Canonsgrove Options Study:
An investigation of homelessness and open market rental accommodation
For Somerset West and Taunton Council

gcp Chartered Architects
ARCHITECTURE | CONSULTING

Somerset West and Taunton

Contents

Document Control

Prepared by:	TM
Checked by:	JPL
Revision:	B
Date:	30.10.2020

gcp Chartered Architects
ARCHITECTURE | CONSULTING
t 0117 967 6286
e mail@gcparch.co.uk
w www.gcparch.co.uk
@ gcparchitects

Somerset West and Taunton

Introduction

About the options study

This report has been prepared by gcp Chartered Architects on the instruction of Chris Brown, Assistant Director Development and Regeneration Somerset West and Taunton Council.

The report accompanied work being undertaken internally by the council to understand the need for further investment in the permanent provision of homelessness accommodation throughout the district.

This site is referred to as Canonsgrove but forms part of a larger site originally conceived in 1825 as Canonsgrove House, a private residential property. The site was occupied as private dwellings until it was requisitioned for the second world war effort in circa 1941. Following the war, it provided accommodation for a police training college and several blocks of en-suite study bedrooms. A range of sports provision was added in the grounds over a number of years. In circa 1995 the site was split with the main Canonsgrove House reverting to private residential use, the study bedrooms were acquired by Bridgwater and Taunton College. The site this report focuses upon is land acquired by the college as identified in Figure 1: Land subject to study.

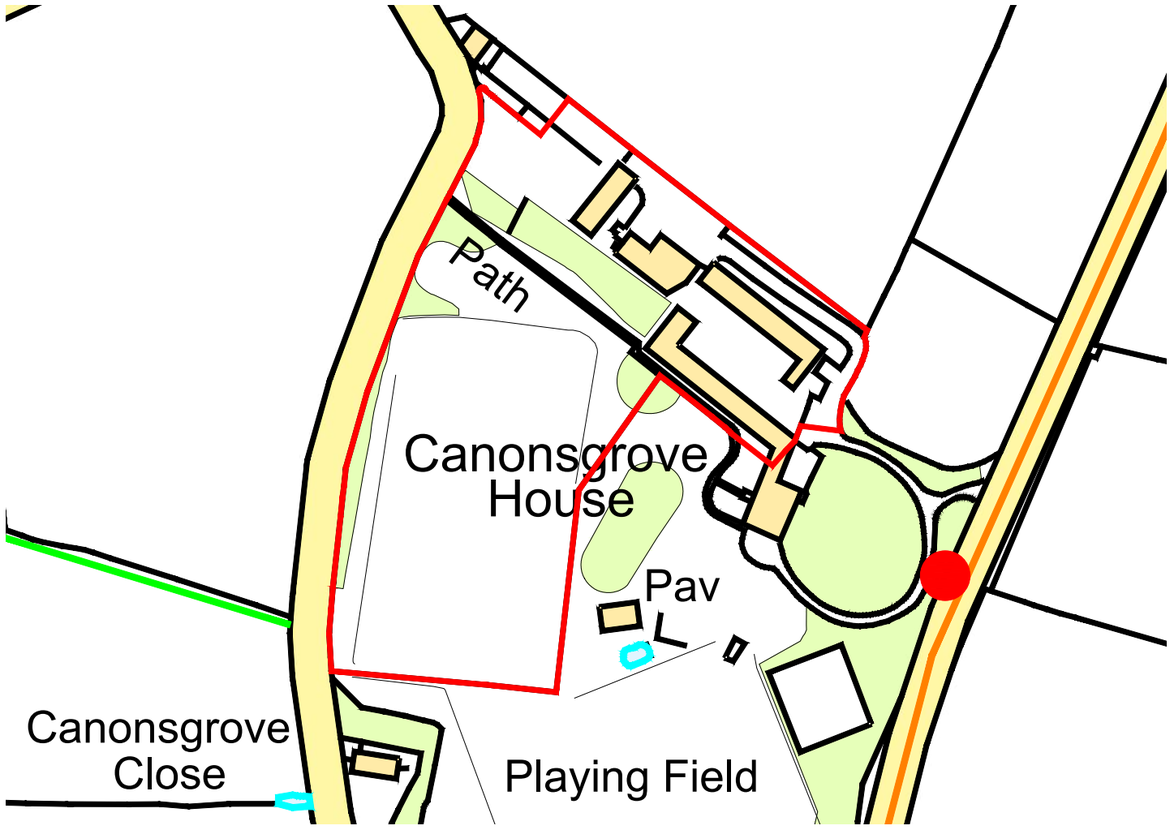


Figure 1: Land subject to study

The residential blocks have historically been referred to as Quantock, Blackthorn, Mendip and a sports hall which is referred to as Brendon. For simplicity, this referencing has been continued within this report as indicated in Figure 2: Naming of blocks.

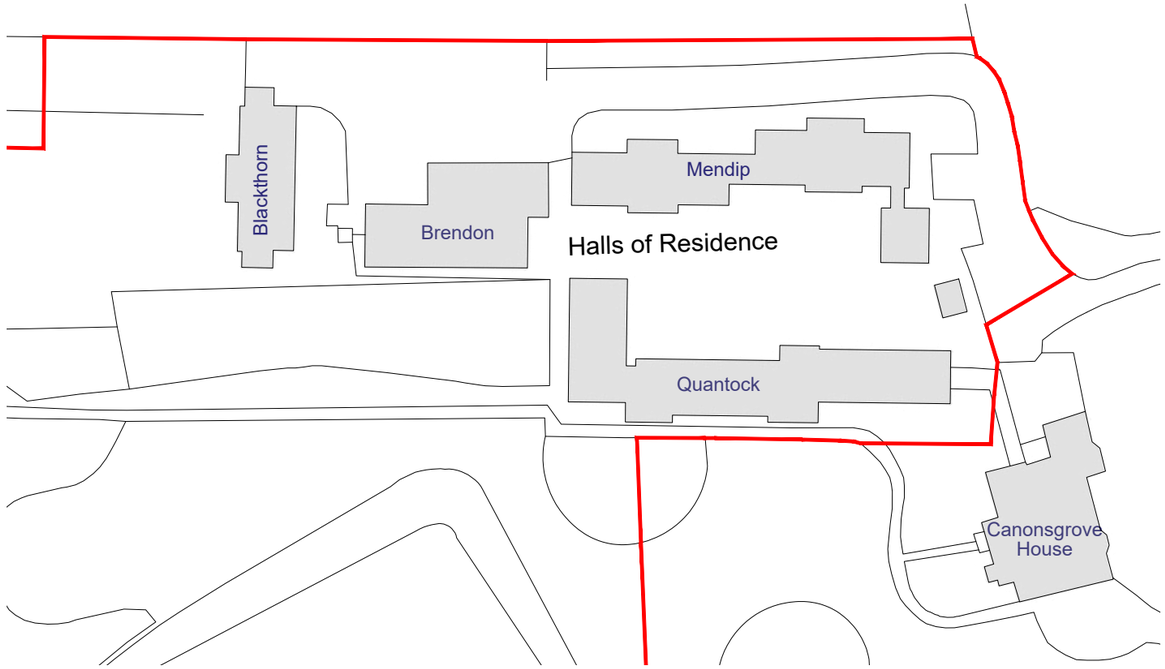


Figure 2: Naming of blocks

This report also refers to Canonsgrove. This is the proposed development site as indicated in Figure 1. The site address is Canonsgrove Halls of Residence, Trull, Taunton, TA3 7HP. Canonsgrove should not be confused with the original Canonsgrove House, the adjacent private dwelling.

The site is owned by Bridgewater and Taunton College. Quantock and Brandon are leased to Somerset West and Taunton Council as part of an interim solution to the governments everyone in initiative to support the homeless in the district amid the covid-19 emergency and currently provides accommodation for about 48 people, both men and women. Blackthorn and Mendip are leased on a ten-year agreement to the University of Bristol Hospitals Trust UBHT for trainee doctor accommodation. The site has capacity for over 200 residents.

About gcp Chartered Architects

gcp Chartered Architects have experience of designing a wide range of residential accommodation from one-off low energy PassviHaus homes through to very specialist housing projects such as those for homeless move on accommodation (very similar in desired outcome to the Canonsgrove project), young mothers support housing and gypsy and traveller provision. The challenges of developing Canonsgrove for both homeless and private rented accommodation is a core part of their experience as designers and construction development advisers.

Background

Following the Governments 'everyone in' campaign, as a direct result of the Covid epidemic in March 2020, one of three residential blocks and the sports hall was leased from Bridgwater and Taunton College (B&TC) at their Canonsgrove Campus. The accommodation was to provide a safe living environment for up to sixty eight (68) of the District's rough sleepers. This accommodation also allowed residents improved access to support and interventions to help improve their health and consider lifestyle changes. The scheme became an exemplar project showing the best in partnership working and rapid response to protecting vulnerable people. There are now around fifty four (54) single homeless living on the campus.

Homelessness in SW&T

The council has identified the following types of accommodation required to support the varied needs of homeless

- Accommodation closely linked to support:
  - Short term-assessment accommodation
  - Emergency assessment accommodation
  - Supported short/medium-term accommodation for medium/high risk customers
  - Trainer flats (although these do not necessarily need to be in the same locality as the support)
- Accommodation that needs to remain separated:
  - MAPPA
  - Under 25s
  - Dry house / Abstinence
  - Women Only
- *Move on or permanent affordable accommodation:*
  - Training flats (these may or may not be linked to support hubs)
  - Move on accommodation
  - Affordable one bed housing

Accommodation brief for Canonsgrove

The Canonsgrove site has the potential to provide both supported and move on or permanent affordable accommodation. No fixed accommodation brief has been provided for this options study. Instead, the site is to be assessed in terms of the capacities of the different types of accommodation that could be provided and how they might be distributed across the site.

Three main types of accommodation unit are proposed:

- Existing student style bedrooms – to be retained for lease to the college.
- Supported studio apartments designed to facilitate semi independent living supported by communal hub facilities. These facilities to include communal space, space for onsite support staff, training rooms, one to one meeting spaces.
- Move on accommodation in the form of 1 bed flats.

Somerset West & Taunton consultants' brief

The initial brief for this work was agreed in late October 2020 and comprised:

Overview: The site is a large site which is providing 48 complex homeless rough sleepers, an everyone in solution. The owners of the site are Bridgewater and Taunton college. There are three hostel blocks / student accommodation, sports centre and full-sized football pitch in extensive grounds. There are circa 200 units within the three blocks with one block leased to the NHS, one block used by rough sleepers and one block currently unused.

***Scope of work**: The brief is to explore the initial ideas for the site which include reducing capacity by approximately 50% and changing the planning status (if required) of two blocks to one bed self-contained units with support hub for permanent homelessness move-on accommodation. The initial concept designs would need to focus on creating a sustainable scheme and that could help make the scheme more acceptable to the local community.*

The scope was expanded part way through the commission to include a high-level assessment of the main planning policy issues relating to the site and its possible use for private rented residential accommodation. This expansion was deemed beneficial in that it would provide a more rounded appraisal of the site and its potential to deliver the homelessness accommodation as well as being financially viable.

The scope of the commission was clarified so that when assessing the development capacity of the site, the playing field should be excluded from modelling. The rational being this is a valuable asset for both the current residents and similarly is likely to be enjoyed by any future residents.

Separately of this commission, Somerset West and Taunton have appointed Curtin & Partners as structural engineers. Their appointment has been to assess the structural integrity of the buildings and the implications of any alterations required to deliver the concept designs. Their work is incorporated into this report.

Timescales and project management

The work was commissioned in late October 2020 with an anticipated delivery date during early January 2021. To support this delivery, gcp provided a broad programme to deliver the report as commissioned, but with acknowledgement that Covid-19 restrictions might delay delivery. Site inspection was critical to understanding the construction of the residential blocks and fortunately these were completed in line with prevailing Covid protocol in place at the end of 2020.

The commission acknowledge access to current / accurate information pertaining to both the buildings and the site in the time available would be a limiting factor. The council had very limited information. Therefore, as there was insufficient time to commission new site survey information verifying the source and scope of any available record available information would be a priority.

Regular Zoom progress meetings were coordinated with the team to review latest findings and actions agreed.

Approach

Introduction

At the outset of the commission, the scope of work was expanded to detail all main task the team agreed were essential investigate so that redevelopment options could be developed with sufficient confidence that the council could be confident if their subsequent decision making in relation to the long-term use of Canonsgrove.
The work comprised the following:

- Desk research
- Site visits
- Consultations

Desk research

The desk research stage comprised: existing site information / record drawings; planning history and Historic land use.
Existing site information / record drawings: During this period, the limitations of available record information were explored and confirmed. The following is a summary of information made available to the team during the study:

- Topographic survey: no survey data available, although Ordnance Survey plan purchased for this commission
- Site plan: not available other than as Figure 3: Existing site plan
- Building plans by block, Quantock, Brandon, Blackthorn and Mendip.

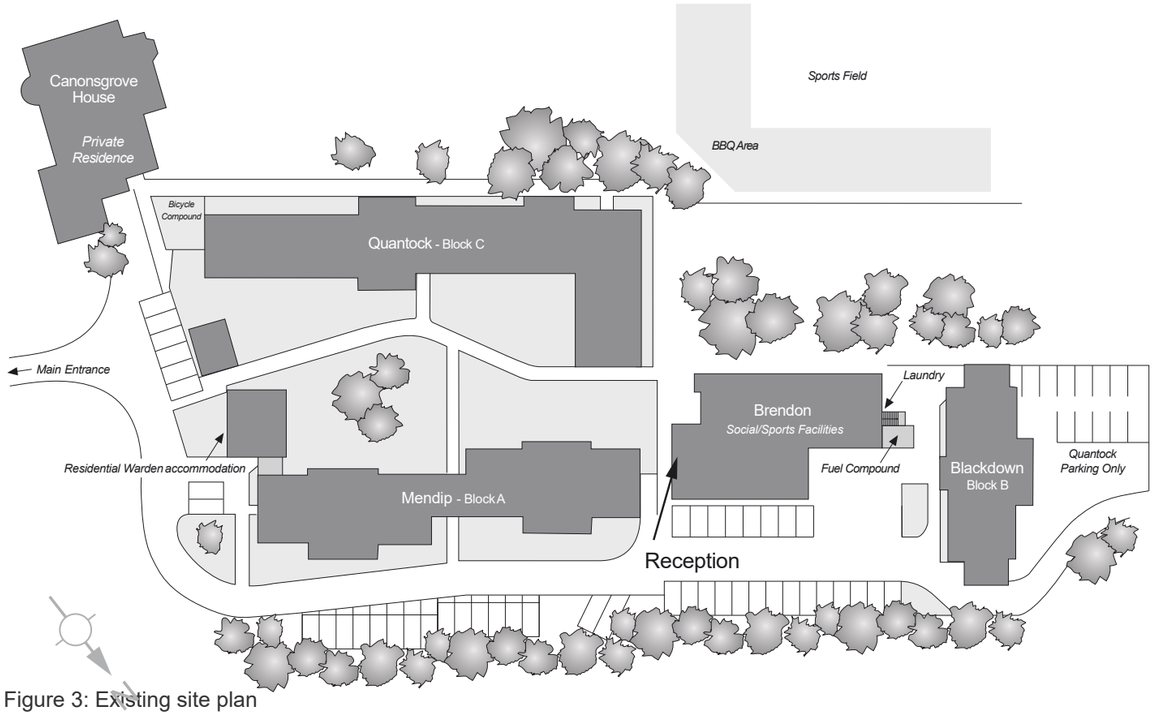


Figure 3: Existing site plan

Planning history:

Historic planning records for the site are not available online. Due to Covid-19 restrictions a search of the councils' archives has not been possible to date.

Historic land use: A provisional review of historic mapping indicates the site has been in residential use since around 1850. This accords with other research that suggests Canonsgrove House was built circa 1880 Figure 4: Historic land use plans. It is interesting to note that the house from the very earliest days had two entrances, the main entrance off Honiton Road, and a secondary entrance off the unnamed road to the west.

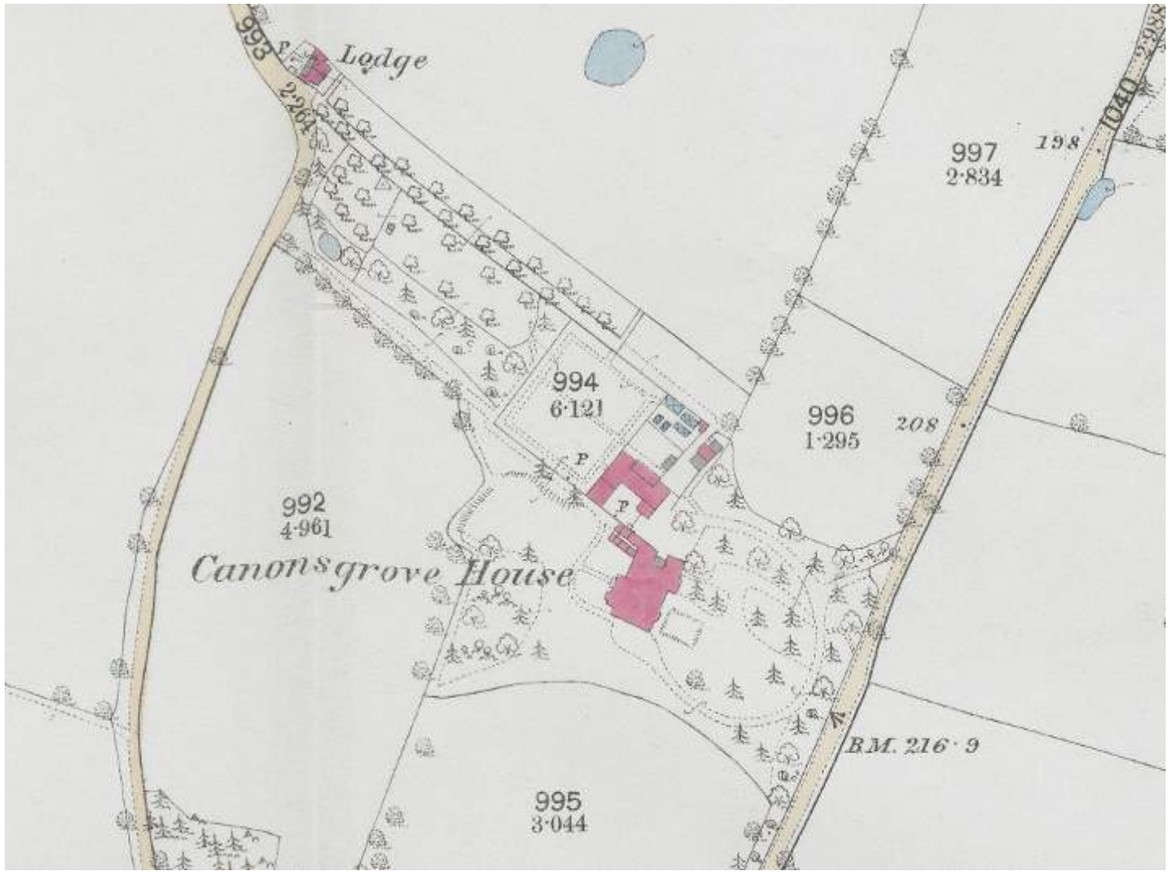


Figure 4: Historic map - 1848-1888 OS map

Site visits

Two site visits were undertaken. The first was undertaken as a fact-finding exercise and to develop an appreciation of the site and its surroundings. The visit around the site was escorted by the manager of the homeless provision on site. The main findings of this visit are summarised below:

- Entrance from Honiton Road is for both vehicles and pedestrians. This is unattractive and cluttered with no dedicated / segregated footway access. The approach is unsympathetic to the historic setting and feels like the splitting of the site was done with minimum financial outlay and with little consideration to the to the overall composition of the site. The division looks unplanned and ill-considered – visitors are first confronted with an electricity substation on entering the site
- Navigation around the site is poor with limited signage and little natural progression through the site. The reception as it is in Brendon and is hidden from view.
- The spaces around the buildings are poorly maintained and not really fit for current use. There is no clear waste strategy with commercial refuse paladins taking the place of car parking spaces
- There is a cycle shelter for 20 bikes in the car park although it was noted that the YMCA were storing bikes belonging to the homeless in the sports hall for security.
- The landscape is not loved with the grass being mown at best. There are significant trees on site as part of the original 1880 estate. These need maintenance and management
- The relationship and boundary between the private house and the residential accommodation is not well conceived and is permeable
- There is a rear access to the site off unnamed road to the west of the site. Historically this has been an access point for the site but currently it is somewhat moribund.
- The playing fields are poorly maintained. Currently access is only available through the residential blocks. Access for external use / hire could be made however through the rear site access.

