

# Policy and Sustainability Committee

10.00am, Tuesday, 30 August 2022

## EnerPHit Tranche 1 Programme

Executive/routine	Executive
Wards	All
Council Commitments	18

### 1. Recommendations

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- 1.1 That the Policy and Sustainability Committee:
  - 1.1.1 Approves the initiation of the EnerPHit Tranche 1 Programme - a five-year (2022/23 to 2027/28) programme to retrofit 12 Council operational buildings to an EnerPHit informed approach/standard;
  - 1.1.2 Notes that the estimated total cost of the EnerPHit Tranche 1 Programme based on the latest completed feasibility reports is £61.83m. Of this, £60.85m has already been included in the Council's Sustainable Capital Budget Strategy 2022-32, which assumes £10m of revenue funding from the Scottish Government's Green Growth Accelerator programme; and
  - 1.1.3 Notes the contribution the programme will make to long-term sustainability and Net Zero Carbon ambitions of the Council and that the programme will act as a pathfinder and exemplar for future Council operational buildings retrofit programmes.

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# Policy and Sustainability Committee

## EnerPHit Tranche 1 Programme

### 2. Executive Summary

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- 2.1 This report sets out the proposal for the first steps that the Council's operational estate will need to make towards achieving the 2030 Net Zero Carbon Target. The proposal is to deliver a five-year retrofitting programme to 12 Council operational buildings to an EnerPHit informed approach/standard utilising Council capital funding supplemented by a revenue contribution of up to £10m from the Scottish Government's 'Green Growth Accelerator' programme.
- 2.2 A principal aim of the programme will be to bring about a major change in the way the Council approaches the retrofitting of operational buildings in the future and that upon completion, the programme will both catalyse and be a benchmark for future retrofit programmes.
- 2.3 A short video has been produced that summarises the objectives and deliverables of the programme. The video can be viewed by clicking on the link below:

[EnerPHit Tranche 1 Programme Summary Video](#)

### 3. Background

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- 3.1 In May 2019, the Council declared a Climate Emergency and committed to a target of Net Zero emissions by 2030 for both city and corporate emissions. The Council's target is 15 years ahead of the Scottish Government's legislative target of achieving Net Zero by 2045.
- 3.2 Council emissions amount to 3% of the city's carbon emissions. The carbon emissions from the existing operational estate are the Council's largest total annual emissions source (estimated to be up to 63% pre-COVID-19); therefore, how the Council chooses to retrofit its operational buildings will be integral to contribute to the 2030 target. It should be noted that the Scottish Government has set a 2038 target for public buildings to be decarbonised.
- 3.3 There are essentially two main elements to addressing this challenge:
  - 3.3.1 To reduce the energy demand of existing operational buildings as far as practically possible (primarily via improved energy efficiency); and

- 3.3.2 To fulfil operational buildings' future energy demands from clean and low/zero carbon sources, in particular, a shift away from fossil fuels such as gas that is currently the predominant source of space heating across Council buildings.
- 3.4 For new build construction, the Council is already using the Passivhaus standard, a low energy and low carbon building comfort standard, as the default approach to meet the Net Zero challenge for all future operational new builds.
- 3.5 Historically, the Council did not have a widely adopted approach to sustainability or Net Zero standard for the retrofitting of existing operational buildings. Recognising the value of the Passivhaus standard for new builds, the EnerPHit standard has been identified as the most appropriate standard for the deep energy retrofit of the operational estate. EnerPHit is effectively a retrofit specific version of the Passivhaus standard.
- 3.6 This report seeks the initiation of the EnerPHit Tranche 1 Programme- a programme to retrofit 12 Council operational buildings to an EnerPHit informed standard/approach, which is seen as a critical first step in the Council's EnerPHit journey. The 12 buildings are seen as prototypes/exemplars in the establishment of a process and approach for the future sustainable retrofitting of the operational estate. The experience and knowledge gained from implementing the programme will be utilised for the rest of the Council's operational portfolio and will also allow the creation of a skilled EnerPHit team within the Council.
- 3.7 The EnerPHit team will also work with the city Energy Efficient Public Buildings Partnership chaired by the University of Edinburgh. This partnership is seeking to share knowledge and investment plans to enable key organisations across the city with a duty to retrofit their estate to do so as quickly and efficiently as possible. The Council programme will provide a substantial input to this wider city agenda which goes beyond the focus on our own emissions.

