West Midlands Combined Authority

Homes for the Future

Proposed Technical Standard

Rev 10

Cast

usefulprojects

8th December 2023

Introduction

The Homes for the Future Technical Standard feeds into our WMCA Homes for the Future Strategy. It clearly lays out the required targets for stakeholders delivering residential development on land that WMCA owns, acquires or invests in with a tiered approach that progressively increases targets over time to allow the market and applicants to adjust to the standard.

The net-zero carbon targets have been developed in relation to the principles established in WMCA's Zero Carbon Homes Charter and Routemap. In order to meet and better our goals of delivering 18,000 high quality sustainable homes per year by 2031, we have aligned both zero-carbon principles along with AMC/MMC strategies. This will enable the scalability of zero-carbon homes, as well as addressing current challenges with the traditional skills sector. Through optimising the number of pre-manufactured components utilised within projects through the use of Modern Methods of Construction (MMC) there is also the potential to reduce whole life carbon of homes. The underlying aim of adopting MMC on a construction project is to drive the most efficient design and construction process. These systems work to generate a systemised approach to development, resulting in simpler designs and less overall waste, factory settings allow greater opportunities for waste to be recycled and repurposed.

The means of achieving targets however have been left up to the individual applicant, this flexibility should encourage innovation and support adaptation to the standard. Potential approaches that applicants could apply have been included within this document to provide some ideas as to how the targets could be met. These have been included within the wider context of land use and infrastructure planning that applicants could consider in order to facilitate sustainable living and further sustainable benefits.

Homes for the Future – Principles, targets & alignment

Principles

Homes for the Future is vital to meet WMCA's net zero carbon emissions by 2041 and deliver zero-carbon homes in the region by 2025. It has been developed on the following basis:

- Creating a policy landscape which builds certainty and consistency around the approach to delivering zero-carbon homes in the region
- Building on exemplar industry guidance and emerging standards including the RIBA and LETI challenge targets and the UK Net Zero Carbon Buildings Standard, to provide a clear trajectory for the West Midlands
- Adopting collaborative governance models and delivery processes to maximise resources and enhance knowledge-sharing
- Aligning investments to support the delivery of zero-carbon homes and demonstrating the cost effectiveness of doing so
- Building our capacity, regional skills and expertise in zero-carbon homes
- Facilitating the deployment of zero-carbon technologies to build an innovation-led green economy
- Recognising that land use and infrastructure planning have a material impact on the carbon footprint of a place, consideration of the wider principles of site selection
- Carbon is one component of sustainable placemaking alongside ecosystem resilience, sustainable mobility, circularity, wellbeing and inclusion

Target Setting and Alignment

In order to meet our commitments and long-term objective to deliver zero carbon homes, the following targets have been set for all new homes delivered in the region.

WMCA Net Zero Targets:

2030 Target:

- Energy, EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand of <15KWh/m2/yr
- Embodied Carbon: Upfront embodied carbon of <300kgCO2/m2 (A1-A5).

2025 Target:

- Energy, EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand: <15 KWh/m2/yr
- Embodied Carbon: Upfront embodied of <400kgCO2/m2 (A1-A5).

Statutory Plus Target:

- Dwelling Emission Rate against the Target Emission Rate of Building Regulations Part L 2021, or associated updates.
- Embodied Carbon: As a minimum all delivery partners must measure embodied carbon impacts of the proposed construction.

Technical Standard: Overview

The standard sets out three primary requirements to be achieved for each dwelling.

1. **Energy Use Intensity (B6)**

   Energy Use Intensity (EUI) should be measured using appropriate modelling software such as Passivhaus Planning Package (PHPP) for both regulated and unregulated energy, in accordance with CIBSE TM 54. Space heating demand should be reported separately. The standard sets out progressive targets to facilitate the achievement of net zero homes in operation by 2025. Where targets cannot be achieved at a dwelling level, due to site constraints on orientation, they should be achieved on average within the development boundary. We are also requiring EUI to be assessed alongside overheating risks.

2. **Upfront Embodied Carbon (A1-A5)**

   Upfront embodied carbon should be measured in accordance with RICS Whole Life Carbon Assessment Guidance.

