Site 1

Figure 8: Aerial Site Image

Figure 9: Figure Ground Plan

Site 2

Figure 10: Aerial Site Image

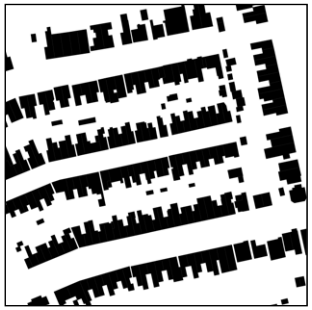

Figure 11: Figure Ground Plan

Site 3

Figure 12: Aerial Site Image

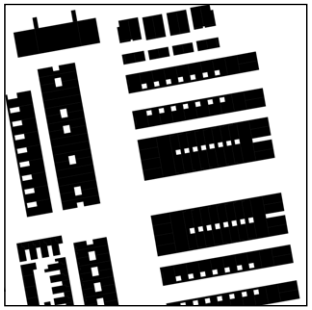

Figure 13: Figure Ground Plan

Site 4

Figure 14: Aerial Site Image

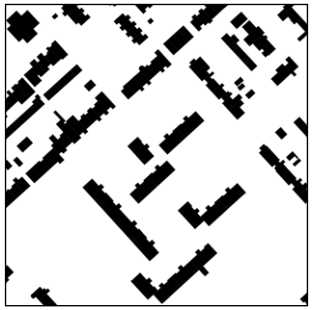

Figure 15: Figure Ground Plan

Site 5

Figure 16: Aerial Site Image

Figure 17: Figure Ground Plan

Site 6

Figure 18: Aerial Site Image

Figure 19: Figure Ground Plan

Table 1: Cambridge comparative density study

Site Study no.	Site Location	Bldg ht. avg. (metres)	Height range (metres)	Site Area (ha)	Number of Resi units	u/ha	Plot Coverage	Plot Ratio
1	Teasel Way, Fulbourn, Cambridge	7.0	7.6	4	146	36.50	0.24	0.61
2	Blinco Grove, Cambridge	7.5	13.3	4	178	44.50	0.34	1.00
3	Accordia Housing, Aberdeen Ave, Cambridge	8.1	11.6	4	141	35.25	0.39	1.28
4	Edgecombe, Kings Hedges, Cambridge	5.7	8.7	4	193	48.25	0.21	0.48
5	Glenalmond Ave, Cambridge	13.0	25.2	4	410	102.50	0.35	1.66
6	Station Road, Cambridge	14.7	35.9	4	262	65.5	0.47	2.35

Tall Building Clusters

9.14 A variation to the increase in the general height of buildings, is the concentration or clustering of taller buildings in a confined area. For example, this could include grouping of tall buildings that contrast with their immediate surrounding, such as the Station Road development at Cambridge Station, or the combination of lower rise blocks with taller elements above or in between them.

9.15 Clustering of tall buildings often generates an intense and strongly enclosed environment. It will amplify the visual, townscape, heritage and landscape impact of a development, and naturally there will only be few places, such as some urban centres with little sensitivity, that can successfully accommodate and assimilate this impact. The clustering of tall buildings should generally only be considered as part of a comprehensive masterplanned approach to placemaking, where the cumulative impacts of height can be understood, planned for and mitigated. Clustering of tall buildings will be an effective means to boost the general density of an area over and above what can be achieved with a modest increase in the general height or a single tall building.

Summary

9.16 Increasing the general height of an area, either as part of a comprehensive development or through cumulative incremental developments, is the most effective means of increasing the density of an area. Where height increases remain below the treeline its impact on the surrounding heritage, townscape and landscape character are easier to mitigate. In contrast, singular tall buildings are less effective in increasing the density of a development whilst their skyline impact is far greater, as they inevitably will rise over the tree and roof line. Clusters of tall building can be more effective in boosting the density of an area, but their skyline impact will be amplified due to their cumulative impact, and there will be few places (if any) where such an impact can successfully be accommodated in Cambridge.

9.17 If the objective is to increase density in a certain area, the principal strategy should be to seek modest increases in the general height, and to provide more compact and efficient development forms. If tall buildings are promoted, the aim should be to enhance distinctiveness and support legibility and placemaking, rather than to use it as a means to increase density per se. In major regeneration areas with a strong focus on intensification and placemaking (for example around a public transport hub), and that have little visual, heritage, townscape and landscape sensitivity, the provision of a cluster of taller buildings could be explored, subject to full understanding and mitigation of their impacts on sensitivities.

10 Social Aspects of Tall Buildings

10.1 A study by Jan Gehl on perception and building scale has shown that beyond a height of six storeys people can no longer recognise facial expression and there is less scope for meaningful communication and engagement with activities at street level, which are essential for social engagement and community life. Developments of up to five storeys offer more sociable environments with a greater relationship between dwellings and (communal and public) outdoor spaces and hence are more suitable (and a preferred choice) for family accommodation.

10.2 Research has found that occupants of higher rise development generally have a lesser sense of connection with the community in the wider neighbourhood. In turn, people living in courtyard style lower rise development reported the strongest sense of community within the wider area. (Lessons from Higher Density Development, Report to GLA, 2016, para. 6.16-6.19)

10.3 The research suggested that the greater sense of community within low to mid-rise courtyard style development may be explained by the greater use of communal amenity spaces, the limited number of units per core (supporting familiarity in between the people living within a building), and the concentration of family accommodation, which foster a greater degree of social interaction. Conversely, units in taller buildings often are privately rented, smaller, and targeted at a younger professional audience. Turnover in young and mobile households will be generally higher, while their network of friends and family is usually widespread and less confined to a certain locality.

10.4 Given these characteristics tall buildings are more likely to be suitable for younger professionals that have a lesser reliance on local networks than families or older residents. Furthermore, tall buildings may be better located in lively urban and central areas, rather than in residential neighbourhoods and other places where the establishment of social networks and a sense of community is highly desirable, and where low to midrise courtyard style blocks may provide a better typological solution.

11 Tall Buildings Development Costs and Viability

11.1 Tall buildings that rise above 8-10 storeys are more expensive to build and cost more per square feet than low or medium rise buildings.

11.2 Tall buildings generally have a less efficient net to gross floor space ratio than lower rise buildings. This is due to additional structural requirements on the sub-structure and building frame to respond to its greater weight and higher windloadings. Tall buildings also require larger cores to provide for vertical transportation requirements, servicing and emergency access. They need larger capacities of plant and distribution systems and potentially also intermediate plant floors. Due to their form the wall to floor space ratio is less efficient than in compact lower rise development where buildings join up at party walls.

