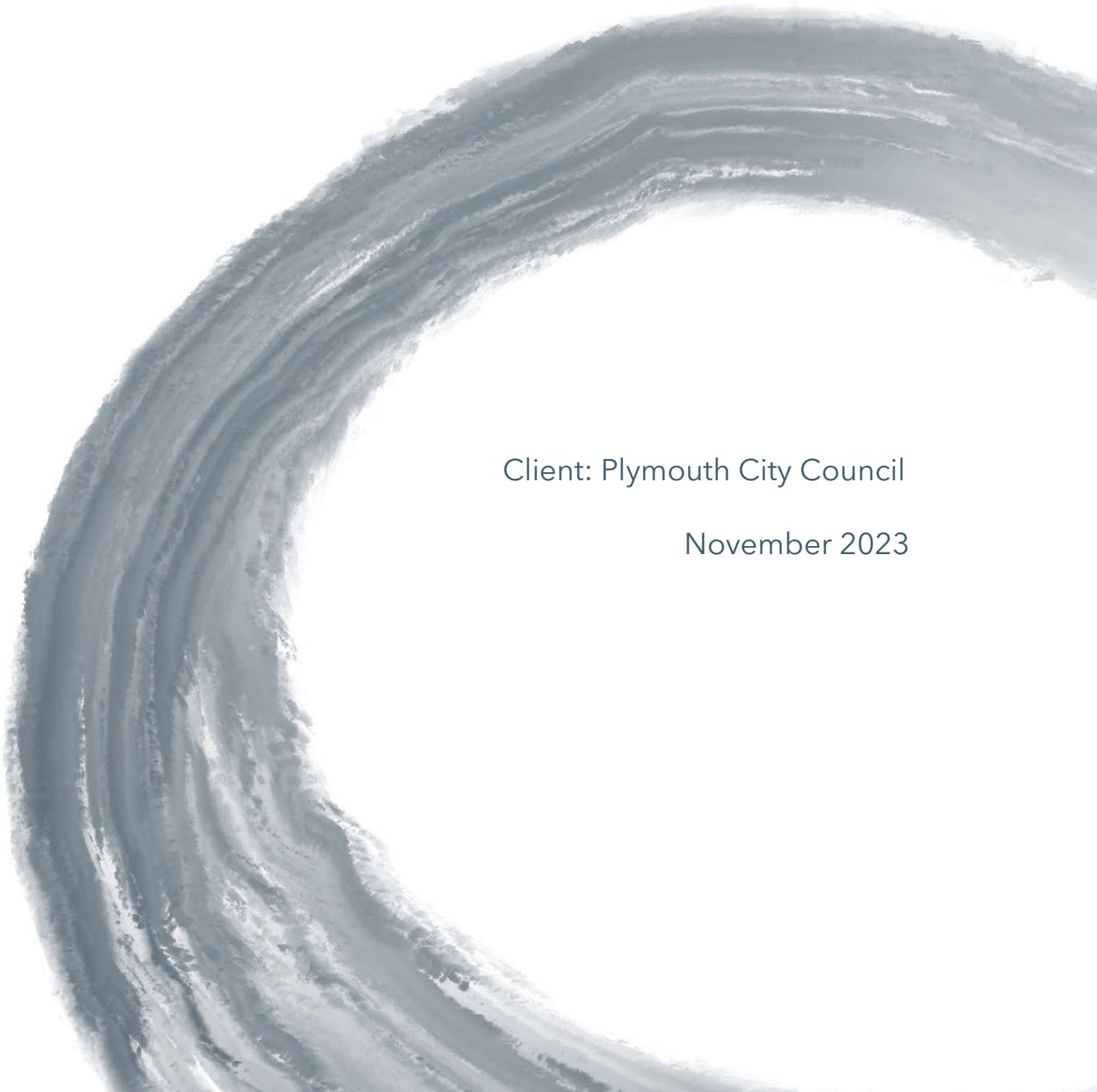
YGS ENVIRONMENTAL CONSULTANTS

Armada Way

TREE TRANSLOCATION ASSESSMENT



Client: Plymouth City Council

November 2023

Prepared For:

