London Borough of Southwark

Tustin Estate Sustainability Strategy

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Date: 08/01/21

V4.0

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Anthesis Consulting Group

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Contents

Executive Summary

This strategy sets out the planning requirements relevant to sustainability, the targets to be met across the RIBA sustainable outcome categories of sustainability and the design principles to meet these targets. The strategy then provides an assessment of the existing sustainability proposals and the further recommendations in order to meet the planning policies and sustainability targets

The sustainability requirements within different planning polices at time present conflicts which will need to be addressed and balanced by the design team. The scope of further studies will need to take into account the conflicting ambitions of for example, embodied carbon and urban greenery.

Summary of Sustainability Initiatives

Topic	Option 1	Option 5 – Current Proposals	Option 5 – Further Recommendations
Operational Carbon	9.7 t/co2e per current resident over 30 years	1.9 t/co2e per current resident over 30 years	-
Embodied Carbon	23.6 t/co2e per resident (including new build residents)	30.9 t/co2e per resident (including new build residents) Representing a 25% reduction on baseline	24t/co2e per resident (including new build residents) Representing a 40% reduction on baseline
Energy Generation	SELCHP connection	SELCHP connection	PV panels on the roof of the school PV panels on the roof of the residential buildings
Water	Reduction in cold water use and hot water use	Reduction in potable water use to 105l per person per day Installation of sustainable urban drainage systems	Reduction in potable water use to 60l per person per day Installation of rainwater harvesting for irrigation within the school

Topic	Option 1	Option 5 – Current Proposals	Option 5 – Further Recommendations
Transport	-	Retained parking spaces, electric charging points, car club spaces, secure bike storage within blocks, cycle racks within estate, Improved pedestrian routes, benches and shading Increased transport demand from construction contractors, managed via transport plan	Support for residents to take up cycling including provision of cycle hire fob for 2 years, training and borrow a bike scheme Improved cycle links to wider cycle network Improved ICT connection
Land Use and Biodiversity	-	Same number of trees Community growing space Increased planters and landscaping Increase in green space and nature within the school Increase in gardens from the inclusion of gardens in the over 55's	Increased number of trees and canopy cover Green roofs

Topic	Option 1	Option 5 – Current Proposals	Option 5 – Further Recommendations
Health and Wellbeing	-	Additional health and leisure activities for the over 55s and young people Increased play area Improved indoor air quality, daylighting and access to outside space.	Residents in all new build properties will have control over their own heating and ventilation systems Provision of outdoor recreational equipment for all residents
Communities and Social Value	-	Improved external lighting, pedestrian routes, communal spaces, outdoor activity space Measurement of social value impact	
Sustainable Lifecycle Cost	-		Measurement of lifecycle costs to ensure high standards maintained and operational costs for residents and the school are managed and targets achieved Measurement of operational energy consumption against design targets Implement Soft Landing approach Carry out seasonal commissioning and training of building operatives for a minimum of first year of operation.

Topic	Option 1	Option 5 – Current Proposals	Option 5 – Further Recommendations
BREEAM		A BREEAM target of 'Excellent is proposed for Non-domestic buildings, inline with anticipated policy requirements.	Ratings beyond 'Excellent' are available, and may wish to be considered at future design stages

Summary of Carbon Emissions

The residential elements of the proposed development option (5) have been modelled against that of Option 1 which is the existing estate but with a connection to SELCHP and of the existing estate with no changes. The key sustainability metrics around heating, hot water and cold water, and embodied carbon from construction have been summarised and emissions modelled based on existing data where available or proxy data and assumptions where not available.

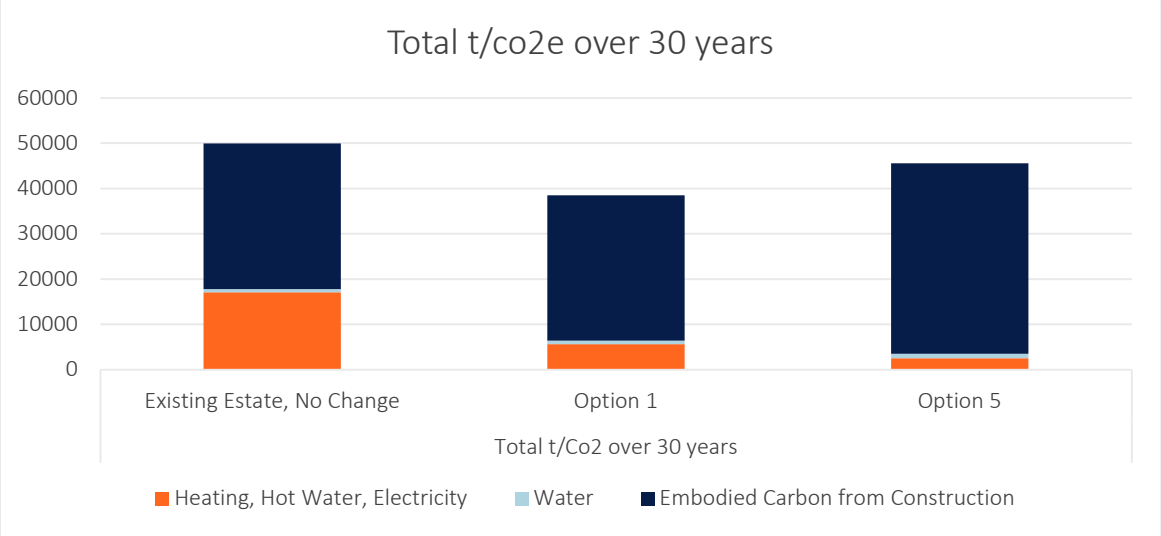
The options are:

Existing Estate No Change:
Existing heating and hot water systems across the existing 298 homes
Equivalent number of new build homes elsewhere (439 new homes)

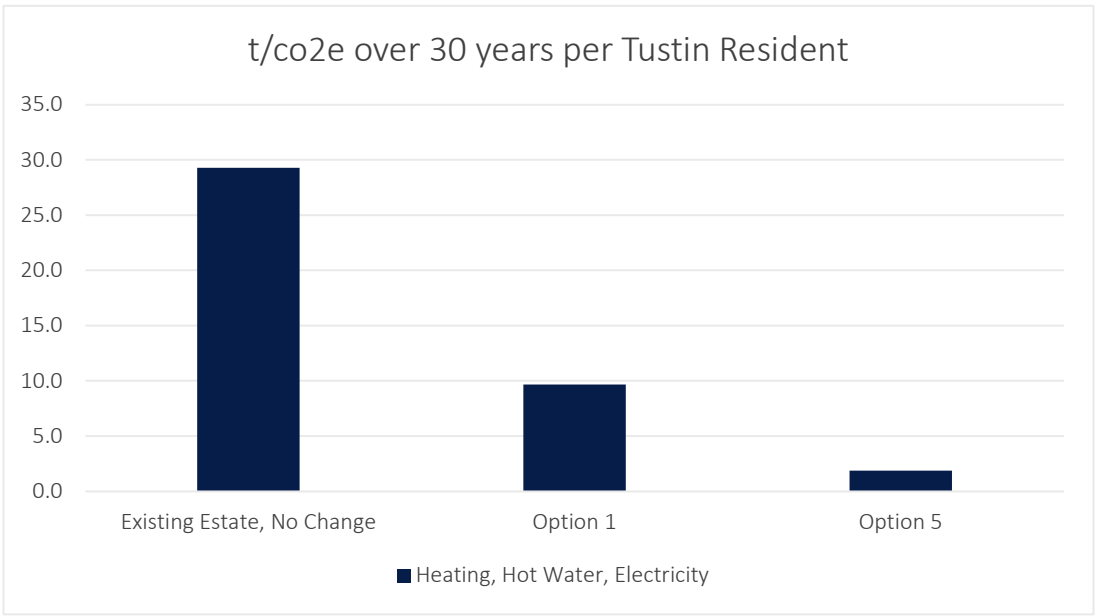
Option 1:
439 New homes built elsewhere
SELCHP connection to provide heat and hot water for existing 298 homes
New Kitchens and Bathrooms within the 298 homes

Option 5:
Demolition of low-rise block and reprovision alongside additional homes. Total number of homes of 688
Refurbishment of 49 Manor Grove council properties alongside new build in fill.
SELCHP connection to provide heat and hot water

Results:



Total emissions include operational emissions from heating, hot water and electricity for the residents within the Estate but not from equivalent new build.
Embodied carbon emissions to include those from both the estate and, for the existing estate no change and option 1, also the equivalent new build elsewhere.
A comparison of per resident emissions for heating, hot water and electricity, over 30 years[1] can be seen below. It is assumed there are 583 individuals on the existing estate, rising to 1361 individuals for option 5.



[1] Building lifetime can be reasonably expected to be 50 years +

Introduction

The London Borough of Southwark have appointed Anthesis to produce an initial Sustainability Strategy for their existing Tustin Estate development. A process is underway to decide between 5 options to redevelop the Estate. Of the initial 5, one (option 5) has been chosen to take forward to the final resident ballot to be held on the proposals to redevelop the Estate. Option 5 is for the demolition and rebuild of the low rise homes excluding Manor Grove house and the rebuild of Pilgrims Way Primary School and the business units. The existing high-rise towers are to be retained.

The Council are proposing working with the London Energy Transformation Initiative (LETI) to ensure their own new housing programme plays an appropriate role in combatting climate change. The LB Southwark planning policy requires the construction of all new homes in the borough to achieve Net Zero Carbon (NZC), and the council has now declared a 'Climate Emergency' with the goal of doing all it can to make the borough carbon neutral by 2030.

To reach NZC, the Council must also consider the emissions associated with their housing stock construction and building materials (embodied carbon), not just emissions through in-use energy consumption (operational carbon).

The aim of this report is to provide a Sustainability Strategy for the development which is in line with the wider policy context and ambitions of the Council. The strategy will cover both embodied carbon (emissions during construction, maintenance and demolition) and operational emissions of the completed buildings (energy consumption within the buildings, assumed transport emissions from the occupants).

There are key 'Climate Emergency' performance targets which the architect is to be aware of when developing the development proposal at this location.

1. Tustin Estate is expected to embrace the Royal Institute of British Architects (RIBA) sustainable outcomes throughout development
2. The new development is expected to achieve the operational carbon targets set by LETI within the climate emergency design guide
3. The development will aim to reduce embodied carbon to achieve the embodied carbon targets set within the LETI guidance

Summary of the Development

Existing Site

The Tustin Estate is located adjacent to the Old Kent Road (A2) and Ilderton Road. An overground line runs to the east of the site, with stations located at South Bermondsey and Queens Road, Peckham. The nearest Tube stations are located at Elephant and Castle and Borough, however, two new stations are proposed adjacent to the Old Kent Road in the event the Bakerloo line extension takes place. By 2030 it is possible that a new station will be constructed near to the Tustin Estate, near the junction of the Old Kent Road and Asylum Road.

The current Tustin Estate is already undergoing some refurbishment works to the existing residential tower blocks. This document relates to the proposed development of the low-rise block, Bowness, Heversham, Kentmere, Hillbeck and Ullswater as well as the houses located in Manor Grove. The existing housing totals 218 social rent homes, and 49 leaseholder homes within the low-rise blocks, and 31 freeholder homes across a mixture of 1 bed to 4 bed houses.

