

Disassembly and Adaptability Study

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Executive summary

This report has been produced to demonstrate all functional adaptability considerations that can be made for the proposed development. The report outlines where feasibility, accessibility, versatility, adaptability, convertibility, expandability and refurbishment potential could be considered within the development, as well as outlining recommendations of what could be included within the design to ensure it is designed for disassembly and functional adaptability. The report has been developed in accordance with the Design for disassembly and adaptability BREEAM v6 New Construction requirements: credit issue Wst 06.

About the scheme

The planning application consists of the erection of two buildings for Flexible Use Classes including Eg (ii) (iii), B2, B8, including servicing, parking access, landscaping.

The BREEAM assessment will be undertaken using the Similar Buildings approach, with a single certificate issued upon completion that lists all assessed units.

Client requirement for the new build industrial development is as follows:

- Excellent BREEAM rating

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Introduction

Why is futureproofing and adaptability required?

The construction industry is responsible for approximately 60% of total UK materials use and one-third of all waste produced. At least 17 million tonnes of inert waste are produced by the UK construction industry annually. Typically, buildings are stripped out or in many cases even demolished considerably earlier than their design life would predict, or structural stability require. In most cases only high value materials are reclaimed or reused and many resources are either used for low grade uses, taken to landfill or, in some cases, even illegally dumped, leading to increased environmental damage and costs to local authorities and society. This risk can be reduced by considering building adaptability and also future disassembly to allow for easy material separation and reuse.

Through consideration of future-proofing features within developments we can help to reduce waste and cost associated with future refurbishment or fit-out works and ultimately in demolition, improve the ability to cost-effectively reuse and recycle materials, encourage consideration of circular economy principles during design and construction, and reduce costs and disruption associated with the need for future adaptation, demolition and strip-out, thereby reducing the associated waste and costs.

Wst 06 Design for disassembly and adaptability

BREEAM introduced this credit to encourage design teams and developers to recognise and encourage measures to accommodate future changes of use of the building over its lifespan.

The BREEAM criteria require a building-specific Design for disassembly and adaptability study to be undertaken by the client and design team by Concept Design (RIBA Stage 2), which includes recommendations for measures to be incorporated to facilitate future adaptation.

These functional adaptation measures must then be adopted in the design by technical design stage (RIBA Stage 4) in accordance with the functional adaptation strategy recommendations, where practical and cost effective.

Disassembly and adaptability strategy

To ensure that all aspects of the potential for Design for disassembly and adaptability were considered for the project at the early design stages, a workshop was carried out by Eight Versa on 13th March 2025 (RIBA Stage 2), with key members of the design team, including:

- Letchworth Investment LLP for Wrenbridge - client
- KAM - project manager
- CMP Architects - architect
- Burrows Graham - structural engineer
- MBA Consulting - services engineer

The workshop enabled discussions to be carried out on a number of different design for disassembly and adaptability themes, including discussions regarding opportunities for refurbishment, change of use, and the degree of adaptability of materials and internal arrangements if required within a future scenario. These discussion points covered the following themes: feasibility, accessibility, versatility, adaptability, convertibility, expandability and refurbishment potential.

All findings were recorded and have been outlined within this report.

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Refurbishment Potential

Introduction

A summary of measures implemented to support the development's potential for major refurbishment and expandability.

	Considerations	Recommendations
Potential for extension	Opportunities for vertical and horizontal extension;	- Structural frame would not allow for vertical extensions. - Limited opportunities for horizontal extension, due to limited space within the site boundary.
Exploring the potential for additional mezzanine floors to be added or removed	Structural design/loading allowance for changing or adding mezzanine levels.	- The design could include structural allowances to enable future mezzanine floors to be implemented. - Although unlikely, the structural load provision could allow for a further first floor office space to be implemented across the warehouse space. - Insulation could be implemented under the ground floor slab in the warehouse undercroft to allow for future fit out of an office within the undercroft space.
Opportunities to allow fenestration to be replaced or upgraded	Features that allow for easy disassembling and replacement of building features; Opportunities to thermally upgrade / replace facade.	- It is recommended that the frame is designed within a uniform structure to allow for ease of cladding / glazing replacement. - A uniform frame structure could also allow for additional openings to be easily implemented if required. - It is recommended that there is a façade maintenance and/or replacement strategy for the development. - The external wall cladding system could be built-up rather than composite to allow for insulation to be upgraded / replaced in the future. - Consideration should be made to the warehouse loading doors to allow for potential future changes.
Removing and replacing finishes without compromising or damaging the next construction layer	Modular building options; Façade and glazing replacement strategies; Opportunities to build on a standard sized grid system.	- Insulated, composite panels could be utilised within the internal wall build ups as these can allow for easier adaptation, to be removed or altered to allow additional openings / change in layout, if required. - It is recommended that the plant is located next to an external wall, and the external façade cladding is removable to allow for ease of plant replacement if required. - It is recommended that the plant space has additional space allowance for future upgrades / tenant plant fit out requirements.

