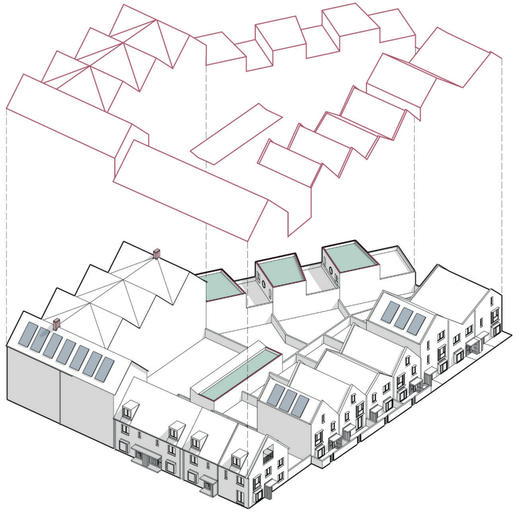
7.6 Roof form

DC.19: **Variegated roofline**

- DPGV will be characterised by a varied and visually interesting roofline of predominantly pitched roofs.
- A variey of symmetrical and asymmetrical pitches will be welcomed with most angles in excess of 45 degrees in pitch.
- Shallower pitches and flat roofs will be acceptable when forming part of a well conceived architectural composition.
- Flat roofs should be concealed behind parapets and used as terrace spaces where practical.
- Chimney stacks are synonymous with Surrey's roofscapes and can add to visual variety of form, though require a contemporary interpretation and should not be used in pastiche architecture.
- Green and brown roofs should be used wherever practical.
- Photovoltaic panels should be included wherever practical including a target of 70% roof area coverage on large apartment blocks.
- Photovoltaic panels should be easily accessible for maintenance and cleaning.



A predominantly pitched roofscape combined with elements of flat roofing concealed by parapets

7.7 Refuse and utilities

DC.20: **Well integrated design**

Refuse storage and utilities equipment must be well integrated into the overall built form and layout of plots. Taking time to design space that conceals equipment creates uncluttered and visually attractive buildings that would otherwise be degraded in quality.

Applicants must demonstrate how their proposals are in accordance with the following principles:

- Utilities equipment must not be visible from the public realm unless there is a non-negotiable regulatory or operational justification;
- Utilities equpiment must be included within RMA layouts at the outset and not considered as an afterthought;
- If this cannot be avoided, equipment must be designed and located to be visually discrete e.g. planting screening, while allowing essential access;
- Access to heat interface units, plant rooms and other utility spaces must be discretely located and well resolved within the overall design of the building;
- Front or side refuse storage should be ventilated, robust able to withstand daily use, visually discrete and well integrated to the building and landscape e.g. a shared material palette with the main building;
- Rear refuse storage should be protected from the elements with easy access to rear streets or within short moving distance to a designated holding space;
- Collective refuse storage for apartments or mixed use buildings can be internal or external. Internal storage must consider ventilation, fire compartmentalisation, robustness, cleaning and maintenance. External storage can be free-standing or integrated into built form but must create a positive outlook for residents.

Examples of ventilated, robust waste and recycling storage integrated into the overall built form of the individual dwelling (left) and communal dwellings (right)

7.8 Resources

DC.21: **Embodied carbon**

Embodied carbon emissions are those emitted producing a building's materials, their transport and installation on site as well as their disposal at end of life. Minimising embodied carbon is an integral way of achieving carbon neutrality at DPGV. Applicants must demonstrate how their proposals minimise embodied carbon using (but not limited to) the following suggestions:

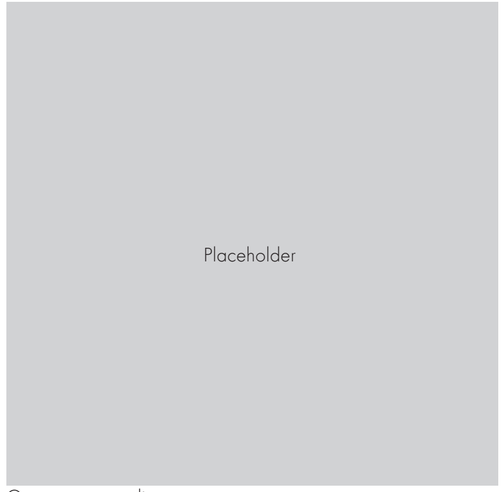
- Undertake a Life Cycle Assessment (LCA). Achieving an up front embodied carbon target of < 500kg CO2/ m2 is considered best practice;
- Design and choose materials that limit embodied carbon e.g. 30% of materials from re-used sources is considered best practice, local material sources transported sustainably;
- Design 'light' structures as substructures and superstructures account for between 57% and 67% of housing embodied carbon;
- Ensure longevity of materials to limit maintenance and replacement over time (see **7.5 Facades and materials**);
- Design for flexibility and adaptability so buildings require less energy for alteration and modification (see **7.2 Flexibility and adaptability**);
- Use Modern Methods of Construction and pre-fabrication to limit carbon associated with transportation of materials from extraction to manufacturing to site and carbon associated with the construction and installation process; and
- Design for a circular economy using Modern Methods of Construction that specifies standard materials and standard sizes that can be re-used at the end of the building life (see **7.2 Flexibility and adaptability**). A 50% reuse rate is considered best practice.

Imperial War Museum workspace (by Jestico + Whiles), constructed off-site using MMC. The building's triple-aspect workspace utilises natural ventilation and daylighting strategies, reducing energy demand on active systems. Photo credit: ©Matt Clayton

DC.22: **Water efficiency**

Water efficient design is an essential part of sustainable building design with measures including rainwater harvesting, grey water recycling and on-site water management. Policy CC2 of LPP1 requires that new dwellings meet the requirement of 110 litres of water per person per day. Applicants should demonstrate how their proposals are water efficient using (but not limited to) the following suggestions:

- Grey water recycling systems can make use of waste water from kitchen and bathroom sinks, showers, baths and dishwashers. Collected into water tanks or butts this water can be used to water water outdoor landscaping and gardens.
- Rainwater harvesting systems uses water tanks or butts to collect rainwater and redirect this for storage and reuse e.g. for use in flushing toilets and washing clothes.
- On-site water management technology can use sensors to monitor and anticipate extreme weather conditions e.g. remote controlled water butts that discharge contents in advance to maximise collection during the weather event.
- Permeable surfacing and vegetation can increase rainwater infiltration and direction towards natural watercourses, reducing surface water run-off flood risk. For information see **9.3 SuDS**.



Greywater recycling system

DC.23: **Energy hierarchy**

DPGV will be a pioneering new settlement that is carbon neutral. A holistic, all encompassing effort is needed to achieve this ambition including a employing the energy hierarchy as a cross-cutting principle.

All applicants should demonstrate how the following energy hierarchy principles and suggestions have informed their approach to design and construction:

Be lean: use less energy

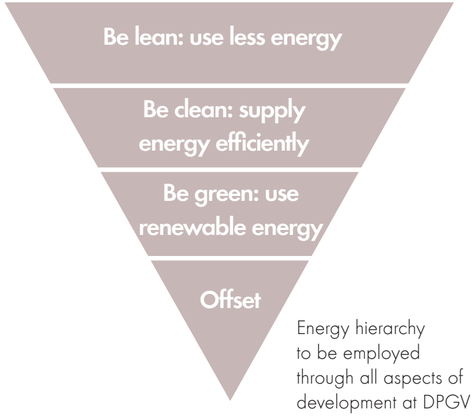
- Employ a 'fabric first' approach that limit energy demand through passive measures and efficient building fabric;
- Design compact buildings that minimise the ratio of external surface area to net internal floor area (form factor) in delivering to maximise energy. Form factor values between <0.8 - 1.2 are considered best practice.