11.3 Tall buildings are usually 25-40% (offices) and 30-40% (residential) more expensive to build than low-rise buildings. (James Barton, Aecom, 2014) Generally the form, shape and complexity of tall building projects are cost drivers in tall buildings. Aspects that drive the cost in tall buildings are:

- Iconic architecture and more complex design
- Structural solutions to respond to lateral and vertical loads require additional restraints
- Slenderness ratios which reduces floor plate efficiencies and shape of a floor plate which affects wall to floor space ratio
- Quality and materiality of the façade
- Impact of solar gain from large amounts of glazing and associated mitigation
- Recessed balconies and winter gardens at higher levels to maintain their amenity
- Servicing, especially the need to boost water supplies and pressurisation of heating and cooling solutions
- Sprinkler systems and anticipated building regulation requirement for minimum two stair cores
- Vertical transportation and access requirements, which may increase the size of the core if height increases, public access to the upper floors is permitted, or a mix of uses with separate access requirements is promoted.

11.4 Given the façade and structure are important cost factors in tall buildings, pressure to reduce costs may result in the provision of simpler structures, the loss of slenderness and a greater bulk, uniform buildings with a lesser articulation of the overall form and the use of cheaper materials and façade systems, affecting the appearance and longevity of the building. There is a risk that cost savings due to viability concerns in tall buildings can result in a bland and poor-quality solutions that fail to bring positive change to an area and its skyline. Given the visual impact of a tall building on the cityscape a more expensive design could be required.

11.5 The higher cost of tall buildings needs to be passed on to the end-user in the form of higher rental or purchase prices. Generally tall buildings can demand a premium for the views over the city and a more exclusive environment. Values tend to increase with height with top floor penthouses often demanding an

additional premium. Tall buildings therefore require a strong residential market that is able and willing to pay the additional cost in comparison to more conventional properties in the area.

11.6 Research in London found that tall buildings are only viable in higher value areas and that viability weakens where values drop. The same study finds that small high-density infill development of four storeys (that can deliver 150 units per hectares), remains viable in areas with lower values. This highlights the opportunities for intensification especially of lower value area where there is an availability of sites suitable for this type of development. (Lessons from Higher Density Development, Report to GLA, 2016, para. 9.34-36) While individually small high-density infill schemes will deliver lesser units than a tall building on a site, cumulatively they can contribute to the significant intensification of urban areas. They are also cheaper to build, more affordable to local occupants, help to repair and modernise the urban fabric and can create more sociable environments. As such small high density infill buildings can present a suitable development approach for the intensification of areas where tall buildings may be inappropriate or unviable, especially in historic city centres and town centre fringes.

11.7 More recently institutional investors have been stepping into the Private Rental Sector (PRS) to provide managed Built to Rent (BTR) accommodation on a bigger scale. BTR provides renters with a choice of professionally managed property, that offer greater levels of security, high levels of management often supported by other lifestyle amenities such as shared facilities, social spaces and gyms. BTR have a longer time horizon and an interest in the continued performance and quality of the accommodation.

11.8 The holistic and strategic approach by BTR investors to the long-term management of their buildings should better enable them to put in place strategies to undertake and pay for the significant repair and refurbishment cost that will come with the natural life span of services and façade systems, especially in taller buildings, and thereby ensure the upkeep of quality and maintenance of the building over its lifetime. In schemes with many individual lease holders (owner occupation or small buy to let investors), sudden large costs for necessary refurbishment works or the replacement of broken parts (such as lifts or services) can be unexpected and highly challenging to individual owners, if not properly planned by the management company and covered through a sinking fund. This was recently exemplified in a number of privately owned towers with Grenfell type façade systems where leaseholders were faced with significant and unaffordable bills for the replacement of façade systems.

12 Tall Buildings and Regeneration

12.1 Tall buildings may have a role in regeneration projects. Regeneration is about bringing new activities to underperforming areas through transforming the area's image, creating a new focus, promoting new uses and revitalising its activities. Regeneration often brings higher densities and a greater mix of uses into an area and tall buildings could have a role in delivering these.

12.2 It is argued that tall buildings can act as catalysts in regeneration projects, as they can provide a widely visible landmark to the area, signal change, raise the profile and generate investor confidence. However, regeneration projects are highly place and context specific, and what works in one area may not be desirable in another. For example, public realm and environmental improvements, the introduction of new activities or the establishing of a new connection could be more effective means to instil regeneration in a lagging area than the delivery of a tall building. While tall buildings can contribute to regeneration they will need to be complemented by other interventions as

Image 11: Tall buildings form part of the regeneration of former industrial land at Porto Nuova, Milan

Image 12: Tall buildings often form a prominent part of large scale regeneration schemes - Old Gas Works, Sutton (Source: Google Street View)

Image 13: North Road Estate Renewal - successful regeneration project providing street blocks of coherent height that enhance the setting of the historic clock tower (Camden, London)

part of a coherent regeneration strategy. However, there is no inherent need for regeneration projects to have a tall building. In fact, regeneration schemes in Cambridge through the Cambridge Investment Partnership (CIP) have increased unit yields through denser forms that typically did not exceed five storeys. In the Ironworks and Timberworks CIP schemes, the 5 storey blocks were high points (i.e. large buildings) rather than tall buildings.

12.3 Where a tall building is promoted as part of a regeneration scheme it is important that the full life impact is considered for an area. Whilst there is a 'wow' factor to a newly built tall building this tends to wear off over time, and it is important that a tall building remains a vital and successful building once the initial effects of novelty and gloss have worn off, and that it continues to contribute positively to the area and its people over the medium and long term.

12.4 Tall buildings have the tendency to increase land values in their surrounding of a scheme due to speculation. The permission or even only the planning of a tall building in an area can result in other sites in the vicinity being promoted for tall buildings, often of similar or greater height. While the expectation of increased land value returns may stimulate development interest in a regeneration area it also can have detrimental impacts on the viability of other development projects that deliver less floor space.

12.5 Tall building projects can fall foul of natural development cycles. Often, they are being promoted when the market is on the up, but can fail to be delivered as the market contracts, viability margins shrink and funding sources dry up. Failed tall buildings sites can leave painful gaps in the urban fabric where little development takes place until the market has recovered or unrealistic land value expectations have been written off. Similar impacts can be seen from 'flipping', when developers promote a tall building on a site, obtain planning permission, and then sell the site on with the permission for higher density development, without an intention to build the scheme out. In the meantime, the site sits empty, land values stifle alternative development schemes, and regeneration is stagnating.

12.6 Due to higher rental or purchase costs and increased service charges tall buildings will be less affordable than other development types and only appeal to more affluent sections of the society. This can result in gentrification as people with higher spending power move into an area. It can also mean that tall buildings do little to resolve a shortage of homes in an area if they are too expensive for local people to afford their purchase values, rent or service charges.