3. **Modern Methods of Construction**

   Measured using the Pre-Manufactured Value metric adopted by the Construction Leadership Council. The aim is to drive pre-manufactured solutions that enable better building performance generally but also contribute to improved sustainability performance specifically, especially relating to measures 1 and 2 above.

2030 Target - Achieve net zero carbon in construction and in operation

Energy Use Intensity:

- EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy).
- Space heating demand of <15KWh/m2/yr

Upfront Embodied Carbon:

- Embodied carbon calculation to verify target equivalent to <300kgCO2/m2

Modern Methods of Construction:

- All developments achieve PMV of 55%

2025 Target - Achieve net zero carbon in operation

Energy Use Intensity:

- EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy).
- Space heating demand:15-20 KWh/m2/yr

Upfront Embodied Carbon:

- Embodied carbon calculation to verify target equivalent to <400kgCO2/m2

Modern Methods of Construction:

- All developments achieve PMV of 50%

Statutory Plus Target - Enhanced measurement and monitoring

Energy Use Intensity:

- Dwelling Emission Rate against the Target Emission Rate of Building Regulations Part L 2021

Upfront Embodied Carbon:

- As a minimum all delivery partners must measure embodied carbon impacts of the proposed construction.

Modern Methods of Construction:

- Review opportunity for PMV uplift across all MMC categories

Targets

	2030 Target - Achieve net zero carbon in construction and in operation	Commentary and Context
2030	**Energy Use Intensity:** • EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). • Space heating demand of <15KWh/m2/yr **Upfront Embodied Carbon:** • Embodied carbon calculation to verify target equivalent to <300kgCO2/m2 **Modern Methods of Construction:** • All developments achieve PMV of 55%	This standard sets the expectation of achieving net zero carbon in construction and operation in 2030 (in accordance with UKGBC definition). Again, pilot projects may achieve this standard sooner, although it will require significant learning and sharing of intelligence about the design and construction solutions that enable this standard to be achieved. It will also require the construction sector and materials supply chain to respond to client demand to achieve this level of performance.
2025	**Energy Use Intensity:** • EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). • Space heating demand:15-20 KWh/m2/yr **Upfront Embodied Carbon:** • Embodied carbon calculation to verify target equivalent to <400kgCO2/m2 **Modern Methods of Construction:** • All developments achieve PMV of 50%	This standard sets the expectation of achieving net zero carbon in operation in 2025 (in accordance with UKGBC definition). Pilot projects will likely achieve this standard sooner, and it will replace the current minimum standard in 2025.
Statutory Plus	**Energy Use Intensity:** • Dwelling Emission Rate against the Target Emission Rate of Building Regulations Part L 2021 **Upfront Embodied Carbon:** • As a minimum all delivery partners must measure embodied carbon impacts of the proposed construction. **Modern Methods of Construction:** • Review opportunity for PMV uplift across all MMC categories	A “statutory (plus enhanced measurement and monitoring)” standard has been developed to enable the incremental implementation of the 2025 Target standard. It is certain to be the case that developments will come forward that are at an advanced design stage and are therefore limited in the extent to which an enhanced specification can be deployed. The statutory plus standard will respond in those cases by requiring additional considerations of developers, such as a requirement to measure both whole life carbon and PMV assessments before and after completion. This is intended to drive up understanding of the core issues, solutions for enhanced performance, and ensure that as a minimum all developments start to consider the steps that will be mandatory in future.

Evidence for all standards - Energy

Statutory Plus Target	Dwelling Emission Rate against the Target Emission Rate of Building Regulations Part L 2021.

Planning

- Building Regulations compliance modelling to be carried out to verify as-designed energy and carbon performance against target reductions.
- Overheating analysis to be undertaken for all habitable spaces across the scheme to ensure high levels of occupant comfort are achieved (e.g., following CIBSE TM59 Design methodology for the overheating risk in homes).

