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Cronksbank Cottage - Retrofit Feasibility

John Gilbert Architects, with NBM Construction Cost Consultants

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1. Introduction

This report is an interim report for consideration by Langholm Initiative in regards to the refurbishment of Cronksbank Cottage, on Langholm Moor.

Cronksbank Cottage is a long-term empty house owned by the Langholm Initiative in need of significant renovation and energy upgrade. The Initiative's intention is for this to serve as a prototype for the process of costing and carrying out low energy retrofit to then upgrade the other properties in the ownership of the community. On the basis of the Housing Needs and Demand profile, it is likely that the redeveloped property would be offered for affordable rental tenure.

Langholm Initiative's aims are as follows:

- achieve reduced running costs for the eventual occupants of the property
- reduced maintenance costs
- reduction of the carbon footprint of the home once occupied

The report has been written by John Gilbert Architects following a visit to the property on the 5th March 2024. A further version will contain indicative costs prepared by NBM Cost Consultants.

Work undertaken thus far and captured in this report is as follows.

On the site visit Chris Morgan and Rachel McKay of John Gilbert Architects surveyed the building in it's current state. From this we have prepared a set of drawings derived from a 3D model of the building which indicate both the existing and proposed internal layout and support the costing exercise to come.

We have prepared a condition survey which is contained in the following section. This section also contains the SHQS assessment in tabular form.

We have then created a SAP 'model' of the building using Elmhurst software and established the likely existing 'SAP Rating' which is 28 F. Pursuant to the brief we have then prepared a number of scenarios in this software to evaluate how best to see the EESSH2 requirement of an EPC Rating of 81 B. We have described this process in section 3 of the report and aimed for a solution which achieves compliance without excessive disruption to the external appearance of the building or unnecessary additional cost.

We prepared four retrofit specification options. The first with all items identified during the condition survey and SHQS assessment in section 2. Having modelled the building in RdSAP, our second specification would, if installed, allow the property to be compliant with EESSH2. We then prepared a third specification to enable the building to achieve the AECB Carbonlite Standard using Design PH and PhPP to assess this. Lastly, we prepared a 'JGA Recommended' specification, which in practice is pretty similar to the second specification, which we believe offers the most cost effective route to an affordable, comfortable refurbishment of the cottage.

We have undertaken a PAS 2035 based risk assessment to assuage any concerns about the risks often associated with retrofit works.

We have arranged through NBM Cost Consultants for indicative costs to be provided for each option and we have commented on these, as well as providing the full QS report separately.

2. Condition Survey and SHQS Assessment

2.1. Condition Survey

Administrative

Building Form and layout

The property is a two-storey, detached house built with solid stone walls in the main with a solid brick rear section and side porch almost certainly added later. It has a dual pitched and slated roof with prominent hips to each side and a single central chimney with two terminals. There is a kitchen and two good sized habitable rooms, along with a porch and two stores downstairs, two good sized bedrooms upstairs and a bathroom and further store accessed via a leave a few steps below full first floor.

One of the downstairs stores is accessed from outside and there is a further timber shed close to the house and another derelict and roofless shed about 50m to the North which may not be associated with the property?

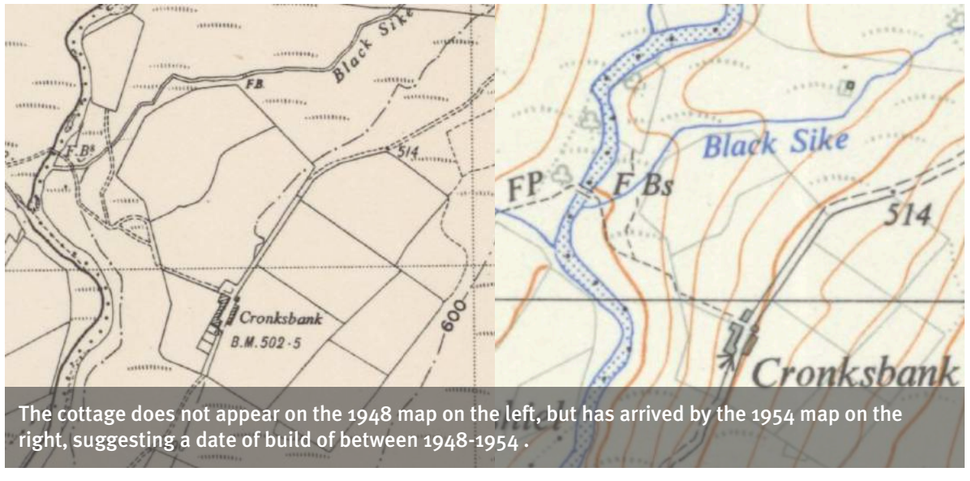
The house sits within a partially complete stone walled garden, mainly to the South and what appears to be a large area of hard standing to the North, largely overgrown which also contains the oil tank. The property is accessed via a single and fairly rough track leading sharply downhill from the main road linking Cronksbank House and Perterburn, via a lockable gate.

Status

The building is currently empty and appears to have been so for some time. It has been stripped out of all fittings and would seem to have been in the middle of upgrading works when work was stopped. Several areas of internal plasterboard lining have been replaced and re-skimmed, while there is a new heating system and plumbing, and all electrics appear to be new.

Age

According the maps available online from the National Library of Scotland, the building was built some time between 1948 and 1954, making it about 70 years old.



The cottage does not appear on the 1948 map on the left, but has arrived by the 1954 map on the right, suggesting a date of build of between 1948-1954 .

Heritage protection

The building is not listed, nor is it within a conservation area, but see below.

Planning Constraints

The site is outwith the Langholm Settlement Boundary so general LDP policies apply and there are no previous planning applications. However, it is just outwith the LDP Eskdale HMA boundary for both Sites of International Interest for Biodiversity and Sites of National Interest for Biodiversity and Geodiversity (SSSI) but being so close we believe it is likely to be viewed as on the boundary and therefore of consideration. The site is also in the Regional Scenic Area.

Overall the environmental designations are likely to represent a significant potential constraint on development, and in particular in the construction phase.

External

Roof Finish

Although the image below is reproduced quite small, careful study of the drone images reveals that the slate finish itself is in very good condition. There are only one or two slipped slates and those that can be seen in some of the valley areas are not slipped, but have been put there deliberately in what we believe is an ill-judged attempt to reduce the water ingress problems (refer to rainwater goods, below). In addition, some areas show a mix of algal-covered and clean slates which suggests that the roof has been relatively recently repaired. We will propose that a small amount of money is set aside to check a range of things on the roof but we do not anticipate any money being needed to work on the slate finish itself.

Flashings

The flashings generally are in a good condition. This applies to all of the ridge and hip flashings, as well as the chimney and valley flashings between the main roof and small dormers to the South. The straps however for all ridge and hip flashings are rusted and should be replaced with stainless or galvanised versions. This can be seen in the chimney image below

There are what appear to be painted lead rolled flashings to several verge areas and these should be carefully cleaned down and re-painted to match the adjacent verge joinery.

Chimney

The chimney can be seen below and appears to be in good condition. It should be rubbed down to clear all moss and there looks to be a small amount of pointing needed at some open joints. The open terminal should be fitted with a vented cap to prevent rain and bird / insect ingress.

Rooflights

There is one relatively modern roof light in the bathroom. This appears to be in good condition, it is double glazed and the flashing externally appear to be in good condition. Nothing required but note when the ceiling in the bathroom is insulated, it will be important to ensure this doesn't become a thermal bridge area so care should be taken to insulate around the opening.

Rainwater Goods

All rainwater goods are in what appears to be the original cast iron. It is black painted and in a fairly poor condition. There are also clear areas where it has dropped to create areas of pooled water which in at least one case seems to be the reason for the water ingress, decay and mould in the main bedroom, see right. So, in certain areas these need to be re-set to drain properly to the downpipes.

It is unusual to have all cast iron pipework retained and from a conservation perspective it should all be rubbed down, joins checked and all re-painted. There is one area where there has been localised cracking of mortar around the downpipes fixing and this should all be repaired / repointed.

There is a discussion point here. From a conservation perspective it is definitely desirable to retain and repaint the existing cast iron. However, the sizes of both gutters and downpipes are small compared to what will be needed in the future with climate change and increasingly heavy downpours. From a climate change adaptation perspective, and incidentally a future maintenance perspective for LI, the best course of action is to remove all cast iron rainwater goods and replace them with black painted, larger diameter lightweight steel pipework.

Roofwork Joinery

There are verge boards and protruding rafters along with a small width of exposed sarking boards, all of which have been painted in an off-white colour, along with the adjacent lead flashings to verges. These areas of timber look in reasonable condition but need to be rubbed down and re-primed and repainted.

Note that there are several birds' nests tucked into some areas of the roof work joinery and these should only be removed if specifically agreed with client and if acceptable to Planning and the ecological surveys which may be required.

Stonework

The stonework externally is generally in good condition despite being pointed in what appears to be a cement mortar. There are very few evident cracks and no evidence of surface loss. There are some areas of re-pointing, but these don't appear to betray historical cracks. Some are shown below. This is an area in the middle of the South facing wall where there is also a series of holes drilled. Such holes might ordinarily show a chemical injected damp proof course, but they only extend for a metre or so. Overall, although it would be good to get the whole stone wall repointed in lime mortar, since there are no obvious signs of disrepair, apart from filling a few small cracks and the drilled holes noted above, we don't propose to do anything remedial with the external face of the stone walls.

Brickwork

There is what appears to be an extension to the rear (North) of the property and a small porch extension to the West. See the image below which is taken from the North-West.

It appear from close inspection of the old maps that these were not part of the original building, but appeared relatively soon after. The brickworks shows signs of changes but is in good condition generally and like the stonework shows little signs of problems. There are matching stone lintels and cills to some of the windows. There is an area of missing mortar associated with a downpipe which is covered in the rainwater goods section above and cracking where the porch meets the stone house to the rear. Along with the stonework, we have suggested leaving a small sum for re-pointing but otherwise we do not propose any works to the brickwork itself.

Windows and External Doors

All of the external doors and windows are a relatively modern white double glazed PVCu type, with the exception of the rear store which has an older sold timber ledged and braced-type door. All windows and doors are of the same type except the windows in the ground floor bedroom and first floor window above which are of a different type, albeit similar. The existing external store will become part of the insulated envelope and as such we will need to include for new double glazed PVCu external door there.

All windows are fitted with trickle vents.

Most of the doors and windows are in need of a good clean, but in reasonable condition.

Internal

Attic

We were not able to access the attic as there are no hatches. The roof generally is in good condition, but there are localised areas clearly visible from inside of decay which may have spread to the main structure, so we have allowed a sum for potential repair and replacement.

Wall and Ceiling Finishes

The wall and ceiling finishes internally are in a very mixed condition. Some areas, say around 20% of the total, have recently been re-plastered and are essentially good as new. The majority of the areas, say 70%, are painted or wallpapered and in reasonable or poor condition. All of these areas should probably be stripped back to the underlying plaster, with some allowance for repairs required as a result.

Another 10% or so of areas are already failed or failing and need to be entirely removed, along with, in some areas, underlying lath and plaster. The image below shows the larger bedroom (East) upstairs which demonstrates all three conditions.

Internal doors and internal Woodwork

Most of the internal doors appear to be if not original then rather old and nice ledged and braced timber doors which it would be good to keep. Internal woodwork, where not already removed tends to be in need of a good rub down and redecoration. Some is covered in mould. We have proposed that internal doors are retained and simply cleaned, and all other internal woodwork is redecorated and replaced where necessary.

Floor Finishes

On the first floor, there are timber boarded floors and these could be cleaned, sanded down and painted. We propose an opaque floor paint rather than a transparent wax or oil because of the varying ages of wood. A small allowance for repairs will be needed.