The second site visit was undertaken with Curtins with the specific task of investigating the structure of all the buildings. The main findings of this visit as summarised in the Curtin report attached as Appendix to this report.

All visits were undertaken within strict social distancing protocols.

Consultations

To support the options appraisal a small number of key organisation / people external to Somerset West and Taunton Council were identified as consultees to help the team get a better understand of how the site could be repurposed to provide facilities for both homeless and open market rental.

The following organisations were consulted with main comments noted:

- YMCA Dulverton Group: Canonsgrove Centre Manager:
  - Site liked by residents particularly in respect of the open space, private accommodation, sports facilities, place to keep bicycles
  - Reasonable relationship with occupant of Canonsgrove House
  - Rear access off unnamed road is not used
  - Site easy to manage and the rural environment creates a calmness unknown at town centre sites

- On the day of the visit, they were supporting 51 residents
- Residents generally older than 24 with some couples
- Six rooms had been allocated for Covid-19 isolation purposes that was currently adequate
- They work with a number of organisations in addition to the normal support agencies to help their residents including Somerset Activity and Sports Partnership, On Your Bike, art therapy etc.
- The UBHT students tend to be 3rd, 4th and 5th year medical student at Musgrove Park Hospital
- Privacy measure have been introduced at ground floor level outside windows by installing Heras fencing

- Bridgwater and Taunton College: Estates Manager:
  - Provided record information.
  - Blackthorn block has just been renovated to enable some residents of Mendip block to be moved across to provide greater privacy from the homeless provision on site.

Context

Introduction

Understanding the context of a site is important when considering any new development or alteration to an existing provision. This becomes even more important when the proposed development is likely to present a challenge to the status quo or could be conceived as a radical departure.

The context for the Canonsgrove site is interesting given the adjacent residential property and its relative rural location to the south of Taunton.

South Taunton, Trull and Staplehay

Canonsgrove is located to the south of Taunton between the villages of Trull and Staplehay and the M5 motorway and is in the parish of Trull. Trull and Staplehay are the main close residential communities in the locality. To the west of Canonsgrove is the small hamlet of Sweethay The Canonsgrove site is largely masked from view on the public highway (Honiton Road) by extensive mixed deciduous and coniferous tree cover. The area between Canonsgrove and Trull, Staplehay and Sweethay is open farmland intersected with hedgerow typical of the Vale of Taunton.

Planning policy comment

This is not an in-depth review of planning policy pertaining to development on this; rather it an advice note highlighting the need to undertake a through planning policy review to ensure whatever use is ultimately selected for the site that the appropriate evidence base is established to justify the proposed use.

The Taunton Deane Core Strategy 2011 – 2028 (adopted September 2012) is the most important planning policy document when considering development on this site. The Site Allocations and Development Management Plan 2028 (adopted December 2016) includes specific and detailed development management policies and should be read alongside the framework of the adopted Core Strategy.

Somerset West and Taunton Council are in the early stages developing the Local Plan 2040 although progress on this has been severely delayed due to the pandemic. The council are at the early stage of this plan making process. The Issues and Options Consultation Document (January 2020) indicated an approximately two-year period for the development of the new local plan concluding in December 2021 with the adoption of the plan. There is no update on the delivery timescale, but it should be noted as work is completed on the new local plan it will assume greater weight in determining planning applications.

In making any planning application for development on the Canonsgrove site reference should be made to the above policy documents together with relevant guidance notes eg Policy Guidance for change of use of rural service provision and conversion of existing buildings (February 2014) and the National Planning Policy Framework.

The site is currently designated as having a Use Class C2 Residential Institution use in planning policy. This allows uses includes residential care homes, hospitals, nursing homes, boarding schools, residential colleges, and training centres. Use Class C2 (residential institutions) can benefit from limited permitted development opportunities to change use without requiring a full planning application. Currently the permitted development is restricted to a change to a state-funded school or registered nursery. This would be subject to Prior Approval Application.

There have been several recent planning applications relating the development of the halls of residence accommodation and the wider Canonsgrove site. The planning approvals, or refusals for these schemes will give a good indication of issue that are likely to be relevant in developing any application on the site. These applications are:

- 42/95/0038: Full Planning Application for Demolition of Three Houses and Garage Block and Erection Of Two Residential Blocks And Refurbishment Of Existing Study Bedrooms To Form An Additional 142 Study Bedrooms And Two Staff Flats And Formation Of Car Parking At Canonsgrove House, Staplehay, Taunton. Status: Conditional Approval. Scheme has been implemented via the construction of Mendip and Blackthorn blocks.

- 42/05/0024: Outline Application for Erection Of 14 Houses, Erection ff Student/Staff Accommodation and The Tennis Court, Erection of Theatre Workshop Building and Formation Of Associated Car Parking At Canonsgrove House, Staplehay, Trull. Status: Withdrawn

- 42/13/0079: Outline Application for Residential Development Comprising Up To 37 Dwellings with Associated Parking and Landscaping at Canonsgrove Halls Of Residence, Honiton Road, Staplehay. Status: Withdrawn. This application was made by Somerset College, now part of Bridgewater & Taunton College

Having said that, it is interesting to note the site is not located within the Green Belt, Conservation Area, or is in the grounds of a Listed Building. This helps significantly in terms of well-known limiting planning policy doesn't apply to this site although the historic setting within the curtilage of Canonsgrove House is likely to be a material consideration.
There are several Tree Preservation Orders (TPO's) applied to individual and groups of trees across the site. In developing any proposals for the site due consideration should be given to retaining all TPO trees wherever possible.

To the south of the site, beyond the M5 motorway some quarter of a mile away is Poundisford Park (Grade II Listed status). This is the most notable historic asset in the vicinity but if development is constrained as suggested above it is unlikely to have any material impact on this property. Given the distance from the site and lack of clear lines of site between the two this is not considered to have a material impact on the potential of the Canonsgrove site. The Canonsgrove site is well bounded by trees hence it could be argued that there would be no or minimal impact on adjacent landscape or heritage designated areas.

Two miles to the south is the Blackdown Hills Area of Outstanding Natural Beauty (ANOB) which warrants consideration in terms of key views into the site. It should be noted these are long distance views and so long as any development is constraint as indicated above this should not pose a significant challenge.
In terms site specific development restrictions, the site is registered as having Outdoor Sports Facilities (Taunton Deane Green Space Strategy, Issue number: 4, 1st April 2014), but these facilities are not recorded as having 'Unrestricted

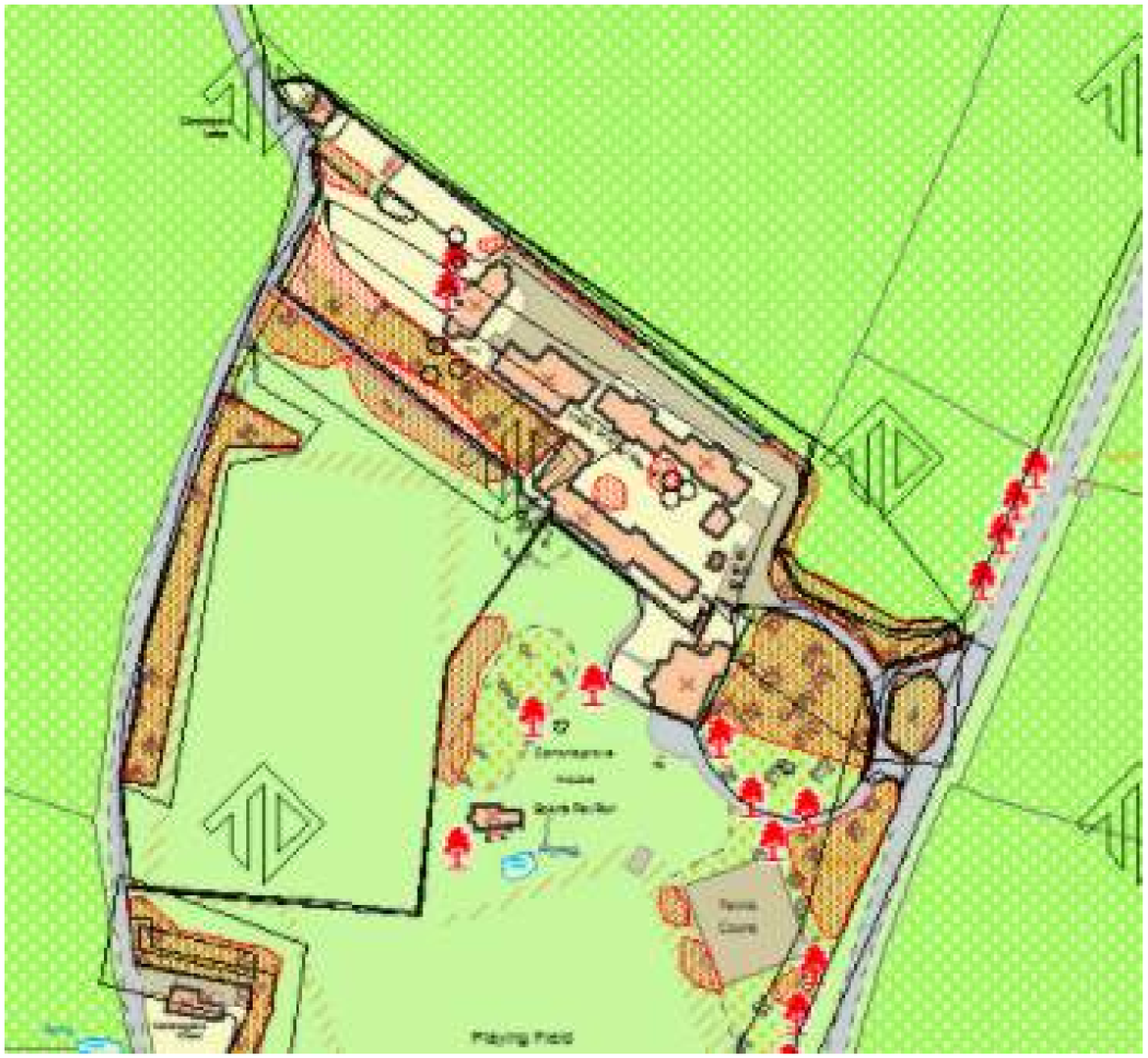


Figure 5 TPO map from Taunton Deane website

Access'. This indicates there is more than one pitch and it is therefore assumed the pitch indicated on the historic mapping for Canonsgrove House has also been counted in this assessment. This might impose restrictions on what use the football / playing pitch can be put to in the future. Sport England have strongly object to previous applications and have recommended that development that resulted in the loss of the playing pitch is refused.

To the immediate north of the site, on the land between Canonsgrove and Staplehay a major outline application (42/13/0018) for up to 170 new homes was refused in 2014.

Planning considerations

The previous applications referred to above provide useful guidance on the likely response from the local planning authority on most key issues pertaining to the site such as heritage, fauna and flora etc, but is should be noted that whilst these applications establish a precedent, the prevailing planning policy at the time of application with carry greatest weight.

The preference for student accommodation close to their place of study and in a town centre location has driven Bridgewater & Taunton College to seek alternative use for the site. The site until early 2020 had been used solely as halls of residence, albeit not by Bridgewater & Taunton College, but by University of Bristol for student doctors working at Musgrove Park Hospital as part for their training. This use is completely in line with the current land use designation for the site.

In response to the Covid-19 global pandemic Somerset West and Taunton Council in early 2020 and in liaison with Bridgewater & Taunton College, repurposed Quantock Hall and Brandon to provide much needed homelessness accommodation with the aspiration that Canonsgrove could form part of the long-term solution to the homelessness issue in the district. This approach was in line with the governments ‘Everyone in’ initiative, but the legality in planning policy terms of using Canonsgrove for this type of occupation either on a temporary or permanent basis is subject to a separate review. Therefore, the planning status of the current homelessness use / occupation of the site is not part of this report.

The site to the north of the Canonsgrove was categorised as a ‘Non-developable Site’ by Taunton Dean in the latest strategic housing land availability assessment SHLAA. No specific reason is published for its categorisation, but this further reinforces the view expressed in the refusal decision for outline application (42/13/0018) that residential development in this part of the district might not be appropriate. In 2019 this view was further emphasised with the updated SHLAA but again no reason was published for its exclusion as developable land. These policy decisions indicate the authority consider housing between Staplehay and the Canonsgrove site inappropriate development, and therefore this policy position is likely to have an impact on any proposals for permanent residential accommodation on the Canonsgrove site.

A way around this impasse, as the Canonsgrove site already exists with a significant amount of built accommodation, with significant levels of embodied carbon, would be for Somerset West and Taunton Council to develop Design Briefs for the site as in other circumstances. The drive should be to find an appropriate use for the existing buildings at Canonsgrove, that preserves the asset, but repurposes it through over cladding / insulation to deliver much needed low energy accommodation. This approach supports the Climate Emergency declared by Somerset West and Taunton Council on 22nd February 2019 that is supported by Carbon Neutrality and Climate Resilience (CNCR) Action Plan and a Somerset wide Somerset Climate Emergency Strategy published by Climate Resilient Somerset. The approach, given the commitments above, should be to wherever possible renew, reuse, repurpose any existing assets.

Access is a key issue for the Canonsgrove site. The current consent allows for 200 plus students and support staff to occupy the site and it can only be assumed that many would need to rely on public transport, cycling or walking to access Taunton. Two bus services (97 and 98) are infrequent, and only runs every two hours between 8.15am and 5.38pm.

There is no Sunday service.

Whilst vehicular access off Honiton Road is safe and issue free, pedestrian and cycle access is a 2.5mile journey to the centre of Taunton is more challenging. Access along Honiton Road in the direction of Staplehay is relatively safe for pedestrian’s curtesy of a narrow pavement. Cycling is possible but the Honiton Road is prone to high car speeds and there is no dedicated cycle route. The pavement could be adapted to provide a shared surface for pedestrians and cyclist.

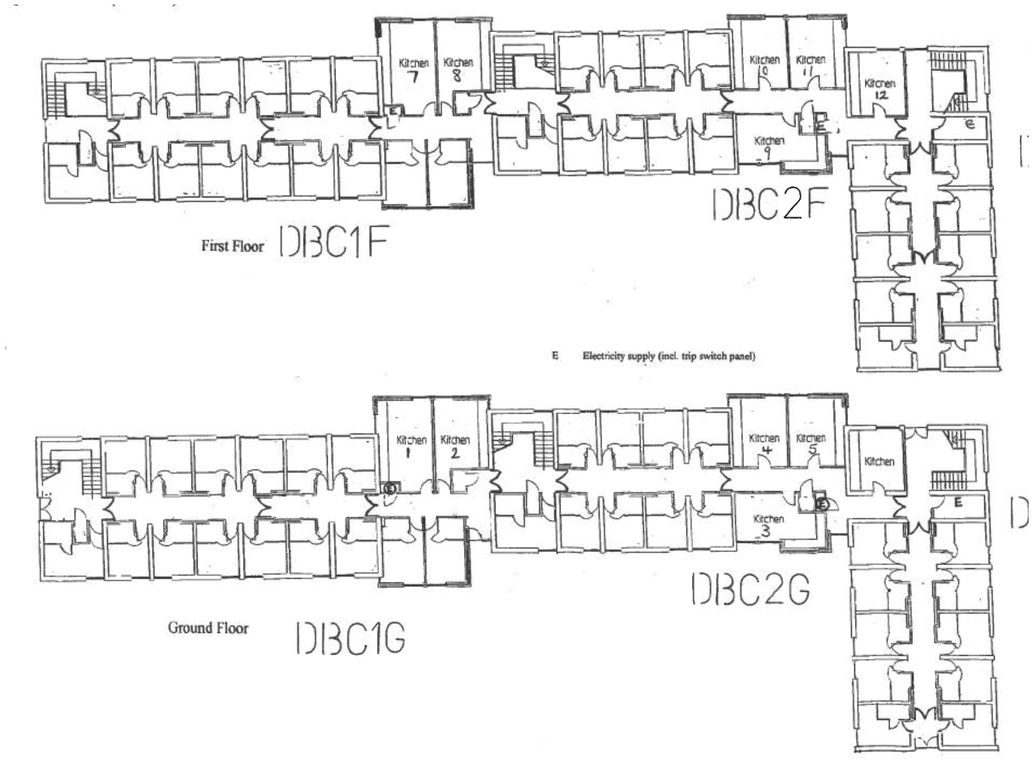
Building analysis

Introduction

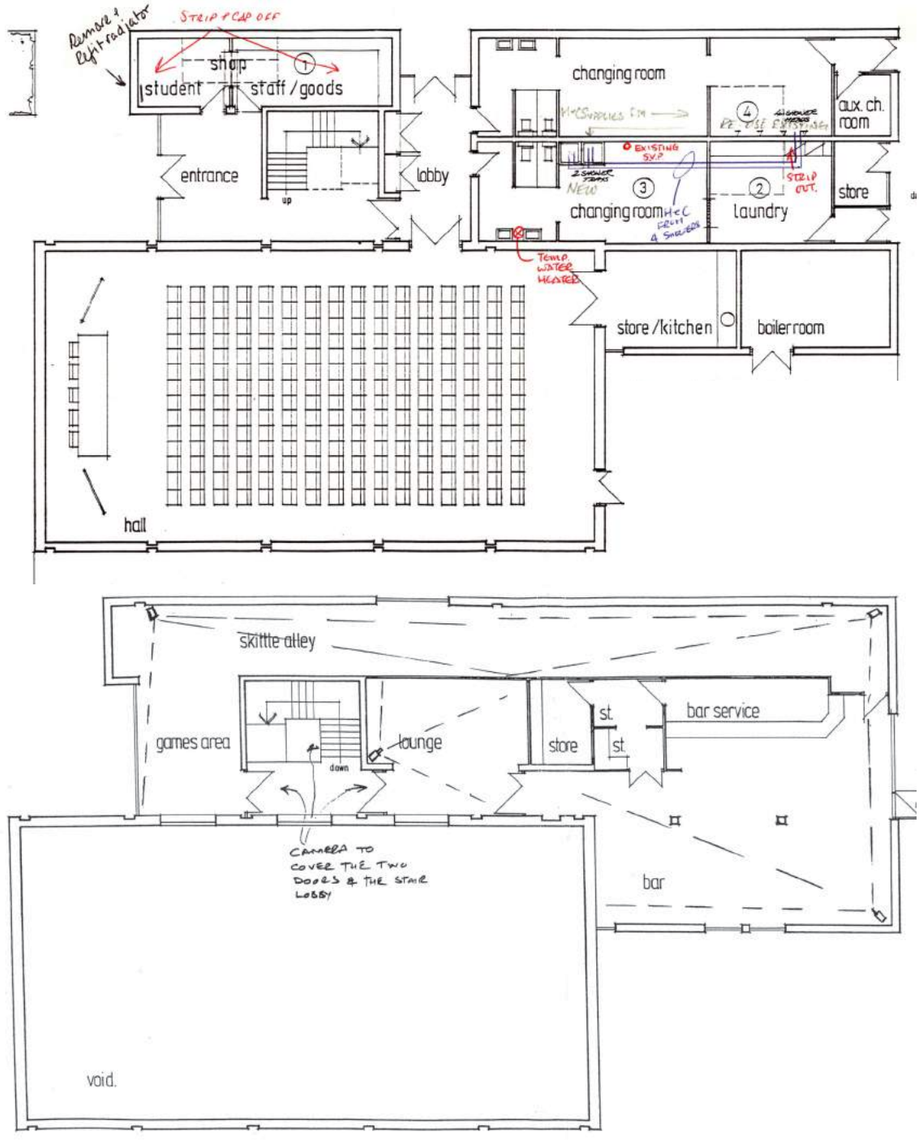
The building analysis undertaken as part of this commission was a high-level spatial analysis rather than an in-depth building condition survey etc. The main point of the analysis is to assess if it is possible to reconfigure the existing buildings with the minimum amount of work to make them fit for purpose to accommodate the defined client groups in respect of the homelessness provision and separately provide desirable open market flats for rental / sale.
This spatial analysis is supported by the structural engineering analysis summarised below.