## **4. Main report**

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- 4.1 To meet the Council's 2030 Net Zero target, a step change is required in the way the Council approaches building retrofitting works with regard to building specifications and the monitoring of energy use.
- 4.2 The current primary driver used for prioritisation of buildings for retrofitting works is building condition and its inherent risk on user health and safety. Going forward, building condition will still be a primary driver but it will be augmented by additional sustainability and Net Zero drivers in the reduction of thermal demand and the decarbonisation of heat by changing the primary building heating source from gas to electricity where practically possible.
- 4.3 The EnerPHit Tranche 1 Programme is a proposed buildings retrofit programme to implement an EnerPHit informed approach for 12 buildings by 2027/28.
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## **Full business case**

- 4.4 The programme's Full Business Case, titled 'Implementation of an EnerPHit informed approach to selected City of Edinburgh Council operational buildings- Tranche 1' can be found in Appendix 1.
- 4.5 The Full Business Case has been prepared in line with the HM Treasury "Five Case" model; provides the justification for proceeding with the programme; and outlines the expected benefits of the programme. It is structured into:
  - 4.5.1 The 'strategic case' that outlines the strategic rationale for the Council to proceed with the programme;
  - 4.5.2 The 'economic case' that describes the rationale used for the selection of buildings for the programme and outlines the key outcomes which will be generated via implementation;
  - 4.5.3 The 'financial case' that outlines how the programme is budgeted and how it will be funded from a combination of the Council's Capital Programme and from the Scottish Government's Green Growth Accelerator (GGA) programme;
  - 4.5.4 The 'commercial case' that sets out the procurement strategy for the programme; and
  - 4.5.5 The 'management case' that outlines the governance and management measures which will be put in place to deliver the programme to completion.

## **What is EnerPHit?**

- 4.6 EnerPHit is the Passivhaus comfort, quality and energy standard for building retrofits. EnerPHit allows the Council to upgrade the comfort, thermal and energy performance of buildings.
  - 4.7 EnerPHit standards focus on building fabric improvements to existing buildings and are based on the five main principles of:
    - 4.7.1 Improved thermal insulation;
    - 4.7.2 Energy efficient windows;
    - 4.7.3 Comfort ventilation, heat recovery and energy efficient heating system and circulation;
    - 4.7.4 Airtightness and reduction of air leakages; and
    - 4.7.5 Reduction of thermal/cold bridges.
  - 4.8 Adopting an EnerPHit informed approach is considered to be the best and most practical approach for the Council to retrofit the existing operational portfolio as the EnerPHit standard is widely recognised across the UK and Europe building design and construction industries. It is also widely valued as a clear methodology for understanding and identifying the optimal retrofit path for a building.
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## **Programme scope**

- 4.9 The EnerPHit Tranche 1 Programme has selected 12 operational buildings that are considered to be prototypes of the wider operational portfolio and their selection analysis is detailed in Appendix D of the Full Business Case.
- 4.10 The programme will be carried out in four phases and will involve retrofitting works to the following 12 operational buildings:
- 4.10.1 Brunstane Primary School - Phase 1 (planned delivery from 2022/23 to 2024/25);
  - 4.10.2 Lorne Primary School - Phase 1 (planned delivery from 2022/23 to 2024/25);
  - 4.10.3 Greengables Nursery Main Building - Phase 2 (planned delivery from 2023/24 to 2025/26);
  - 4.10.4 Greengables Family Centre Main Building - Phase 2 (planned delivery from 2023/24 to 2025/26);
  - 4.10.5 North West Local Office Main Building - Phase 2 (planned delivery from 2023/24 to 2025/26);
  - 4.10.6 Ferryhill Primary School Main Building - Phase 3 (planned delivery from 2024/25 to 2026/27);
  - 4.10.7 Hillwood Primary School Main Building - Phase 3 (planned delivery from 2024/25 to 2026/27);
  - 4.10.8 Liberton Nursery Main Building - Phase 3 (planned delivery from 2024/25 to 2026/27);
  - 4.10.9 Southeast Local Office Main Building - Phase 3 (planned delivery from 2024/25 to 2026/27);
  - 4.10.10 Hermitage Park Primary School - Phase 4 (planned delivery from 2025/26 to 2027/28);
  - 4.10.11 Moffat Nursery Main Building - Phase 4 (planned delivery from 2025/26 to 2027/28); and
  - 4.10.12 Trinity Academy Block A - Phase 4 (planned delivery from 2025/26 to 2027/28).
- 4.11 The programme scope excludes other Net Zero initiatives such as the review of heat networks and renewables. These initiatives are being considered by the Council but outside of this programme.
- 4.12 The programme is pioneering, utilising an EnerPHit standard that has never been used by the Council before and therefore a phased approach is considered to be proportionate and practical given there will be a steep learning curve for the Council, the supply chain that delivers the works and, through the wider GGA programme and for the Scottish Government.
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- 4.13 The phased works delivery approach will be over a five-year period, from 2022/23 to 2027/28, and each building is expected to take around 21 months to deliver from award of contract. By 2027/28, all 12 buildings included in the programme are expected to be delivered to completion.

