
Avondale Drive Estate – Circular Economy and WLC

Project/Ref: 07900 – Avondale Drive Estate

03/12/2021

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Audit sheet

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The study is based on One-click LCA Software. All results and strategies are directly affected by the inputs listed in this document; any deviation from these is bound to output different results. It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. Details of assumptions made and approximations used are supplied as part of the report.

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EXECUTIVE SUMMARY

This report provides a Circular Economy Statement and Whole Life Carbon Assessment in support of a “hybrid” planning application, which comprises an illustrative Masterplan and a fixed Detailed First Phase. The calculations and bill of materials for the Masterplan are based, pro-rata, on the fixed Detailed First Phase. As such, they should provide a more accurate basis than the usual Outline stage assumptions; however these figures are subject to the detail that comes forward as the part of future Reserved Matter Applications.

Key Stakeholders:

Client / Applicant: Hillingdon Council. Their purpose is to provide affordable homes to meet local needs, to include existing returning residents of the estate and new residents from within the borough.

Architect: PTE Architects

Project Manager & Quantity Surveyor: Martin Arnold Associates

Structural Engineer: Whitby Wood

M&E Engineer and Sustainability: Synergy Consulting Engineers

Landscape: TEP

Description of the Development:

Development in outline (with all matters reserved) for residential floorspace (Class C3) to comprise: demolition of all existing buildings and structures; erection of new buildings; new pedestrian and vehicular accesses; associated amenity space, open space, landscaping; car and cycle parking spaces; plant, refuse storage, servicing area and other works incidental to the proposed development; and

Detailed planning consent for Block A comprising 30 residential units (Class C3); new pedestrian access; associated amenity space and landscaping; cycle parking, refuse storage, and other associated infrastructure.

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Strategic Approaches:

A pre-demolition audit will be undertaken at each phase to investigate how recycling of construction, demolition and excavation material can be maximised. This will highlight specific elements of the existing buildings and hardstanding on site that may be re-used or recycled, for example; crushing existing concrete for re-use and cleaning and re-using any bricks.

The proposed apartment block will be of concrete frame construction with brick outer / block inner leaf walls, extremely high levels of insulation and a **zero carbon in use** energy strategy. The design has been developed to allow for MMC (Modern Methods of Construction) such as off-site manufacture of repetitive elements, for example bathroom pods and MVHR cupboards.

In use, the proposed development's Waste Management Strategy will implement best practice guidance for separation, storage, and collection of waste arising.

Adaptability is another key principle of the circular economy and the design includes the following measures to reduce waste arising at the replacement or end of life stages.:

- Allowance for all major plant to be dismantled and removed.

- All landlord's services infrastructure through the common parts to be accessible.

- Tenants MVHR units to be accessible from corridors.

- High quality robust materials palette.

- Windows to be removable and replaceable independent of building frame.

Implementation Approach:

This report will be reviewed by the Design Team and Constructor throughout all project stages alongside the following reports:

- Pre-demolition audit / Material efficiency report

- Functional Adaptability Study

- Climate Change Adaptation Strategy / ORA

- Material Durability Reports

- Sustainable Procurement Plan

- Site Waste Management Plan

- Whole life Carbon Assessment

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DESCRIPTION OF THE DEVELOPMENT

The site covers 1.07 Ha and is occupied by the existing Avondale Drive Estate. It currently contains 144 existing dwellings in three, 13-storey, 1960's blocks, constructed using concrete large-panel system.

It is bounded by Avondale Drive to the South and Abbotsway Way to the East. Pedestrian access is provided onto Abbotsway from the estate. Both pedestrian and Vehicular access is provided onto Avondale Drive to the South. Minet Junior School is located directly to the West; directly to the North is Hitherbroom Park, which forms part of a Site of Nature Conservation Importance (Borough Grade 1). To the South of the Estate is low rise housing.

Existing Utility connections include Electricity, Gas, Water, Sewerage and Telecoms, but no District Heating.

The GIA of the illustrative Masterplan is 22,772m², with Residential GIA of 16,478m². The Detailed first phase has 2,175m² Residential GIA.

The number of dwellings on the site will increase from 144 to 240.