Be clean: supply energy efficiently

- Incorporate Mechanical Ventilation with Heat Recovery (MVHR), and Waste Water Heat Recovery (WWHR) to reclaim waste heat from both space and hot water heating systems;
- Design a '5th generation' ambient loop district heat sharing system that redistributes a range of temperatures, particularly effective within mixed-use buildings with different heating (and cooling) demand profiles;

Be green: use renewable energy

- Use a heating and hot water generation system that is fossil fuel free;
- Integrate on-site energy generation, such as air source heat pumps and/or solar photovoltaic panels, and related storage options such as photovoltaic cell water cylinders and home batteries;
- Photovoltaic panels should be accessible for easy maintenance and cleaning.
- On individual dwellings, target 100% of annual energy requirement to be delivered on-site; and
- On residential apartment blocks, target a 70% roof area coverage of photovoltaic panels.



Energy hierarchy to be employed through all aspects of development at DPGV

DC.24: **Energy efficiency**

Energy efficiency is integral to sustainable building design. Taking a 'fabric first' approach means maximising the performance of the components and materials that make up the building fabric itself, reducing the need for mechanical or electrical service systems. This is key to creating comfortable buildings that are easy to heat and cool, affordable to maintain and minimise a building's operational carbon.

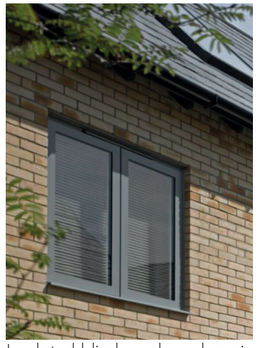
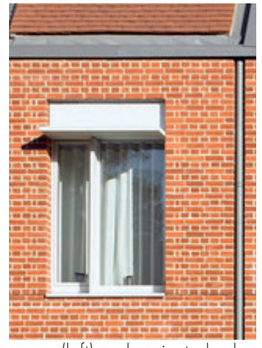
Applicants must demonstrate how their proposals have employed 'fabric first' principles set out below:

- Well considered orientation, aspect and window placement to optimise passive solar heating, daylight and sunlight. A total glazing ratio between 15-40% is considered best practice;
- Planting that creates shade in summer without blocking daylight and sunlight in the winter;
- Air-tight, well-insulated buildings that avoid thermal bridging to prevent heat loss without compromising indoor air quality. Maximum air-tightness leakage of 1 m3/h/m2 at 50Pa is consIdered best practice;
- All homes should be dual aspect with openable windows on both sides to allow cross ventilation;
- Design high levels of thermal mass in the building fabric to absorb, store and slowly release heat throughout the day and night; and
- Avoid excessive solar heat gain through solar shading, smart glazing systems, reflective and insulating window blinds, overhanging eaves to shade windows and walls on south facing elevations.

Additional energy efficiency measures should include innovative technologies such as active demand responsive appliances such as Passive Infrared controls to limit unnecessary energy use.

In exceptional cases applicants are strong encouraged to calculate and disclose the Energy Use Intensity (EUI) and space heating demand, to evaluate on-site energy efficiency measures. EUI of 35 kwh/m2 per year and Space Heating Demand of 15 kwh/m2 per year are considered best practice.

Proposals must meet criteria for power and fuel conservation as set out in Approved Document L of the Building Regulations. Proposals which achieve Passivhaus certification will be welcomed by the Council.

Insulated blinds and overhanging eaves (left) and projected solar shading (right) shade windows and walls to keep buildings cool

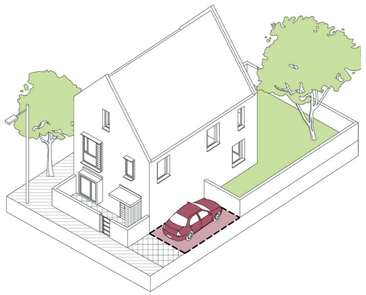
7.9 Car parking

DC.25: **Car parking principles**

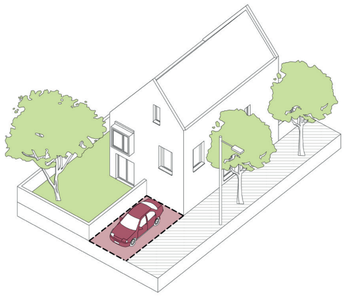
Car parking must be carefully considered and form part of a well conceived overall design approach to the built form, streets, public realm and landscape. A number of car parking configurations will be suitable across the different parts of DPGV. A site-wide parking strategy must be prepared as a part of the masterplan and design codes using a range of solutions appropriate to the character, building typologies and placemaking aspirations of each phase. Detailed proposals are to be resolved through the Reserved Matters Applications.

