



# Canopy Cover Supplementary Planning Document

March 2020

Guidance to accompany policy DM34 of the  
Wycombe District Council Local Plan

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## 1. Purpose of this SPD

- 1.1.1. This document provides guidance on how to meet Canopy Cover Requirements as set out in part of policy DM34 of the Wycombe District Local Plan. Following the process and using the tools set out in this SPD will enable applicants to clearly demonstrate that the Canopy Cover Requirement are met, and will ensure that proposals are assessed consistently by the Local Planning Authority.
- 1.1.2. This Supplementary Planning Document (SPD) and the [linked Canopy Cover Calculator](#), will form a material consideration in the determination of planning applications.
- 1.1.3. Information about the level of information required for various types of planning application can be found in Section 4.

## 1.2. The Structure of this SPD

- 1.2.1. This SPD is structured as follows:
  - Introduction
  - How to screen an application to assess Canopy Cover Requirement
  - How to survey and measure existing canopy cover
  - How to measure new canopy cover (trees and green infrastructure)
  - What is required to support a planning application

## 2. Introduction

### 2.1. Policy Background

- 2.1.1. The role of trees in the natural environment is recognised in the National Planning Policy Framework (NPPF):

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland.

### 2.2. DM34: Delivering Green Infrastructure and Biodiversity in Development

- 2.2.1. Wycombe District Council adopted a new Local Plan in August 2019. Part of policy DM34 Delivering Green Infrastructure and Biodiversity in Development requires new development to provide different amounts of canopy cover depending on the size and location of the development.

2.2.2. This policy covers a range of requirements. Those relating to canopy cover are in parts of the policy; 3 b) and c), and hereafter referred to as the Canopy Cover Requirement, the policy states:

- 3) Development (excluding householder applications) is required as a minimum to:
- b. Achieve a future canopy cover of 25% of the site area on sites outside of the town centres and 0.5 ha or more. This will principally be achieved through retention and planting of trees, but where it can be demonstrated that this is impractical the use of other green infrastructure (e.g. green roofs and walls) can be used to deliver equivalent benefit;
  - c. Within town centres and on sites below 0.5 ha development is required to maximise the opportunities available for canopy cover (including not only tree planting but also the use of green roofs and green walls);

2.2.3. In relation to part 3c to “maximise” means to ensure that all reasonable opportunities are taken to retain and plant trees and provide green roofs and green walls. In these circumstances the use of the tools and the process set out in the SPD will help applicants ensure and demonstrate that opportunities have been maximised.

## 2.3. What is Canopy Cover

- 2.3.1. Tree Canopy Cover is the ground-area that is covered by trees when viewed from above, however, the trees height, shape and density also contribute to the value the tree canopy delivers.
- 2.3.2. The term hedgerow can be applied to a wide range of planting features, many of which will not provide meaningful canopy cover value. For the purposes of this SPD hedgerows will not be included in the canopy cover calculations, however if the applicant feels there is justification for including them, this will need to be agreed with the Local Planning Authority.
- 2.3.3. Every effort should be made to meet the Canopy Cover Requirement through retained and new trees on site. If the Canopy Cover Requirement cannot be met through trees, other Green Infrastructure Elements (Green Roofs and Green Walls) can be considered, as they are capable of offering similar benefits to trees. Aside from Green Roofs and Green Walls, other types of Green Infrastructure are not counted towards the Canopy Cover Requirement.

## 2.4. Screening for Canopy Cover Requirement

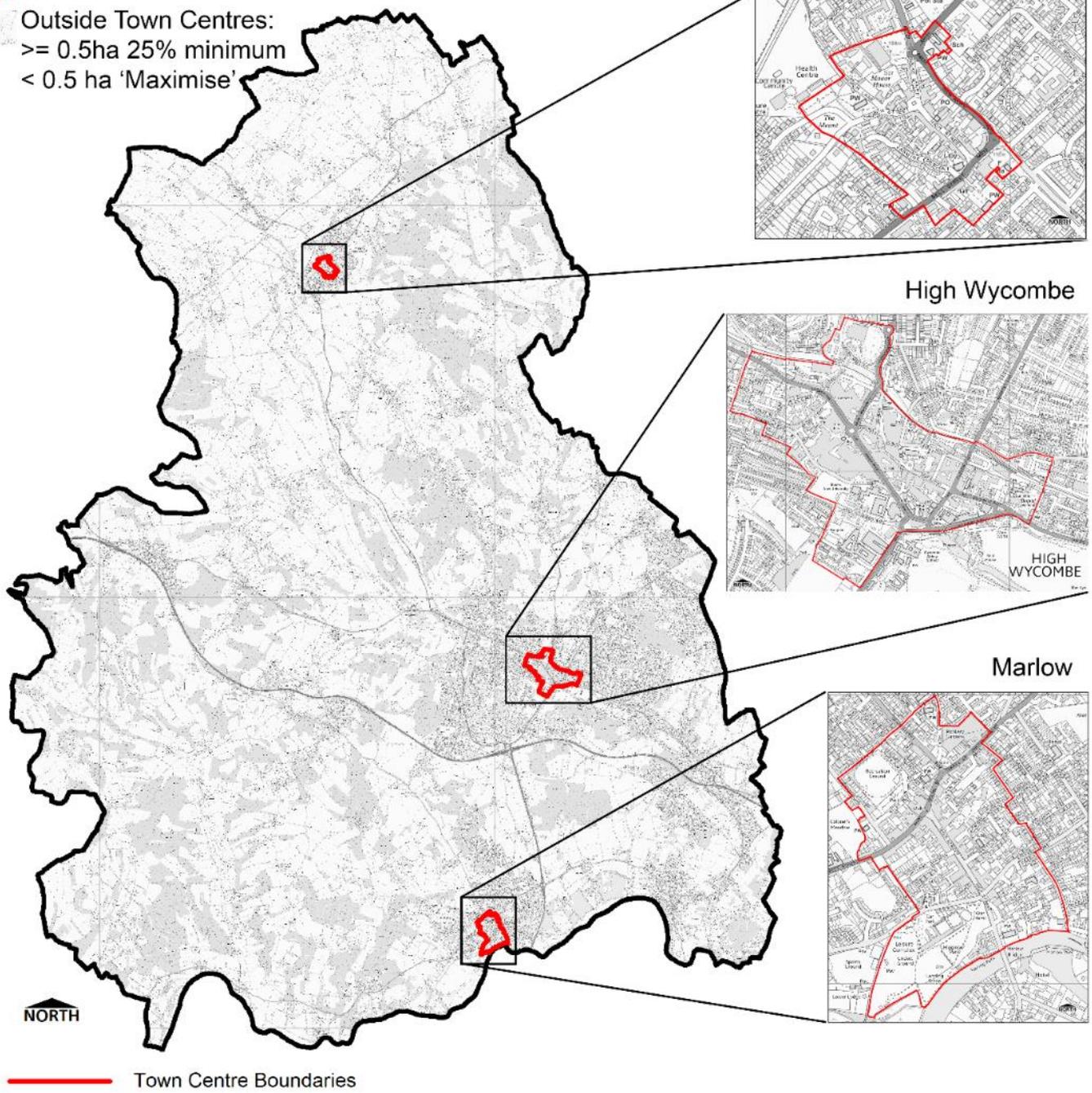
2.4.1. The Canopy Cover Requirement applies differently to different types of planning application, as set out in the table below:

Scale of Application	DM34 Policy Requirement
Householder Application	Policy not applicable
Change of Use applications with no operational development	Policy not applicable
Applications on sites less than 0.5 ha.	Requirement to maximise tree canopy cover.  We recommend you use the Canopy Cover SPD and Canopy Calculator Workbook to support your application.
Applications on sites within town centre boundaries	Requirement to maximise tree canopy cover.  We recommend you use the Canopy Cover SPD and Canopy Calculator Workbook to support your application.
Applications on sites outside of town centres <u>and</u> 0.5. ha or more.	Requirement to provide a minimum of 25% tree canopy cover.  It is required for you to use the Canopy Cover SPD and Canopy Calculator Workbook to support your application.

