Development Plan (2017-2023), Portmarnock South Local Area Plan 2013 (as Extended) and ‘The Forest of Fingal – A Tree Strategy for Fingal’ have formed the basis of the design layout by ensuring that important trees and hedgerows have been considered and incorporated in the layout where possible.

Tree Preservation Orders & Conservation Areas

- 4.8. Tree Preservation Orders (TPOs) may be made under Section 45 of the Local Government (Planning and Development) Act, 1963 and subsequent acts. Part XIII of the Planning and Development Act 2000 sets out the provisions for TPOs. A TPO can be made if it appears to the planning authority to be desirable and appropriate in the interest of amenity or the environment. A TPO can apply to a tree, trees, group of trees or woodland.
- 4.9. The principle effect of a TPO is to prohibit the cutting down, topping, lopping or wilful destruction of trees without the planning authority’s consent. The order can also require the owner and occupier of the land subject to the order to enter into an agreement with the planning authority to ensure the proper management of the tree, trees or woodland.
- 4.10. A review of the FCC website did not allow a search for TPOs to be conducted, to ascertain if any TPOs exist upon the Site.

Special Amenity Area Orders

- 4.11. A National Special Amenity Area is a designation for a landscape of national importance for its aesthetic/recreational value.
- 4.12. Planning authorities are empowered (under section 202 of the Planning and Development Act 2000), to make a Special Amenity Area Order (SAAO) for reasons of outstanding natural beauty or its special recreational value and having regard to any benefits for nature conservation. The purpose is to preserve/enhance landscape character and to prevent/limit development.
- 4.13. A review of the Fingal County Council Development Plan (2017-2023) indicates that the application site is not currently designated a SAAO.

Felling Licences

- 4.14. It is an offence for any person to uproot or cut down any tree unless the owner has obtained

permission in the form of a felling licence from the Forest Service, with the exception of the following scenarios (under section 19 of the Forestry Act 2014):

- A tree in an urban area. (An urban area is an area that is comprised of a city, town or borough specified in Part 2 of Schedule 5 and in Schedule 6 of the Local Government Act 2001, before the enactment of the Local Government Reform Act 2014 (this act dissolved Town Councils, however, the old boundaries of these areas are still considered as urban for the purpose of the Forestry Act 2014).
- A tree within 30 metres of a building (other than a wall or temporary structure) but excluding any building built after the trees were planted.
- A tree less than 5 years of age that came about through natural regeneration and removed from a field as part of the normal maintenance of agricultural land (but not where the tree is standing in a hedgerow).
- A tree uprooted in a nursery for the purpose of transplantation.
- A tree of the willow or poplar species planted and maintained solely for fuel under a short rotation coppice.
- A tree outside a forest within 10 metres of a public road and which, in the opinion of the owner (being an opinion formed on reasonable grounds), is dangerous to persons using the public road on account of its age or condition.
- A tree outside a forest, the removal of which is specified in a grant of planning permission, providing it was indicated on the lodged plans as being planned for removal as part of the application
- A tree outside a forest of the hawthorn or blackthorn species growing in a hedge.
- A tree outside a forest in a hedgerow and felled for the purposes of its trimming the hedge providing that the tree does not exceed 20 centimetres diameter at 1.3 metres above ground level.
- Agricultural holdings can fell a limited small number of trees not exceeding 3 cubic metres.
- The maximum number of trees permitted to be felled under that exemption per year is 4 trees (12 cubic metres)
- Outside a forest, apple, pear, plum, or damson species are exempt from the need for a felling license.

Wildlife

4.15. The cutting or felling of trees is prohibited during the period 1st April to 31st August every year with limited exceptions under the Wildlife Acts 1976-2008.

5. ARBORICULTURAL IMPACT ASSESSMENT

Development Proposal

5.1. The proposed development (Phase 1D), generally comprises: -

- 172no. residential units consisting of 22no. duplexes and 150no. houses ranging in heights between 1.5 and 3 storeys.
- Provision of public open space including Skylark Park and extension to Railway Linear Park and Townland Boundary Linear Park.
- Vehicular access to serve the development is proposed off the existing / under construction access points on roads serving the St. Marnock's Bay development.
- A new vehicular road is proposed to serve the proposed development which will connect with Moyne Road. The permanent road includes the provision of a new junction with Moyne Road and SuDS features to control surface water run-off.
- Upgrade of existing temporary foul water pumping station and storage tank to increase capacity.
- All associated and ancillary site development, infrastructural, landscaping and boundary treatment works.

Design Principles

5.2. The design layout has been directly and indirectly influenced by the existing tree cover on site. The default position has been to avoid development within the canopy or RPA of any retained tree, however where this has not been possible a hierarchy of mitigation has been applied, as illustrated in Figure 3.

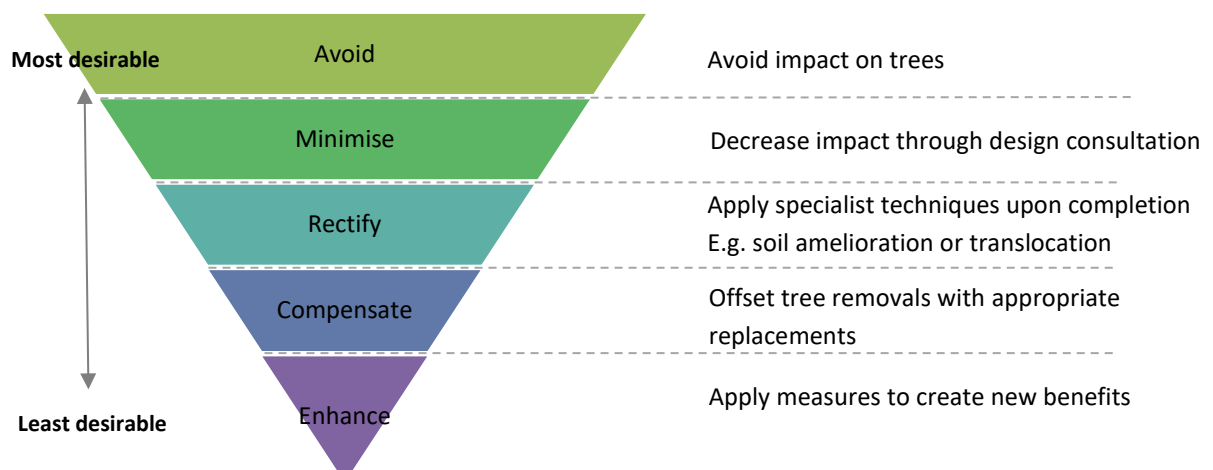


Figure 3. Trees and Development Mitigation Hierarchy (John Morris Arboricultural Consultancy, 2020).

Tree Removals & Pruning

- 5.3. Tree removals and pruning have been limited to that which is necessary and unavoidable to allow the development proposal to be implemented, with consideration given to species attributes, the tolerance of individual trees to disturbance, and to the presence of surrounding trees and features of the site which may have an influence on retained trees.
- 5.4. The pruning of trees may also be required for reasons of good arboricultural practice or management to promote tree health and longevity, to remove hazards for reasons of health and safety, or to limit the impacts of the development proposal upon trees where incursions into RPAs are unavoidable.
- 5.5. The proposal will require part removal of five groups of trees and two hedgerows.
- 5.6. The reason for these removals is to create sightlines for a new vehicular entrance at Moyne Road and to allow pedestrian and vehicular access between residential dwellings and areas of public open space.
- 5.7. The size and frequency of access points has been limited to that which is necessary to allow essential connectivity and movement around the development.
- 5.8. The aim has been to preserve and incorporate hedgerows into the design layout in recognition of importance they hold in the local landscape, particularly those that demarcate historic townland boundaries in accordance with the indicative internal street and movement network as set out in the Portmarnock Local Area Plan 2013 (as Extended).
- 5.9. In locations where hedgerows or groups of trees are to be removed, it is proposed to provide new compensatory planting.
- 5.10. This approach is taken in accordance with the Portmarnock South Local Area Plan (2013).
- 5.11. Those areas of hedgerow to be removed are illustrated on the Tree Impact & Protection Plan (TIPP) (Ref: 21-252-03), attached to this report.
- 5.12. All tree works are outlined in the Tree Schedule attached to this report and should be undertaken by a qualified and insured contractor in accordance with BS3998:2010 *Tree Works – Recommendations*.

Ground Levels & Incursions within RPAs

- 5.13. There is no requirement for changes in ground levels or incursions within the RPA of any retained hedgerow.

Construction Phase

- 5.14. All site compounds, facilities and routes to allow the movement of construction traffic across the Site will be sited outside influencing distance of RPAs for all retained trees.

Mitigation & Improvements

- 5.15. The aim has been to include those arboricultural features that are capable of providing a

substantial future contribution in terms of their amenity, landscape, and ecological value, including those that contribute to the landscape character of the local area.

- 5.16. To mitigate the removal of small areas of hedgerow it is proposed to plant new trees and shrubs across the Site that include a diverse mix of native species such as Rowan (*Sorbus aucuparia*), Hawthorn, Oak (*Quercus petraea*), Bird cherry (*Prunus padus*), Wild cherry (*Prunus avium*), Downy birch (*Betula pubescens*) and Scots pine (*Pinus sylvestris*).
- 5.17. The location of the new trees has been selected to create a harmonious balance between the existing natural infrastructure and new built environment, with new planting providing visual amenity and ecological value by enhancing existing hedgerows and creating new green corridors that link to hedgerows and vegetation in the wider local landscape.

Magnitude of Impact

- 5.18. The overall magnitude of impact for proposed tree removals has been assessed using the criteria in Table 4.

Table 4. Magnitude of arboricultural impact (John Morris Arboricultural Consultancy 2020).

Magnitude Rating	Description of Impact	Mitigation
High	Major loss or alteration to the main arboricultural features or characteristics of the site that will result in a post-development situation that is significantly different.	Realistic and feasible mitigation measures should be implemented that will reduce the magnitude of impact within a reasonable timeframe and/or create a post-development situation that improves on the pre-development baseline.
Medium	Partial loss or alteration to the main arboricultural features or characteristics of the site that will result in post-development situation that is partially different.	
Low	Minor loss or alteration to the main arboricultural features or characteristics of the site that will result in a post-development situation that is similar to before.	
Negligible	Very minor loss or alteration to the main arboricultural features that will result in a post-development situation that is unchanged.	
None	No loss or alteration to arboricultural features.	

- 5.19. The proposed layout will require the minor loss of main arboricultural features or characteristics of the Site and as such the magnitude of impact will range within the category of low.
- 5.20. To mitigate the removal of these features it is proposed to plant a diverse mix of new trees and shrubs across the Site, that will significantly increase canopy cover in the local landscape and improve species diversity.

5.21. The benefits provided by this new planting will increase year on year, therefore reducing the magnitude of impact and creating a significant improvement on the pre-development baseline. To accelerate the timeframe over which these benefits are realised, it is proposed to a range of trees that will include extra heavy and semi-mature standards.

6. ARBORICULTURAL METHOD STATEMENTS

Purpose

6.1. The purpose of this statement is to provide a system of working to ensure retained trees are protected at all times during construction. It should be read in conjunction with the Tree Impact & Protection Plan (TIPP) attached to this report.

6.2. A copy of this report must be made permanently available for the duration of the development. It can be:

- Included in tender documents to identify and quantify tree protection and management requirements;
- Used to plan timing of site operations to minimise the impact upon trees, and;
- Referenced on site for practical guidance on how to protect trees.