Design verification

- Planning stage studies to be verified against design updates to ensure proposals remain on track to meet their planning targets

Post-occupancy

- The effectiveness of measures will be reviewed as part of the post completion works to ensure as-designed

2025 Target	<35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand:15-20 KWh/m2/yr.

Planning

- EUI to be assessed in accordance with CIBSE TM 54 using modelling software such as the Passivhaus Planning Package (PHPP). The assessment will include both regulated and unregulated energy so that comparison can be undertaken at post occupancy to close the 'performance gap'. Space Heating Demand should be set out as part of this assessment. The assessment shall be undertaken for a representative sample taking account of different typologies and orientation. Details of the fabric and MEP specification should be provided including thermal bridging analysis. Processes for ensuring requirements can be delivered should also be included, such as Passivhaus accreditation, air permeability testing and performance contract requirements
- A comprehensive overheating analysis of all habitable spaces across the scheme shall also be undertaken to ensure overheating risks are mitigated. This should be done in accordance with CIBSE TM59 and be modelled using future climate files

Design verification

- Planning stage studies to be verified against design updates to ensure proposals remain on track to meet the planning and target scenario

Construction

- Air tightness testing to be carried at construction stages to verify building airtightness against the strict targets required to achieve the low energy ambitions

Post-occupancy

- POE verification on the buildings operational performance will be carried out to ensure a positive feedback loop to support future project delivery. POE evidence will include in-use energy consumption data and user satisfaction feedback
- Energy use guidance to be provided to all residents to support reduced operational energy of all electrical equipment, including supplementary lighting

Evidence for all standards - Energy

2030 Target	<35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand of <15KWh/m2/yr.

Planning

- EUI to be assessed in accordance with CIBSE TM 54 using modelling software such as the Passivhaus Planning Package (PHPP). The assessment will include both regulated and unregulated energy so that comparison can be undertaken at post occupancy to close the 'performance gap'. Space Heating Demand should be set out as part of this assessment. The assessment shall be undertaken for a representative sample taking account of different typologies and orientation. Details of the fabric and MEP specification should be provided including thermal bridging analysis. Processes for ensuring requirements can be delivered should also be included, such as Passivhaus accreditation, air permeability testing and performance contract requirements.
- A comprehensive overheating analysis of all habitable spaces across the scheme shall also be undertaken to ensure overheating risks are mitigated. This should be done in accordance with CIBSE TM59 and be modelled using future climate files.
- BRE Home Quality Mark (HQM) assessment. HQM measures the quality and sustainable value considering running costs, health and wellbeing, and environmental footprint. HQM assessment is carried out a numerous stages of the design process by an independent assessor to demonstrate high-quality homes within the marketplace.
- Commitments to technologies and evidence of design strategies should be provided.

Design verification

- Planning stage design statement should be submitted to verify that design development is in accordance with planning stage carbon statements and confirm proposals remain on track to meet their planning targets.

Construction

- Air tightness testing to be carried at construction stages to verify building airtightness against the strict targets required to achieve the low energy ambitions.

Post-occupancy

- POE verification on the buildings operational performance will be carried out to ensure a positive feedback loop to support future project delivery. POE evidence will include in-use energy consumption data and user satisfaction feedback.
- All developments to have in place a recognised monitoring regime to assess energy use, indoor air quality and risk of overheating.
- Energy use guidance to be provided to all residents to support reduced operational energy of all electrical equipment, including supplementary lighting.

Evidence for all standards - Embodied Carbon

Statutory Plus Target	As a minimum all delivery partners must measure embodied carbon impacts of the proposed construction.

Planning

- Building Regulations compliance modelling to be carried out to verify as-designed energy and carbon performance against target reductions.
- Whole life carbon analysis to be carried out to estimate the predicted whole life carbon impacts of development in accordance with RICS Whole life carbon assessment for the built environment methodology.

Design verification

- Planning stage studies to be verified against design updates to ensure proposals remain on track to meet their planning targets.

2025 Target	Up-front embodied carbon calculation to verify target equivalent to <400kgCO2/m2 (A1-A5).

Planning

- Whole life carbon analysis to be carried out to estimate the predicted whole life carbon impacts of development in accordance with RICS Whole life carbon assessment for the built environment methodology. Evidence of optioneering to be carried out prior to planning to ensure an optimised construction solution is taken forward. Analysis should be undertaken using BREEAM compliant LCA tools with Environmental Product Declarations for key components. This requires designs to be sufficiently developed (RIBA Stage 3) to support an elemental bill of quantities assessment or a condition to undertake this through reserved matters.