12.7 The impact of tall buildings on land values, the realistic prospect of being delivered, and the local socio-economic conditions will need to be carefully considered when assessing the appropriateness of a tall building proposal in an area. Clear planning policies and guidance that defines where (how many and at what height) tall buildings are appropriate in a certain regeneration area can help to avoid land speculation. A clear understanding of the target market

and how this will affect local people in often deprived regeneration areas is also needed to ensure proposals are realistic, address local needs and avoid the pitfalls of gentrification.

12.8 Given the prominence and transformative impact that a tall building will inevitably have on its surrounding context and the skyline, there is a general expectation that where they are permitted they should deliver tangible regeneration benefits for the local community, beyond mere token gestures. While regeneration projects do not necessary require tall buildings, where a tall building is being brought forward as part of a regeneration project there will be the general expectation for it to deliver wider public benefits to its locality beyond its form and function.

13 Heritage Impact

13.1 The NPPF (2024) states that 'heritage assets range from sites and buildings of local historic value to those of the highest significance, such as World Heritage Sites which are internationally recognised to be of Outstanding Universal Value. These assets are an irreplaceable resource, and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations.' (Para 189) 'When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). (Para 199) 'Substantial harm to or loss of assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional' (para 200b)

13.2 Tall buildings by their very nature will have a visual impact that needs to be thoroughly considered. Individually

Image 14: Modern tall buildings contrast markedly with the historic fine grain Georgian townscape in Angel, London

or cumulatively the visual presence or prominence of tall buildings can cause harm to the significance of heritage assets and their setting, even when located further away.

13.3 Heritage assets often are sources of distinctiveness, meaning and quality of a place. As a shared cultural resource of historic interest and cultural identity they need to be managed carefully and nurtured for the benefit of future generations. Positive conservation of heritage values should enable cities to respond to social, economic and technological change in a manner that allows change to sustain and reinforce these values.

13.4 Understanding a place's skyline characteristics and how these form part of the setting of heritage assets will be important in establishing how sensitive the skyline is to tall buildings. Strategic and local views, as well as dynamic views along routes or through open spaces, may need to be assessed to understand the impact of a proposed tall development on the skyline, and that harm it may cause to the significance of heritage assets and their setting.

13.5 Development with its height and scale should respect, respond and contribute to characteristic places, building on their heritage and the values associated with them. The impact and design of a tall building, in respect of heritage assets in its immediate, and wider surrounding, will need to be assessed and guided by an experienced heritage expert.

13.6 Tall buildings must be carefully sited so as not to have an excessive intrusive impact on the historic environment and to damage historic settings. World Heritage sites and their buffer areas, registered parks and gardens and their settings, conservation areas, and Grade I and II* listed buildings in most cases will be highly sensitive to tall buildings.

13.7 Recognised local views, vistas or panoramas that show a heritage asset in its setting are also particularly vulnerable to damaging intrusion by insensitive tall, or massive-scale development. Harmful impact from intrusion of a tall building for example could include an altered sense of scale, undermining the relationship of built form to the sky or landscape, or detract from the colour, materiality and form that typifies what is special about a historic place, and what essentially contributes to its heritage value. View studies, that identify significant views and establish their sensitivity and importance, visually, experientially and by cultural and historical association, can provide helpful guidance on how to assess and interpret the impact and harm that a proposed tall building may have on strategic and other views.

13.8 It is often beneficial to use 3d modelling to test and calibrate the height of tall buildings in strategic and other views during the initial design development phase of a proposed tall building. This would ensure a full understanding of the likely impact and harm of a tall building early on in the process, and should inform any necessary mitigation approaches to avoid any aggressive domineering or otherwise harmful effect on heritage assets and their setting. Modelling of tall buildings can aim to soften their profile and reduce their monumental impact. Choice of facing materials is important to assist in visually weaving the new building into its established surroundings.

13.9 A heritage impact statement will need to be produced that identifies the heritage assets that the proposal has taken into account. This should demonstrate how the tall building proposal has responded to these heritage assets and their respective significance, and how the proposal has mitigated its potential adverse impact to avoid or minimise harm to the heritage asset and its setting. This should be supported by a visual impact assessment that illustrates and evaluates the impact of the tall building proposal on heritage assets and their setting where this is relevant. The scope of the heritage impact statement and supporting VIA should be discussed and agreed with the Planning Authority.

13.10 First pre-application meetings for a tall building proposals should provide a map with a computer-generated zone of theoretical visibility (ZTV) of the top level(s) of the development. This should indicate from where the proposed building would potentially be visible and help with the identification conservation areas, other heritage assets, viewpoints and other sensitivities that may be sensitive to visual intrusion by a tall buildings and that require closer inspection and testing. At pre-application stage initial massing model impressions from sensitive locations should be provided to provide an initial understanding of the likely impact of a proposed tall building, so as to inform mitigation approaches early on in the design process. In Cambridge developers should make use of the GCSP digital model of the city if their site and relevant views are covered by the model. They should also provide an inset 3d model of the proposed massing (initially) and detailed architectural proposal (later on in the pre-application process) in a compatible geolocated format to enable the authority to assess the proposal by themselves in the 3d virtual environment of the city. Where this is not available wireframe renders of the massing inserted in verified photographs from relevant viewpoints should be provided to enable an initial review of the likely impact.

13.11 When the general principle of a tall building is established in a location or to understand better how a proposal with its design and architecture manages to respond to its context and mitigate its impact, more detailed accurate visual modelling of proposals should be represented in photomontages or dynamic modelling that show the ‘before’ and ‘after’ view. Relevant views should be defined by the Council and may include views from outside the Local Authority area when needed. Chapter 7 of this study identifies key views in Cambridge that should be taken into account by tall building proposals. Detailed photomontages should be part of pre-application discussions and application submissions.

13.12 A tall building proposal will need to take account of and avoid harm to the significance of heritage assets and their settings. The preservation and enhancement of heritage assets and their settings should be given significant weight. Proposals resulting in harm will require clear and convincing justification, demonstrating that alternatives have been explored and there are clear public benefits that outweigh that harm.

14 Visual Impact

14.1 Due to their massing and height, tall buildings can have a positive or a negative impact on important views, prospects and panoramas, and the wider visual experience of a place, its character and skyline. Relevant views may include views of iconic buildings and landmarks, distinct townscapes, topographical features, waterfronts, and more broadly the skyline, especially where they are prominent, accessible and highly valued.

14.2 Local Plans and conservation area statements refer to protected strategic vistas and local views that will need to be protected. There will be many more undesignated views on a local, as well town or city wide scale, that are cherished by people and important for the collective understanding of a place, and to 'make sense' of a building in its setting. Views from rivers are especially significant because of the openness of the water space that allows for panoramic or prospect views and enable the recognition of the wider settlement characteristics in its setting. The same applies to large parks and open spaces, especially where they comprise of open grass lands or are elevated and allow the unrestricted views over the cityscape. Viewpoints may be within or outside the borough boundary. As already referred above, Chapter 7 of this study identified relevant key strategic views in Cambridge that alongside other locally important 'near' views will need to be considered and tested.