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Adaptability of Building Services Design

Introduction

A summary of measures implemented to support the development's potential for increasing accessibility with regard to MEP and changes to all major plant

	Considerations	Recommendations
Changes to FCU or ventilation strategy within the building	Allowance for increased air volumes Reducing major disruption through consideration of replacement strategies for AHU / local ventilation	• The plant room could have additional capacity to accommodate additional equipment if changes in ventilation were required in the future. • The heating and cooling units would be located and controlled within zones to allow flexibility for future office layout.
Change in primary energy fuel	Access to primary energy fuel considerations	• A capped gas supply could be provided to allow future change of primary energy fuel, although the preference is to ensure the site is electric.
Replacement and ease of maintenance of MEP services	Potential locations of radiators / trench heaters. Replacement strategies for individual / sequential component upgrades Impact of integrated services	• It is recommended that a plant replacement strategy is developed. • The plant should be located at ground floor level where possible. • It is recommended that the plant is located next to an external wall with removable cladding panels to allow for ease of plant replacement if required. • Raised access floors and exposed services could be maximised to allow for full flexibility for future tenant.
Futureproofing MEP capacity / requirements	Opportunities to additional infrastructure installation for future requirements (e.g. additional cooling load / future car charging points)	• Electricity capacity to development could be increased if required. • Roof loading capacity will allow for solar PV panel installation. • Infrastructure for future electric car charging parking spaces will be installed. • Increased data capacity could be considered for the development for potential future change in use / requirements.
Plant capacity	Plant room / deck structural loading capacity Space provision	• The plant capacity should allow for additional plant to be installed for the future tenant / future upgrade. • The development is shell and core, so there is flexibility for the plant capacity and design.

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Adaptability of Internal Environment

Introduction

A summary of measures implemented to demonstrate the versatility and adaptability of the development.

	Considerations	Recommendations
Opportunities for adding / removing interior partitions or demountable partitions with ease	Consider design features that can allow for open plan or a variety of different fit-out layouts in the future; Opportunities for movable / demountable features, e.g. partitions or ceiling tiles.	• Utilising a standard grid steel frame design could allow quicker and cheaper construction and give better flexibility for future changes. • Demountable partitions could be utilised to provide ability to change room sizes and layouts in the future. • Potential to use lightweight partition systems that could be easily deconstructed to enable reconfiguration without major works. • The office will be kept open plan to enable full fit-out flexibility for the future tenant. • Suspended ceilings would be installed in office areas. Gives greater flexibility for changing services in the future. Where possible, services will be left exposed to maximise change in servicing layout.
Features that allow for a change in working style or floor layout	The office at shell & core should be kept open plan to enable full fit-out flexibility for the future tenant. Suspended ceilings could be installed in office areas. Gives greater flexibility for changing services in the future. Where possible, services will be left exposed to maximise change in servicing layout.	• The office will be kept open plan to enable full fit-out flexibility for the future tenant. • Suspended ceilings will be installed in office areas. This gives greater flexibility for changing services in the future. Where possible, services will be left exposed to maximise change in servicing layout. • Raised access floors could be utilised where possible to enable the ability to change room sizes and layouts in the future. • Floor boxes will be installed across the office floor plat to allow for flexible electrical access.
Allowance for a change in assumed tenancy numbers	Features of the building that allow for different occupancy numbers; Isolating or preventing access to different areas of the building.	• Additional capacity could be considered for incoming water and drainage if more WCs / showers were needed. • Increased capacity for cycle storage could be provided.
The control strategy for lighting and HVAC and how it can accommodate localised changes	Adaptability of servicing control strategy	• Any internal lighting installed will be zoned to allow for reconfiguration of the office layout. • The heating / cooling units will be zoned with separate controls to allow for potential changes in building layout if required in the future.

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Potential for Building Change in Use

Introduction

A summary of measures implemented to support the potential for convertibility and feasibility of the development with regard to change of use.