The existing gas supply will be made redundant.

The annual net electricity consumption will reduce to zero with sales of excess Photovoltaic electricity to the grid in summer offsetting purchases of electricity from the grid in winter, however the peak load will increase from approximately 300KVA to 480KVA, necessitating a dedicated substation.

Water consumption will increase when there are 240 dwellings instead of 144, but consumption per person will drop to <105l/pers, through water conservation measures.

The Urban location places an important constraint on the ventilation strategy – firmly steering the design down a “mechanical ventilation with heat recovery” route, to allow the affected apartments to incorporate NO_x filtration of their fresh air supply and supplementary passive cooling. These features mean the apartments affected by noise and air quality issues from the Abbotsway to the East do not *have* to open their windows to deal with summertime overheating risk.

The proposals include high levels of insulation to deliver annual heat losses of less than 10KWh/m² per year (ie comparable with Passivhaus), best in class communal heat pump implementation, and sufficient Photovoltaics on the building itself to achieve net zero carbon in use (regulated loads) entirely through on site measures, without recourse to carbon offsetting payments.

The illustrative Masterplan is intended to be constructed in several phases.

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METHOD STATEMENT

A series of Stakeholder meetings involving the developer and design team were used to agree specific measures and commitments. A detailed list is given in Appendix 1, however the following key decisions are presented to illustrate how circular economy considerations affected the design in important ways.

1. What is the need? London Borough of Hillingdon wants to ensure the Avondale Drive Estate is a good place to live for existing residents and future generations. The scheme is coming forward in partnership with Avondale Drive Estate residents, to deliver high quality homes across a mix of unit types within a newly revitalised neighbourhood.
2. Existing Buildings. Refurbish, or deconstruct and re-use, or demolish and recycle? The decision to not refurbish came down using the site as efficiently as possible; providing an additional 96 dwellings, which will have much lower energy use and maintenance requirements than the 1960's panel-built blocks they will replace. The existing concrete can be crushed and used for aggregate in pile caps and so forth.
3. Form of construction. Concrete frame with brick outer-skin external walls provides a low maintenance, low energy building, with the ability to recover at least some of the building fabric in a higher value state (sorting and cleaning the bricks instead of crushing for aggregate). The compact form (high ratio of floor area to envelope area) helps with both the operational and embodied Carbon emissions.
4. Energy Strategy. Following discussions with the client and design team, it was decided to use much higher insulation standards than just minimum compliance levels, a heating strategy that might be described as "Passivhaus, but with Heat Pumps" to produce ultra-low energy consumption. This in turn made it possible to achieve zero carbon in use, with rooftop Photovoltaic panels. This decision was driven in part by the client's desire to make the tenants' annual heating bills as low as possible – in line with the building's whole raison d'être – but also chimes with circular economy principle of minimising energy in use.
5. Maintainability. The proposals incorporate a very high level of maintainability – for example it was decided early on to make the MVHR units accessible from cupboards instead of ceiling voids. All risers are accessible. No cast-in underfloor heating pipework or domestic hot and cold water. The use of enhanced maintainability fulfils a key circular economy tenet, both by extending the life of the asset and make it easier to remove for refurbishment or recycling at end of life.

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CIRCULAR ECONOMY ASPIRATIONS

How does the Design Team interpret the circular economy?

Basically, the Circular Economy is about not just conserving a finite resource by making *any* use of it, but instead making the *best possible* use. It is somewhat analogous to the 2nd Law of Thermodynamics: all processes increase the overall entropy of the universe - but the more *efficient* a process is, the smaller that increase in entropy. The end goal is to retain the value of materials and resources at their highest value (lowest entropy) indefinitely, with no residual waste at all – or at least come as close to it as possible with today's knowledge.

The principle can be seen in the decision to use a limited land resource to provide nearly twice as many dwellings as it does now.

The principle can be seen in decisions to use low maintenance, long-lived and easily disassembled brick outer walls.

It can be seen in the decision to make use of the roof area to provide sufficient PV to achieve Zero carbon in use, instead of the bare minimum “35% better than building regulations”.