6.3. The compliance of arboricultural method statements is a recommended as a condition of planning and is necessary to ensure the protection and vitality of retained trees.

Pre Commencement Meeting

6.4. A pre-commencement meeting will be held prior to commencement of any demolition or construction works on site. The pre-commencement meeting may require the attendance of:

- The Main Works Contractor;
- Landscape Architect;
- Structural/Civil Engineer;
- Project Arboriculturist; and
- Any other parties as required.

6.5. The purpose of this meeting will be to agree the details of the tree protection measures and ensure that all aspects of tree protection are understood. The Project Arboriculturist and Main Works Contractor will agree and mark the location of the tree protective fencing and temporary ground protection and any other specific tree protection measures, as required.

Monitoring

6.6. Once works commence upon the site the role of the project arboriculturists role will switch to monitoring compliance with arboricultural planning conditions, provision of advice in relation to tree related matters and supervision of sensitive works that may impact upon retained trees.

Key Responsibilities

- 6.7. It is the responsibility of the main contractor to ensure that all site personnel fully understand the protection measures on the site, that tree protection measures are adhered to at all times, and that the project arboriculturist is contacted if there are any issues related to trees.

Tree Protective Fencing

- 6.8. A protective fence will be erected around retained trees, prior to the commencement of materials or machinery being brought onto site, removal of soil or any form of construction. The area within this fencing will form the construction exclusion zone (CEZ) and it will be afforded protection at all times. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopies.
- 6.9. The fence is to be sited in accordance with the TIPP attached to this report.
- 6.10. Details of the minimum distance for fencing from trees can be found in the Tree Schedule attached to this report.
- 6.11. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, a number of fencing/protection solutions will be required including the Heras 151 system of fencing, timber boards and hessian sacking wrapped in chestnut cleft pale.
- 6.12. Details of the various types of fencing is provided in Appendix 2.
- 6.13. The fence will have signs attached to it stating that it defines a CEZ and that no works are permitted beyond it.
- 6.14. An example of a tree protection sign is provided in Appendix 3.
- 6.15. The protective fencing may only be removed following completion of all construction works.
- 6.16. The following principles will be adopted by site personnel within the CEZ during construction, to ensure protection of retained trees:
- No level changes.
 - No excavations.
 - No fires.
 - No use of herbicides.
 - No storage of materials, machinery or access for construction workers.

Site Compounds & Facilities

- 6.17. Site compounds and facilities will be located outside of all RPAs and CEZs as identified on the TIPP.

Site Cranes, Piling Rigs and Machinery

- 6.18. The location of all site cranes, piling rigs and other machinery should be sited outside of RPAs to avoid soil compaction.

Pollution Control

- 6.19. Any storage or mixing station located outside of the construction exclusion zone will be located in a place that minimises the risk of contaminated runoff entering to prevent adverse physiological impacts on trees that may result from contact with rooting environments. This may be achieved by using a non-permeable membrane on the ground, surrounded by sandbags or sawdust to contain any spillage.

Temporary Ground Protection

- 6.20. Where it is not practical to protect RPAs by use of protective fencing, BS5837 allows for the fencing to be set back and the soil shielded by ground protection. A range of methods can be used including retaining existing hard surfaces or structures that already protect the soil, installing new temporary surfaces, or a combination of both. Whatever the choice of method, the end result must be that the underlying soil remains undisturbed and retains the capacity to support existing and new roots.
- 6.21. If fences are to be set back on a temporary the following specifications are recommended for use as temporary ground protection to protect roots and soil.
- 6.22. For pedestrian traffic, a plywood board with a minimum thickness of 40mm should be laid on a minimum of 100mm deep woodchip, with geotextile membrane beneath.
- 6.23. For small plant machinery with a gross weight of up to 2 tonne, interlinking aluminium or composite tracks with sufficient load bearing capacity should be laid on a minimum of 150mm deep woodchip, with geotextile membrane beneath.
- 6.24. For heavy machinery with a gross weight of up to 3.5tonne, interlinking aluminium or composite track with sufficient load bearing capacity should be laid over a minimum layer of 200mm deep woodchip, with a geotextile membrane beneath.
- 6.25. An example of temporary ground protection measures can be found in Appendix 4.
- 6.26. Any temporary protective surfaces must remain in place until all construction activity is finished.
- 6.27. Upon completion of construction works, the temporary ground protective measures should be removed working backwards from on top of the system. This will need to be done carefully to ensure that there is no excavation or compaction of the original surface or change in ground levels.
- 6.28. Once this material has been removed vehicular access to this part of the site will not be permitted.
- 6.29. The location of where temporary ground protection is to be located and at what stage of development is illustrated on the TIPP attached to this report.

Permanent Ground Protection

- 6.30. Where permanent hard surfaces are required within the RPA, there must be no excavation into

the soil, either through the lowering of levels and/or scraping, other than the removal of turf or other surface vegetation, using hand tools only.

- 6.31. A 'No-dig' solution should be implemented in accordance with industry best practice and in particular with reference to Arboricultural Practice Note 12 (APN12) which provides details of the 'No-dig' method of construction. The area directly beneath the finished hard surface and on top of the RPA should be protected by the installation of a three-dimensional cellular confinement system, or a suitable alternative solution (e.g. pile and beam, screw piles or other root bridging technique) as specified by the project structural engineer.
- 6.32. The suitability and type of permanent ground protection required will depend on the existing properties and load bearing capacity of the soil, and the future use and load bearing capacity requirements of the site and should therefore be specified by the project structural engineer.

Three-Dimensional Cellular Confinement Systems

- 6.33. This is a load bearing system which protects roots from the effects of compaction from regular vehicular, cycle or pedestrian movement. A range of products are offered by various manufacturers but whatever system is used, the end result must be that the underlying soil or rooting environment remains undisturbed and retains the capacity to support existing and new root growth.
- 6.34. Details of three-dimensional cellular confinement system and general guidance on its installation can be found in Appendix 5. It will be the responsibility of the contractor to ensure that whatever system is used, it is installed in accordance with the latest guidelines provided by the relevant manufacturer.

Installation of Lighting Columns / Railings / Fences

- 6.35. The erection of a new posts or lighting columns will require 'hand-digging' in the location where any foundations or posts are required within RPAs, to prevent damage to tree roots.
- 6.36. Any soil removal during excavations must be undertaken with care to minimise root disturbance and avoid any damage to root bark.
- 6.37. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 10-20mm behind the final face of the excavation.
- 6.38. Roots greater than 25mm diameter should only be cut in exceptional circumstances and following approval by the project arboriculturist.
- 6.39. Fibrous clumps of roots must be retained where possible, with any exposed roots protected from desiccation by covering them with a damp hessian sack or damp sharp sand (**builders' sand must not be used**).
- 6.40. Prior to backfilling, roots must be surrounded with topsoil or sharp sand before the excavated earth is replaced. The soil must be free of contaminants and any foreign objects that may be potentially harmful to roots.

Installation of Services

- 6.41. All services and utilities will be installed within existing service routes and where possible outside of RPAs.
- 6.42. Where installation of utilities or services is required within RPAs, working practices will be adopted in accordance with the National Joint Utilities (NJUG) 10, Vol 4, Issue 2, 2007 'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees'.
- 6.43. In accordance with 4.1.3 of NJUG 10 2007, acceptable techniques in order of preference include:
 - a) Trenchless; b) Broken Trench; and c) Continuous Trench. Trenchless methods involve the use of thrust boring machinery, whilst broken and continuous trench methods require that excavations within RPAs are carried out using hand tools only.
- 6.44. For a proposal of this nature, broken or continuous trench methods are the most appropriate and should be employed as per NJUG 10, to prevent any damage to tree roots or disruption to soil rooting environments.

Soft Landscaping

- 6.45. To avoid damage to existing tree roots and prevent soil compact, any machinery used to remove existing surfaces and ground vegetation for purposes of soft landscaping (e.g. seeding new lawns or laying turf) should be sited outside of RPAs. If this is not possible, hand tools must be used.
- 6.46. The removal of the surface layer within RPAs must not exceed 50mm, to prevent exposure and damage of tree roots beneath.
- 6.47. Soft landscaping works must not involve raising or lowering of the existing ground level within any RPA as this can starve roots of oxygen and cause irreversible physiological damage to trees.
- 6.48. The use of rotavators within RPAs is prohibited.
- 6.49. Any level changes outside RPAs must be graded to marry existing soil levels within RPAs.

Excavations and Removal of Existing Surfaces

- 6.50. All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air such as an Air Spade may be an appropriate alternative to hand digging, if available.
- 6.51. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.
- 6.52. If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots.

Once the roots have been located the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 100-200mm behind the final face of the excavation.

- 6.53. Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots greater than 25mm in diameter should only be cut in exceptional circumstances. Roots greater than 100mm in diameter should only be cut after consultation with the project arboriculturist.

Upgrading Existing Surfaces

- 6.54. Where upgrading of existing hard surfaces is required, the preferred option will be to leave the surface in place and install the new surface specification on top.
- 6.55. If the retained surface is impermeable, it may be appropriate to remove or puncture sections to create a more favourable environment for roots beneath, before the new surface is laid, through consultation with the project arboriculturist.
- 6.56. Where the existing surface is to be removed or upgraded, the surface layer should be excavated down the existing subbase and the new surface specification installed on top, to prevent any damage to roots beneath.
- 6.57. It is recommended that where possible, new and upgraded hard surfaces should be porous (e.g. permeable brick paving, porous resin bound aggregate or tarmac) to allow the flow of water and oxygen to roots. Wet concrete should only be poured if an impermeable geotextile fabric has first been installed to prevent soil contamination from toxic leachate.
- 6.58. New surfaces and upgraded surfaces should be set back from the base of stems by a minimum of 50mm to allow space for future growth and minimise the risk of distortion with new surface.



7. ABOUT THE AUTHOR & LIMITATIONS

Authors Qualifications & Experience

- 7.1. This report has been written by John Morris, Director and Principal Arboricultural Consultant at John Morris Arboricultural Consultancy Ltd. John has a First Class BSc (Hons) in Housing (Ulster University) and a Post Graduate Diploma (UK NQF Level 7) in Arboriculture & Urban Forestry (Myerscough College & University of Central Lancashire). John has worked in the housing, development and arboricultural sectors combined for over 15 years and regularly undertakes continuous professional development (CPD) in all areas of arboriculture and wider business administration. John is a Professional member of the Arboricultural Association (AA), Associate member of the Institute of Chartered Foresters (ICF) and Chartered member of the Institute of Housing (CIH).

Limitations

- 7.2. This report is for planning purposes and is not a detailed assessment of the health and condition of trees, however where defects have been identified works have been recommended to ensure site safety.
- 7.3. This report does not take responsibility for the effects of extreme weather conditions, vandalism, accidents or any works to trees that occur without the authors knowledge, or that are not recommended within this report.
- 7.4. Tools used during the assessment have been limited to a sounding mallet, probe or binoculars.
- 7.5. No invasive or diagnostic equipment has been used, nor have any aerial inspections, belowground root investigations, or soil, leaf or root samples been taken for further testing or analysis.
- 7.6. Trees were assessed during a single visit conducted on 27th September 2021 and the information gathered during the survey pertains to that moment in time.
- 7.7. The observations within this report will remain valid for two years from the date of inspection.
- 7.8. The location of trees places reliance on the accuracy of the topographical survey unless otherwise caveated within the report.
- 7.9. All works recommendation as a result of the survey should be undertaken by a suitably qualified and insured arborist in accordance with BS3998:2020 *Tree Works – Recommendations* to prevent any structural or physiological impairment to trees.