Applicants must demonstrate how the following principles have informed their approach to car parking:

- Consider early in the design process and well-integrated into the proposed site layout and built form;
- Discrete and avoid visual domination of the street and public realm;
- Use a variety of configurations appropriate to character to avoid monotony and homogeneity;
- Minimise hard standing where practical including use of permeable surfacing;
- Design for flexibility and adaptability e.g. on-plot car parking used as a courtyard space or easily adpated to a garden or allotment
- Podium parking and parking barns must be future-proofed through the design process, demonstrating feasible alternative futures for adaptation to new uses e.g. community, work or amenity space etc.;
- On-street parking must be well integrated into the streetscene through public realm and landscape design e.g. street trees, SuDS, shrubs planting etc.;
- On-street parking is best arranged parallel to the street to enable strong enclosure;
- Avoid 'wiggly' street design which permits 'fly-parking' on street and verge mounting;
- Pedestrians priority over parking and moving vehicles to be reflected in designs;
- On-plot parking must be to the side or set back behind the building line;
- On-plot parking must be located to enable at least 50% of the area of front gardens (where provided) to be planted;
- Residual space should be designed as to prevent easy conversion into another parking space; and
- Parking in garages must allow for the primary purpose of parking a vehicle with additional space for cycle storage e.g. at least 3.3m wide and 6.0m deep;
- Parking courts are less desirable due to their visual dominance but where proposed must be designed as attractive places with cars parked in them;
- Parking courts must be overlooked and designed as positive prospects; designed to prevent damage to hard and soft landscaping; and include a robust management plan.

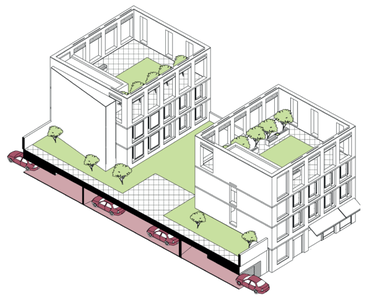


On-plot side and recessed

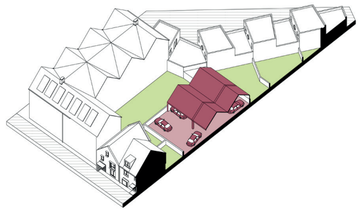


On-plot rear

On-street



Podium



Parking barn

Parking court

7.10 Cycle parking

DC.26: Cycle parking principles

Active travel will be a hallmark of the healthy lifestyle associated with DPGV. A significant amount of this travel will be undertaken by bicyle and it is essential the building design encourages and facilitates cycling as the default mode of travel for short or intermediate distance trips.

Applicants must demonstrate how the following principles have informed their approach to bicycle and motor cycle parking:

- All proposals must comply with local authority requirements for cycle parking, but must also take into account future requirements;
- Individual homes must provide more than sufficient bicycle storage which is covered, secure and easily accessible;
- Storage should cater for larger cycles, including adapted cycles for disabled people;
- This is best accommodated through integrated vertical storage adjacent to front doors or as part of recessed porches; or internal storage located as near as possible to the main point of access. Hallways, balconies and terraces are inappropriate as storage;
- Cycle storage in garages must not prevent them being used for their primary purpose of parking a motor vehicle;
- Cycle storage in garages should be parallel to vehicle parking close to the entrance and with sufficient manoeuvre space;
- Cycle storage in rear gardens and yards could include integrated storage or be capable of accommodating purpose built, secure and covered storage;
- Cycle storage to the side of a house should be integrated into the built form or if proposing outbuildings these must relate to the architectural language of the main building;
- Communal cycle storage for apartment blocks and mixed use buildings should be secure, indoor and located on the ground floor e.g. podium;
- Podium storage must be visually and spatially separated from any car parking or bin storage, providing at least 2m circulation space for easy access and manouver; and
- This space must be well-lit, provide wayfinding to entrance and exit points, as well as indicating priority of motor vehicles.