14.3 To evaluate the impact of a tall building on the skyline one needs to understand the aesthetic characteristics of the skyline and their relevance for the image and identity of a place. This should consider strategic landmarks, the roofscape, other skyline features and the role of tree cover (very important in Cambridge), the visible setting and backdrop, and relevant viewing points from where wider skyline characteristics and compositions can be appreciated. Highly distinctive skyline aspects that are intrinsically linked to the identity of a place should be protected. Tall buildings should only be permitted where they do not undermine the essence of highly valued skyline characteristics or genuinely enhance a place's skyline image in a meaningful and considered way. Where specific skyline characteristics can be appreciated from key views, they should be identified as test views in which the impact of a tall building proposal should be modelled and assessed. Evaluation of views may need to go beyond aesthetic concerns and also consider the setting of heritage assets, potential harm to significance, and the experiential, cultural and historical realms as discussed in the previous section above.

14.4 As discussed above, any tall building proposal will need to establish its zone of visual influence that shows from where it potentially can be visible from. This should assist in the identification of sensitive areas or viewing location where the building could have a visual impact. A visual impact assessment (VIA) will need to test and assess the impact of its tall building proposals on designated and non-designated short, medium and long distance views, including panoramic or prospect views, linear views to landmarks, approach road views, wider townscape or

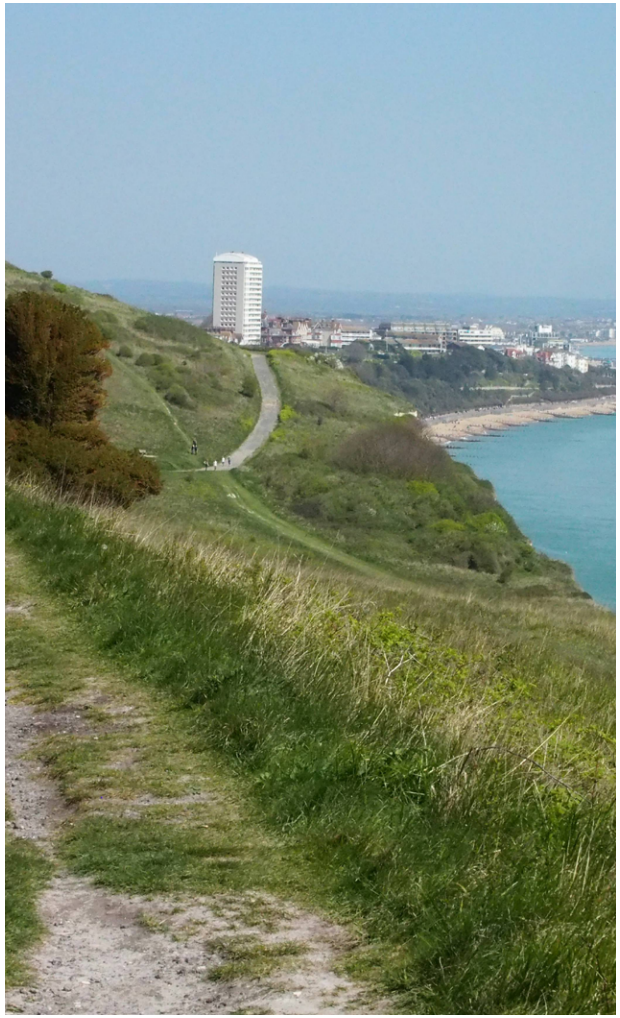

Image 15: Tall building in Eastbourne highly visible from the South Downs National Park

landscape views, local and other views as relevant. The VIA should visualise, describe and assess the impact of the tall building on views, and demonstrate how it has considered its findings and mitigated adverse impacts or enhanced the distinctiveness of the skyline. VIAs should follow the latest guidance on visual impact assessments of the Landscape Institute. This should make use of 3d modelling and representation techniques discussed earlier. Views should be discussed and agreed with the Planning Authority.

15 Siting, Layout and Urban Form

15.1 Tall buildings due to their greater height and contrasting scale, organisation and design can have a significant impact on the form of an urban area, the sense of scale and the quality of the spaces around the building. The way a tall building is designed, sited and orientated will have an important impact on the integration and quality of a proposals response in relation to its context and if it contributes or detracts from local character.

Tall buildings and topography

15.2 The topography of a place can have an important impact on the perceived prominence of a tall building. A tall building located in an elevated position will be more prominent and striking because it will appear as a silhouette against the sky.

15.3 Conversely tall buildings located on lower lying land will be less prominent as they more often will be seen against the backdrop of the urban fabric or landscape beyond. Tall buildings on higher ground will gain extra height in relation to lower lying areas and so will have a greater risk of affecting sensitive townscape or landscape characters.

15.4 When discussing tall buildings, their height above ordnance datum (AOD) must be understood as it is a measure of their absolute height, including the underlying topography. They can then be compared to the AOD height of other buildings to ensure that the impact of tall buildings and other features on the skyline are fully understood. Buildings of modest heights can be very prominent if located on a hill side or top and may impact on established skyline characteristics and unduly compete with far larger and significant tall buildings on lower ground.

15.5 Generally, unless there is a specific reason for a tall building on a hilltop location (like a radio tower), tall buildings on elevated land should be avoided due to their increased effect on the skyline and surrounding character.

Tall buildings and public spaces

15.6 The argument has been made that one of the benefits of tall buildings is that they stack up floor space to greater height and thereby make room at street level for the establishment of public spaces, especially in dense street based urban settings where there are little public spaces amenities. Tall buildings bring a greater concentration of activities and therefore increase the need for public open space. To be successful public spaces need to be in the right place and located where they can benefit from footfall and good environmental conditions. While it would not be useful or practical to require every tall building to deliver a new public space, generally tall buildings should contribute to the provision of quality public spaces in their vicinity.

15.7 Tall buildings cast shadows and can reduce sun and daylight reaching public spaces. Their impact on natural lighting levels in public spaces will therefore need to be carefully considered when deciding on the layout of a development and the location of a tall building in relation to public spaces. People enjoy sun exposed public spaces and overshadowed and gloomy environments are less popular.

15.8 Tall buildings should avoid creating significant overshadowing of a public space especially during times of the day when they are more intensively used. Public spaces are often more used from lunch time onwards, during the afternoon and early evening, although some spaces that for example are used by schools may see more intensive use before midday. A tall building located to the north of a public space would cause little impact in terms of overshadowing, while a tall building located to the south would have its shadow travelling over the space as the day passes by and possibly affect sun and daylighting on parts of the space. A tall building located to the east of a public space would affect it during the early parts of a day, while when located to the west it may cast long shadows over a space as the sun is setting. Generally locating tall buildings to the south or the west of a public space should be avoided.