The estate also includes a primary school and children's centre with 220 pupils including a nursery class. The primary school will be re-developed alongside the low-rise blocks.

Retail and businesses are currently located at Old Kent Road within the existing ground floor of Bowness, and in 871 Old Kent Road (Afrikiko Bar Restaurant & Club).

Figure 1 Existing Estate

Proposed Development

This strategy relates to RIBA concept stage masterplan for:

- Redevelopment of the low-rise homes with the:
- The demolition and replacement with new homes of Bowness House, Heversham House, Hilbeck Close, Kentmere House & Ullswater House
- Retention of the houses in Manor Grove with improvements to the tenanted homes
- New houses in between the houses on Manor Grove
- A new park in the centre of the estate
- A new Pilgrims' Way School
- New retail and business spaces on the Old Kent Road and Ilderton Road

Of the 298 existing homes, 18 of the council homes are subject to refurbishment. 200 are subject to demolition and rebuild. 49 leaseholder subject to demolition and rebuild and 31 freehold properties to be maintained at the freeholders discretion.

SELCHP

(SELCHP) network provides heat and hot water from heat would otherwise be wasted by being released into the atmosphere. The network can be seen in figure 2 below, with the phased expansion indicated. It is proposed that the network will serve communal plant rooms in each new block, which will then feed individual homes via pipework within buildings and individual heat interface units (HIUs) in each home. It is anticipated reliability, and individual control will improve compared to existing systems.

SELCHP infrastructure installed on site will also facilitate the provision of low carbon heating to the business units, particularly if these have a significant demand e.g. DHW generation for dishwashing. However it is not possible at this stage to determine what best suits final fit out of these spaces as this is largely dependant on the nature of the occupation of the spaces. It is therefore proposed to offer SELCHP as an optional low carbon heating source with an electrical supply allowing for an alternative (assumed ASHP) approach which may also include cooling depending on business requirements. It is not proposed to include a gas supply to business units, to restrict heating and cooking solutions to lower carbon electrical alternatives with minimal local air quality impacts .

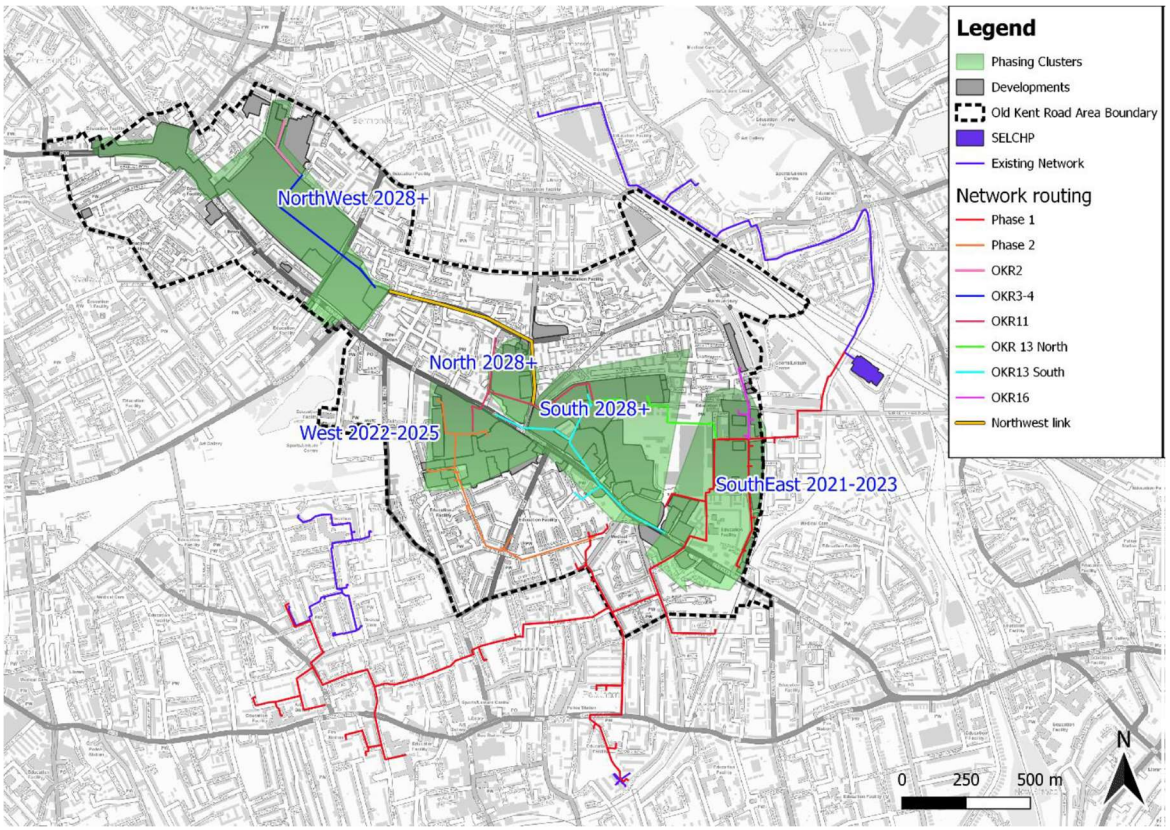


Figure 2: SELCHP Heat Network Map

Figure 3 The proposed re-developed site

Policy Context – National and Regional

Planning policies are in place to drive developments according to the priorities and needs of the local population. Policy documents are in place at the national, regional and local level. A summary of the relevant policies at each level is set out below.

National Climate Change Policy

The UK now has a statutory obligation to achieve Net Zero Carbon Emissions by the year 2050, and is a signatory to the Paris Agreement, seeking to limit man made Climate Change to below 2°C, as well as pursuing efforts to limit this to no more than 1.5°C.

The London Borough of Southwark separately has declared a Climate Emergency for the borough and has committed to 'do all we can to make the borough carbon neutral by 2030'. As part of this process the borough is exploring what may be done within its activities, including its new build programme to achieve these policy goals, whilst providing long term affordable housing within the borough.

National Planning Policy

The national planning policy framework provides simplified planning policy. The framework includes a high-level objective of sustainable development as defined as economic, social and environmental objectives. Further objectives include sustainable transport, planning for climate change and mitigating climate change impacts, and conserving the national environment.

Regional Policy

The London Plan (2016) is "the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years".

The London Plan identifies the Old Kent Road as an Opportunity Area which means the Mayor encourages development and growth of these areas.

The London Plan includes extensive guidance on the response to climate change including sustainable construction, decentralised heat networks, renewable energy generation, overheating risk and cooling demand, water use and nature and biodiversity, wastewater management and disposal and active travel.

New London Plan (draft)

The new plan is in draft form as it moves through the process to being fully adopted. Therefore the existing plan remains the adopted policy, however the new London plan is still pertinent to planning approval. The new plan calls for an Old Kent Road Area Action Plan, which has been completed and is referenced below.

The new plan also reinforces the move to Zero Carbon by 2050, and brings together policies on air quality, green infrastructure, waste, transport, and mitigation of climate impacts such as increased temperatures.

London Environment Strategy

The LES is a London wide strategy, with key targets across six areas:

- Increase green cover to 50% and tree canopy cover by 10%
- Make London a Zero Waste City by 2026
- Make London a Zero Carbon City
- Make London resilient to climate change impacts
- Achieve the best air quality of any major city
- Reduce the number of Londoners affected by noise pollution

Policy Context - Southwark Planning Policies and Related Strategies

Core Strategy (2011)

This strategy is in place until 2026 and aims to deliver sustainable development across the borough via 13 strategic policies:

- Strategic Policy 1 – Sustainable development
- Strategic Policy 2 – Sustainable transport
- Strategic Policy 3 – Shopping, leisure, and entertainment
- Strategic Policy 4 – Places for learning, enjoyment, and healthy lifestyles
- Strategic Policy 5 – Providing new homes
- Strategic Policy 6 – Homes for people on different incomes
- Strategic Policy 7 – Family homes
- Strategic Policy 8 – Student homes
- Strategic Policy 9 – Homes for Travellers and Gypsies
- Strategic Policy 10 – Jobs and businesses
- Strategic Policy 11 – Open spaces and wildlife
- Strategic Policy 12 – Design and conservation
- Strategic Policy 13 – High environmental standards

New Southwark Plan (2020)

This plan is currently is in the final development stages and is already informing action in the borough and will therefore be included within this strategy as the primary borough-wide development policy.

The Plan includes policies coving healthy living, sustainable transport, affordable homes, residential design, social rented homes, homes for older residents, and policies relating to the cleaner greener safer objectives covering all aspects of green space, water and sustainability.

Climate Emergency Policies

In March 2019, a Climate Emergency was declared due to the increase of carbon dioxide and other greenhouse gases in the atmosphere. The Climate Emergency will have a direct impact on the residents of Southwark and have therefore aimed to make the borough carbon neutral by 2030. Emissions that are controlled by Southwark, including council homes and vehicles, are only 14% of the borough's emissions. Emissions from council-related operations have already fallen 37% since 2008.

Some of Southwark's plans to tackle climate change includes:

- cutting the Council's carbon emissions by 25%
- divesting pension funds away from fossil fuels into sustainable alternatives
- introducing idling fines for drivers who leave their engines running while idle
- closing roads around schools to improve air quality
- ensuring more people are walking and cycling rather than using greenhouse gas emitting vehicles
- protecting Southwark's biodiversity
- keeping recycling rates high: Southwark's rates are currently the highest in inner London
- committing to ending single use plastic in the council, halving it in the borough and introducing water fountains to reduce plastic bottle use

Southwark intend to achieve the carbon neutral target by 2030, while calling on other London boroughs to also achieve this.

Transport Policies

Key planning policies related to transport are:

- Southwark Cycling Strategy – key target to increase mode share to 10% by 2026
- Movement Plan – key target to reduce trips by motorbike and car to 13% by 2041
- Healthy Streets Approach – linked to the London Plan, the healthy streets approach encourages walking and cycling and the reduction of air pollution

Air Quality Policy

The Southwark area is not currently meeting legal limits for all pollutants regulated by EU legislation. The main source of atmospheric pollutants of concern in Southwark are traffic emissions, as well as combustion plants/sites and domestic heating. The Air Quality Strategy and Action Plan 2017-2022 aims to address this issue by setting out the following targets:

1. Comply with legislations such as EU Directives, The Environmental Act 1995, The Environmental Protection Act 1990. The Clean Air Act 1993 and the Air Quality Standards and Regulations 2010 & 2011.
2. Comply with the GLA London Local Air Quality Management Framework by:
    - Having an up-to-date valid Air Quality Strategy
    - Monitoring local air quality
    - Providing an Annual Status Report
    - Delivering the Air Quality Action Plan
3. Support the GLA's air quality objectives.
4. Support the local public health framework objectives.

Old Kent Road Area Action Plan (OKRAAP)

The OKRAAP comprises a masterplan for the area and sets out the vision and policies for development in key areas around the Old Kent Road. Key policies relating to sustainability cover use of low carbon heat networks, healthier street approach for OKR, green routes, Sustainable Urban Drainage Systems (SUDS) and at least $5m^2$ of public open space per dwelling.

