

murray & associates
landscape architecture

IE DUBZZ-STE1-E0-MAL-RP-L-91000
LANDSCAPE ARCHITECT'S DESIGN REPORT

At

INXN DUB15/16, PROFILE PARK, DUBLIN 22

INCLUDING:

Landscape Design Report

Appendix A: Landscape Specifications Landscape Management Plan

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Introduction: Existing Site and Context

DUB15/16 Data Centre Infrastructure development is proposed as part of the existing Profile Park, located in Kilcarbery, Dublin 22. The site is well connected by the N7 and adjoining M50 roads, and nearby bus stops are serviced by the 13, 68 and 68X bus routes. The site is set up for development with infrastructure provided by the Profile Park development. The DUB 15/16 development will adjoin the previously built DUB 13 DUB 14,. The site, measuring 6.18 hectares, is located on the south-east end of the business park. It is bordered by Grange Castle Golf Course to the east, which is a private facility. Agricultural land with a farm and 19th century Kilbride House adjoin the subject site to the south. This farm was once a castle site. These lands also include a graveyard with ruins of a church, which is a National Monument. Baldonnel Casement Aerodrome – a Department of Defence military air base – is located within approx. 150m from the proposed site south boundary. The site is accessed via an internal business park estate road network from the north. This internal access road partially divides the site, with area to the west occupied by 2 no. existing data centre buildings and a former construction compound and area to the east being a greenfield site, bordered by a ditch and hedgerow along this eastern boundary which separates the site from the Grange Castle golf course. The site contains an existing stream, previously culverted and proposed for re-routing to enhance and create a more natural, biodiverse stream environment. Existing vegetation include the culverted streams associated hedgerow, and scrub regrowth of two hedgerows previously removed during profile parks development.

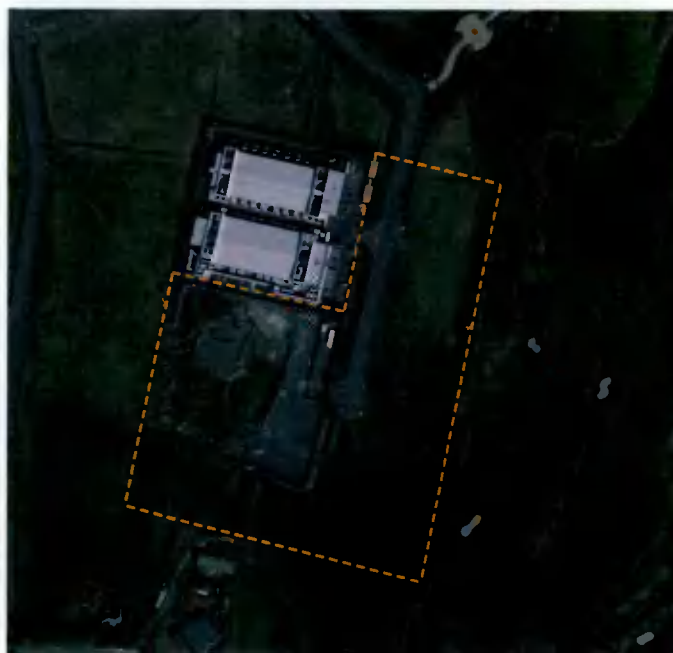


Figure 1 –DB8 Arial Site Location

Proposed Development

The development will consist of:

10 year permission for the following development: Removal of an existing unused waste water treatment facility on site and the erection of two data centre buildings, gas powered energy generation compound, and all other associated ancillary buildings and works. The two data centre buildings, DUB 15 and DUB 16, will comprise a total floor area of c. 33,577m² over two storeys. The first 2 storey data centre building (DUB15), located to the south west of the site, will comprise 16,865m² data storage use, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space. A second 2 storey data centre building (DUB16), located to the south east of the site, will comprise 16,712m² data storage areas, ancillary office use and associated electrical and mechanical plant rooms, loading bays, maintenance and storage space. Both data centre buildings will reach a height of 20m. Emergency generators and associated emission flues and plant are proposed in compounds adjacent to each data centre building. Gas powered energy generation is proposed to the north east corner of the site to provide electricity for the proposed development. The application proposes to re-route and widen an existing watercourse constructed following an earlier planning permission. It is proposed to reroute this watercourse along the eastern and southern boundary of the site. Landscaping is proposed to the south of the site to screen the buildings. Fencing and security gates are proposed around the site. New access roads within the site are proposed along with 71 car parking spaces and 26 cycle spaces, bin stores, site lighting, and all associated works including underground foul and storm water drainage attenuation and utility cables and all other ancillary works. A Natura Impact Statement will be submitted to the planning authority with the application.

The application is for a development which comprises an activity which will require an Industrial Emissions Licence from the EPA.



Figure 2 –Proposed Landscape Plan
(See IEDUBZZ-STE1-E0-MAL-LA-L-91001 for details)

Landscape Strategy

The landscape strategy is focused on providing usable open spaces for the employees at INXN DUB15/16 Data center, while also providing increased biodiversity value to the site. A nature loop walk and pocket park a breakout zone to gather and relax and take lunch in the outdoors, has been provided to the rear of the site. Benches along the loop walk provide a more intimate and contemplative space to escape the work day. Landscape elements were also used to increase screening. Shrub planting along the building edges and flanking car parking, softens and screens the hardscaping. A berm and avenue of trees along the south creates a visual boundary. The existing green boundary along the east will be enhanced with low level riparian strip planting and wetland trees, biodiversity value and water quality. The Pocket Park is located at the center of a large greened area, trying in with the loop walk allowing for maximum use and to take advantage of the aspect of the site. Central woodland planting creates a sense of enclosure around the seating, to give a 'clearing in the woods' type effect. Feature trees are dotted along the loop walk to add interest and are placed at the center of the seating zone to create a focal center point. The feature trees were selected to provide year round interest. The Landscape design takes advantage of stream on site by providing wetland tree and marginal planting along the boundary of the stream, naturalization of this element increases biodiversity and amenity value. Spending time near water bodies is thought to lower levels of stress and release endorphins, by providing benches at the edge of the water an oasis for workers has been provided.



Figure 3 --Proposed Pocket Park Plan
(See DB080-MA-LS-XX-DR-L-PLNT-1052 for details)

Planting Palette

Soft buffer planting of ornamental grasses and ferns has been selected to screen and soften building edges, while maintaining a sophisticated architectural aesthetic.



Figure 4– Precedent Image Screening Planting

Ground cover planting has been selected for planting under tree canopies and around parking spaces. Planting such as Viburnum Davidii, dogwood and periwinkle will grow low to the ground and well in shade, while providing flowering interest in a colour pallet of white, pink and purple.



Figure 5– Precedent Ground cover Planting

Decorative planting in shades of purple and pinks is provided through shrub planting. Lavender, Rosemary, and Heather provide colour, scent, and interest through structure while not in flower.



Figure 6– Precedent Decorative Planting

Ornamental trees create a feature element at the center of the pocket park evergreen magnolia provides flower and year round lush foliage, Japanese maple provides vibrant colour in the autumn, while the flowering cherry takes center stage in the spring.



Figure 7– Feature ornamental trees with year-round interest

Planting has been used not just for aesthetic purposes in this scheme but has had a major role in the proposed increase of biodiversity value of the site. Native wildflower seed planting will provide bee and butterfly friendly planting, while creation of a new surface water attenuation feature allows for riparian zone and marginal wetland planting creating a new habitat. Please refer to the Ecological Impact assessment for further details of habitats.