The ground floor is more complicated. The smaller bedroom downstairs features what we suspect is the only remaining area of original suspended timber floor. All other areas have been replaced with an approximately 100mm of concrete screed over hardcore and rubble. The screed has been cut into in places to run new central heating pipework to new radiators as shown below.

We do not think it is worth considering digging up the remaining areas of concrete screed and this heavily restricts what insulation is possible, so we have opted within the insulation section to install 50mm rigid high performance insulation over all floors, and lay a floating timber or laminate floor over all areas of the ground floor. Again, an allowance for infilling the existing trenches will be required.

Fixtures and Fittings

Kitchen Units and Appliances

Some new pipework has been installed but there is essentially nothing in what is assumed to be the kitchen by way of kitchen units. The image below shows the existing condition. We will need to allow for all new kitchen base and wall units, worktop and fixtures, to include sink and taps etc, and inbuilt oven and hob. The volume of storage should comply with HfVN and for this reason we have moved the kitchen into the larger living space in the proposed layout. Space will be required for a fridge/freezer and washing machine. We have not allowed for a dishwasher but this can be adjusted in due course.

Bathroom Fixtures

Some initial plumbing has been installed in the upstairs bathroom but essentially it will require a complete installation. It will need a bath, shower, wash basin and WC with all associated plumbing and electrics. Other items such as extract fan and heating will be noted in the respective section.

Other

There are many items which might be needed to make the house a home and we have suggested a sum of £3,000 could be retained for this. Items might include inbuilt shelving, hooks, matting, bathroom fittings like mirrors, door stops etc.

Utilities and Services

Foul Drainage System

SEPA Discharge Consent CAR/R/1070399 exists for outfall to watercourse. The septic tank is located in the field to the south of the cottage. We have proposed that this is surveyed and checked, with a small sum allocated for any minor repairs.

There is a broader question which is whether or not this arrangement is acceptable in terms of discharge quality, and whether any secondary treatment is required but assuming that this has not been raised hitherto, we have left this for now.

Surface Water Disposal

It is assumed that all existing downpipes run into either the foul drainage system or to the adjacent ditch to the West. Elsewhere we have proposed that a land drain be installed around the perimeter the building. In doing so, it is likely that the base of all downpipes can be intercepted and if these drains run to the foul system, these could be connected instead into the land drain which as noted elsewhere could drain into the adjacent ditch to the West.

Water Supply

There is an existing source and water treatment equipment in a box outside the main door. We are not aware of any anecdotal evidence regarding the capacity of the supply but assume a capacity check of the existing source would be worthwhile if the same is being organised for Cronskbank House? We have not allowed for this as part of this report but have allowed for a thorough check of the existing treatment system and any associated pre-filtration and internal plumbing arrangements.

Space Heating System

Although incomplete, it appears that the existing heating system is relatively new in most part. A 1000l oil tank feeds an external 26kW Grant combi boiler which in turn feeds new radiators via new copper pipework which has been raggled into the solid floors downstairs. The pipework is not completed but there appears to be some electrical accompanying works including a programmer.

If for any reason the client was looking to reduce costs, it would be reasonable to use the existing - essentially new - heating system as it is, and in the first set of specifications, we have allowed simply for a small sum to ensure the system was completed, pipes were insulated and the overall system was properly commissioned.

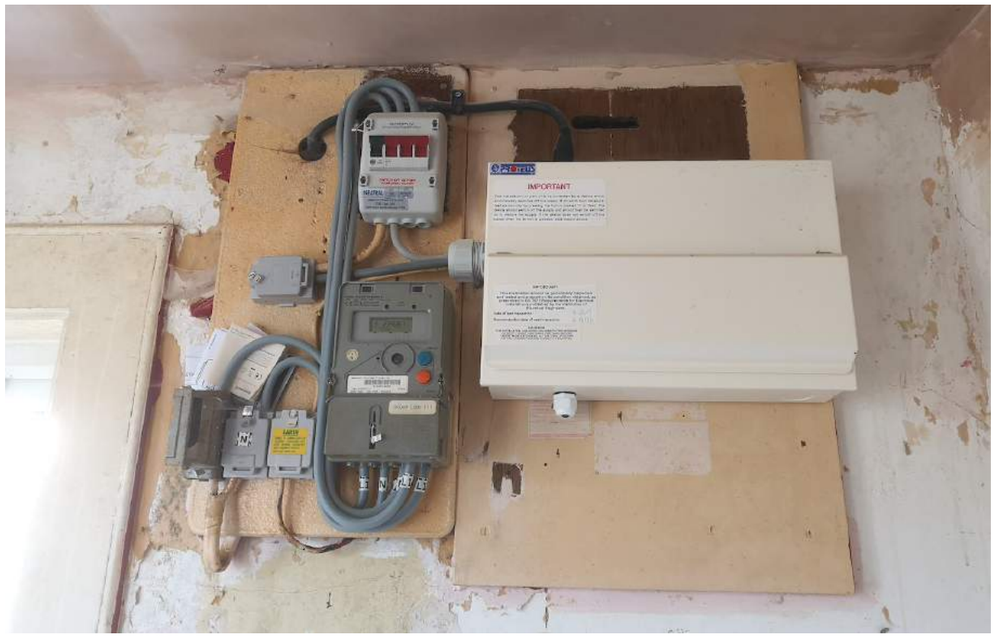
However, the combination of wanting to develop generally more sustainable solutions in the valley, and the more specific requirements of meeting EESSH2 means that the oil boiler and tank will probably need to be replaced by a heat pump and we have allowed for this in the later options. If this is to be the case, it is likely that the (new) radiators may need to be replaced with larger versions and we have proposed that a sum is allowed for this.

Water Heating System

If the existing oil fired system is retained then the system appears to be in place, and once all bathroom fittings have been installed, per the section above, then completion can be covered in the above section on insulation and commissioning etc.

Electricity Supply

The electrical system appears to have been renewed recently as part of the works that were ongoing when the area was purchased. The distribution board in the kitchen has a note saying that the last inspection was in 2019. We have suggested that as part of any competent refurbishment, an overall electrical check would be required, but excluding the additional wiring etc required for the items noted below, we presume at this stage that that is all that is required.



Electrics

The lighting appears to be newly installed and complete, albeit with out of date bulbs which need to be replaced with LEDs. More lights will be required once the new kitchen and bathroom are to be installed, along with possibly other additions.

Emergency lighting should be installed in accordance with the new technical standards.

Additional low voltage sockets will be required, say 2 per room for now, but would ideally be in line with new-build requirements.

Given the isolation of the property, we wondered if a lighting protection system would be worth installing? We have allowed for it at this stage, but it could be removed if not felt necessary.

Allow for a minimum specification security system, as might be required by a home insurance company.

Allow for fire / smoke / heat alarm system per technical standards for new homes.

There is an existing telecom point. Allow for checking and ensuring this is up to date as well as extending it if needed.

Ventilation: allow for installation of 2no continuous extract fans (none extant)

Externals

Surrounding Ground and Boundaries

The ground immediately around the building is fairly flat but also fairly boggy beyond the areas of (overgrown) hard standing and littered in sheep poo. The priority would be to fence off the Northern section to create a sheep-free zone and create a path around the property. It would be worth including for a ‘French drain’ system around the perimeter of the building to ensure that the walls remain dry and to drain what is fairly boggy garden ground all around. We have allowed for fencing with 1 new gate (for car access), a path and a perimeter drain.

Access

There is a gated access track which drops fairly steeply from the adjacent road and which crosses the Black Side burn to the property.

We have allowed for clearing the drainage ditch to the East side of the track and note that a culvert has recently been installed to clear the existing surface flooding. WE’ve suggested that the track surface could be scraped to remove planting and top dressed with a minimal stone dressing but this may be overkill.

We’ve also proposed that safety railings or barriers should be installed to the bridge sides as there is currently nothing to prevent one driving cleanly over the edge of that bridge! Parking is envisaged as being on the hard standing area to the immediate North of the house and no works are needed to upgrade that.

Outbuildings

There is a simple timber shed close to the entrance door. This was locked when we visited but looks to be in reasonable condition and we assume that it would be made available to any prospective tenant. We have not allocated any money against it.

There is also a dilapidated shed about 50m to the North against the field boundary wall. Similarly, we have assumed this is nothing needing to be done with this.

Wider Land Around

There is a drainage ditch to the immediate West of the stone garden boundary, and the Black Sike burn to the East, which is the burn over which one crosses to access the site. We have not allowed for any works to any wider areas apart from that related to the track access.

2.2. SHQS Assessment

The brief required that an SHQS assessment was to be carried out of the property and this was done while on site and recorded below. Note that the property fails in many ways but this is not surprising given that it is devoid of all normal fittings and fixtures.

All items noted in the boxes below have been added into the schedule of works but are shown in the text beneath each table.

Cronksbank Cottage: SHQS Assessment			**Part A: Tolerable Standard (12 Elements)**
	One or more element failures means outright failure of the tolerable standard criteria (A) and thus outright failure of SHQS.		
Ref	Description	Compliance	Notes
1	Structural Stability	yes	Some minor cracking, doesn't appear serious, some re-pointing which may relate to historical movement but also doesn't appear serious. Cement mortar which is usually a problem but lack of cracking suggest generally it is working well. Many areas of new plaster internally so not possible to see if internal movement has been an issue. No residual cracking obvious. Generally looks OK
2	Rising & Penetrating Damp	yes	Property has been empty so hard to tell, but no evidence of present or past rising damp. Note that ground is generally pretty boggy though so land drainage should be considered generally.
3	Lighting, Ventilation & Heating	no	Not complete but note lighting appears to be all new, as does heating. Ventilation not complete so close, but not currently compliant.
4	Wholesome Water Supply	yes	Not confirmed. There is an existing water treatment system (in external box by back door) but not checked. Assume this could be checked and maintained and would be acceptable.
5	Sink with Hot and Cold Water	no	No fixtures and fittings.
6	Water- or Waterless Closet	no	No fixtures and fittings.
7	Bath/Shower & Basin with H/C Water	no	No fixtures and fittings.
8	Foul & Surface Water Drainage	tbc	This has not been checked. We will allow for a drain check and review of septic tank which is located to South of property. SEPA Discharge Consent CAR/R/1070399 exists
9	Cooking Facilities	no	No fixtures and fittings.
10	External Doors and Outbuildings	yes	Two adequate external doors. One to an outdoor store should be upgraded if made part of the heated envelope. One functional and one derelict outbuilding.
11	Electrical Installations	yes	All surface mounted fitments appear to be new, along with lighting and MDB was checked in 2019, so we assume system is acceptable, but will need to be checked again once all aspects completed.
12	Thermal Insulation	no	We were not able to check the attic. Assume nothing there based on high levels of mould to ceilings. Nothing in floors or walls. Windows are double glazed / adequate but need to be cleaned.
	Overall	Fail	

Part A Tolerable Standard. Works required:

- land drainage to be considered
- all ventilation and heating. Lighting appears OK, to be checked.
- check water supply and foul drainage
- all bathroom and kitchen fittings
- thermal insulation as discussed in more detail elsewhere.