Building by building analysis

- Quantock, Halls of Residence:
  The block, originally built as three separate block was constructed at the same time as Brandon. The block is comprised of two floors in loadbearing fair-face brick / masonry with precast concrete floors and a flat roof. The original blocks have been joined together with small link buildings in a similar construction. The accommodation floor to floor is identical and comprises small ensuite study bedrooms. Communal kitchens in the original blocks have subsequently been converted to further ensuite rooms.
  Heating is provided by electric panel radiators. Hot water via electric hot water tanks with one tank per approximately 10 rooms.
  This block is need of maintenance and refurbishment.



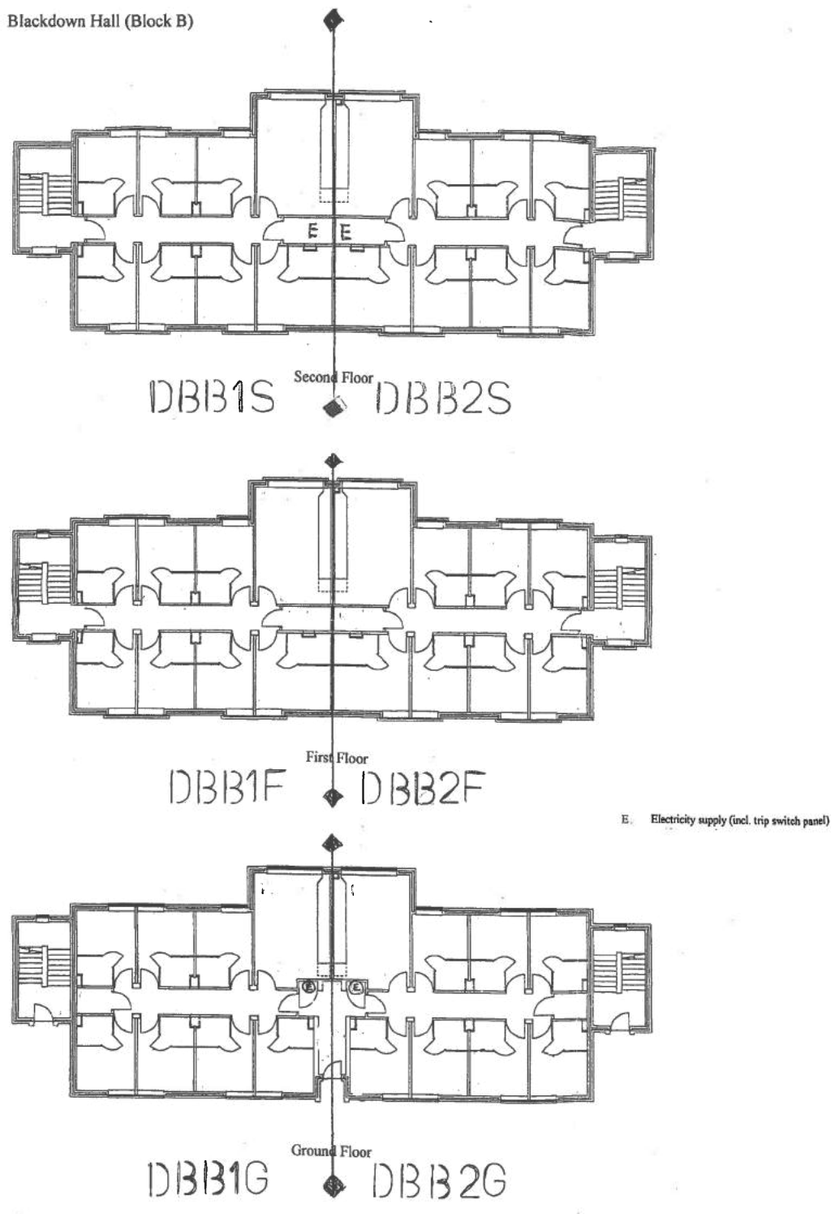
- Brandon, Sports Facilities:
  The block comprises a sports hall with ancillary accommodation such as changing and club room space with skittles alley. The construction methodology of ancillary accommodation is very similar to that of Quantock with some areas supported via a steel frame with infill panels fair-face brick / masonry eg the sports hall. This block is largely unaltered since it was originally constructed.
  Heating and hot water is believed to be via gas boilers in a dedicated plant room.
  Again, the load bearing nature of the construction with insitu floor and the steel frame of the sports hall makes this block easily adaptable.
  This block is need of maintenance and refurbishment.



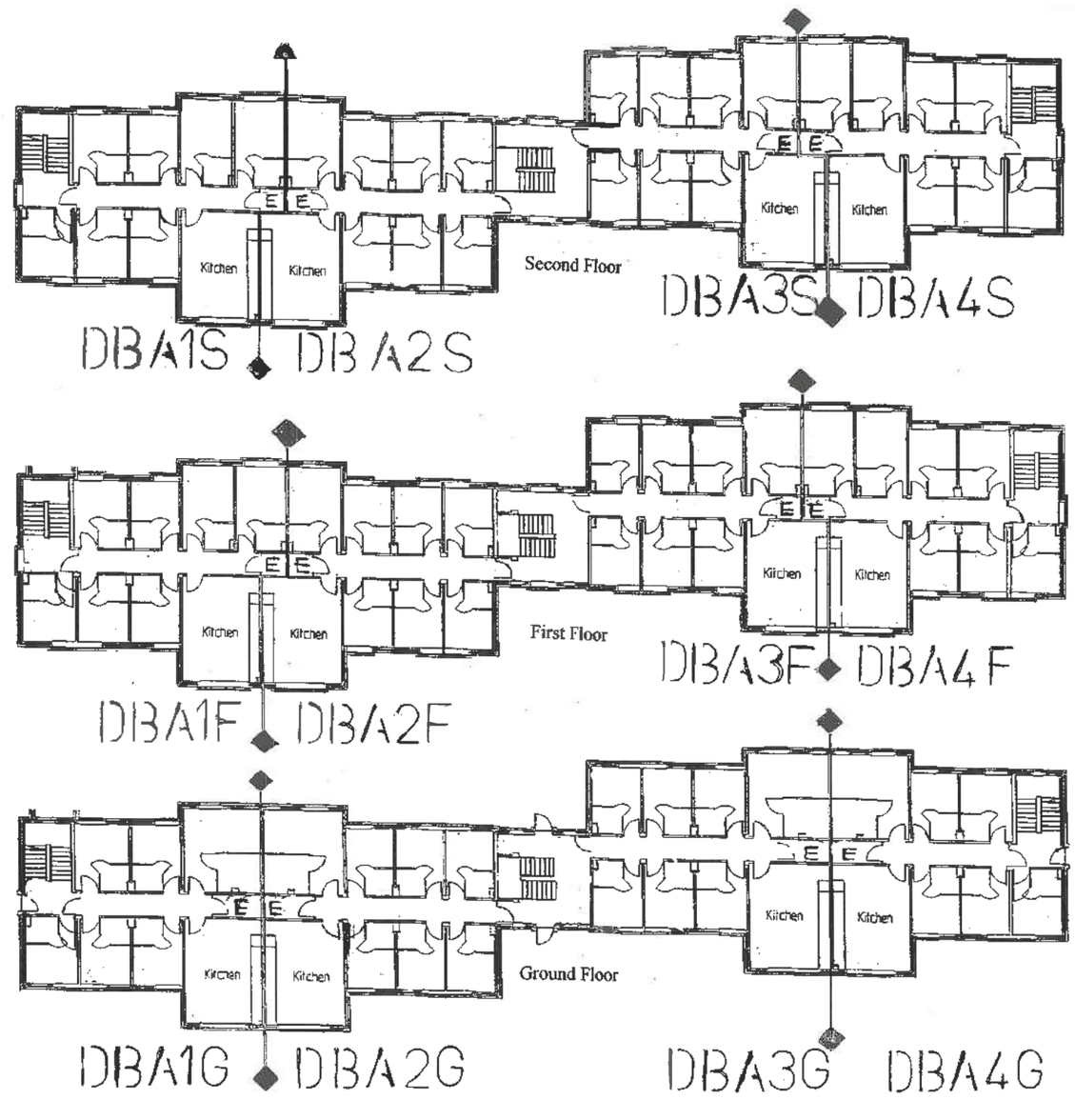
- Blackthorn, Halls of Residence:
  Built at the same time as Mendip block in the late 1990's this block comprises three floors in loadbearing fair-face brick / masonry with precast concrete floors and a pitched tiled roof. The accommodation floor to floor is identical and comprises small ensuite study bedrooms arranged into blocks of seven with a communal kitchen.
  Heating is provided by electric panel radiators. Hot water via electric hot water tanks with one tank per block.
  The load bearing nature of the construction with insitu floor makes this block easily adaptable.

- Mendip, Halls of Residence:
  This block is of identical construction to Blackthorn only with twice the footprint and number of bedrooms. There is a wing on the east end with a couple of larger rooms designed as warden's accommodation.

  Again, it is envisaged that this block will be easily adaptable.



E. Electricity supply (incl. trip switch panel)



Provisional site options

Introduction

The accommodation brief sets out the Somerset West and Taunton Council expectation in terms of their requirements for the site. The key issues that effect the site planning are:

- Are all residents, staff and guests restricted to using the vehicle access off Honiton Road, or can the access to the rear of the site be utilised? The options explore using both site entry points
- If the rear entrance were employed to provide vehicle access for some residents, could restrain access be provide through the site to the bus, cycle and walking route along Honiton Road? The options assume this would be possible
- In planning the site, would it be preferable to separate out the blocks used for homelessness and those deployed for private rented accommodation, ie there is no mixed tenure? The options assume this would be desirable
- To provide the level of support facilities needed for the homelessness accommodation some new build accommodation will be needed. The options assume this would be acceptable and likely to achieve planning approval if the development was constrained within the overall footprint perimeter of the existing development.
- Given the development was originally conceived as a police training college and therefore not automatically appropriate for the proposed use, some demolition of the existing building might facilitate a better / more efficient / more manageable layout. The options assume this would-be possible accommodation, and even desirable in planning terms

Accommodation type options

Based on the existing layouts we have developed three possible accommodation units that the buildings could be readily converted to:

Bedrooms:

retains the existing density of accommodation with small study bedrooms (approximately 10m2) with en-suites. Minimal construction work required only a general refurbishment / redecoration of the existing layouts.

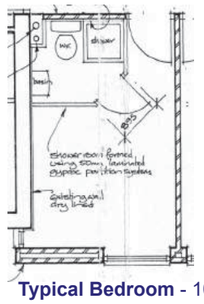
Studios:

By combining two or three of the existing rooms together studio rooms (approximately 20m2) are created which provide a small kitchenette / dining / sitting area as well as bed space and bathroom. These rooms are designed to support more independent living. Communal facilities would still be required for the supported accommodation. Spaces for communal recreation, one to one meeting space, training spaces, laundry, staff offices, etc.

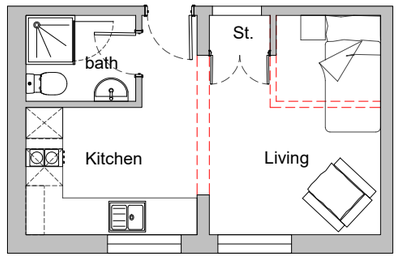
Flats:

By joining more of the existing rooms together 1 bed 2 person flats conforming to national space standards (50m2) can be formed. These flats would be suitable for open market use or as part of the supported homeless accommodation offering encouraging even more independent living as move on accommodation.

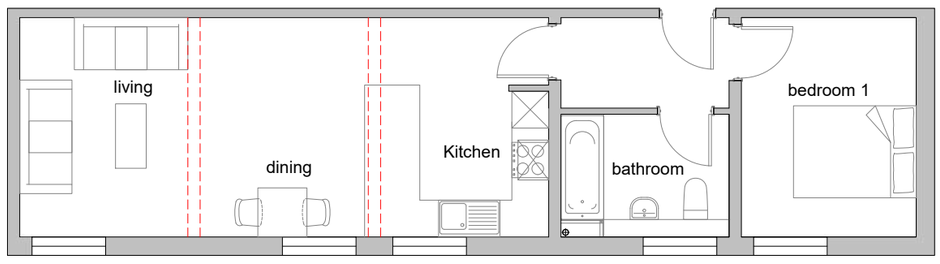
Using the accommodation types developed above we explored what the capacity of each building would be depending on the type of accommodation within it as illustrated on the following pages:



Typical Bedroom - 10m2



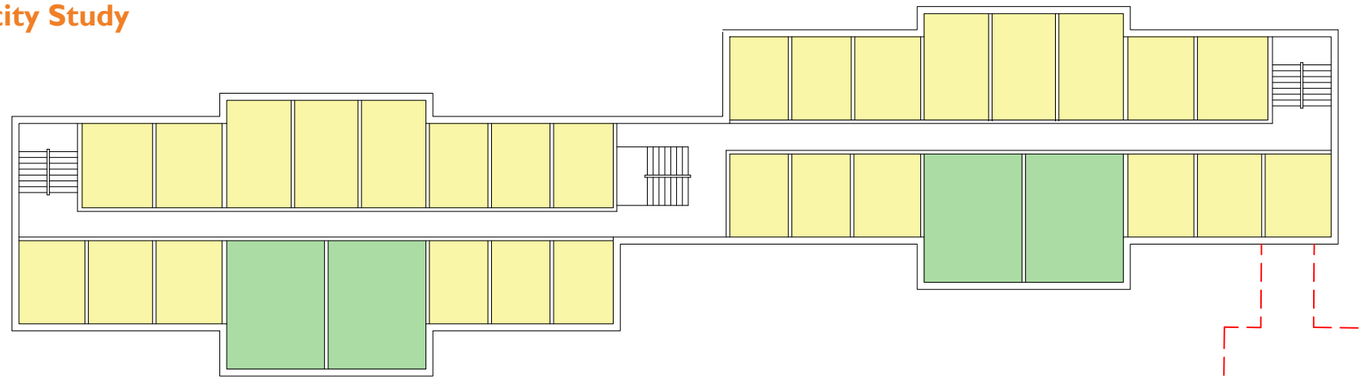
1b1ps - 20 m²



1b2pf - 50 m²

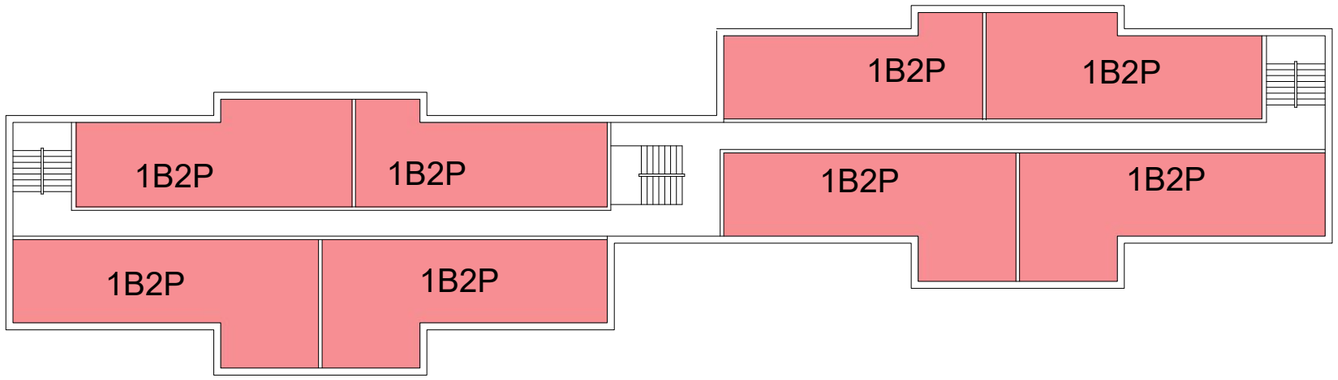
Typical Accommodation options

Mendip Block Capacity Study

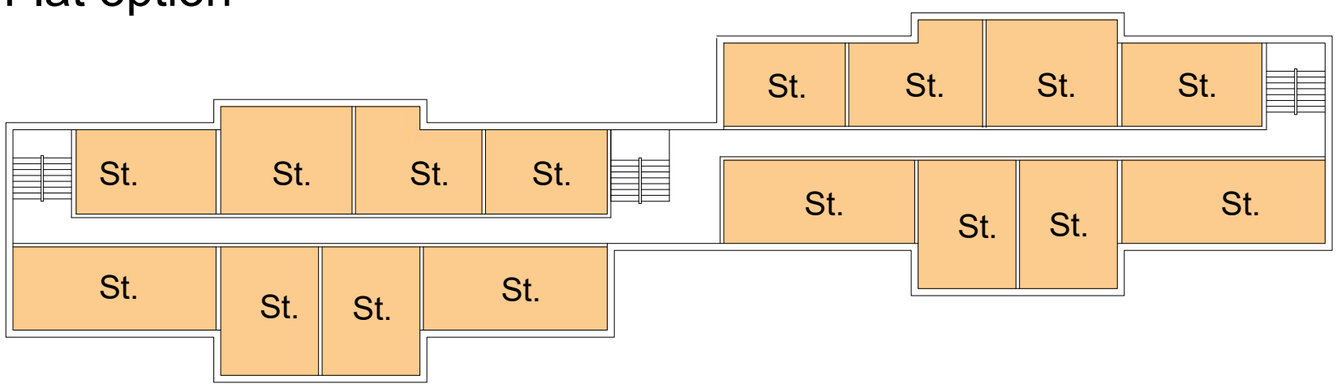


Existing

possible demolition of extension to improve site layout (no existing drawings available)



Flat option



Studio option

Existing Bedrooms

Existing Communal

Flatlette

Apartment

Capacity:
Existing - 84 x bedrooms
Flats - 24 x 1B2P F
Studios - 48 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