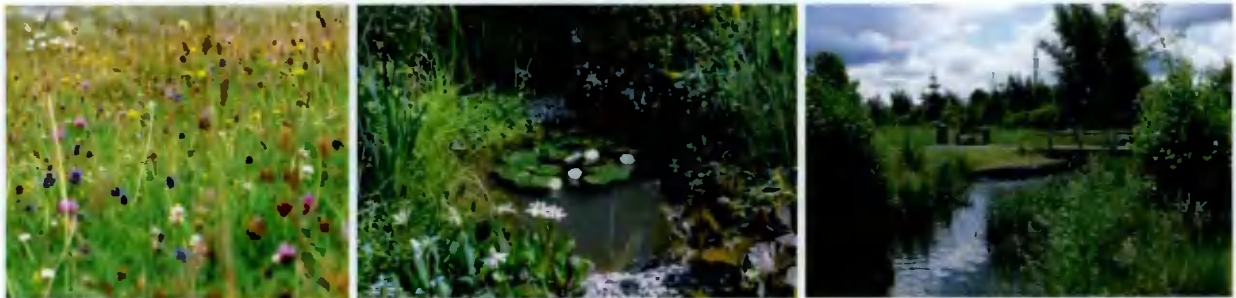


Figure 8–Biodiversity Native flowers and riparian and marginal planting

The additional native woodland planting provided on site, will consist of Birch, Oak, Field Maple and Bird cherry. This will provide additional screening as well as diversifying the tree species in this area (currently predominantly Ash, which is being badly affected by dieback).



Figure 9– Native Irish Trees

Materials Palette

The hardscape materials were selected to complement the function of spaces and contribute to sustainable urban drainage. Permeable paving is used in the parking bays and pedestrian zones. Hard surfacing within the greened area is used only to provide access paths and seating zones and consists of an understated buff colour self-binding gravel path to compliment the natural surroundings. Bespoke timber benches are designed to fit seamlessly with the design, curved and L shaped benches create more social spaces, while single rectangular benches allow for a more private space.



Figure 10- Precedent Image Hard Landscape Materials
 (Permeable paving, Buff Gravel Path, M&A bespoke curved bench @ The Green, Malahide)

Conclusion

The landscape design provides a variety of spaces to benefit both the workers and local biodiversity. Maintenance and replanting of the greening along the stream will enhance local biodiversity, while new habitats are introduced through wildflower meadow seeding and riparian and marginal wetland planting.

Overall, the development will provide appropriate infrastructure to the intended use of the site, while also providing additional amenity and biodiversity value, contributing to the overall aesthetics and function of the local area.

Appendix A

Landscape Specifications Landscape Management Plan

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Preamble

This document has been prepared for submission as part of the planning application for INXN DUB 15/16 Data Center Development and should be read in conjunction with the landscape plans prepared by Murray & Associates, Landscape Architecture. The intent is to provide technical information for the implementation and the management of the landscape scheme proposed in the application. To this end, the following sections of this document include an outline landscape specification which details the standards of supply and workmanship that will be required, and a landscape management plan which will be the basis for the maintenance and management of the landscape following completion.

Any changes that occur to the proposed landscape design as a result of compliance with planning conditions or detailed design may result in changes to the following documents. Any substantial changes will be agreed with the local authority as necessary.

A. OUTLINE LANDSCAPE SPECIFICATION

1. SPECIFICATIONS FOR SUPPLY OF NURSERY STOCK

1.1. Supply of nursery stock:

The nursery stock material will be delivered following consultation between the employer's representative, landscape Contractor and the selected nursery. It is intended to serve notice of delivery by means of phased orders at least two months prior to commencement of the dormant season in November of that year. Delivery will be at all times by means of covered vehicles, and all plant material will be clearly labelled. The source of origin must be from the selected nursery, as no other additional stock from other nurseries will be permitted without prior inspection and approval

1.2. Nursery stock:

All plant material shall be good quality nursery stock, free from fungal, bacterial or viral infection, aphids, red spider or other insect pests and any physical damage. It shall comply with the requirements of B.S. 3936: Parts 1-10: 1965 Specification for Nursery Stock, where applicable.

All plants shall have been nursery grown in accordance with good practice and shall be supplied through the normal channels of the wholesale nursery trade. They shall have the habit of growth that is normal for the species. Country of origin must be shown in all cases for species grown from seed.

Unless otherwise stated, the plant materials shall be supplied in accordance with the following codes where stated:

1+0 1 Year old seedling

1+1 1 Year old seedling lined out for 1 year 1+2 1 Year old seedling lined out for 2 years

1+1+1 1 Year old seedling lined out for 1 year, lifted and lined out for one further year 2+2
2 Year old seedling lined out for 2 years

0/1 1 Year old Hardwood cutting 0/2 2 Year old Hardwood cutting 2X Twice transplanted tree

3X Three times transplanted tree 4X Four times transplanted tree P9 Containerised
plant in 9cm pot CG / c/g Containerised plant

gt. Girth

ht. Height RB / r/b Rootball BR / b/r Bareroot

MS Multi-stemmed

Ftd Feathered trees

1.3. Species:

All plants supplied shall be exactly true to name as shown in the plant schedules. Unless stipulated, varieties with variegated and/or coloured leaves will not be accepted, and any plant found to be of this type upon leafing out shall be replaced by the contractor at his/her own expense.

Bundles of plants shall be marked in conformity with B.S. 3936: Part 1: 1965 and B.S. 3936: part 4: 1966. The nursery supplier shall replace any plants which, on leafing out, are found not to conform to the labels. Definitions of all terms used are in accordance with the following British Standards: -

B.S. No. 3936: Part 1: 1992 entitled "Nursery Stock- Trees and Shrubs"

B.S. No. 3936: Part 4: 1984 entitled "Nursery Stock- Forest Trees"

B.S. No. 3936: 1992 entitled "Specification for Nursery Stock"

1.4. Tree and Shrub Specifications:

Trees shall have a sturdy, reasonably straight stem, and a well-defined straight and upright central leader, with branches growing out of the stem with reasonable symmetry. The crown and root systems shall be well formed. Roots shall be in reasonable balance with the crown and shall be conducive to successful transplantation. All trees shall be clearly labelled.

1.4.1. Root-Balled Trees

Trees shall have a clear stem from ground level to the lowest branch and a total height as appropriate to the girth size, and the minimum girth as specified shall be measured at 1.0m above ground level— all as required under BS3936: Part 1. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. All nursery stock trees shall have been undercut and provided with a rootball of min. diameter appropriate to girth and height. All rootballs shall be wire and hessian-wrapped.

1.4.2. Multistem Trees - Rootballed

Multistem trees shall have a minimum of 3no. stems originating from or near ground level (<0.3m) and be of reasonable bushiness and health, with a well grown root system and a total height as specified on the drawings and schedules. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. All rootballs shall be wire and hessian-wrapped. All multistem trees stock trees shall have been undercut a minimum of 3no. times and

provided with a rootball of sufficient size and diameter to enable healthy transplanting and successful establishment and growth. All rootballs shall be wire and hessian-wrapped.

1.4.3. Container grown Shrubs, Ferns, Grasses, Perennials, Bamboo, Hedging

Containerised Shrubs and Climbers shall be of the size specified in the schedules, with several stems originating from or near ground level and of reasonable bushiness, healthy, vigorous and with a sound root system. Pots or containers shall be appropriate to the size of shrub supplied and clearly labelled. Shrubs shall not be pot bound or with girdled or restricted roots. Shoots and aerial parts shall be free of disease, and/or damaged leaves or shoots.

1.4.4. Hedging Stock – Bare-Root

Hedging stock shall be of size specified in the schedules, with several stems originating from or near ground level, with reasonable bushiness, healthy, vigorous and with a sound root system. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots. Transplants shall be not less than one year old. Trees of species not listed in B.S. 3936: Part 4: shall be sturdy, with a balanced root and shoot development. Size shall conform to the schedules. Trees shall be well furnished with lateral fibrous roots, and shall be lifted without severance of major roots. Roots shall be of the habit normal for the species, without deformation. Transplants shall be clearly labelled and wrapped in polythene from the time of lifting until planting to conserve moisture. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots.