It can be seen in the decision to standardise bathrooms and MVHR arrangements to allow the possibility of off-site manufacture and ease of maintenance access in order to maximise product life and facilitate recycling at end of life.

It can be seen in a design that maximises the ratio of living area to envelope area, thereby reducing both the embodied carbon and carbon emissions in use.

Arguably, the Circular Economy philosophy can be seen in providing homes for returning residents of the estate and new residents from within the borough in Hillingdon who otherwise could not afford to live there, preserving a finite human resource – local key workers – in a borough they otherwise might be priced out of.

How does the circular economy improve sustainable development outcomes?

Simply: it makes the best possible use of limited resources, while preserving and retaining those resources for future generations to make even better use, with their hopefully better knowledge. We believe this development has some exemplary features, such as Zero Carbon emissions in use, achieved using an HVAC strategy that is extremely inexpensive, space efficient and low maintenance when compared to London apartment blocks of the last 20 years. No heat interface units, no standing losses/ heat gains in corridors, passive cooling at zero cost, no unvented Cylinders in apartments, no Combined Heat and Power units, no gas supplies, extremely low maintenance requirements. The strategy directly addresses and eliminates many of the issues with CHP / Energy Centre / District heating for which CP1 and “Ambient loop” are really only sticking plasters.

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Priorities to Accelerate the Transition to a Circular Economy.

A major priority for design teams in London has to be to develop simpler, cheaper, lower WLC, designs for major buildings going forward than has been the case over the last 20 years. We believe the proposed development achieves this.

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PLANNING POLICY

The London Plan, Policy SI 2 Minimising Greenhouse Gas Emissions, states that “major developments should be zero carbon” and “Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.”

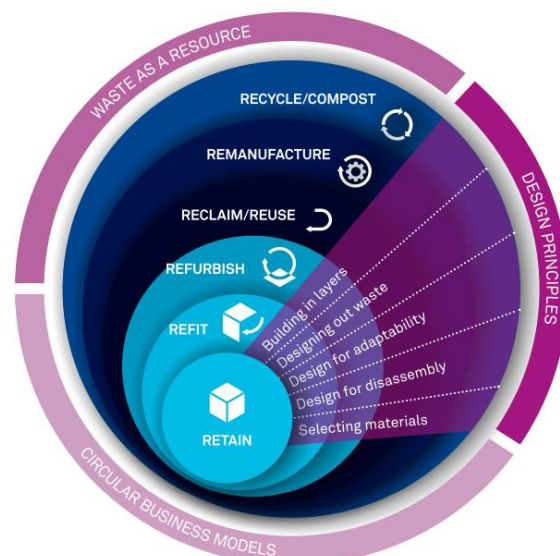
The London Plan, Policy D3 “optimising site capacity through a design-led approach” supports the application of circular economy principles:

“To minimise the use of new materials, the following circular economy principles (see also Figure 3.2) should be taken into account at the start of the design process and, for referable applications or where a lower local threshold has been established, be set out in a Circular Economy Statement (see Policy SI 7 Reducing waste and supporting the circular economy):

- building in layers – ensuring that different parts of the building are accessible and can be maintained and replaced where necessary 113 The London Plan 2021 – Chapter 3 Design [↑]To table of contents
- designing out waste – ensuring that waste reduction is planned in from project inception to completion, including consideration of standardised components, modular build and re-use of secondary products and materials
- designing for longevity
- designing for adaptability or flexibility
- designing for disassembly
- using systems, elements or materials that can be re-used and recycled[...]

3.2 shows a hierarchy for building approaches”

Figure 3.2 - Circular economy hierarchy for building approaches



Source: Building Revolutions (2016), David Cheshire, RIBA Publishing ©

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Policy SI7 “Reducing waste and supporting the circular economy” sets objectives to:

“Resource conservation, waste reduction, increases in material re-use and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration to:

- 1) promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible*
- 2) encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products*
- 3) ensure that there is zero biodegradable or recyclable waste to landfill by 2026*
- 4) meet or exceed the municipal waste recycling target of 65 per cent by 2030*
- 5) meet or exceed the targets for each of the following waste and material streams: a) construction and demolition – 95 per cent reuse/recycling/recovery b) excavation – 95 per cent beneficial use.*
- 6) design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food. Referable applications should promote circular economy outcomes and aim to be net zero-waste. A Circular Economy Statement should be submitted.”*

The Hillingdon local plan, Policy BE1 Para 10 calls for:

“sustainable design and construction techniques to increase the re-use and recycling of construction, demolition and excavation waste and reduce the amount disposed to landfill;

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CONCLUSION

London Plan Policy SI7 (b) sets out the information required in a circular economy statement:

“1) how all materials arising from demolition and remediation works will be re-used and/or recycled”.