The plan also specifies the design and management of new buildings in Old Kent Road minimise residents' exposure to harmful air pollutants indoors and outdoors.

An updated version was published in December 2020.

Sustainable Design and Construction SPD

The Sustainable Design and Construction SPD provides guidance on how new development in Southwark should be designed and built so that it has a positive impact on the environment.

It covers the following topics:

- Energy use and minimising climate change
- Adapting to climate change that is unavoidable
- Avoiding pollution and environmental nuisance
- Avoiding waste and minimising landfill
- Protecting and enhancing biodiversity
- Conserving water
- Planning for flood risk

Sustainability Assessments SPD

This document provides a framework for sustainability assessments to be carried out at Planning Stage of major developments.

Sustainability Strategy Methodology

The proposed development will be reviewed against the RIBA Sustainable outcomes which will be used as a framework to ensure sustainability is embedded into the development throughout all the design stages.

Secondly the operational and embodied energy elements of the strategy will draw on recent work by LETI which provides an evidence base regarding approaches to design strategy in line with responding to the climate emergency. Further guidance can be obtained at https://www.leti.london/cedg

An overview of the RIBA Sustainable Outcomes is provided below.

RIBA Sustainable Outcomes

The Royal Institute of British Architects (RIBA) has also recognised the requirement and challenge for Architects to be providing NZC for new and retrofitted buildings by 2030. To this end it has published guidance aligning development with the UN Sustainable Development Goals, namely:

Net Zero operational carbon

Operational carbon (carbon released from in-use operation of a building) should be limited to 35 kWh/m^2/yr.

Net Zero embodied carbon

Embodied carbon emissions are generated from the processes associated with sourcing materials, fabricating them into products and systems, transporting them to site and assembling them into a building. They also include the emissions due to maintenance, repair and replacement, as well as final demolition and disposal. This can contribute to over half of the lifetime emissions of a new building.

The current guidance from RIBA, LETI and the UKGBC does not mandate zero embodied carbon currently but will move to this in the future. Instead they suggest reducing embodied carbon by 40-70% compared to baseline. LETI suggests a focus upon the areas responsible for the majority of embodied emissions, which is the materials used in construction (64% of the total) and of this, the superstructure which is 46%.

Sustainable Water Cycle

The water cycle is an extremely important topic that must be addressed in many regions of the world. Climate change will require buildings to save water and also be more resilient to future extreme weather conditions. Within the London Borough of Southwark, forecast rises in sea level and increased intense rainfall are likely to increase the risk of flooding in certain locations.

This outcome promotes a decentralised building level approach to alleviate the pressure on national water supply and drainage infrastructure.

The overall aim is to significantly reduce potable water use to a locally sustainable level which is achieved by reducing water usage by behaviour, low water appliances and better leak detection. Also increased use of recycled rain/wastewater. The principal target is to reduce potable water use by 60% to more sustainable levels.

Sustainable connectivity and transport

The need to address sustainability travel not only aligns with Southwark and UK climate policies, but also addresses health, air quality, public amenity space, safety and noise issues.

The RIBA believes that reducing carbon emissions associated with transport should also consider reducing the need for travel in the first instance as well as buildings and infrastructure having to support the future widespread use of electric and/or hydrogen vehicles.

Sustainable land use and biodiversity

Biodiversity is significantly reducing and the demand to increase the built environment grows therefore using previously inhabited sites for development are favoured. It's also important to increase the biodiversity on a site. The targets are therefore to significantly enhance the local flora and fauna, along with an urban greening factor of 0.3 for non-domestic and 0.4 for residential developments.

Good Health and Wellbeing

This relates to indoor health, visual, aural and thermal comfort, and occupant wellbeing. There are 6 variables that alter user satisfaction:

1. density
2. comfort
3. responsiveness to need
4. ventilation type
5. workgroups and their layout in the space plan
6. design intent and how this is communicated to users and occupants.

Unintended consequences may occur when focusing on heat loss reduction with a key risk to the Council being overheating arising from increased insulation/air-tightness, but without mitigating the risks of excessive internal heat gains from services or glazing. Overheating can result in an increased mortality risk for the weak and vulnerable, which is a key demographic served by council housing. This illustrates the importance of “considering sustainability holistically: achieving net zero carbon must not be to the detriment of occupant health”.

Sustainable communities and social value

This outcome relates to the social impact of a development on the end users and the wider community. The goal is to create places for people that support their basic needs as well as enhance individual/social wellbeing and community identity.

The Social Value Toolkit (SVT) has been developed to measure the impact of design on communities. High level outcomes for the SVT are:

1. Freedom
2. Connecting
3. Active Lifestyles
4. Positive Emotions

Sustainable life cycle cost

Life cycle costs are significant in financial management of construction projects. Current buildings with highly complex services are contributing to unsustainable running costs, as well as concern of inadequate resilience in the future climate. The insurance industry will need to respond to a building's resilience and ability to withstand climate change.

There is also indication that low carbon buildings enable significant cost benefits.

The target for this outcome is to measure and benchmark the operational running costs of a building in use and compare this to the return on investment value created by the project.

Further information and guidance may be obtained at the following link:
https://www.architecture.com/knowledge-and-resources/resources-landing-page/sustainable-outcomes-guide

Sustainability Strategy

Reviewing the LETI and RIBA sustainability performance targets, alongside the specification for zero carbon new building, climate emergency policies and local planning policies, the following approaches are anticipated within the Tustin Estate project.

Net Zero Operational Carbon

The planning policies to which this outcome directly address are;

Policy	Section	Reference
LBS Sustainable Design and Construction SPD 2009	Section 3,	Be lean, be clean, be green Connection to heat networks Minimise energy, water and carbon emissions
LBS Climate Emergency Policy		Ambition to achieve carbon neutrality by 2030
LBS OKRAAP Dec20	AAP 3	All developments must achieve net zero carbon and connect to SELCHP.
New London Plan 2019	Policy SI 4	Managing heat risk
New Southwark Plan	P68, P69	"Achieve a BREEAM rating of 'Excellent' for non-residential development and non self-contained residential development over 500sqm; and Achieve BREEAM rating of 'Excellent' in domestic refurbishment for conversion, extension and change of use of residential floorspace over 500sqm; and Reduce the risk of overheating, taking into account climate change predictions over the life time of the building, in accordance with prioritised measures set out in the cooling hierarchy" Development must "Be lean (energy efficient design and construction); then 2. Be clean (low carbon energy supply); then 3. Be green (on site renewable energy generation and storage)." Reduce carbon emissions by "100% on 2013 Building Regulations Part L standards for residential development"

Targets:

The preference is anticipated to be a 'fabric first' solution, with high levels of insulation, air tightness and low levels of thermal bridging.

The targets to achieve for the residential building are:

- 35 kWh / m2 / yr for operational energy (excludes renewable provision)
- Heating and hot water to be provided via SELCHP district heat network

The targets to achieve for the school are:

- 65 kWh / m2/ yr for both heating and hot water (excludes renewable provision)
- Heating and hot water to be provided via SELCHP district heat network

The targets to achieve for the Business units are:

- 55 kWh / m2/ yr for both heating and hot water (excludes renewable provision)
- Heating and hot water to be provided via SELCHP district heat network, with potential alternative provision via electrical solutions, (business occupation dependant)
- No Gas infrastructure, therefore all cooking and catering from electrical sources

It is assumed that any remaining operational carbon emissions over 30 years will be offset at the offset price current at the time of submission to planning.

Design Principles:

The targets should be met via the following design principles:

1. Prioritise retrofit of existing buildings
2. Prioritise Fabric First principles for building form and envelope
3. Fine tune internal environment with efficient mechanical systems
4. Provide responsive local controls
5. Specify ultra-low energy appliances
6. Specify ultra-low energy IT
7. Prioritise maximum use of onsite renewables appropriate to context
8. Demonstrate additionality of offsite renewables
9. Offset remaining carbon through a recognised scheme

Additional guidance specifications for lighting power efficiency, fabric, and HVAC efficiency can be found within the LETI design guides for both medium residential and schools.

Sustainability Proposals:

Considering the targets and principles alongside the need to reduce embodied carbon within the building, there are two approaches that are suggested for consideration at RIBA stage 3 or 4:

1. Seek to understand the performance of the proposed design using PassivHaus techniques e.g. PassivHaus Planning Package (PHPP)as a preface to potentially adopting performance standards such as Association of Energy Conscious Buildings (AECB) or even PassivHaus. This approach would aim to remove the need to install individual heating systems and resolve a number of conflicting challenges.

The preference of the landlord is to avoid underfloor heating due to the complexity of resolving leaks, and the more difficult maintenance required. However a low temperature heating circuit suitable for maximising the efficiency of a district heat network such as SELCHP would require

larger radiators, increasing embodied carbon and taking up wall space within the homes. These would also require maintenance and control. Training and guidance for residents is required to ensure the heating is well controlled in order to manage internal temperatures and control costs.

Given the existing LETI targets for heating and hot water are very low, the energy used within a typical home for heating per year will be in the region of 1000kWh per year. Providing and maintaining complex heating systems in order to provide this level of heating would result in extremely high embodied carbon compared to operational carbon.

While delivering PassivHaus standard on a development of this scale is rare, there are similar developments underway in London. The Agar Grove development in Camden will feature 493 homes within a redeveloped estate with the first 38 delivered in 2018.

Figure 4: Image taken from https://www.hawkinsbrown.com/projects/agar-grove

2. Aim for a carbon target for the heating and hot water, rather than a kWh target. This would recognise the low carbon heating source of SELCHP and allow higher heating energy consumption within the homes. This would provide residents with a more conventional building and avoid the risk of the building not achieving the design standard of Passivhaus. It is likely that mechanical ventilation will be required, either to meet the operational targets or to meet internal air quality requirements.

Comparison of these approaches should be conducted to provide a more detailed assessment of the optimum approach for operational carbon, embodied carbon and lifecycle cost. Further reference can be found in Sustainable Life Cycle Cost section below.

For the business units the same principles apply. These are smaller facilities, however there is increased complexity in delivery, in that it is proposed these are completed to a 'Cat A' or similar fit out level, with final fit out by the tenant.

To mitigate the risk to Southwark it is proposed they will minimise energy consumption in a similar manner. An infrastructure connection to SELCHP is intended to be provided, however it is recognised that individual business units may have very different energy requirements depending on the nature of the occupier. It is therefore proposed that an electric, ASHP based approach may be allowable, particularly if there is a business cooling demand (e.g. Convenience store). No gas infrastructure is proposed, effectively mandating electrical approaches for any cooking of catering.

Final fit out and energy equipment outside of the London Borough of Southwark's design remit will be managed via a 'Green Lease' approach, with suitable clauses included to manage performance of the final tenant in line with the Net Zero ambitions of the wider development.

Overheating

With either approach, a key risk for the Council is overheating owing to the prevalence of vulnerable tenants within this building archetype. The architect is to show how this risk has been mitigated through appropriate design such as shading, orientation and thermal mass. It is suggested to conduct an overheating assessment using DSM software at RIBA stage 3.

Within the school, overheating can be a common problem in newer buildings due to the challenge of managing large numbers of occupants entering and leaving rooms and buildings in short spaces of time. Careful consideration should be given to appropriate heating and ventilation systems which are able to ramp up and down quickly to match demand. Under floor heating systems can be hard to manage in these environments due to the slow response times.