Appendices

Appendix 1: Tree Survey Criteria (BS5837:2012)

The assessment of the trees has been carried out in accordance with the guidance provided in Annexe C of BS5837, which requires that any tree on or influencing distance of the site with a stem diameter of over 75mm at 1.5m above ground level be recorded.

Stem diameter measurements were taken using a girthing tape or Biltmore stick, and in accordance with Annexe D of BS5837.

Height, crown spread, and canopy clearance measurements are recorded in accordance with the measurement convention detailed in paragraph 4.4.2.6 of BS5837.

The trees are categorised in an order defined in **Table 1** of BS5837, a copy of which can be seen below in **Figure 1**, but which can be summarised as:





- **Category A** Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years.
- **Category B** Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years.
- **Category C** Trees of low quality and value currently in adequate condition and able to remain until new planting can be established with a minimum useful life expectancy of 10 years, and young trees with a stem diameter less than 150mm.
- **Category U** Trees in poor structural condition or physiological decline that cannot be realistically retained in the context of current land use for more than 10 years.

Further subcategories 1-3 indicate the area(s) in which a tree or group retention value lies.

- Mainly arboricultural.
- Mainly landscape.
- Mainly cultural, including conservation.



BS5837:2012 Assessment Criteria & Cascade Chart

Table 1 Cascade chart for tree quality assessment	Criteria (including subcategories where appropriate)	Identification on plan
<p>Trees unsuitable for retention (see Note)</p> <p>Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years</p> <ul style="list-style-type: none"> Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <p><i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i></p>	<p>3 Mainly cultural values, including conservation</p>	<p>See Table 2</p> 
<p>Trees to be considered for retention</p> <p>Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years</p>	<p>1 Mainly arboricultural qualities</p> <p>Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)</p>	<p>See Table 2</p> 
<p>Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years</p>	<p>2 Mainly landscape qualities</p> <p>Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features</p> <p>Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality</p>	<p>See Table 2</p> 
<p>Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm</p>	<p>3 Mainly cultural values, including conservation</p> <p>Trees with no material conservation or other cultural value</p> <p>Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits</p>	<p>See Table 2</p> 

Appendix 2 – Calculation of the Root Protection Area

Circle Radius

The circle radius has been calculated by obtaining the stem diameter (measured at 1.5m above the ground) in millimetres and multiplying it by 12. Where the tree is multi-stemmed, an average stem diameter is calculated by the following formula specified in section 4.6.1 (a) & (b) of BS5837.

For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2}$$

For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

This total is then divided by 1000 to provide a circle radius in metres.

RPA Areas

The RPA has been assessed according to the recommendations set out in section 4.6 of BS5837. It is calculated by multiplying the radius squared by 3.142 (π).

Length of sides of a square

Section 5.5.3 of BS5837 recommends that the ground protection and barriers should be shown as a polygon surrounding the stem of the tree. With a circle, the distance from the edge of the circle to the centre will remain constant, but with a square, the distance from the centre of the tree to the sides of the square is less than the distance to the corner of the square. The area of the square must remain the same as the area of the circle. In order to ensure that it is the case, the length of side of the square is calculated at the square root of the RPA area.

Minimum barrier distance

This is the closest point that a side of the square can be to the centre of the tree.

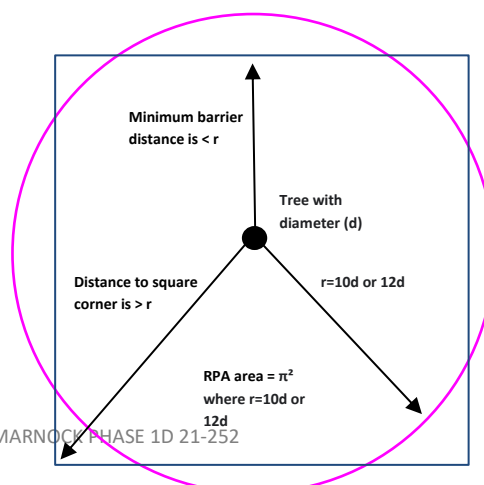


Figure 1. Illustration of area calculations and minimum barrier distances



Figure 1 illustrates the differences between a square and a circle in area. Where the distance from the centre of the tree to the corner of the square is greater than the radius of the circle (r), but the distance from the centre of the tree to the side of the square is greater than the radius of the circle (r), the total area will remain the same. The minimum barrier distance from the tree is calculated by taking the length of the side and dividing it by two.

Clarification note on the RPA radius

The RPA radius is not the automatic minimum distance of the tree protection. It is a notional figure for use as a means of calculating the actual area of the RPA. BS5837 clarifies this under *Section 3.7 Root Protection Area (RPA) – layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the trees viability, and where the protection of the roots and soil structure is treated as a priority.*



Appendix 3 – Example of Tree Protective Fencing

heras® 151 and 151steadfast system

round top panel with anti-climb mesh
high visibility orange blocks
steadfast strut
anti-tamper coupler
fully tested and certificated
health and safety compliant (HSG 151)

Having invented the original concept of temporary fencing back in the 80's, Heras is proud of its reputation as a true innovator. Our latest solution for securing site perimeters and protecting the public has been phenomenally successful since its launch, and offers the ultimate market leading temporary fencing system.

Our safer, more stable and most secure system ever offers you total peace of mind, and unrivalled performance.

You can be sure that by installing the Heras® 151 Steadfast System (patent pending), you are conforming fully to the latest HSE Guidelines on "Protecting the Public" from the dangers of construction sites.

Heras has campaigned widely over recent years against falling product standards, and has consulted closely with senior figures across the construction industry for our products meet and exceed your expectations. This latest innovative system means you should never again need to compromise on:

- Value for money
 - Quality
 - Performance
 - Design
 - Ease of installation.
- All backed up with unbeatable service from our nationwide branch network – deal direct with Heras – your safety first fencing supplier.

Fully Tested and Certificated

- Extensive independent testing by Sheffield Hallam University has proved the performance of the system, resisting wind speeds well in excess of gale force.
- The HSE has confirmed that the system meets all of the guidelines in the HSG 151 Publication "Protecting the Public - Your next move".
- In turn, therefore, we can offer customers a certificate of compliance when they purchase this system from Heras.
- It is your responsibility to ensure the system is correctly installed and fixed. For help and advice, contact your nearest branch.

151 system

The key components of the Heras® 151 system are as listed:

Round Top Panel with Anti-Climb Mesh

- The strongest panel on the market, with 3 sides formed from a continuous length of tube, eliminating the top corner weld, often the weakest point in traditional panel design.

High Visibility Orange Block

- Permanently coloured with a durable UV stabilised "twink" casing and filled with solid high density concrete.
- Effectively highlights any potential trip hazard.
- Beware of cheap imitations – painted coatings will chip and peel.

Heraslock® Anti-Tamper Coupler

- Providing additional security, these couplers can only be removed with the use of the specialist tool.

151 steadfast system

The Heras® 151 steadfast system incorporates all the benefits of the 151 system, with the addition of the patented...

Heras® Steadfast Strut

- The unique design of this clever strut dramatically increases the stability of the fence.
- The strut fits neatly within the high visibility block allowing a neat and compact solution, and acts as an integrated anti-lift device.
- 3 additional fixing holes incorporated into the design allow for soil pins and thumbbolts, dependent on ground conditions.

Optional Extras

- Heras® Steadfast Safety Strips with reflective coating can be fitted in minutes to highlight site dangers.
- Front support brackets allow vastly improved performance on softer ground conditions and fit quickly and easily into the high visibility blocks.



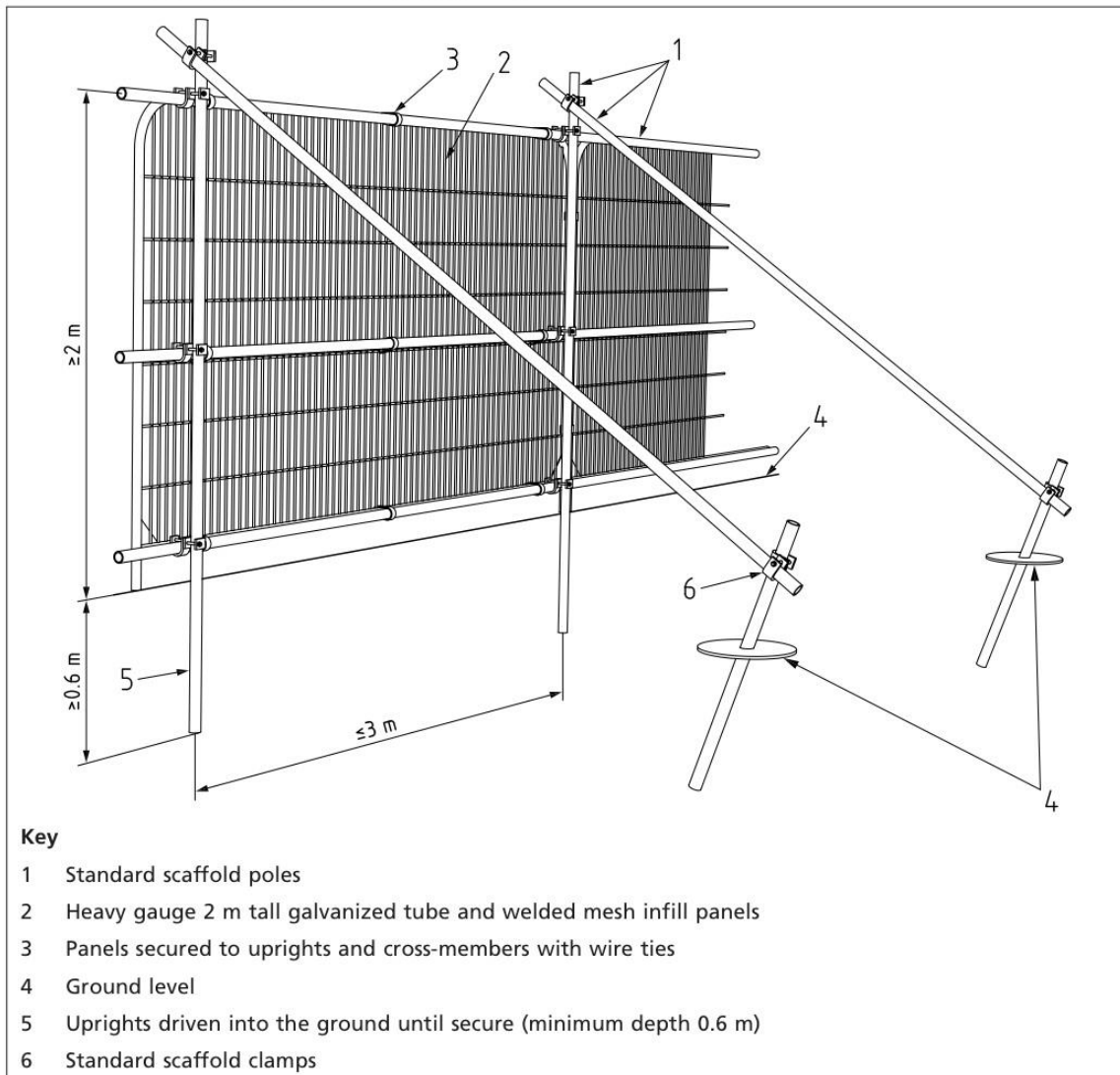
ROUND TOP PANELS WITH ANTI-TAMPER RESTR

Our latest solution for securing site perimeters and protecting the public has been phenomenally successful since its launch, and offers the ultimate market leading temporary fencing system.