Appendix A sets out the broad targets (eg 95% construction and demolition reuse/recycling/recovery and b) 95% of excavation of beneficial use) and the “detailed planning stage” tab of the reporting spreadsheet, gives specific end of life scenarios and estimated tonnage (eg: “bricks 4,449,193kg re-use, 419,233kg recycling)

2) how the proposal’s design and construction will reduce material demands and enable building materials, components and products to be disassembled and re-used at the end of their useful life

Appendix B details the specific actions, such as; greater use of MMC (ie prefabrication); disassembly recovery review, supplier take-back schemes.

3) opportunities for managing as much waste as possible on site

Appendix A sets these out, such as; Concrete will be crushed, grated and stockpiled on site prior to being re-used; Bricks will be cleaned for re-use; Metal will be separated for recycling.

4) adequate and easily accessible storage space and collection systems to support recycling and re-use

As described in Appendix B, and in the Waste Management plan, residential units will incorporate sufficient internal storage containers to promote separation of recyclable materials at source. Residents will manually transport the separated waste down to the communal waste stores via the passenger lifts. Sufficient space within each communal waste storage area has been provided to accommodate one week’s worth of residual waste and recyclables containers.

5) how much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy

This is summarised in Appendix D

6) how performance will be monitored and reported”

Appendix B gives a summary of actions + who + when. These are also covered in more detail in the Site Waste Management Plan.

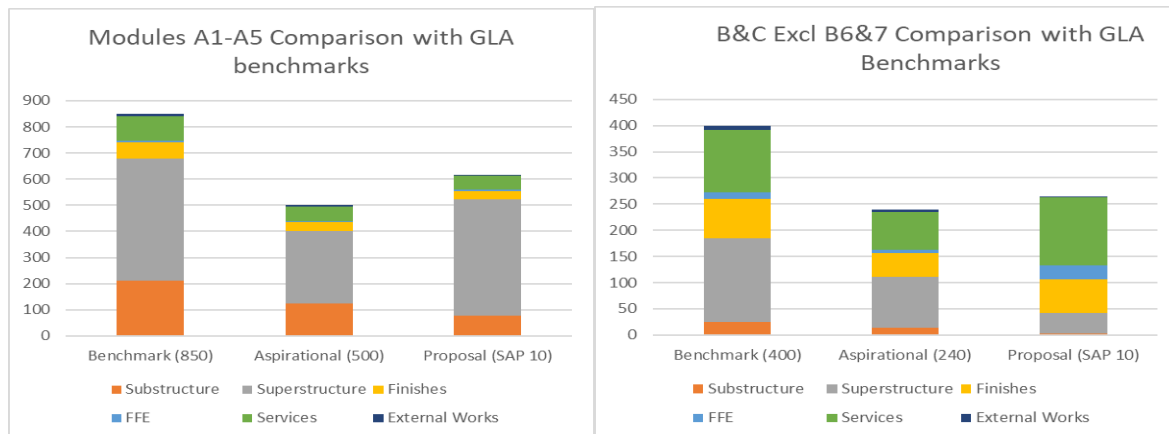
The London Plan, Policy SI 2, part F requires a Whole Life Carbon Assessment and provides a spreadsheet template for reporting purposes. The WLC report (method and results) is given in Appendix E along with list of data sources, Appendix F, and Circular Economy Materials Report, Appendix G. The Development is currently

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comfortably meeting the GLA Benchmark figures, and even approaching the “aspirational benchmark” figures



A detailed breakdown is given in the reporting template (in .xls form) that accompanies this report.