Cronksbank Cottage:: SHQS Assessment			**Part B: Free From Serious Disrepair (18 Elements)**
	Primary Element (4 Elements) Fails if ⟶ 20% requires repair or replacement. One or more element failures means outright failure of the free from serious disrepair criteria (B) and thus outright failure of SHQS.		
Ref	Description	Compliance	Notes
13	Wall Structure	no	Stone work appears in reasonable condition but some minor cracking and internally there are several areas of badly damaged plaster which require replacement. Fundamentally sound but some superficial maintenance required.
14	Internal Floor Structures	no	All floors bar one (GF bedroom) downstairs have been replaced (from presumed original suspended timber floor) with a screed over hardcore. There are several areas requiring repair where central heating pipes have been chased in. Floor seems structurally OK though.
15	Foundations	yes	We weren't able to check foundations, but no evidence of serious movement that would suggest an issue.
16	Roof Structure	tbc	No access possible to any of the roof areas including main attic. Evidence of some extensive decay and mould suggests all is not well in a couple of areas and access to main roof in particular is strongly recommended.
	Secondary Element (14 Elements) Fails if ⟶ 20% requires repair or replacement. Two or more failures means outright failure of the free from serious disrepair criteria (B) and thus overall SHQS failure.		
17	Principal Roof Covering	yes	Seen only from drone, but roof covering generally looks to be in good condition.
18	Chimney Stacks	yes	Appears structurally sound and haunching appears in reasonable condition with no major gaps or cracks. It is heavily discoloured and covered in algal growth so needs to be cleaned down and checked further. One terminal is open and requires to be capped and vented.
19	Flashings	yes	These appear to be in reasonable condition albeit zinc ridge clips have rusted and should be replaced
20	Rainwater Goods	no	Rainwater goods are all in original cast iron and in need of rubbing down and re-decoration. Some areas are not falling as necessary and need to be re-set to fall properly. Some localised cracking around one or two fixings. Note almost all external wastewater pipework is in larger, black uPVC. Ideally we would separate the combined drain runs.
21	External Wall Finish	yes	Mix of stone and brick finishes which are not perfect but in reasonable condition generally.
22	Common Decks / Balustrading	n/a	
23	Common Stairs & Landings	n/a	

Cronksbank Cottage:: SHQS Assessment			**Part B: Free From Serious Disrepair (18 Elements)**
24	Balconies & Verandas	n/a	
25	Attached Garage	n/a	
26	Internal Stairs (dwelling)	yes	Internal timber stairs are in acceptable condition but require repainting and re-carpeted or similar.
27	Damp Proof Course	yes	Very limited evidence but there appears to be a bituminous layer to stonework areas. Note that land drainage is recommended which would help with any groundwater pressure issues.
28	Windows & Doors	yes	These are all double glazed uPVC and in reasonable condition.
29	Common Windows / Rooflights	n/a	
30	Underground Drainage	tbc	Not checked but note that a drain survey will be recommended as part of any proposals.
	Overall	Fail	

Part B Free from Serious Repair. Works required:

- minor re-pointing externally and some fairly major plaster repair / replacement internally
- ground floors require repair where central heating pipes have been installed into screed
- review and potential repair of roof structure proposed
- rainwater goods need to be set to fall correctly, or replaced, and other minor items are noted
- drainage survey proposed

Cronksbank Cottage:: SHQS Assessment			**Part C: Energy Efficiency (6 Elements) REPLACED BY EESSH RATING BUT NOTED HERE FOR INFO**
Ref	Description	Compliance	Notes
31	Cavity Wall Insulation	n/a	
32	Loft Insulation	no	No access to the log but almost certainly no insulation there judging by mould on ceiling finishes which evidence that this is the coldest surface.
33	Hot Water System Insulation	no	Existing oil boiler and tank exist and central heating system is in place along with most water pipework, but no fitments installed as yet.
34 A	Full Central Heating	tbc	Existing oil boiler and radiators appear to be plumbed in and potentially operational but require to be checked.
34 B	Efficient Central Heating	yes	CH controls appear to be relatively modern and wired in. Likely this would be acceptable but also likely removed in favour of a heat pump.
35	EESSH Compliance or Equivalent	tbc	SAP calculations to be carried out.
	Overall	n/a	

Part C: Energy Efficiency. We have made notes on site in the table above but all elements of this have now been superseded by the requirements of EESSH2 and are discussed elsewhere.

Cronksbank Cottage:: SHQS Assessment			Part D: Modern Facilities & Services (12 Elements)
	Primary Element (4 Elements) Fails if ⟶ 20% requires repair or replacement. One or more element failures means outright failure of the free from serious disrepair criteria (B) and thus outright failure of SHQS.		
Ref	Description	Compliance	Notes
36A	Bathroom Condition: basin	no	No sanitary or kitchen fittings installed as yet so currently non-compliant.
36B	Bathroom Condition: bath / shower	no	
36C	Bathroom Condition: WC	no	
36D	Bathroom Condition: h/c water supply	no	
37A	Kitchen Condition: sink	no	
37B	Kitchen Condition: cabinets/worktops	no	
37C	Kitchen Condition: h/c water supply	no	
38	Kitchen Facilities: safe layout	no	
39	Kitchen Facilities: adequate sockets	no	
40	Kitchen Facilities: adequate storage	no	
	Overall	Fail	

Part D: Modern Facilities & Services. Works required:

- All kitchen and bathroom fittings

Cronksbank Cottage: SHQS Assessment			**Part E: Healthy, Safe & Secure (15 Elements)**
	Healthy Elements (3 Elements) One or more element failures, 41-43 means outright failure.		
Ref	Description	Compliance	Notes
41	Lead Free Pipework	tbc	Incoming water pipe appears to be copper but no further checking done. All internal pipework is new and copper but age of property would suggest lead supply pipe.
42	Mech Vent in Kitchen and Bathroom	no	A duct has been inserted for bathroom extract but no fan as yet and nothing to Kitchen.
43	External Noise Insulation	yes	This is not likely to be an issue. Windows and doors are double glazed.
	Safe Elements (9 Elements) If more than 20% of elements 47-51 require repair or replacement then they are deemed to fail. One or more element failures, 44-52 means outright failure of the healthy, safe and secure criteria (E).		
44	Safe Smoke Alarms / Detectors	tbc	Some installed but not checked. ‘Smokes’ have their own sub-circuit on the DB so may be OK but needs to be checked.
45	Safe Electrical Systems	tbc	All face plates appear new, but needs to be checked.
46	Safe Gas / Oil Systems / Appliances	tbc	The oil system appears in order but again will need to be checked.
47	Safe Lifts	n/a	

Cronksbank Cottage: SHQS Assessment			**Part E: Healthy, Safe & Secure (15 Elements)**
48	Safe Common Halls etc.	n/a	
49	Safe Paths, Paved Areas	no	Variety of hard and soft landscaping around the building is all overgrown and will require some work, if not replacement.
50	Safe Refuse Chutes	n/a	
51	Safe Bin Stores	yes	Not identified but plenty of space that could be used. Main issue that refuse collection will be some way down the road towards Broomholmshiels.
52	Safe Common / Public Lighting	n/a	
	Safe Elements (3 Elements) One or more element failures, 53-55 means outright failure of the healthy, safe and secure criteria (E).		
53	Secure External Doors	yes	Existing uPVC doors are in reasonable condition albeit dated, like the windows.
54	Secure Common Door Entry System	n/a	
55	Secure Common Doors in Good Repair	n/a	
	Overall	Fail	

Part E: Healthy, Safe & Secure. Works required:

- All kitchen and bathroom fittings

3. RdSAP and Achieving EESSH2 Compliance

Part of the brief of this project is to calculate and demonstrate the means to achieve an EESSH2 compliant upgrade to the property using either SAP (Standard Assessment procedure) or RdSAP (Reduced Data SAP). These are the calculations which 'lie behind' the EPC ratings you see on the certificates usually placed in your boiler cupboard or similar.

RdSAP is the usual way to calculate energy efficiency in existing buildings and that is what we have used in this report. The software used is Elmhurst and the software system used is SAP 9.94.

We have concerns about the adequacy of SAP and RdSAP to support the development of truly energy efficient homes. In short, the procedure is not accurate and tends to under-value fabric improvements (insulation and airtightness) but over- value technical solutions like the addition of 'low carbon' heating systems. Although this can be helpful in reducing carbon emissions, it can lead to solutions which are more costly to purchase, costly to run for occupants and costly to maintain.

In addition it is worth noting that the ratings given are not based on the actual energy efficiency of the building, they are based on the cost of energy needed, and insofar as the costs of energy change a great deal, can be quite far removed from the reality of costs for most occupants.

In the table on the right, we have modelled a number of scenarios to achieve EESSH2 compliance per the brief. In doing so, we have tried to triangulate between the competing demands of simply getting the numbers over the line (in this case 81 'B'), considering the cost of the works proposed and the heritage or aesthetic value of the property. In addition we are considering practical issues, and most importantly, whether or not we believe the measures proposed will actually lead to an efficient and comfortable home for tenants in the long term.

The following is a narrative and explanation of the sequence of scenarios in the table.

Options 1 to 5 are simple, cumulative measures taken to ensure that the property is at a basic level of energy efficiency akin to a modern building. There are some constraints which we have overlooked or at least simplified in the roof, but we have restricted ourselves to 50mm only in the ground floors to avoid raising the levels to a point where all door lintels would need to be raised. We have noted draughtstripping as '100%' which is a fairly meaningless metric but will translate that in reality as including for an air pressure test and some remedial works on site to ensure a competently draught-free home. Changing all light bulbs is easy enough and we have assumed in all options, that the brick porch and rear extension are insulated externally with 100mm of mineral wool (EWI), rendered with a suitable finish to minimise the aesthetic change.

All of these measures - in reality - would provide a pretty good result and in our view could easily constitute the only works needed to provide a decent home for a tenant at a fairly cost effective rate. However, as can be seen, these measures in themselves are not getting us very far in the world of RdSAP and so we need to press on, in order to achieve the EESSH2 compliance required.

In option 6 we add 50mm internal wall insulation (IWI) to all stone walls. This is relatively effective at raising the score, but bear in mind that it is fairly costly to do, because this means adding insulation to ALL external stone walls. To see if this could be avoided, we also modelled option 7 in which there is no internal insulation to the walls, but we swap the oil boiler for an air sourced heat pump, and this option provides a far more impressive jump up in score, but not enough on its own to get us to 81.

	Cronksbank Cottage:	**RdSAP Assessment**			
Ref	Proposed Measure	Energy Rating		Annual Co2 emissions tonnes	Annual Heating Cost £
0	Existing Condition: No insulation to roof, walls or floor. 16mm dg windows and doors (2.4 U), oil boiler, '50%' draughtstripped	28	F	12.0	2,780
	[the following are cumulative and included in all later scenarios]				
1	350mm insulation to attic / roof (or close equivalent at coombs	36	F	9.8	2,376
2	1+ 50mm insulation added to all floors	38	F	9.4	2,307
3	2+ Draughtstripped = '100%'	38	F	9.3	2,282
4	3+ All lights (12) to be LED	40	E	9.2	2,168
5	4+ EWI (External Wall Insulation) to brick porch and rear extension only. 100m rendered	43	E	8.6	2,048
	[the following are NOT necessarily cumulative and should be considered stand-alone options]				
6	5+ 50mm IWI (Internal Wall Insulation to all stone walls	56	D	6.6	1,601
7	5+ ASHP (Valiant Arotherm 8kW) + programmer + TRVs + bypass + reduced flow temp (36-45 degrees)	67	D	3.6	2,164
8	5+ 100mm IWI + ASHP as above	76	C	2.6	1,551
9	8+ PV (photovoltaic panels) @ 20% of roof surface (c. 13m2 which may not be practical - 15% didn't get over threshold)	82	B	2.1	1,252
10	8+ 18 hour tariff (may not be available) (No PV)	84	B	2.6	1,298
11	10 + reduction in IWI to 50mm	83	B	2.8	1,408
12	10 + remove all IWI to stonework	79	C		
13	12+ all external doors = triple glazed at U= 1.0	79	C	3.5	1,757
14	12+ all windows = triple glazed at U= 1.0	80	C	3.3	1,654

Thus in option 8, we put back the IWI but up it to 100mm, and this gets us close with a 76C, but still not enough. Note that both these options are costly to achieve.