15.9 A tall building, especially where it stands-alone or rises straight up from the street space will benefit from a greater sense of space around its base, so as to provide an appropriate setting of its height and mass. A public space at the base of a tall building should be proportionate to its height and prominence. Setting a tall building back from the footway behind a plaza, a wider footway or a landscaped area, or the creation of a new public space are means by which designers can establish an appropriate setting for a tall building.

Human scale and the sense of street enclosure

15.10 Jan Gehl's research explores human senses in city environments. It finds that narrow streets and small spaces convey a corresponding experience of warm and intense city environments, while environments where distances, urban space and buildings are huge, generally signal an impersonal, formal and cool environment. As such the distance and height of building will have an impact on the character of a place and how it is perceived as personal, friendly, and welcoming. This can explain the popularity of historic town centres that offer intricate environments with a small scale and a rich experience.

15.11 "Our horizontal field of visions means that when we are walking along a building's façade only the ground floors can offer us interest and intensity. If ground floor facades are rich in variation and detail, our city walks will be equally rich in experience...From the street, we can only experience with difficulty events that take place higher up in buildings. The higher up the more difficult to see … Connection between street plane and tall buildings is effectively lost after the fifth floor" (Gehl, p.41).

15.12 An important way by which people experience cities is by moving through its streets and spaces. Perspective views along streets and onto the foreshortened rhythm of buildings and facades provide an understanding of the scale of buildings, the sense of enclosure, and the pattern, materiality and colours that characterise the environment. Sideway views help appreciate the articulation and detailing of facades and activities within buildings. Only buildings at the end of streets, at junctions or visible from a greater distance for example across a public space are observed in their entirety.

15.13 Considering the human perspective in the design of places is important. For designers this means to create spaces and buildings with proportions and details that reflect a human scale and respond to people's sensorial facilities. This is particularly relevant when designing tall buildings, which are naturally larger than their typical surrounding. The detailing of the lower floors will be of particular importance as well the siting, integration and articulation of the tall building element. A building will be more successful, if its base with its articulation, fenestration, scale, height and parapet line responds to the finer grain pattern of development along a street and provides adequate activities and surveillance. Where the taller element sits at the street frontage it should be an integral part of the wider development and proportionate with its massing and scale to other buildings in the street. Alternatively the tall building could be set back on a plinth or urban block behind the parapet line and therefore less visible from the street space. A building that breaks the prevailing pattern of development and rises unmediated straight up from the street space will be less successful in establishing a human scale response.

15.14 The sense of enclosure, level of coherence in heights and the width to height relation of a street space are key attributes that determine the character and feel of a street space, and if it feels

balanced and harmonious or fragmented and uncoordinated. More enclosed streets can feel urban and intense, while lesser enclosed streets can feel spacious and open.

15.15 Tall buildings can have an adverse effect on street enclosure and the sense of human scale. A tall building in a street frontage can create a significant imbalance in a street scene. Tall buildings located on opposite sides of a street can create excessive enclosure and an undesirable 'canyon' effect. The impact of tall buildings on the enclosure and balance of street scenes can be mitigated by situating the tall building element above a base and away from the street frontage, to effectively limit the visual impact of greater height on the street space, or alternatively by moving the tall building significantly back from the building line.

15.16 Tall buildings, with their large grain, substantial bulk, clean lines and modern materials can create a jarring contrast when next to smaller scale urban fabric, and indeed can have the effect of visually demeaning to surrounding housing. Tall buildings due to their scale are often impersonal and therefore weaken the sense of ownership of an area by its people. The domineering impact of tall buildings can be avoided by reducing the height of a tall building, locating it further away from finer grain townscapes or by introducing buildings of intermediate heights that visually help to mediate between the smaller and larger scale.

Tall buildings as landmarks

15.17 Where a tall building is proposed to perform a landmark role (as discussed in section 3.4), it should be carefully sited to enhance its prominence and to magnify its visibility within the local network of streets and spaces (not withstanding if it has a local vs. district vs. city scale role. This could mean a location in the focus at the end of a street, at a prominent street corner or in an exposed location along an approach route or other vista.

15.18 The siting and orientation of a landmark building within its context should consider the specific views from where it is expected to be seen, and maximise on its distinctiveness in these views. Responding to a particular linear view however should not undermine the wider legibility principle that tall buildings when seen on the skyline should clearly be recognisable as one and the same building from whatever direction it is seen.

15.19 To ensure its presence and singularity, a landmark building (including heritage buildings such as church spires) should not be obscured or detracted from by other (tall) buildings, for example in the background, and its silhouette should be clearly visible and contrasting before the sky.

Integration of tall buildings within larger development schemes

15.20 The taller a building, the greater will be its access, servicing and (often) car parking requirements, often requiring design resolutions at the base of the building at street level. Typically towers with their entrance, lobby space, and potential commercial spaces at the front of buildings, usually establish active and welcoming street interfaces, whilst often their side or rear are less successful in creating active and overlooked spaces, especially on relatively small sites. Entrances to car parks and exposed parking areas, loading and service bays, emergency exits, technical facilities, blank walls and left-over spaces can compromise the quality, passive supervision and animation of the adjoining street space.

15.21 Appropriately mitigating impacts of towers on the street space can require expensive technical solutions such as locating the technical, servicing and parking facilities underground, which in many places will be financially prohibitive. An alternative solution can be to integrate a tall building within a larger development such as a street block. Providing parking, servicing and technical spaces of a tall building within the envelop of a larger building scheme will free up the base of the tower for active uses and allow for the creation a better street environment. Integrating taller buildings with a courtyard type street block can also help to mediate the scale of the taller building with lower buildings in the surrounding.

15.22 Associated lower rise development may also be more suitable for family accommodation to complement smaller units in the tower and to provide a balanced housing mix. Equally they could accommodate affordable housing where they could more easily be managed separately by a registered provider and benefit from lower service charge than units in the tower. This is obviously scale dependent and should not seek to segregate affordable housing from market housing. Development will also need to accord with the Affordable Housing SPD in terms of cluster sizes, tenure blind design etc.

Image 16: Example of a modest tall building integrated into a larger development block

16 Street, Public Spaces and Interface

Interface with the street space

16.1 In the past many taller buildings have failed to establish a positive relationship with the public realm. Towers in post-war housing estate developments were notorious examples of this, often exhibiting large windswept and underused green spaces around the tower base, blank walls and inactive ground floors, poorly marked entrances and over dominant servicing arrangements.