Communal cycle storage that is well-lit and has easy access to the public realm

8 STREETS AND PUBLIC REALM

8.1 Street network

DC.27: **Street hierarchy**

DPGV will be characterised by a connected street network that is easily legibly and navigable by all modes of travel. This legibility will be underpinned by a robust street hierarchy that gives shape and order to buildings, streets and public spaces.

The street network and hierarchy must be established through the masterplanning process with RMAs responding to this overarching structure in accordance with the following principles:

- Streets and public spaces must satisfy practical requirements of vehicle access and safety, but must not be dominated by technical requirements;
- Streets and public spaces must put people first by emphasising pedestrian and cyclist priority over motor vehicles;
- Appropriate enclosure that reflects the hierarchy and character of different parts of DPGV, achieved through street widths and the scale of buildings either side;
- Streets and public realm must be animated and secure through continuous enclosure including building frontage and natural surveillance (see XXX);
- The street layout should be well-connected to facilitate permeable, compact and walkable layouts defined by perimeter blocks;
- Cul-de-sacs typically result in buildings being arranged around a highway layout, undermining placemaking aspirations and are therefore inappropriate.
- Pedestrianised streets, which help prioritise pedestrians and cyclists, are encouraged but must satisfy requirements for parking, access and servicing.

This following images are illustrative street sections that relate to the street hierarchy framework established in Part B. The sections illustrate character and key components to be considered in the design process, such apportioned widths and indicative enclosure from buildings fronting the street.

Runway Road

Main street (primary)

Town centre

Connecting street (secondary)

Local street (tertiary)

Local pedestrianised street (tertiary)

Shared surface / mews street

8.2 Positive public spaces

DC.28: **Positive public spaces**

Public spaces at DPGV require a holistic approach to design in order to have a strong relationship with buildings, be well-used and valued by residents and visitors alike. Applicants must demonstrate how the following principles have informed their approached to public space design:

- Public spaces must be designed and configured to be well-overlooked with a sense of enclosure provided by surrounding buildings and landscaping.
- New development must ensure positive frontage is also provided onto larger open spaces, including the Country Park and Neighbourhood Parks with managed vehicle access at the edges of these spaces.
- The layout of new development must ensure public space is well-integrated, avoiding leftover spaces that lack obvious purpose and overlooking.
- Public spaces must also be located in suitable locations - e.g. at the confluence of pedestrian routes, within walking distance of dwellings and away from busy vehicular routes

Overlooked pocket space between dwellings. Royal Way, Cambridge

Dwellings fronting onto a larger green open space. Trumpington, Cambridge

8.3 Animated street fronts

DC.29: **Animated street fronts**

Animated street fronts are a key element that builds positive an lasting relationships between buildings, streets and open spaces. The following approaches can encourage animated and active street fronts:

- On residential streets, designers must create animated frontages and streetscapes to ensure a safe and welcoming environment for all
- In particular, new development must consider the configuration of fronts and backs to ensure dull or blank facades are minimised, whererever possible
- To achieve animated street fronts, building designs must contribute positively to the streetscape with, for example, frequent front doors and windows overlooking the street
- Similarly, the privacy planting/screens to front gardens should not be over 1.5m in height to ensure overlooking is maintained at ground level

Animated street with front doors and windows overlooking the street. Marmalade Lane, Cambridge. Credit: Mole Architects

Doors, balconies and bay windows create animated street frontages. Warriner Gardens, London

8.4 Surface materials and crossings

DC.30: **Surface materials**

- Surface materials must be selected to form a coherent palette for the site that is distinctive, defines difference between places, and reflects materials within the wider Surrey landscape.
- Surface materials must be appropriate to their function within the street and the character area. For example, key public areas with high footfall should use durable, distinctive, and high-quality materials.
- Where appropriate, surface materials should seek to reinforce pedestrian priority. For instance, using setts on the carriageway for low-traffic streets
- Small memorable details, such as: drainage channels, water inlets, utility covers and integrated signage should be considered as ways to provide integrated artwork or wayfinding and could be used to reference DPGV's heritage.
- Where tree grilles are required, they must be selected to be in-keeping with adjacent paving whilst supporting healthy tree growth. Grilles must be suitably permeable to allow sufficient water and air to reach the soil and sufficient space (or removable sections) to allow for tree growth.