1.4.5. Hedging Stock – Rootballed

Hedging stock shall be of size specified in the schedules, with several stems originating from or near ground level, with reasonable bushiness, healthy, vigorous and with a sound root system. Shoots, roots and aerial parts shall be free of disease, and/or damaged leaves or shoots. Such hedging shall be provided with a rootball of sufficient size and diameter to enable healthy transplanting and successful establishment and growth. Rootballs shall be hessian- wrapped only for any plant under 1m in height.

1.4.6. Bulbs and Corms

Bulbs and Corms should be supplied whole and entire, certified disease and disorder free, dry, and in a dormant, leafless, rootless state. Bulbs must be viable and provenance certification may be required to ensure that bulbs have not been stored too long or become unviable.

2. SPECIFICATIONS FOR CARE OF NURSERY STOCK

2.1. Protection:

The interval between the lifting of stock at the nursery and planting on site is to be kept to an absolute minimum. Plants shall be protected from drying out and from damage in transport. All stock awaiting transport shall be protected from the wind and frost and from drying out.

2.2. Damage

On completion of lifting of plants in the nursery, any broken shoots or severed roots shall be pruned, areas of damaged bark neatly pared back to sound tissue.

2.3. Inspections

The Employer's representative will inspect the hardy nursery stock during the execution of the works. **Only plants selected and approved in the landscape contractors selected nursery will be accepted on the site.**

2.4. Delivery and heeling in

All plants will be delivered on a phased basis as called up in advance in agreement with the Employer's representative and the appointed Landscape Contractor. In the event of the Employer's representative being dissatisfied with the care and attention given to the stocks, following heeling-in or arrival on site, he shall notify the Landscape Contractor who shall take steps to ensure careful heeling-in procedures. Any damaged plants must be replaced by the Landscape Contractor entirely at his own expense.

The preparation of the heeling-in area and its subsequent maintenance is the sole responsibility of the Landscape contractor. No responsibility for the maintenance of stock delivered to site will attach to the employer whilst stock is protected on site, even if the stock requires protection beyond the normal planting season.

3. SPECIFICATIONS FOR SITE OPERATIONS

3.1. Setting out:

Setting out shall be in accordance with site meetings with the Employer's Representative, and the drawings listed in the preliminaries. No planting works shall take place when the soil /fill is in a waterlogged condition or the ground is frozen. Transplants in mixtures shall be planted in staggered rows. Species shall be planted in groups, as indicated in the planting drawings. No planting shall take place until all planting holes (with ameliorants) have been inspected and approved by the Employer's Representative, or a person appointed by him as a representative, to ensure accordance with the specifications. No planting shall take place when ground conditions are frozen or waterlogged. All planting holes shall be opened and closed on the same day.

3.2. Earthworks, Soil and Grading

3.2.1. Stripping and storage of existing soil on-site

All soil removed during grading works is to be placed in storage bunds on-site. Topsoil must be stripped separately from subsoil for re-use in landscape works and must be fit for purpose. Topsoil would be defined as soil that has a high content of organic material, usually corresponding to the 'O' and/or 'A' horizon of the soil profile. Subsoil would be all mineral soils that do not have a substantial organic component. Where the difference between topsoil and subsoil is unclear, consult the Employer's Representative.

Subsoil that is excess to fill requirements is to be stored on-site in a designated location, to be agreed with the Employer's Representative. Subsoil shall be stored in stable mounds with side slopes of gradient no more than 1:2 and an overall height of no more than 2m. Mounds to be seeded with wildflower seed as per clause 3.3.3.

Topsoil shall be stripped using a tracked vehicle to avoid subsoil compaction. Avoid tracking over or compaction of the topsoil. Topsoil should be stripped and dumped to form the berms using the dump and back-actor method. Double handling of topsoil is to be avoided. Topsoil that has been compacted shall be removed off site and replaced at the contractor's expense.

Topsoil shall be stored in stockpiles of dimensions no greater than 10m long x 5m wide x 0.5m high, such that a long, narrow and low berm is created to preserve the intrinsic qualities (structure and soil life) of the topsoil whilst in storage. The topsoil shall be loose tipped to create the berm and lightly compacted with the back of a digger bucket to create a degree of compaction suitable for storage, with side slopes of gradient no more than 1:2. No machinery shall be run over the soil berm. Berms shall be seeded with grass seed as per clause 3.3.2.

3.2.2. Subsoil

(a) Supply of Subsoil

Existing subsoil shall be used for all grading works.

Imported subsoil – if required - shall be sourced from a reputable source and be free of waste, chemicals, large stones, builder's rubble and any other detritus.

(b) Formation of Slopes/Mounds

Subsoil to be used to form even slopes or mounding to contours shown on drawings. Subsoil to be formed to smooth contours to 150mm below finished levels indicated on drawings, where the area is to be grassed or 300mm.

(c) Formation of Grassed Areas

Subsoil to be graded accurately to contours / levels / falls / crossfalls shown on drawings.

3.2.3. Topsoil

(a) Supply of Topsoil

Existing topsoil may be used for all grading and planting works, if it complies with the following specification, which would also apply to imported topsoil, as required. It is expected that imported topsoil will be required for all planting areas.

Topsoil shall be sourced from a reputable source and be free of waste, chemicals, large stones, builder's rubble and any other detritus. Topsoil shall have good structure, be friable, fresh and free-draining with at least 20% organic content. Imported topsoil shall comply with BS3882: 1994, and shall be free draining sandy loam, clay or other approved. It shall be free of stones over 40 mm diameter, and stones over 10 mm diameter shall not exceed 5% by weight. It shall be free from subsoil, sods, roots of trees and shrubs, and rubbish. Topsoil shall be from the original surface layer of grassland or cultivated land, to a maximum depth of 200 mm. Soils from woodland, heathland, bog or contaminated land will not be acceptable.

(b) Removal of topsoil:

In areas to be regraded, all topsoil should be stripped and stored as per following clauses.

(c) Weather and Soil Conditions

All work involving topsoil shall not be carried out, unless the Employer's Representative permits otherwise:

- Where areas have been exposed to a cumulative rainfall exceeding 60mm over the preceding 28 days

measured at a point approved by the Employer's Representative; or

- Where soil moisture content is wetter than the Plastic Limit (PL) of the soil less 3%. The PL of the soil can be assessed in the field as the minimum moisture content at which the soil can be rolled and moulded into a thin thread approximately 3mm in diameter without breaking or cracking and in a laboratory according to BS 1377:Part 2.
- When heavy rain is falling;
- During periods of severe frost when the soil is frozen. Handling frozen soil will cause damage to the soil structure.

(d) Topsoil Spreading

Topsoil shall be moved and spread only in dry weather. Before topsoiling, remove all stones, rubble and rubbish over 75mm diameter from the surface of the subsoil formation. Dig out any areas polluted by oil or chemicals and make up with clean soil. Loaders shall load from the base of the soil storage berm only. Placement of soil should be carried out using a tracked vehicle to avoid subsoil compaction. Reinstated areas of topsoil shall not to be tracked over. The topsoil shall be allowed to settle to a thickness of 300mm and the contractor shall make full allowance for such settlement in applying the topsoil. Uneven areas shall be topped up as necessary.

(e) Topsoil Depths & Provision

The following depths should be provided for topsoiled areas:

- (i) Grassed Areas: 150mm
- (ii) Bare-root planting: 300mm
- (iii) Shrub planting: 450mm
- (iv) Tree planting: Pit to specified size, depending on size of tree (see relevant Clauses)

(f) Grading

Topsoil to be graded accurately to contours / levels / falls / crossfalls shown on drawings. Glazed / compacted areas of subsoil to be roughened or ripped as necessary. (Drainage to be installed where necessary to Engineer's specification.) Any compacted areas to be ripped after placing of soil.

(g) Compacted areas

Any areas identified as compacted following completion shall be deep ripped and re-graded or re-soiled as necessary, to ensure a free-draining soil gradient and to avoid anaerobic conditions developing in the topsoil.