In option 9 we add photovoltaics, which we know is well liked by RdSAP, and this gets us over the threshold to an 82B. However, we are not certain that amount of PV can be fitted on the roof in practice, and moreover it would have a considerable visual impact from the road, so we are keen to avoid this, especially as mains electricity in Scotland is now largely renewable anyway, so the benefits of PV in Scotland are marginal.

A similar breakthrough can be achieved by taking away the PV and ensuring that the property operates on an 18 hour tariff, as option 10, but this may or may not be available, so is something of a risk, albeit one worth taking at this stage we suspect.

Keeping the 18 hour tariff, we then modelled option 11 in which we reduced the internal wall insulation to 50mm, which allows us a pass still at 83B, but removing all internal insulation per option 12, which would significantly reduce cost, cannot achieve compliance.

In options 13 and 14 we tried to get over the line using improved windows and external doors, which is something that is costly, but would in reality improve comfort and energy efficiency, but this too is insufficient to get us back over the line.

Our concluding solution therefore is to recommend option 11, or possible option 10 if you prefer. In this option we have the relatively costly ASHP and IWI, but there are no PVs or new windows, both of which are expensive, the external visual impact is relatively minimal, and energy efficiency in practice is pretty good.

Note that although 100mm of insulation on the walls is better thermally, it is also considered by some to raise the moisture risks within the wall and for that reason we propose using 50mm only, per option 11.

View of the existing building from the North-West showing the brick rear extension and porch to the West, as well as the oil tank and external oil boiler. The white box between the two doors contains the water treatment. Under the EESSH2 compliance proposals, the oil tank and boiler would be replaced by an external heat pump unit, while the brick walls would be insulated and rendered.

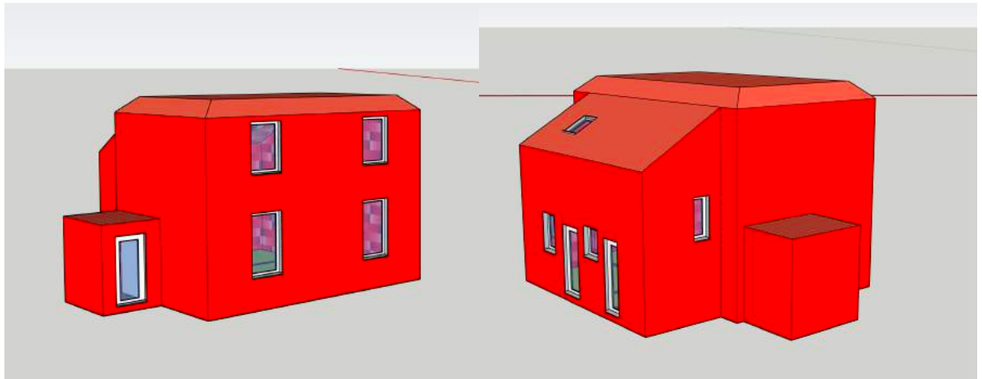
4. Achieving EnerPHit or AECB Carbonlite Standard

Assessment Process

Additionally to the main brief, we were asked to assess the potential of the property to attain 'EnerPhit' or a similar level of energy efficiency to maximise the energy efficiency of the building and therefore minimise the ongoing carbon emissions and fuel bills of any occupant as well as guaranteeing best practice levels of comfort.

'EnerPhit' is the name given to the Passivhaus approach when applied to existing buildings and it is an extremely rigorous standard. Unlike SAP and RdSAP it has been designed to be an accurate assessment of energy efficiency which is why we prefer it. However, it is not without it's issues. The main one is that it assumes that the whole house is kept at 20 degrees C at all times, which is very unusual in UK homes, especially older ones where the house is usually allowed to get cooler than that at times, and where some rooms tend to kept warmer than others to save fuel.

The software used to determine whether or not a project has been designed to the Passivhaus standard - new or retrofit - is called PhPP (Passivhaus Planning Package). This is very detailed and takes a lot of time to undertake, but there is a plug-in which can be used to simplify much of the initial work and also to visualise the building a little more intuitively. The plug-in is called 'Design PH and it is what we have used for this feasibility stage. We have created a 3D model of the building, as seen below, but note that the bit being modelled is the insulated envelope, so, for example, we are not interested in the area of roof above the insulation, nor do we need to model the dormers above the front upstairs windows



To this model we apply U values, airtightness levels and so on, and it calculates the annual energy demand to keep the building warm, bearing in mind the solar gains coming through the windows, the orientation of the building, its location and so on.

Note that unlike the RdSAP software, this process only concerns itself with the fabric of the building, not any of the services, their efficiency or any renewables input, so it only tells part of the story, albeit the part of the story which most closely affects occupant comfort.

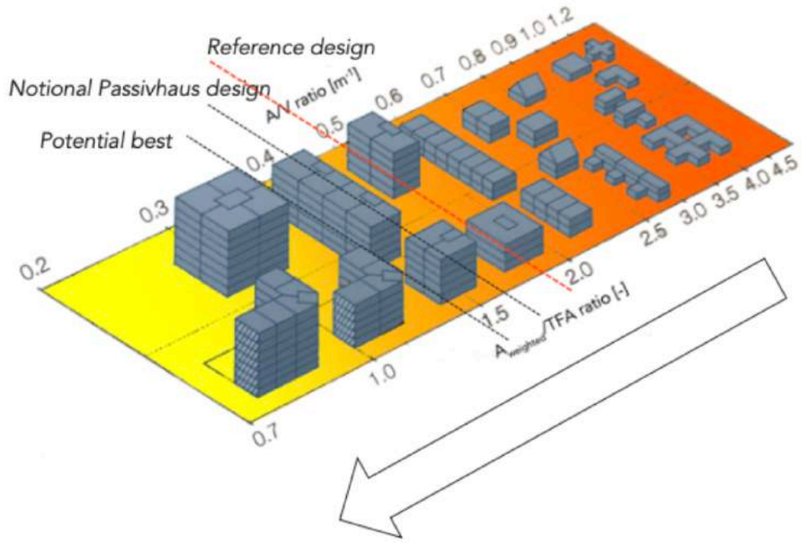
The assessment of the energy used to keep the building warm is also not calculated in the same way as RdSAP so it is not possible to compare what are otherwise apparently identical metrics. In practice you, as client and we, as designers will need to weigh both processes up and judge the best balance of works having used each process as a separate insight.

Form Factor and Why EnerPHit isn't Feasible

Passivhaus Consultants talk a great deal about 'form factor' but it is because it is so central to making buildings more energy efficient and has nothing to do with insulation, airtightness or occupant behaviour.

Form factor describes the ratio between the area of external surface area (roof, walls, window and floor) all of which are losing heat to the outside world, and the volume that they enclose. The more heat-losing surface area in relation to the volume inside, the greater the heat loss. Theoretically, a sphere has the smallest ratio of volume to external surface area but we don't find many of these in construction and in practice it tends to be larger, more compact and simpler forms which offer the best results.

Cronksbank Cottage has a very poor form factor because it is simply quite small and has quite a few 'ins and outs' which increase its surface area. Being a two-story house (rather than single storey) helps somewhat, but in any event its form factor comes in around 3.5, which as can be seen on the scale along the bottom of the diagram below, puts it close to being about as bad as you can get!



As shown in the table on the next page, the existing energy consumption of the house, calculated using Design PH is around 535 kWh/m2/a. To achieve EnerPhit we would need to get that number down to 25 kWh/m2/a, and that is more or less impossible without ridiculous levels of insulation which would be both impractical and hugely costly.

Having realised this fairly early on we have turned out attention to another, similar energy efficiency standard known as the 'AECB Carbonlite Standard'. This is less rigorous and has a target value of 50 kWh/m2/a which is obviously easier to meet, but it still employs a similar rigour in terms of how it is assessed. It also allows the target to expand up to 100 kWh/m2/a where it is not feasible, or is problematic for some reason to reach the 50 kWh/m2/a target. Knowing that we were going to struggle to reach EnerPhit at anything like a sensible cost or practical level, we propose instead that we aim for the AECB Carbonlite standard and the table and discussion overleaf describes the sequential process of reaching the target.

Meeting the AECB Carbonlite Standard

The table below shows the iterative process we went through to bring the modelled energy consumption down to below the 100 outside target of the AECB Carbonlite Standard.

The building was modelled carefully as it exists (albeit we do not know what's in the loft but believe there to be be no insulation there). This provided us with our starting point of 535 kWh/m2/a at the top of the table right.

Our first move is to model the loft as fully insulated an this takes our figure down to 455 kWh/m2/a. Without digging up the ground floor we don't see how practically we can add more than around 50mm insulation to the ground floor (except in the timber floored room) which is a significant constraint. However, we have modelled that 50mm in the floor and this takes us to 440 kWh/m2/a.

The existing airtightness is unknown but is assumed to be around 10 ach, which is a fairly good figure for an existing building reflecting the fact that it has a largely sold ground floor. We then modelled the building with an air change rate of 3, which improved the figure to 400 kWh/m2/a.

We then modelled an external wall insulation to the brick porch and rear extension, as with the RdSAP process ad this took us to a figure of 332 kWh/m2/a. We then added 50mm internal wall insulation to all of the stone walls which took us to the 252 kWh/m2/a shown in yellow.

We improved the assumptions made about thermal bridging in all of the details which would need to be worked out in some detail in any future design work, but is reasonable to assume at this stage and this took the figure to 201 kWh/m2/a.

Hoping to avoid replacing the widows, we then realised we would need to bite the bullet and so all windows and external doors are replaced in the model with Passivhaus levels versions and this takes us to 170 kWh/m2/a.

At this point we suspect that all measures, even if fairly costly, would make sufficient difference to internal comfort and efficiency levels that they could be broadly justified. It is difficult to know exactly at which point this comes, and it differs for everyone, but as can be seen further improvements become slightly more incremental and would probably be harder to justify. It depends also, for example, on how strongly the client wanted to work to a defined standard rather than look more simply as 'affordable warmth' as a worthwhile, if undefined goal.

Further steps included increasing the internal wall insulation to 100mm overall and this improved the figure to 148 kWh/m2/a. Arguably this is worth doing because the majority of the cost of insulation is in labour and there is little between the 50 and 100m boards that would be needed, but it also increases moisture risks in the wall, depending on the exact detail and given the exposure levels of the house, we see this as potentially risky.

Nonetheless we kept this in and then turned our attention to ventilation, changing the open windows to continuous mechanical extract which reduces overall energy consumption down to 136 kWh/m2/a, and then introducing heat recovery ventilation, which improves that number down to 122 kWh/m2/a.

Improving the average thermal bridging figures to 0.2 improves the figure to 111 kWh/m2/a, but note that this would require confirmation once construction details had been agreed. The next step involves increasing the ground floor insulation around 180mm which would take the floor level to same levels as the first step of the stairs. This obviously causes problems with the door

	Cronksbank Cottage:	**DesignPH Assessment**
Ref	Proposed Measure	Annual Space Heating Demand (kWh/m2/a)
0	Existing Condition: No insulation to roof, walls or floor. 16mm dg windows and doors (2.4 U), airtightness @ n50 = 10	535
	[the following are cumulative and included in all later scenarios]	
1	350mm insulation to attic / roof (or close equivalent at coombs	455
2	1+ 50mm insulation added to all floors	440
3	2+ Airtightness modelled at n50 = 3	400
4	3+ EWI (External Wall Insulation) to brick porch and rear extension only. 100m rendered	332
5	4+ 50mm IWI (Internal Wall Insulation to all stone walls	252
6	5+ Thermal Bridges reduced from 0.5 to 0.25 overall	201
7	6+ all external doors = triple glazed at U= 0.8	170
	Below measures arguably less cost effective and not all cumulative	
8	7+ IWI to stone walls increased to 100mm	148
9	8+ ventilation changed from windows only to extract ventilation	136
10	9 + ventilation changed to MVHR at 85% efficiency, airtightness improved to n50 = 2	122
11	10 + improve thermal bridges to 0.2 throughout	111
12	11 + ground floor insulation increased to 180mm (lintels raised, same level as bottom step of stairs)	106
13	12+ EWI to brick walls increased to 200mm	100
13	13 + airtightness improved to n50 = 1.5	97

heights, and so this move would also need to include for raising of all lintels in the house, it is worth noting that there is ample room to achieve this. This improves the figure again to 106 kWh/m2/a but clearly we are gaining small improvements in this case for a fairly costly intervention in the real world.