16.2 To ensure a tall building sits comfortably within an urban environment it needs to establish a positive relationship and interface with the street space. The building interface with the public realm should generally provide well-defined edges and activated frontages with transparent facades. Leftover spaces and set-backs that create hidden or unsupervised corners in the street space should be avoided. The design will need to contribute to the safety, diversity, vitality, social engagement and 'sense of place' of the building's surroundings and maximise access for people of all abilities.

16.3 Entrances and lobbies should be clearly recognisable, be proportionate to the size and use of the building, while also reinforcing the fine grain of activity at street level. Usually, the ground floor of towers should also provide retail or commercial uses that are active, outward looking and help to animate the street space. Blank frontages should be avoided. These spaces together with internal circulation areas within a building should be designed to encourage interaction and foster social cohesion and increase livability.

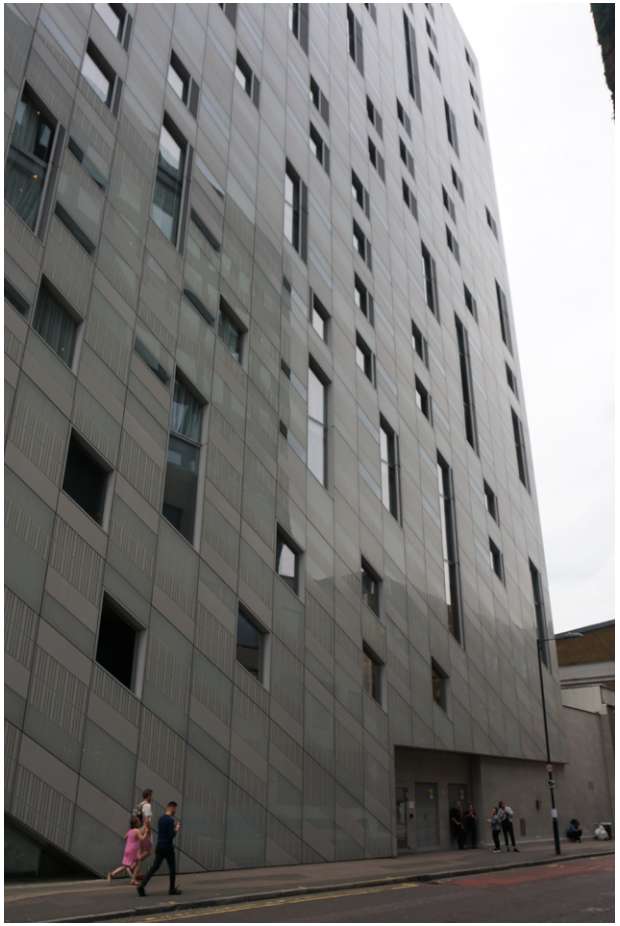

Image 17: Example of a tall building with a negative frontage and poor relationship with the street (Old Street, London)

Quality of the public realm

16.4 The public realm outside the entrance of a tall building should be generous and provide appropriately for the increased pedestrian activity of the building as well as for waiting and mingling of people. Adequate gathering space must be provided around the building to facilitate the evacuation of the building in case of an emergency.

16.5 The vehicular drop off for the building should be away from the main entrance to avoid conflicts with pedestrian activity. Servicing should be controlled through effective management, for example street based servicing at controlled hours that can avoid having service yards or lanes. Access to parking or servicing bays should be realised away from pedestrian activity. The width of driveways and vehicular entrances should be consolidated and minimised, and routes should not create barriers at street level.

17 Residential Amenity

17.1 Tall building design needs to pay particular attention to their impacts on existing or new housing, specifically in respect of privacy, amenity and overshadowing. Inappropriately planned, designed and located tall buildings can detract seriously from the quality of a residential environment. Tall buildings may overshadow, overlook and dominate their immediate surroundings and can have detrimental effects on residential amenity, private gardens, patios and public spaces.

17.2 Tall buildings can represent a jarring contrast when built in low-rise housing areas and have the effect of visually demeaning the surrounding area. Tall buildings are often impersonal and therefore weaken the sense of ownership of an area by its people.

17.3 Tall buildings may also undermine residential amenity and privacy of existing and future residents through loss of day and sun-lighting and overlooking.

Sun and daylighting

17.4 Central core access in higher and tall developments make the provision of dual aspect dwelling difficult, often leading to a prevalence of single aspect units. Single aspect units can cause issues of insufficient levels of ventilation and overheating from sun exposure. Overheating can be a particular problem in taller buildings as they are generally more exposed to sunlight and less able to benefit from contextual shading. Furthermore, tall buildings often have a greater level of glassing to maximise on views from the building, which without effective levels of (external) shading may create sun-traps. Overheating of homes in tall buildings may be exacerbated where the ability to open window is restricted for safety reasons.

17.5 North facing single aspect units are especially problematic as they do receive little or no direct sun-light, and in taller buildings are less likely to benefit from reflected sun light. Single aspect units, especially where they are set back behind or underneath balconies may also suffer from lack of daylight, especially in the inner parts of the accommodation, where they may require artificial lighting even during day-time. As a general principle single aspect units should be avoided.

17.6 Development should also consider the amount of sky view visible, not only from indoors (within development and affected neighbouring developments), but also from open spaces, courtyards and the street space. Adequate sky view can make an area feel more pleasant. The sky view can be enhanced through the setting back of taller building elements from the building front or the modulation of its shape and form.

17.7 Tall buildings should fully comply with BRE's good practice guidance on day and sunlighting.

Overlooking, privacy and outlook

17.8 High density development that includes tall buildings on compact sites can result in overlooking between dwellings and lack of privacy. Overdevelopment occurs where dwellings are facing one another without adequate separation and privacy distance. In this scenario, residents can feel like their homes are on show and exposed. It may result in curtains and blinds being constantly closed to avoid real or perceived overlooking, which further reduces daylighting and the quality of life of residents. Other impacts of development in close proximity is that the outlook from dwellings, particularly those on lower floors, can be dominated by other buildings, creating a lack of sky view, and reduced daylight to reach the interior of buildings.

17.9 To avoid this, many authorities stipulate a minimum separation distance between buildings, which may be different for tall buildings compared to lower rise development. For instance, the City of Toronto stipulates a minimum separation distance of 25m between the towers of tall buildings and this distance is expected to increase as buildings become taller. This approach is usable as the city is organised on a grid with standard road widths and development blocks. However, in more complex environments where each tall building proposal will have unique circumstances, a minimum separation distance may be overly restrictive or impracticable.

17.10 Alternatively local authorities can set minimum separation distances on a site-by-site basis. Promoters of tall buildings should demonstrate that adequate separation has been incorporated into their scheme. Sites where adequate separation cannot be maintained may be inappropriate for multiple tall buildings. Proposals near to existing tall buildings, especially in clusters, must demonstrate that they will be appropriately separated. Privacy should also be safeguarded through the design of the building and aspect of dwellings and private open spaces, for instance through orientation, articulation and setbacks.