3.2.4. Structural Soil / Tree Pits

Structural Soil to consist of the following, in the proportions determined by the manufacturer:

| | |
|--------------------------|--|
| Range of use | Tree planting pits under high traffic areas |
| Material | Crushed stone, sandy clay loam, peat-free compost |
| Total pore volume | > 35% Vol |
| Moisture Content | 12-20% |
| Key data | Total Nitrogen 500 mg/L Phosphorous 300mg/L Potassium 450 mg/L Magnesium 200 mg/L Calcium 3000 mg/L Sulphur 250 mg/L |
| Organic content (LOL) | 3-7 % w/w |
| pH value | 6.5-7.8 |
| Water permeability | 1.7 x 10 m/s |
| California Bearing Ratio | greater than 50 |
| Bulk density | Approx. 1.8ton/m ³ |

The structural soil shall be placed to the line and graded as shown on the plans or as directed by the Landscape Architect / Engineer.

- Install structural soil in 150mm (6") lifts and compact each lift. Compact all materials to 90-95% compaction from a standard AASHTO Compaction Curve (AASHTO T 99). Adequate compaction can be achieved with the use of a standard pedestrian plate compactor.
- No placement or compaction shall occur when moisture content exceeds 2% above the optimum compaction moisture content as determined by AASHTO T 99 (ASTM D698).
- Protect Structural Soil during delays in compaction with plastic or plywood as directed by the Engineer.
- Field tested permeability shall be within 12 - 25mm (0.5" and 1") per hour.

Engineering specifications for pavement installation call for a high degree of compaction which is generally specified as 95% Proctor or peak density, to ensure that pavements would not subside, crack, or fail. When CU-Structural Soil is correctly installed and compacted to 95% - 100% Proctor Density, it has a CBR (California Bearing Ratio) of 50 or greater.

NOTE RE STRUCTURAL SOIL: Alternative specification may be agreed at construction stage, subject to agreement with Planning Authority.

3.3. Surface cultivation of Topsoil

Surface cultivation will consist of ploughing or rotovating the topsoil to a minimum depth of 450mm over shrub areas or 150mm over grass areas. Care to be taken to ensure that the subsoil is not brought to the surface. It shall then be worked to reduce the topsoil to a fine tilth. After cultivation, all debris, perennial weeds and stones over 25mm in any dimension are to be removed off site.

Final grading is to be carried out to ensure the true specified level and slope and to avoid minor ridges, dishing or other depressions where water may collect.

Unless otherwise stated, finished levels of grass and shrub planting areas will be 50mm above adjoining paving or kerbs, retaining wall copings, manhole covers etc. and levels will be arranged to give gentle falls for drainage and to avoid ponding hollows. Any area unduly compacted during the work of grading will be loosened by forking or harrowing. The use of heavy rollers to roll out mounds will not be permitted.

Unless otherwise stated, finished levels of topsoil, after settlement, to be:

1. 50mm above adjoining pavements and kerbs
2. 300mm higher for shrubs than for adjoining grass areas
3. married in with adjoining soil areas
4. all stones above 50mm diameter to be removed off site by the landscape contractor.

3.4. Seeding:

3.4.1. Amenity Grass Areas

Fine cut areas to be sown with Coburns 'Greenlawn' Grass Seed Mixture as detailed below or equal at a rate of 40g/sq.m together with fertiliser 10:10:20 at a rate of 50g/Sq.m

15% Dwarf Perennial Ryegrass

15% Dwarf Perennial Ryegrass

20% Dwarf Perennial Ryegrass

25% Strong Creeping Red Fescue

20% Chewings Fescue

5% Browntop Bentgrass

4. SPECIFICATIONS FOR PLANTING OPERATIONS

4.1. Tree Support:

All trees in pavement tree pits shall be anchored by means of root ball guying. Rootball is anchored by a timber frame (or equivalent support system – e.g. Platipus system) located around the top surface of the rootball, which is fastened by wires (4mm galvanised cable guying wire) to 'dead man' anchors, kerbstones or timber beams located below the rootball.

4.2. Stakes:

Round stakes shall be of peeled larch, pine or Douglas fir, preserved with a water-borne copper chrome arsenic composition in accordance with I.S. 131. All trees to be double staked with crossbar 100x25mm securely attached to uprights with galvanised nails. Stakes shall be round, 1.8m long, 75mm in diameter. Stakes shall be pointed at the butt end. Set stakes vertically in the pit and drive before planting. Drive stake with a wooden maul or cast-iron headed drive. Sledgehammer should not be used. Stakes shall be driven into the excavated planting pit to a depth of 1000mm.

4.3. Tree ties:

Tree ties shall be of rubber, PVC or proprietary fabric laminate composition and shall be strong and durable enough to hold the tree securely in all weather conditions for a period of three years. They shall be flexible enough to allow proper tightening of the tie. Ties shall be min. 25mm wide for 120cms – 150cm height trees and min. 38mm for larger sizes. They shall be fitted with a simple collar spacer to prevent chafing. Two ties per tree shall be applied to standards; for staked transplants, one tie per tree is required.

4.4. Protection:

The interval between the lifting of stock at the heeling-in area and planting on site is to be kept to an absolute minimum. Plants shall be protected from drying out and from damage in transport. All stock awaiting planting on site shall be stored in a sheltered place **protected from the wind and frost and from drying out.**

All transplants shall be wrapped in polythene from the time of lifting to conserve moisture. Except when heeled-in, they shall be protected in polythene at all times until planted into their final position on site.

4.5. Damage:

On completion of planting any broken branches shall be pruned, areas of damaged bark neatly pared back to sound tissue.

4.6. Watering / Fertilisers:

All trees and shrubs shall be soaked in water for one hour prior to planting. Fertilisers shall conform to BS 5581: 1981. Fertiliser must be mixed through and incorporated into the base of the planting hole and covered with soil in order to avoid roots of plants coming in direct contact. Follow manufacturer's instructions for all chemical products.

4.7. Tree planting:

Trees shall be planted at the same depth as in the nursery, indicated by the soil mark on the stem of the tree. They shall be planted in the centre of the planting pit and planted upright. Stones or other rubbish over 75mm shall be removed. Supply and install the staking / guying system as per clauses 4.1-4.4. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position. Upon completion of planting, all pits shall be raked over lightly to leave an even surface and neat appearance. All stones greater than 25mm dia. to be removed. Provision should be made for the watering of root-balled trees in the first year following planting.

4.8. Specimen Trees

Excavate tree pits to 1200mm x 1200mm x 1000mm deep. Farmyard manure 80mm deep and 100g of 0.10.20 shall be applied to each tree pit prior to planting. Farmyard manure shall consist predominantly of faecal matter and shall be free of loose, dry straw and undigested hay. It shall be free of surplus liquid effluent. Install tree support system as per clause 4.1. Fill planting hole with topsoil as per clause 3.2.2, and remove all stones and debris, firming plant into position.

4.8.1. Small Trees / Large Shrubs

Excavate tree pits to 750mm x 750mm x 750mm deep. Farmyard manure 60mm deep and 100g of 0.10.20 shall be applied to each tree pit prior to planting. Farmyard manure shall consist predominantly of faecal matter and shall be free of loose, dry straw and undigested hay. It shall be free of surplus liquid effluent. Install tree support system as per clause 4.1. Fill planting hole with topsoil as per clause 3.2.2, and remove all stones and debris, firming plant into position.

4.9. Container Grown Shrubs, Grasses, Ferns, Perennials P9 / 20-30 / 30-40cm

Excavate planting hole to a depth of 300mm x 300mm x 300mm deep; the base to be broken to a depth of 50mm and glazed sides roughened. Apply FYM to base of hole to a depth of 150mm and 30g of 0:10:20 per planting pit. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position.

4.10. Containerised Shrubs, 40-60cm

Excavate planting hole to a depth of 500mm x 500mm x 500mm deep; the base to be broken to a depth of 50mm and glazed sides roughened. Apply FYM to base of hole to a depth of 150mm and 50g of 0:10:20 per planting pit. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plant into position.