1. Front stabiliser
2. High visibility footboards
3. Round top panel
4. Steadfast strut
5. Anti-tamper coupler
6. Optional steadfast safety strips
7. Anti-sink round top panel with steadfast strut to increase stability.



Figure 2 Default specification for protective barrier





Appendix 4 – Example of Tree Protective Signs





Appendix 5 – Example of Temporary Ground Protection

DuraDeck -|-|-|-|-|-|- PRODUCT SPECIFICATIONS DD1

Traction Surface: Double-traction tread design includes two parallel traction treads positioned at 90 degrees to adjacent double traction tread sets.

Module Size: **Length:** 8' / 2.44 m
 Width: 4' / 1.22 m
 Module Size: 32 sq/ft / 2.973 sq/meters
 Thickness: ½" thick mat + 3/8" cleat

Module Weight: 86 lbs. / 39.01 kg.
 Per Square Foot: 2.69 lbs. / 43 oz. / 1.22 kg. / 1219 grams
 Per Square Meter: 28.60 lbs. / 12.97 kg.

Colors: Black, White.
 Custom colors available (minimum order required).

Material: Black High-Density Polyethylene (HDPE) post-industrial recycled plastic, naturally UV resistant due to the carbon black used for color. White mats available.

Test Results:	ASTM	Units	Typical Values
Melt Index	D 1238	g/10min	4.9
Density	D 792	g/cm ³	.960
Tensile Strength	D 638	mpa (psi)	30 (4,350)
@ Yield 50mm/min			
Elongation @ Break	D 638	%	1 500
50mm/min			
Flexural Modulus	D 790	mpa (psi)	1 240 (180,000)
Hardness, Shore D	D 2240	--	70
Compressive Strength:		D695-02a	psi 2,843
Flammability Resistance:	UL-94 HB		Passed

Tread Pattern: **DD1:** Rugged double-traction tread on both sides

Support Structure: Matting incorporates multi-directional structural support (cleat design) allowing for distribution or dispersion of PSI weight factors. Not intended for bridging.

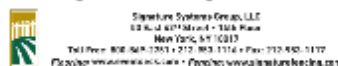
Weight Loading: Varies, depending on sub-surface, up to 80 tons capacity.

Ground Surface: DuraDeck mats are designed to be used with no ground preparation over grass, gravel, soil, concrete, asphalt, mud and sandy soil conditions.

Connection System: DuraDeck mats have eight holes: one in each corner and four in the center line (two on each 8ft side) to create multi-directional roadways of nearly any size or shape. Mats can be connected using metal DuraLink connectors. DuraLinks do not require tools to install.

Shipping: Pallet maximum is 50 units (4' x 8')
 20' Ocean Container: 250 – 4' x 8' unit order and/or equal to 29,240 lbs.
 40' Ocean Container: 500 – 4' x 8' unit order and/or equal to 43,000 lbs.

Warranty: 7 years against cracking and breaking under normal use.





Appendix 6 – Guidance on Three-Dimensional Cellular Confinement Systems

Preparation

During the preparation stages it is important to consider any activity that may cause damage to tree roots or soils beneath, resulting in compaction and therefore an increase in bulk density that could result in oxygen depletion and reduction in soil water availability. The clearance of vegetation could also result in direct damage to root bark or severance of roots that are vital for tree survival.

The location and movement of site traffic should therefore give due consideration to ensure roots and soils do not undergo any form of compaction, or excess excavation of earth to remove any surface vegetation. Further risk factors include the creation of an impervious surface, causing a rise in the water table due to construction, increasing ground levels and contamination of sub soils.

When looking at site conditions and future use requirements, the following information should be considered to enable a load bearing structure capable of supporting proposed traffic:

- Californian Bearing ratio (CBR) – Standard test method for measuring soil strength
- Soil types
- Water table
- Maximum load requirements
- Acceptable rut depth
- Reinforcement type (I.e. depth of three-dimensional cellular confinement system)
- Type and depth of engineered infill material (E.g. Clean, angular stone, usually 40mm to 20mm).

Excavations

The precise location and depth of roots within the soil is unpredictable and can only be established once digging has commenced. Ideally, all RPAs should be no-dig, but this is often not possible on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted. Some limited excavation may be required to achieve this, and this is not necessarily damaging to trees if it is done carefully and no large roots are cut. The top 50mm of soil on grass surfaces is unlikely to contain any tree roots and therefore the removal of this will not impact the tree. It may be possible to dig deeper than this depending on local conditions, but this would need to be assessed by the retained project arboriculturist.

On undulating surfaces, finished gradients/levels must be planned with sufficient flexibility so as to allow changes to occur if the excavation of high points reveals unexpected large roots. If roots are less than 25mm in diameter, it would normally be acceptable to cut these. However, for roots over

25mm diameter, cutting them may cause damage to the tree and further excavation may not be possible. In this case, the surrounding levels must be adjusted to take account of these high points, by filling with suitable material. If this is not possible and it is necessary to cut larger roots, discussions should be held with the retained project arboriculturist before any final decision is made.

Installation

Generally, it is best practice to place a geotextile separation filtration layer over the prepared sub-grade and overlap dry joints by 300mm.

The three-dimensional cellular confinement system should be expanded to the full length, with panels secured in place using staking pins to anchor open the cells. Adjacent panels should be stapled together to create a continuous mattress and the structure infilled with a no fines angular granular fill (typically 4-20mm) within each open cell.

A treated timber edging is usually acceptable for an edge restraint, however other suitable materials may include railway sleepers or metal pins.

Surfacing Options

Generally, a variety of surface finishes can be installed including block paving, gravel, tarmac and concrete but will depend on the individual manufacturer's specification and product requirements.



Appendix 7 – Example of Three-Dimensional Cellular Confinement System

CellWeb™ Tree Root Protection System



The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.



Potential loss of existing tree due to poor construction techniques.

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.



Glynebourne Wood.

Pedestrian path to recreational wand and built using a CellWeb™ foundation which was covered with Duoblock and then filled with woodchip to create a porous surface.



Product features



CellWeb™ comprises an expandable cellular mattress that is then filled with a clean stone sub-base and above a Treetex T300 Geotextile.

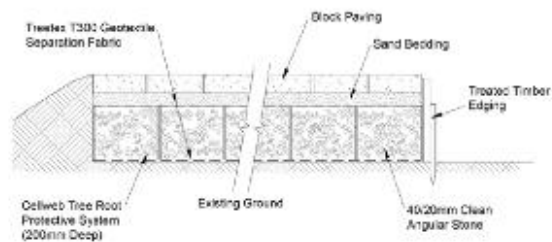
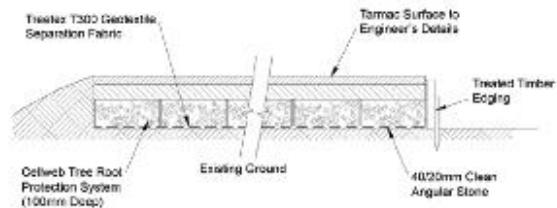
The honeycomb-like structure is made of robust high-density polyethylene (HDPE) that is simply stretched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CellWeb™ this is achieved without compaction and without reduction in permeability.

Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to nearby tree roots. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CellWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CellWeb™ significantly reduces surface rutting, increasing the long-term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CellWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CellWeb's green credentials.

- No excavation – Soil structure remains undisturbed; risk of root damage minimised.
- Porous infill – Allows tree roots to conduct moisture and gas exchange.
- No compaction – No need to compact the infill to achieve a load-bearing structure.
- Lateral stability – Structure remains rigid to vertical loads.




**Please call
01455 617 139**

or email sales@geosyn.co.uk
for further information.

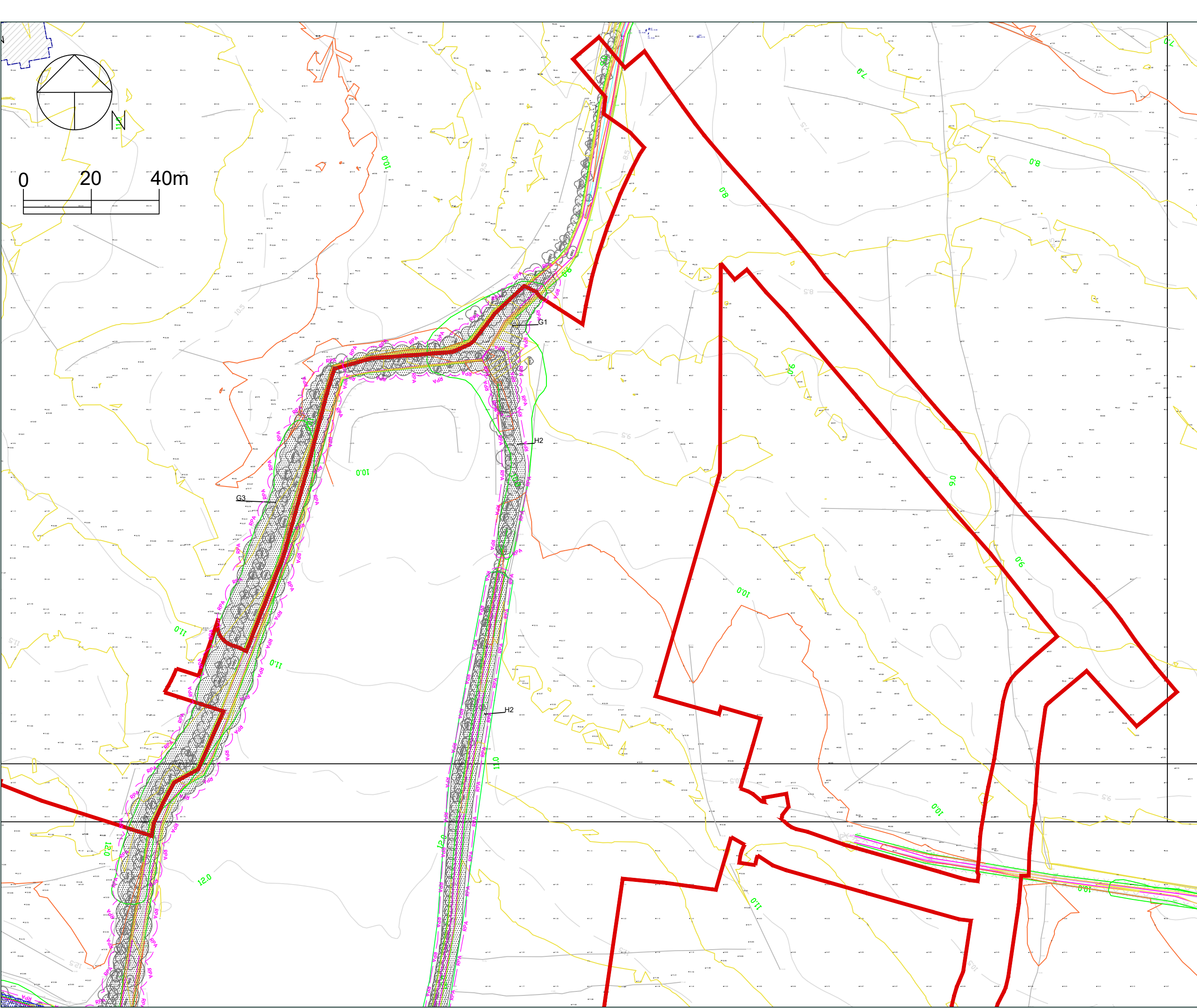
Wide
product
range

Large
stock
holding








Next day
delivery

Client	Quintain Ireland																	
Project / Site	Portmarnock Phase 1D																	
Reference	21-252-01																	
Survey Date	27th September 2021																	
Abbreviation	Definition	Age Class			Physiological Condition			Structural Condition			Category		U.L.E	Sub category				
H	Height (m)	Y (Young)	Newly planted (<10 yrs old)		Good	No obvious health problems		Good	No visible defects		A	High value and conservation		40+	1	Mainly arboricultural		
Stem Dia.	Stem diameter (mm)	SM (Semi-mature)	First third of life expectancy		Fair	Intervention may improve health		Fair	Defects may require intervention		B	Moderate value and conservation		20+	2	Mainly landscape		
C.C	Crown clearance (m)	EM (Early mature)	Second third of life expectancy		Poor	Serious ill health or dying		Poor	Dangerous or no remedy		C	Low value and conservation		10+	3	Mainly cultural		
L.B.H	Lowest (significant) branch height (m)	M (Mature)	Full age for species								U	Not suitable for retention		<10				
L.B.D	Direction of lowest (significant) branch	OM (Over mature)	Beyond life expectancy & in decline															
U.L.E	Minimum useful life expectancy (yrs)	V (Veteran)	Ancient characteristics or conservation value			Suffix:		G - Group H - Hedgerow W - Woodland P - Tree is on private land *Tree is not on topographical survey and therefore position remains indicitive # Measurements estimated (tree is inaccessible)										