*Table 1 Planning applications and DM 34 policy requirements*

### Canopy Cover Requirements

-  Town Centres 'Maximise'
-  Outside Town Centres:
  - $\geq 0.5\text{ha}$  25% minimum
  - $< 0.5\text{ ha}$  'Maximise'



OS mapping: © Crown Copyright and database rights 2020 Ordnance Survey 100023306.

Figure 1: Wycombe Area Town Centres of High Wycombe, Princes Risborough and Marlow (see Appendix 1 for larger images of town centres).

## 3. Process of Fulfilling Canopy Cover Requirement

### 3.1. Canopy Calculator Workbook

- 3.1.1. The [Canopy Calculator Workbook \(found here\)](#), provides a consistent method for understanding and meeting the Canopy Cover Requirement. There are a number of worksheets within it to iterate and refine your site design and layout:
0. Instructions for use of the Canopy Calculator Workbook
  1. Site Summary Worksheet – referred to throughout the process to check progress towards the target
  2. Retained Canopy Worksheet – used to record and assess retained canopy cover on the site
  3. New Canopy Worksheet – used to record and assess new canopy cover on the site
  4. New Green Infrastructure Elements Worksheet – used to record and assess other GI elements provided on the site
  5. Species List – used to aid design decision making, and as a look up table
  6. Lookup Tables – for reference
- 3.1.2. Sections 3.2 to 3.5 below set out the process of completing the Canopy Cover Workbook, referencing documents and plans which you will need to support your application.

## 3.2. Site Summary Worksheet: Site area and constraints

- 3.2.1. The Site Summary worksheet is the first worksheet to be used, and the last to be referred to in the process. It is used to work out the site area within the red edge (the application boundary) which must achieve the Canopy Cover Requirement.
- 3.2.2. It then pulls together information from the Retained Canopy Cover, New Canopy Cover and New Green Infrastructure Worksheets to show if the Canopy Cover Requirement is met.
- 3.2.3. Surveys set out below provide baseline information for the design process, and must be carried out before it can be demonstrated that the Canopy Cover Requirement is met

Surveys required <i>See section 5.1</i>	Survey Purpose
Topographic Survey	To define the site <b>red edge</b> (application boundary) and baseline for further surveys
Preliminary Ecological Assessment (PEA)	To identify <b>excluded</b> areas from tree planting, including easements and habitats which would not have their special nature enhanced through the planting of trees
Utilities search/survey.	

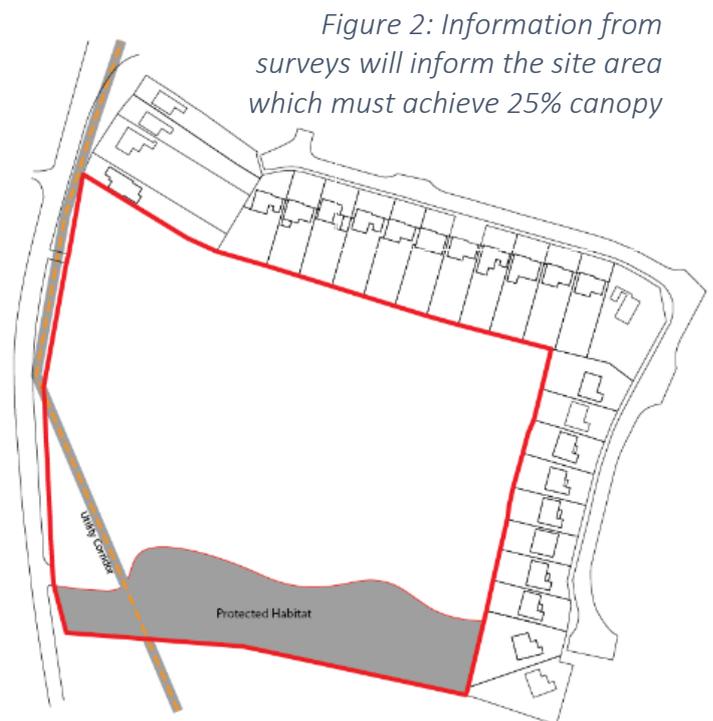


Figure 2: Information from surveys will inform the site area which must achieve 25% canopy

- 3.2.4. There may be other surveys required if further restrictions are identified in the baseline information. Any further restrictions to tree planting on a site should be justified by the applicant and will need to be agreed with the Local Planning Authority before an exclusion is applied.
- 3.2.5. This information should be entered in the Site Summary Worksheet of the Canopy Calculator Workbook.
- 3.2.6. Instructions and comments are included within the worksheets to help you complete them. Cells with comments have a red triangle in the top-right corner.

### Canopy Balance Check:

- 3.2.7. Each of the following worksheets Retained Canopy, New Canopy and New GI Elements includes a running total of Canopy Cover on the site, to aid an iterative design process.

<b>Running Total %</b>		<b>25%</b>
<b>Retained Trees</b>	<b>New Trees</b>	<b>New GI</b>
<b>6%</b>	<b>6%</b>	<b>13%</b>

### 3.3. Retained Canopy Worksheet: Survey and assess existing trees

- 3.3.1. The Retained Canopy Worksheet is used for calculating retained tree canopy in m<sup>2</sup>. If there are existing trees on site, this Worksheet is the next to be filled in.
- 3.3.2. The survey and plans set out below provide the information for this step in the process, and must be carried out to identify retained canopy cover.

Surveys, Assessment and Plans required <i>See sections 5.1, 5.2 &amp; 5.3</i>	Use in the Canopy Cover process
Tree Survey and Categorisation	Used in the Worksheet to measure canopy cover
Arboricultural Impact Assessment (AIA) and Tree Retention/Removals Plan	Used in the Worksheet to identify trees which may be removed
Tree Protection Plan (TPP), Arboricultural Method Statement (AMS).	Used to inform deductions from the canopy area of trees. Canopy reduction and encroachment can be initially estimated if these documents are not available. The Worksheet will need to be updated once this information is available.

Figure 3: Information from trees surveys will inform the creation of plans.

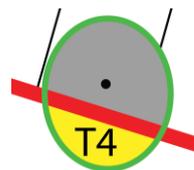
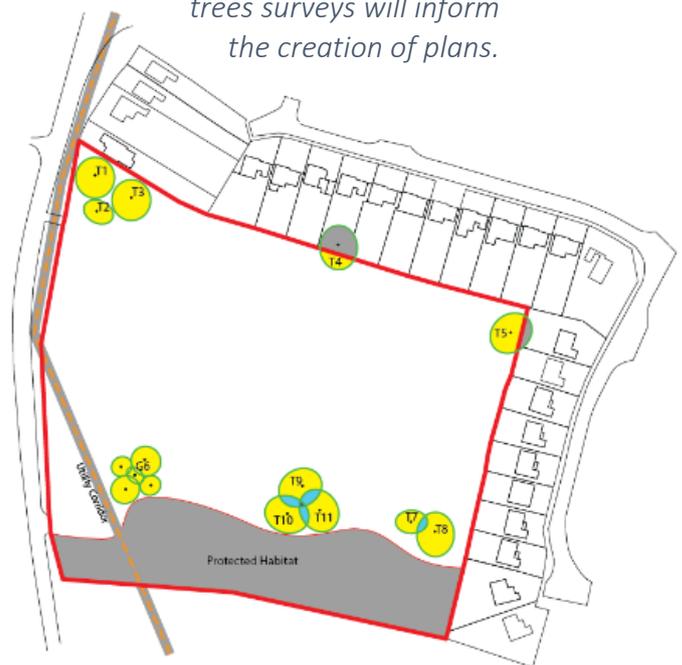


Figure 4: Where trees overhang the red edge, only the canopy inside the site should be included.