Plymouth City Council

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Issue Schedule					
Issue Code	**Date**	**Comments**	**By**	**Verified**	**Approved**
P01	02/11/23	Draft	AK /JK	AK	SWB
P02	06/11/23	Final	AK /JK	AK	SWB
P03	07/11/23	Final Appendix A drawing updated	AK /JK	AK	SWB
P04	17/11/23	Peer Reviewed with minor updates	AK /JK	DS	DS

Contents

1 Introduction

1.1 Background

YGS Environmental Consultants Ltd has been commissioned by Plymouth City Council [PCC] to produce an Arboricultural Package for the Armada Way redesign, as part of the Plymouth City Council's Better Places Plan.

The proposed new design requires a number of existing trees to be translocated (moved), as they will prevent installation of the new sustainable urban drainage system, along with associated changes in ground levels. Some of the trees are also situated on the route of the proposed 12-metre-wide cycle and pedestrian route through the centre, which plays a critical role in opening up the vista to the Hoe. The trees will be replanted at the new arboretum that is being created at The Park in Plympton.

Tree assessment and scoping has already identified key issues related to the translocation of the six subject trees.

1.2 Objectives of this Report

This report has been prepared by YGS with input from an independent Chartered Arboriculturist and a peer review and verification by an additional Chartered Arboriculturist. The report findings are based on a review of tree condition and site specific issues noted during a joint site inspection undertaken on 16 October 2023.

The proposed new design requires a number of existing trees to be translocated. The trees are to be moved in by November 2024. Six trees have been identified for translocation. The overall objectives of this report are to:

- To assess the subject trees in the current context and to update the baseline tree survey data (Nov 2021) as necessary.
- Provide an evaluation of the methods and requirements necessary to move the subject trees within the required timeframe.
- Provide aftercare requirements to maximise the successful re-establishment of the trees.

2 The Trees

The subject trees are identified as follows: See Appendix 1 for Tree Locations

Tree No.	Common Name	Stem Dia (mm)	Height (m)	Crown Spread (m)	Life Stage
T007	Cockspur Thorn	390	6.5	9.5	Mature
T045	Whitebeam	310	7	7	Early mature
T118	Hybrid Whitebeam	260	7	6	Semi mature
T119	Japanese Maple	m/s	4	5.5	Early mature
T120	Japanese Maple	m/s	4	5	Semi mature
T125	Silver Maple	330	9	7.5	Semi mature

2.1 Tree Condition

In terms of size and overall above ground condition, the subject trees are broadly similar to the recorded tree survey data (Nov 2021). Life stage has been modified for T118, T120 and T125 - changed from semi-mature to early mature. There are some minor changes in condition but nothing significant and as such the BS retention category has been amended due to changes in the immediate landscape and environment.

Tree No.	Common Name	Retention Category	Life Stage
T007	Cockspur Thorn	B2	Mature
T045	Whitebeam	B1	Early mature
T118	Hybrid Whitebeam	C1	Early mature
T119	Japanese Maple	C1	Early mature
T120	Japanese Maple	C1	Early mature
T125	Silver Maple	C1	Early mature

Previous groundwork, undertaken between the original tree survey and our most recent site assessment, has resulted in some potential changes to the rooting environment and revealed some useful anecdotal evidence. Each tree is described below.