DC.32: **Surface materials: sustainability**

- Designs must use materials that have longevity, durability, minimise the need for regular repair and replacement and can be reused/adapted at the end of their life.
- Designs should seek opportunities to retain/re-use existing high-quality materials already on-site.
- Specified materials must have a low whole life carbon impact with materials selected from sustainable sources.
- Non-natural materials must have a high content of reused or recycling aggregates

Granite kerbs will typically require less repair/replacement than concrete kerbs and will usually have a lower whole life carbon impact, when sourced sustainably

DC.31: **Surface materials: quality**

- Materials need to be laid with skill and care to ensure a high-quality public realm. This includes rationalised detailing and minimised cutting of materials to avoid large areas of paving infill
- All access/inspection chambers and manholes must be aligned to the paving layout. All covers should be inset with the adjacent paving material.
- The material type, thickness, jointing and sub-base should be considered where vehicle overrun is anticipated to avoid damage to surface materials.

Access cover integrated into paving with minimal infill

Inset access cover

Paving cut with precision around street furniture

8.5 Street furniture

DC.33: **Street furniture**

- Street furniture should be provided as appropriate and should be formed of a consistent palette to ensure coherence throughout the public realm.
- All furniture should be high quality, robust and adaptable – with components that can be easily maintained, repaired or replaced.
- In addition to off-the-shelf products, designers should consider opoortunities for bespoke street furniture that is place-specific and reflects the site's heritage
- Street furniture should be positioned with enough space around to fulfil its function, allow minimum passing space of 1.5m and adequate space for street cleaning.
- Public seating must include back and armrests to assist accessibility for all users.
- Public realm should include waste and recycling bins, near place of activity and pedestrian intersections.
- Accessible drinking fountains should be located in areas of high pedestrian footfall or near to recreation areas e.g. along the Peri-track.
- Utilities should be positioned to minimise obstructions to pedestrian movement and, where possible, should be integrated within street furniture e.g. as part of light column

Examples of high-quality street furniture. Street furniture in DPGV should form a coherent palette with consistent materials and finishes

Sheffield cycle stands

Timber bench with different seat back configurations

Caption

Artform Spencer Bin

Accessible drinking fountain by Urbidermis

DC.34: **Lighting**

Artificial lighting should help create the sense of a welcoming, safe and secure neighbourhood made up of well-lit streets. Designers should consider the following:

- Lighting levels should be reduced to minimise adverse impacts on areas of dark skies. Light spill must be minimised through the appropriate specification, sitting, orientation and control of lighting apparatus to ensure lighting does not have a negative impact on dwellings and sensitive habitats.
- A consistent suite of light fittings should be used to ensure coherence of design throughout the public realm with feature lighting used sensitively.
- The type, mounting, colour and illuminance levels for lighting should be appropriate to the scale and context of streets and spaces
- Designs should use 'layered' and dispersed lighting to achieve required illuminance, rather than singular light sources floodlighting spaces.
- Light fittings must be energy efficient and should integrate technologies that allow adaptive lighting.
- To avoid duplication of posts and reduce street clutter, lighting columns should generally be used for signage and could be used for utilities, such as electric vehicle charging inlets.

lighting on a street with vehicular access. Credit: Igguzini

Pedestrian level lighting using low illuminance to minimise impact on adjacent wildlife corridor

Light column with multiple spotlights and CCTV attached

Low-level lighting should be used adjacent to wildlife habitats. Credit: Igguzini