4.11. Hedging 25-30cm, 40-60cm

Excavate trench to a depth of 300mm x 300mm wide; the base to be broken to a depth of 50mm and glazed sides roughened. Incorporate 200mm depth of well-rotted FYM into base and cover with 150mm soil min. Apply 100g 0:10:20 per metre into backfill. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plants into position.

4.12. Hedging 90-120cm

Excavate trench to a depth of 500mm x 500mm wide; the base to be broken to a depth of 50mm and glazed sides roughened. Incorporate 200mm depth of well-rotted FYM into base and cover with 150mm soil min. Apply 100g 0:10:20 per Sq.m into backfill. Backfill planting hole with excavated topsoil, and remove all stones and debris, firming plants into position.

4.13. Bulb and Corm Planting

Bulbs to be planted in single species drifts of 100-300no. bulbs. Excavate hole wide and deep enough for the bulbs. Bulbs to be planted at a depth three times longer than the bulb, measured from base to tip. Place the bulbs in the hole with the shoot facing upwards, spaced at least twice the bulb's own width apart. Replace the soil and gently firm with the back of a rake. Avoid treading on the soil following planting as this can damage the bulbs.

4.14. Ground finish:

Upon completion of planting, all ground finish shall include for the removal of stones greater than 25mm excavated during the course of the digging for planting purposes. All soil surfaces should be even and free of mounds, rutting or hollows.

4.15. Spraying:

Following planting, weed free circles to be formed around individual plants, as directed, using an approved broad-spectrum contact herbicide, as approved by the Employer's representative, in mid-spring following planting. Herbicide to be applied using controlled drop applicator. The contractor shall be responsible for keeping the ground (1m diameter circle) around all planted material weed free by means of herbicidal application, using approved sprays, during the course of the contract. Weeds to be removed include grasses, broad-leaved annual and perennial weeds and all noxious weeds.

4.16. Weed control fabric

The weed control fabric shall be 105gsm and shall suppress weeds whilst allowing water, air and nutrients to pass through. Mypex™, PlantexR or equal woven fabric product acceptable. Cut with a scissors or knife. All sharp objects should be removed from the surface soil prior to laying the weed suppressing geotextile. Overlap adjacent rolls by at least 10cm. Membrane to be pegged to ground using proprietary plastic pegs.

When planting into the geotextile membrane an 'X' shaped notch should be cut into the membrane for each individual plant, to allow for excavation. Planting should resume as per species specification. Excavated material should not be stored on geotextile and the membrane area should be thoroughly swept of any residual material prior to application of finished aggregate or mulch.

Membrane to be applied to all planting and gravel areas.

4.17. Bark mulch

Bark Mulch to be 'Golden Pine Bark' by Growise or equal and approved. The product shall consist of matured Conifer Bark with an even nominal particle size distribution of 5-75mm with less than 5% dust and fines and less than 15% wood content. The pH to be between 4.5 and 5.5. The product shall be pest, disease and weed free and not have been treated with Methyl Bromide or any additives. The product shall have been tested in accordance with the requirements of BS 4790:1987, for fire resistance.

The natural heat treatment maturing process shall have been sufficient to ensure that excess volatile substances are driven from the product. During the process, temperatures within the product heaps must exceed 50°C for a minimum 14 day period, followed by a further period of stabilisation.

Lay Bark Mulch to a finished depth of 75mm allowing at least 10% for settlement after 30 days. All such mulch of good quality from an approved source will be inspected by the Employer's representative prior to delivery. All product volumes to be calculated using The Bulk Density method, as set out in BS EN 12579:2000 and BS EN 12580:2000. Slow release Nitrogen fertiliser to be applied to soil prior to mulching.

B. PRELIMINARY LANDSCAPE MANAGEMENT PLAN

1. Introduction

The purpose of this Preliminary Landscape Management Plan is to provide guidance and specifications for the maintenance requirements of the landscape elements of the proposed development at North West Logistics Park – Unit 635. This will cover all of the landscape typologies (trees, shrubs, hedging, grass, bulbs, etc.) on-site to ensure that all maintenance operations required for the efficient and effective management of the landscape are characterised and defined. The plan will provide a set of measurable performance standards that can be applied to evaluate landscape maintenance works carried out on the site.

2. Nature of Site

New landscape spaces associated with the development include:

Landscape areas surrounding the proposed developments are planted with native trees and shrubs, to soften and screen the development over time. The car parks will have verges of low maintenance shrubs and native trees.

Hard landscape works to be maintained include feature paving, lighting, footpaths, road carriageway areas and drainage elements.

3. Timeframe & Programming

The proposed landscape spaces and infrastructure, including the landscape works, will be managed and maintained by the applicant. A detailed programme of works will be agreed with the Contractor prior to maintenance operations commencing in each year.

Where the roads proposed as part of this application are to be used as construction access to sites, the performance standards and specifications contained in this document will be amended for the duration as it would be wasteful of resources to maintain roads that are part of a construction site to the level specified herein. During such periods, protection of trees in verges will be prioritised and strict conditions requiring tree protection from construction vehicles, compaction, etc. will be enforced as part of construction contracts.

4. Aims & Objectives

4.1 General

Fundamentally, the aim of landscape management is to ensure that all external areas are kept in good condition, as perceived and expected by the management, users and local authorities. The Landscape Management Plan aims to provide a manual for the maintenance requirements of all landscape spaces associated with the development. It will define and specify all necessary

operations for the efficient and effective management of the landscape in order to ensure that each area is appropriately and sustainably maintained.

4.2 Horticultural / Sylvicultural Objectives

Horticultural and sylvicultural aims relate to the appropriate management operations for all plants and trees. The specific horticultural objectives are as follows:

- All plants to be maintained so that they remain in good health;
- All plants to have a habit and form consistent with species type and aesthetic objectives;
- Specialist operations for particular types of plants where necessary to achieve the aesthetic or functional objectives,
- e.g. pruning, dead-heading of flowering plants, formative clipping, etc. are included in the plan;
- Areas surrounding plants are to be maintained in such a way that potential threats to plant viability are addressed,
- e.g. weed control (particularly invasive and noxious weeds);
- Recognition of planting (including trees) at the end of its viable life is important to ensure that it is removed and replaced in a timely manner to avoid eyesores.

4.3 Performance Standards

Performance Standards can be defined as follows in the context of this plan: **written specifications of the conditions that will exist when satisfactory works are completed.** Performance standards will be measurable against the specified outcomes required for a particular operation, within a particular area. Performance standards must be upheld by the contractor at all times and will be monitored on an ongoing basis through regular site inspections.

Performance standards are specified in section 5 of this document. All required maintenance operations are defined and detailed to provide both specifications for the landscape contractor to follow and a set of measurable outcomes to appraise and value the contractor's performance against the requirements of the contract.

4.4 Environmental Considerations

Responsible and sustainable landscape management is about balancing the performance standards with the required standard of maintenance. The following principles have guided the development of the specification:

- **Minimise use of non-renewable resources**
 - e.g. reduce lawn areas to reduce consumption of fossil fuels, reduce use of chemical inputs such as pesticides, where possible.
- **SuDS**
 - Sustainable Drainage systems have been included in the design and are an integral part of the landscape. It is imperative that these are managed and maintained to ensure that they are not compromised in their functioning.
- **Utilise low input systems**
 - Includes measures such as: mulching instead of herbicide use, where possible; encourage rough-cut or meadow grass where appropriate to avoid regular mowing.
- **Green waste recycling / mulching / composting**
 - Avoids excessive transportation and use of landfill
- **Use of environmentally friendly products where possible**
 - e.g. biodegradable herbicides, biodegradable tree ties, timber stakes.
- **Biodiversity & Nature Conservation**
 - Project ecologist will be consulted for any replacement planting or operations that could disturb wildlife in order to comply with best practice; All works involving tree surgery or removal of trees / hedgerows will be carried out outside the nesting season (unless required for health and safety or is unavoidable).
- **Control of Invasive Species**
 - It is an objective of this plan to control and prevent the spread of invasive species, and in particular, Giant Hogweed, in order to protect the biodiversity of the landscape.
- **Protection of site resources**
 - Appropriate maintenance will result in the protection of existing trees, vegetation and soil resource of the site.