- 3.3.3. When completing the Retained Canopy Worksheet, canopy cover area can be calculated in two ways:
- By entering the canopy radius, using cardinal four points of the compass, for individual trees. (method 1 below), or
  - By entering the area for groups of trees using CAD or GIS to measure the area. (method 2 below)
- 3.3.4. The entire existing canopy for a tree or tree group can be included if it:
- Is entirely within the site
  - Will have no planned tree surgery works
  - The Root Protection Area (RPA) will not be encroached upon by development and associated works, and

- Trees based outside the site must not be included in calculations if their BS5837:2012[2] categorisation is 'U' (those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years).

3.3.5. Instructions and comments are included in the column headers of the Retained Canopy Worksheet to help you complete the worksheet. Cells with comments have a red triangle in the top-right corner.

## Canopy Cover Area Overlap

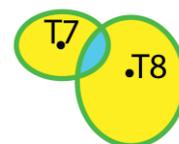
3.3.6. When two or more trees overlap, as shown in the diagrams below, different methods can be used to measure canopy cover to ensure these areas are not double counted. Either method can be used, but if you later remove trees, you may find it more helpful to use method 1. Calculations should be entered into column M of the Worksheet.

3.3.7. Method 1: Dividing overlap method:

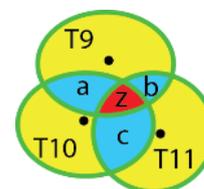
When to use:

- For small numbers of trees
- When trees are to be removed

a. For two overlapping trees, the blue overlap area (diagram T7 and T8) is divided in half



b. For three or more trees, each of the blue overlap areas (a, b, and c) are halved and added to a third of the red overlap area (z) (diagram T9, T10 and T11). The method is the same regardless of the number of trees in the group. The calculations are set out in the table below:



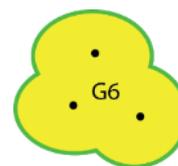
Different types of overlap	Formulae
T9 overlap area for column M	$\frac{1}{2}a + \frac{1}{2}b + \frac{1}{3}z$
T10 overlap area for column M	$\frac{1}{2}a + \frac{1}{2}c + \frac{1}{3}z$
T11 overlap area for column M	$\frac{1}{2}b + \frac{1}{2}c + \frac{1}{3}z$

Table 2 Canopy overlap calculations

### 3.3.8. Method 2: Perimeter method:

When to use:

- Recommended for groups of 3 or more trees, or woodland (diagram G6).



The perimeter area is calculated using a CAD or GIS programme.

## Tree Removal

- 3.3.9. If trees are to be removed, this should be indicated in column 'O' of the Worksheet. If method 2, set out above, is used and the tree(s) within a group are later proposed for removal, the group area will need to be recalculated, and the Worksheet updated.

## Canopy reduction or RPA Encroachment

- 3.3.10. Canopy Reduction or encroachment into the Root Protection Area (RPA) cannot be determined accurately until the layout and design of the site is fixed, and the Arboricultural Impact Assessment has been produced. For an Outline application, these can be estimated realistically, and refined at the reserve matters stage when more information is available.

- 3.3.11. Retained Canopy should also be shown on site layout plans.

- 3.3.12. If the Canopy Cover Balance is less than 25%, new canopy should be provided.

<b>Running Total %</b>		<b>6%</b>
<b>Retained Trees</b>	<b>New Trees</b>	<b>New GI</b>
<b>6%</b>	<b>0%</b>	<b>0%</b>

### 3.4. New Canopy Worksheet: Survey Soil & designing in new trees

- 3.4.1. The New Canopy Worksheet should be used iteratively alongside Species List Worksheet and the Canopy Cover Design Guide <sup>[17]</sup> in the layout and design of the site, to ensure that both quantitative and qualitative information about trees is taken into account whilst working to meet the Canopy Cover Requirement.
- 3.4.2. The New Canopy Worksheet calculates the future canopy value of new trees and the required soil volumes in m<sup>2</sup>.

Surveys, Assessment and Design required <i>see sections 5.1 &amp; 5.2</i>	Use in the Canopy Cover process
Soil Survey	Inform where to plant trees, and the soil texture needed to support them.  If using new soil, the specification can be provided by the supplier
Tree Planting Plan	Show which trees will be planted for canopy cover, and minimise canopy cover overlaps.



- 3.4.3. The New Canopy Worksheet may need to be completed iteratively as the overall site layout and design, and the landscape design evolves. Input should be sought from arboricultural, landscape, SuDS, engineering and other professionals.

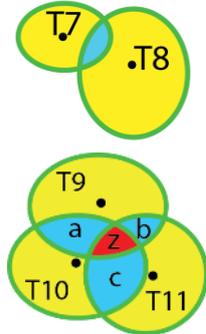
#### Tree Planting Plan

- 3.4.4. The Tree Planting Plan will show the location, species and radius at planting of the canopy of new trees. The reference number and species of new trees should be entered into the Worksheet. The Worksheet then provides a projected canopy radius at 25 years, which should be plotted onto the Tree Planting Plan and Tree Planting Detail.

## Canopy Cover Area Overlap

3.4.5. Planting should be designed to avoid excessively overlapping canopies at 25 years. Where this cannot be avoided, and two or more trees overlap as shown on the Tree Planting Plan, use the method below to ensure these areas are not double counted. Calculations should be entered into column E of the Worksheet.

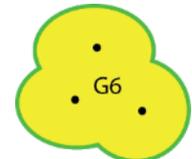
- a. For two overlapping trees, the blue overlap area (diagram T7 and T8) is divided in half.
- b. For three or more trees, each of the blue overlap areas (a, b, and c) are halved and added to a third of the red overlap area (z) (diagram T9, T10 and T11). The method is the same regardless of the number of trees in the group. The calculations are set out in the table below.



Different types of overlap	Formulae
T9 overlap area for column M	$\frac{1}{2}a + \frac{1}{2}b + \frac{1}{3}z$
T10 overlap area for column M	$\frac{1}{2}a + \frac{1}{2}c + \frac{1}{3}z$
T11 overlap area for column M	$\frac{1}{2}b + \frac{1}{2}c + \frac{1}{3}z$

Table 2 Canopy overlap calculations

- c. If you are proposing to plant new woodland, the perimeter method should be used (diagram G6). The perimeter area is calculated using a CAD or GIS programme.



3.4.6. If part of the new canopy overlaps with a retained tree or the sites red edge, this area of overlap should also be deducted using the appropriate method above.

### Soil texture

- 3.4.7. The New Canopy Cover Worksheet calculates the required soil volume for each new tree to enable it to grow to its projected size.
- 3.4.8. Different types of soil have different Available Water Holding Capacity (AWHC) which has implications for the total volume of soil the tree will require, and the value of the new tree canopy.
- 3.4.9. Trees may be planted into the retained soil on site, or an imported soil. The soil texture should be selected in column J of the worksheet.

### Interconnected Soil and SuDS

- 3.4.10. Soil volumes should be reduced by 20% for trees which are in an interconnected soil volume, including SuDS. If a tree is incorporated into SuDS, it will receive a more significant water recharge when it rains, so will need approximately 20% less

soil volume to grow to its projected size. The tree pit should be designed to drain, therefore not all soil textures will be suitable for use with a SuDS system.