#### **The Programme Benefits**

- 4.14 The programme will address several sustainability and Net Zero challenges. It will formulate the Net Zero approach and will set the direction for the future retrofitting of the Council's operational portfolio.
- 4.15 The successful implementation of the programme is expected to bring about multiple benefits and positive outcomes for the Council, for local communities, for Edinburgh and for Scotland in general. In summary:
- 4.15.1 Greenhouse gas emissions reduction benefits and contribution to Net Zero ambitions;
  - 4.15.2 A general reduction in energy demand for the buildings which have undergone interventions;
  - 4.15.3 More 'green' and sustainable buildings with improved user comfort, resilience and futureproofing;
  - 4.15.4 Promotion of 'green' jobs and new opportunities for the supply chain;
  - 4.15.5 Promotion of sustainability and Net Zero knowledge and skillsets, in particular knowledge/capacity building within the Council;
  - 4.15.6 Strategic alignment with the Council's Net Zero policy and ambitions and;
  - 4.15.7 Reputational benefits with City of Edinburgh Council being seen as a leader across the city and all other local authorities in Scotland.
- 4.16 The programme will deliver low carbon and energy efficiency interventions focusing on thermal demand reduction via energy efficiency enhancements complemented by the replacement of existing fossil fuel primary plant to low/zero carbon primary plant such as heat pumps.
- 4.17 Upon completion, the programme is forecasted to deliver year-on-year operational carbon emissions reductions: approximately 802 accumulated tonnes of CO<sub>2e</sub> savings between 2022/23 to 2027/28 consisting of approximately 33 tonnes of CO<sub>2e</sub> savings by 2024/25; 86 tonnes of CO<sub>2e</sub> savings by 2025/26; 271 tonnes of CO<sub>2e</sub> savings by 2026/27 and 411 tonnes of CO<sub>2e</sub> savings by 2027/28. It is estimated Whole Life carbon emissions reductions of 78% will be achieved for each of the 12 buildings included in the programme.
- 4.18 The delivery of the programme presents an opportunity for the Council to gain knowledge and expertise which will allow the Council to develop a sustainable retrofitting strategy for the wider operational estate- one that will better inform the scale and the tolerance of acceptance.
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4.19 Full details of the programme benefits can be found in the Economic Case section of the Full Business Case.

### **Programme Delivery and Management**

4.20 The strategic governance of the programme will be led by the Service Director for Sustainable Development, who will also be the Senior Responsible Officer (SRO) to manage and oversee the programme for the duration of the five-year programme with oversight of the programme contribution to the council target under the Sustainability Board.

4.21 Full details on how the programme will be managed and governed can be found in the Management Case section of the Business Case.

4.22 A further tranche of sustainable retrofitting works 'Tranche 2' is currently under consideration and is expected to run concurrently with Phase 1 once the proposed buildings have been assessed and funding identified. Further reports will be provided to Committee as the programme progresses.