We then looked to improve the depth of external insulation to the porch and rear brick extension and this took us to 100 kWh/m2/a. By reducing the air change rate in the model, we finished tweaking the model with a result of 97 kWh/m2/a.

Hopefully it is clear that the improvements increasingly involve small improvements in energy consumption figures but some fairly costly works in some cases. If this study is to move beyond a feasibility study, it would be interesting to model the building in more detail and include modelling of heat pumps and other services improvements which in some cases could provide cost effective improvements, especially if they were wanted due to the RdSAP process anyway.

5. Retrofit Specifications

The following has been divided into four sections; those measures we believe would need to be undertaken in any reasonable refurbishment of the building, those additional measures which would be needed to achieve EESSH2 compliance, those needed to achieve an AECB Standard or 'EnerPhit' retrofit and lastly the small tweaks to the second option which comprises our recommended option.

5.1. Specification for ALL Retrofit Options. This deals with the Condition Survey and most of the SHQS assessment

Building External Finishes

Check and secure any loose or missing slates (none obvious). Replace all rusted ridge and hip flashing straps with galvanised versions. Clean and repaint all rolled verge flashings. Clean down chimney stack, re-point open joints and finish open flue with a vented cap

Take down and rub down / clean and repaint all cast iron rainwater goods. Re-set lengths that are not draining properly and re-point around area to rear where there is localised cracking around downpipes fixing.

OR: replace all cast iron rainwater good with new 150mm guttering and 110mm downpipes in black coated steel system connected into existing gulleys etc via adaptors. Allow for access hatches at low points in all downpipes.

Allow small sum for checking and re-pointing of small areas of stonework / brickwork with lime mortar. Allow for cleaning of all external doors and windows only. Include for new double glazed PVCu external door for external store.

Internal

Attic: allow sum for repair of timber structure, likely to be some decay, but limited area, say £5k. Allow also for forming a lockable hatch into the main attic and porch ceiling.

Wall and Ceiling Finishes: allow for full replacement of 10% of total area to include new plasterboard and underlying timber supports etc as necessary. Allow for stripping back of around 70% of existing wall and ceiling areas to remove wallpaper / old paint etc back to clean plaster. Include for 10% surface repairs within this allowance. 20% of wall and ceiling finishes are new.

Allow for redecoration of all walls and ceilings. Allow for mineral paint in all areas to reduce health risks from VOCs etc.

Internal doors and internal Woodwork: allow for cleaning down existing timber internal doors. Allow for 30% new skirting and architraves where these have been removed and clean down and redecoration of all internal woodwork.

Floor Finishes: allow small sum for repairs to upstairs timber floors and then for a painted finish to all first floor areas.

Ground floor to be floating timber floors over insulation as noted elsewhere. Allow for vapour control layer / airtightness over existing screed or timber boards. Include small sum for repair to existing screeds where central heating pipework has been run within screed depth.

Fixtures and Fittings

Kitchen Units and Appliances: install kitchen units as shown in proposed plan, to include all base and wall units, worktop, sink and oven / hob, plus all associated plumbing and electrics.

Bathroom Fixtures: install bath, shower, wash basin and WC including all associated plumbing and electrics.

Other: allow sum (£3,000) for miscellaneous fittings TBC.

Utilities and Services

Foul Drainage System: there is an extant SEPA discharge consent for septic tank in a nearby field with discharge to the nearby water course. Allow a sum to survey and check this, with a small sum to allow for minor repairs if needed.

Surface Water Disposal: note allowance for building perimeter land drain as noted in Externals section below. Allow sum to re-connect existing downpipes into the new land drainage system if possible.

Water Supply: allow for check of of existing water treatment equipment and any associated pre-filtration, plumbing / storage. (Capacity heck assumed to be undertaken as part of wider TVNR project)

Space Heating System. If existing oil fired system is left in place, allow sum for completing all connections, insulating pipework and properly commissioning system only.

Water Heating System. As above.

Electricity Supply: allow for a safety check on existing electric supply (looks new)

Electrics: allow for say 6no new light fittings, replace all bulbs with LED bulbs (12no), allow for emergency lighting installation including external by entrance door. Allow for say 10no new sockets.

Allow sum for new lightning protection system, basic security system, compliant fire alarm system. Allow for checking, upgrading if necessary and extending existing telecom point.

Ventilation: allow for installation of 2no extract fans. Include for chimney balloon to block existing living room chimney flue.

Externals

Surrounding Ground and Boundaries

Install a suitable stock-proof fence around Northern edge of the building encompassing existing timber shed and connecting to existing stone boundary walls. Include for 1no gate to North.

Allow small sum for decorating and maintaining existing Gate to East.

Include for forming land drain around complete perimeter of building to comprise 300x300m trench laid to fall with land drain at base, fleece surround and clean pebble or gravel backfill. Discharge to natural drain / trench which runs alongside to West of property.

Allow for 600mm slabbed path all around property adjacent to perimeter trench above and over suitable free draining sub-base

Access: Allow sum to clear adjacent drainage ditch to main access track, scrape track surface to remove plant growth and top dress with mixed size stone. Allow for installed railings / barrier over bridge on both sides.

Outbuildings: no works anticipated.

Wider Land Around: no works anticipated at this stage.

5.2. Specification to meet EESSH2 Compliance (EPC 81B)

The following specification will be reported separately and relate to the additional costs of meeting EESSH2, or an EPC rating of 81 / 'B' per the brief.

Roof / Loft Insulation

350mm mineral wool quilt to main attic and porch. Ensure ventilation is maintained around eaves, plumbing is insulated and cabling is within conduit or above insulation. Lay breather membrane over and seal to prevent lifting.

To Coombs in main house and rear extension, remove existing lath + plaster / plasterboard finish, install 150mm mineral wool quilt insulation between rafters and then cover with 90+12.5mm insulated taped and filled plasterboard. No services within (move bathroom ceiling light to 2no wall uplighter or similar). Ensure 50mm vented space between quilt insulation and sarking.

Wall Insulation

On brick walls we propose 100mm rendered mineral wool external wall insulation (EWI), finished with a muted colour of render. Allow for extending insulation into windows reveals and using XPS below ground floor level and min 300mm into ground (note perimeter drain will be constructed which reduces additional costs of doing this)

On stone walls, we propose 50mm wood fibre insulation applied internally on all external walls. Works to involve removal of existing linings, application of insulation board (allow for some dubbing out of walls to provide level finish), forming a new 32mm service void and new plasterboard finishes to all areas.

Floor Insulation

Once floor raggles are infilled, install self levelling screed if needed and 50mm PIR insulation, VCL over and floor finish as noted elsewhere.

Airtightness

The SAP metric of '50%' airtightness is meaningless but we have suggested improving this to '100%'. We propose this means allowing for 2no airtightness tests, (£600 each) along with miscellaneous works to achieve an overall airtightness level of 3 m3/m2/yr. Allow £1.5k for the works.

Heat Pump

To achieve EESSH2 the oil boiler needs to be replaced. Allow for removal of existing system and installation of suitable air source heat pump, to include external unit and internal tank (in rear store room) including all associated controls, plumbing and wiring. Allow for addition of 4no new radiators to supplement existing (in preference to replacement)

18 Hour Tariff . To achieve the compliance we utilised a different tariff in SAP which may not be available in the area, so this will need to be checked and the closest alternative used before confirmation of final rating can be achieved.

5.3. Specification to meet AECB Carbonlite Standard

The following specification will be reported separately and will achieve the 97 kWh/m2/a required to come within the outer AECB Carbonlite Standard of 100 kWh/m2/a.

Roof / Loft Insulation: 350mm mineral wool insulation per 5.2

Wall Insulation: Both internal and external insulation specification per 5.2, bt note EWI should be 200mm thick and IWI to be 100mm thick

Floor Insulation: Install 180mm PIR insulation over self levelling screed (assumed), then VCL and floor finish. Note requirement to raise all ground floor internal door lintels to maintain suitable door heights, all doors and frames removed, and re-hung as necessary.

Airtightness: All as per 5.2, including allowance for 2no tests and £1.5k works, tbc.

Windows and External Doors: Allow for removal and replacement of all windows and external doors with Passivhaus equivalent timber triple glazed windows and external doors. Allow extra for additional sealing of window frames to masonry and insulation of reveals before redecoration

Thermal Bridges: Allow sum of £5k to improve thermal bridging. Details tbc.

Ventilation: Allow for complete MVHR unit and ductwork, including installation.

5.4. JGA Recommended Specification

This would be all works in 5.1 and all works in 5.2, plus the following:

Allow for an asbestos survey, and a Structural Engineer's survey

Install 150mm duct through floor in Living room to serve possible wood stove.

Allow sum (£3k) for improving thermal bridging details.

6. Risk Assessment

The brief asks for an assessment of risks and controls, as well as mentioning PAS 2035. PAS 2035 is not something to be achieved as such, but a description off a process by which common risks associated with retrofit are evaluated properly. It is a relatively recent (introduced in 2019) process which was introduced in response to widespread dismay at the poor quality of much retrofit work around the UK. The PAS does not set energy efficiency targets, but does refocus the effort on adopting an approach which is more concerned with quality, an awareness of the effects of works on the whole property and a focus on fabric rather than technology.

This report is not a strictly PAS 2035-compliant report (which would take longer and be more detailed) but in keeping with the PAS, the aim of these proposals is to reduce the heating demand of the building and improve comfort whilst also managing air quality, and ensuring that none of the measures proposed negatively affect the maintenance or long-term performance of the building.

Our retrofit strategy is based on a 'Whole House Retrofit' (WHR) and 'Fabric First' approach, which can be summarised as follows:

1. The WHR approach usually involves a wider range of measures than, for example, simple window replacement or cavity wall insulation installation. It means considering the building (and occupants) as an interactive system, and our aim is to understand the long term consequences of all measures proposed.

2. The 'Fabric First' approach is one where we focus first on the building fabric rather than concentrating on building services and renewables etc. The main advantage of this approach is that while both fabric improvements and renewable can both reduce carbon emissions, fabric improvements simultaneously reduce fuel bills and improve comfort, whereas that is not a given when you swap fossil fuels for renewables. The second advantage is that fabric improvements generally outlast services installations many times over, so costs tend to be spread over far more years of benefit.

While the main driver for most retrofits is energy efficiency, it is also an opportunity to address any maintenance issues. Maintenance can sometimes be overlooked in favour of 'more interesting' energy efficiency improvements, but there is a risk that energy efficiency improvements can be undermined by maintenance problems if not addressed at the same time. In line with a PAS 2035 approach therefore, we will highlight maintenance measures that are needed as part of this work.

Too often, the retrofit industry follows a 'sexiness hierarchy' in which low carbon technologies come first, fabric improvements come second and maintenance comes third, if it features at all. This has led to many expensive, ineffective and in some cases very damaging retrofits across the UK. PAS 2035 - and this report - upends this hierarchy and looks towards maintenance first, fabric improvements second and low carbon technologies last. Each property is unique, but in general this will lead to more economical, effective and problem- free solutions.