Communal and private amenity spaces

17.11 Living in a tall building, particularly in the upper floors, can result in a sense of separation from the outside work and the community more widely. Provision of adequate private and communal amenity spaces can support mental and physical well-being of residents in high density developments, and counter effects of social isolation inherent to tall building typologies. These may take the form of communal courtyards and gardens, private gardens at ground floor level, balconies, terraces or communal rooftop open space.

17.12 Communal amenity space should typically be provided at the centre of the development where it is easily accessible to all residents and well overlooked. Communal spaces should generally be part of the typical movement of residents through the building (e.g. a podium terrace which has direct access to the communal parts of the building and lifts/stairs). Roof top spaces in tall buildings are out of the way and often less successful and generally not recommended.

17.13 The design and orientation of private or communal spaces should ensure that they receive adequate sun and daylighting, and are not affected by adverse wind impacts that reduces their amenity for outdoor seating. Communal outdoor spaces should be designed so as to avoid undue impact on the privacy of adjoining residential units and their private outdoor spaces.

17.14 On upper floors, balconies and terraces will be the main outdoor amenity space for residents. Balconies should be large enough (minimum depth of 1.5m) so residents can make effective use of them, for instance for a table and chairs. Balconies should be appropriately enclosed to provide residents with real and perceived sense of protection from the elements. At higher elevations in-set balconies that are less exposed to wind impacts should be provided. Dual aspect dwellings should explore the potential of having more than one balcony on different sides of the building to maximise use throughout the day. However, excessive or poorly designed balconies can add considerable bulk to a building and result in overshadowing of windows, and so should be designed carefully.

17.15 Developments that feature family housing units should provide outdoor play space for children based on an assessment of estimated child occupancy. Play spaces should be situated in well-lit parts of communal spaces and offer protection from excessive sun-lighting, ideally designed so that family units overlook the play area, and be inclusive to all residents and tenures.

Access and servicing

17.16 Tall buildings by their nature require space for services such as utilities, waste and recycling, deliveries, loading and maintenance. In standalone tall buildings, these “back of house” activities can take up significant amounts of the ground floor frontage, creating a poor pedestrian environment and unattractive facades. As set out above, tall building proposals should aim to incorporate back of house activities away from the street interface in the centre of a street block or underground.

17.17 Servicing should be concealed behind and within buildings, and access should be provided away from the public realm. The extent of the site dedicated to these activities can be minimised through shared access, a comprehensive design approach and efficient layouts. If servicing must face the public realm, due to site constraints, it should be designed in such a way as to minimise its visual, functional and other sensorial (noise, smell) impact on street activities.

17.18 Service entrances should use high quality materials and can become a design feature of the building, incorporating artwork or interesting architectural detailing. Entrances should be recessed to reduce their prominence in the streetscene, and can be screened with landscaping or architectural elements. The management regime should ensure that service entrances are generally closed unless needed for service access.

18 Infrastructure Requirements for Tall Buildings

18.1 Tall buildings can place a greater demand on infrastructure as a consequence of a large number of people locating to an area in a comparatively short period of time. This can have a number of consequences:

Utilities and Waste

18.2 Tall buildings tend to use more energy due to the requirements for lifts, servicing, water, mechanical ventilation, cooling and lighting. This places a particular strain on utilities providers to respond quickly and effectively to meet the residential or commercial requirements. Utilities planning needs take place as early in the development cycle as possible to avoid problem later on relating to utilities provision. Waste management and disposal can also be challenging with sufficient space required for storage and additional strain placed on the waste collections and the local road network.

Community facilities

18.3 Tall buildings, particularly those with family sized residential units can lead to significant additional pressure and demand for community facilities including schools places and on social and health care. This need must be planned early with educational, social and health care providers. Where possible these requirements should be planned into schemes as sites that can accommodate such provision may not be available.

Transport and connectivity

18.4 Planning for tall buildings close to existing stations and public transport provision is essential. However, assessment of capacity is required and a multi- modal approach should be taken that considers the potential to enhance connectivity through new bridges, cross river access and enhanced public realm to overcome infrastructure barriers. The location, design and facilities of tall buildings, as well as the design of the surrounding street network should encourage walking and cycling over private car use.

19 Tall Buildings and Sustainability

Sustainability

19.1 Tall towers are principally less sustainable than medium rise buildings.

19.2 Tall buildings are more resource and carbon intensive to construct per unit of floor area than low or medium rise buildings. This is due to their increased wind loadings and heavier frames, their vertical transportation and servicing requirements.

19.3 The operation of tall buildings is also more energy intensive and expensive, due to the vertical travel and servicing requirements, the high façade to floor area ratio, the need for mechanical ventilation and cooling, as well as the challenges of maintaining and replacing cladding and other building components at height. Due to the prevalence of glass and other light façade materials tall buildings are susceptible to solar gain and overheating, often requiring intensive mechanical ventilation and hence greater amounts of carbon energy. Shadows from towers may result in the loss of daylight and solar gain in neighbouring developments, resulting in greater reliance on artificial light in affected properties.

19.4 The greater its height "the more inefficient the building becomes in terms of the net area measured against carbon emissions from operation, construction and maintenance." (Simon Sturgis, Sturgis Associates).

19.5 Tall buildings are highly specialised structures. They are also typically less adaptable to changing economic circumstances and use requirements, and often need resource intensive and expensive refurbishment, or even complete re-development, when they become dated in layout, performance or appearance. The life expectancy of glazed cladding systems is only 40 to 50 years before replacement is required (Simon Sturgis, Sturgis Associates).

19.6 Tall buildings should aim to enhance their energy efficiency through the use of latest sustainable design and construction practices and technologies, with detailed consideration given to the built form configuration and orientation, energy sources and conservation, material source and lifecycle, internal temperature control and use of natural ventilation, water use and conservation and mitigation of water run-off, waste management and on-site ecology. Consideration should also be given to how to reduce the embodied energy in the building and enhance the long-term energy and resource efficiency by designing for flexibility and building adaptation. Renewable energy generation and the installation or future proofing for Photo Voltaics (PVs) should also be considered.

Climate Resilience

19.7 Tall buildings, particularly upper floors, are typically exposed to direct sunlight much more than lower rise development. This is particularly true when they are designed with large amounts of glazing and floor to ceiling windows. Whilst this may be welcomed during cooler parts of the year, during the summer it can lead to overheating.

19.8 Summers in Britain are projected to become hotter with more frequently occurring heat waves as a result of climate change. The design of tall buildings should take into account how the local climate will change so residents are protected from extreme weather. In the instance of heat waves, this may include external shading structures and the ability for residents to control the amount of shading, for instance through shutters.

19.9 Instances of flooding are also expected to increase in Britain and this must be taken into account when locating tall buildings. Tall buildings should not generally be situated in areas of increased flood risk.