In a similar manner overheating risk in Business units should be mitigated at initial stages through checking compliance against SBEM and building regulations Part L, assuming a worse case potential occupation, to avoid any potential problems at fit out stage. It is suggested to also conduct an overheating assessment for these spaces, using DSM software at RIBA stage 3 including these within the residential commission assuming this is taken forward.

Controls

It is likely that the residential and school buildings will involve the use of Mechanical Ventilation with Heat Recovery (MVHR) with a wet heating system and hot water provision via a heat interface unit connected to a block level energy centre fed from the heat network.

These systems are complex with potential for inefficient operation, confusion and poor performance, frustrating both residents, teachers and building management teams.

To avoid this, consider the following:

- From earliest possible stage consider how the building and its systems will be used and managed.
- Write and regularly update a narrative about this. Put the final version in the Logbook.
- Design for usability and manageability, testing ideas with occupier representatives.
- Identify who will operate the building as early as possible.
- Don't leave control user interfaces to engineers. Architects need to understand where best to put them and how they are supposed to work. Where possible, integrate the latest design for usability learning to choose the control interfaces for occupants. Allow for automatic control where most desirable such as ventilation controlled on occupancy but balance the needs of operational energy management with building users having a sense of being in control of their local environment. This is a difficult subject to get right as it incorporate psychology, building physics and product design, however it should be remembered that the level at which occupants interact with the building is via the control and operation of these services and so perception of success of the overall building also relies on success of the controls interfaces.

- If possible, involve the future building users and managers to review the designs, ideally in mock-ups and with samples of the proposed user interfaces.
- Plan for commissioning, including seasonal commissioning and fine tuning during Year 1 in line with BSRIA Soft Landings Approach.

The controls element should align closely with the requirements for metering and monitoring of energy consumption. This will enable identification of control problems from an early stage.

Renewables

The operational energy targets in this report do not include any energy generated via renewables. Therefore, locally installed photovoltaic panels (PV) which generate electricity should be used to assist in meeting additional energy demand above that of the kWh / m2 targets above.

Given the density of the residential accommodation (which incorporates the business units), the generation potential compared to demand is likely to be small. However this can be confirmed during building energy modelling at a later design stage. A decision should be made regarding the share of the benefit of the PV. It is suggested that the generation be first allocated to communal energy demands within the buildings such as lighting, lifts, pumps and other electrical components of the communal heating and hot water infrastructure. This will assist in reducing service charges to residents by offsetting electrical energy charges for these systems. Further potential locations for PV panels are the roof of the school, as currently proposed.

Where offsite renewables are installed to meet these targets it is necessary to demonstrate additionality. This can be achieved by funding installation upon community buildings which would not otherwise obtain funding to install PV panels. Electricity generated can then be sold to the buildings at a favourable rate. However it is anticipated that the more likely approach this development will take will be to pay a price per tonne of carbon to the Southwark carbon fund. This will cover additional energy and resulting carbon above the target set here.

Pilgrims Way Primary School

Consideration is given here to the proposed design of the re-developed and extended Pilgrims Way Primary School. The existing design locates the school within the centre of the estate with links between the school and the green space at the centre. The design of the school itself is at an early stage. As this develops it should ensure to follow the Old Kent Road Area Action plan policy 13 as well the DfE guidance on school design at a minimum.

Net Zero Embodied Carbon

The planning policies to which this outcome directly address are;

Policy	Section	Reference
London Plan	7.14	Development proposals should promote sustainable design and construction to reduce emissions from the demolition and construction of buildings.
Core Strategy	5.122	It is important that the whole of a development's lifecycle is considered, including the energy and CO2 involved in manufacturing building materials.
Sustainable Design and Construction SPD	12.4, 11.5,	Are materials used low in embodied energy and GHGs? Demolition to be carried out in accordance with the ICE Demolition Protocol Use of the BRE Green Guide to ensure no construction material nor specification with high embodied impact to be used unless a compelling whole life energy or technical case is made. A site Waste Management Plan to be submitted A green procurement plan to be prepared covering the required SPD targets
London Environment Strategy		Zero Waste Target
New Southwark Plan 2020	P61	Development must: Demonstrate how the waste management hierarchy will be applied during construction Provide a suitable off site waste management strategy

Targets:

It is understood embodied carbon is the predominant source carbon emissions arising from the complete redevelopment of this site. There following targets are to be used:

- Reduce embodied carbon by 40% or to <500kgCO_2/m^2 – residential and business units
- Reduce embodied carbon by 40% or to <600kgCO_2/m^2 – school
- Zero Construction waste

Design Principles:

The following design principles are to be followed to achieve these targets:

1. Prioritise re-use of materials from the existing buildings
2. Carry out whole life carbon analysis of all building elements
3. Prioritise ethical and responsible sourcing of all materials
4. Prioritise low embodied carbon and healthy materials
5. Minimise materials with high embodied energy impacts
6. Target of zero construction waste diverted to landfill
7. Promote use of local, natural materials
8. Consider modular off-site construction systems
9. Detailing to be long-life and robust
10. Design building for disassembly and the circular economy
11. Offset remaining carbon emissions through recognised scheme

Existing Sustainability Proposals:

The process to decide on the final redevelopment of the estate has involved a review of 5 Options, as mentioned in the introduction above. As part of the development of the 5 Options an initial embodied carbon analysis has been conducted. The full report and results can be found here: https://tustin.estate/wp-content/uploads/2020/10/2020-10-28-LB-Southwark-Tustin-Estate-LCA-V0C-Updated-Final.pdf

This reviewed the five options for redevelopment against a baseline of maintaining the original estate. The chosen option represents the highest carbon emissions due to the increase in overall floor area and the embodied carbon within the new superstructure of the building.

Retaining the superstructure and re-using this by stripping back the buildings before re-building to higher specifications is one option for reducing the embodied carbon of the development. However the current design does not allow for this, as the layout of the estate needs to change in order to achieve the increase in number of homes and achieve the amenity benefits. The study does identify a set of alternative materials which should be adopted as a minimum within the development. A summary of the initial embodied carbon calculation can be seen below.

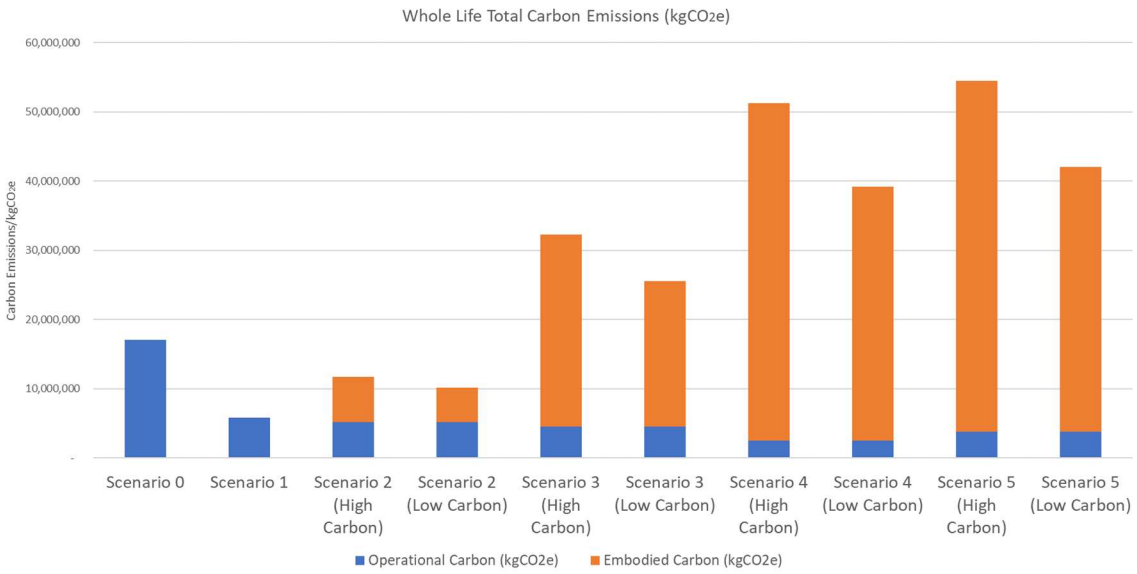


Figure 5 Embodied and Operation Carbon for the 5 Options

Scenario	Explanation
0	The existing estate with no changes, with an assumed lifetime of 30 years.
1	The existing estate but with a connection to SELCHP to provide heat and hot water.
2	The existing estate with a connection to SELCHP and some new homes that help achieve zero carbon targets.
3	The existing estate with connection to SELCHP and the refurbishment of some blocks and the demolition and rebuild of some blocks with new homes
4	The demolition and rebuild of the estate with connection to SELCHP
5	The demolition and rebuild of the estate, except for Manor Grove which will be retained and refurbished. Connection to SELCHP. Overall carbon increased compared to option 4 due to increased total floor area to be built.(Option 5 in the resident ballot).

The table below sets out the difference between the high and low carbon scenarios:

Measure Number	High Carbon Buildout – Original Material Used	Low Carbon Buildout – Low Carbon Alternative Materials
1	Foundation includes both pilings and concrete slabs	Foundations made only with pilings, no concrete slabs
2	Market average insulation used	Rockwool insulation used
3	Concrete made using 13% GGBS (Ground-granulated Blast Furnace Slag) and virgin steel reinforcement	Concrete made from 73% GGBS (Ground-granulated Blast Furnace Slag) and using recycled steel for reinforcement
4	Conventionally sourced plywood and timber	Plywood and timber from sustainable sources

The low carbon scenario for option 5 represents a 24.5% reduction on carbon compared to the high carbon baseline for option 5. Therefore more work is required to ensure the 40% reduction is achieved.

Further Sustainability Recommendations:

The principal sources of embodied carbon within the proposed development is the superstructure and the use of concrete. The decisions around material use must balance the ambition of low embodied carbon, fire safety standards, thermal mass and operational energy use, acoustics, building footprint, storage and use of sub-structures.

Therefore, it is anticipated that the architect will consider:

- Potential for reutilisation of existing building elements or materials
- Where not feasible, how it is proposed to minimise carbon embodied carbon emissions through material selection such as:
    - The use of 100% recycled steel
    - Use of high cement replacement as possible
    - Minimising the use of sub-structures, while balancing the need for plant rooms and cycle storage
    - Consider the use of CLT within the super-structure

    - Consider re-use of bricks facilitated via lime mortar
- Consider adaptability and disassembly through the building lifecycle

It is recommended to carry out more detailed embodied carbon lifecycle assessment in order to decide on the final materials. It should be noted that "the structural engineer can play an important role in reducing eCO_2 by as much as $100kgCO_2/m^2$ for a typically sized building."[2] These are to be co-ordinated with other design requirements, in particular fire safety standards where relevant.

At the early design stages, material specification is likely to be indicative. In this case it is recommended to use RICS standard specifications to drive material selection until more detailed lifecycle assessment can be carried out.

It is expected that the façade will be brick in line with visual character policies. However there maybe potential for use of structural timber products within elements of the new development. This can be assessed by the structural engineer alongside other options.