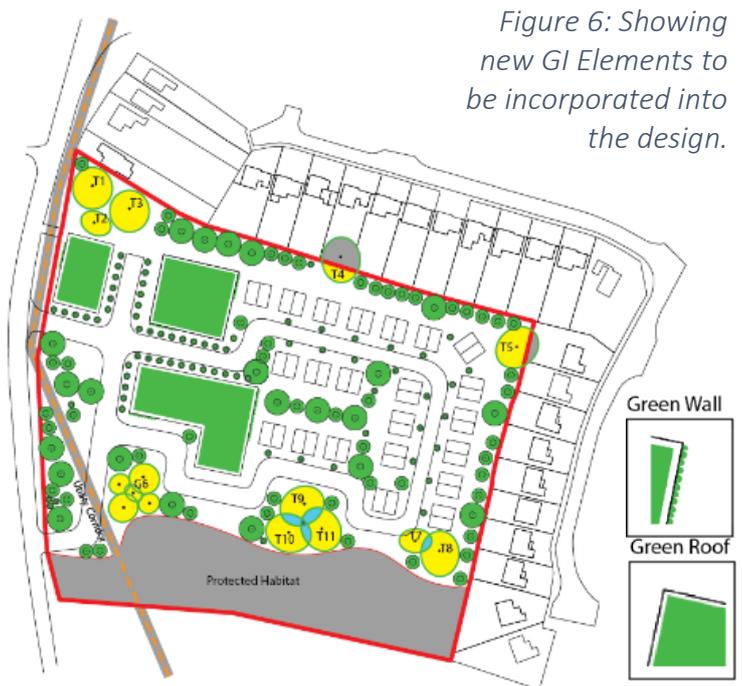
- 3.4.11. A reduction of 20% can only be applied once, even if it is in both a shared soil volume and incorporated into a SuDS.
- 3.4.12. Where trees are proposed in hard landscapes, the Tree and Design Action Group<sup>[4]</sup> have produced helpful guidance. Where trees are proposed in hard landscapes, pre-construction conditions will be imposed to demonstrate that the tree(s) can be successfully delivered in accordance with the New Canopy Worksheet.
- 3.4.13. The New Canopy Worksheet includes running totals which can be checked as the designs are iterated. This will identify if New Green Infrastructure Elements should be considered at this stage.

<b>Running Total %</b>		<b>12%</b>
<b>Retained Trees</b>	<b>New Tree</b>	<b>New GI</b>
6%	6%	0%

### 3.5. New GI Elements Worksheet: Assessing opportunities for new GI

- 3.5.1. If the policy requirement cannot be met through trees alone, new Green Infrastructure (GI) elements can be provided to meet the shortfall. Green roofs and green walls can be designed into the scheme by using the New GI Elements worksheet alongside the Canopy Cover Design Guide [17].
- 3.5.2. The leaf area per m<sup>2</sup> of vegetation on a green roof or green wall is less than that of tree canopy cover per m<sup>2</sup>; therefore, their GI value is less than for trees. The New GI Elements Worksheet automatically calculates the value of new GI elements.

Assessment and Design required <i>See section 5.2</i>	Use in the Canopy Cover process
Green Infrastructure Elements Plan	Show where green roofs and walls will be included.



- 3.5.3. The applicant should:
  - Design for and include new GI Elements as necessary to meet the requirement
  - Illustrate these GI Elements on the Green Infrastructure Elements Plan
  - Use the New GI Elements Worksheet of the Canopy Calculator Workbook to determine the canopy cover value (m<sup>2</sup>) of the new GI Elements

### Green Infrastructure Elements

- 3.5.4. Where Green Walls or Green Roofs are to be incorporated into the development, these must be indicated on building elevation drawings, and the GI Elements Plans should include a cross-section for each GI Element proposed, and structural requirements. Where GI Elements are proposed, pre-construction conditions will be used to demonstrate that the building is capable of supporting the GI element.

### Canopy Cover Balance

- 3.5.5. The running total can be checked again and if 25% has been achieved, the total will change from red to green. Further detail is shown on the Site Summary Worksheet

<b>Running Total %</b>		<b>25%</b>
<b>Retained Trees</b>	<b>New Trees</b>	<b>New GI</b>
6%	6%	13%

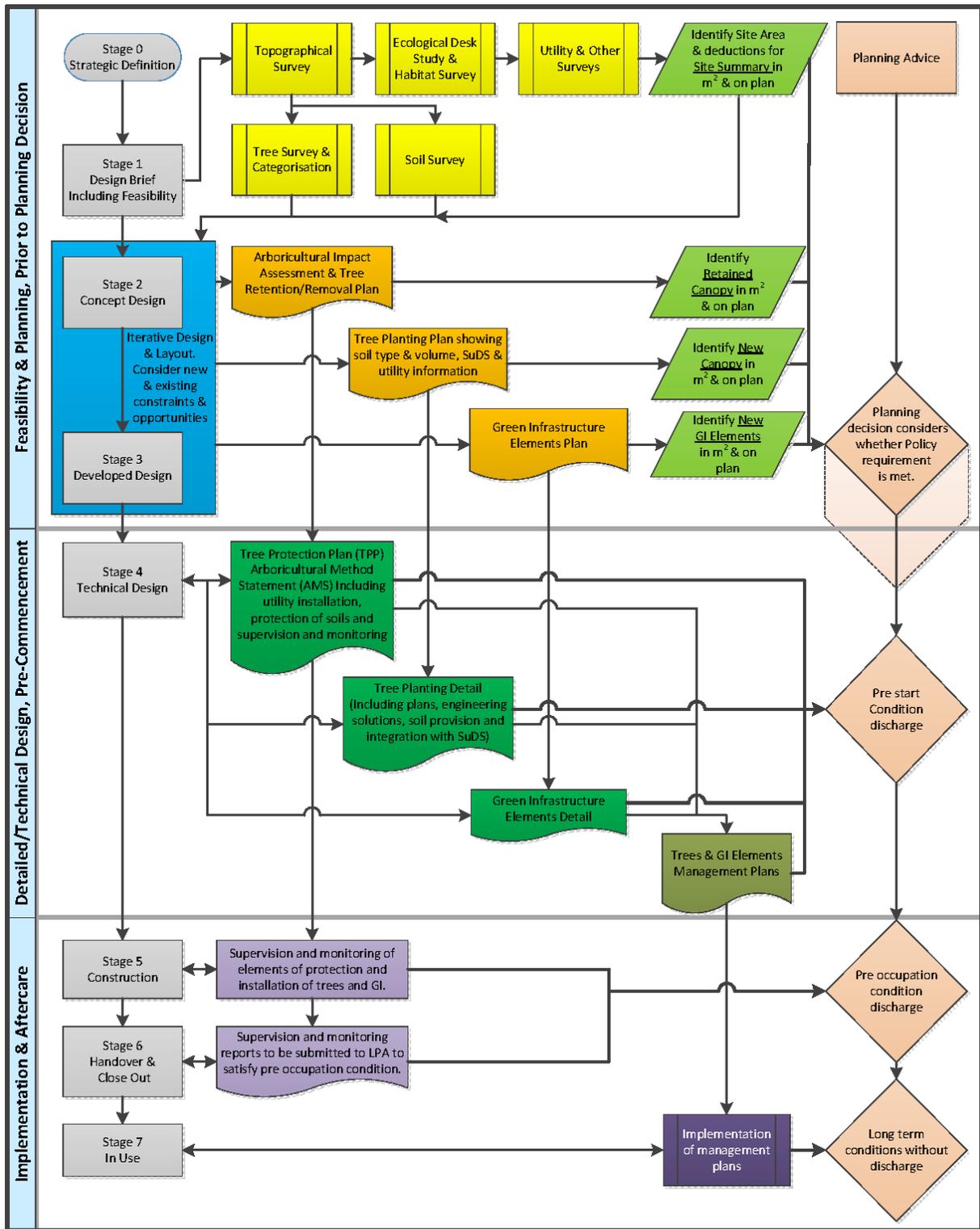
## 4. Submitting your application

- 4.1.1. To support your application, you will need to submit the documents identified below. The Canopy Cover Process flow chart in Figure 7 sets out the documents and process in the context of RIBA Plan of Work Stages 2013 <sup>[1]</sup>. These documents are described in detail in Section 5 of the SPD, they are required to demonstrate that the policy requirement for canopy cover is met.
- 4.1.2. The Canopy Calculator Workbook should always be submitted as an electronic copy so that your case officer can verify the results.
- 4.1.3. Depending upon the complexity of retaining and planting trees and of installing green roofs and walls it may be appropriate to seek Planning Advice before submitting your application