20 Appearance, Design and Materiality

20.1 Due to its wider visibility and prominence the architectural quality of a tall building needs specific attention. This should consider the following aspects:

Architectural Form

20.2 Depending on its width and depth a building might appear very different from various angles. Generally, it can be distinguished between a point block, where the width and depths are similar, and a slab block where the width sometimes significantly exceeds the depth of the building (Figure 20). The impact of tall slab blocks on their immediate surrounding is usually more severe, particularly in terms of overshadowing and wind funnelling. They also can appear very different from different directions, slender from one angle and bulky from the other, which might affect their recognisability and legibility from different viewing directions.

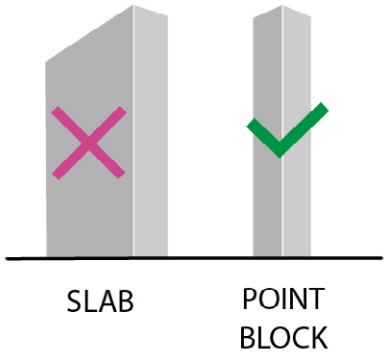

Figure 20: Distinction between a point block and a slab block

Slenderness

20.3 A slender tower with a strong sense of verticality, 'reaching to the sky', is commonly considered more attractive and elegant, while a large and bulky tall building may appear intrusive and out of scale in the skyline. The slenderness of a tower can be expressed through the height to width ratio - the greater the ratio - the more slender the building. The slenderness of a building is primarily appreciated in views from further away, along a vista, across a water body or across the rooftops of the surrounding buildings.

20.4 Floor plan efficiencies that require a certain footprint size within the tower element can make designing a slender tall building challenging, especially in areas where heights are limited to local scale tall buildings. A modulation of the building form and other design measures can help achieve a sense of verticality. For example, the bulk of a building can be broken into sub-elements that individually express verticality rather than being composed of a single uniform volume. This is especially relevant in the Cambridge context, where most taller buildings are of lesser height (up to 10 storeys), and where floor plan efficiencies with a minimum of 4- 8 units per floor can generate quite squat building forms.

Composition and sub-division

20.5 A tall building can benefit from its form, or architecture, changing with its height. As the eye wanders up and down the shaft of the tall building and its supporting base, subdivision and other modulation of form and the façade will make the building more interesting and distinctive. Amenity spaces may be used as dividers within a tall building.

20.6 Stepping floors back with increasing height can also make a building appear more slender. The simple extrusion of a typical floor plan for all of its floors will make a tall building appear monotonous and bland.

20.7 Generally a tall building should express its three compositional elements: its base, the shaft and the top (Figure 21). The top part of a tall building, as it ends the vertical mass of the body, needs careful articulation. A tower that lacks an expressed top may appear incomplete and unfinished. The top is normally seen in views from further away and its shape and impact on the skyline will need to be considered.

20.8 Some landmark towers apply a sculptural approach to the entire building, where the shaft and top of the building flow into each other and are expressed more subtlety through the modulation of the form of the building. In more traditional tall buildings the distinction between the shaft and top should be more clearly expressed. The base of the tall building is where it meets the ground, which determines how it is experienced from the street and how well it integrates with and responds to the townscape.

20.9 In relation to their base two principal types of tall buildings can be distinguished, the stand-alone tower, and the tower that sits on top of a podium or develops out of an urban block.

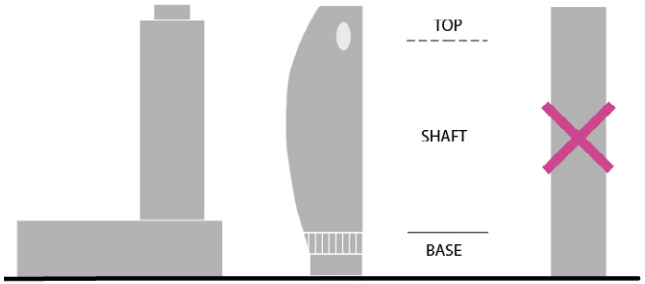

Figure 21: Three compositional elements of a tower: the base, the shaft and the top

20.10 Stand-alone towers can be more iconic sculptural features. However, due to the concentration of functions at the bottom of the tower and limited footprint, they often establish a poor relationship with the public realm around the base.

20.11 Towers that develop out of an urban block or podium can usually better internalise their servicing requirements and establish an active relationship to the street space all around the block. The more the tower element sits back from the building line of the street block the lesser will its impact be on the scale and enclosure of the street space and the character of an area.

20.12 Setting back the tower can also improve the micro climatic condition in the street space around the building. Towers developing out of urban blocks relate better to the human scale perception of the street space, and are generally the preferable type of tall buildings in an urban context.

Orientation

20.13 As a tall building will be visible from many places it must have an outlook to all sides. In some instances a tall building may benefit from a principal orientation towards a particular side or direction, for example to address an important view or to orientate toward river, waterfront or open space. However, buildings that are recognisable as a single coherent sculptural object from all around are easier to recognise than buildings that appear different from different angles. While a tall building may assume a special response towards a particular side or direction, all facades should have openings or windows and provide an active frontage. Areas with large blank facades should not be permitted.

Materiality and detailing

20.14 The materiality, detail and texture of façade, its colour in relation to its back-drop, such as the sky or other tall buildings, its night time impression, feature and aircraft warning lighting, are all important aspects that affect the appearance and impact of a tall building in views both from afar as well as close up.

20.15 The choice of facing materials is often important to assist in visually weaving the new building into its established surroundings, or where appropriately provide a contrast. Materials should also be chosen based on their durability, ease of maintenance and repair, overall cost over their lifetime, overall carbon impact, and impact on other natural resources.

20.16 At design stage they need to be carefully tested through three-dimensional modelling and visualisations to fully understand their impact.

20.17 Consideration should be given to how design detailing is perceived both from close up and in long distance views.

20.18 All aspects of the design should be represented in accurate visualisations including façade details to allow a detailed three-dimensional understanding of the tall building proposals from all sides and from important views and to allow an assessment of its land mark qualities.

Lighting

20.19 As previously discussed, the lighting of buildings can have negative impacts on residential amenity and wildlife. However, the careful design of architectural lighting can greatly enhance a building and contribute to the skyline in evening and nighttime views.

20.20 In the case of special, district landmark scale tall buildings, it may be encouraged to light the facade of the building to celebrate the building and enhance its appearance at night. However, it must be carefully designed to avoid excessive light pollution and nuisance to residents of the building and surrounding homes. Lighting should always be energy efficient and designed in consultation with an ecologist to minimise impact on biodiversity, if relevant.

20.21 However, tall buildings should avoid excessive illuminated signs and advertisements that do not contribute to the architecture of the building or its place within the skyline.

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