[2] Whole-Life Carbon and Buildings, The Concrete Centre

	Material	Details	Specification
1.	Concrete	Piling	C32/40 20% cement replacement [1]
		Substructure	C32/40 20% cement replacement [1]
		Superstructure	C32/40 20% cement replacement [1]
		Generic concrete	C16/20 0% cement replacement [1]
2.	Steel	Reinforcement bars	97% Recycled Content [2]
		Structural steel sections	20% Recycled Content [3]
		Studwork/Support frames	Galvanised steel, 15% Recycled Content [4]
3.	Blockwork	Precast concrete blocks	Lightweight blocks for building envelope
			Dense blocks for other uses
4.	Timber	Manufactured structural timber CLT, Glulam, etc.	100% FSC/PEFC [5]
		Formwork	Plywood
		Studwork/Framing/Flooring	Softwood
5.	Aluminium	Cladding panels	Aluminium sheet, 35% Recycled Content [6]
		Glazing frames	Aluminium extrusions, 35% Recycled Content [6]
6.	Plasterboard	Partitioning/Ceilings	Min. 60% Recycled Content [7]
7.	Insulation	To floors, roofs & external walls	PIR

Figure 6: Embodied Carbon Specification[3]

[3] https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf

Waste

Embodied carbon results from the use of construction materials, equipment and fixtures and fittings within a new build development. Embodied carbon is therefore directly linked to the volume of material used. Therefore during the construction phase, embodied carbon of the end building can be reduced by reducing the volume of material wasted, and the way remaining waste is processed. Landfill of waste results in higher carbon emissions than re-use or recycling of materials.
To achieve the targets of zero construction waste to landfill, it is recommended to develop a site construction waste management plan. Waste can be designed out from early stages of the project and therefore the waste management plan should include:

- Designing for waste-efficient procurement
- Designing for materials optimisation
- Designing for off-site construction
- Designing for re-use and recovery
- Designing for deconstruction and flexibility

The plan should also demonstrate how the development is applying the waste management hierarchy.

If Southwark does not already specify the use of Modern Methods of Construction, it is recommended to require this for this development. The architect is expected to also consider the end of life of the development and potential for re-use of the building elements. One way to achieve this is to use lime mortar in the binding of the brick façade, allowing the bricks to be more easily re-used at end of life.

Sustainable Water Cycle

The planning policies to which this outcome directly address are;

London Plan	5.13, 5.15	Utilise Surface Water Management Plans to identify areas where there are particular surface water management issues and develop actions and policy approaches aimed at reducing these risks." Rainwater should be stored for later use. Rainwater should be attenuated in ponds or open water features for gradual release. Rainwater should be attenuated in tanks or sealed water features for gradual release. Residential developments should be designed so that mains water consumption would meet a target of 105 litres or less per head per day.
Sustainable Design and Construction SPD	8.1, 8.2, 11.7	Installing efficient water fittings and plumbing, such as dual flush toilets, low flow shower heads and low water consuming washing machines. Durable plumbing should be used to prevent leakages. It may also be possible to draw water locally from boreholes or connect to existing local water supply systems that source water from boreholes. Rainwater should be collected, or grey water reused for uses other than drinking. Grey water systems are often only feasible on large schemes as they require a dual plumbing system to be installed. There should be 100% metering of all newly built property. Highly efficient water savings fixtures, fittings and appliances should be installed. Rainwater collection for external irrigation should be considered.
Core Strategy	Strategic Policy 13	Sustainable urban drainage systems, the avoidance of paving over gardens and the creation of hard standing areas are required to reduce water run-off which reduces flood risk.

OKRAAP Dec20	AAP12	Ensure that surface water discharges are limited to greenfield run off rates, with 100% of attenuation provided on site. Follow the IWMS for OKR Investigate and deliver communal Sustainable urban Drainage Systems (SuDS) Reuse grey water to reduce potable water use.
NSP	P66	"water use of no more than 105 litres per person per day" "enable the use of grey water and/or rainwater for non-drinking uses"

Targets:

London has one of the lowest rainfall rate of any capital city in the world, with less than Barcelona, Rome and Istanbul and water stress is likely to increase with climate change in the future. Therefore, in line with the sustainable outcomes the following targets are suggested:

- UK target of 105l per person per day as the maximum, aiming to get as close to 60 litres per person per day for domestic buildings
- 6l/p/per day for non-domestic buildings

This target from RIBA of 60l is considerably lower than the local planning policy target of 105l per person. However this target will go hand in hand with the net zero operational target which will hinge on reducing hot water demand in order to achieve the kWh/m2 target. It is therefore recommended that the 60l be seen as a soft target, and the more important target of operational energy consumption will be a stronger driver of water efficiency.

Design Principles:

These targets should be considered alongside the following design principles:
1. Provide low flow fittings and appliances
2. Provide waterless appliances where possible
3. Provide leak detection
4. Provide rainwater recycling and attenuation. Consider greywater recycling
5. Provide on-site reed bed black water cleansing and recycling if practicable
6. Create Sustainable Urban Drainage that supports natural aquatic habitats

Existing Sustainability Proposals:

The existing masterplan makes good use of planting and SuDs along the pedestrian areas in order to manage surface run off. The central park provides considerable rainwater attenuation. It is assumed that the precise greenfield run off rates have not yet been calculated according the methodology set out in the OKR Integrated Water Management Strategy, but that should these be exceeded, that the design team will review options to reduce this via methods such as further SuDs installations, green roofs and rain gardens.

The existing proposals include confirmation that water meters will be fitted to new homes as per legal requirements in place since 1990. Refurbished homes do not have to have water meters fitted. However it is recommended to offer these, and encourage their uptake. Water meters for

each home and the school will assist with leak detection as well as provide performance data and the ability to monitor and assist residents with managing water consumption. Water meters also enshrine fairness, as those residents whom use less water will see a reduction in their costs.

Further Sustainability Recommendations:

The design has not yet reached the stage of specification of fittings and fixtures however In order to meet the reduced water demand, it is anticipated that the new development will feature low-flow fittings and appliances. Low flow taps and showerheads are increasingly common. A flow rate of 5lt per minute for showerheads is currently possible.

It is important to consider the unintended consequences of significantly reduced water targets such as:

- High maintenance requirements of grey water recycling
- Difficulty of flushing low flow toilets (efficient design or vacuum systems should be considered)
- Consider impact on Victorian sewage system of low water use

Within the school, waterless urinals should be specified. Waterless urinals have been used for nearly 20 years in the UK and around the world and are an established technology. Leak detection should form part of the school building management system and fall under the remit of the building manager.
The use of rainwater recycling for use within a building poses significant challenges for both maintenance, operational and embodied carbon and health. Therefore it is not suggested that this form part of the sustainability strategy for the development.

However the use of rainwater for external irrigation is achievable within the new school. It is however recommended that this is taken up by the school on a small scale should they wish to do so on a small scale and in line with education initiatives such as 'Food Growing Schools London'.

The concept masterplan as it is currently developed contains SuDS installations at the southwestern edge of the development alongside the Old Kent Road. Incorporating further raingardens, with adequate safety provision for young children, will help to alleviate increased summer temperatures, and increased intensity of rainfall which are expected as climate change impacts in London.

We advise that a water and drainage strategy is prepared for the site covering drainage, rainwater harvesting for irrigation and potable water use to between 60l per person and 105l, the balance of green roofs for biodiversity vs clean roofs for rainwater harvesting, legionella compliance, flood risk management and reducing the urban heat island effect.

Figure 7: Example of Waterless Urinal

Sustainable Connectivity and Transport

The planning policies to which this outcome directly address are;

London Plan	3B.6	Promotion of high-speed broadband connections.
Southwark Cycling Strategy	Target 1,	Key target to increase mode share to 10% by 2026.
Movement Plan	M4,	Key target to reduce trips by motorbike and car to 13% by 2041. 80% of people walking, cycling or taking public transport by 2041. Reduction in CO2 NOX, PM 10, PM2.5. Increase the proportion of residents within 400m of strategic cycle network.
NSP	P50, P52, P53	Development must enhance walking networks, ensure routes are inclusive, enhance strategic networks such as the Green Chain walking route and Low Line The development should; integrate into the Southwark Spine cycling route, meet cycle parking requirements, provide a free two year cycle hire fob to residents where a scheme is locate within 400m of the development Provide electric vehicle charging points (EVCP) Provide car club bays proportionate to the size of the development
OKRAAP	AAP9, AAP 11	Ensure new neighbourhoods connect with existing communities, and provide safe and enjoyable walking and cycling routes for people to move around easily as they live, work and enjoy the area.

Targets:

The target for this outcome from RIBA is "to achieve net zero carbon emissions for transport by 2050. To support this target this outcome promotes the need to measure, manage and reduce the kgCO2 /per person/ per year of the occupants to the net zero target. (i.e. well within the personal annual carbon budget of approximately 1 TonneCO2 /per person/per year)"

Existing planning policies at the local level and existing activity to address active travel around the OKR area are more targeted and more relevant for this development. Therefore the following is suggested to address these targets.

Design Principles:

The following key relevant design principles are also provided via RIBA and included for consideration:

1. Create comprehensive green transport plan including digital connectivity
2. Provide high quality pedestrian and cycle links to local amenities
3. Provide end of journey provision for active travel runners and cyclists (showers, dry lockers etc)
4. Provide infrastructure for electric vehicles as a priority
5. Provide car sharing spaces
6. Provide suitable onsite personal storage

Existing Sustainability Proposals:

The current master plan includes provision of the same number of existing car parking spaces, which is a requirement from the residents' manifesto. Alongside this will be provision of electric car charging space and car club spaces. Cycle storage will be provided in safe secure spaces internal to blocks.

The existing pedestrian route mapping through the estate connects pedestrians to green routes to nearby green spaces. This is inline with the movement strategy and the NSP requirements. See figures 8 and 9 below.

The current masterplan includes improved benches, signage and shading in line with requirements to encourage walking. Access to the school will be via a shared use road, closed to traffic outside of school hours.