Quantock Block Capacity Study

Existing Bedrooms

Existing Communal

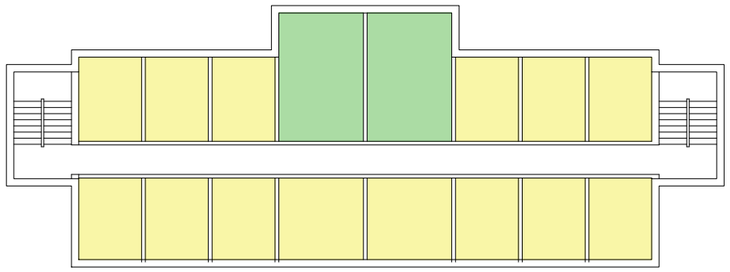
Flatlette

Apartment

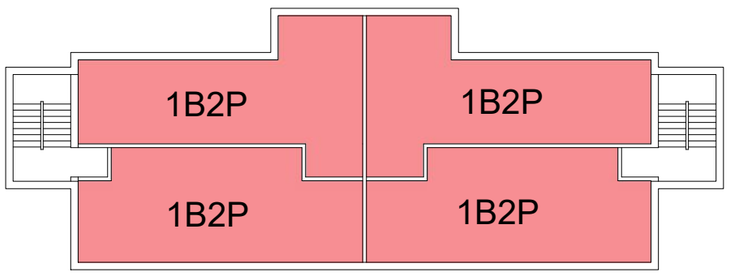
Capacity:
Existing - 68 x bedrooms
Flats - 20 x 1B2P F
Studios - 40 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

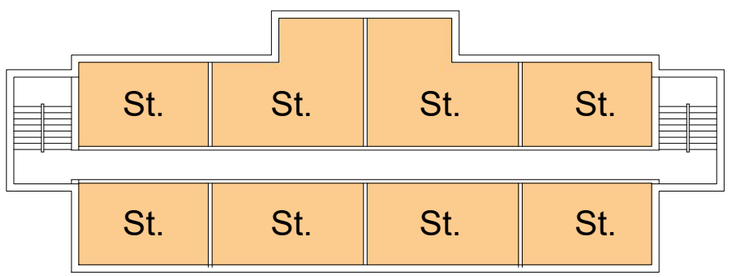
Blackthorn Block Capacity Study



Existing



Flat option



Studio option

Existing Bedrooms

Existing Communal

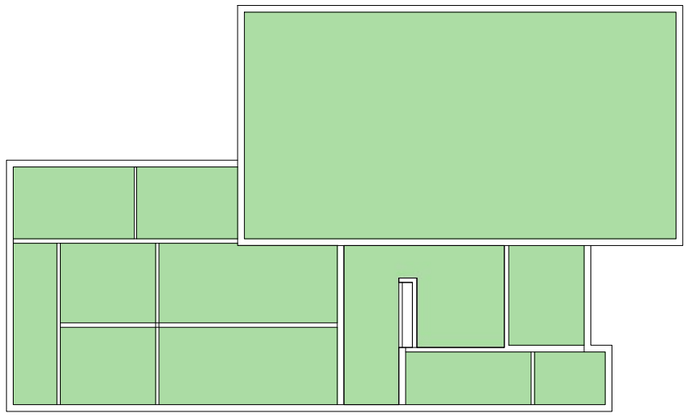
Flatlette

Apartment

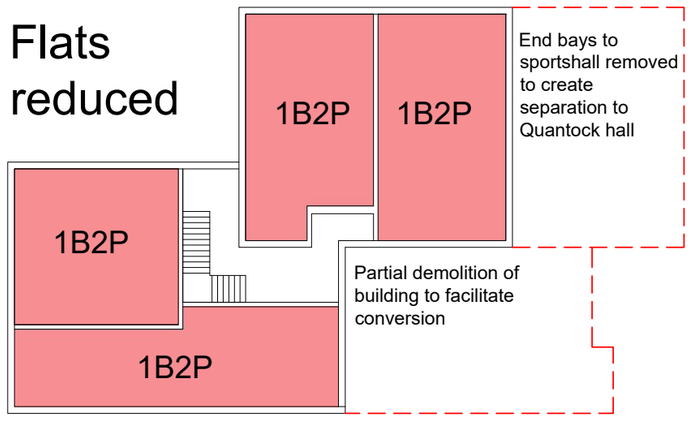
Capacity Blackthorn:
Existing - 42 x bedrooms
Flats - 12 x 1B2P F
Studios - 24 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

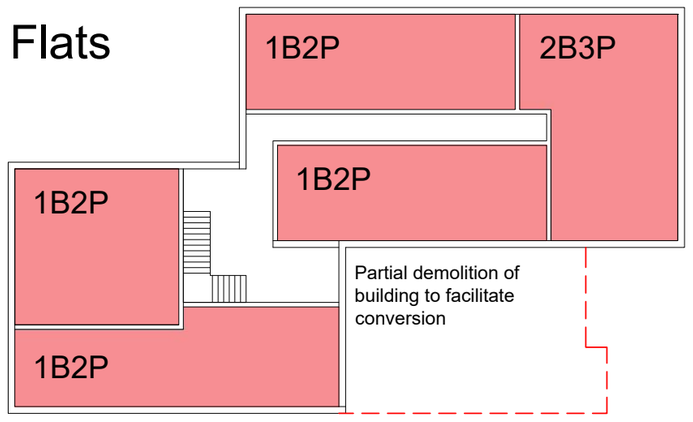
Brendon Block Capacity Study



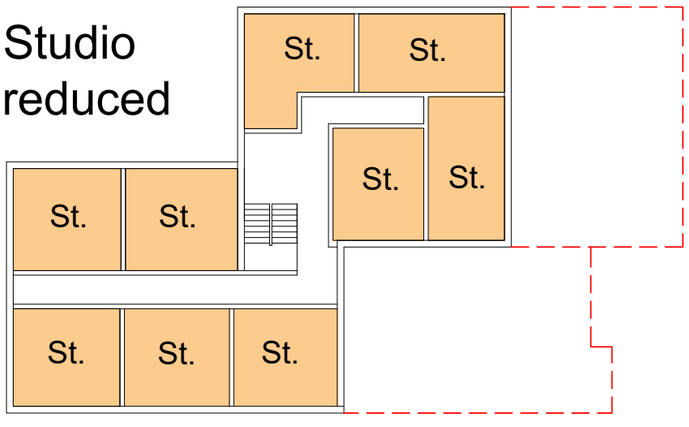
Flats reduced



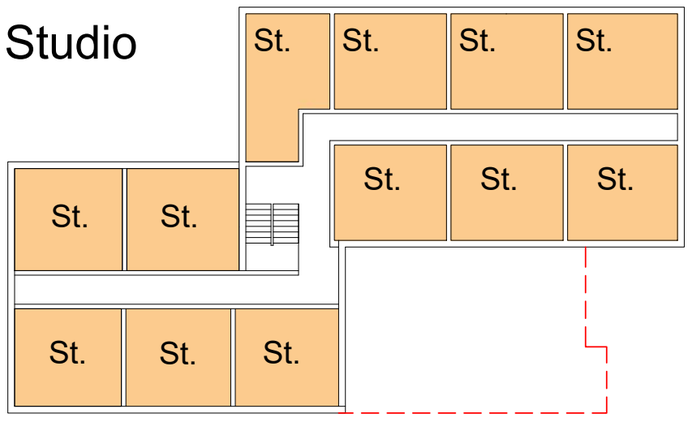
Flats



Studio reduced



Studio



Capacity Brendon:
Flats - 8 x 1B2P F, 2 x 2B3P F
Studios - 24 x 1P1B S
(studio option will require some communal areas in addition)

Capacity Brendon (reduced footprint):
Flats - 8 x 1B2P F
Studios - 18 x 1P1B S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

The site layouts options

Different combinations of these layouts were then used to develop some outline site plans to illustrate the different ways in which the site might be used. The key difference between the options is around the degree of separation and access arrangements for the different uses on site:

Option One

Capacity:

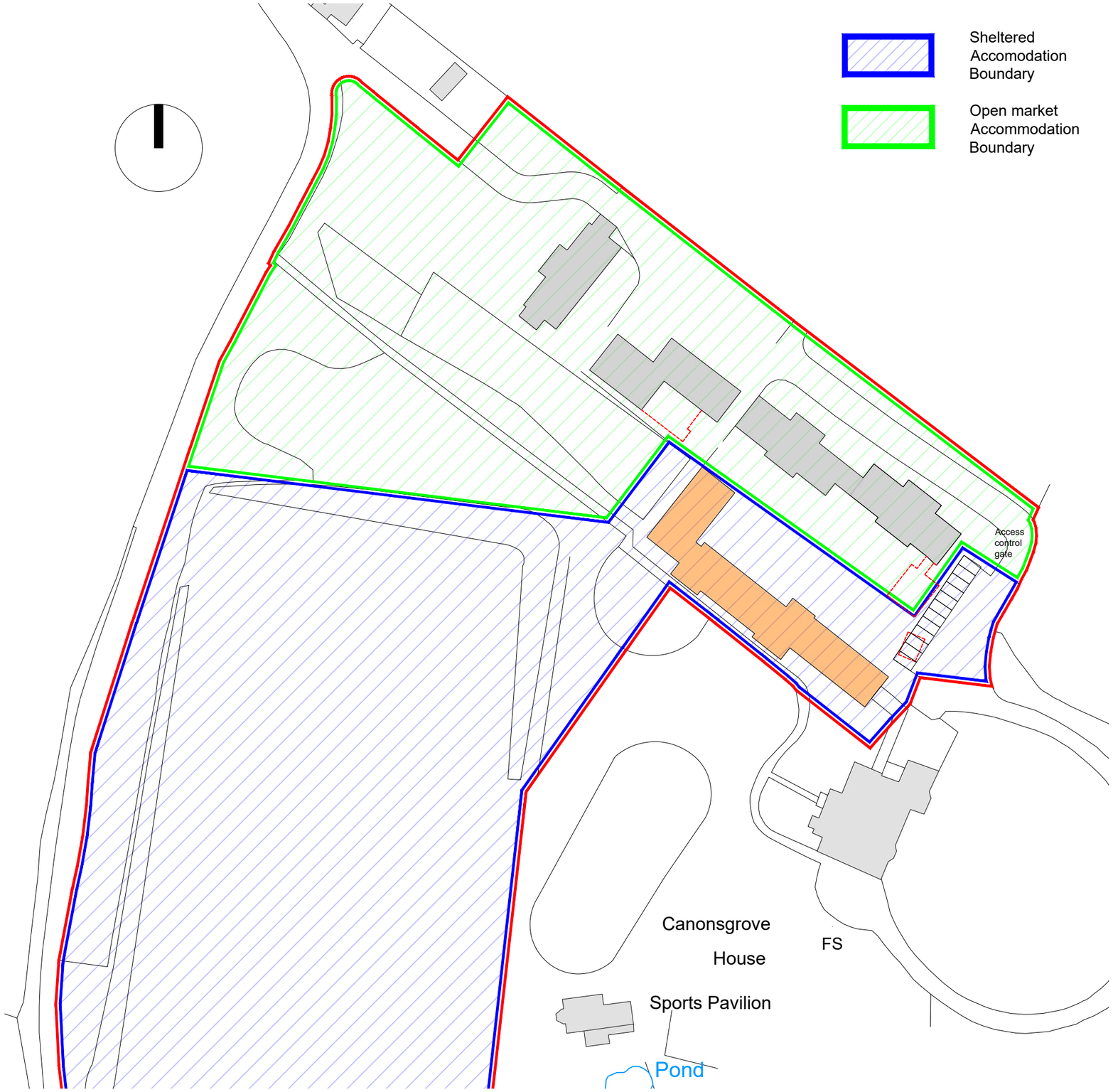
Open market options:
46 x 1B2P F
96 x 1B1P S

Sheltered Accommodation options:
68 x bedrooms
20 x 1B2P F
40 x 1B1P S

Note: some additional space required for communal uses from studio option.

Access

All traffic from main road. Rear access grounds maintenance only.
Note: controlled gate access in to open market accommodation.



Option Two

Capacity:

Open market options:

46 x 1B2P F

94 x 1B1P S

Sheltered Accommodation options:

72 x bedrooms

20 x 1B2P F

42 x 1B1P S

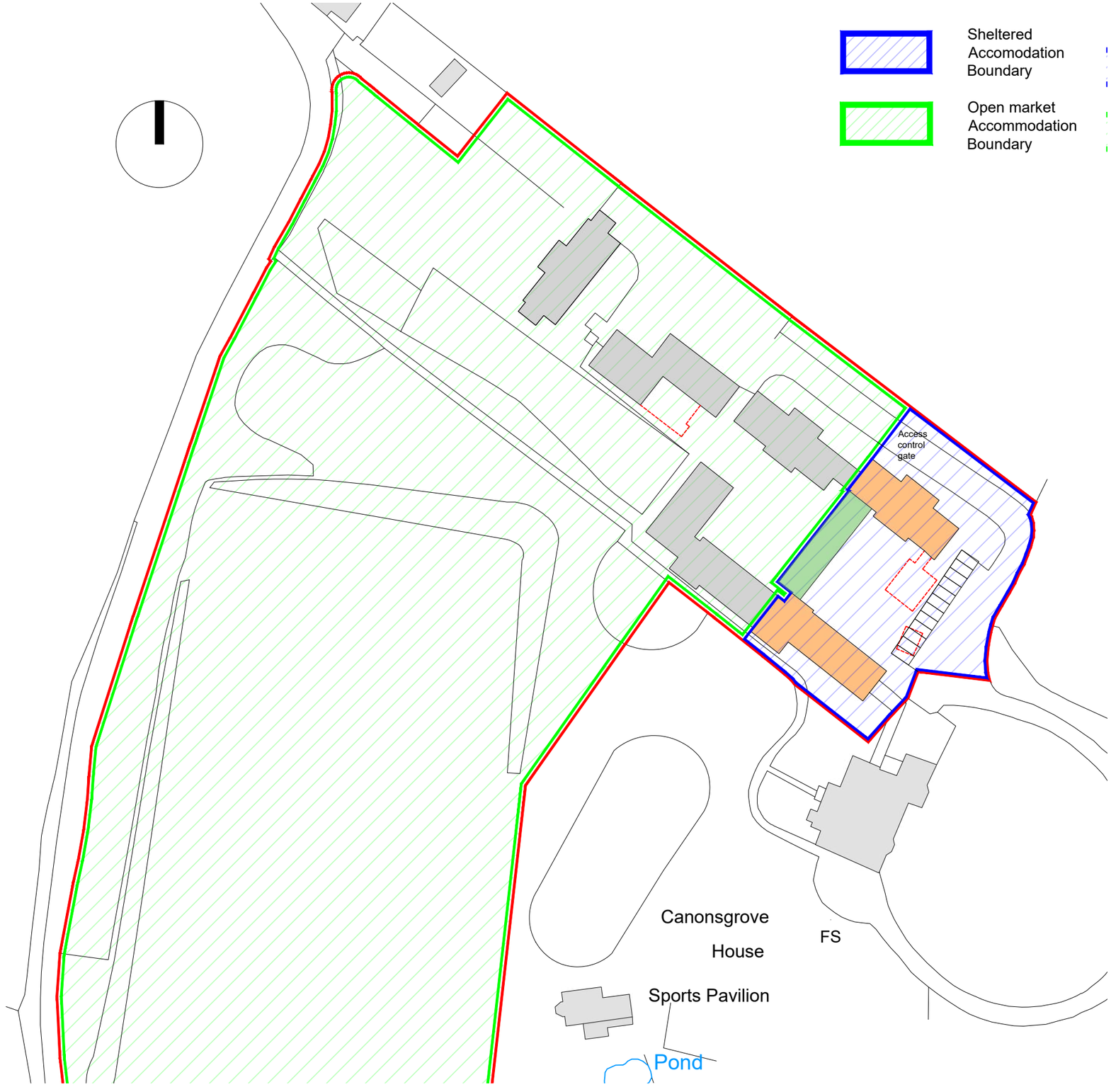
Note: some additional space required for communal uses from studio option.

Access

All traffic from main road.

Rear access grounds maintenance only.

Note: controlled gate access to open market accommodation



Option Three

Capacity:

Open market options:

46 x 1B2P F

94 x 1B1P S

Sheltered Accommodation options:

72 x bedrooms

20 x 1B2P F

42 x 1B1P S

Note: some additional space required for communal uses from studio option.

Access

All traffic from main road.

Rear access grounds maintenance only.

Note: controlled gate access to open market accommodation

Headline development costs

A high level cost estimate has been generated for the construction work required on site based on £/m2 rates from other similar projects. The following assumptions have been made.

- £800 / m2 cost to redecorate and upgrade energy performance where existing internal arrangement is retained
- £1300 / m2 cost to refurbish, including internal alterations to form flats or studios including energy performance enhancements
- £1800 / m2 cost for conversion of Brendon (sports hall) to residential accommodation
- 10% contingency
- 15% consultant fees
- Allowance made for external works and Utilities alterations.
- No allowance is made for the purchase of the site.

A high and low range of development costs are derived depending on which of the site options is preferred as the tables below. The lower cost is for the option where the internal configuration of Mendip block is retained.

Lower range cost

Block	area m2	m2 cost	Total
Mendip	1530	£ 800	£ 1,224,000
Blackthorn	685	£ 1,300	£ 890,500
Quantock	1375	£ 1,300	£ 1,787,500
Brendon	830	£ 1,800	£ 1,494,000
External works			£ 150,000
Utilities			£ 50,000
			£ 5,546,000
Contingency		10%	£ 554,600.0
Consultant fees		15%	£ 831,900.0
Total			**£ 6,932,500.0**

Upper range cost

Block	area m2	m2 cost	Total
Mendip	1530	£ 1,300	£ 1,989,000
Blackthorn	685	£ 800	£ 548,000
Quantock	1375	£ 1,300	£ 1,787,500
Brendon	830	£ 1,800	£ 1,494,000
External works			£ 150,000
Utilities			£ 50,000
			£ 5,968,500
Contingency		10%	£ 596,850.0
Consultant fees		15%	£ 895,275.0
Total			**£ 7,460,625.0**

Note -

the above figures are high level estimates only. If more accurate advice is required it is recommended a quantity surveyor is appointed to review the proposals and provide a cost estimate.

Engineering implications

A full copy of the engineering report on the existing buildings is attached as appendix A. The executive summary is as follows:

Existing Ground Conditions

The site has a layer of topsoil and made ground sitting over a layer of clay to a depth of around 2.5m and is underlain by mudstone bedrock.

Existing Building Structure

The existing buildings were constructed in the 1970's and mid 90's with the residential buildings being of a load bearing masonry with concrete floor construction, whilst the sports hall has elements of steel framing along with load bearing masonry.

The foundations of the existing building appear to be mass concrete foundations that likely extend down to the mudstone rock formation below. These strip foundations are located under the load bearing walls. It is anticipated that pad foundations or thickenings to the strips will be encountered under the columns to the sports hall.

Constraints

The below is a list of the key constraints identified at this stage.

- Existing foundation depth and sizes - and the interaction of proposed works with existing substructures
- Variable ground conditions
- Existing below ground drainage runs and their connection points
- Existing structural load paths and headroom constraints
- Existing stability system
- Restricted access due to the existing building

Proposed Structural modifications

The proposals to refurbish the buildings will depend on what can be easily achieved structurally. The nature of the existing buildings and their current load paths mean that any proposed modifications will ideally be limited to non-load bearing walls. Where this is not practical these should ideally be limited to single door width openings to link adjoining rooms where possible, as to do anything more will result in significant works to provide support to the existing floor structure and will result in the likely introduction of down stand beams within these spaces, which may or may not have headroom issues.