Type of application	Supporting documents required
Outline Application	<p>As a minimum:</p> <ul style="list-style-type: none"> <li>• Tree Survey &amp; Categorisation (if there are existing trees on site)</li> <li>• Arboricultural Impact Assessment &amp; Tree Retention/Removal Plan (if there are existing trees on site)</li> <li>• Site Summary Worksheet (electronic copy)</li> <li>• Retained Canopy Worksheet (electronic copy)</li> <li>• Preliminary Ecological Appraisal</li> <li>• Illustrative Layout Plan</li> </ul> <p>You may be asked to submit documents indicated below if there is uncertainty about the scope for the Canopy Cover Requirement to be met</p>
Full or Reserved Matters Application	<p>In addition to the documents above, you will also need to submit, as a minimum:</p> <ul style="list-style-type: none"> <li>• Tree Planting Plan</li> <li>• Green Infrastructure Elements Plan (if GI Elements are proposed)</li> <li>• New Canopy Worksheet (electronic copy)</li> <li>• New GI Elements worksheet (electronic copy)</li> </ul> <p>Additionally, you may be asked to submit:</p> <ul style="list-style-type: none"> <li>• Tree Protection Plan and Arboricultural Method Statement</li> </ul>
Conditions	<p>The following documents may be required by condition:</p> <ul style="list-style-type: none"> <li>• Tree Protection Plan and Arboricultural Method Statement (if not already approved)</li> <li>• Tree Planting Detail</li> <li>• Green Infrastructure Elements Detail</li> <li>• Trees and GI Elements Management Plan</li> <li>• Supervision and Monitoring Report</li> </ul>

*Table 3 Supporting documents required for different levels/stages of application.*

## 5. The Canopy Cover Process



### Colour Key



### Shape Key

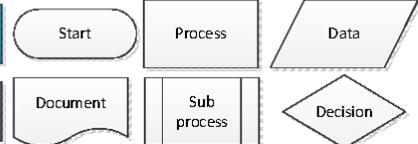


Figure 8: The Canopy Cover Process is illustrated in the above Flow Chart from top-right to bottom-left, in the context of the RIBA Plan of Work 2013 Stages [1] (left) and Planning Stages (right)

## 5.1. Surveys (RIBA Stages 0-1)

- 5.1.1. Surveys are required to establish the baseline, and inform the design and layout of the site. Different surveys inform different stages of the process. All arboricultural survey and assessment work must be carried out by a suitably qualified arboricultural consultant in accordance with BS5837:2012.

### Topographical Survey

- 5.1.2. A topographical survey provides the baseline for the further surveys and will allow the applications red edge site area to be plotted and calculated accurately. This information is used in the Site Summary worksheet.
- 5.1.3. Topographical surveying should follow the Royal Institute of Chartered Surveyors (RICS) guidance: Measured surveys of land, buildings and utilities <sup>[5]</sup>. And must also include the detail set out in clause 4.2 of BS5837:2012 <sup>[2]</sup>.
- 5.1.4. It is recommended that you have a conversation with your arboricultural consultant prior to commissioning to ensure all necessary information is gathered.

### Tree Survey & Categorisation

- 5.1.5. Tree surveying should be undertaken by an arboricultural consultant in accordance with BS5837:2012 <sup>[2]</sup> and will provide a survey plan and tree schedule. This information will be used in the Retained Canopy Worksheet.
- 5.1.6. Some trees categorised as U may be recommended for removal on arboricultural grounds, however there may be ecological reasons which make their retention desirable. If the tree is retained, it will count towards the tree canopy cover on the site.

### Preliminary Ecological Appraisal (PEA)

- 5.1.7. A PEA assesses ecological features present, or potentially present, within a site and its surrounding area, and can identify additional surveys which may be required. The Chartered Institute of Ecology and Environmental Managements (CIEEM) Guidelines for Preliminary Ecological Appraisal <sup>[18]</sup>, should be followed when carrying out a PEA.
- 5.1.8. The PEA will identify habitats which would not have their special nature enhanced through the planting of trees, e.g. chalk grassland. Such areas, along with appropriate buffers around them, must be excluded from the red edge site area before calculating the m<sup>2</sup> area required to meet the 25% Canopy Cover Requirement for the site. This information is used in the Site Summary worksheet.

### Soil Survey

- 5.1.9. Soil is one of the most important factors to the successful growth of trees and other Green Infrastructure elements. The process of securing good soil in a new development requires an understanding of existing soil, knowledge of what soil is needed, and where, when and how soil must be protected, remediated, moved, removed or supplied to meet the development's needs.

- 5.1.10. Soil surveying must be undertaken in accordance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2009, section 4.1) <sup>[7]</sup>.
- 5.1.11. The soil survey will help to identify:
- Which areas will be suitable for new planting and should be protected
  - Any remediation required (e.g. cultivation or addition of nutrients or organic matter) to ensure planting in retained soils can be successful
  - Any areas of contaminated soil which cannot be planted or which need removal
  - Whether soil from one area can be reused for planting in other areas
- 5.1.12. These details must be shown on the Tree Planting Plan, and a combined constraints plan, if used, which can inform the layout and design process.

### Utility Survey

- 5.1.13. Utilities such as gas pipe lines, electrical power lines or fibre optic cables may restrict the way in which a site can be designed, due to wayleaves, easements and covenants. Utilities may therefore be excluded from the red edge site area.
- 5.1.14. Retained Utilities should be plotted on the Tree Planting Plan, with indication of the nature of the constraint (e.g. type, legislation, guidance, legal agreement).
- 5.1.15. Utility Surveys, if necessary to identify exclusion areas, should be undertaken in accordance with The Survey Association guidance <sup>[6]</sup>. This information is used in the Site Summary worksheet and Tree Planting Plan.
- 5.1.16. For the purpose of this document, utilities include but are not limited to:
- Electricity cables below ground and lines above
  - Power supply for street lighting
  - Gas pipelines
  - Foul and mains water (sewerage) drainage
  - Surface water drainage
  - Underground SuDS systems
  - Telephone Lines
  - Fibre optic cables
  - Cable TV
  - District heating systems
  - CCTV

### Surveys which identify other restrictions

- 5.1.17. Surveys may reveal other restrictions to tree planting on a site which are not mentioned here. The default position is that they would not be excluded from the red edge site area, however if the applicant feels there is justification for excluding the area, this will need to be agreed with the Local Planning Authority before the exclusion is applied.

## 5.2. Assessment and Design (RIBA Stages 2-3)

- 5.2.1. Assessing and understanding the constraints and opportunities on a site will facilitate meeting the tree canopy requirement. Plotting existing constraint information collected from tree, soil, utility, and other surveys on a single plan is not required by the Local Planning Authority, but may be helpful to you in the design and decision-making process and demonstrating this to the Local Planning Authority.

### Arboricultural Impact Assessment

- 5.2.2. An Arboricultural Impact Assessment (AIA) is a written assessment which determines the site specific effect of a planned development on the existing tree stock.