Figure 8: Green links

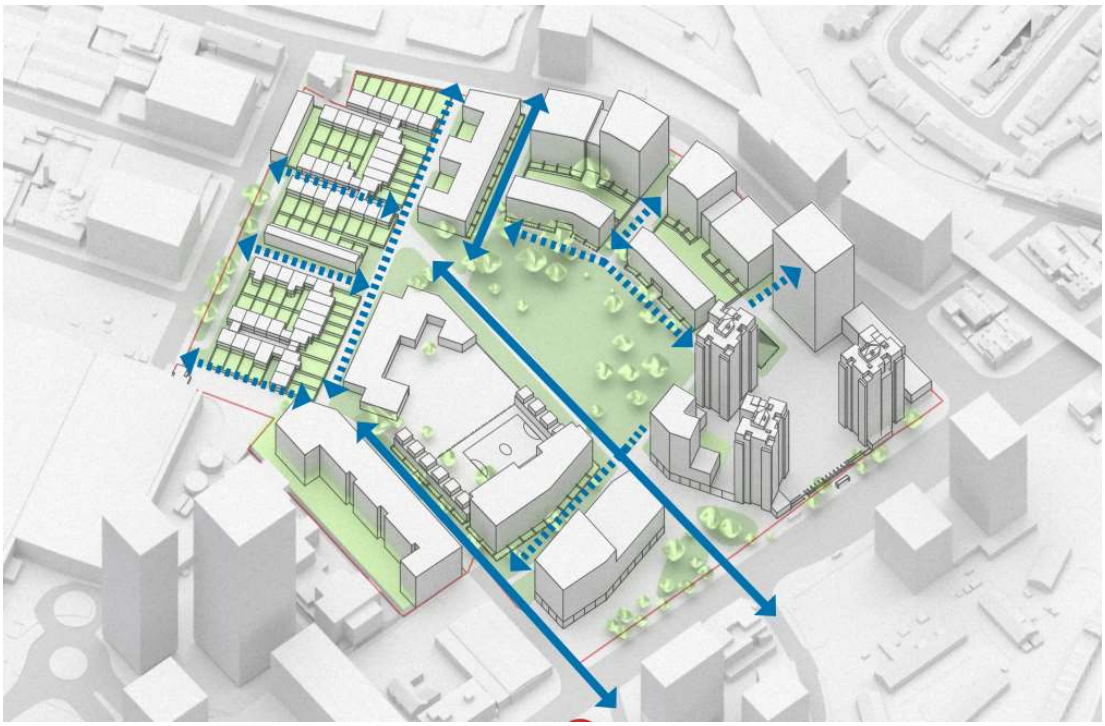


Figure 9: Pedestrian routes

Further Sustainability Recommendations:

The existing design does not currently clarify the proposed cycle routes between the homes and the existing and future cycle infrastructure along the Old Kent Road and Ilderton road. This should be reviewed and clarified in later iterations.

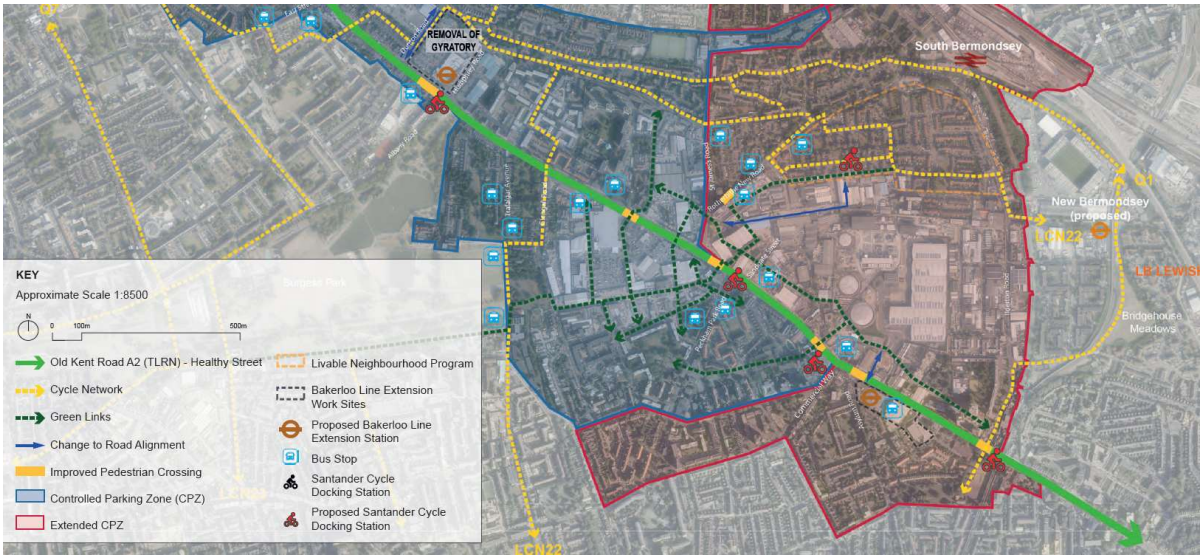


Figure 10: Movement Plan Map, taken from OKRAAP Dec 20

While it is proposed to include cycle storage within each block, further detailed is required to ensure the number of cycle storage places for residents and visitors is in line with the NSP P53. Secondly Cycle storage within Manor Grove Homes will need to be considered as part of a green transport plan. This plan should:

- Review existing travel patterns and opinions of residents towards active travel – identify constraints and opportunities
- Consider the current local environment for cyclists and walkers
- Consider the current and proposed disabled access
- Review public transport links to site and consider integration of the cycling and walking routes within the estate to the wider cycle network, green routes and public transport connections
- Address cyclist facilities include cycle storage, maintenance, cycling equipment storage e.g. panniers, helmet, clothing
- Provide a package of measures to support active travel such as 'borrow a bike scheme' and support to undertake cyclability training
- Consider the design and functionality of pavement and shared spaces in light of the following - "Currently 65 per cent of disabled Londoners consider the condition of pavements to be a barrier to walking, and 43 per cent report that obstacles on pavements, such as unnecessary signage, advertising boards and other clutter, are a barrier to walking more."
- Include existing design work regarding places to sit and shade, street design, benches trees and planters is incorporated. This will enable walking by vulnerable and disabled residents to be maximised.
- It is advised that pedestrian routes are shared spaced with cycle routes throughout the estate in line with advice and guidance from Southwark Council Transport Policy Team Lead.

Monitoring of the plan should be undertaken as part of wider transport monitoring conducted by London Borough of Southwark Highway and Active Travel teams, and TFL.

While the design includes the re-provision of an equal number of parking spaces to the existing estate, it should be noted that within the lifetime of the estate, local and national policy will encourage residents to move away from car ownership towards active travel and car clubs. Therefore the provision of car parking spaces for a small number of the total residents prevents this space being used for amenity that benefits the whole estate, such as additional play areas. One possible route to address this is to make the car parking permits limited to current owners, and for these permits and the equivalent spaces to be removed from use as they are retired by the owners. Over time this will result in a reduction of total parking spaces, which can then be regenerated into alternative useful spaces.

Construction Phase

During the construction phase of the development, a Construction Travel Plan will be implemented to promote cleaner and greener travel choices and will seek to eliminate reliance on the car by the construction workforce. Here, the Travel Plan Manager will liaise closely with the Southwark Council and TfL to encourage workforce use of public transport and car sharing schemes to minimise impacts on the local network. This will reduce vehicle movements to their minimum, reduce single occupancy car use, and promote alternative forms of transport.

Connectivity

Providers will deliver ultra-speed broadband telecommunications infrastructure to all residential users. Based on Fibre to the Premise Technology (FTTP), residential and business users will experience the fastest broadband speeds in London. The site-wide optical fibre network will support the latest in cellular telecoms 2G, 3G, 4G and the emerging 5G including small cell deployment. Such technologies will support connection of multiple Internet Protocol integrated systems from CCTV, Energy and Environmental Monitoring, through to platform to support SMART technologies and IoT (Internet of Things) enabled devices.

Sustainable Land Use and Biodiversity

The planning policies which this outcome directly address are;

Policy	Section	Requirement
London Plan	5.10, 5.11, 5.13, 7.14	Increase green surface area, increase number of trees, consider green walls and roofs.
Core Strategy	2.5, Strategic Policy 11	Invest in children through improvements to schools, youth provision, play spaces, links to jobs and provision of good quality homes. Protect woodland and trees and improve the overall greenness of places. Promote green corridors, gardens and local food growing. Promote and improve access to and links between open spaces, including green chains.
Natural Environment and Rural Communities Act 2006		Every public body must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.
Sustainable Design and Construction SPD	4	Development should orientate buildings and streets to minimise summer and maximise winter solar gain, use trees and other shading, include green roofs and walls, maximise natural ventilation, and help create green spaces. Green walls or roofs are to be included in all schemes, unless this is not feasible.
NSP	P59, P60	Developments should include “features such as green and brown roofs, green walls, soft landscaping, nest boxes, habitat restoration and expansion, improved green links and buffering of existing habitats.” Development must retain and protect significant existing trees Where trees are removed to facilitate development, they should be replaced by new trees which result in no net loss of amenity

Targets:

The RIBA targets for this outcome, in additional to those covered in the table above, are:

- significantly enhance the local flora and fauna post development compared to pre-development
- urban greening factor of 0.3 for non-domestic and 0.4 for residential developments

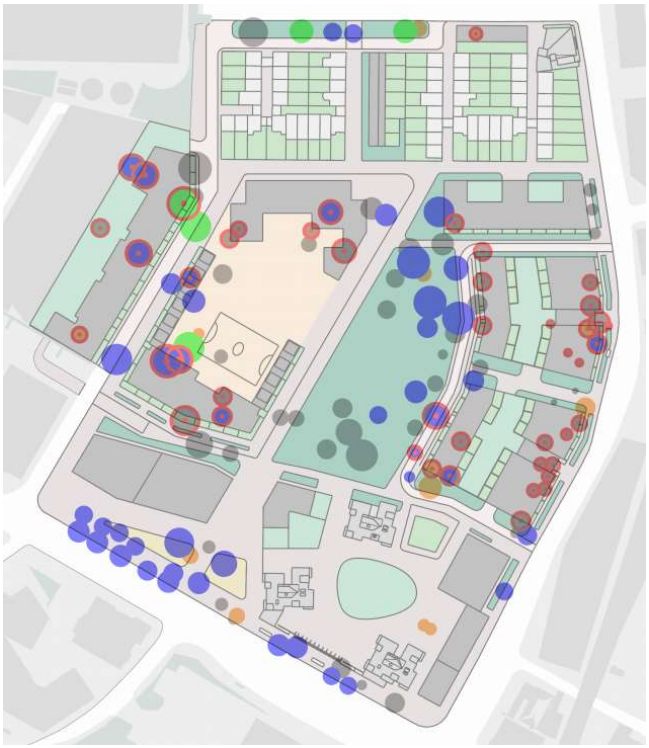
Design Principles:

The design principles to achieve these targets are:

1. Leave a site in better 'regenerative' ecological condition than before development.
2. Carry out sustainable remediation of site pollution
3. Retain existing natural features
4. Create mixed use development with density appropriate to local context
5. Create a range of green spaces (green roofs, vertical greening, pocket parks, green corridors)
6. Create habitats that enhance biodiversity
7. Create 'productive' landscapes for urban food production
8. Zero local pollution from the development

Existing Sustainability Proposals:

The existing development is set around a large park in the centre of the estate. The park includes space for play and dog exercise, pedestrian routes, green corridors and trees. Of 130 existing trees, 84 will be retained, with 46 relocated or replaced. Trees currently set within the central park of the estate will be retained, while those around the blocks and school will be relocated.



Tree Category	Existing	Relocated
Category A - Trees of high quality	5	1
Category B - moderate quality	47	13
Category C - low quality	65	27
Category U - Dead or Dying	13	5
Relocated Trees		
Total	130	46
Total Retained	84	

Based on TE Brief Appendix_11_Tree_Survey_26-08-16.

Figure 11: Trees to move retained or relocated

Community food growing and garden space is being considered above ground level both within the over-55's block and the remaining residential blocks. The location, size and landscaping of these has not yet been determined. An intensive green roof, known as a roof garden, typically has over 200mm of soil depth to allow for a range planting options and requires maintenance and irrigation. An extensive green roof, typically has between 40mm and 150mm of soil, and is planted with low-growing drought tolerant plants such as sedum. Maintenance and irrigation needs are usually only during establishment.