Design verification

- Planning stage studies to be verified against design updates to ensure proposals remain on track to meet their planning targets
- Whole life carbon analysis to be carried at the end of each RIBA Stage, to ensure proposals remain on track to meet the target scenario

Evidence for all standards - Embodied Carbon

2030 Target	Up-front embodied carbon calculation to verify target equivalent to <300kgCO2/m2 (A1-A5).

Planning

- Whole life carbon analysis to be carried out to estimate the predicted whole life carbon impacts of development in accordance with RICS Whole life carbon assessment for the built environment methodology. Evidence of optioneering to be carried out prior to planning to ensure an optimised construction solution is taken forward. Analysis should be undertaken using BREEAM compliant LCA tools with Environmental Product Declarations for key components. This requires designs to be sufficiently developed (RIBA Stage 3) to support an elemental bill of quantities assessment or a condition to undertake this through reserved matters.

Design verification

- Planning stage design statement should be submitted to verify that design development is in accordance with planning stage carbon statements and confirm proposals remain on track to meet their planning targets
- Whole life carbon analysis to be carried out at the end of each RIBA Stage, to ensure proposals remain on track to meet the target scenario

Construction

- Construction stage verification of operational and embodied carbon performance and tracking any changes made, especially material or technology choices, and including site emissions of fuels/ power/ waste

Evidence for all standards - Construction

Statutory Plus Target	Review opportunity for PMV uplift across all MMC categories

DfMA and PMV

- PMV estimate at design stage and updated PMV estimate following MMC options review using the Cast MyPMV tool
- Output of MMC options review
- Verification of PMV and MMC solutions deployed

2025 Target	All developments achieve PMV of 50%

DfMA and PMV

- DfMA and PMV reviews undertaken at key design stages
- Verification of 50% PMV both during design and at completion using the Cast MyPMV tool

2030 Target	All developments achieve PMV of 55%.

DfMA and PMV

- DfMA and PMV reviews undertaken at key design stages.
- Verification of 55% PMV both during design and at completion using the Cast MyPMV tool

Statutory Plus – Potential approaches

	Statutory Plus Target	Potential approach	Example Specifications
Energy	Dwelling Emission Rate against the Target Emission Rate of Building Regulations Part L 2021	**Passive Design** The following passive design strategies meet the Statutory Plus performance requirements: At masterplan-level, priority will be given to higher density accommodation for its improved form factor and associated reductions in heat loss and overall improved massing efficiency.	**Fabric specification** Design of dwellings will go beyond current building regulation fabric performance standards. Therefore, we would expect dwellings to target the following fabric performance as a minimum: • Floor (W/m2.K): 0.13 • External wall (W/m2.K): 0.18 • Roof (W/m2.K): 0.13 • Windows (W/m2.K): 1.40 • Air permeability (m3/(h.m2): 5.00
		Active Systems To achieve operational performance in line with the statutory plus target we anticipate the design to consider the following key features as a minimum:	**No Gas** Commitment to no new gas installations across the entire masterplan.
			Zero Carbon Feasibility Study A low zero carbon feasibility study will be used to identify the key measures for implementation at both a site-wide masterplan level and building level.
		Renewables and Net Zero Targets	**Renewables** Maximise on-site renewable energy generation irrespective of whether carbon reduction targets are already met.
			PV Panels Roof-top solar PV should be optimised across the site. Evidence will be sought to validate the environmental claims of energy suppliers.

Statutory Plus – Potential approaches

Embodied Carbon

Statutory Plus Target	Strategies	Example Specifications
As a minimum all delivery partners must measure embodied carbon impacts of the proposed construction	To demonstrate performance in line with requirements set out under the Statutory Plus target, we anticipate the following as a minimum:	**Lifecycle Assessment** • Design and completion stage lifecycle assessment of embodied carbon in accordance with BS EN 15978 and in the built environment. Reporting standards should be aligned with relevant industry guidance at the time of assessment (RICS Professional Statement for Whole Life Carbon Assessment) **Key reporting standards from 2023:** • Assessment to include all works elements (including services, FFE, internal finishes, external works) and min., 95% of building elements as measured by cost, with the exception of on-site renewables and associated infrastructure (e.g.. battery storage), which should be reported separately. Generic values may be used for non-fixed elements (FFE) where no data available. • 'Up-front' carbon reporting (life-cycle modules A1-A5) should exclude sequestration (e.g., in timber materials)