Tree No.	Tag No.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Crown Spread (m)				C.C (m)	L.B.H (m)	L.B.D	Age	Physiological	Structural	Comments	Recommendations	U.L.E	Cat.	RPA (m2)	RPA Radial distance (m)
							N	E	S	W												
G1	N/a	Ash (Common)	<i>Fraxinus excelsior</i>	14	480	1	6	6	6	6	6	0	South	M	Fair	Fair	Dense multistem group with ivy clad stems that form homogeneous canopy, dense hedgerow understorey comprising bramble, ivy, spindle, elm, blackthorn, hawthorn and goat willow. Occasional tree showing early signs of ash dieback (hymenoscyphus fraxinea) with minor dieback of outer foliage.	Part removal to facilitate proposal. Monitor progression of ash dieback and remove affected trees when crown dieback reaches c.75%.	10+	C2	102	6
H2	N/a	Mixed Species Hedgerow	N/a	3	180	1	2	2	2	2	0	0	South	EM	Fair	Fair	Dense mixed species hedgerow comprising hawthorn, blackthorn, bramble ivy, predominantly blackthorn to north and elm further south with occasional hawthorn, elder, hazel, and dog rose, either side of field ditch.	Part removal to facilitate proposal. Maintain retained as hedgerow.	10+	C2	14	2
G3	N/a	Mixed Species Group	N/a	10	240	1	6	6	6	6	0	0	South	EM	Fair	Fair	Dense linear mixed species group comprising elm with occasional ash, dense understorey of bramble, hawthorn, blackthorn and goat willow.	Part removal to facilitate proposal. Remove single dead ash on corner where G3 meets H4.	10+	C2	28	3
H4	N/a	Mixed Species Hedgerow	N/a	4	220	1	2	2	2	2	0	0	South	EM	Fair	Fair	Dense linear mixed species hedgerow comprising hawthorn, elm, blackthorn, bramble, dog rose, spindle, ivy, goat willow surrounded by dense vegetation.	Part removal to facilitate proposal. Maintain retained as hedgerow.	20+	B2	23	3
G5	N/a	Ash (Common)	<i>Fraxinus excelsior</i>	12	280	1	5	5	5	5	0	0	South	EM	Poor	Fair	Dense multistem group of c.6 multistem trees, early to intermediate stage ash dieback with loss of foliage and recession into central crown, limited useful life expectancy, arising from hedgerow.	Part removal to facilitate proposal. Monitor crown condition and reduce/incorporate into hedgerow when crown dieback reaches c.75%.	10+	C2	34	3
H6	N/a	Mixed Species Hedgerow	N/a	3	220	1	2	2	2	2	0	0	East	EM	Fair	Fair	Dense linear mixed species hedgerow comprising hawthorn, elm, blackthorn, bramble, dog rose, spindle, ivy, goat willow surrounded by dense vegetation, extends along railway track.	Maintain as hedgerow.	20+	B2	23	3
G7	N/a	Mixed Species Group	N/a	6	240	1	3	3	3	3	0	0	East	EM	Fair	Fair	Dense linear group with homogeneous canopy, arising from hedgerow, either side of field ditch.	Maintain as hedgerow.	10+	C2	28	3
G8	N/a	Mixed Species Group	N/a	10	300	1	4	4	4	4	0	0	South	EM	Fair	Fair	Dense linear group, ivy clad stems, south of bank/field ditch with stream with understorey of blackthorn, hawthorn, bramble with gap in middle where new road sub base is under construction	Part removal to facilitate proposal. Remove dead stems east of opening by new road.	10+	C2	41	4
G9	N/a	Mixed Species Group	N/a	11	310	1	4	4	4	4	0	0	South	EM	Fair	Fair	Linear mixed species group comprising elm with dense understorey hedgerow of hawthorn, blackthorn, elder and bramble, either side of ditch surrounded by dense vegetation.	Part removal to facilitate proposal. Maintain retained as hedgerow.	10+	C2	41	4



LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
-  Category C
-  Category U
-  Root Protection Area
-  Existing Layout
-  Site Boundary

NOTES

Tree positions place reliance on the topographical surveys. The position of those trees not recorded on the topographical survey remains indicative and can be identified with an asterisk on the accompanying Tree Schedule (Ref: 21-252-01).

Scale is for illustration purposes only.

Drawing should be read in colour.

Category A
Trees of high arboricultural quality and value in such condition to be able to make a significant contribution for a minimum of 40 years.

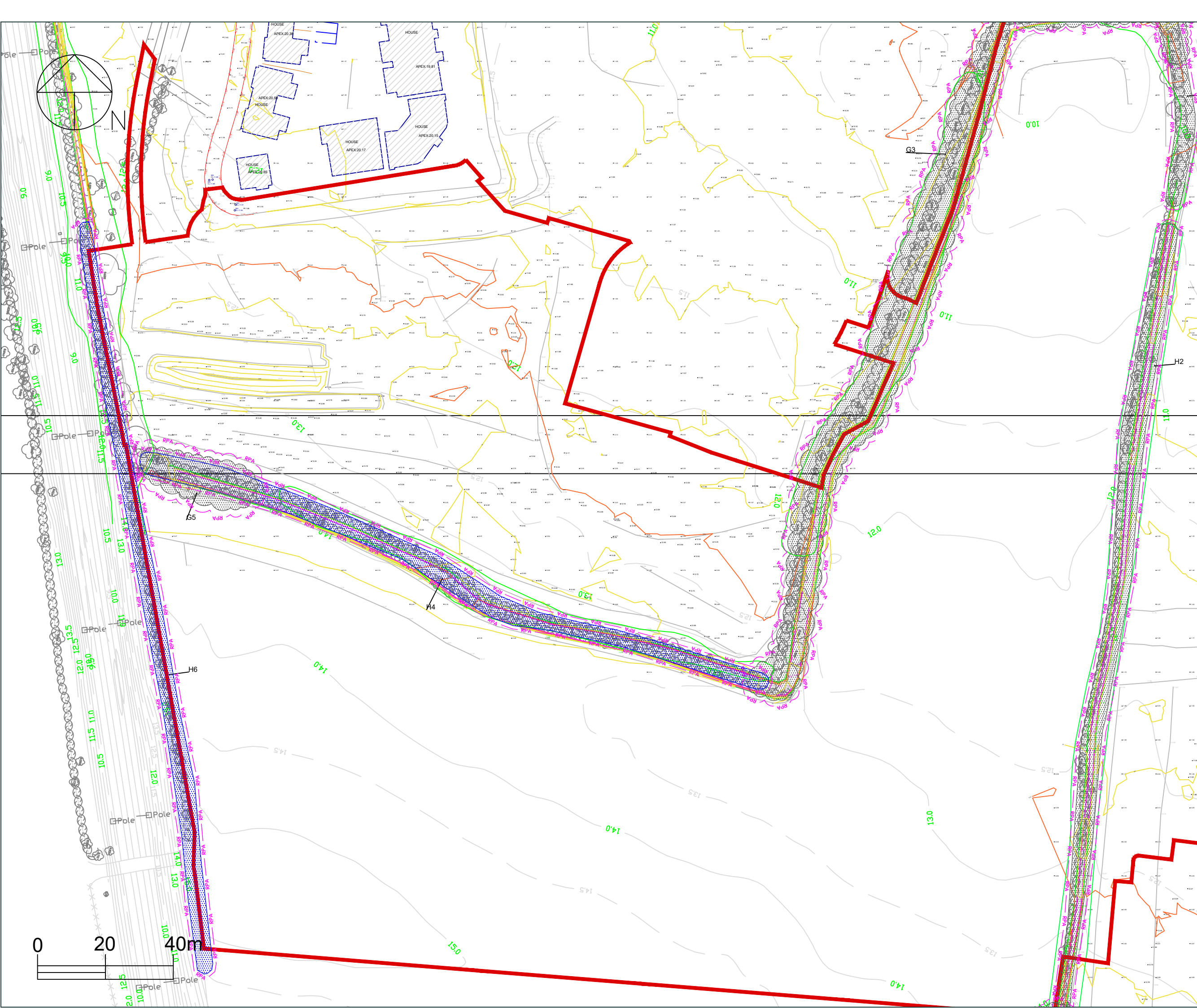
Category B
Trees of moderate arboricultural quality and value in such condition to be able to make a substantial contribution for a minimum of 20 years.

Category C
Trees of low arboricultural quality and value currently in adequate condition until new planting can become established with a minimum useful life expectancy of 10 years, or stem diameter of <150mm.








Category U
Trees in poor physiological or structural condition that cannot realistically be retained in the context of current land use for longer than 10 years.