The potential risks occasioned by the retrofit works are grouped towards the bottom of the table opposite which also includes more conventional risk assessment. The table acts as the Stage 2 Designer's Risk Register for this stage of the project.

	Cronksbank Cottage:	**Risk Assessment**	
Ref	Potential Risk	Proposed Control	Residual Risk
0	Past site and building history.	Appears to have always been a house, no evident industrial processes, albeit possible residual unwelcome agricultural uses	Low
1	Planning Issues. Within the Regional Scenic Area and just outwith important designated biodiversity areas. Ecological / biodiversity significance may affect potential proposals	Reuse as a house is wholly uncontroversial and if used for affordable rent likely to be encouraged. Restrictions / additional consideration required in external appearance and any proposals to surrounding garden / land likely due to local designations.	Low
	Risks related to Existing Site, Building and Condition		
1	Access / Outwith immediate site. Track to property is unmade and bridge over burn is unmarked with no side protection.	We propose improved track finish and marking and protection at bridge, also improved drainage by track.	Low
	Wayleaves	Wayleave presumed in existence for far access to field to North	Low
	Contamination	Previous potential agricultural use, eg storage of diesel etc. means possible contaminated land. CL survey could be undertaken if deemed necessary but appears to have been domestic only.	Low
	Flood risk. Black Sike burn indicates surface water flood risk by bridge on SEPA flood risk map	To be discussed.	TBC / Medium
	Surface Water / SUDS	Burn to Soouth-East and ditch to West provide plenty of options for surface water discharge	Low
	Radon	Site is in an area of low risk.	Low
	Coal Mining	Not part of a coal mining reporting area	Low
	Exposure / Lightning	The property is entirely isolated so we have proposed installation of lighting protection	Low
2	Structure	No apparent structural issues, beyond some minimal cracks which have been identified for re-pointing.	Low
3	Damp	No signs of damp from ground, no signs of damp from occupation because house has been empty, but clear signs of moisture damage from leaking / overflowing gutters into eaves-level construction. We have allowed for new / re-set guttering, re-pointing and replacement of internal finishes, along with checks and repairs if necessary to roof level joinery. Any risk from ground level damp will be reduced by proposed perimeter drain.	Low
	Utilities	Discussed in detail. Surveys / Checks etc. included in works proposed.	Low

	Cronksbank Cottage:	**Risk Assessment**	
Ref	Potential Risk	Proposed Control	Residual Risk
4	Deleterious materials	Asbestos report required. Lead pipe cannot be ruled out but all visible pipework is new and copper	TBC / Medium
	Building specific	Normal issues related to attic access and confined working spaces. No requirement for sub-floor insulation. Current access involves step to all doors, but adjustment would be easy to arrange.	Low
	Emergency Access and Fire Safety	Emergency access is available, albeit track is not ideal. Proposals include for fully compliant and up to date fire alarm system.	Low
5	Waste disposal	We understand waste disposal will only be from near Broomholmshiels.	Low
	Existing ventilation	Existing ventilation is via chimney in living room, infiltration ad opening windows.	Low
	Overall Design Risks		
6	House remains too cold / costly to heat	Levels of insulation and airtightness proposed would make this a well insulated and draught-free home so very little risk of this. Thermal bridges will need to be avoided and a greater level of detail and some supervision may need to be increased to ensure works are carried out as specified and without excessive thermal bridging	Low
7	Overheating following retrofit	Building form and insulation levels, along with non-excessive window areas facing South mean overheating is a low risk in this case, albeit there is no external shading. Cross ventilation is possible in all rooms and one first floor rooflight would allow for some stack ventilation on windless and hot nights. External shading could be easily retrofitted if needed but short and medium term risk is low.	Low
8	Excess moisture caused by retrofit works	Post retrofit the building will be relatively airtight and wet insulated so RH and moisture risks generally are increased. However, continuous extract ventilation has been specified as a minimum and this will manage the risk effectively, especially if rh-controlled.	Low
10	Specific Design Intervention Risks		
11	Roof / Attic Insulation	Main risk would be sealing in of existing damp but this is anticipated. Ventilation to attic must be retained and note in specification relates.	Low

	Cronksbank Cottage:	**Risk Assessment**	
Ref	Potential Risk	Proposed Control	Residual Risk
12	Ground Floor Insulation	No real risks associated with GF insulation. Depth is limited to avoid reducing internal heights too much. VCL will protect timber floor (in one rom) from moisture risk and no insulation has been placed between joists so risk has not been increased within solum	Low
13	Improved airtightness (n50 of 3) will reduce natural dissipation of moisture.	Proposed airtightness level is good for an existing building but not too onerous. IWI materials used are vapour transfusive. Continuous extract ventilation will ensure RH is maintained at acceptable limits and could be RH-controlled if felt necessary.	Low

7. Skills Development

There are several skills needed as part of the just transition which are clearly specialist, such as those associated with renewables infrastructure and novel service techniques like heat pumps, photovoltaics and so on.

Many are what might be called ‘normal’ building skills associated with ground working, masonry and builder skills, joinery and other trades for which existing training routes are available.

Retrofitting the UK’s buildings is understandably costly and disruptive but there is one glimmer of good news, which is relatively little appreciated, which is that many of the skills, and much of the effort needed is essentially little more than DIY and can be easily undertaken by non-skilled people.

In the case of Cronksbank Cottage, for example, all of the insulation which is proposed to be added to the loft and ground floor could be easily installed by unskilled / volunteer labour, as long as there is some skilled supervision.

In addition, many of the jobs include simple cleaning or preparatory work which could be undertaken by anyone. Rubbing down, cleaning an painted gutters and downpipes takes no skill expect patience and care, installing timber battens and plasterboard is simple enough and all of the decoration works can be done by anyone capable of wielding a paintbrush.

IN addition, most of the external works, involving digging trenches, installing paths and what might be termed gardening level works can also easily by done by unskilled people.

Perhaps the main qualifying criteria is general fitness. It is not easy for everyone to climb into a loft and access the low eaves areas to insulate, and some tasks do require some strength and basic stamina, but even with a group of mixed-ability volunteers, it would be possible to arrange tasks to suit the skills and abilities available.

The most important issue, at least for those tasks pertaining to insulation and energy efficiency is neatness. This doesn’t sound like a serious issue, but ensuring that insulation, in particular fits perfectly, without any gaps at all is primarily a function of neatness, because heat, air and moisture follow the laws of physics. In most cases, we would expect to achieve a better result - for insulation and airtightness - from unskilled but careful and conscientious volunteers than we would from builders working to a price.

This clearly provides opportunities for ups killing but also for reducing costs. We ahem some experience of arranging work parties of unskilled people on various construction project types and JGA would be more than happy to be involved in discussions regarding how this could be achieved in this case, tailored to the limitations of those involved.

There are logistical issues to co-ordinate, the most important of which tends to be ensuring that any volunteer or unskilled efforts do not interfere the scheduling of any contractor who is working on the building. There are serious insurance implications for contractors in having people on sites for which they are responsible, so this aspect has to be carefully managed. There are often also issues related to limited mobility, adequate eating and toilet facilities, access generally and pacing the work to those who are often no used to manual labour.

The photo top right shows the 10 year old winner of a competition held by the author to complete the best new section of wall, when organising a volunteer workshop in an unusual straw/clay

building technique for a home for his mother. This girl got the best balance of strength and care compared to a number of adults who were either too forceful or too careful and although this is an unusual example, it does go to show in a lighthearted way that there are few limits to who can meaningfully contribute to construction, depending on how the system is organised to suit.

More recently our practice have been heavily involved in training towards developing new skills in low energy buildings and retrofit in the ‘Built Environment - Sustainable Transition’ (‘BE-ST’) training centre in Hamilton. Nearly 2,000 people have been trained here and the courses may be of interest to the Langholm Initiative. The course link is shown below along with an image of the training course and centre as shown on their website below.

https://www.be-st.build/accelerate-to-zero/retrofit/low-carbon-learning/

8. Indicative Costs

NBM Cost Consultants have provided indicative costs for all options. Their report is relatively lengthy so rather than add it as an appendix we have sent it under separate cover, but have noted the main points here.

It is also worth adding some explanation at this point to avoid confusion.

Option 1 is called the 'SHQS Option' and involves addressing all of the issues raised within the condition survey and the SHQS survey which were part of our brief. None of the works mentioned relate directly to energy efficiency, this option is, in effect, all of the other work needed excluding energy efficiency items. Importantly, this option should be added to any of the other options in order to ensure all issues have been addressed.

Option 2 comprises all energy efficiency or low carbon services sufficient to get the building to pass the EESSH2 standard by using RdSAP. To reinforce the point, this option would cost both the £55k noted below PLUS the £86k of the SHQS Option.

Option 3 sets out the work needed to meet the AECB Carbonlite Standard. This is closest standard to the EnerPHit standard which is not itself feasible or cost effective on this project. Again, the sum noted would need to be added to the first figure.

Lastly, we have considered what we believe would represent the best value for the client and made out own recommendation as to the best way forward. This is broadly similar to the 'EESSH2' Option but with some tweaks. Again the noted cost should be added to the first figure.

The four options are noted in the grey table below which is take from the cost report, but please use the following numbers when considering the four options:

Option 1 SHQS £86,427 + VAT etc. (but does not address energy efficiency)

Option 2 EESSH2 £86,427 + £55,572 = £141,999 + VAT etc. (meets EESSH2 requirements)

Option 3 AECB £86,427 + £86,674 = £173,101 + VAT etc. (meets AECB Standard)

Option 4 JGA £86,427 + £60,905 = £147,332 + VAT etc. (Most cost effective we believe)

A) OVERALL FEASIBILITY COST SUMMARY

	Description		Cost	G.I.F.A. m²	G.I.F.A. ft²	Cost/m²	Cost/ft²
1	SHQS Option	£	86,427	102	1,098	£847	£79
2	EESSH2 Option	£	55,572	102	1,098	£545	£51
3	AECB Option	£	86,674	102	1,098	£850	£79
4	JGA Recommended Option	£	60,905	102	1,098	£597	£55

To help try to make the costs more realistic in terms of timing, we asked the QS to project the costs forward to a start date of December 2024, so there is a degree of speculation about the actual costs, but this takes account of some inflationary increases from the date of this report.

At such an early stage in the project, the QS has also noted a number of exclusions and assumptions with are worth bearing in mind, and which are noted in the greyed text below.

Please refer to the QS report for further details.

E) NOTES (RELATING TO WORKS COSTS)

1 Exclusions

The foregoing costs excludes the following:

a) Increase in costs beyond base date of December, 2024
b) Works to any areas that are not affected by the proposed alterations
c) Decoration to EESSH2 , AECB and JGA Recommended Option
d) Additional requirements from Planning
e) Additional requirements from Building Control
f) Asbestos removal should it be required (subject to undernoted)
g) Statutory fees, Building Warrant, Planning etc
h) VAT
i) Professional fees
j) Flood risk prevention

2 Assumptions

The foregoing costs assume the following:

a) The existing electrical and plumbing installation is capable of serving the new equipment
b) All existing furniture will have been removed/ placed in centre of room
c) No allowance at present for removal of carpets
d) Allowances for Asbestos Check and minor allowance for removal arising to SHQS Option
e) Allowance for Structural Survey to SHQS Option

3 Basis of Cost

The foregoing costs based on the following:

a) Architects Retrofit Feasibility - V2 (220607) incorporating Drawings, Specifications etc
Architects email re.minor cost adjustments to nbm dated 30 July 2024 @ 4.15 pm.
b) Structural Engineers - No information available
c) Services Engineers - No information available
d) Site Investigations - N/A
e)

4 Programme of Works

a) TBC

5 NBS Specification

a) No NBS specification available to date

6 Construction Design & Management Regulations

a) No Pre Tender Health & Safety Plan available to date

9. Recommendation

To help Langholm Initiative we have made a recommendation as to how best to move forward, but it is of course entirely up to you.