Construction

Statutory Plus Target	Strategies	Example Specifications
Review opportunity for PMV uplift across all MMC categories	The design process should accommodate an informed reviews of construction methodology and material selection, with a focus on optimising PMV. PMV should be estimated at the design stage, updated to reflect which MMC options have been selected, and subsequently re-measured post-completion.	**MMC Cat5: Non-structural Assemblies** • This category can also be combined with elements of categories 2, 3, 6 and 7 to drive further PMV improvement. i.e., Cat 2c frame and Cat 5a bathroom pod creates an 18% uplift to 58% PMV from traditionally built typically at 40% PMV. **MMC Cat6: Traditional Building Product Led Site Labour Reduction/ Productivity Improvements** • This category can also be combined with elements of all other categories to drive further PMV improvement. **MMC Cat7: Site Process Led Labour Reduction/ Productivity Improvements** • This category can also be combined with elements of all other categories to drive further PMV improvement.

2025 Target – Potential approaches

	Targets	Strategies	Example Specifications
Energy	EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand:15-20 KWh/m2/yr	**Passive Design** We anticipate the following passive design strategies and component choices to meet the 2025 targets:	**Fabric specification** 1. Exemplary façade performance to be achieved through high performance materials specification and build ups: • Floor (W/m2.K): 0.11 • External wall (W/m2.K): 0.15 • Roof (W/m2.K): 0.11 • Windows (W/m2.K): 0.80 Dwelling design will carefully consider junction details to reduce heat loss and significantly reduce thermal bridges.
			Airtightness 1. Airtightness levels to achieve 0.6 air changes per hour @50Pa. This will be achieved through rigorous standards in practice from good design to construction.
			Façade design (Glazing, solar gains and shading) 1. Specification of triple glazing to limited heat loss and reduce cold draughts. 2. Layout and orientation of homes to be considered in context of the wider masterplan site to ensure potential solar gain benefits are achieved. 3. Glazing will be optimised to balance daylight and overheating requirements. This will account for up to 25% glazing ratio in southern elevations to avoid excessive heating demand in winter months whilst reducing the risk of summertime overheating. 4. Potential for a natural ventilation strategy should be explored with priority given to cross ventilation.

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2025 Target – Potential approaches

	Targets	Strategies	Example Specifications
Energy	EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand:15-20 KWh/m2/yr	**Active Systems** To achieve operational energy performance in line with the 2025 targets we would anticipate the building to incorporate the following active systems:	**Heat Pumps** 1. All electric building services strategy adopting high efficiency heat pump technology. Direct electric space heating can be adopted where high fabric performance achieved.
			MVHR 1. Mechanical ventilation with heat recovery (MVHR) including air filtration, improving indoor air quality and reducing dust and allergens: • MVHR heat recovery efficiency: >75%. • MVHR electrical efficiency: <0.45Wh/m2
			Supplementary heating 1. Where heating demand is low due to the passive approach, priority will be given to low energy systems that take advantage of post-air heating units within the MVHR ventilation system and/or underfloor heating. Opportunities can also be to explored into the use of direct electric heating where high fabric efficiencies are achieved.
			Wastewater Heat Recovery 1. Shower wastewater heat recovery (SWWHR) to reclaim typically 40-60% waste heat from shower water.
			Lighting Control 1. Automated lighting controls with daylight and occupancy sensing.
			Appliances 1. Primary energy appliances: Only highly efficient appliances (A rated washing machines, dishwashers etc.) and equipment (fans, pumps, lighting etc.) must be specified.
		Renewables and Net Zero Targets	**Renewables** 1. Optimise the use of on-site renewable generation (15m2 PV/dwelling, 2.5m2/apartment). 2. Build additional resilience into the system through the introduction of battery storage technology at both masterplan and plot level. Consumers can store solar electricity they have generated during off-peak, cheaper hours, rather than buying more expensive grid electricity.
			Energy Procurement 1. Ensure mechanisms are in place to enable purchase of 100% renewable energy from credible renewable energy sources. Renewable Energy Certificate's (REC) will be sought to validate the environmental claims of energy suppliers.
			Net Zero Verification 1. Verification process to be carried out following the UKGBC guidance for net zero carbon verification. A minimum level of reporting of the buildings' operational performance.