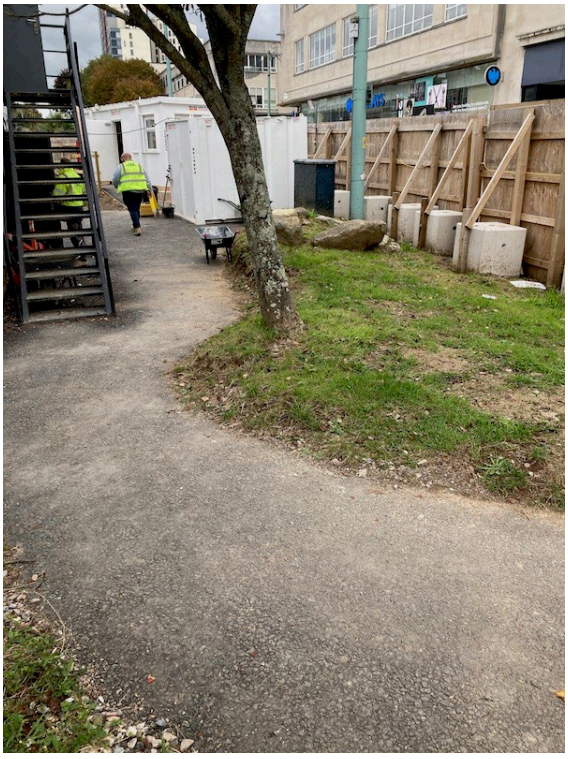
T007 Cockspur Thorn

This tree is surrounded on three sides by built infrastructure and growing in a raised area of landscape. The tree is generally in fair/moderate health. The tree has suffered a recent scaffold branch failure. The limb has split. There was no evidence of impact or mechanical damage, and it has most likely failed due to a combination of factors: over-extension, a weak attachment fork, and possibly a strong gust of wind. The tree does not have much inner foliage-bearing material through the crown, which limits its options for reduction pruning; this specimen is thus not the most tolerant of such pruning operations. The tree is mature in age and as such is likely to be more sensitive to any translocation operations. The crown size is 9.5m wide which will present physical challenges to its movement; this is exacerbated by the fact that over-extended scaffold branches are potentially delicate - as indicated by the recent branch failure. Due to these factors, although translocation is possible, further investigation is advisable to determine the most appropriate process to translocate this tree.

T045 Whitebeam

This tree is generally in reasonable health and fair condition. It was historically surrounded by other trees, with various elements of hard landscape in close proximity (now removed). The photograph on the right was taken in January 2023 after the removal of raised stone walls and hard surfacing.

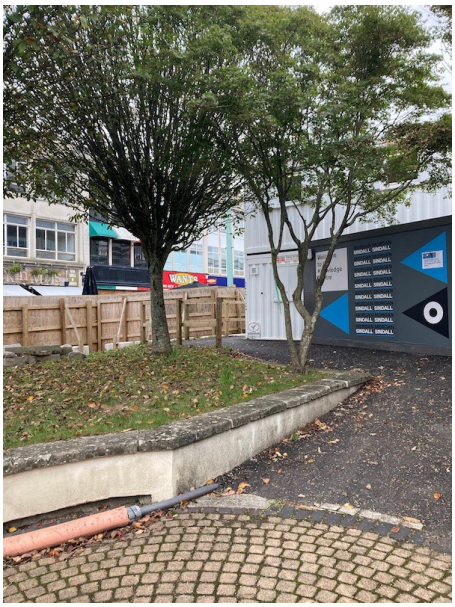
T118 Hybrid Whitebeam



This tree is generally in reasonable health and condition. It was historically surrounded with various elements of hard landscape in close proximity (now removed). The contractors office units and path have been installed following removal of the original hard landscape.

T119 and T120 Japanese Maple

These trees are generally in good health and fair condition. They are growing in restricted root space close to hard landscape. The photograph on the right is tree T119.



T125 Silver Maple

This tree is in reasonable health but particularly poor structural condition. It is a managed pollard in the hard landscape. There is a significant wound at the top of the stem following previous limb failure. Adjacent trees have recently been removed, leaving this tree exposed and at greater risk to branch loss. The pollard management regime will need to be maintained in any event.

3 Moving Trees

There are various methods and techniques used to translocate trees. Trees are dynamic organisms, intimately related to their environment. The success of translocating trees depends on a depth of understanding and an approach to limit the uncertainties. Preparation and method must be appropriate to each individual tree. Tree growth, form and function must be assessed on a case-by-case basis, however the key considerations are:

- Tree condition/tolerance - health, age and vigour.
- Root spread - form, extent and depth.
- Site access for machinery – enabling works and translocation operations.