### Tree Retention and Removal Plan

- 5.2.3. The Tree Retention and Removals Plans will illustrate the constraints that existing trees present to development of the site. They will be informed by the Tree Survey and Categorisation, and will be iterated by your arboricultural consultant, working with the rest of your team.
- 5.2.4. Tree retention decisions should be based on the category of the tree(s) in question, and their ecological value, as well as potential development options and the tree canopy requirement. Areas of retained canopy, root protection areas, and any reductions should be shown on the Tree Retention and Removal plans. They should also be included on site layout plans submitted with your application.
- 5.2.5. The Tree Retention and Removal Plan, based in part on the requirements of BS5837:2012, should include:
- Tree or group numbers
  - The canopy area of trees and groups
  - Tree retention category, (using colour and/or letter and number)
  - Root Protection Areas, the shape of which must be adjusted to realistically reflect known constraints to rooting
  - Retention or removal indicated by their canopy extents being marked with a solid or dashed outline respectively
  - Areas of tree canopy which are to be removed through tree surgery marked with a dashed outline
  - Areas of overlap between tree canopies marked with a dotted outline
  - Areas of canopies which hang outside the site marked with a dotted outline
  - Other constraints which trees present such as shading and potential future size (optional)
- 5.2.6. The Arboricultural Impact Assessment and the Tree Retention and Removal plan are used to complete the Retained Canopy Worksheet of the Canopy Calculator Workbook.

## Tree Planting Plan

5.2.7. The Tree Planting Plan should show the following information:

- New tree number
- Canopy size at planted shown as a circle
- Projected canopy size at 25 years, shown as a dashed circle, as shown in the New Canopy Worksheet
- The area of soil for each tree as shown in the New Canopy Worksheet
- Soil textures – base on soil survey or supplier specification (see below)
- The location of existing utilities and planned new utility corridors and ducting (see below)
- The location of SuDS systems (see below)

## Soil Texture

5.2.8. Many sites have inadequate quantities of healthy, un-compacted soil to meet the requirements of new trees. If the condition of the existing soil cannot be remediated, it will be necessary to provide new soil. Where trees are planted in to an engineered system, or where green roofs or green walls will be provided, imported soils will almost certainly be used. The specification for new soil can be provided by the supplier.

5.2.9. It is necessary for existing and new soil volumes to be shown on Tree Planting and/or Green Infrastructure Elements Plans, appropriately annotated so details can be cross-referenced with the New Canopy and the New GI Elements Worksheets of the Canopy Calculator Workbook.

## Other Constraints

5.2.10. Elements of the design for a new development will create new constraints and affect opportunities for tree planting and incorporation of Green Infrastructure Elements.

5.2.11. Designs should progress in parallel so that the incorporation of new trees and Green Infrastructure elements is not an afterthought. If designs are not coordinated there is an increased chance of clashes occurring between different elements, and of missed opportunities to make mutually beneficial efficiencies e.g. combining SuDS systems and tree planting. Early and frequent coordination between design professionals can avoid these clashes.

5.2.12. Some of these constraints are dealt with below. Guidance on the way in which tree planting can be designed to respond to these constraints and opportunities is given in the Canopy Cover Design Guide<sup>171</sup>

## Sustainable Drainage Systems (SuDS)

5.2.13. Sustainable Drainage Systems (SuDS) often deal with surface water run-off in an engineered system, which directs water away from trees and other vegetation which could benefit from it.

- 5.2.14. SuDS which incorporate trees have the capacity to hold and filter water as it passes through the system. Incorporating trees into SuDS facilitates the delivery of tree canopy with less soil volume.
- 5.2.15. SuDS systems will need to be shown on the Tree Planting Plan alongside soil volumes and the Root Protection Areas of retained trees.

### **New Utilities**

- 5.2.16. Information from the utilities searches/surveys will inform the potential routing of new utilities, however, it is important that their locations are also planned alongside tree retention and new tree planting to maximise the efficiency of the use of space and avoid conflicts.
- 5.2.17. Underground services should be designed in conjunction with new tree planting, and shown together on the Tree Planting Plan to demonstrate feasibility.

### **Green Infrastructure (GI) Elements Plans**

- 5.2.18. Green Infrastructure Elements, if provided, must be shown on the Green Infrastructure Elements Plan. If combined on the Tree Planting Plan, this should be clearly stated in the Title Block on the plan. The following detail must be included:
- The GI Element number, from column B of the New GI Element Worksheet
  - Detail of any SuDS System incorporated with the GI Element.
- 5.2.19. Where Green Walls or Green Roofs are to be incorporated into the development, these must be indicated on building elevation drawings, and the GI Elements Plans should include a cross-section for each GI Element proposed, and associated structural requirements.

## **5.3. Technical Design (RIBA Stage 4)**

### **Tree Protection Plan (TPP) and Arboricultural Method Statements (AMS)**

- 5.3.1. Protection of retained trees should be shown on Tree Protection Plans (TPP) and in Arboricultural Method Statements (AMS). Mitigation for activity within or impacting on the Root Protection Area (RPA) or crowns of retained trees must be addressed in the AMS. Details of the protection of retained areas of soil must be addressed in the TPP.
- 5.3.2. The AMS and TPP will in most cases require specialist supervision and monitoring to ensure trees are properly protected through the development process. Where appropriate, a Supervision and Monitoring Report may be required by condition.

## Tree Planting Detail

- 5.3.3. The tree pit design must be appropriate for the location and tree species.
- 5.3.4. In all circumstances the design and specification of new trees should be in accordance with BS8545:2014<sup>[8]</sup>. Tree Planting Details will need to include cross referenced plans, illustrations/sections and specifications for:
- Tree species (including cultivar/variety)
  - Size at planting (girth and height)
  - Production method (e.g. bare rooted, root balled, containerised)
  - Support measures (e.g. stakes and ties or underground guying method)
  - Protection measures (e.g. strimmer guard, animal protection, other ornamental vandal or vehicle guards)
  - Mulching including material to be used, depth and area covered
  - Further information about the provision of soil
  - How utilities will interact with the system
  - How SuDS will interact with the system
- 5.3.5. In addition for trees in soft landscaped areas details will need to include:
- The condition and location of retained soil into which trees will be planted:
  - Soil type
  - Bulk density
  - Macro and micro nutrients available: N, P, K and others
  - Soil drainage
  - Soil depth
  - Soil contaminants
  - Soil remediation what, where and when it will be undertaken
- 5.3.6. For trees in hard landscapes, additional details to be submitted include:
- Specification of the system which will be used to contain the required soil volume. Note that some systems use a lot of space to provide a required soil volume (e.g. the Stockholm System) and this must be taken into consideration in the design.
  - Plans and sections through the system for each tree, showing:
    - How the system will be supported (sub-base)
    - How any surfaces will be built up, on top of the soil volume
    - How air and water will interact with system to avoid drought, waterlogging and anaerobic soil conditions
  - Details of the tree equipment/furniture i.e. tree grills or guards and support system.
  - Details of specialist supervision of the installation of soil systems, to ensure that they are correctly installed and that this is recorded and verified.

5.3.7. Further tree planting guidance for the choice of species and designing them into space is included in the Canopy Cover Design Guide<sup>[17]</sup> This should be used in conjunction with the Species List Worksheet of the Canopy Calculator Workbook.

## Green Infrastructure Elements Detail

5.3.8. The details of Green Infrastructure Elements will need to be submitted to prove that they can provide the canopy cover value shown in the New GI Element Worksheet.

5.3.9. For Green Roofs it will be necessary to show a plan of the roof with details of the species to be planted and sections of the roof including:

- depth and type of soil
- details of any SuDS included
- sign off by a structural engineer that they the structure supporting the green roof is sufficient

5.3.10. For Green Walls it will be necessary to show plans and sections of the wall proposed, including:

- the location and volume of soil to support the growth of the wall
- the size, species and location/pattern of plants to be used
- details of an irrigation system if required.

5.3.11. Guidance on green walls and green roofs can be found in the Canopy Cover Design Guide<sup>[17]</sup>

## Management Plans

5.3.12. Management and maintenance plans ensure that trees and Green Infrastructure Elements establish properly. Details need to be set out in management plans which will specify what, when and by who maintenance to will be undertaken. This should be for the first five years after planting, and include detail of how it will be funded.