5. Specifications for Landscape Maintenance Operations

5.1 Grass and Lawn Areas

(i) General

At all times grass to look lush, vigorous and of fine quality with a minimum weed content, and a minimum variation in height of the sward during the growing season. Cutting should take place on a regular basis. Grass cutting areas shall be cleared of litter and rubbish prior to grass-cutting taking place.

No ruts are to be caused due to poor ground conditions. During periods of poor weather, no grass is to remain lodged following cutting. In periods of prolonged wet weather or where ground is waterlogged, consult with Property Manager prior to engaging in grass cutting operations.

Noxious and competitive weeds such as Ragwort, Gorse, Thistle, Dock, Nettle, Briar, Horsetail and Dandelion shall not be allowed to establish in any grass areas.

(ii) Amenity Lawn Areas

| Criterion | Performance Standards |
|-----------------------------------|--|
| Aesthetic functional requirements | Amenity lawn areas are those grass areas which will be maintained for general access and amenity purposes, to create a lawn which is neat, healthy, close-cut and with minimal weed content. |
| Permitted mower type | Cylinder mower, Rotary mower, ride-on mower, tractor-pulled gang mower (note: subject to ground conditions; hand-mowing required in designated areas and/or where ground is soft) |
| Height of Cut | Minimum 20mm; maximum permissible height 50mm. At the commencement of the contract, following flowering cycle of seasonal bulbs or if grass cutting has been forestalled due to poor ground conditions resulting in the grass growing above the maximum permissible height, it shall be cut to 50mm on the initial cut, then to 25mm on the subsequent cut. Such initial long grass shall be collected and removed off site. |
| Frequency | Mow weekly during spring; summer and autumn; only when necessary in winter. Mowing is not permitted when ground conditions are very soft, waterlogged or frozen, or during spells of cold, drying winds or when the grass is frosty or wet. |

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| Finish | Even finish. Vary direction/pattern of cutting every 3 months. Grass shall be trimmed from around the bases of walls and fences, back of footpaths and kerbs, litter bins, sluice valves and hydrant markers, trees, poles, signage and public lighting columns, etc., and this interface between grass and walls, fences, etc., as noted above, kept in a neat and tidy condition. This trimming shall be deemed to be included for at every grass-cutting. The Landscape Contractor is bound to comply with this instruction and herbicide application is not permitted to achieve this. |
| Clippings | To be gathered at every cut and disposed of in designated area or off-site. Box to be emptied regularly during cutting to avoid clumps being left on the grass. |
| Fertiliser | In mid-spring (late March to April), use a proprietary lawn fertiliser at the manufacturer's recommended rates, to be approved by the ER. Apply fertilisers when the soil is moist, or when rain is expected. If grass loses vigour and freshness between late spring and late summer (often May to August), repeat the application of lawn fertiliser. |
| Weed Control | Minimum weed content permitted i.e.: (1) <5% of species content; (2) <10% of total grass area. When necessary and agreed with ER, use a selective herbicide, with the active ingredient Mecoprop-C, MCPA, 2-4-D or Dicamba to control broad-leaved weeds in the sward. Weeds resistant to herbicide to be dug out by hand in autumn. |
| Scarifying | Scarifying to be carried out to keep levels of thatch (old grass stems, dead moss and other debris) at an acceptable level (i.e. less than 1cm deep). To remove thatch, rake vigorously but carefully with a power-scarifier. Recommended to be carried out in autumn only. |
| Aeration | Spiking with holes 10-15cm (4-6in) apart and deep to be carried out once per annum. |
| Rolling | Amenity grass areas should be reasonably even, with no variations greater than 25mm over a 1m straight edge. In September, to repair any uneven areas of the lawn, use an edging iron to slice through the turf and roll it back. Fork over the underlying ground and add or remove soil |

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| | <p>as needed. Replace the turf, pressing the edges together, roll with lawn roller (nominally 100kg, subject to site conditions) and water thoroughly.</p> |
| Edging | <p>Lawn to be edged by hand or edging machine regularly to leave an even, straight edge and to ensure that the grass or soil does not protrude over the edge by more than 25mm.</p> |
| Over-seeding | <p>After moss or weeds have been removed, or where grass is growing sparsely, over-seeding may be necessary. (Early autumn or mid-spring). Break up the surface with a fork and rake to leave a fine, even tilth; Sow grass seed at half the recommended rate (usually 10-15g/sq.m); lightly rake to incorporate the seed into the surface; water if weather remains dry for 2-3 days following seeding.</p> |
| Watering | <p>Watering to be carried out when required. Ensure that the water reaches a depth of 10cm (4in) after each watering. Rate: max. 20 litres per square metre.</p> |

Indicators of under-performance:

Excessive weeds or weeds such as clover or moss indicate poor sward health; bare patches may indicate scalping or lack of vigour; yellowing or browning of sward may indicate drying out, under-feeding, herbicide drift or inappropriate use of herbicide; thatch build-up greater than 1cm depth; rutting of the surface, wheel marks or poor drainage may indicate compaction of soil caused by mowing in wet weather or use of unsuitable mower type.

(iii) Rough Cut Grass Areas

| Criterion | Performance Standards |
|-----------------------------------|---|
| Aesthetic functional requirements | Rough cut grass areas are those grass areas which will not usually be accessed by users and will usually be in low priority areas, or in the background. These areas are to be maintained to create a grass area which is healthy and with minimal weed content, with grass allowed to grow relatively long between infrequent and regular cuts. |
| Permitted mower type | Strimmer, Rotary mower, ride-on mower, tractor-pulled gang mower (note: subject to ground conditions; strimming required in designated areas, areas of slope gradient greater than 1:3 and/or where ground is soft) |
| Height of Cut | Grass areas shall be cut to a height of c. 75mm |
| Frequency | 5no. times during the growing season, at regular intervals of approximately 6 weeks |
| Finish | Rough cut shall mean grass of minimum height 75mm, with informal appearance |
| Clippings | To be gathered at every cut and disposed of in designated area or off-site. |
| Fertiliser | In mid-spring (late March to April), use a proprietary lawn fertiliser at the manufacturer's recommended rates, to be approved by the ER. Apply fertilisers when the soil is moist, or when rain is expected. |
| Weed Control | Minimum weed content permitted i.e.: (1) <5% of species content; (2) <15% of total grass area. When necessary and agreed with ER, use a selective herbicide, with the active ingredient Mecoprop-C, MCPA, 2-4-D or Dicamba to control broad-leaved weeds in the sward. Noxious or invasive weeds to be spot treated by controlled droplet applicator or glove |

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|--------|--|
| | with Glyphosate (Round-Up or equal) in May, June and August and prevented from flowering. |
| Edging | Rough-cut grass areas to be edged by hand or edging machine regularly to leave an even, straight edge and to ensure that the grass or soil does not protrude over the edge by more than 25mm |

5.2 Shrub Planting

(i) *Groundcover / Mixed Borders / Mass Shrub Plantation*

| Criterion | Performance Standards |
|-------------------------------------|---|
| Aesthetic / functional requirements | Shrub planting areas shall be kept clean at all times, with an even finish. Plants to have a healthy, lush appearance, typical for plant species and time of year. |
| Weed Control | Weeds shall not be allowed to cover more than 5% of the ground at any one time, neither shall weeds exceed 50mm in height. Residual herbicide permitted for established shrub areas. |
| Bark Mulch | Required – min. 50mm deep; to be kept topped up at all times. |
| Fertiliser | Annual feeding with 50g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.) |
| Pruning / Clipping | Pruning once per annum to maintain the typical size and form of the plant, for sightlines and for plant health; all clippings to be gathered at every pruning and disposed of in designated area or off-site. |
| Edging | Beds to be edged by hand or edging machine twice per annum to leave an even, straight edge. Shrubs or soil not to protrude past the edge by more than 50mm. |
| Watering | Watering required only in periods of prolonged drought (i.e. after more than 2 weeks) |