8.6 Car parking

DC.35: **Car Parking**

- Strategies for car parking across the site must ensure that parking is considered from the outset and integrated into the design of new development. Parking dominated schemes are not appropriate
- Designers should consider both on-plot parking and street parking to mitigate the impact of vehicles.
- Parking should be integrated with surface materials used to increase the percieved footway width and reinforce pedestrian priority.
- Parking should be interspersed by generous planting, with a reccommended maximum of three parallel parking bays.
- Where parking is provided in front of properties, soft landscape designs should restrict front gardens from being converted into further parking
- Where required, electric vehicle charging posts should be integrated into the streetscape design and must not obstruct pedestrian movement. Ideally, charging points should be integrated within light columns or street furniture to minimise street clutter

8.7 Cycle parking

DC.36: **Cycle Parking**

- Like car parking, cycle parking should be integrated into any new development from the outset to ensure proper integration and adequate distribution across the site.
- To encourage cycling, adequate provision of both residents cycle parking and visitor cycle parking should be provided.
- On street cycle parking should be located in well-lit, overlooked positions and should be integrated into streetscape designs.
- For security, residents cycle parking should ideally be provided on-plot with dwellings designed to comfortably accommodate secure and covered cycle storage e.g. as part of a covered porch
- Alternatively, residents cycle parking could be provided as secure lockers within the public realm or as part of purpose-built outbuildings.

9 LANDSCAPE AND GREEN INFRASTRUCTURE

9.1 Trees and planting

DC.37: **Trees**

Trees have the potential to transform the three-dimensional qualities of places - providing shade, dappled light and seasonal interest. Trees should be used extensively across the site to reinforce difference, character, and identity of places or neighbourhoods.

Designs should consider the shapes, sizes and colours of trees to reinforce. For example, different neighbourhoods could use contasting species mixes that respond to their urban/suburban character. Alternatively, specific streets/spaces could use a singular species to highlight uniqueness. Given the site's historic Canadian links, designs could also explore use of maple trees (such as Acer Rubrum) to define key locations e.g. the Avenue approach.

Designs should also consider opportunities for specimen trees to provide markers within the public realm and open spaces. These could be statement trees (e.g. Holm Oak, Redwood or Dawn Redwood) or could be blossoming and fruiting trees that bring seasonal interest and foraging opportunities. Similarly,new development should consider opportunities to integrate large structural trees, such as London planes and large conifers into streets and open spaces to give a sense of maturity while smaller species establish.

Examples of tree species with different appearance and purpose

Poplar - fast growing tree for carbon sequestration

Fruit tree - for urban foraging

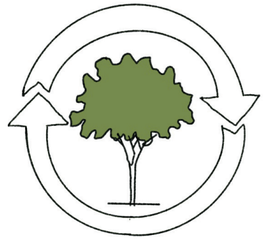
Metasequoia - statement tree

London Plane - canopy tree

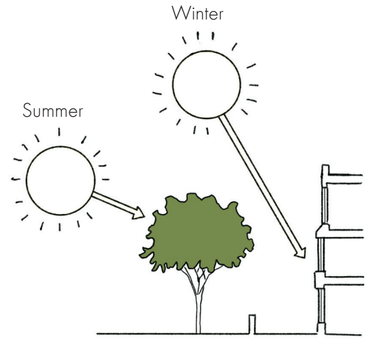
DC.39: **Trees: habitat and microclimate**

Trees should be considered an integral part of DPGV's green infrastructure helping to support habitat creation and increase biodiversity through connected wildlife corridors. To maximise biodiversity gain, trees should be planted in both the public realm and private gardens with at least 2 trees provided per dwelling within built areas.

Trees should also be used to sequester carbon and improve air quality across the site, and positioned to improve microclimate conditions, providing shade for buildings and public realm, and sheltering against wind.



Consider tree species that can sequester carbon and filter air pollutatns



Trees, if positioned carefully, can provide shade for the public realm and can mitigate overheating risk for buildings

DC.38: **Planting**

In combination with trees, planting should be used to define contrast between different places and neighbourhoods - bringing colour and visual interest, as well as supporting habitats and increasing biodiversity.

Planting must be selected to suit its location/specific climatic conditions, and designers should choose hardy plants, with low maintenance requirements.

Designs should also consider opportunities for productive landscapes, providing plants that can be foraged by local residents.

Neighbourhoods streets planting example

Urban centre planting example

Naturalised planting