3.1 Tree condition/tolerance

Studies have shown that healthy vigorous trees less than 30 cm (stem) diameter, root balled at three to five times stem diameter, are surprisingly tolerant to translocation. That also holds for larger trees, although the larger the tree, the greater the resultant stress.

Appropriately managed, the recovery from transplanting is likely within 4-5 years with good aftercare.

The subject trees have been evaluated and it is considered possible to translocate all the trees with the appropriate techniques' methodologies and aftercare in place. Further investigation has also been proposed to refine the preferred translocation methodology for each tree.

3.2 Root spread

There are unknowns relating to the actual extent of tree rooting. The actual location of roots may be unknown, however, the necessary information can be obtained during the translocation process, and specific tree requirements allowed for, by modifying the techniques used.

Image of typical tree rooting within an urban environment.

It is important to understand the functions of roots. The major functions are anchorage and water extraction, but the roots also function as a storage system for starch.

For trees which have the potential to be translocated, within the required timeframe, two key techniques have been identified, these are as follows:

3.3 METHODS OF TRANSLOCATION

Tree Spade

This option requires the use of a mechanical tree spade. These are generally mounted on the back of a six-wheel truck and usually operate a 2m diameter spade. The operation requires the truck to remove a plug of soil from the translocation area, which is then set aside for reuse. The tree spade is then positioned around the tree to be translocated, and hydraulic blades simultaneously cut out a plug containing a section of the root ball. The roots beyond the spade are severed during this operation. The tree is then transplanted within the already prepared pit where the first soil plug was removed. The soil plug is then relocated within the hole from which the tree was removed. Clearly if located off site, the trees will require transportation to the new location.

Truck mounted tree spade

Due to the site conditions, it is considered that this method will not be practicable due to the likely nature and depth of the urban soils along with access issues for the equipment required. It is also considered that, due to the age of the trees, the tree spade will not be able to extract sufficient root material for the successful translocation of the larger trees. This is also limited by the presence of existing hard surfacing and the planter retaining walls, that are in very close proximity to the trees.

3.4 Preferred Method - Air Spade And Tracked Excavator

The second, and preferred method of translocation, is through the use of the compressed air method e.g., Air spade or similar product in combination with a tracked excavator. The 'air spade' is used to expose the tree roots, which can then be cleanly cut, creating the root ball for translocation. Trenches are opened up at a distance of between 3-5 times the stem diameter and all woody roots pruned to define the extent of the root ball.

Radial trenches towards the tree will then be opened and the root ball undercut, whilst retaining as much soil and fine root material as possible. A framework will be secured as necessary to assist the lift. The root ball can then be wrapped with hessian and lifted with the excavator and translocated to a pre-dug tree pit.

Image of prepared root ball prior to lifting.

Image of excavator lifting root-balled tree

4 Considerations

4.1 Enabling works

Some enabling works will need to be carried out before translocation of any trees. These will include the removal of all barriers, including planters, bollards, cycle stands, boulders and potentially lighting bollards, from the existing and proposed translocation sites. The areas will need to be thoroughly investigated for live services and unknow below ground conditions. The areas will also need to be tracked, by the contractor, to ensure manoeuvres can be made. Preparatory investigations are also proposed through the use of an 'air spade', to establish the rooting condition and extent, to determine the appropriate detail for the translocation.

4.2 Timing

For best results, trees should be translocated during their dormant period, October – March.

4.3 Translocation Site

The translocation site will need to be reviewed and prepared prior to translocation. Before the start of the operation, the new tree location must be known, and tree pits must be pre-dug.

4.4 Conclusions for translocation method

Due to the potential unknown underground environment, including the potential for services, it is crucial that all operations are carefully planned, monitored and undertaken by skilled operatives.

The use of the compressed air method and excavator is considered the most appropriate translocation method for this city centre location.