Ensuring that option 1 is incorporated into any project going forward, will mean that all of the other aspects of refurbishment have been adequately addressed such as internal finishes, maintenance and access around the property. It is good that the previous owners had made a start on some upgrading, but there is still a fair amount to do before the building is suitable for a contemporary home.

Including all works noted within Option 2 will ensure that the building complies with EESSH2 which is a crucial requirement for all landlords who look after housing for social rent. Achieving the standard now will future-proof the property against incoming legislation which will force all landlords to seek the relatively good energy efficiency levels and low carbon equipment that have been specified. The combination of relatively good energy efficiency specified and heat pumps etc should make the house very affordable and comfortable despite the age, location and exposure of the cottage.

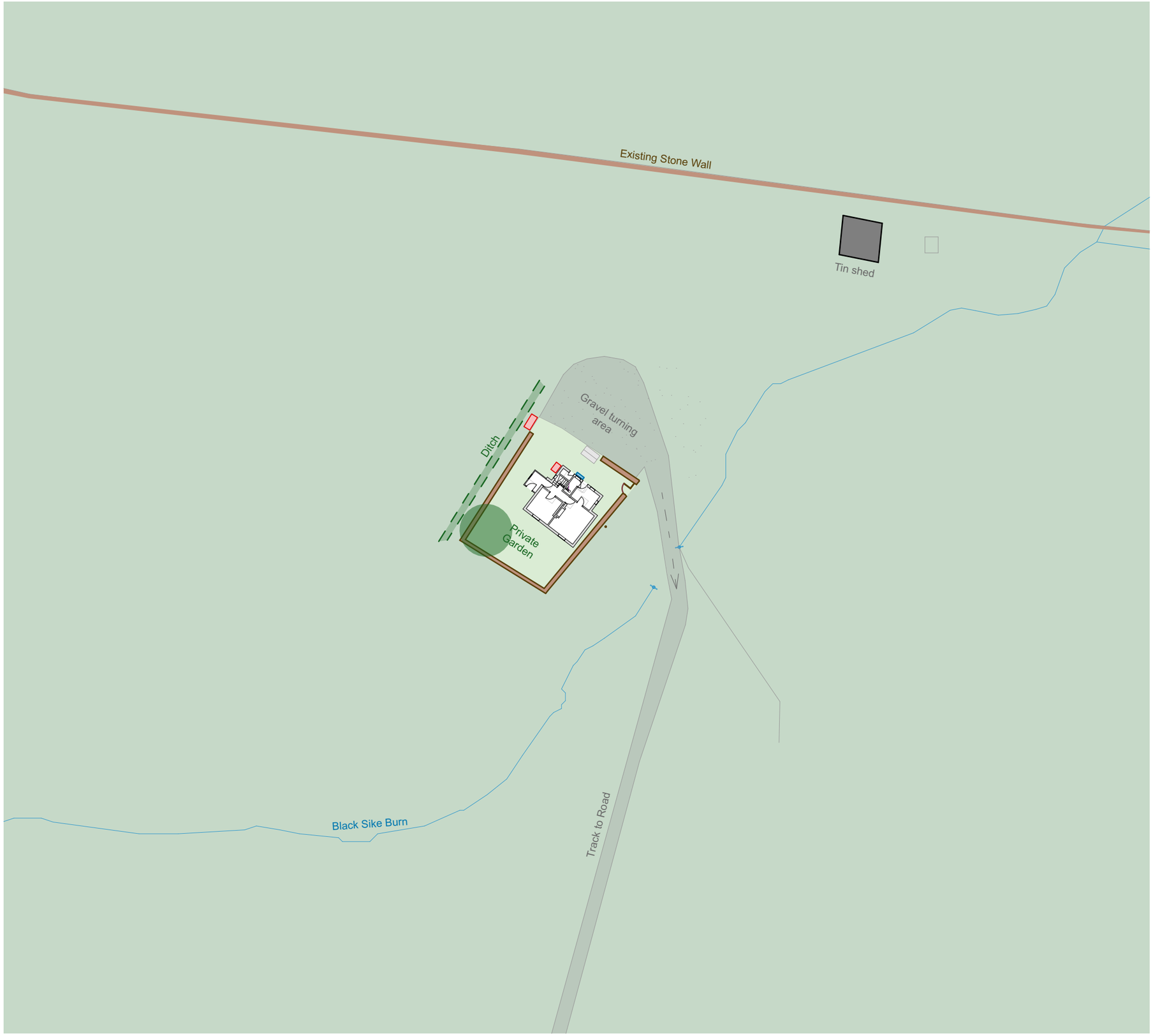
As Architects and Passivhaus specialists, we are usually trying to persuade clients to goo further with energy efficiency and embrace the Passivhaus or ‘EnerPhit’ standard, but we acknowledge that the upfront costs for this can be very high. Having completed a number of EnerPhit projects has also shown us that stretching everyone to reach a single numerical target can mean making a series of other decisions about the building that are sub-optimal in other ways, often in relation to waste. To reach the AECB standard, for example, it will be necessary to remove all windows and external doors and replace them with triple glazed alternatives. From the point of view of comfort and energy efficiency the case is clear, but from the perspective of creating waste, it is a questionable move. We have explained in detail that achieving an EnerPHit standard is not feasible because largely of the size and poor form factor of the cottage, but even the AECB standard specification which is easier to achieve we believe stretches the budget and practicalities of building beyond something that is cost effective and sensible.

Sustainability is not, ultimately about numbers, but about finding a suitable balance and so we have sought to recommend a solution - Option 4 - which remains relatively cost effective: making significant gains in energy efficiency and low carbon technologies without pushing the existing construction too far. In addition, meeting EESSH2 means that we have future-proofed LI against incoming costs, hassle and ensured long term regulatory compliance. We hope that providing a fourth and recommended option is helpful but the choice remains very much yours.

10. Appendices

10.1. Drawings

Existing and proposed drawings are shown on the following pages.



Scale Bar

0 5 10 15 20 25 30

metres

Notes / Key

Location (what3words): power.detect.talkative

Health & Safety Notes

RevID	Description	Date	Drawn	Checked

Project Status

Feasibility

John Gilbert ARCHITECTS

201 White Studios, 62 Templeton Street, Glasgow, G40 1DA

Tel: 0141 551 8383
Web: www.johngilbert.co.uk

Client

Tarras Valley Nature Reserve

Project Name

Tarras Valley

Drawing Title

Site Plan

Drawn By	Scale at A3	Project No.	Drawing Number_Rev
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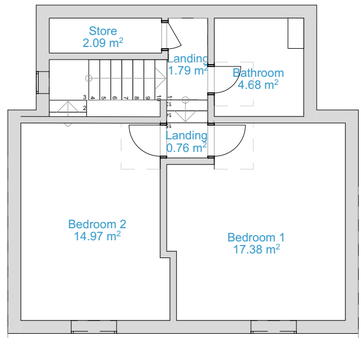
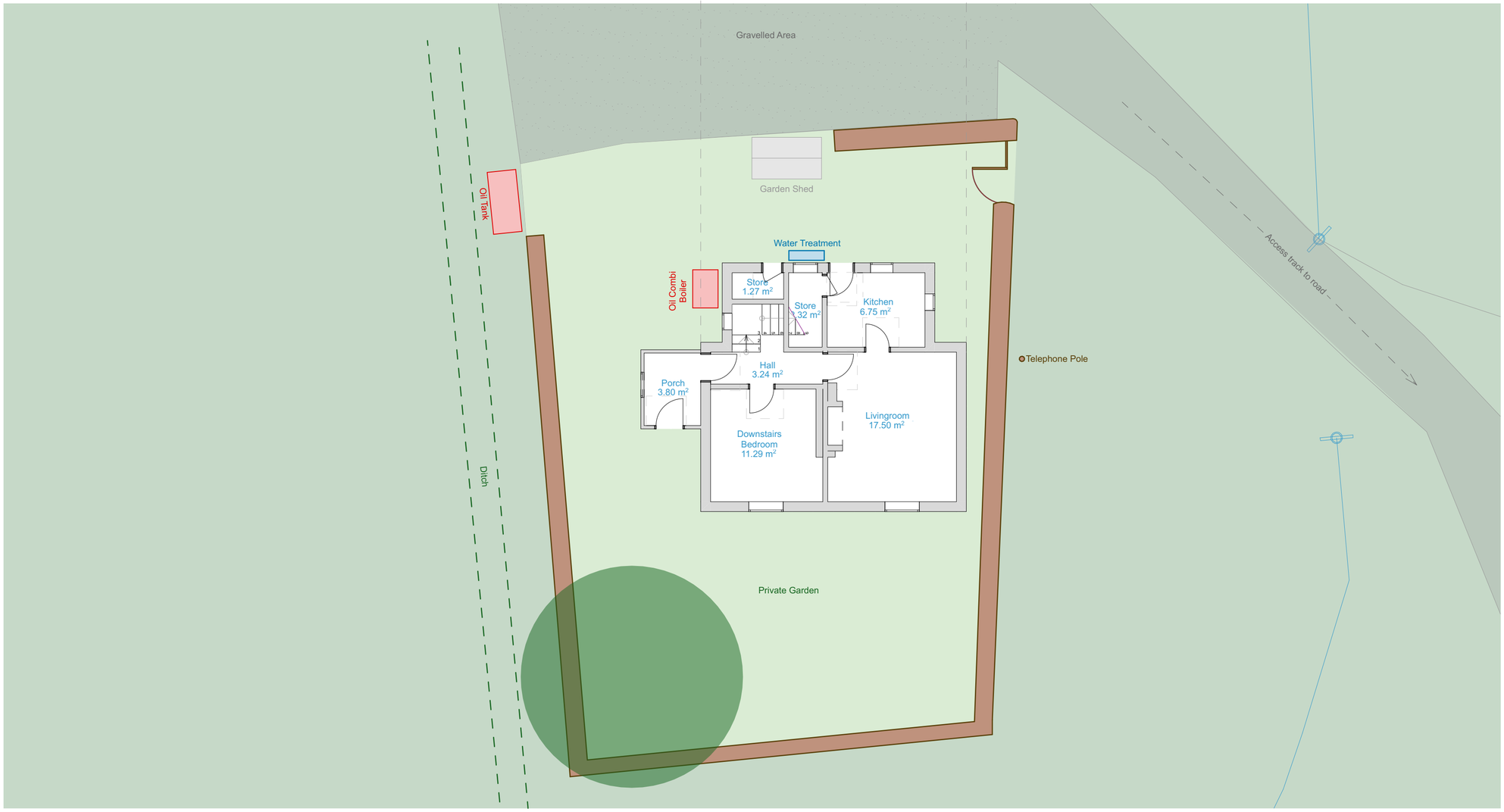


1. First Floor Plan 1:100



0. Existing Ground Floor Plan 1:100

Notes / Key

Health & Safety Notes

RevID	Description	Date	Drawn	Checked

Project Status
Feasibility

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Client
Tarras Valley Nature Reserve