	Considerations	Recommendations
Alternative use classes that could be accommodated internally within the building without a major re-work	Utilising a standard grid steel frame design could allow quicker and cheaper construction and give better flexibility for future changes. Demountable partitions could be utilised to provide ability to change room sizes and layouts in the future. Potential to use lightweight partition systems that could be easily deconstructed to enable reconfiguration without major works	• A steel frame design could allow for quicker and cheaper construction and give better flexibility for future changes. • Structural load could accommodate additional mezzanine floor levels for future office or retail storage space. • External wall cladding panels could enable sections to be replaced with areas of glazing if required. • Open plan areas will be utilised to enable the warehouse and/or office to be subdivided into smaller spaces in the future.
Alternative use classes that could be accommodated within the building without affecting the external façade and structure	The office at shell & core should be kept open plan to enable full fit-out flexibility for the future tenant. Suspended ceilings could be installed in office areas. Gives greater flexibility for changing services in the future. Where possible, services will be left exposed to maximise change in servicing layout.	• The façade could allow for additional openings / entrances to be accommodated for future flexible use or change in door sizes.
Options for spaces to be amalgamated or split easily, with flexibility of infrastructure to allow for this.	The warehouse units could be split into smaller units OR could easily be amalgamated if a demountable partition was installed and the structure could accommodate.	• The warehouse units would be designed to be open plan to allow a future split into smaller units. • In addition, the two smaller spaces could be amalgamated into a single unit if required in the future.
MEP features that allow for ease of change in use	The plant size and loading capacity could allow for additional MEP services to be installed should there be a change in use.	• The plant size and loading capacity could allow for additional MEP services to be installed should there be a change in use.

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Potential for Disassembly at Building End of life

Introduction

A summary of measures implemented to support the potential for disassembly at end of life

	Considerations	Recommendations
Opportunities for using materials that need less frequent maintenance, repair or replacement	Determine warranty lengths of different material options in line with expected lifespan of the building; Consider chance of material surviving disassembly; Could a temporary structure be utilised if the building lifespan is short.	- Choose materials with greater warranty length for confidence in durability. The lifespan length should be in line with that of the building. - Specify materials that would not break during disassembly to ensure they could be reused.
Options for exposed and reversible connections to allow ease of disassembly and alteration	Consider whether connections be made adaptable to prevent breaking at end of life; Establish whether space can be made around the applicable components to provide ease of disassembly; Consider the use of loose components as opposed to poured and welded connections	- Use screws and bolts to make connections rather than welding to encourage disassembly through visibility. - Ensure connection areas have adequate space around them to allow disassembly to take place safely and successfully. - Design connection areas to avoid the need for welded and poured materials.
Potential to install building systems in layers to allow adjustments to a single layer to take place	Consider material build ups with different materials that may need repair or replacement at different times throughout the lifespan of the building.	Choose construction build ups in layers that would allow one particular element to be altered rather than the whole structure being removed.
Avoid use of toxic treatments to increase chance of reuse or recycling as opposed to disposal to landfill	Determine treatments needed for applicable materials.	Specify non-toxic treatments where possible to remove risk of material becoming unusable at building end of life as a result of the treatment.
Opportunities for standardisation of design to allow future reuse and upgrade of materials	Investigate areas where standard sized materials can be used; Identify potential inclusion of standard connections; Investigate whether a modular build type could be utilised.	- Specify materials that have a standard size to allow reuse. - Specify standard sized connections. - Specify modular building elements to allow ease of construction and disassembly.

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Summary of findings

The Functional Adaptation Strategy summarises the key features of adaptability and futureproofing that could be implemented within the development, following a workshop with key members of the design team.

All recommendations outlined within this report will be implemented within the development, where feasible, to demonstrate that the building will allow for the following:

- Expandability: The potential for the building to be extended, horizontally or vertically.
- Refurbishment potential: The potential for major refurbishment, including replacing the facade.
- Versatility: The degree of adaptability of the internal environment to accommodate changes in working practices.
- Adaptability: The potential of the building ventilation strategy to adapt to future building occupant needs and climatic scenarios.
- Convertibility: The degree of adaptability of the internal physical space and external shell to accommodate changes in-use.
- Feasibility: The likelihood to contain multiple or alternative building uses, area functions and different tenancies over the expected life cycle.
- Accessibility: Design aspects that facilitate the replacement of all major plant within the life of the building, and accessibility to local services, such as local power, data infrastructure etc.

The report will be used to implement disassembly and adaptability design within the proposed development. During the technical design stage, the recommendations and solutions proposed (where practical and cost effective) will be outlined within a functional adaptation implementation plan and a building adaptability and disassembly guide will be produced to communicate the characteristics allowing functional adaptability and disassembly to prospective tenant.