Below Ground Drainage

The proposed below ground drainage network will need to maintain the existing runs but also include for an allowance for additional rainfall if required as part of any planning condition. As the extent of the existing hardstanding isn't due to increase then existing provisions would appear to sufficient subject to confirmation from the local planning and water authorities.

A CCTV survey of existing below ground drainage network will be required to ascertain the geometry of the existing below ground drainage network. Once the CCTV survey has been confirmed and the information is available then a capacity check would need to be carried out to assess the existing network for the proposed alterations. On the back of this study, we would highlight any reinforcement that may be required.

Further investigations and surveys required

- Phase 1 Ground Investigation to assist with planning submission
- Asbestos survey
- CCTV Survey and mapping of existing below ground drainage
- Topographical survey
- Below ground services drawing
- Investigations to existing walls to be removed to confirm they are non-load bearing
- Structural record drawings for main Quantock, Brendon and Mendip blocks

Planning risk overview

Introduction

Wherever development is proposed, planning risk exists. No development is risk free. The proposal to repurpose Canonsgrove to provide both open market rental flats and more specialist homelessness accommodation presents a range of specific potential risks. This risk overview touches on the main risks identified during this Options Study. This isn't a detailed appraisal of potential planning risks and therefore should the repurposing of Canonsgrove be pursued then a more in-depth assessment of the planning risks should be commissioned.

This overview does not address the issue of if C2 use is appropriate for the homelessness accommodation that is currently being explored by Somerset West and Taunton Council. Depending on the outcome of this work, it might be appropriate to include this risk in any future commissioned work.

This overview assumes that any planning application includes all the National and Local List requirements for the submission of a planning application and takes note of recent planning decision in the locality to inform any application. Failure to prepare a well informed and detailed application will result in far more planning risks than indicated below.
Main planning risks

- Use - Open market housing: Open market housing is now problematic in rural location. The issue relates to effectively demonstrating the location is sustainable in respect of Core Strategy policy. Policy SP 1 Sustainable Development Locations and Policy DM 2 Development in The Countryside have been used by Somerset West and Taunton to refuse consent in the district, thereby establishing precedent that the policy is sound and defensible. Making an application for open market housing in this location would be a direct challenge to this policy unless a convincing argument can be made justifying the location is sustainable can be made
- Acceptable form of development: Given the site is already developed and has consent for the magnitude and scale of development on site, any proposals that seek to alter the form of that development that maintains or reduces the status quo should present minimal risk. Proposals that increase the footprint of development within the perimeter of the existing building blocks should also be acceptable, particularly if the development is of a minor nature and single storey in height. If development is proposed that falls outside the existing footprint of the development perimeter, this is likely to be more contentious and open to serious challenge, particularly if it increases the magnitude of units of accommodation available
To mitigate these and other planning risks, should the council wish to purchase the site and develop the scheme it is recommended a Pre-planning Application is submitted to Somerset West and Taunton Council. This is a non-public application process that seeks the opinion of the local planning authority as to the likelihood of an application for development being successful. The process seeks opinion from a range of internal developments and provides a brief response based on information submitted. Typically, the more detailed the information submitted the more considered the response.

Comparative case study

Forecastle, Thornbury, Bristol, is a long establish development owed and run by Elim Housing Association. The development provides accommodation very similar in nature to that proposed by Somerset West and Taunton for the repurposing of the Canonsgrove site. This site was subject to a £1.1m Homes England funded redevelopment that completed in 2018.
See Appendix B for further details.

Other potential risks

Planning is not the only risk for a scheme such as Canonsgrove. To date the scheme has been managed by YMCA Dulverton Group which appears to be working well. Should the commissioning model change or the YMCA pull out of providing such services then this presents a risk. This is particularly relevant if they drive the detail of any ultimate design brief, making the scheme bespoke to their operating model eg not having on-site management office as the organisation has this elsewhere in locality. The main mitigation against this risk would be to agree a design brief that has in built flexibility that allows for different operating models to deliver the on-site management needed.

Providing housing for the homeless is always contentious. The local community of Staplehay and Trull have proved with historic applications lodged in the locality that they have both the resources and ability to mount effective lobbying campaigns against development they find objection to. Their strength of conviction against certain types of development, particularly housing, has been seen to be resolute. Their communication has been channelled through Trull Residents Group (TRG). Engaging with the Trull Residents Group in meaningful dialogue will help to explore the issues associated with finding a viable long-term use for the Canonsgrove site. Along with the Trull Residents Group, Trull Parish Council also provides an effective statutory lobbying organisation that represents the whole of the local community. To help mitigate the risk from the local community of generating hostile press coverage and mounting a vociferous campaign against any proposals put forward for the redevelopment of the site, it is recommended a community engagement strategy is devised that includes regular communications with both Trull Residents Group and Trull Parish Council.

Opportunities

The Canonsgrove site has a considerable amount of embodied carbon tied up in the existing buildings. A real opportunity exists to find an acceptable use for these buildings that could provide much needed residential accommodation without resorting to demolishing the blocks. The blocks could be repurposed and upgraded to provide an exemplar low carbon development with low energy consumption. This approach would underpin Somerset West and Taunton's Climate Emergency declaration.

There are significant opportunities to introduce new tree planting across the site and develop an active regime to better manage the natural environment around the site. This would support policies and objectives in the Core Strategy around developing tree cover Objective 8 and would also support the Taunton Dean Green Infrastructure Strategy (2009) through the enhancement of the Green Wedge concept.

Phosphate: a recent court case regarding phosphate pollution affecting areas of special scientific interest has changed planning policy to require that all development is nutrient (phosphate) neutral. Given that most development involves the discharge of waste materials into the sewer system, nutrient neutral development can practically only be delivered by offsetting. Local councils are in the process of setting up offsetting schemes for developers to buy into but in the meantime until this is in place no planning consents are being granted in the area. It is unclear at this time how long it will take to resolve the situation.

It is an untested approach, but it could be argued that by reducing the capacity at Canonsgrove, which would result in a reduction in the amount of phosphate generated by the site, this could be used to offset other development off site. This development would have to be within the same water treatment area. Given that there are over 200 bedrooms on the site and phosphate output is calculated per bedroom there is the potential for quite a lot of capacity to be used elsewhere. Given the cost of offsetting schemes there is a potential asset for the site.

Conclusions

- Current planning policy would indicate it is unlikely consent for open market rental or sale flats would be supported
- Alternative options that are likely to be supported could include anything that falls under the C2 planning use class or under permitted development. eg:
  - Care / retirement home
  - School (under permitted development)

- Research indicates that any development is likely to be challenged by the local community.
- The council's policy on climate emergency and zero carbon development is in advance of current planning policy that has the potential to stifle the Councils aspirations.

Recommendations

- Seek alternative uses that would compensate for projected income lost from the open market accommodation
- Develop any proposals for the site in conjunction with the local community
- Work with the planning department to prepare a development brief for the site.
- Confirm project development costs via appointment of a Quantity Surveyor

APPENDIX A - Engineering report

Canonsgrove Hall

Civil and Structural Feasibility Report

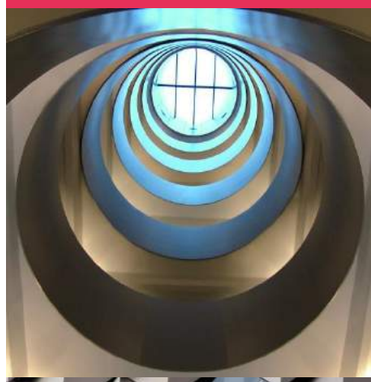
Curtins Ref: 077700-CUR-00-XX-RP-S-00001

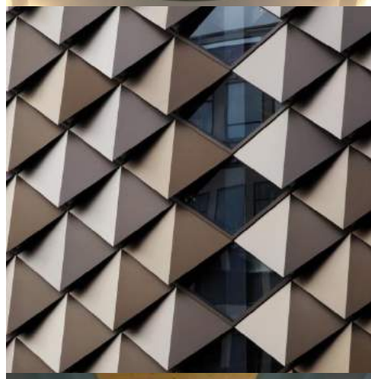
Revision: P02

Issue Date: 22 January 2021

Client Name: Somerset West and Taunton Council

Site Address: Canonsgrove Halls, Trull, Taunton TA3 7HP





Curtins
Quayside
40-58 Hotwell Road
Bristol BS8 4UQ
Tel: 0117 302 7560
www.curtins.com

Rev	Description	Issued by	Checked	Date
P01	DRAFT Issue	NW		12/01/2021
P02	Update following comments	NW		22/01/2021

Author	Signature	Date
Nick Weller MEng (Hons) CEng MICE Principal Engineer		12/01/2021

Reviewed	Signature	Date

File location: \\brfs02\Projects\076000+\077700-CanonsgroveHalls\Q4-Production\4B-Documentation\S\077700-CUR-00-XX-RP-S-00001_Canonsgrove_Halls_A3.docx

Table of contents

Executive Summary

Existing Ground Conditions

The site has a layer of topsoil and made ground sitting over a layer of clay to a depth of around 2.5m and is underlain by mudstone bedrock.

Existing Building Structure

It is believed the existing buildings were constructed in the 1970's and mid 90's with the residential buildings being of a load bearing masonry with concrete floor construction, whilst the sports hall has elements of steel framing along with load bearing masonry.

The foundations of the existing building appear to be mass concrete foundations that likely extend down to the mudstone rock formation below. These strip foundations are located under the load bearing walls. It is anticipated that pad foundations or thickenings to the strips will be encountered under the columns to the sports hall.

Constraints

The below is a list of the key constraints identified at this stage.

- Existing foundation depth and sizes - and the interaction of proposed works with existing substructures
- Variable ground conditions
- Existing below ground drainage runs and their connection points
- Existing structural load paths and headroom constraints
- Existing stability system
- Restricted access due to the existing building

Proposed Structural modifications

The proposals to refurbish the buildings will depend on what can be easily achieved structurally. The nature of the existing buildings and their current load paths mean that any proposed modifications will ideally be limited to non-load bearing walls. Where this is not practical these should ideally be limited to single door width openings to link adjoining rooms where possible, as to do anything more will result in significant works to provide support to the existing floor structure, and will result in the likely introduction of down stand beams within these spaces, which may or may not have headroom issues.

Below Ground Drainage

The proposed below ground drainage network will need to maintain the existing runs but also include for an allowance for additional rainfall if required as part of any planning condition. As the extent of the existing hardstanding isn't due to increase then existing provisions would appear to sufficient subject to confirmation from the local planning and water authorities.

A CCTV survey of existing below ground drainage network will be required to ascertain the geometry of the existing below ground drainage network. Once the CCTV survey has been confirmed and the information is available then a capacity check would need to be carried out to assess the existing network for the proposed alterations. On the back of this study we would highlight any reinforcement that may be required

Further investigations and surveys required

- Phase 1 Ground Investigation to assist with planning submission
- Asbestos survey
- CCTV Survey and mapping of existing below ground drainage
- Topographical survey
- Below ground services drawing
- Investigations to existing walls to be removed to confirm they are non-load bearing
- Structural record drawings for main Quantock, Brendon and Mendip blocks

1.0 Introduction

Curtins has been appointed to carry out the Civil and Structural high level review of the proposed works at Canonsgrove Halls to convert and reconfigure some the existing buildings to be more suitable for the proposed updated use to provide housing for the homeless persons under the care of Somerset West and Taunton council. The following document outlines the Civil and Structural implications of the project and provides design commentary for the project which is at initial feasibility stage. It also identifies key risks with the emerging design and how further investigation and alterations may improve buildability, economy and quality of the proposed works.

2.0 Site History and Existing Ground Conditions

The current site consists of two 2 storey buildings and two 3 storey buildings currently used as residential accommodation. One of the buildings was originally used as a sports hall, with skittle alley, changing rooms and social club. The buildings were constructed during two phases, the first double storey buildings in the 1970's followed by addition of the two 3 storey buildings added during the mid 90's.

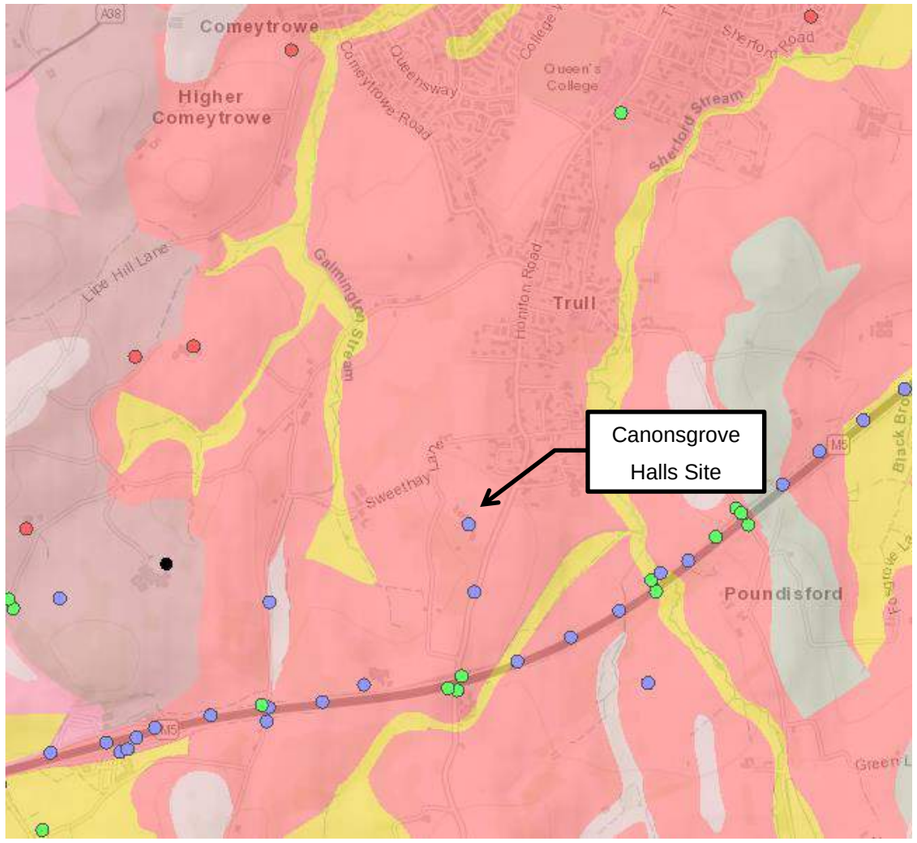
2.1 Ground Conditions

It is understood from review of the British Geological Survey information that the site is underlain by mudstone bedrock. The Bedrock geology is defined as: Branscombe Mudstone Formation - Mudstone. Sedimentary bedrock formed between 228.4 and 201.3 million years ago during the Triassic period.

At this stage, site investigations have not been specified. There are however several historical trial pits dug on the site along with some deeper boreholes within 400m from the site as per the blue dots on the plan.

From reviewing this existing information, the site has a layer of topsoil and made ground sitting over a layer of clay to a depth of around 2.5m and is underlain by the mudstone bedrock.

From these investigations the anticipated allowable bearing capacity at the depth of the mudstone is of the order of 90-100kN/m2



2.2 Existing Trees

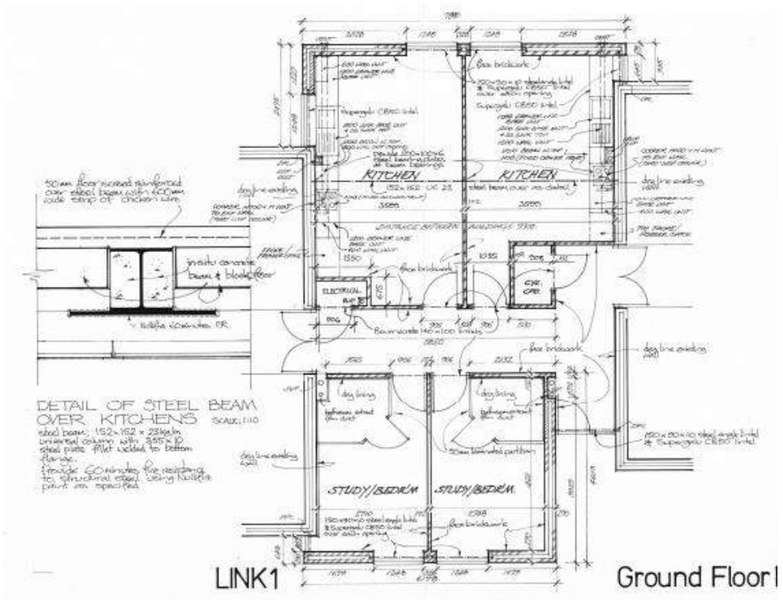
There are several existing trees that are near to the existing buildings and further investigations would need to be undertaken to see if there has been any impact of their proximity on the existing buildings. If any of these are to be removed as part of the proposed works then the impact of removing these trees and the potential volumetric changes that may occur due to the differing water demands should be considered with any final foundation solution.

3.0 Existing Building Structure

The existing buildings were constructed in the 1970's and mid 90's with the residential buildings being of a load bearing masonry with concrete floor construction, whilst the sports hall has elements of steel framing along with load bearing masonry.

The Quantock residential block consists of precast floor units that span between the bedroom party walls. The corridors typically span the same direction and utilise steel beams to support the precast floor units, spanning across the corridor to the load bearing masonry party walls between rooms. The span of the roof matches the floors and is constructed of a metal deck with insulation over.

The Quantock block used to be three separate blocks that were joined when the additional blocks were constructed in the 90's. The construction of these link sections is similar to the newer blocks although adopts load bearing masonry, however the floor construction utilises beam and block rather than wider precast floor units. The spans of the 1st floors are also in the opposite direction with the beam and block floor spanning between the external wall and the internal corridor walls. Due to the spans steel beams have been utilised within the kitchens to one of the link buildings which are supported on the dividing wall. The roof construction is timber, and spans across the shortest distance.



Link building steel beam details

Brendon block is the social/sports facilities. The construction of this block is different than the Quantock block due to the use of the building. The building does however appear to adopt a similar construction where possible with precast floor units being supported off load bearing masonry walls at ground floor where the spans allow. The larger more open plan spaces are achieved via steel beams and trusses that span across the spaces. These typically are supported on the masonry walls but in the case of the sports hall these larger trusses are supported on steel columns embedded in the external walls. Limited existing structural information is available for this building.

The residential blocks Blackdown and Mendip constructed in the 90's are both of load bearing masonry construction. These blocks utilise beam and block floors that span between the external and internal corridor walls with the exception of the areas where the kitchens are located as the increased spans have resulted in the orientation being adjusted to span across the rooms between the internal walls.

The roofs to these blocks consist of timber roof trusses spanning between the outside walls along with the internal corridor walls matching with the floors below. The orientation of these roof trusses matches the orientation of the floors below, with the same load bearing walls being utilised as the floors.

3.1 Foundations

The foundations of the existing building appear to be mass concrete foundations that likely extend down to the mudstone rock formation below. These strip foundations are located under the load bearing walls. It is anticipated that pad foundations or thickenings to the strips will be encountered under the columns to the sports hall.

3.2 Stability

Stability of the existing buildings is thought to be provided via the masonry walls of the building which resist lateral wind loads rather than via stiff core elements. The sports hall likely utilises the end walls as stability to the open space along with the infill masonry panels between the columns providing restraint.

3.3 Existing building condition

A detailed condition survey of the existing building has not been undertaken due to it being occupied and the limitations of potential asbestos contained within the building fabric. Once the building has been decamped and the removal of the existing finishes has been carried out then the condition of the building fabric will be able to be better determined. It should be noted that from the walkaround site that no obvious structural defects were picked up in the blocks visited.