TITLE: Tree Constraints Plan (Insert 1)	
PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 03.10.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL

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LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
-  Category C
-  Category U
-  Root Protection Area
-  Existing Layout
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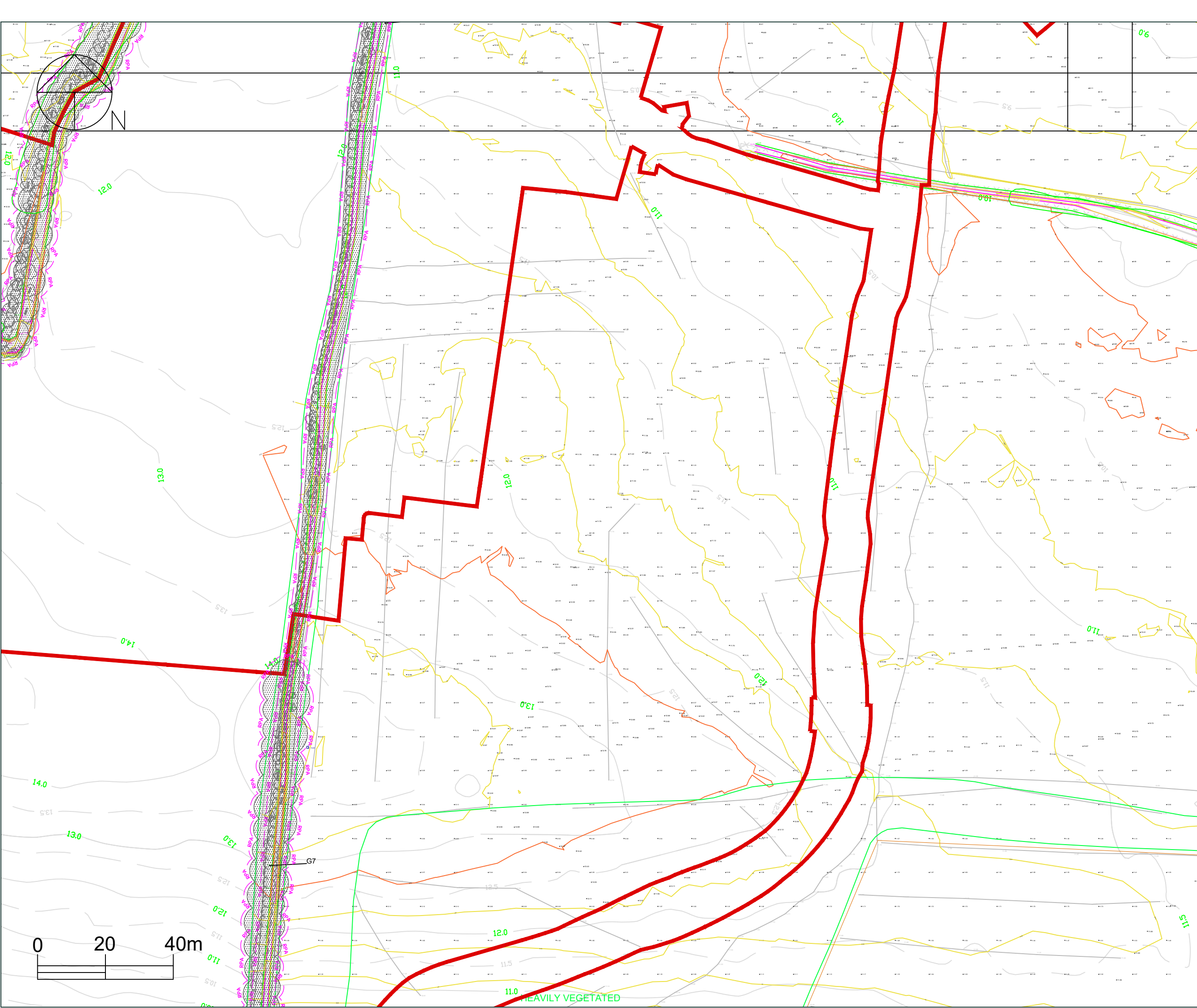
Category A
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Trees of moderate arboricultural quality and value in such condition to be able to make a substantial contribution for a minimum of 20 years.








Category C
Trees of low arboricultural quality and value currently in adequate condition until new planting can become established with a minimum useful life expectancy of 10 years, or stem diameter of <150mm.

Category U
Trees in poor physiological or structural condition that cannot realistically be retained in the context of current land use for longer than 10 years.

TITLE: Tree Constraints Plan (Insert 2)	
PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 03.10.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL



LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
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-  Existing Layout
-  Site Boundary

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Drawing should be read in colour.

Category A

Trees of high arboricultural quality and value in such condition to be able to make a significant contribution for a minimum of 40 years.

Category B

Trees of moderate arboricultural quality and value in such condition to be able to make a substantial contribution for a minimum of 20 years.

Category C

Trees of low arboricultural quality and value currently in adequate condition until new planting can become established with a minimum useful life expectancy of 10 years, or stem diameter of <150mm.

Category U

Trees in poor physiological or structural condition that cannot realistically be retained in the context of current land use for longer than 10 years.

TITLE: **Tree Constraints Plan (Insert 3)**

PROJECT / SITE: **Portmarnock Phase 1D**

CLIENT: **Quintain Developments Ireland Ltd**

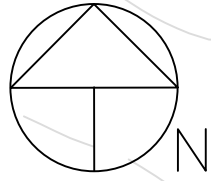
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REVISION: **v1**








DATE: **03.10.2021** SCALE: **1:1000@A3**

DRAWN BY: **JM** CHECKED BY: **JL**

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LEGEND

-  Category A (Tree stem and canopy spread)
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Scale is for illustration purposes only.

Drawing should be read in colour.

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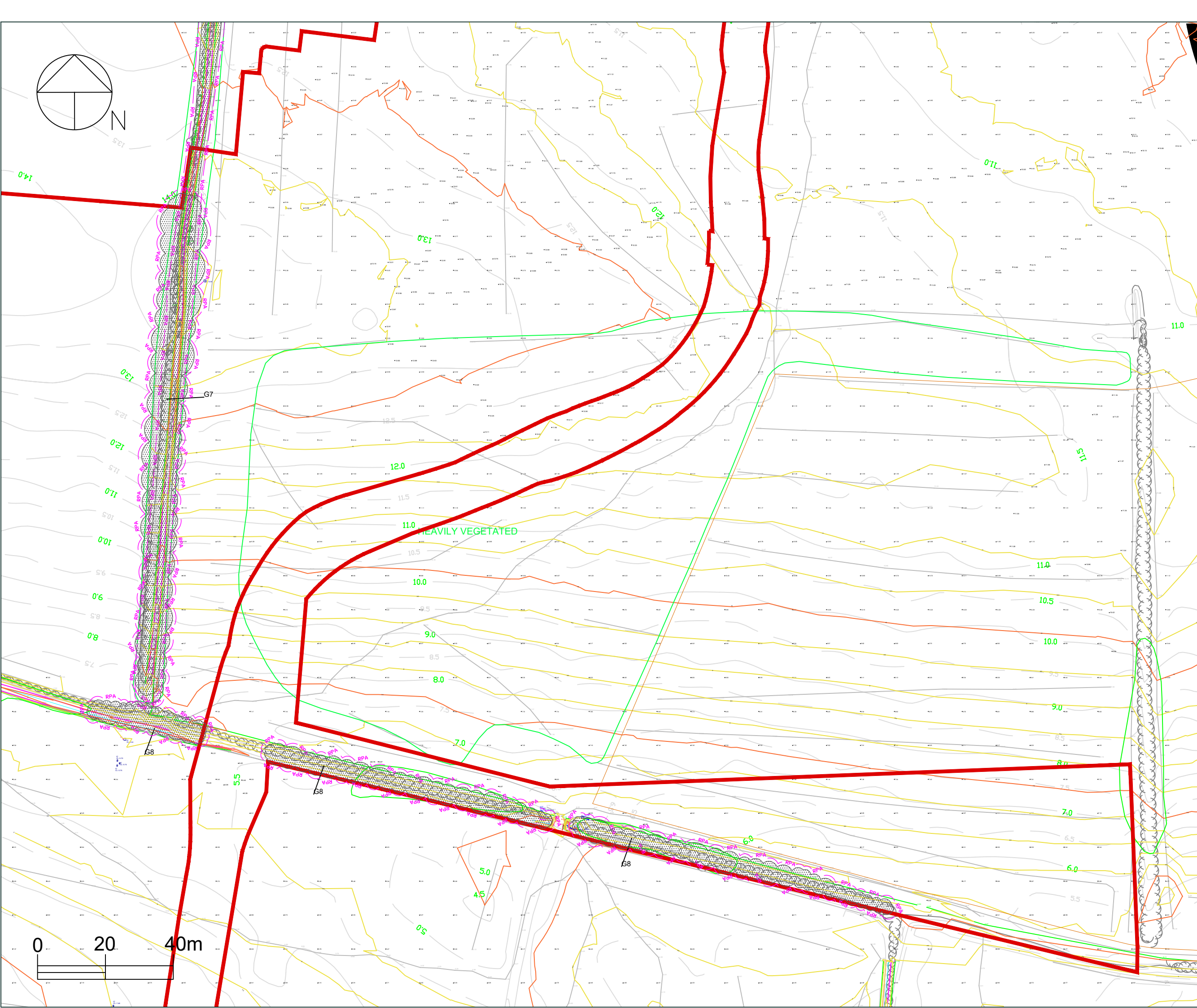
Category B
Trees of moderate arboricultural quality and value in such condition to be able to make a substantial contribution for a minimum of 20 years.

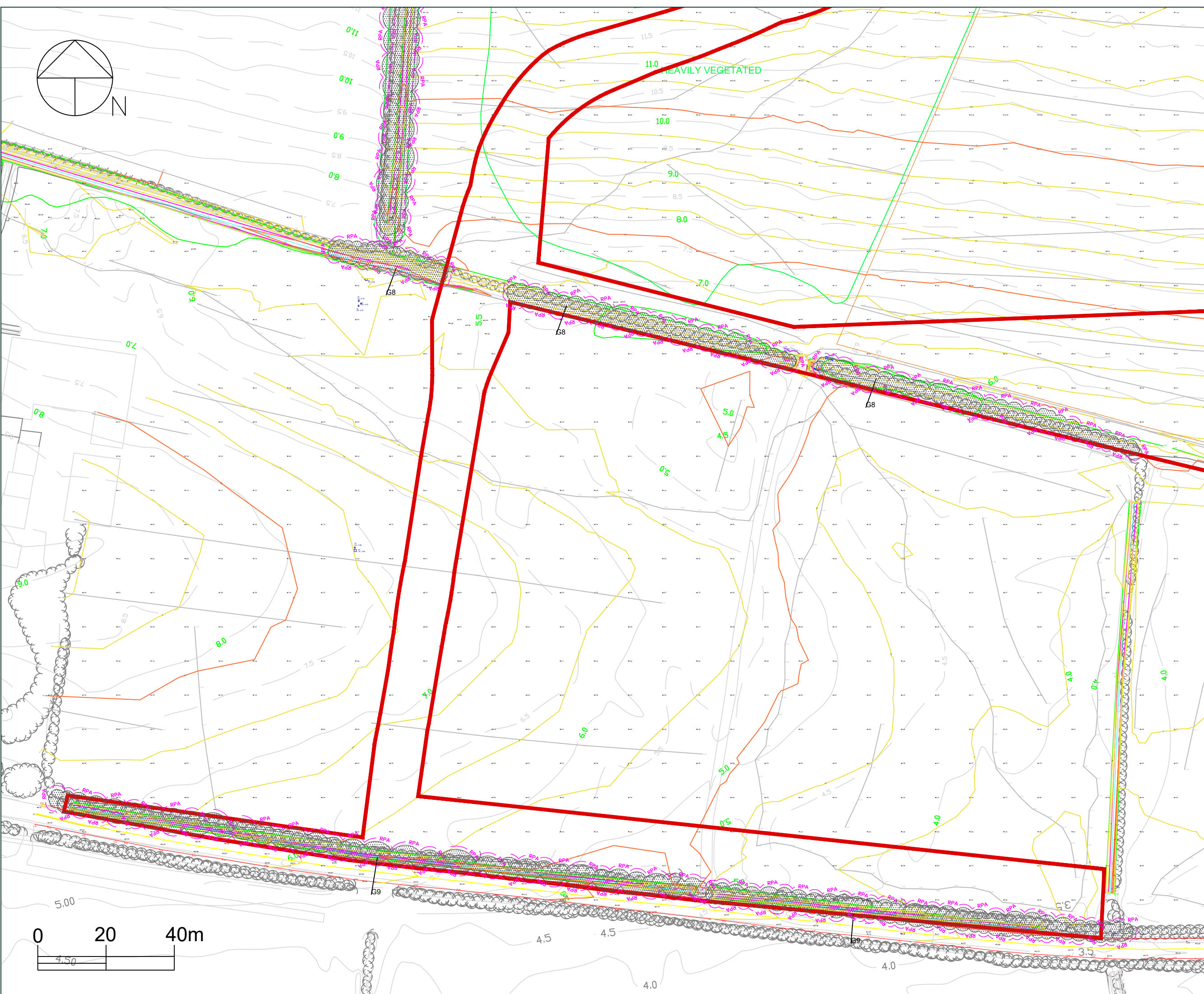
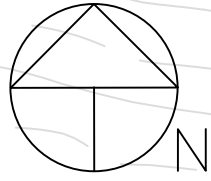
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Category U
Trees in poor physiological or structural condition that cannot realistically be retained in the context of current land use for longer than 10 years.