(ii) *Specimen Shrubs*

| Criterion | Performance Standards |
|-------------------------------------|--|
| Aesthetic / functional requirements | Specimen shrub planting areas shall be kept clean at all times, with an even finish. Shrubs to have a healthy, lush appearance at all times, typical for plant species and time of year. |
| Weed Control | No weeds permitted in the shrub area. Established shrub areas may be treated with an approved residual herbicide to provide year round weed control. |
| Bark Mulch | Required – 75mm deep; to be kept topped up at all times. |
| Fertiliser | Annual feeding with 50-100g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.) |
| Pruning / Clipping | Regular pruning as necessary to maintain the typical size, habit and form of the plant, for health and to maintain best appearance; all clippings to |

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| | be gathered at every pruning and disposed of in designated area or off-site. |
| Watering | Watering required to ensure consistent availability of water to plant during periods of drought (i.e. after more than 5 days) - minimum |

(iii) Hedge – Free Growing

| Criterion | Performance Standards |
|-----------------------------------|---|
| Aesthetic functional requirements | /Even, clean finish to ground plane. Hedge to have a healthy, lush appearance, typical for plant species and time of year. Relatively informal habit acceptable. |
| Weed Control | No weeds permitted in the hedge area. Established hedge areas may be treated with an approved residual herbicide to provide year round weed control. |
| Bark Mulch | Required – 50mm deep; to be kept topped up at all times. |
| Fertiliser | Annual feeding with 50g/sq.m of general-purpose fertiliser in February. (Rake back mulch prior to application.) |
| Pruning Clipping | /Pruning once per annum as necessary to maintain the required height and width, and prevent “leggy” growth; all clippings to be gathered at every pruning and disposed of in designated area or off-site. Laying may be required for Hawthorn and Blackthorn hedges if hedge growth becomes thin at the base. |
| Watering | Watering required only in periods of prolonged drought (i.e. after more than 2 weeks) |

(iv) Native Shrub Plantation

| Criterion | Performance Standards |
|-----------------------------------|--|
| Aesthetic functional requirements | /Even, clean finish to ground plane. Hedge to have a healthy, lush appearance, typical for plant species and time of year. Relatively informal habit acceptable. |
| Weed Control | Weeds shall not be allowed to cover more than 5% of the ground at any one time, neither shall weeds exceed 50mm in height. Residual herbicide permitted for established areas. |
| Bark Mulch | Required for high prominence areas; recommended for medium areas – 50mm deep; to be kept topped up at all times. |

| | |
|---------------------|--|
| Fertiliser | Not required. |
| Pruning Clipping | Pruning once per annum for shrubs such as Dogwood and Guelder Rose or to control height and spread when necessary. |
| Watering | Watering required only in periods of prolonged drought (i.e. after more than 2 weeks) |

(v) Scrub - naturally occurring

No maintenance operations required, except to ensure that any edge plants are kept cut back at least 1m from road edges and tidy where visible or prominent.

5.3 Trees & Woodlands

(i) General:

- Canopies overhanging a pedestrian path to be maintained to 2.2m and canopies overhanging vehicular access to 4m.
- Limb damage caused by wind, passing traffic, etc. to be pruned resulting in a clean even wound.
- No signs, security boxes, etc. to be attached to trees.
- Surface tree roots not to cause a trip or mowing hazard. In grass areas, top up soil over roots and re-seed.
- Raised paviers or cracked/bulging walls due to root growth are to be reported to the Contract Administrator.
- Exposed roots from construction works to be kept moist by wrapping damp hessian around roots until soil is backfilled and then apply a one off generous application of water. Root damage to be pruned resulting in a clean even wound prior to backfilling / topsoiling.
- Control of ivy and suckering on the trunks of trees within falling distance of activity
- Informal monitoring of trees for change of condition or evidence of a fungal fruiting body.

(ii) Specimen, Solitary and Avenue Trees

All trees to be maintained in accordance with requirements for species and habit to be maintained in accordance typical form for tree. Tree trunk will be kept visible for defect inspection with control of ivy and removal of suckering. Mulch 1m diameter will be maintained around all individual trees within grassed areas. Stakes and ties to be retained for a maximum period of 3 years, with tie loosened annually and both stake and tie to be removed after 3 year period. All nursery marking,

bamboo and labels to be removed off all trees. Tree grilles in hard surface areas to be maintained weed free.

Any visible change in condition to be reported.

(iii) Tree Groups, Woodland, Grid, Hedgerow Trees

Such areas shall be kept free of noxious and pernicious weeds at all times. Mulch or spray rings 1m diameter will be maintained along group perimeter and around all plants in young woodland areas where canopy cover has not been achieved. Established woodland areas shall not be treated with herbicide except where necessary for the removal of noxious and invasive weeds including Ragwort, Gorse, Thistle, and Dock, hogweed, bramble and any others. Japanese knotweed shall not be allowed to establish in any woodland areas. Bramble should not exceed 20% of ground cover of any woodland. Ivy shall be controlled and shall not be allowed to establish itself on trees along the perimeter and within falling distance of activity within woodland areas. Understorey (excluding saplings) not to exceed 1m in height in order to retain visibility for user safety in areas of activity. Tree numbers not to exceed 4 per sq.m of trees with a girth of less than 250mm and numbers not to exceed 2 per sq.m for trees with a girth of over 300mm. Fallen or felled trees in woodland areas to be maintained on-site where permissible, for reasons of biodiversity and ecology which contribute to the overall health of the woodland.

5.4 Herbaceous Perennial Planting (including Ferns and Ivy)

(i) Bulbs

Watering: Ensure that bulbs have adequate water throughout growth period, up until cutting back occurs (see below). Fertiliser: Apply approved general purpose fertiliser to all bulb areas at nominal rate of 35g/sq.m in late February.

Cutting Back: Cut back dead foliage to ground level six weeks after the end of flowering (or earlier if foliage is yellow and straw-like). Do not tie or knot the leaves.

Note: Herbicides may not be used in or around bulb areas.

5.5 Hard Landscape Surfaces & Signage

Hard Standing including roads, paved areas, pavements, and kerb-lines - shall be kept clean at all times, with no growth of weeds and without moss infestation. Roads and kerb lines shall be kept free of litter and build up of grit and debris through the implementation of a regular sweeping program.

(i) Weed Control

All paved areas such as footpaths, kerb lines, feature paving, gravel areas, etc., throughout the site are to be maintained weed free at all times. The application of a suitable broad-spectrum herbicide e.g. Glyphosate (Roundup Bi-Active or equal and approved) shall be applied 3no. times per annum to achieve this. Once per annum a suitable chemical to treat moss shall be applied

where it has established on hard surfaces. An initial physical treatment, such as scraping using a spade, will be required to remove existing moss growth prior to spraying.

(ii) Sweeping

Sweeping shall mean sweeping of feature paving areas, footpaths and kerb lines along all public roads (edge of road) and removal of all grit, rubbish and leaves from these areas. Soil wash from beds on to paved areas should also be swept. This work to be executed fortnightly.

Note: Particular attention is required during the period of October/ November to deal with leaf fall.

(iii) Cleaning

Cleaning shall mean the removal of paper, plastic bags and all other rubbish. Cleaning shall be carried out as follows:

- Fine cut grass areas, all paved and hard standing areas, footpaths and kerb lines: This work to be executed prior to grass cutting on each grass cutting visit. Cleaning shall be carried out 36no. times per annum, including winter.
- Rough cut grass areas: prior to each scheduled grass cut, minimum 8no. times per annum.
- Tree groups, boundary tree areas, shrub maintenance areas, all other areas: 8no. times per annum.