4.0 Constraints

There are a number of constraints that are associated with the proposed works. The below is a list of the key constraints identified at this stage.

- Existing foundation depth and sizes - and the interaction of proposed works with existing substructures
- Variable ground conditions
- Existing below ground drainage runs and their connection points
- Existing structural load paths and headroom constraints
- Existing stability system
- Restricted access due to the existing building

5.0 Proposed Structural Modifications

The proposals to refurbish the buildings will depend on what can be easily achieved structurally. The nature of the existing buildings and their current load paths mean that any proposed modifications will ideally be limited to non-load bearing walls. Where this is not practical these should ideally be limited to single door width openings to link adjoining rooms where possible, as to do anything more will result in significant works to provide support to the existing floor structure, and will result in the likely introduction of down stand beams within these spaces, which may or may not have headroom issues. Specific commentary on each of the blocks will be given further in the subsequent sections.

5.1 Loading

The proposed usage of the floors after the refurbishment works are of a similar in type to the original and under current standards the imposed floor loading would be taken as A1 Domestic residential areas where a load of 1.5kN/m2 would be adopted.

5.2 Services

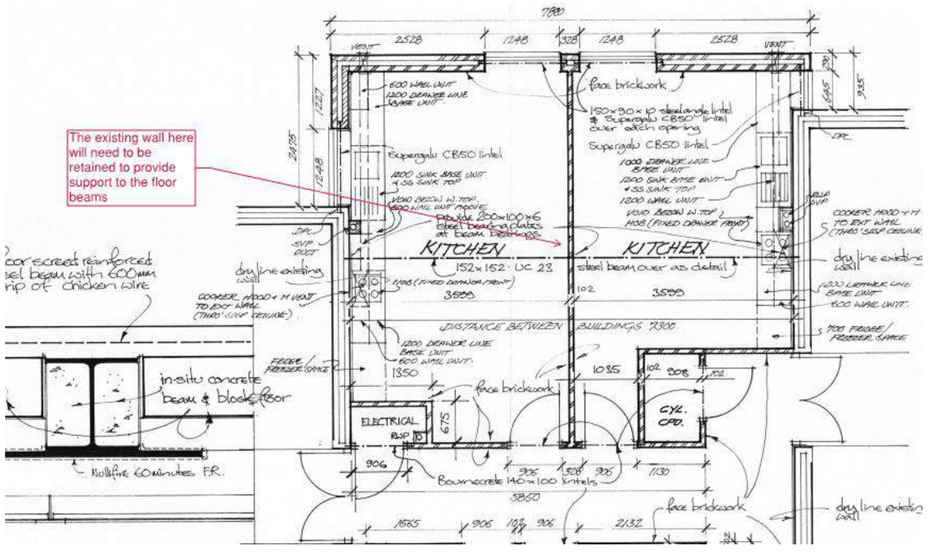
It is understood that the servicing strategy would be kept generally light touch with mainly services replacement and these works will involve some minor alterations but do not require the modification of significant structural elements.

5.3 Existing Wall Removal - Quantock

The span of the existing floors and roof for the majority of the block span across between party walls, the exception to this are the later two link sections of the building that were constructed at a later date. As such modifications or openings to be created to these walls would require structural works to reinstate the vertical load paths. Small single width openings created between existing rooms could be achieved via the introduction of new lintels or steel beams up to 2.2m to support the existing precast floor units although this would likely introduce a downstand and it would need to be confirmed if there is sufficient existing headroom to accommodate this.

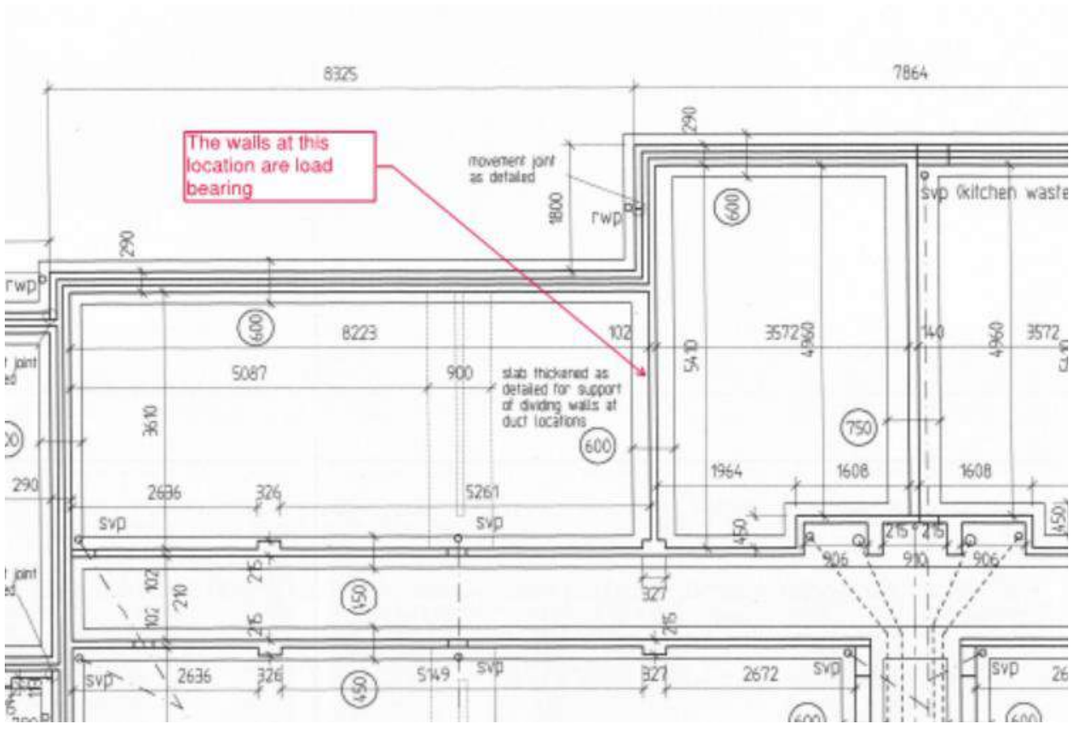
There would be greater flexibility at first floor to create wider openings as the load here is less and it might be beneficial to consider this in the final proposed room layouts adopting a more open plan at first floor but retaining the majority of the structure at ground floor. Although it is important to retain the lateral stability of the building and as such consideration needs to be made to ensure full walls are retained per bay where possible by handing room layouts so that sufficient walls are retained.

The two link sections utilise different structural spans and the requirements for openings in the load bearing elements will need to be considered for these. The presence of the existing steel beams supported on the party wall between the kitchens to one of the links will require a minimum length of this wall to be retained limiting the possibility to open up this space.



5.4 Existing wall removal – Blackdown & Mendip

The span of the existing floors are principally front to back across the buildings between the external and internal corridor walls. Modifications to the party walls between rooms should be straightforward and will not require significant structural works thus making the creation of larger more open plan units easier. There are some exceptions where the existing kitchens are located where the span of the floors is rotated by 90 degrees and spans across between the party walls. At these locations it is possible to form door openings, but these will require further assessment.



5.5 Modifications – Brendon

The proposals to the sports hall and the rest of Brendon block are fairly significant and will require the most amount of work to convert the existing building into the proposed room layouts. The first floor of the building spans between load bearing masonry whilst the roofs are typically steel trusses or timber joists spanning between steel beams supporting metal deck roofing.

Due to the extent of the changes, the proposed solution should try to adopt the existing load bearing ground floor masonry structure as is, where possible, to reduce the requirement to create new foundations or adjust the current load path and support to the existing first floor.

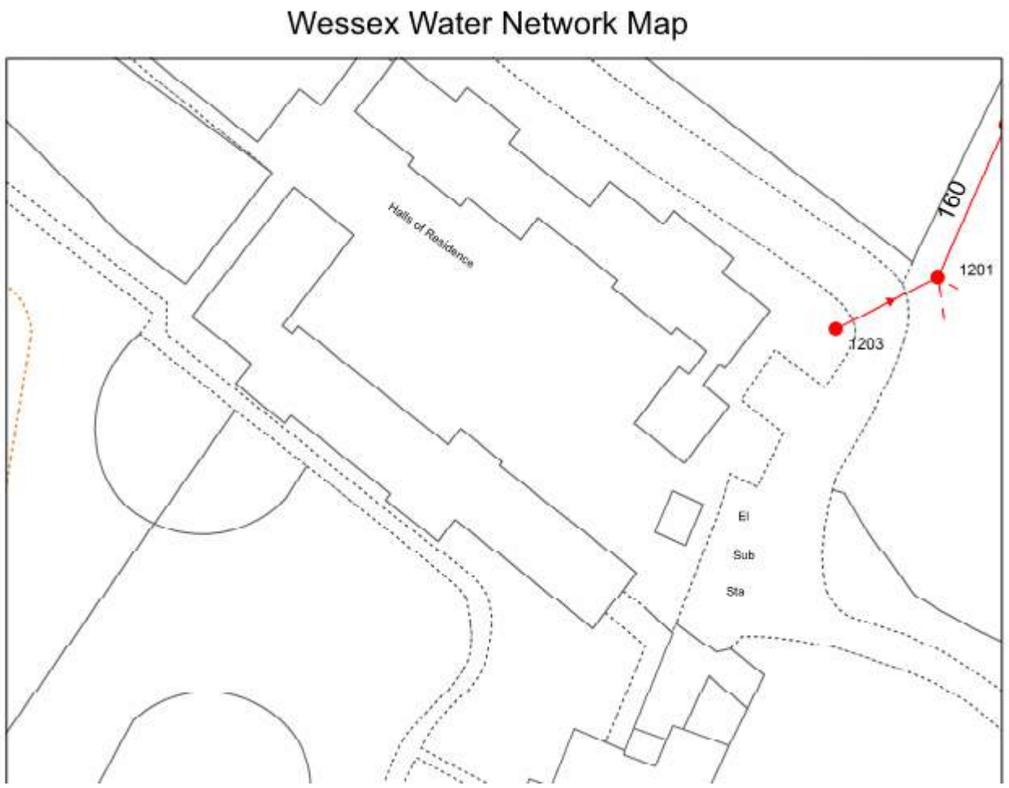
It is unlikely that the existing steel columns supporting the existing roof will have sufficient strength or design capacity to accommodate supporting any new floors without being strengthened and as such it is anticipated that the new floors could potentially be constructed independently within the sports hall space with new foundations as necessary.

If the existing structure is changed too much, it might prove uneconomical to retain the existing structure, as the stability of the existing building and vertical load paths may be compromised to such an extent with the alterations, that the works required to adjust the existing structure would lead to demolition of the existing building completely and provide a specific purpose built building that allows for dedicated provision with more inherent flexibility being a more suitable option.

6.0 Below Ground Drainage

6.1 Existing

Information hasn't been made available on the existing below ground drainage storm and foul networks although it is understood the foul network connects into the main sewer to the North East of the site.



It is anticipated that any existing runs and connections would need to be maintained as part of the works. If there is an increase to the overall occupancy, then confirmation will be required over the existing flow rates to ensure that these remain within acceptable agreed limits.

It is understood that the existing surface water network will feeds into soakaways located on site.

6.2 Proposed

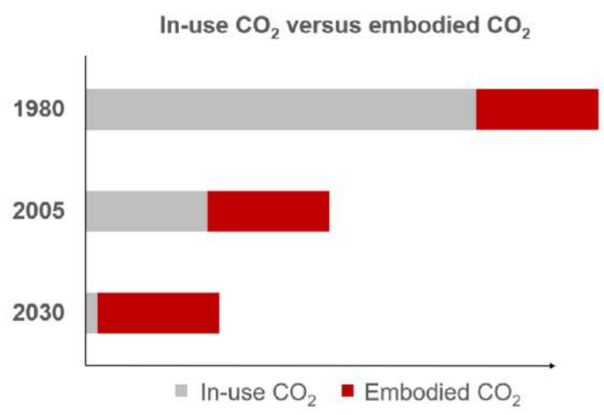
The proposed below ground drainage network will need to maintain the existing runs but also include for an allowance for additional rainfall if required as part of any planning condition. As the extent of the existing hardstanding isn't due to increase then existing provisions would appear to sufficient subject to confirmation from the local planning and water authorities.

A CCTV survey of existing below ground drainage network will be required to ascertain the geometry of the existing below ground drainage network. Once the CCTV survey has been confirmed and the information is available then a capacity check would need to be carried out to assess the existing network for the proposed alterations. On the back of this study we would highlight any reinforcement that may be required.

7.0 Embodied Carbon

7.1 Introduction

There are two main types of carbon impact associated with buildings and their infrastructure: **embodied carbon** which is locked into the construction materials, and **operational carbon** which results from their use through heating, lighting and ventilation. The total carbon impact of buildings has reduced significantly over the last 50 years, as shown in the diagram below. But perhaps what is most noticeable in the diagram is that this reduction has been achieved almost solely from the reduction in operational carbon. This is due to improved insulation, LED lighting, more efficient heating and the increased use of renewable energy. Part L of the Building Regulations has been revised several times over this period, with each iteration requiring higher building performance and an associated reduction in carbon impact. These requirements are bound into legislation, and so the construction industry and clients have had to adopt the changing requirements. The results of this action are clear.



The image also shows clearly that the amount of embodied carbon impact in a building has hardly changed over this time: we're still building largely in concrete and steel. When the Government talks about 'Zero Carbon', it is referring to operational carbon in use, not the embodied carbon impact. Indeed, there is no UK legislation that sets any quantified embodied carbon content for our projects.

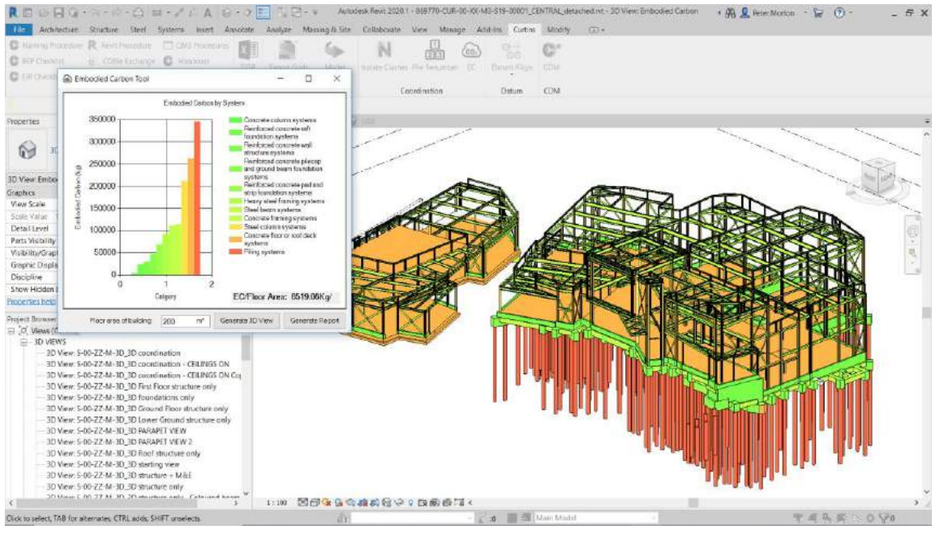
As civil and structural engineers, we are responsible for much of the material content of buildings and their associated infrastructure. Our main materials have a significant embodied carbon content, due to the energy used in production and the production process itself (for example, CO_2 is a by-product of cement production).

Over the decades, Curtins has been associated with many projects that have sought to re-use and refurbish existing building fabric to reduce embodied carbon impact. With new-build projects, we also seek to minimise the material content. However, other considerations often determine the eventual engineering choices, and legislation is focussed on the operational carbon content, as indicated above, not embodied.

The increased awareness of climate change and the impact of engineer's activities on the environment has prompted Curtins to consider embodied carbon in its projects in greater detail, and to quantify the effects of different engineering options. We are also anticipating that embodied carbon targets will come in to force in the future, and we want to be ready for this.

We have developed a simple carbon assessment spreadsheet that calculates the carbon in each of the principal materials (steel, concrete, timber, etc) and delivers a total embodied carbon impact for each chosen solution. Structural elements have a far greater carbon impact than infrastructure items such as earthworks, hard-standings and drainage, so at this stage we are assessing only the structural elements.

Curtins has also embedded the embodied carbon data into our REVIT software to produce a similar assessment tool for the detailed design stage. A snapshot of the model is included below, highlighting the most carbon intensive elements of our structure, so that engineers can take informed decisions on where further engineering effort should be focussed to minimise the impact of the particular solution.



7.2 Embodied Carbon Assessment

7.2.1 General

The image below shows an example output from our carbon assessment spreadsheet.

		Material Impact						Transport Impact	Total EC
System	Material	Quantity	Waste	Concrete		EC / kg	CO_2	CO_2	CO_2
FOUNDATION		(kg)	(%)	(Strength)	(Mix)	($kgCO_2e/kg$)	($kgCO_2e$)	($kgCO_2e$)	($kgCO_2e$)
	Reinforcement	21,287	5%			1.990	44,479	266	44,745
Pads	Concrete	3,652,605	10%	RC 20/25	UK Avg mix (small PFA)	0.112	450,001	23,906	473,907
Ground floor slab	Concrete	604,800	10%	RC 20/25	UK Avg mix (small PFA)	0.112	74,511	3,958	78,470
MAIN FRAME									
	Formwork (m2)					9.870	0	0	0
	Light gauge steel		10%			3.030	0	0	0
	Reinforcement	8,712	5%			1.990	18,204	109	18,313
	Concrete	871,200	10%	RC32/40	UK Avg mix (small PFA)	0.138	132,248	5,702	137,950
-	Steel structural sections	55,000	10%			1.550	93,775	900	94,675
SUPERSTRUCTURE									
	Light gauge steel		10%			3.030	0	0	0
	Steel structural sections	0	10%			1.550	0	0	0
-	CLT		10%			0.437	0	0	0
TOTALS							813,218	34,841	848,060

Summary:

Efficiency Rating ($kg\ CO_2e/m^2$)					
A: 150		EC from material impact:	813,218 kg, or	813 tonnes	96%
B: 200		EC from transport impact:	34,841 kg, or	35 tonnes	4%
C: 250	← 212	Total EC from both impacts:	848,060 kg, or	848 tonnes	100%
D: 300		Floor area of building:	4,000 m^2		
E: 350		Thus, EC per m^2	212 kg CO_2e/m^2 (= total EC / floor area)		
F: 400		Rating:	C		
G: 450					

Our engineers determine the mass of each primary structural material, multiply it by a factor corresponding to waste expected in the fabrication/construction process (say 5-10%) and multiply it again by an embodied carbon constant (column labelled 'EC/kg' above) particular to each material. This constant gives the embodied carbon impact of 1kg of a material in terms of equivalent mass of CO_2. We also add for transport impact, but for heavy, carbon intensive materials, the transport impact is usually only 2-3% of the total and could be ignored in a relative study.

For example, in the spreadsheet above, steel reinforcement has an embodied carbon factor of 1.990kg of CO_2 impact for every kg of steel used. Note that this is higher that the constant for steel sections (1.550kgCO_2/kg), due to a less carbon-efficient production process used for reinforcement. These constants are available in a national database founded on widespread research. Constants are available as shown for all the common construction materials. Note that the constant for concrete is much smaller than for steel (0.112kgCO_2/kg above) but concrete impact can be very great due to the large quantities involved.

As can be seen, the individual material totals can then be added up to give an overall embodied carbon content for the whole structure. A rate of embodied carbon used per square metre of floor can also be simply determined. We are developing graphics (such as the 'energy sticker' shown above) to illustrate this more clearly in our designs and reports.