Further biodiversity and greenery is proposed at ground level within SuDs installations, and trees alongside the Old Kent Road as part of the pavement and pedestrian space. This can be seen in Figure 12 below.

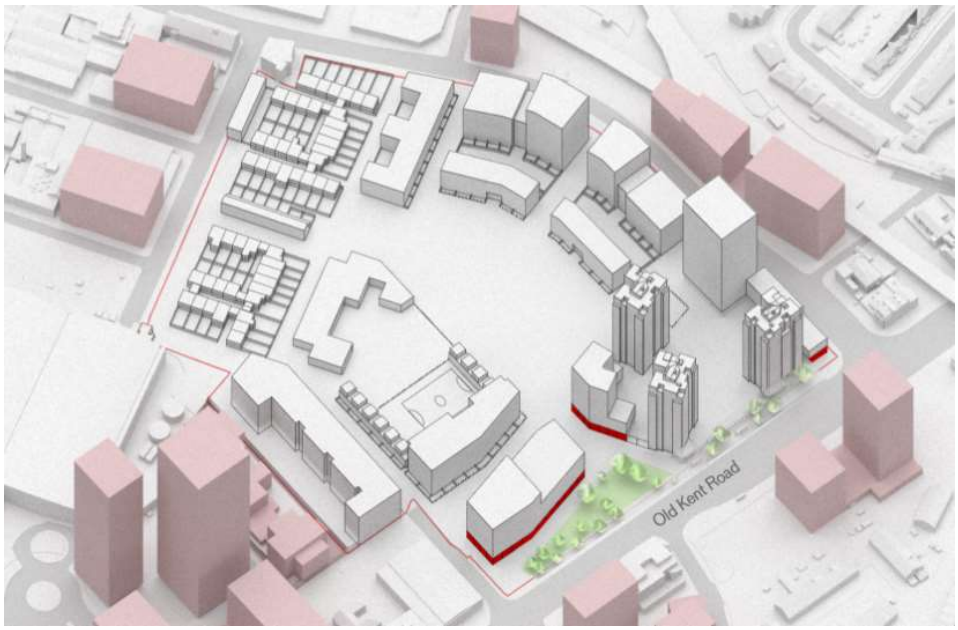


Figure 12: Canopy cover along OKR

Figure 13: Ground level approach from OKR heading north into the estate

Initial design drawings for the redeveloped primary school show trees and greenery to be located at ground level and onto of the ground level interior space with an increase in available green space for pupils.

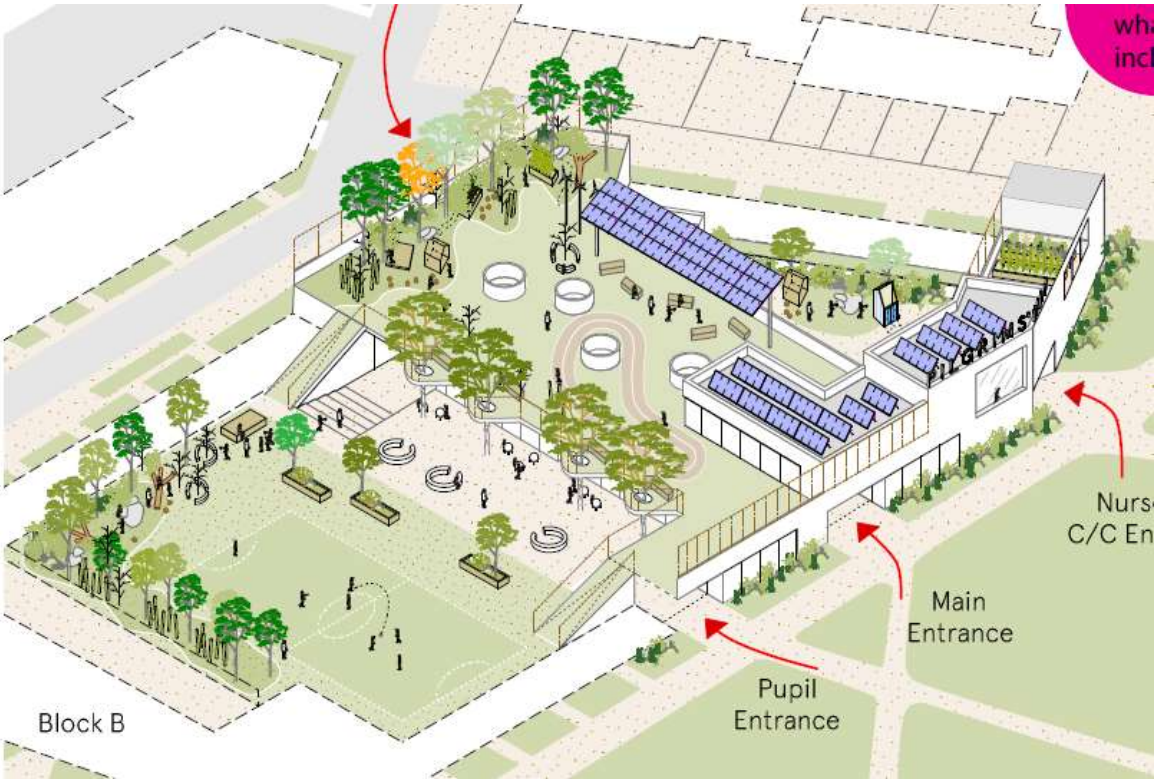


Figure 14: Pilgrims Way Primary School Initial Design

Further Sustainability Recommendations:

Where mature trees are to be relocated, it is recommended to replace them with a higher number of trees of similar mix of species, in order to in the long term, increase canopy cover.

Where roof gardens, community food growing or green roofs are proposed, there will be benefits for biodiversity, shading, rainwater attenuation of 50-90% depending on soil depth, significant cooling performance, carbon sequestration, noise abatement and general amenity but these should be balanced alongside the embodied carbon targets.

While extensive green roofs have less benefits for biodiversity than an intensive green roof, they can provide vital habitats for invertebrates, pollinators, birds and bats.

Adding green roofs will increase the structural weight of the building and therefore negatively affect the embodied carbon. However extensive green roofs have been shown to have a positive impact on the efficiency of PV systems when used together, as well as providing ballast over the top of the PV siting frame.

It is therefore recommended to site extensive green roofs alongside PV where the orientation allows. Secondly it is recommended to understand impacts on embodied carbon, and net heating and cooling demand across a full year alongside the benefits before confirming the type of roof possible and installation locations.

Biosolar roof, Clapham Park, Lambeth, London
Photo: Bauder

Figure 15: Example Extensive Solar Roof taken from https://livingroofs.org/wp-content/uploads/2019/04/LONDON-LIVING-ROOFS-WALLS-REPORT-2019.pdf

Where additional planting is proposed in the masterplan, it is recommended to pay careful consideration to the ongoing maintenance of these. The landlord should consider ways to facilitate volunteer input to upkeep, potentially in connection with the school.

Good Health and Wellbeing

The planning policies which this outcome directly address are;

Policy	Section	Requirement
London Plan	3.19, 7.4, 7.14, 7.15	Developments should increase or enhance the provision of sports and recreation facilities. Development should have regard to the form, function, and structure of an area, place or street and the scale, mass and orientation of surrounding buildings. It should improve an area's visual or physical connection with natural features Development proposals should minimise increased exposure to existing poor air quality and make provision to address local problems of air quality such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans. Development proposals should be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality. Development proposals should ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Development proposals should seek to manage noise by improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity).
Core Strategy	Strategic Policy 5, Strategic Objective 1C, Strategic Policy 11	Southwark's community will be healthy and active. By delivering sustainable growth people will have access to good health, education, sports, leisure and community facilities. Access to community facilities, health centres, libraries, religious centres and leisure facilities needed by a diverse community. The policies related to this theme are STP 1, STP 2, SP 1, SP 2, SP 3, SP 5, SP 6, SP 7, SP 8, SP 9 and SP 14. Identify and protect open spaces that provide quiet areas and relative tranquillity. New developments must provide space for children's play, gardens and other green areas. They must not harm protected and priority plants and animals.
Sports Legacy Plan		Linked to the London Plan, this aims to increase participation in, and tackle inequality of access to, sport and physical activity in London particularly amongst groups/areas with low levels of participation.
Sustainable Design and	5.3	Glazing should be used on windows to reduce noise levels inside buildings.

Construction SPD		Only use artificial lighting when necessary. This includes choosing the right strength of lighting for the task and installing timer switches and motion sensors where appropriate. Any lighting installed should be designed so that it is directed to where it is needed and does not spill into neighbouring residential properties. Lighting must not cause a hazard to navigation, drivers or other road users.
NSP	P64, P65	"Address the impacts of poor air quality on building occupiers and public realm users by reducing exposure to and mitigating the effects of poor air quality" "Avoid significant adverse impacts on health and quality of life; and 2. Mitigate any adverse impacts caused by noise on health and quality of life; and 3. Mitigate and manage noise by separating noise sensitive developments from major noise sources by distance, screening or internal layout, in preference to sound insulation."

Targets:

The RIBA target is to successfully achieve the following building related metrics:

Health Outcome	Metrics	References
Good Occupant Density	M^2 per person appropriate to building type	BCO, DfE, HQM
Good Personal Control	Time of response	Usable Buildings Trust
Good Indoor Air Quality	CO_2 , CO, NOX, PM2.5, PM10, Mould, VOC	CIBSE TM40, WELL v2
Good Thermal Comfort	°C	CIBSE TM59
Good Visual Comfort	Average daylight factor with uniformity 0.4	CIBSE
Good Aural Comfort	Reverberation time and Noise Rating NR appropriate to use	
Physical contact to Nature	Open window within 7m Biophilia- contact to views, Places, Plants, Natural Materials	BREEAM, WELL

The health and wellbeing of council tenants is a particular focus, considering the increased proportion of vulnerable occupants. In particular Air Quality is subject to an enhanced focus within the London Borough of Southwark as well as general ventilation to mitigate risk of damp and condensation within properties and communal areas.

The strategic intent of this outcome is to ensure that in the effort to achieve low operational and embodied carbon, the building occupant and their wellbeing is not de-prioritised.

Design Principles:

The following design principles are provided to achieve the outcome:

1. Provide spaces with strong visual connection to outside
2. Provide responsive local controls e.g. opening windows, or local control of HVAC systems
3. Design spaces with appropriate occupant density for activity
4. Design spaces with good indoor air quality
5. Design spaces with good indoor daylighting, lighting and glare control
6. Design spaces to adaptive thermal comfort standards
7. Design spaces with good acoustic comfort
8. Design spaces that are inclusive and universal accessible
9. Prioritise active circulation routes, e.g. stairs, cycling provision, and walking routes
10. Provide indoor and outdoor planted space

Existing Sustainability Proposals:

The existing master plan for the development includes wide use of balconies, private garden space, roof gardens, and sightlines aligned with a connection to the wider space. The existing proposals achieve inclusive, universally accessible public spaces, and active circulation routes. The blocks have been placed to overlook green spaces achieving a physical connection to nature.