Cleaning shall also include the removal of grit and rubbish from road gullies, drains, Aco drains and collapsible bollards twice per year.

(iv) Signage

All signs are to be cleaned to a high standard 4 times per year.

(v) Gullies

All gullies are to be inspected monthly and if full or blocked, must be cleared out as appropriate.

5.6 Natural Areas

No maintenance operations are permitted within areas designated as natural zones. Neither is dumping of any arisings, storage of materials or any other related activity.

5.7 Weed Control

5.7.1 General

Minimal amount of herbicidal chemicals are to be utilised on the site, with non-chemical means of weed control to be preferred (mulching, mechanical control, hand weeding, etc. where feasible). Biodegradable herbicides are to be preferred where herbicide use is required. Prior to

executing weed control involving the use of herbicides, details of the products to be used including a Material Safety Data Sheet (MSDS) for each product is to be provided to the Contract Administrator for each of the herbicides proposed. A sample herbicide information chart is included in Addendum A.

Where translocated herbicides are applied, spray drift should be avoided and spray guards fitted to apparatus. Where feasible, spot treatment using CDA (Controlled Droplet Applicator) or glove preferred. Use of residual herbicides shall not be used in areas of herbaceous planting, in the initial year following planting of new shrubs or over areas of bare ground within shrub beds where replacement planting is to be carried out. Hand weeding in planting beds will be required where there is a large component of herbaceous material, bulbs or prostrate groundcover plants.

5.7.2 Invasive Weeds

Several invasive species that are currently on the Invasive Species Ireland Amber List (i.e. not a significant threat at present) have been identified on-site, including: Cotoneaster, Buddleia, Winter Heliotrope (*Petasites fragrans*) and Sycamore (*Acer pseudoplatanus*). These plants will be removed from the site and disposed of in accordance with the requirements with the of the Project Ecologist and relevant authorities.

Monitoring for invasive weeds of any kind, most particularly Japanese Knotweed, Giant Hogweed, Himalayan Balsam and other notable invasive plants shall not be allowed to establish in any area of the site. It will be the responsibility of the contractor to be able to identify same and treat at first sign of emergence. Methodology for removal of invasive plants is to be agreed with the Project Ecologist and relevant authorities.

6. Monthly Maintenance Operations Schedule

The following tables give an indicative outline of the required monthly maintenance operations, based on the specification outlined above.

Maintenance Program - January

| Item | Description |
|------|--|
| 1.1 | Yearly maintenance Shrub and tree planting Tree pruning Hedge cutting |
| 1.2 | Weed free circles around trees/whips Check tree stakes and ties |
| 1.3 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Road/Paved area sweep 1 Road Gulley cleaning |

Maintenance Program - February

| Item | Description |
|------|--|
| 2.1 | Yearly maintenance Shrub and tree planting Tree pruning Check tree stakes and ties |
| 2.2 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Road/Paved area sweep 1 Road Gulley cleaning |

Maintenance Program - March

| Item | Description |
|------|---|
| 3.1 | Yearly maintenance Shrub and tree planting Shrub Pruning Tree pruning Hedge cutting Hedgerow cutting Hand Weeding in shrub areas Weed free circles around trees/whips |
| 3.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Grass trimming Grass edging Weed control to rough cut/rough ground areas |
| 3.3 | Grass reinstatement |
| 3.4 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas Clean all signs |

Maintenance Program - April

| Item | Description |
|------|---|
| 4.1 | Yearly maintenance Shrub and tree planting Shrub Pruning Hedgerow cutting Herbicide application to shrub/woodland areas Hand Weeding in shrub areas Weed free circles around trees/whips Apply fertiliser |
| 4.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming Grass edging Weed/Moss Control Fertiliser Application |
| 4.3 | Grassed areas – Rough Cutting Weed control to rough cut/rough ground areas |
| 4.4 | Grass reinstatement |
| 4.5 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas |

Maintenance Program - May

| Item | Description |
|------|---|
| 5.1 | Yearly maintenance Shrub and tree planting Hedge cutting Herbicide application to shrub/woodland areas Hand Weeding in shrub areas Apply fertiliser Watering |
| 5.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming 1 Grass trimming 2 Weed/Moss Control Fertiliser Application |
| 5.3 | Grassed areas – Rough Cutting Weed control to rough cut/rough ground areas |
| 5.4 | Grass reinstatement |
| 5.5 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas Road/Paved area sweep 1 |
| 5.6 | Watering |

Maintenance Program - June

| Item | Description |
|------|--|
| 6.1 | Yearly maintenance Shrub and tree planting Tree pruning Herbicide application to shrub/woodland areas Hand Weeding in shrub areas Weed free circles around trees/whips Apply fertiliser Watering |
| 6.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming Weed/Moss Control |
| 6.3 | Grassed areas – Rough Cutting Weed control to rough cut/rough ground areas |
| 6.4 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas Road/Paved area sweep 1 Clean all signs |
| 6.5 | Watering of all trees & shrubs |

Maintenance Program - July

| Item | Description |
|------|--|
| 7.1 | Yearly maintenance - Shrub and tree planting Hand Weeding in shrub areas Watering |
| 7.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming 1 Grass trimming 2 Grass edging |
| 7.3 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 |
| 7.4 | Watering of all trees & shrubs |

Maintenance Program - August

| Item | Description |
|-------------|--|
| 8.1 | Yearly maintenance Shrub and tree planting Shrub Pruning Hand Weeding in shrub areas Weed free circles around trees/whips Watering |
| 8.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming |
| 8.3 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Road/Paved area sweep 1 |
| 8.4 | Watering of all trees & shrubs |

Maintenance Program - September

| Item | Description |
|------|--|
| 9.1 | Yearly maintenance Shrub and tree planting Shrub Pruning Hedge cutting Herbicide application to shrub/woodland areas Hand Weeding in shrub areas Weed free circles around trees/whips Apply fertiliser Watering |
| 9.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Cut 3 Cut 4 Grass trimming 1 as per clause 3.3 (c) Grass trimming 2 as per clause 3.3 (c) Weed/Moss Control Fertiliser Application |
| 9.2 | Grassed areas – Rough Cutting Weed control to rough cut/rough ground areas |
| 9.4 | Grass reinstatement |
| 9.5 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas Road/Paved area sweep 1 Road Gulley cleaning Clean all signs |
| 9.6 | Watering of all trees & shrubs |
| 9.7 | Attenuation Pond - cleaning, removal of detritus |

Maintenance Program - October

| Item | Description |
|------|---|
| 10.1 | Yearly maintenance Shrub and tree planting Tree pruning Hedge cutting Hedgerow cutting Herbicide application to shrub/woodland areas Hand Weeding in shrub areas Weed free circles around trees/whips Apply fertiliser |
| 10.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 Grass trimming Grass edging |
| 10.3 | Grassed areas – Rough Cutting Weed control to rough cut/rough ground areas |
| 10.4 | Grass reinstatement |
| 10.5 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Weed/Moss control to hard landscape areas Road/Paved area sweep 1 Road/Paved area sweep 2 |

Maintenance Program - November

| Item | Description |
|------|--|
| 11.1 | Yearly maintenance Shrub and tree planting Hedgerow cutting Check tree stakes and ties |
| 11.2 | Grassed areas – Fine Cutting Cut 1 Cut 2 |
| 11.3 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Road/Paved area sweep 1 Road/Paved area sweep 2 Road/Paved area sweep 3 |

Maintenance Program - December

| Item | Description |
|------|---|
| 12.1 | Yearly maintenance Shrub and tree planting Tree pruning Check tree stakes and ties |
| 12.2 | Grassed areas – Fine Cutting Cut 1 Grass trimming as per clause 3.3 (c) |
| 12.3 | Hard Standing Maintenance and Cleaning Litter pick 1 Litter pick 2 Litter pick 3 Road/Paved area sweep 1 Clean all signs |