8.0 Sustainability

Structural engineering can have direct control of, or influence over the following elements of the design which relate to the delivery of a sustainable and appropriate design solution:

- Selection of a simple structural grid and efficient structural form
- Limiting numbers of building materials to reduce waste
- On-site reuse of materials from demolitions or excavations
- Balancing selection of design loadings to minimize material use, versus provision of future flexibility/adaptability/deconstruction
- Use of reclaimed, recycled, 'A-rated' or 'green' building materials
- Use of specifications to ensure material suppliers use environmental management systems
- Avoidance of synthetic chemicals, polyvinyl chloride (PVC), etc.
- Assessment of embodied energy and potential reductions
- Assessment of prefabrication to minimize waste, if the carbon emissions resulting from transport do not outweigh the benefits
- Specifications to reduce construction and packaging waste
- Integrated drainage systems to minimize run-off

9.0 CDM – Key Risks

A structural risk register will be collated as the design progresses and the construction methodologies are confirmed. The following list is not exhaustive but is used to highlight the significant structural risks that will need to be identified and mitigated against as the design moves forward.

	Risk	Proposed mitigation
1.0	Late or incomplete intrusive substructure investigation data	Early scope and appointment of contractor
2.0	The presence of asbestos in the building needs to be confirmed	Full D&R asbestos survey to be undertaken and any acm's to be removed prior to works starting.
3.0	Complications related to programme and practicality's of demolition	Early engagement with a specialist demolition contractor to ensure that complexities are understood and overcome prior to works being commissioned
4.0	Unacceptable damaging interface between the new and existing foundation systems	Existing foundations to be surveyed to establish exact size and form of existing foundations.
5.0	Unacceptable interfacing or loading of the existing building frame superstructure	Keep the new and old structures independent in the design.
6.0	Presence of unknown services not highlighted on existing records.	Carry out surface scanning to check for unknown buried services.
7.0	Damage to building fabric during the demolition and refurbishment work	Ensure a careful and competent contractor is appointed with suitable experience in this type of work. Clearly define the extent of any demolition works.
8.0	Location of existing below ground drainage connections and their routes	Carry out a survey to establish the current routing and location of the existing below ground drainage

10.0 Further investigations and surveys required

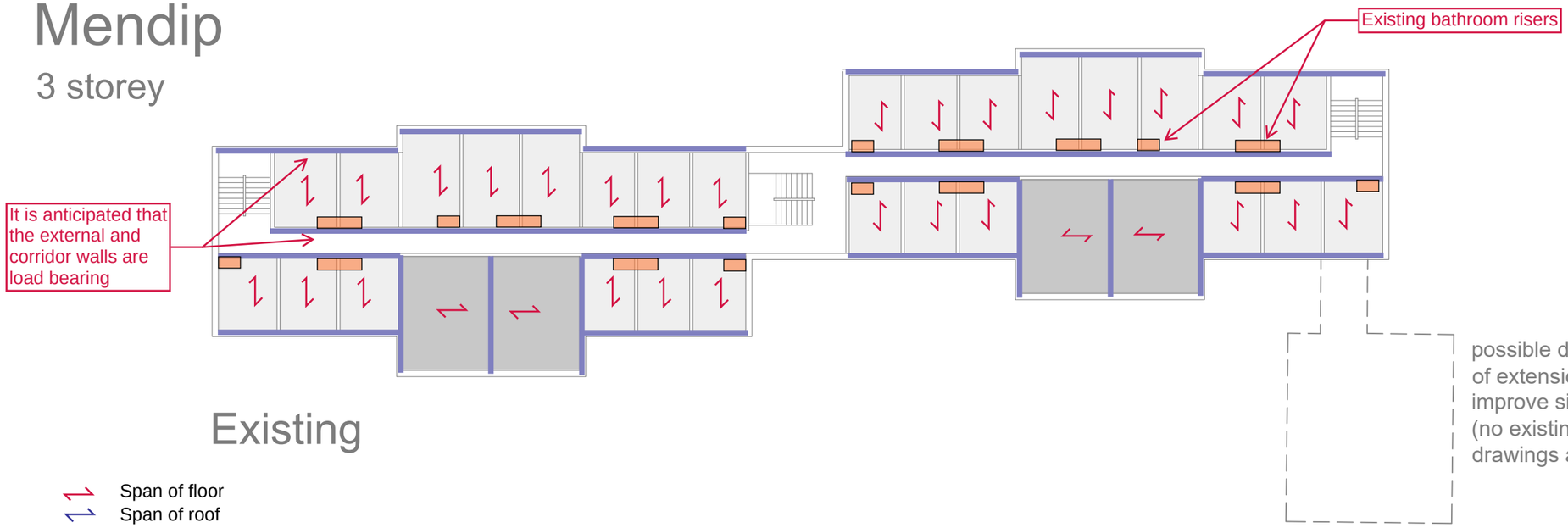
- Phase 1 Ground Investigation to assist with planning submission
- Asbestos survey
- CCTV Survey and mapping of existing below ground drainage
- Topographical survey
- Below ground services drawing
- Investigations to existing walls to be removed to confirm they are non-load bearing
- Structural record drawings for main Quantock, Brendon and Mendip blocks

11.0 Appendices

Appendix A **Existing /Proposed Structure**

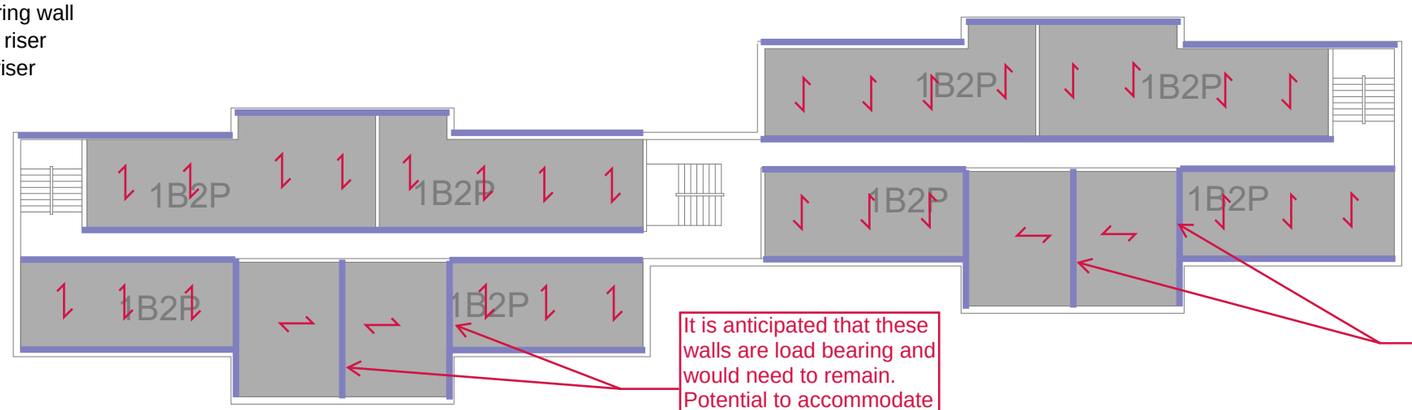
Mendip

3 storey

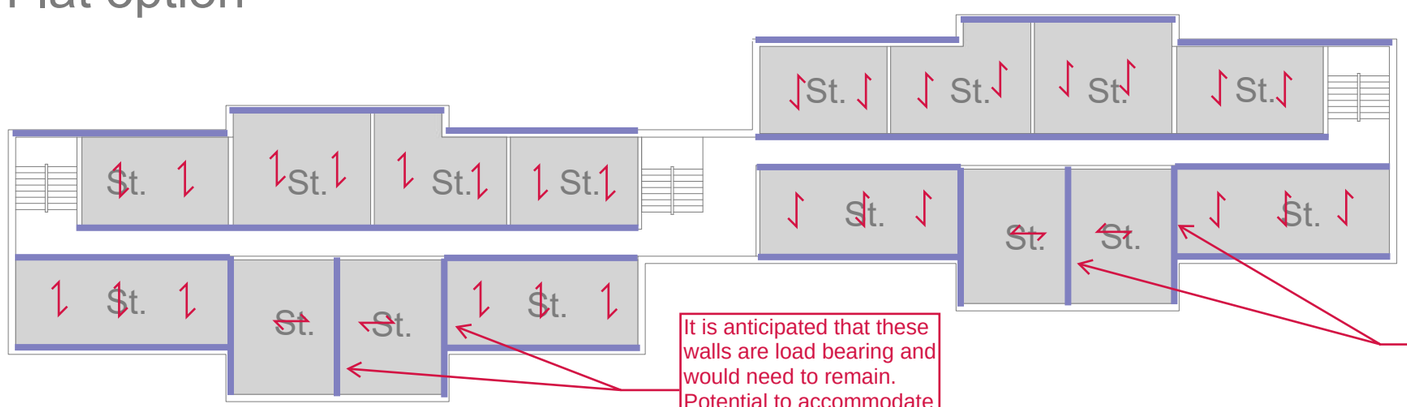


Existing

- Span of floor
- Span of roof
- Floor beam
- Roof beam/truss
- Load bearing wall
- Bathroom riser
- Services riser



Flat option



Studio option

Notes:

- Existing Bedrooms
- Existing Communal
- Flatlette
- Apartment

Capacity:
Existing - 84 x bedrooms
Flats - 24 x 1B2P F
Studios - 48 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

curtins
Curtins Consulting Ltd
Quayside, 40-58 Hotwell Road, Bristol, BS8 4UQ
t: 0117 302 7560
e: bristol@curtins.com
www.curtins.com
Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: Canonsgrove Halls

Drg Title: Mendip Block
Existing structure

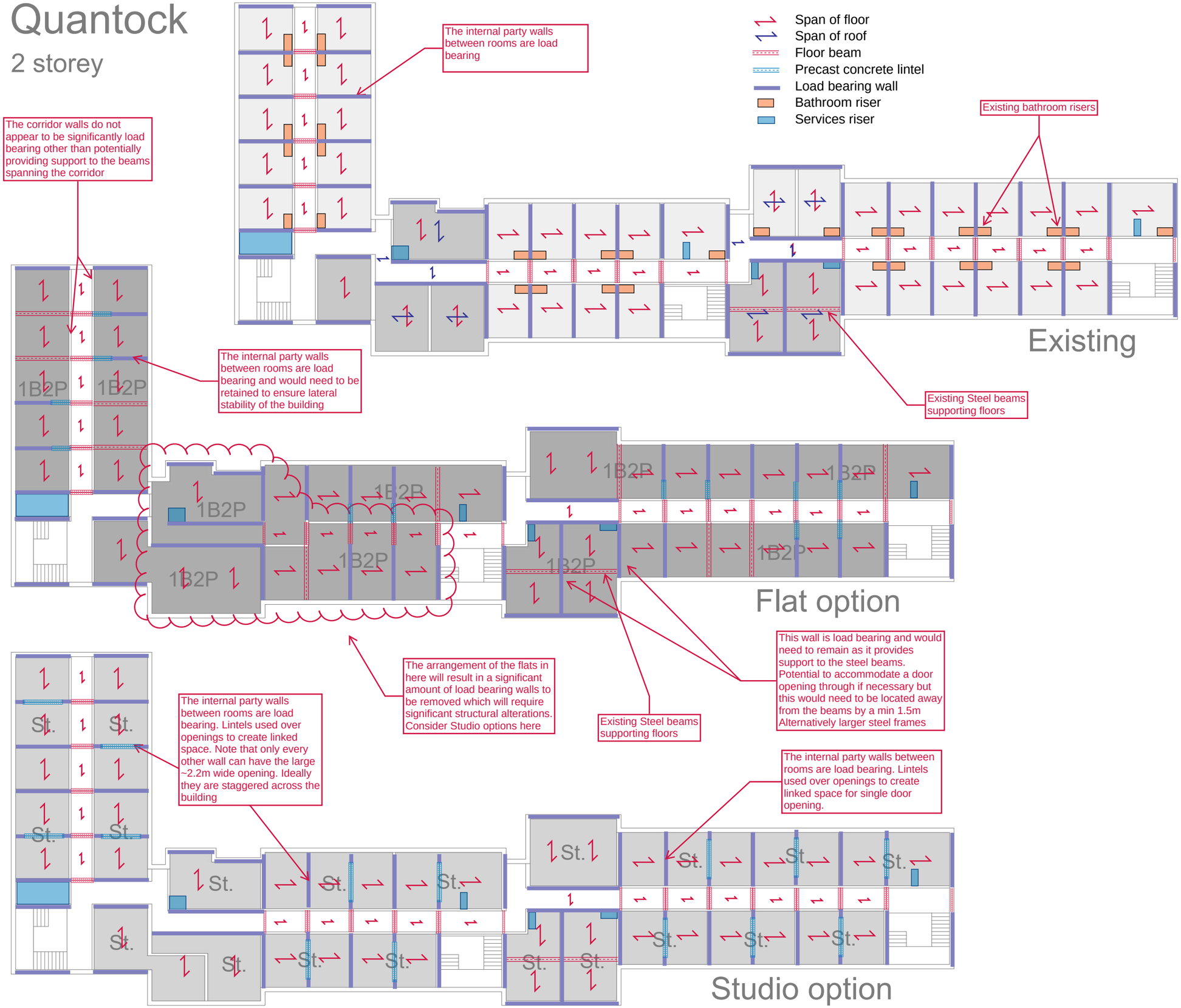
Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A1		NW	NW

Drg No: 077700-CUR-XX-ZZ-DR-S-04001

Rev: P01

Quantock

2 storey



Notes:

- Existing Bedrooms
- Existing Communal
- Flatlette
- Apartment

Capacity:
Existing - 68 x bedrooms
Flats - 20 x 1B2P F
Studios - 40 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

curtins
Curtins Consulting Ltd
Quayside, 40-58 Hotwell Road, Bristol, BS8 4UQ
t: 0117 302 7560
e: bristol@curtins.com
www.curtins.com
Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: Canonsgrove Halls

Drg Title: Quantock Block
Existing structure

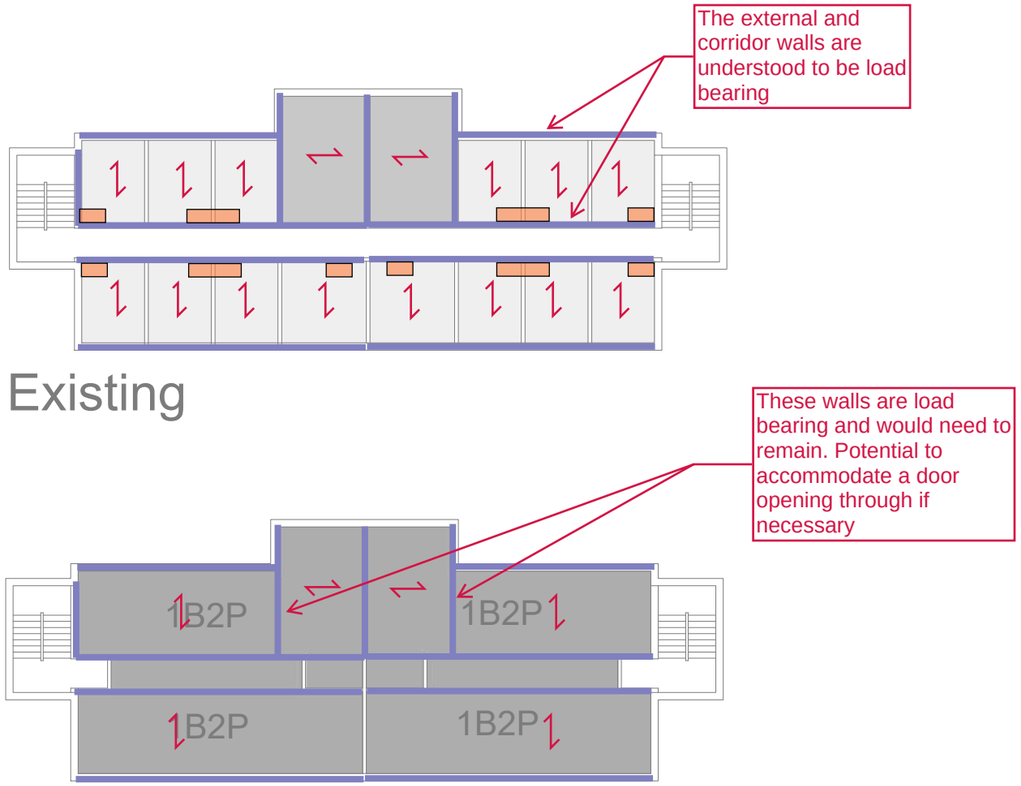
Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A1		NW	NW

Drg No: 077700-CUR-XX-ZZ-DR-S-04002

Rev: P02

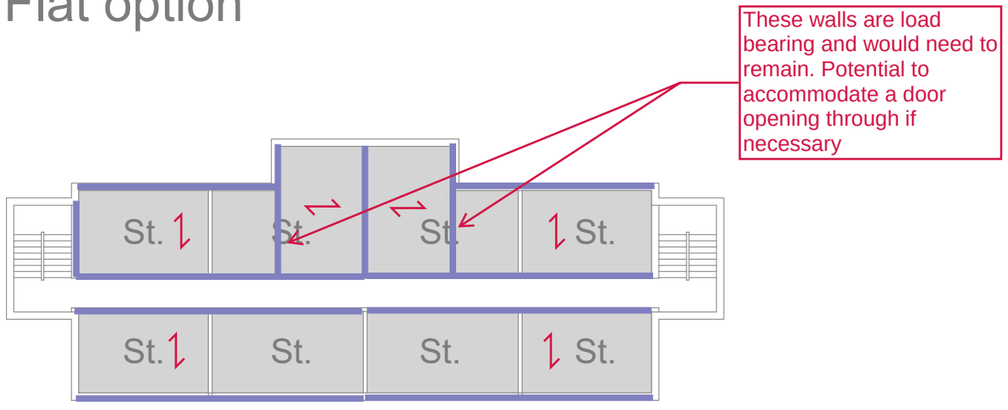
Blackthorn

3 storey



Existing

Flat option



Studio option

Span of floor
Span of roof
Floor beam
Roof beam/truss
Load bearing wall
Bathroom riser
Services riser

Notes:

Existing Bedrooms

Existing Communal

Flatlette

Apartment

Capacity Blackthorn:
Existing - 42 x bedrooms
Flats - 12 x 1B2P F
Studios - 24 x 1B1P S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

curtins
Curtins Consulting Ltd
Quayside, 40-58 Hotwell Road, Bristol, BS8 4UQ
t: 0117 302 7560
e: bristol@curtins.com
www.curtins.com
Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: Canonsgrove Halls