Project Name
Tarras Valley

Drawing Title
Existing Ground + First Floor Plan

Drawn By	Scale at A2	Project No.	Drawing Number_Rev
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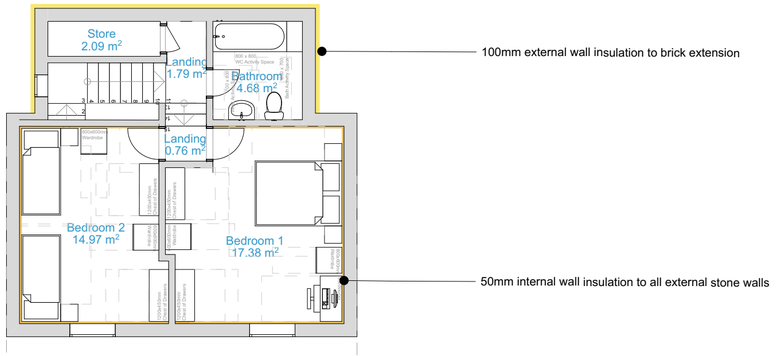
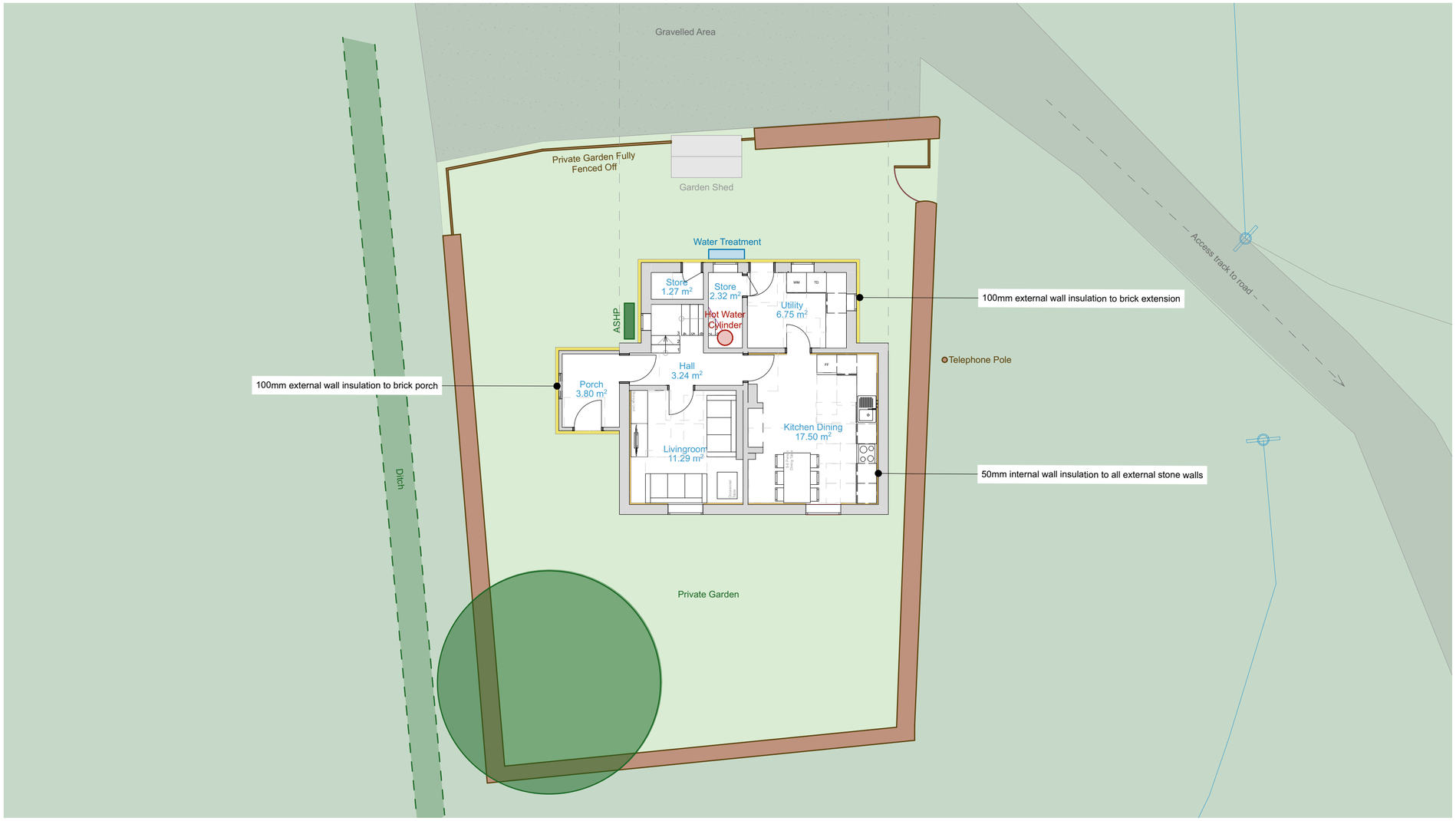


1. Proposed First Floor Plan 1:100



0. Proposed Ground Floor Plan 1:100

Notes / Key

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Project Name
Tarras Valley

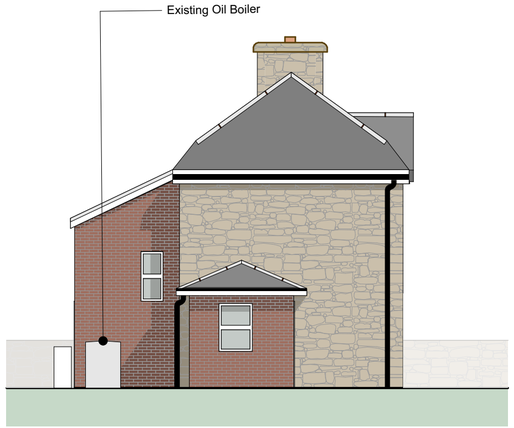
Drawing Title
Proposed Ground + First Floor Plan

Drawn By	Scale at A2	Project No.	Drawing Number_Rev
	1:100	04665	[PP]02_

Photo A

Photo B

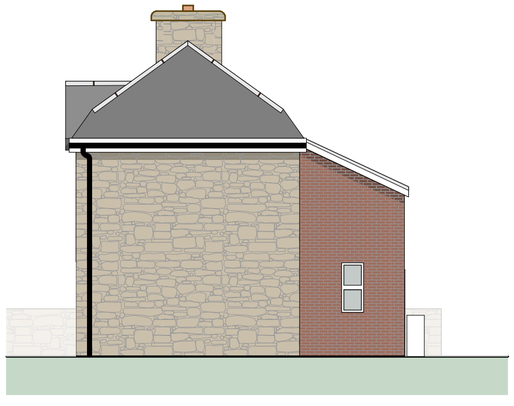
Photo C - Site Context



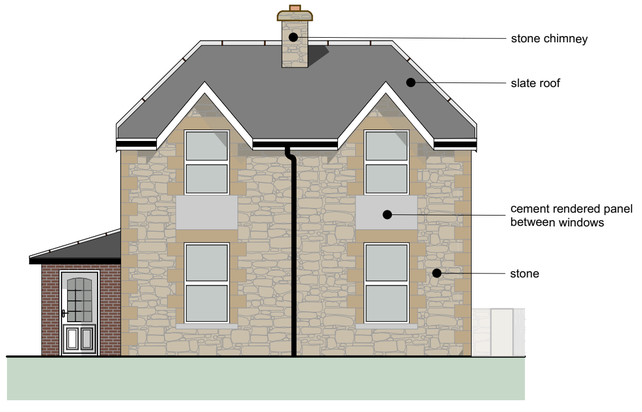
E-01 West Elevation 1:100

E-02 North Elevation 1:100

Refer to Photo A



E-03 East Elevation 1:100



E-04 South Elevation 1:100

Refer to Photo B

Notes / Key

Health & Safety Notes

RevID	Description	Date	Drawn	Checked

Project Status
Feasibility

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Client
Tarras Valley Nature Reserve

Project Name
Tarras Valley

Drawing Title
Existing Elevations

Drawn By	Scale at A2	Project No.	Drawing Number_Rev
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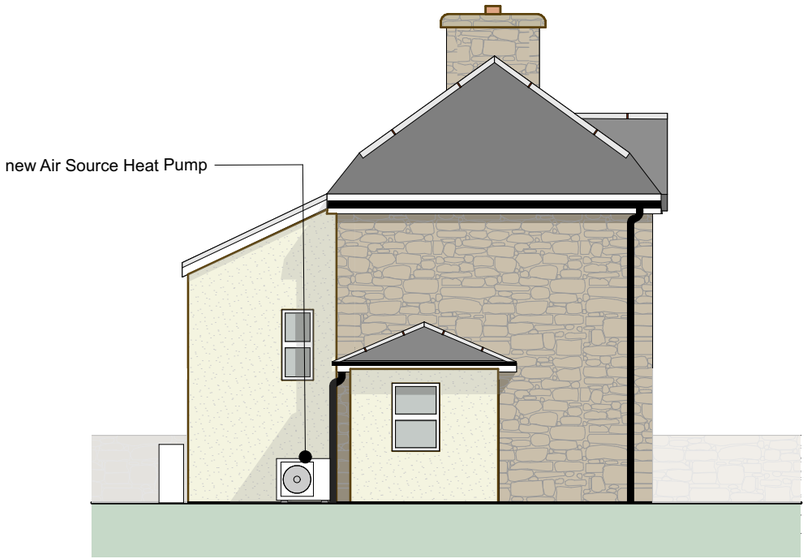
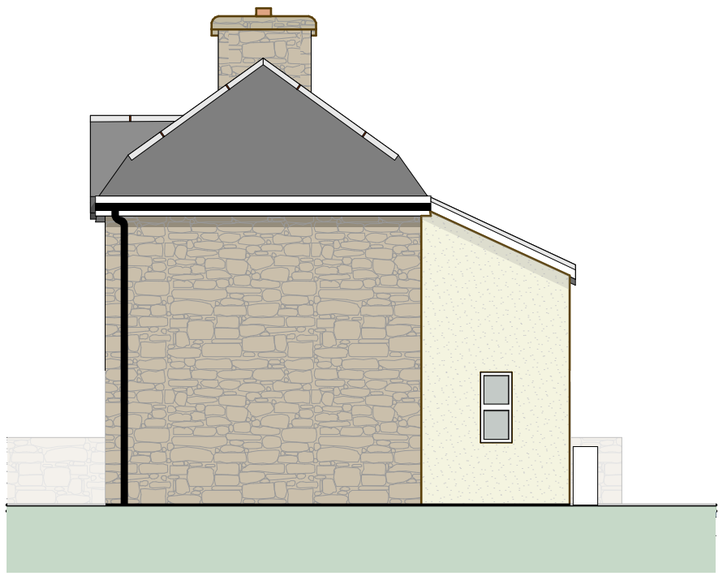


E-01 West Elevation 1:100

E-02 North Elevation 1:100



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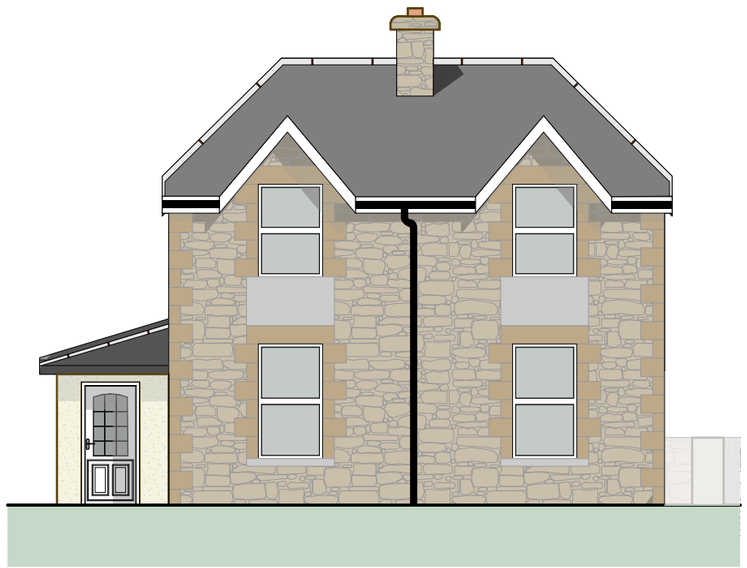

E-04 South Elevation 1:100

Notes / Key

Health & Safety Notes

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	1:100	04665	[PE]02_