2025 Target – Potential approaches

	Targets	Strategies	Example Specifications
Embodied Carbon	Up-front embodied carbon calculation to verify target equivalent to <400kgCO2/m2 (A1-A5).	To demonstrate embodied carbon performance in line with the 2025 targets we anticipate designs will need to prioritise the following key construction items as a minimum:	**For low-rise housing (<11m):** 1. Substructure -Incorporation of low carbon spread foundations (where technically feasible). 2. Superstructure- Lightweight construction (e.g.. timber or light gauge steel construction systems), or exemplar low-concrete specifications for in-situ or precast concrete systems.
			For medium scale housing, requiring further innovation and commitment: 1. Massing- Careful planning to minimise building envelope. Podium construction (e.g.. with ground level parking) should be avoided where possible, and basement construction is unlikely to be feasible without significant commitment to low-carbon construction methods. 2. Substructure - Lean foundation systems, considering raft foundations in lieu of deep piles, where technically feasible, or low-carbon concrete piles where not avoidable. 3. Superstructure - Exemplar low carbon concretes (>65% GGBS or equivalent) or high recycled content (Electric Arc Furnace) structural steelwork, where used
			For all building scales and typologies: Envelope • Lightweight facade systems (avoiding solid brick or pre-cast systems) • Composite, timber or recycled plastic window framing (in preference to aluminum or PVC windows). • Avoid plastic insulation products to roofs/facades, with mineral wool or natural insulation materials preferred. Internal Finishes • Avoid internal finishes where possible, promoting 'fair-faced' elements where possible, and prioritise natural or recycled finishes (e.g.. avoid plastic floors/ carpets and minimise plasterboard quantities where possible) Services • Best practice specifications for heat pump installations with low-GWP refrigerants (e.g.. R32 in place of R410A refrigerants in ASHPs) External Works • Careful specification of external works materials, promoting permeable surfaces and recycled surfacing in preference to asphalt or poured concrete surfacing.

2025 Target – Potential approaches

	Targets	Strategies	Example Specifications
Construction	All developments achieve PMV of 50 and above%	A minimum of 50% PMV is required and the guidance document (to be developed) will specify the typical combinations of solutions that will achieve this. Developers should seek higher performing MMC solutions especially in relation to fabric efficiency to enable net zero homes in operation but should also prioritise suppliers that can substantiate enhanced embodied carbon performance. PMV targets should be established at the outset, alongside a commitment to DfMA principles and likely digitally enabled design and data capture approaches. PMV should be estimated at the design stage and validated post-completion. Data on PMV performance should be shared alongside carbon performance to enable continuous learning and improvement at a system-wide level.	**MMC Cat1: 3D Primary Structural Systems** This category can also be combined with elements of categories 3 and 7 to drive further PMV improvement
			MMC Cat2: 2D Primary Structural Systems This category can also be combined with elements of categories 3, 5, 6 and 7 to drive further PMV improvement.
			MMC Cat3: Pre-manufacturing Components This category can also be combined with elements of all other categories to drive further PMV improvement.
			MMC Cat5: Non-structural Assemblies This category can also be combined with elements of categories 2, 3, 6 and 7 to drive further PMV improvement. i.e., Cat 2c frame and Cat 5a bathroom pod creates an 18% uplift to 58% PMV from traditionally built typically at 40% PMV.
			MMC Cat6: Traditional Building Product Led Site Labour Reduction/ Productivity Improvements This category can also be combined with elements of all other categories to drive further PMV improvement
			MMC Cat7: Site Process Led Labour Reduction/ Productivity Improvements This category can also be combined with elements of all other categories to drive further PMV improvement