5.3.13. Management plans may be required by condition.

## 6. Glossary

### Tree

- 6.1.1. The Oxford Dictionary definition of a tree is: A woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground.

### Canopy Cover

- 6.1.2. Tree Canopy Cover is the ground-area that is covered by trees when viewed from above. Different trees have different shaped crowns and different crown densities; this has a significant impact upon the trees leaf area.
- 6.1.3. The leaf area is a major factor when considering the ecosystem services a tree provides and also the soil volume a tree requires to grow. Therefore, it is appropriate to use the Leaf Area Index (LAI) as a factor in the calculations with regards to the canopy cover calculations. The LAI is built into the Canopy Calculator Workbook.
- 6.1.4. Policy DM34 takes a more expansive view of Canopy Cover than just trees. Some types of Green Infrastructure features can provide similar Ecosystem Services as trees; they can provide a viable alternative to trees on sites where it is difficult to meet the target through the provision of trees alone.
- 6.1.5. The range of features which are included in the definition of Green Infrastructure is wide, but those which are considered as suitable alternatives are kept relatively narrow to ensure that they are most directly comparable with Tree Canopy Cover.
- 6.1.6. Details of the types of alternative GI and how their value is calculated is in New GI Elements Worksheet.

### Green Infrastructure

- 6.1.7. The NPPF defines green infrastructure as “A network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities.” <sup>[20]</sup> Ministry of Housing, Communities & Local Government, 2019. *Guidance: Natural Environment*. Ministry of Housing, Communities & Local Government. It can embrace a range of spaces and assets that provide environmental and wider benefits including parks, playing fields, other areas of open space, woodland, allotments, private gardens, sustainable drainage features, green roofs and walls, street trees and blue infrastructure such as streams, ponds, canals and other water bodies<sup>[20]</sup> Ministry of Housing, Communities & Local Government, 2019. *Guidance: Natural Environment*. Ministry of Housing, Communities & Local Government.

### Ecosystem Services

- 6.1.8. An Ecosystem is the dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Ecosystem services refer to the many benefits the natural environment brings to human well-being. They include temperature regulation, improved air quality and recreation.

## 7. Useful References

[\[1\] RIBA Plan of Work 2013 – Overview](#)

[\[2\] BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations](#)

[\[3\] Hiron, A.D. and Sjöman, H. \(2018\) \*Tree Species Selection for Green Infrastructure: A Guide for Specifiers\*. Trees and Design Action Group](#)

[\[4\] Trees in Hard Landscapes – A Guide to Delivery, TDAG.](#)

[\[5\] Royal Institute of Chartered Surveyors \(RICS\) guidance: Measured surveys of land, buildings and utilities](#)

[\[6\] The Essential Guide to Utility Surveys Using PAS128:2014 Specification for Underground Utility Detection, Verification and Location](#)

[\[7\] Construction Code of Practice for the Sustainable Use of Soils on Construction Sites](#)

[\[8\] BS 8545:2014, Trees: from nursery to independence in the landscape – Recommendations.](#)

[\[9\] The GRO Green Roof Code](#)

[\[10\] Living Roofs and Walls – from policy to practice](#)

[\[11\] Lindsey and Bassuk in \*Arboricultural Journal\* 1992, Vol 16 pp 25-39](#)

[\[12\] \*Delivery of Ecosystem Services by Urban Forests\* by Forest Research](#)

[\[13\] BS 3882:2015 Specification for topsoil](#)

[\[14\] BS 8601:2013 Specification for subsoil and requirements for use](#)

[\[15\] \*The SuDS Manual\* by CIRIA](#)

[\[16\] Santamour, Frank S. 1990. \*Trees for Urban Planting: diversity, uniformity, and common sense\*. Proceedings of the 7th Conference of the Metropolitan Tree Improvement Alliance. 57-65.](#)

[\[17\] \*Canopy Cover Design Guide\*](#)

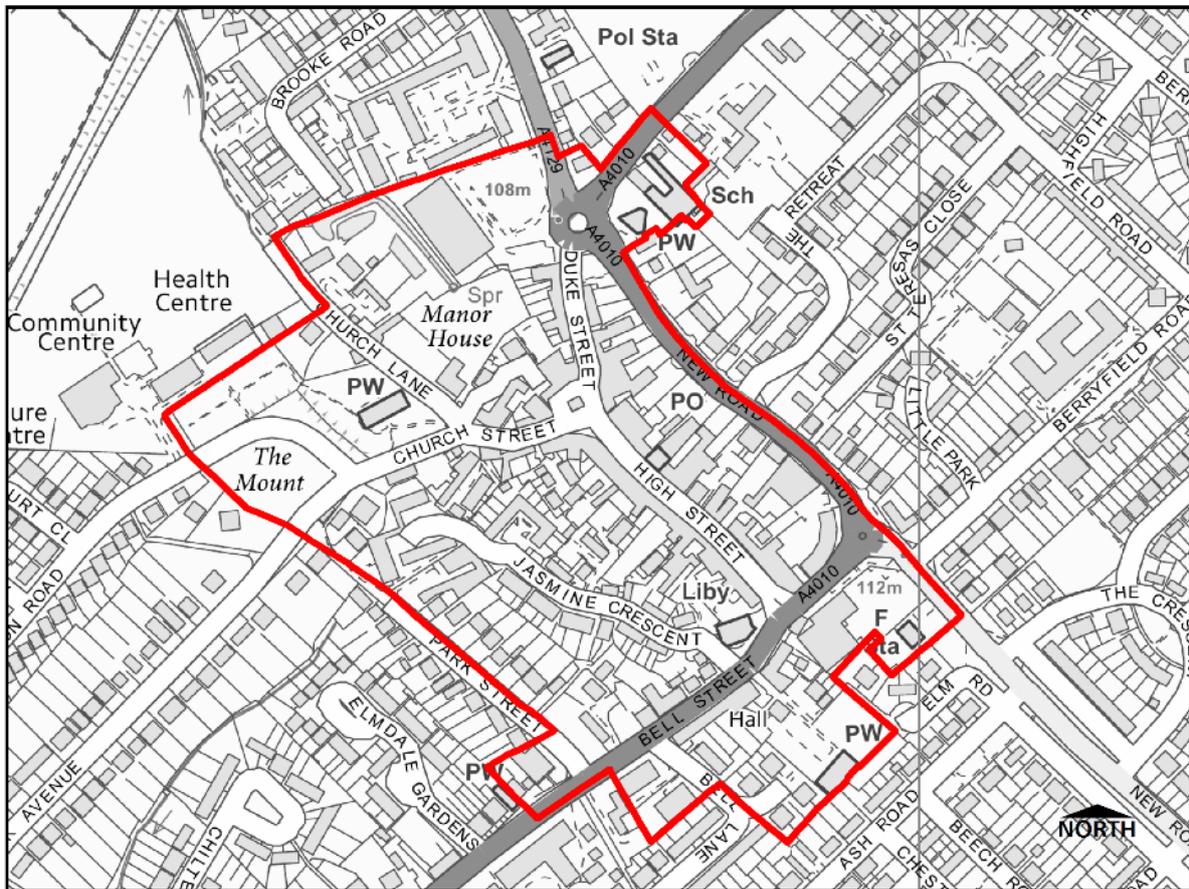
[\[18\] \*The Chartered Institute of Ecology and Environmental Management \(CIEEM\) Guidelines for Preliminary Ecological Appraisal\*](#)

[\[19\] \*National Planning Policy Framework\*](#)

[\[20\] Ministry of Housing, Communities & Local Government, 2019. \*Guidance: Natural Environment\*. Ministry of Housing, Communities & Local Government.](#)