The design team have consulted on space for outdoor recreation space for the over 55's. The resident feedback is supportive of outdoor gym and outdoor games facilities but overall would like this accessible for all ages. The design team should therefore consider opportunities to provide these facilities for use by all residents in order to provide sports, leisure, community and recreational facilities for all residents.

Further Sustainability Recommendations:

As the design progresses through the design stages and more detail is added, the following should be considered.

Controls

The design proposal should ensure to provide local control to residents to enable them to control heat, hot water and ventilation in their homes. Design, training and hand over of controls should be subject to resident engagement. Poor usability of controls will greatly impede the efficient operation of the systems.

Preferentially overheating risk and purge ventilation in residencies is to be controlled via opening external fabric (e.g. windows, dedicated vents) with cross ventilation, and not using mechanical systems. This may conflict with requirements to control environmental noise and where this occurs a careful balance of risks is required to be considered by the design team, potentially with input from Building control and environmental heath teams. While it is anticipated that mechanical ventilation will be necessary to achieve the operational carbon target, it is important this can be bypassed if required or desired by residents. Inability to have personal control over their home environments do so will negatively affect residents' health and wellbeing. Additional considerations of control function and design can be found within the strategic consideration of the operational carbon section above.

Indoor Ventilation

Indoor air quality will be impacted by the ventilation design as well as air pollution ingress from external air. However it is recommended to be mindful of the risks to indoor air quality arising from fit out of high VOC materials. VOCs are Volatile Organic Compounds with a low boiling point and therefore a tendency to evaporate. These can be found in petrol exhaust fumes as well as in paints, personal care products, cleaning products, air fresheners, furnishing and fittings. The effect of VOC emission to the indoor environment, sometimes referred to as off-gassing, has been linked to a number of detrimental health impacts which are loosely referred to as 'sick building syndrome'. To avoid this it is necessary to ensure occupant control over ventilation and increased ventilation following fit out and decoration. Where possible VOC free or low VOC products should be specified.

Ref: https://asbp.org.uk/wp-content/uploads/2016/08/Every-breath-we-take.-Full-Report-Low-res.4.pdf

In the current proposed layout for flats, not all designs allow for cross ventilation. Where this is not possible, the design team should demonstrate how adequate ventilation rates will be achieved.

Daylighting

Indoor daylighting should be considered at an early stage alongside orientation, glazing, solar gain and visual connections to the outside. The existing layout designs show good potential for daylighting with windows at either side of some of the flat layouts. Competing priorities will need to be balanced and can be reviewed via a daylight model alongside an energy model which will provide understanding of solar gain.

Sustainable Communities and Social Value

The planning policies which this outcome directly address are;

Policy	Section	Reference
Fairer Future Commitment		Embed social value into the procurement process Quality affordable homes Safer communities through the use of CCTV, estate safety doors and Women's safety charter
OKRAAP Dec20	AAP4, 5, 10	Provide 4 bedroom socially rented homes, provide older peoples housing, Enable our residents to take pride in and feel responsible for their homes and local area. Retain or increase the amount of employment floorspace (GIA) on site Places make a positive and sustainable contribution to Old Kent Road and create vibrant, attractive, healthy, safe and distinguished places where people want to live, work and visit. Adhere to 'Secured by Design' principles Foster a positive relationship of the overall scheme design with existing residential communities and provide benefits for existing local residents. Provide the highest quality children's play space which should be integrated with landscaping design. As a minimum, the play space should contain provision for wet play, sand play, space to grow plants and food and sufficient seating. Where provision is being made for older children this should include outdoor and/or indoor provision for active uses such as table tennis, and provision for covered seating areas/spaces in which to hang out.
Southwark Plan and Core Strategy	4.5	"We want to create a more distinctive environment on Old Kent Road at a scale that is comfortable to walk around. We would like new homes to overlook streets and spaces so that there will be much better natural security. The area will benefit from good urban design and high-quality architecture to transform it into a place with its own identity rather than a busy road. These must be within a strategy for improved accessibility for pedestrians, cyclists and public transport users, and an enhanced public realm."

Targets:

The ultimate goal for this outcome is to create places for people that support not only basic needs of security, shelter, and health, but to enhance individual and social wellbeing, and community identity. The social value of the new development should be measured via use of the Social Value Toolkit (SVT) as development and published by RIBA.

The targets, as defined by the SVT are:

1. I feel in control of my life – currently valued at £15,894 a year by the HACT Social Value Bank.
2. I talk to neighbours regularly – currently valued at £4,511 by HACT.
3. I feel a sense of belonging in my neighbourhood – currently valued at £3,753 by HACT.
4. I am able to take frequent mild exercise – currently valued at £3,537 by HACT.
5. I am active in a tenant's group – currently valued at £8,116 by HACT.

Design Principles:

The design principles to help achieve social value are:

1. Prioritise placemaking that expresses identity and territory
2. Create secure places for privacy
3. Create places for social interaction
4. Create vibrant mixed-use places
5. Provide high quality permeable links to social amenities
6. Provide High quality pedestrian public realm
7. Create inclusive places for community interaction
8. Create secure places with overlooking views

Existing Sustainability Proposals:

The design of the amenity space is orientated towards the central green space with will operate as a vibrant mixed-use space with safe areas for children's play which will be located within close proximity to the school. Provision of outdoor play and exercise equipment for all ages should be considered. For example, the design team are currently consulting on the provision of leisure activities and opportunities for young people and the over 55s. It is expected that these will be visible in later design iterations.

There currently exists a residents' association which has been involved in the discussion around the development so far, and also a residents' manifesto. Community consultation and engagement is mediated by an independent organisation with significant expertise.

The pedestrian public realm has been developed and designed to a high standard which meets the planning requirements laid out in the table above. The features of the pedestrian public realm are covered within the transport and land use sections above.

The tenure mix, provision of social housing and typologies of building are all in line with the requirements of the OKRAAP.

The use of brick as a façade meets the requirements to retain the character of the area, as specified in the AAP of the OKRAAP.

The green spaces are overlooked by front doors and balconies, in order to provide secure places with overlooking views.

Further Sustainability Proposals:

The aims and objectives of this outcome should be reviewed in careful consideration against the concerns of residents regarding anti-social behaviour and perceptions of safety. Consultation with the police and residents' association alongside review of the lighting and pedestrian routes will help the design team avoid creating 'black spots' without sightlines and adequate lighting.

Sustainable Life Cycle Cost

The planning policies which this outcome directly address are;

Policy	Section	Reference
Fairer Future Values		Spending money as if it were coming from our own pockets
Sustainable Design and Construction SPD	Appendix 6	Developers should consider the potential benefits of renewables to themselves and others, as part of the process of deciding which technologies to include in development proposals. This could include considering running costs reductions or other whole life benefits to the end users of the building. Reduced running costs through energy and water efficient buildings and landscaping. Calculate the costs of technically feasible renewable technologies included in the study. This is particularly important where cost is a factor in ruling out renewable technologies.

Targets:

This outcome relates to an understanding of the implications on operational costs from the design. The objective is to ensure that decisions made in order to reduce build costs, do not increase costs during operational stages.

For this development, the operational costs to the client include maintenance of the systems and connection to the SELCHP Network. However, the monitoring of operational costs of residents will ensure where vulnerable residents are at risk of fuel poverty or where there is a risk of health impacts from incorrect or inadequate functioning of building systems, this is understood. The sustainability targets around operational energy and water consumption will also serve to ensure low lifecycle costs.

The target for this outcome is to measure and benchmark the operational running costs of a building in use as per £/m2 using ICMS Life Cycle method of measurement. And compare this to the return on investment value created by the project, including rental value, building value, and social value as described in the previous section.

Design Principles:

The key design principles for this outcome are:

1. Carry out whole life cycle analysis of key building systems
2. Carry out Soft Landings or RIBA Plan for Use processes
3. Measure energy costs
4. Measure management and maintenance costs
5. Metering of each residential unit will be required, and used as part of the energy services agreement between the client and residents
6. Measure overall running costs
7. Measure added value of occupant health and wellbeing

Existing Sustainability Proposals:

The development is predicated on achieving a business case by selling a portion of the new homes at market rates, while others will be available for social rent. LBS is seeking for sustainability goals to be delivered within the project financial constraints. Where build cost increases the impact should be modelled on the lifecycle costs for the project.

Further Sustainability Recommendations:

LBS also needs to understand how development has been designed to minimise the lifetime maintenance costs and facilitate council operations, for example the implications of enhanced lifetimes for external elements. Additionally, how a development has been designed for safe maintenance access for council operatives and designing out requirements to access tenants properties to undertake statutory maintenance requirements e.g. services, energy and ventilation equipment servicing.

As part of the ME strategy ensure lifecycle analysis is carried out which include maintenance as well as operation. Useful resources to achieve this include a study By Currie and Browne which calculated the abatement cost of different approaches to low carbon building. Key findings include:

- "Ultra-high efficiency housing is more cost-effective than making smaller improvements on current regulatory requirements. Ultra-high levels of energy efficiency are generally found to be more cost-effective than tightening to 20- 30 kWh/m2 /yr of space heat demand. This reflects a significant (up to c.£3,300) saving in the capital cost of the radiators and heating distribution system which helps offset some of the additional costs associated with the most energy efficient fabric specifications.
- Where MVHR is used it should be paired with efforts to achieve very high levels of airtightness. The use of MVHR in homes without high levels of airtightness (i.e. 2.0 m2 /m3 /hr or below) could result in additional running costs because the costs of operating the fans outweigh the savings in reduced energy consumption."[4]

The performance gap is a well document problem where buildings do not operate as efficiently as they are designed. The reasons for this are usually largely associated with a lack of suitable

[4] Ref: www.theccc.org.uk/wp-content/uploads/2019/07/The-costs-and-benefits-of-tighter-standards-for-new-buildings-Currie-Brown-and-AECOM.pdf

training and poor commissioning. Commissioning across the school and the residential blocks should be carried out throughout the first year of operation, on a seasonal basis. As part of the construction and handover process utilise the Soft Landings programme to address the performance gap and ensure smooth transition of the new buildings.

BREEAM

To draw together the sustainability strategy aspirations, comply with future policy and assist in monitoring sustainability throughout the construction and occupation periods it is proposed that the BREEAM standard is used in non-domestic properties. This provides 3rd party audited assurance against a range of sustainability criteria, including elements within the categories above.

For clarity, BREEAM is not available or applicable to new build residential areas.

The targets for both the School and the Business units are a BREEAM 'Excellent' rating, to comply with proposed Southwark planning policy. Ratings are available that exceed Excellent (for example, Outstanding). It is recommended that the client undertakes BREEAM pre-assessments at the next design stage to understand the design implications of these targets in relation to any particular site constraints, and to consider any alternative rating they wish to make a design target.

The business units are proposed to be completed to a 'Category A' finish level (i.e. basic M&E fit out). As such, not all criteria will be able to be assessed as the final fit out will not be present. This is normally installed by a future occupant. To mitigate the risk of non-compliance with the BREEAM criteria at Fit-out, it is proposed that the London Borough of Southwark adopt a 'green lease' approach whereby relevant energy, environmental and BREEAM performance standards are captured within the legal agreement between the council acting as a landlord, and the occupying party. This assists in mitigating the risk that future fit-out does not continue to meet the standards of the initial build out in these areas.