5 Planting

All translocated trees are subject to stress, until a normal spreading root system has developed. That is why the primary objective of planting site preparation is to provide a good soil environment for the translocated trees. The quality of topsoil is a critical factor for the establishment and growth of the translocated tree. The suitability of soil on the site will be checked and appropriate samples analysed by a specialist for depth, structure, texture, and content.

To support healthy growth for the transplanted tree, the new tree pit is required to have a 500mm radius larger than the rootball. This is to be backfilled with a mix of:

- **backfilled topsoil obtained from around the existing tree (this is to provide some of the soil biology which the tree has developed and is used to back into the new planting environment).**
- **20% of PAS 100 compost (this is to provide additional nutrients and the help provide soil conditions conducive for the production of new roots).**
- **P4 granules (These are moisture retentive granules which can be used to regulate soil moisture levels within the soil).**
- **Biochar (This material helps maintain moisture and nutrient levels within the soil and can help the development of mycorrhizal fungi which are critical to tree health).**

The above specifications will be developed in accordance with the requirements of each individual tree location and soil conditions.

We will also install a tree irrigation system/pipe. By proactively installing a water supply system that will irrigate at the root ball, the tree's roots instantly receive the much-needed water to aid growth.

The **stabilisation** of the tree is required. This is done through the use of tree guy wires and or support props.

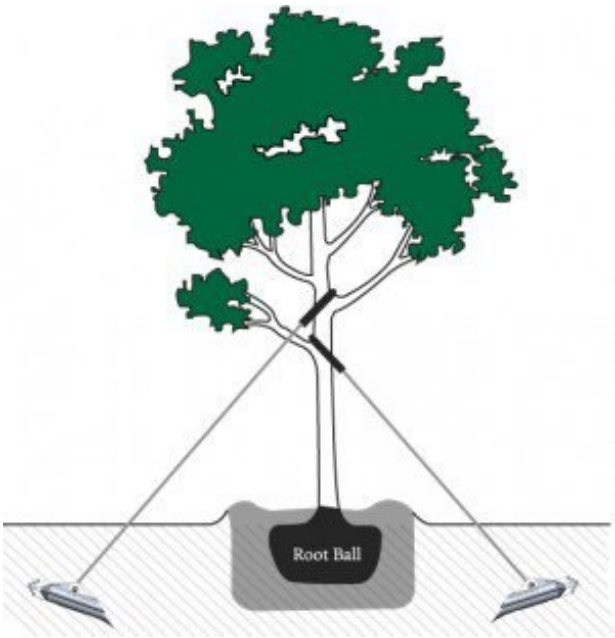


Image of guying system

Following guying the tree pit and the surrounding area should be treated with a mycorrhizal and soil bacterial drench, to aid the soil biology along with fertilisers, to aid establishment.

Mulch is required to be spread to the extent of the guys. This will consist of composted bark mulch to a depth of 100mm. This has a number of functions, from improving the soil condition and encouraging the soil biology to develop, along with retaining the moisture within the soil and releasing nutrients slowly back into the ground. Mulching to the extent of the guys also acts as a deterrent, reducing the risk of people walking into the wires.

Translocated trees will require an aftercare period of up to 5 years which will need to include:

- Watering
- Feeding
- Mulching
- Adjustment and final removal of guying system

The stress of a tree can be observed immediately after transplanting, or gradually, after a period of time. Proper care after transplanting will help to assure survival and minimise stress and ensure a higher rate of success. Maintenance is a continuation of the transplanting process. Effort and expense can be wasted if trees are not given proper care after transplanting.

If continued stresses and slackening growth are visible during the initial transplanting period, corrective actions will be adopted, before further decline of the tree. These are indicated below.

Watering

Sufficient and appropriate watering is important for proper root growth. Provision will be made for watering, allowing for total wetting of the rooting volume to minimise susceptibility to stress and assure survival.

Watering to be done to field capacity – a minimum 50 litres, every 3 days in dry periods, during the growing season (May-September). This is dependant on the size of the extracted root ball and soil conditions.