2030 Target – Potential approaches

	Targets	Strategies	Example Specifications
Energy	EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand of <15KWh/m2/yr	**Passive Design** To achieve the passive performance in line with the 2030 targets we anticipate the following design strategies and component choices.	**Fabric specification** Exemplary façade performance to be achieved through high performance materials specification and build ups. • Floor (W/m2.K): 0.10 • External wall (W/m2.K): 0.10 • Roof (W/m2.K): 0.10 • Windows (W/m2.K): 0.80 • Air permeability (ach): 0.6 • Airtightness levels to achieve 0.6 air changes per hour @50Pa.
			Façade design (Glazing, solar gains and shading) 1. Layout and orientation of homes to be considered in context of the wider masterplan site to ensure potential solar gain benefits are achieved. 2. Glazing will be optimised to balance daylight and overheating requirements. This will account for up to 25% glazing ratio in southern elevations to avoid excessive heating demand in winter months whilst reducing the risk of summertime overheating. 3. Specification of triple glazing to limited heat loss and reduce cold draughts. 4. Dwelling design will carefully consider junction details to reduce heat loss and significantly reduce thermal bridges. 5. Potential for a natural ventilation strategy should be explored with priority given to cross ventilation.

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2030 Target – Potential approaches

	Targets	Strategies	Example Specifications
Energy	EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand of <15KWh/m2/yr	**Active Systems** To achieve the operational performance in line with the 2030 targets we would anticipate the building to incorporate the following active systems:	**All Electric** 1. All electric building services strategy adopting high efficiency heat pump technology. Direct electric space heating can be adopted where high fabric performance achieved. 2. All electric heating systems to capitalise on the decarbonisation of the UK's electricity grid.
			Active Demand 1. Active demand response measures to be considered to reduce peak energy demands and smooth energy consumption, including thermal and battery storage.
			MVHR 1. Mechanical ventilation with heat recovery (MVHR) including air filtration, improving indoor air quality and reducing dust and allergens: • MVHR heat recovery efficiency: >75%. • MVHR electrical efficiency: <0.45Wh/m2
			Supplementary heating 1. Supplementary heating: Where heating demand is low due to the passive approach, priority will be given to low energy systems that take advantage of post-air heating units within the MVHR ventilation system and/or underfloor heating. Opportunities should also be to explored into the use of direct electric heating.
			Wastewater Heat Recovery 1. Shower wastewater heat recovery (SWWHR): to reclaim typically 40-60% waste heat from shower water.
			Lighting Control 1. Automated lighting controls with daylight and occupancy sensing.
			Appliances 1. Primary energy appliances: Only highly efficient appliances (A rated washing machines, dishwashers etc.) and equipment (fans, pumps, lighting etc.) must be specified.

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2030 Target – Potential approaches

	Targets	Strategies	Example Specifications
Energy	EUI: <35kWh/m2 operational energy use (including regulated and unregulated energy). Space heating demand of <15KWh/m2/yr	**Renewables and Net Zero Targets**	**Renewables** 1. 100% annual energy requirement to be achieved through on-site generation. 2. Integrate dynamic, smart grid technology to facilitate demand response, ensuring the most efficient supply of electricity for masterplan residents. 3. Battery storage technology will enhance resilience and optimise use with variable tariffs bringing benefits to consumers into the system (storing solar electricity generated during off-peak, cheaper hours, rather than buying more expensive grid electricity).
			Energy Procurement 1. Ensure mechanisms are in place to enable purchase of 100% renewable energy from credible renewable energy sources. Renewable Energy Certificate's (REC) will be sought to validate the environmental claims of energy suppliers.
			Net Zero Verification 1. Verification process to be carried out following the UKGBC guidance for net zero carbon verification. A minimum level of reporting of the buildings operational and construction performance and third-party audit of data will be required.