## 8. Appendices

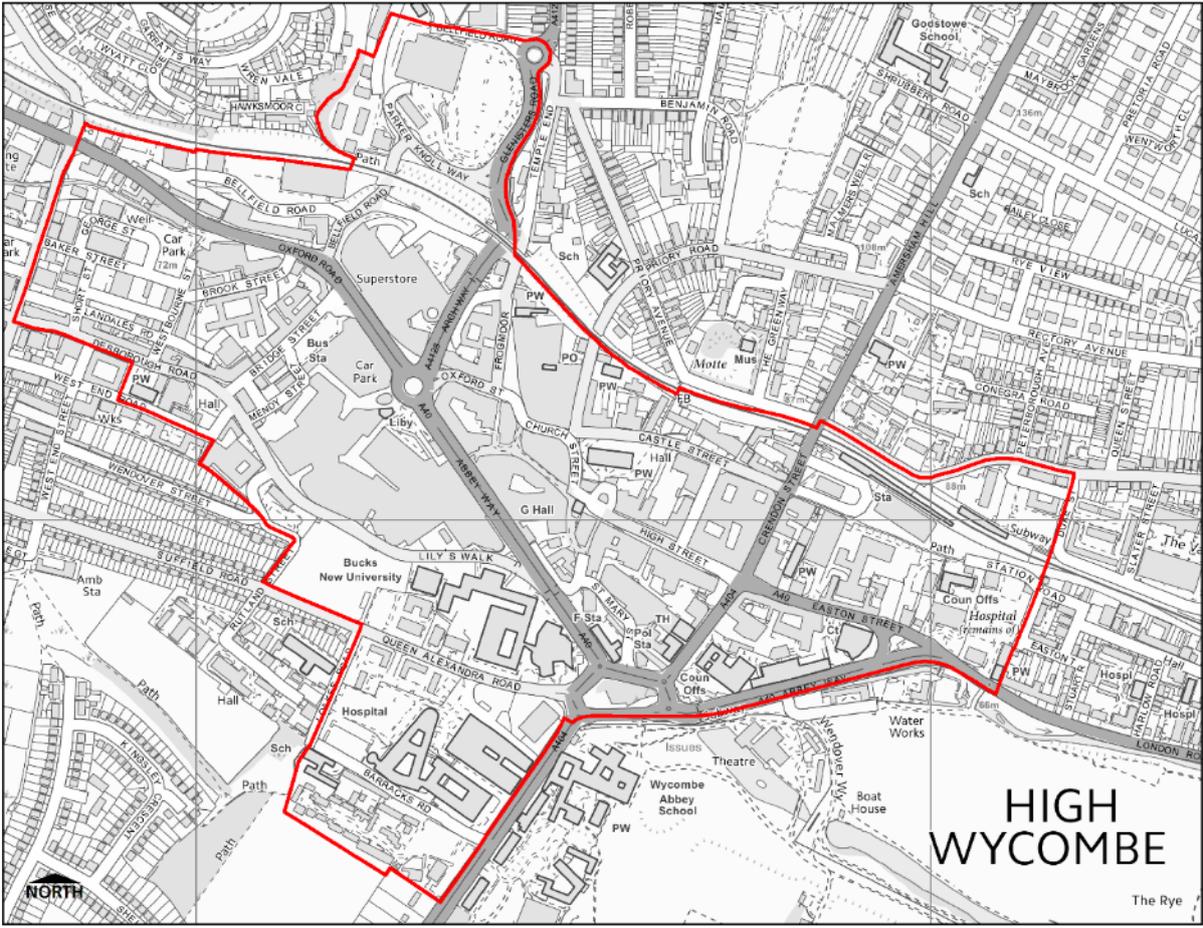
### Appendix 1 – Town Centre Maps



— Town Centre Boundary

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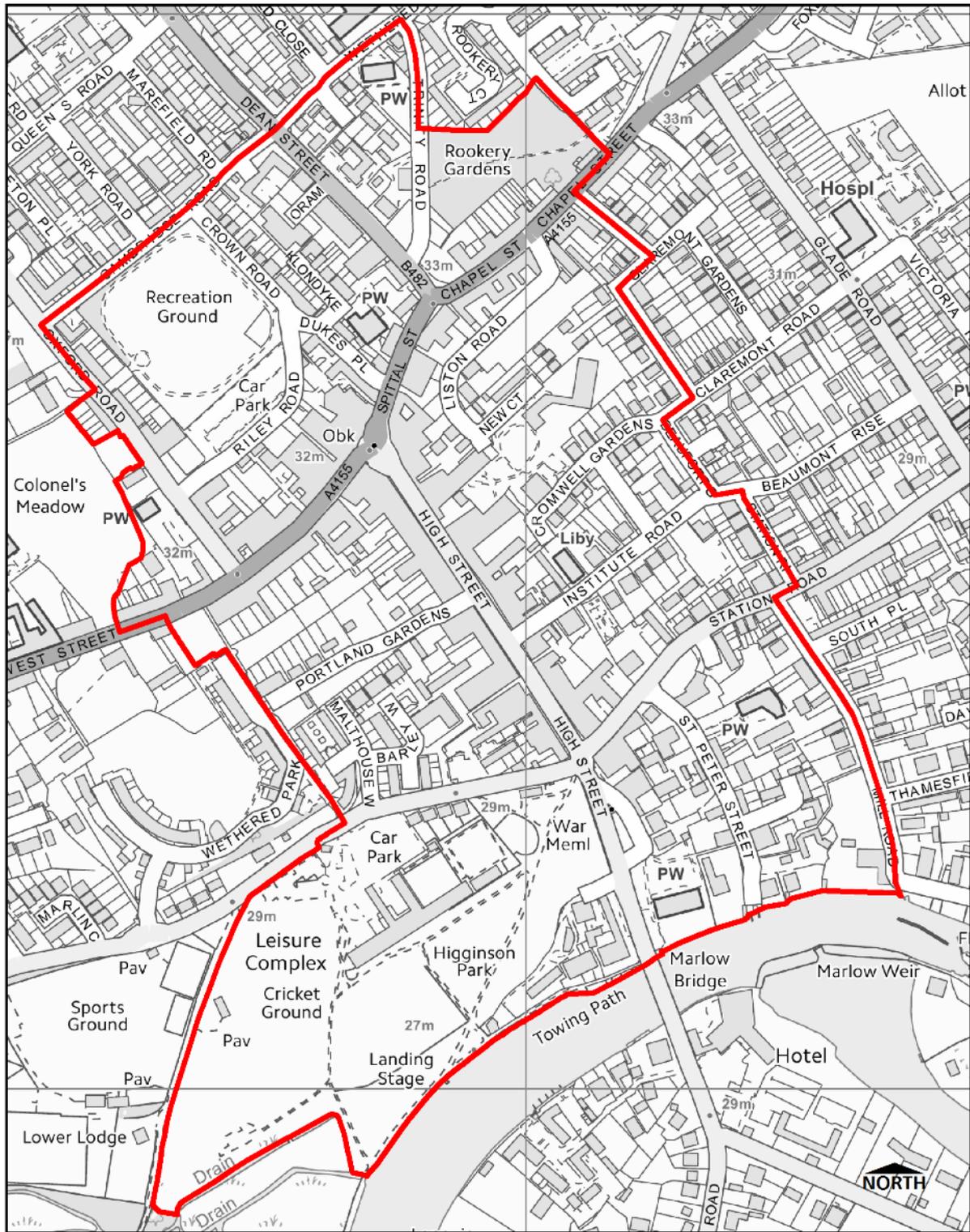
Figure 9: Princes Risborough Town Centre



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— Town Centre Boundary

Figure 10: High Wycombe Town Centre



— Town Centre Boundary

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Figure 11: Marlow Town Centre

## Appendix 2 – Canopy Calculator Workbook

The Canopy Calculator Workbook is integral to the process of fulfilling Canopy Cover Requirement. [This link will download the Canopy Calculator Workbook](#)