Mulching

Care should be taken to ensure that grass or weed growth does not compete with young root growth, by intercepting available water and nutrient supply. Care should also be taken to avoid the risk of damage to the stems of the trees from future strimming or mowing operations. An area with a radius, of at least to the extent of the guys, should therefore be kept free from competing vegetation by mulching, which should also prevent the need for mowing or strimming activities.

Mulch will also conserve soil moisture, buffer soil temperature extremes, control weeds and other competing vegetation, and will replenish organic matters and nutrients in the soil. A well-established layer of mulch can hold more water than the soil itself, without decreasing soil aeration. Mulch should not be placed too close to the tree trunk or root collar.

Guying

Initial guying will help retain a tree in an upright position until sufficient roots are developed to anchor the tree. Guys and stakes and ties will be removed, replaced, or adjusted as necessary to ensure their effectiveness and to prevent constriction or abrasion damage to the tree.

The supports can be removed after the tree establishment. Supports that stay too long without proper adjustment will do more harm than good to the trees.

6 Conclusions

Due to the age of the trees, and the likely stresses placed upon the trees following the translocation process, even with intensive aftercare there is a risk of the trees not surviving the translocation process.

Further ground investigations will be required for all trees and in particular tree 007 before the final translocation methodology can be finalised. The methodology is likely to vary for each tree and will be dependant on the findings of these investigations.

It is recommended that the trees are translocated using excavation with compressed air and removal with a tracked excavator.

ALL operations need to be planned and supervised by competent professionals. Tree pits require preparation in accordance with the recommendations within this report. Trees should be guyed to stabilise the root structure.

Aftercare will be adopted for up to 5 years, along with regular inspections to address any issues that arise during this period.

Appendix A

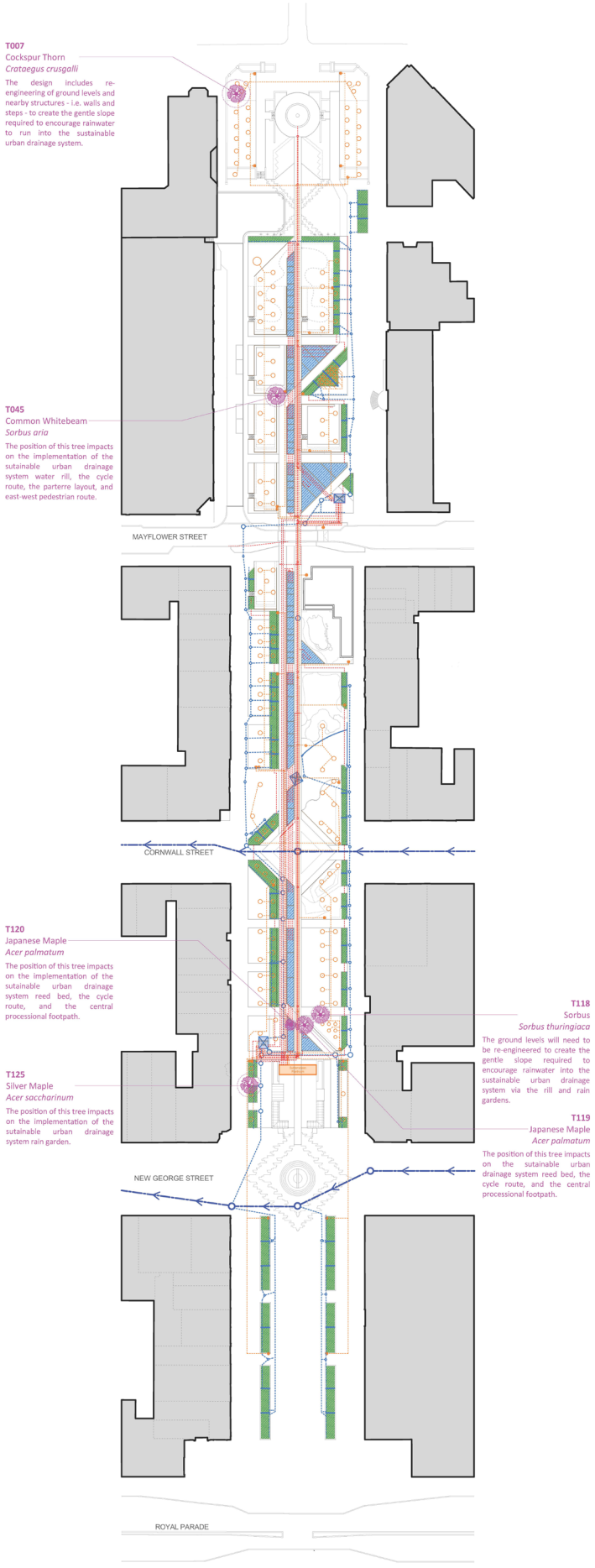
Tree Location Plan Provided By Studio Agora Architects