2030 Target – Potential approaches

	Targets	Strategies	Example Specifications
Embodied Carbon	**Embodied Carbon** Up-front embodied carbon calculation to verify target equivalent to <300kgCO2/m2 (A1-A5).	To achieve the embodied carbon performance in line with the 2030 targets we anticipate the following design strategies and component choices may be required. Lean design will be prioritised to avoid unnecessary finishes. Designs should be performance-based, and encourage maximum use of materials (e.g., structural design should seek design utilisation factors are no less than 100% with no over-specification permitted). Design for Manufacture and Assembly should be considered to simplify the construction process, reducing material waste where possible. Design considerations to ensure a comprehensive approach to tackling the embodied carbon impacts of each building element:	**For low-rise housing (<11m):** Substructure: • No basement construction • Spread foundations with low-carbon concretes (>60% GGBS or equivalent) Superstructure: • Timber frame construction throughout, or significant use of recycled/ secondary components in steel or concrete. **For medium scale housing, schemes are likely to require further innovation and commitment, including incorporation and validation of emerging technologies:** Substructure: • No basement • Lean foundation systems, considering raft foundations in lieu of deep piles, where technically feasible, or ultra low-carbon concrete piles where not avoidable. Superstructure: • Lean building design and massing, optimised to reduce structural grids (<5-6m), minimise facade areas/ form factor, avoid excavations. • Increase structural floor zones to minimise material (e.g., ribbed slabs in favour of flat slabs). • Ultra-low carbon concretes (e.g., using alternative cements/ AACMs etc.) and/or re-used steelwork components. • Consideration of structural timber, including engagement with regulatory challenges in Building Regulations Part B. **For all building scales and typologies:** Envelope: • Low-carbon rainscreen cladding systems in timber or reclaimed materials (e.g., recycled PVC window frames or rainscreen cladding) • Promote natural and recycled insulation materials, including engagement with regulatory challenges in Building Regulations Part B. Internal Finishes • Alternative drylining materials with high recycled content (in preference to plasterboards) Services: • Best practice specifications for heat pump installations with low-GWP refrigerants (e.g.. R32 in place of R410A refrigerants in ASHPs) • Careful routing to minimise material use, including distributed servicing systems. External Works • Eliminate bulk earthworks activities with no net export.

2030 Target – Potential approaches

	Targets	Strategies	Example Specifications
Construction	All developments achieve PMV of 55%.	A minimum of 55% PMV is required and the guidance document (to be developed) will specify the typical combinations of solutions that will achieve this. Selection decisions for MMC suppliers will be based in part on intelligence gathered through the operation of this standard in the years leading up to the 2030 standard being implemented. This will focus on the as-built and verified performance data gathered through earlier delivery projects. PMV targets will be established at the outset, alongside a commitment to DfMA principles and digitally enabled design and data capture approaches. PMV will be estimated at the design stage and validated post-completion.	**MMC Cat1: 3D Primary Structural Systems** This category can also be combined with elements of categories 3 and 7 to drive further PMV improvement **MMC Cat2: 2D Primary Structural Systems** This category can also be combined with elements of categories 3, 5, 6 and 7 to drive further PMV improvement. **MMC Cat3: Pre-manufacturing Components** This category can also be combined with elements of all other categories to drive further PMV improvement. **MMC Cat5: Non-structural Assemblies** This category can also be combined with elements of categories 2, 3, 6 and 7 to drive further PMV improvement. i.e., Cat 2c frame and Cat 5a bathroom pod creates an 18% uplift to 58% PMV from traditionally built typically at 40% PMV. **MMC Cat6: Traditional Building Product Led Site Labour Reduction/ Productivity Improvements** This category can also be combined with elements of all other categories to drive further PMV improvement **MMC Cat7: Site Process Led Labour Reduction/ Productivity Improvements** This category can also be combined with elements of all other categories to drive further PMV improvement

Wider Standards for Sustainable Placemaking

Principles

In addition to the targets laid out within the Technical Standard, applicants are invited to consider the application of Wider Standards for Sustainable Placemaking.

These are represented via four main principles:

- Mobility & Accessibility
- Resilient Eco-Systems
- Well-being & Inclusion
- Circular Economy

It is suggested that applicants consider these principles specifically in relation to the following:

- Site selection
- Masterplan
- Home Design
- Operation of the Home

Applicable WMCA Policy

It is suggested that consideration of the following existing WMCA policies, charters, and strategies will support applicants to address these principles:

WM Design Charter (wmca.org.uk)
WMCA Circular Economy (Executive Summary)
Section 1 - Health and health inequalities in the West Midlands region (wmca.org.uk)
Equity and Inclusion Scheme 2022-24 (wmca.org.uk)
Briefing note - Net Zero Strategy (wmca.org.uk)
Natural Environment Plan (wmca.org.uk)
Five Year Plan (wmca.org.uk)
WMCA Regional energy strategy
Health and Equity Impact Assessments | WMCA

Further support and guidance on implementing the standard can be obtained by reaching out to invest@wmca.org.uk