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PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 03.10.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL

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LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
-  Category C
-  Category U
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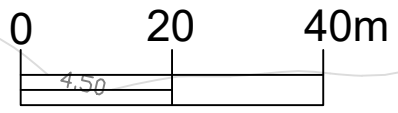
Scale is for illustration purposes only.

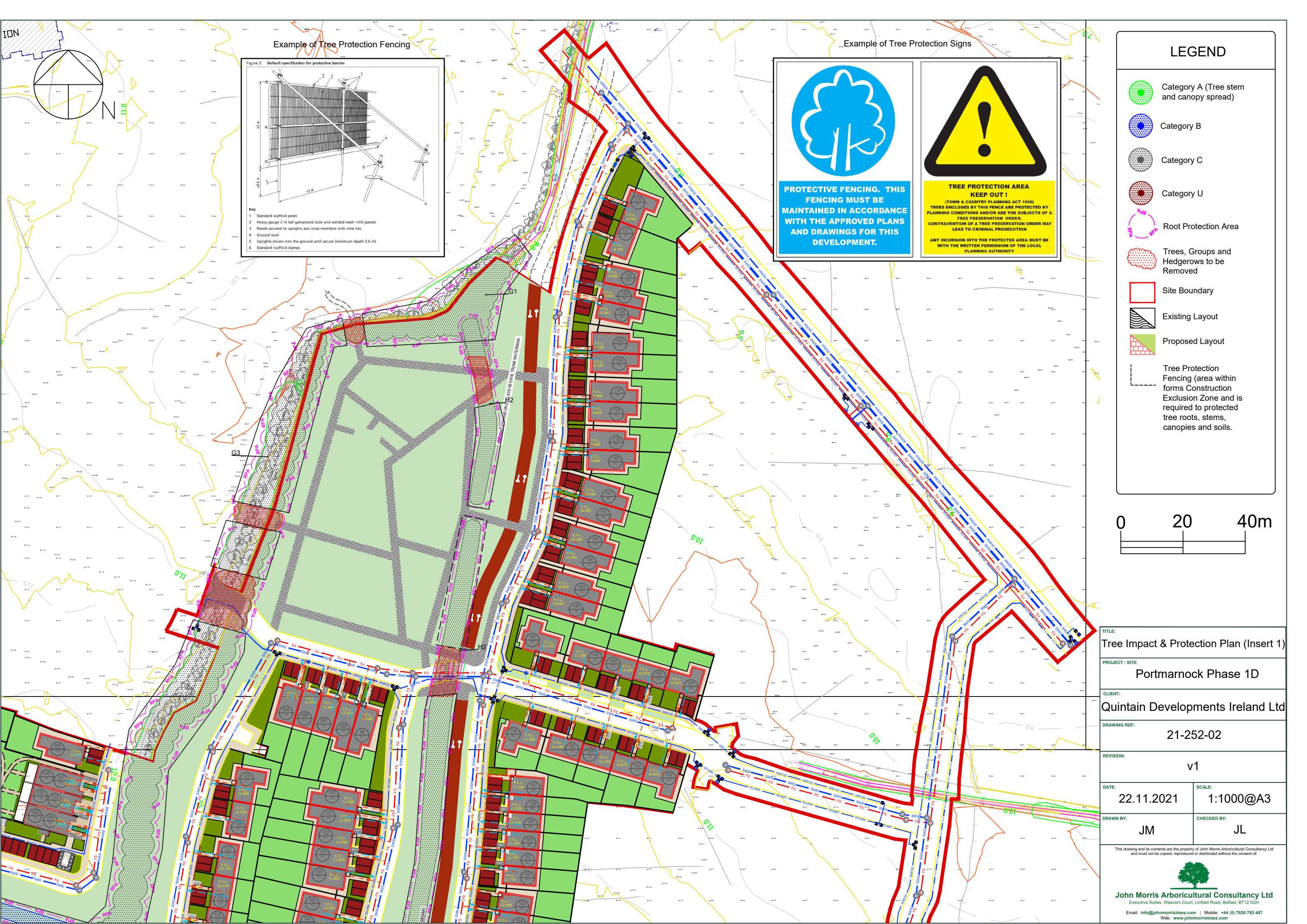
Drawing should be read in colour.

- Category A**
Trees of high arboricultural quality and value in such condition to be able to make a significant contribution for a minimum of 40 years.
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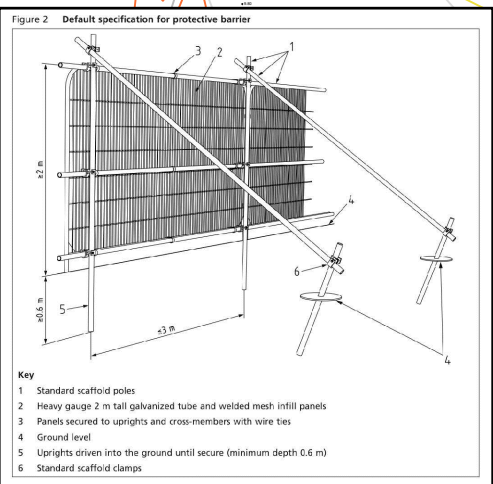
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PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 03.10.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL

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Example of Tree Protection Fencing



Example of Tree Protection Signs













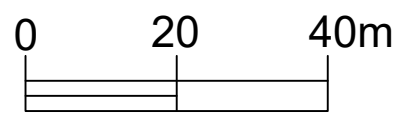
PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.



**TREE PROTECTION AREA
KEEP OUT!**
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE THE SUBJECTS OF A PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION
ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

LEGEND











-  Category A (Tree stem and canopy spread)
-  Category B
-  Category C
-  Category U
-  Root Protection Area
-  Trees, Groups and Hedgerows to be Removed
-  Site Boundary
-  Existing Layout
-  Proposed Layout
-  Tree Protection Fencing (area within forms Construction Exclusion Zone and is required to protected tree roots, stems, canopies and soils.

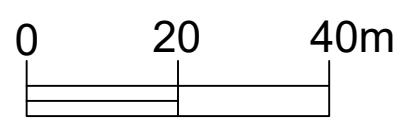


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PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 22.11.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL



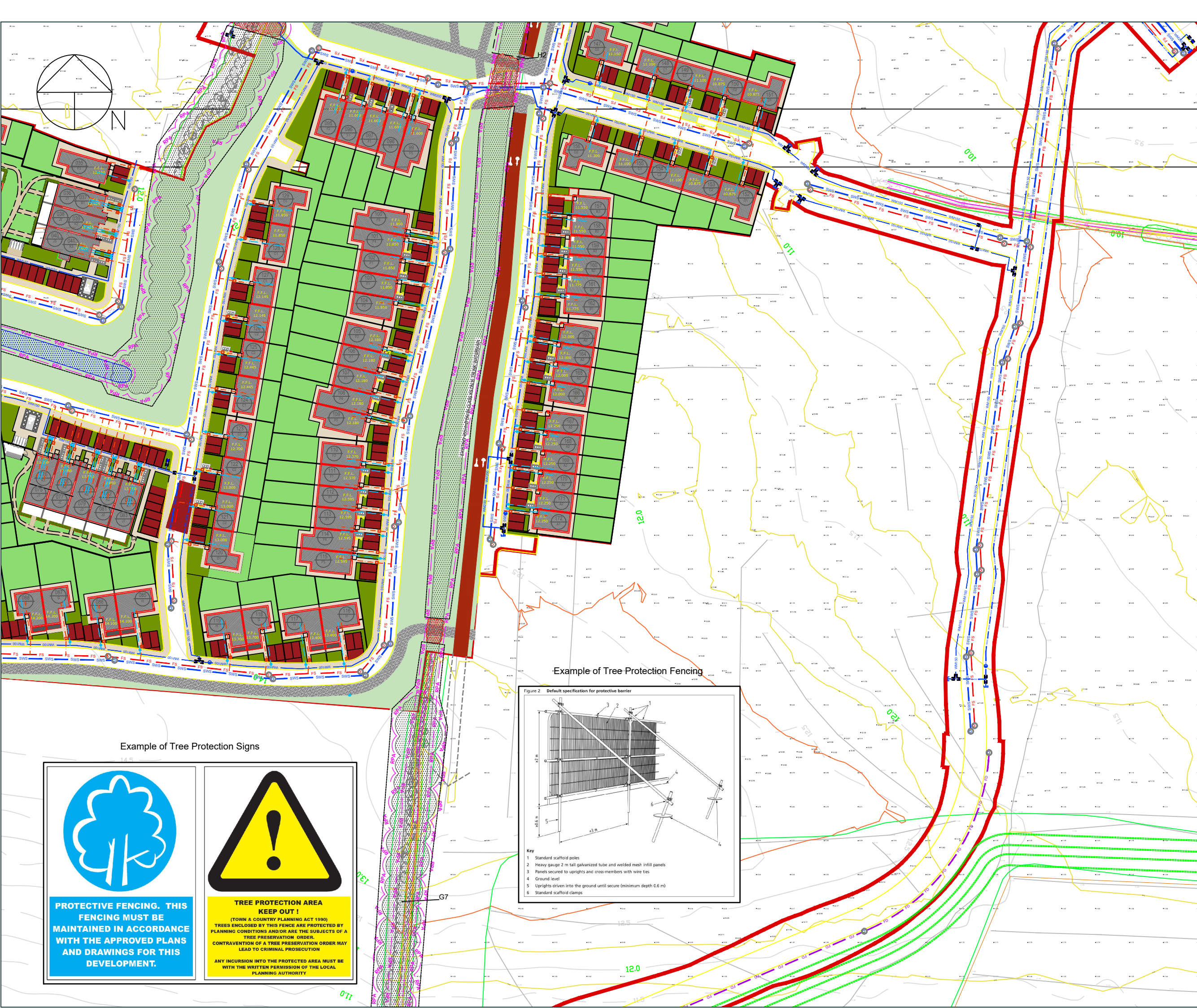
LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
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-  Site Boundary
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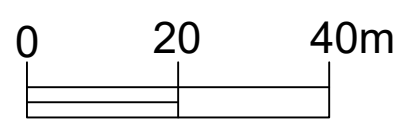
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PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 22.11.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL

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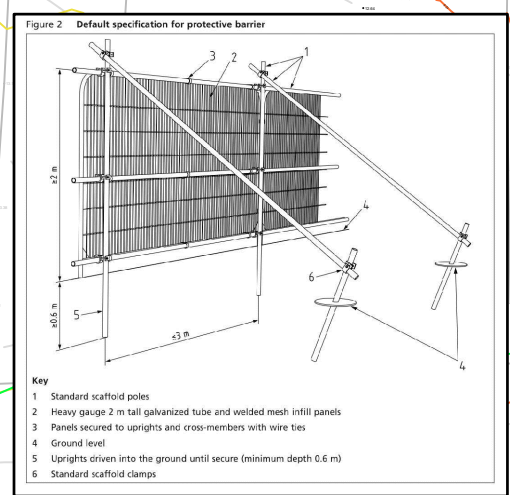


LEGEND

- Category A (Tree stem and canopy spread)
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- Proposed Layout
- Tree Protection Fencing (area within forms Construction Exclusion Zone and is required to protected tree roots, stems, canopies and soils.