NOTES:

The following information represents an interpretation of specialist consultants information produced for the previous design layout which has been adjusted by Studio Agora to suit the revised proposal. As such the information depicted at this stage is INDICATIVE ONLY and subject to disrepancies and further development following the completion of the public consultation.

The schematic is specific to the proposed new Sustainable Urban Drainage System (SUDS) being proposed for Armada Way, as such the existing below ground drainage routes and other service routes have been omitted for improved legibility.

INDICATIVE SCHEMATIC ONLY



LEGEND

- Existing trees for off-site translocation (Root Protection Areas shown)
- Proposed new raingardens to catch surface rainwater
- Proposed new water rill and reed beds to catch, filter & distribute surface rainwater
- Proposed below ground surface water drainage collection network
- Proposed below ground tree irrigation network (and water points)
- Proposed below ground rill, reed bed and raingarden connecting pipework
- Below ground water storage tanks
- Subterranean plant room to house pumps for SUDS system
- Proposed connection route of wider strategic storm water drainage system

GENERAL NOTES

Check all dimensions on site. Do not scale from this drawing. Report any discrepancies and omissions to Studio Agora Architects.

DESIGN/SKETCH DESIGN

Unless stated otherwise this drawings shown are subject to detailed site survey investigations and legal definition the CDM Regulations and the comments and/or approval of the various relevant Local Authority Officers Statutory Undertakers - Fire Officers Engineers and the like. They are copyright project specific and confidential and no part is to be used of copied in any way without the express consent of Studio Agora Architects.

AREA CALCULATIONS

The areas shown are approximate only and have been measured off preliminary drawings as the likely areas at the current state of design using the stated option from the Code of Measuring Practice 4th edition (RICS/ ISVA). These may be affected by future design development and construction tolerances or the result of surveys for existing buildings. Take account of these factors before planning any financial or property development purpose or strategy and seek confirmation of latest areas before decision making.

3RD-PARTY INFORMATION

This drawing includes information provided by independent surveyors and/ or consultants to whom all enquiries shall be made. Studio Agora Architects accept no liability for its content or accuracy.

Client:

PLYMOUTH CITY COUNCIL

Rev	Comment	Date	By	Chk
P01	PRELIMINARY ISSUE FOR COMMENT	26.10.2023	DC	LF
P02	WIDER STRATEGIC STORM WATER CONNECTION ADDED	26.10.2023	DC	LF
P03	FURTHER ANNOTATION ADDED	30.10.2023	DC	LF
P04	UPDATED TO PCC COMMENT	31.10.2023	DC	LF
P05	TREE T125 LATIN NAME AMENDED	01.11.2023	DC	LF

Internal Project Number:

22101

Project:

ARMADA WAY PUBLIC REALM, PLYMOUTH

N

Drawing Number:

67CA09-STA-ZZ-XX-SK-L-XXXX-016

rathbonepartnership
chartered landscape architects

Drawing Title:

PROPOSED INDICATIVE SUDS SCHEMATIC vs. EXISTING TREES FOR TRANSLOCATION - ALL ZONES

Scale @ A0:	Date Drawn:	Drawn by:	Checked by:	Suitability:	Revision:
1:500	26.10.2023	DC	LF	D2	P05

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