Drg Title: Blackdown Block
Existing structure

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A1		NW	NW

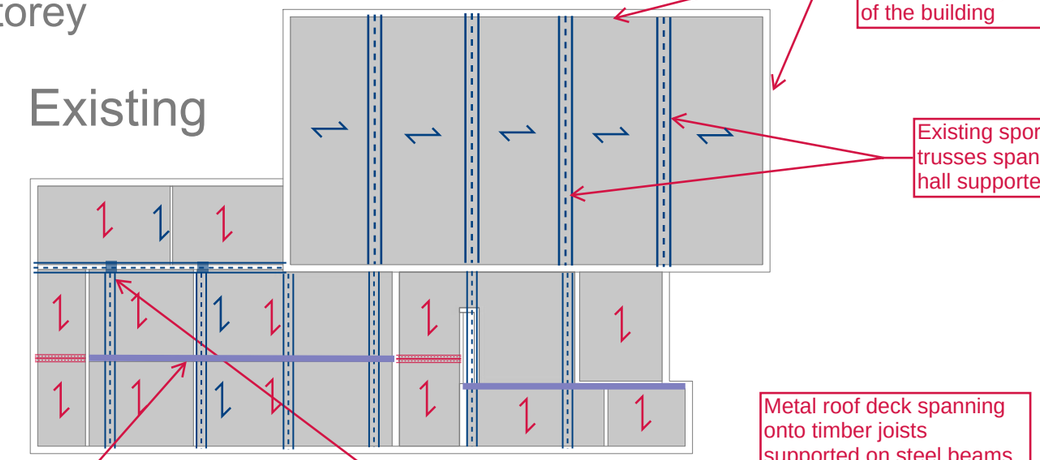
Drg No: 077700-CUR-XX-ZZ-DR-S-04003

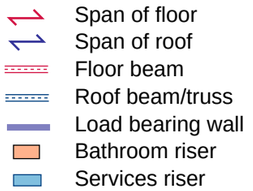
Rev: P01

Blackthorn

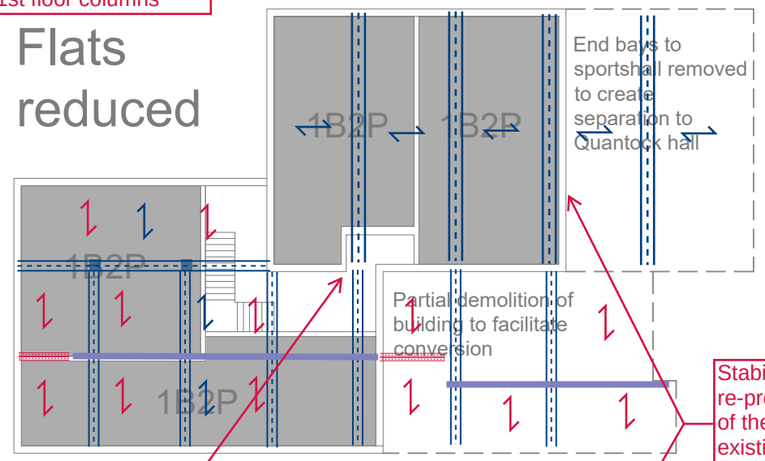
3 storey

Existing

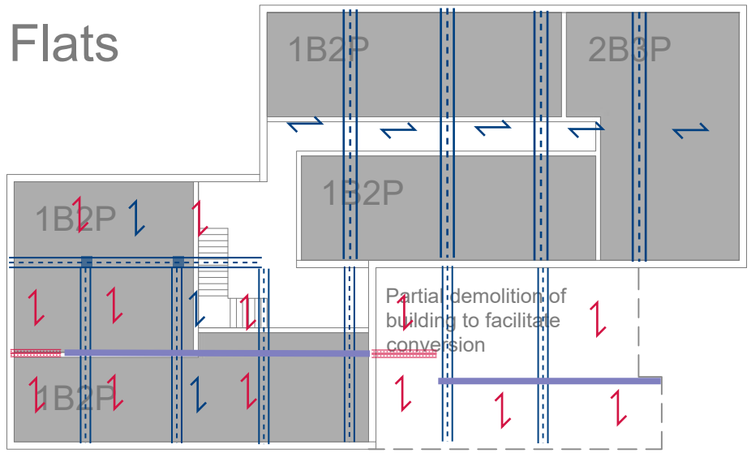




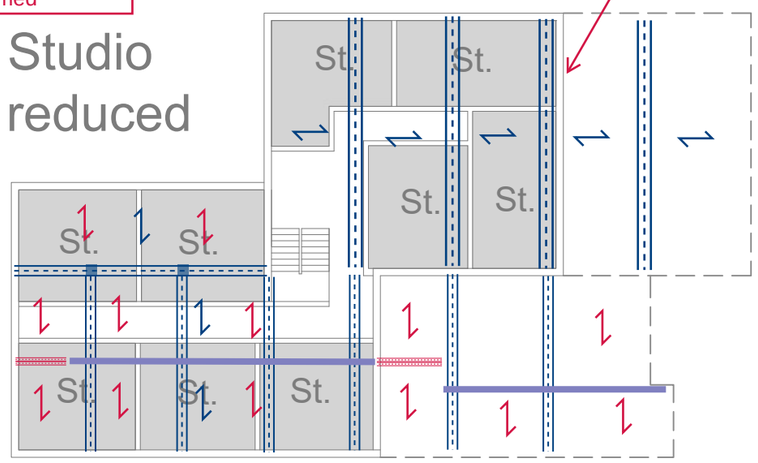
Flats reduced



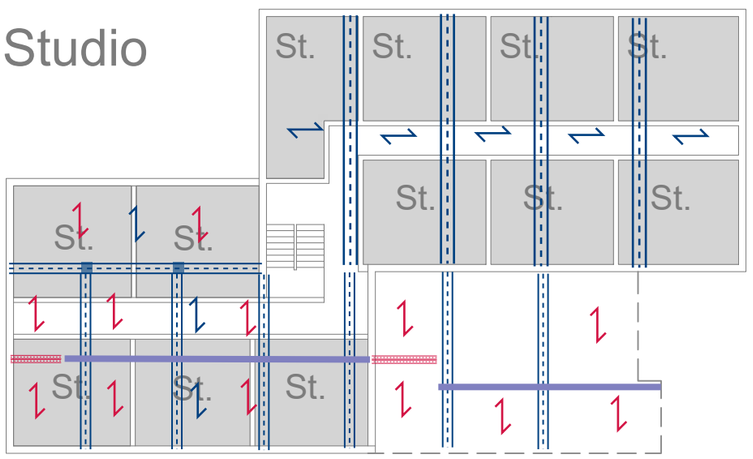
Flats



Studio reduced



Studio



Notes:

Capacity Brendon:
Flats - 8 x 1B2P F, 2 x 2B3P F
Studios - 24 x 1P1B S
(studio option will require some communal areas in addition)

Capacity Brendon (reduced footprint):
Flats - 8 x 1B2P F
Studios - 18 x 1P1B S

Note: studio option will require some communal / support areas. This will potentially reduce the number of rooms available.

curtins
Curtins Consulting Ltd
Quayside, 40-58 Hotwell Road, Bristol, BS8 4UQ
t: 0117 302 7560
e: bristol@curtins.com
www.curtins.com
Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: Canonsgrove Halls

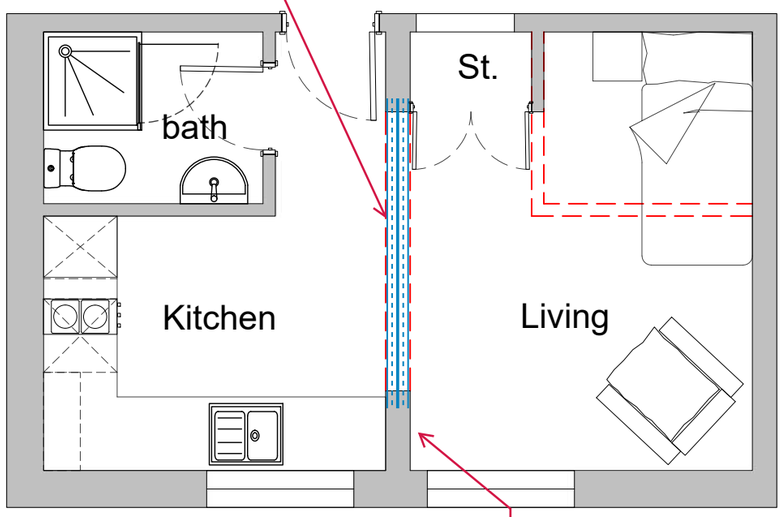
Drg Title: Brendon Block
Existing structure

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A1		NW	NW

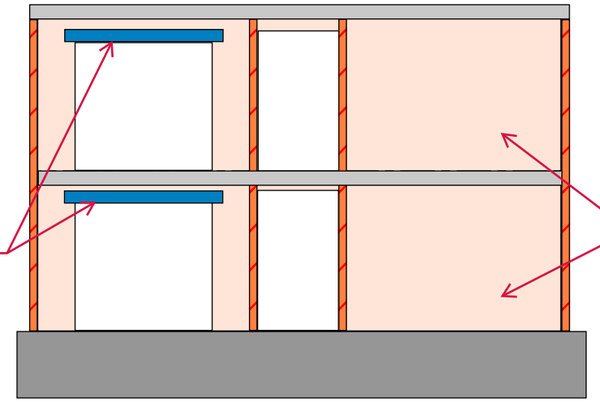
Drg No: 077700-CUR-XX-ZZ-DR-S-04004

Rev: P01

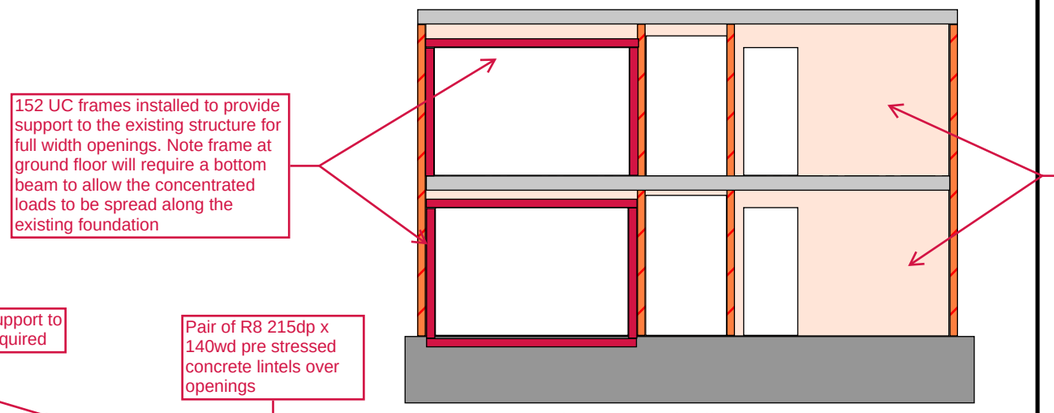
Notes:



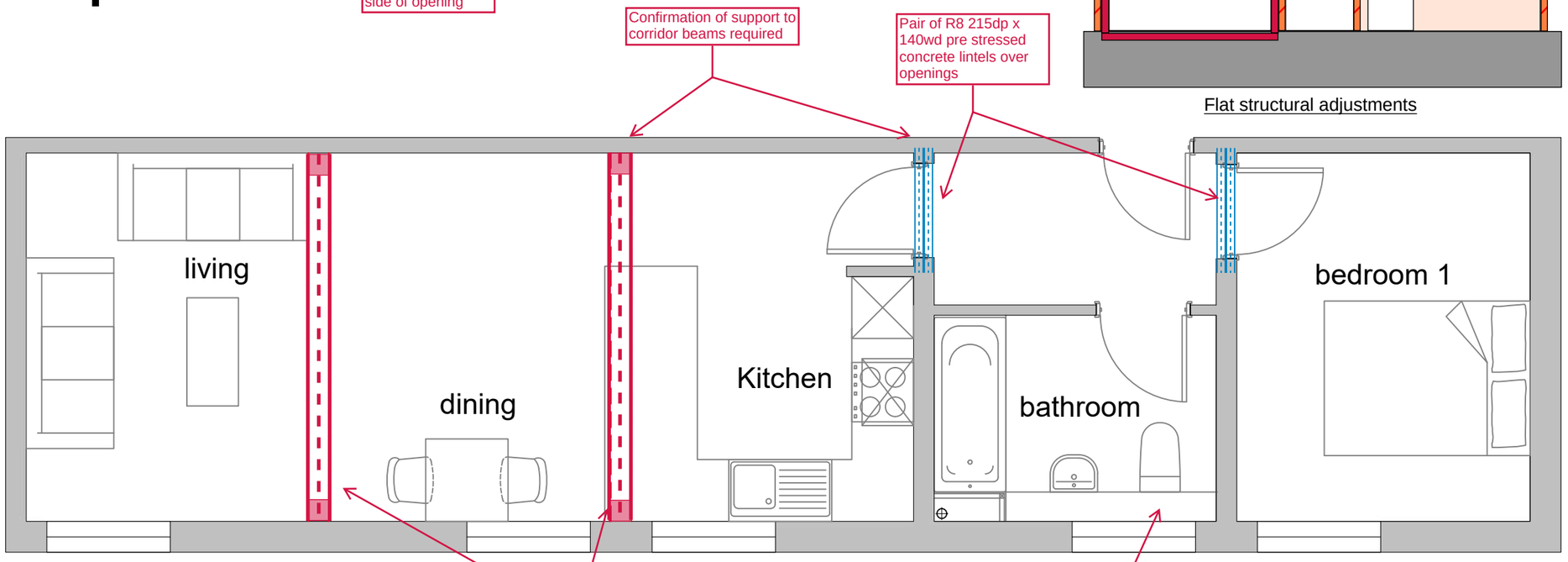
1b1ps - 20 m²



Studio structural adjustments



Flat structural adjustments



1b2pf - 50 m²

Note: Flats are better located at 1st floor due to the larger opening requirements if a combination of studios and flats are adopted as this may reduce the structural requirements from that shown

curtins
Curtins Consulting Ltd
Quayside, 40-58 Hotwell Road, Bristol, BS8 4UQ
t: 0117 302 7560
e: bristol@curtins.com
www.curtins.com
Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: Canonsgrove Halls

Drg Title: Proposed structure (Quantock Block)

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A1		NW	NW

Drg No: 077700-CUR-XX-ZZ-DR-S-04005

Rev: P01

Our Locations

Birmingham
2 The Wharf
Bridge Street
Birmingham
B1 2JS
T. 0121 643 4694
birmingham@curtins.com

Bristol
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ
T. 0117 302 7560
bristol@curtins.com

Cambridge
50 Cambridge Place
Cambridge
CB2 1NS
T. 01223 631 799
cambridge@curtins.com

Cardiff
3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

Douglas
Varley House
29-31 Duke Street
Douglas
Isle of Man
IM1 2AZ
T. 01624 624 585
douglas@curtins.com

Dublin
39 Fitzwilliam Square
Dublin 2
Ireland
T. 00353 1 507 9447
dublin@curtins.com

Edinburgh
1a Belford Road
Edinburgh
EH4 3BL
T. 0131 225 2175
edinburgh@curtins.com

Glasgow
Queens House
29 St Vincent Place
Glasgow
G1 2DT
T. 0141 319 8777
glasgow@curtins.com

Kendal
28 Lowther Street
Kendal
Cumbria
LA9 4DH
T. 01539 724 823
kendal@curtins.com

Leeds
Rose Wharf
Ground Floor
Leeds
L29 8EE
T. 0113 274 8509
leeds@curtins.com

Liverpool
51-55 Tithebarn Street
Liverpool
L2 2SB
T. 0151 726 2000
liverpool@curtins.com

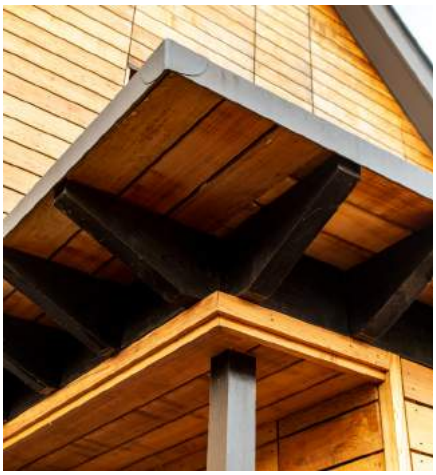
London
40 Compton Street
London
EC1V 0BD
T. 020 7324 2240
london@curtins.com

Manchester
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG
T. 0161 236 2394
manchester@curtins.com

Nottingham
56 The Ropewalk
Nottingham
NG1 5DW
T. 0115 941 5551
nottingham@curtins.com

APPENDIX B - The Forecastle Case Study

New flats replace the previous poorly-built accommodation



The Gatehouse - the former garage is now a community room

The Forecastle | Alveston, Bristol

Client: Elim Housing Association Value: £1.14m

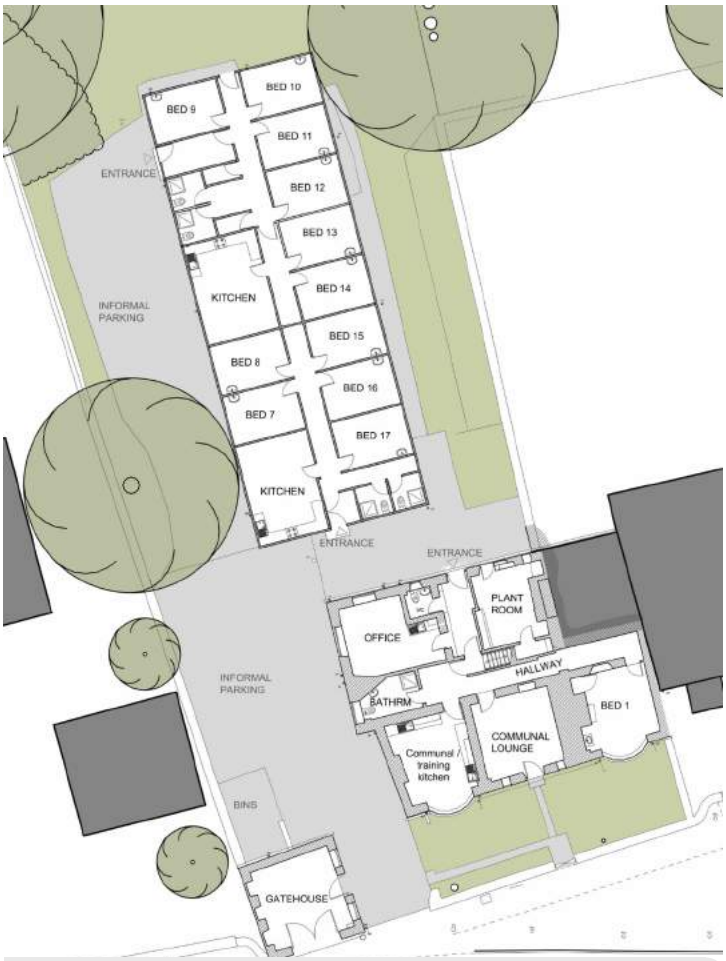
Services provided: Feasibility Study, Funding Application Support, Planning Stage Design, Public Consultation, Planning Application, Detailed Design, Principal Designer, Contract Administration

Redevelopment of 'move-on' accommodation for homeless people in the Green Belt, adjacent to listed sites.

Through refurbishment and extension, **gcp** created an inspiring development of eighteen new self-contained flats for Elim Housing, designed to facilitate independent living and provide a supportive environment for homeless people, with links into health, training and employment networks.

The flats were provided through conversion of an existing building and new build replacement accommodation in the grounds.The former garage was transformed into the Gatehouse, a room available for use by the local community.

In light of the highly sensitive use within an established residential area, **gcp** designed and led the stakeholder and resident engagement process which resulted in no neighbour objections.



Poor quality accommodation previously made inefficient use of the site

The new scheme maximises the potential of the site

Refurbishment and extension within a sensitive heritage context

gcp Chartered Architects
ARCHITECTURE | CONSULTING

t 0117 967 6286
e mail@gcparch.co.uk
w www.gcparch.co.uk
@ gcparchitects

gcp Chartered Architects
ARCHITECTURE | CONSULTING
t 0117 967 6286
e mail@gcparch.co.uk
w www.gcparch.co.uk
@ gcparchitects

Somerset West and Taunton