Example of Tree Protection Fencing

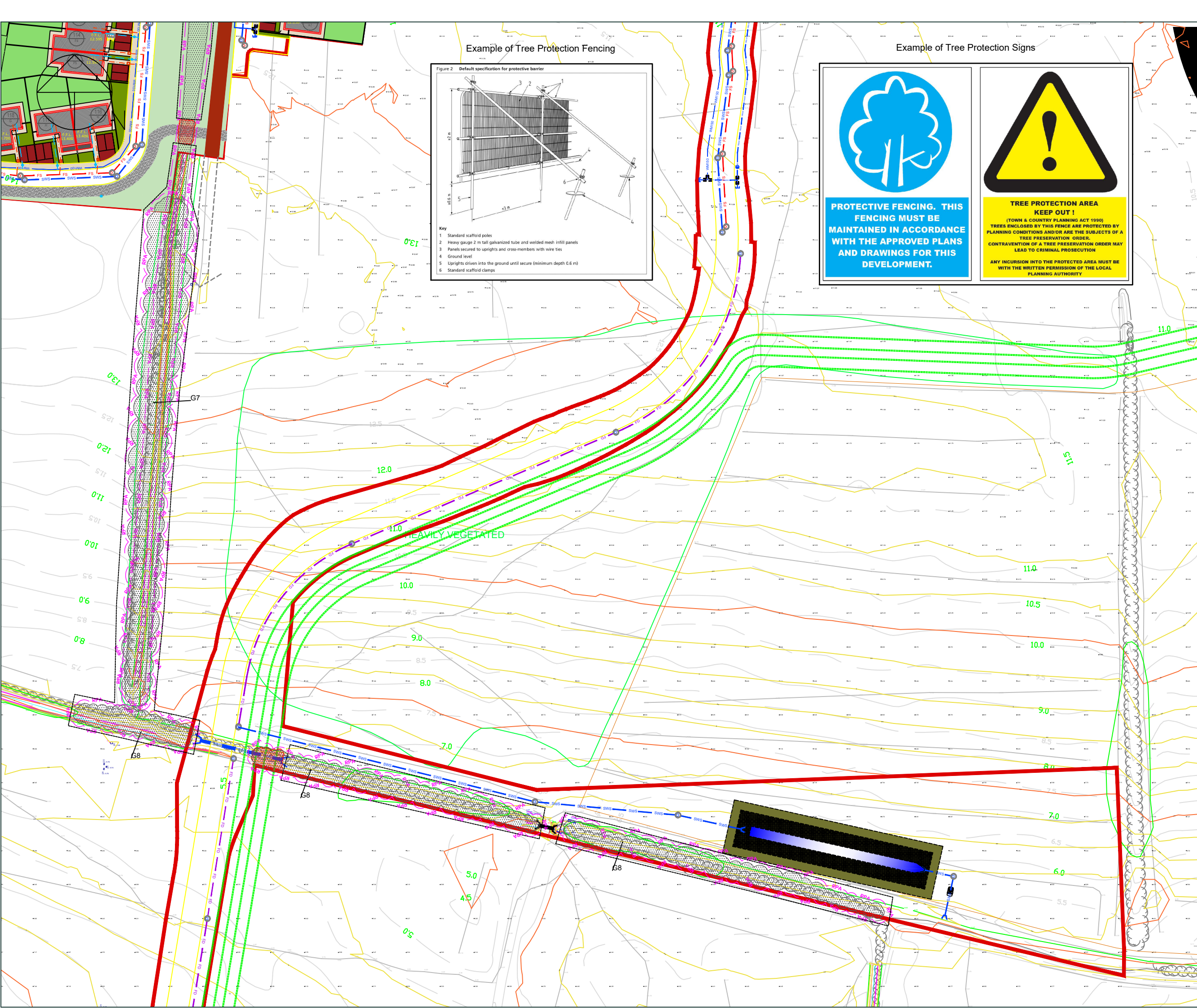


Example of Tree Protection Signs

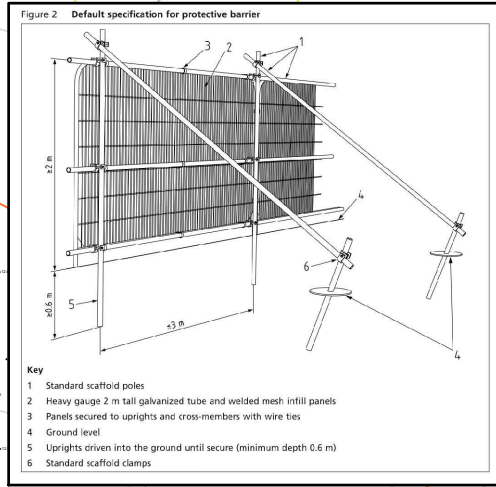
PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.

TREE PROTECTION AREA KEEP OUT !
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER. CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION
ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

TITLE: Tree Impact & Protection Plan (Insert 3)	
PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 22.11.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL



Example of Tree Protection Fencing

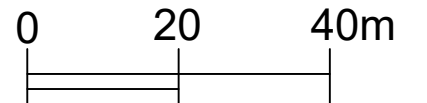


Example of Tree Protection Signs



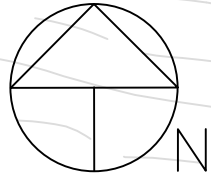
LEGEND

- Category A (Tree stem and canopy spread)
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- Site Boundary
- Existing Layout
- Proposed Layout
- Tree Protection Fencing (area within forms Construction Exclusion Zone and is required to protected tree roots, stems, canopies and soils).













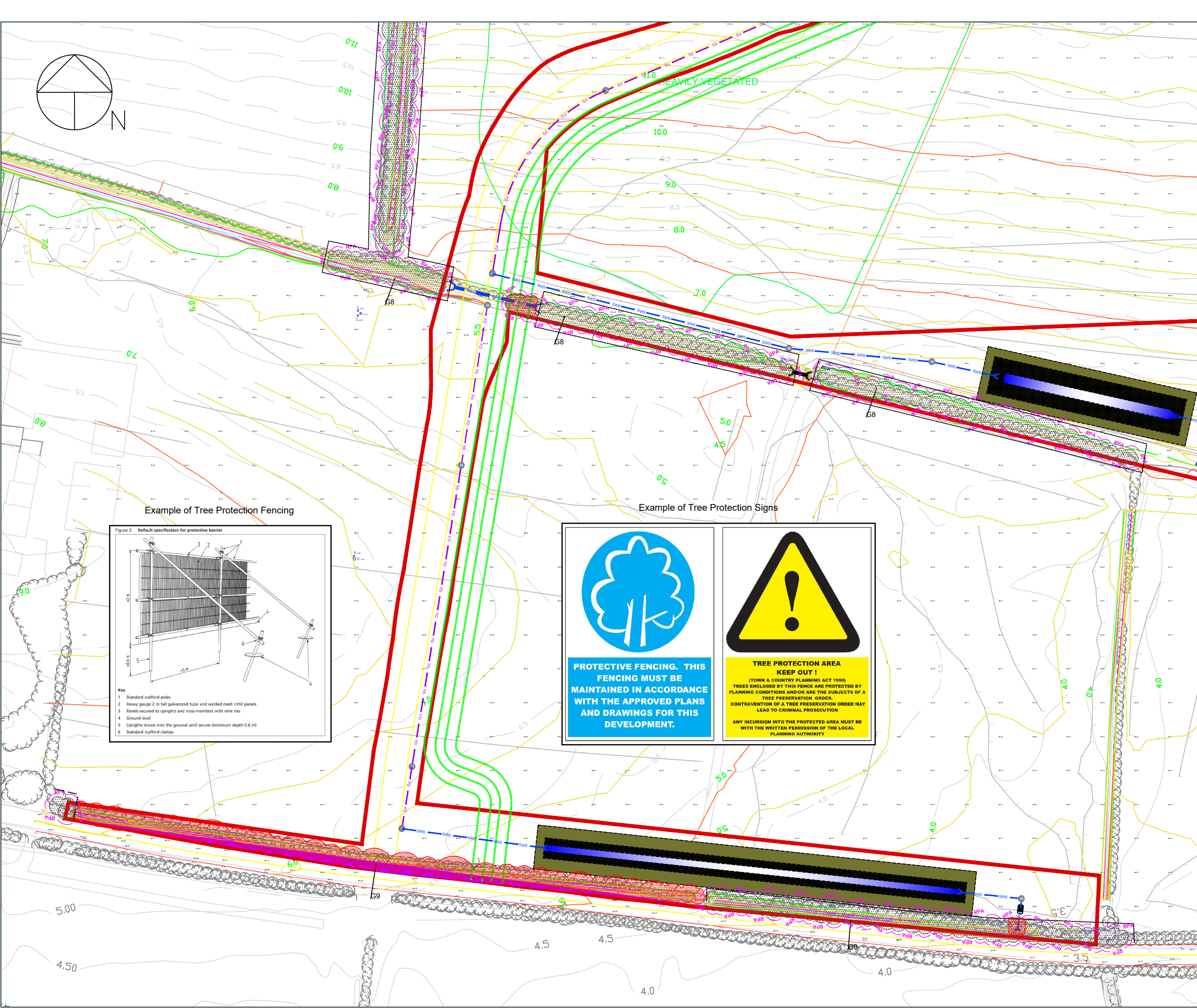
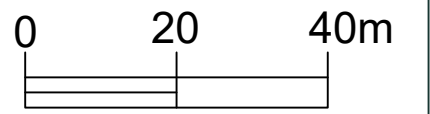
TITLE: Tree Impact & Protection Plan (Insert 4)	
PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 22.11.2021	SCALE: 1:1000@A3
DRAWN BY: JM	CHECKED BY: JL

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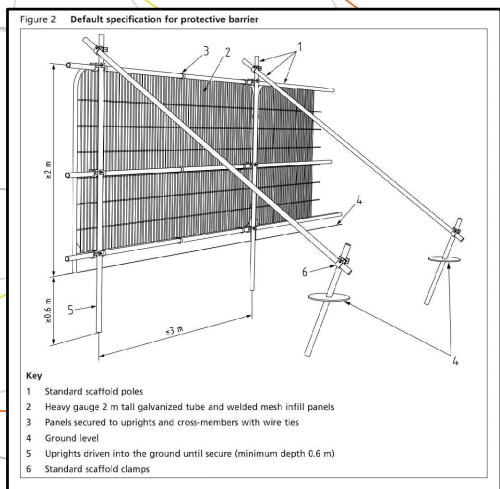


LEGEND

-  Category A (Tree stem and canopy spread)
-  Category B
-  Category C
-  Category U
-  Root Protection Area
-  Trees, Groups and Hedgerows to be Removed
-  Site Boundary
-  Existing Layout
-  Proposed Layout
-  Tree Protection Fencing (area within forms Construction Exclusion Zone and is required to protected tree roots, stems, canopies and soils.



Example of Tree Protection Fencing



Example of Tree Protection Signs



PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.



TREE PROTECTION AREA KEEP OUT!

(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER. CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION

ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

TITLE: Tree Impact & Protection Plan (Insert 5)	
PROJECT / SITE: Portmarnock Phase 1D	
CLIENT: Quintain Developments Ireland Ltd	
DRAWING REF: 21-252-02	
REVISION: v1	
DATE: 22.11.2021	SCALE: 1:1000@A3
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