### **Procurement Strategy**

4.23 The Procurement Strategy for the programme is detailed in the Commercial Case section of the Business Case. The key points of the Commercial Case are:

4.23.1 There are no suitable sectoral Framework Agreements available for use at present which consider EnerPHit in operational non-residential buildings;

4.23.2 The Council intends to embed and procure EnerPHit works into an existing Council refurbishment and new build works Framework Agreement known as the Asset Management Works (AMW) Framework Agreement by adding EnerPHit specifications to the new Framework Agreement;

4.23.3 Once the Framework Agreement is in place, individual EnerPHit site contracts will be awarded via mini competitions amongst suitably qualified contractors with capacity;

4.23.4 The detail and justifications of the Procurement Strategy quality/cost split is currently not finalised as it is necessary to understand the level of contractor interest, expertise and capacity via engagement before a specific strategy can be finalised to deliver the programme works. However, as the quality of works is integral to the success of the programme, an equal 50/50 quality/cost split is anticipated; and

4.23.5 Contractors shall be asked to provide capped profit and overhead percentages at Framework Agreement level to apply to individual site projects. Mini competitions shall then be conducted in relation to site costs based on detailed designs.

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## 5. Next Steps

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- 5.1 Should the recommendations be approved, the Council will proceed with the Detailed Design and Procurement stages and seek to enter into the various agreements required to deliver the programme of works over the course of the next five years.
- 5.2 The Council will proceed with the signing of the GGA funding. The GGA funding model provides revenue payments over an agreed period, aligned with the generation of green growth, and subject to the achievement of pre-agreed programme defined outcomes. The Council is seeking to enter into a 15-year agreement based on the expected asset life of the EnerPHit informed improvements with outcomes as defined in the Full Business Case.
- 5.3 On approval of the EnerPHit Tranche 1 Full Business Case by Scottish ministers, the Council will enter into a funding agreement with the Scottish Government which will detail duration and value of the revenue payments. The value of the revenue payments is expected to equate to the loans charges associated with £10m of capital investment (£0.929m).
- 5.4 In the event that the business case is not approved by Scottish Ministers, the scope of the programme will be reduced so that it can be contained within the approved Council capital budget.

### **Revenue Impact**

- 5.5 The key driver for the EnerPHit Tranche 1 Programme is carbon reduction, rather than the generation revenue savings. While the buildings themselves are expected to be more energy efficient and require a lower heat load following EnerPHit works, they will be powered by electricity, which is currently more expensive than natural gas, so savings are expected to be modest. Based on current tariffs, energy costs for the 12 buildings will reduce £89,000 per annum, although any saving will be required to help offset energy price inflation.
- 5.6 The maintenance costs associated with the EnerPHit informed works are expected to be similar to those incurred on current technology.
- 5.7 The full financial impacts of the programme are detailed in the Financial Case section of the Full Business Case.

## 6. Stakeholder/Community Impact

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- 6.1 This programme will deliver sustainability and emissions reductions benefits for the Council, for Edinburgh more widely and on a national level. It will also contribute to the fulfilment of the key carbon reduction initiatives as set out in the Council's Emissions Reduction Plan (CERP) and the city-wide Climate Strategy. The programme will provide a road map to the incremental or complete upgrade the build fabric of existing buildings.
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- 6.2 Besides the Programme Benefits mentioned in sections 4.13 to 4.17 of this report, the works delivery stage for each contract will include a Community Benefits Clause that will impose a requirement on the appointed contractor to provide specific and measurable economic, social and environmental related community benefits.
- 6.3 Following the programme works delivery, the users and occupiers of the buildings included in the programme will benefit with buildings with improved comfort, of better resilience and which are more energy efficient with lower heating loads.
- 6.4 Measures have been put in place for the governance and management of the programme from its current stage through to completion. Strategies and Management Plans will be put in place for the management of key aspects of the programme such as Health and Safety Management, Communications and Change Management and Risk Management. Full details of these can be found in the Management Case section of the Business Case.
- 6.5 The biggest challenge with respect to the programme is the impact the programme's works delivery will have on the building users as the works, by their very nature, are highly intrusive and disruptive. Each individual building retrofitting project within the programme will require typically 18 to 21 months of site works and the impact on the building users will be significant.
- 6.6 Significant engagement with the building users will be required and while the delivery teams will work with the suppliers to minimise the level of user disruption during site works- i.e., phasing of works and targeting the most disruptive works during the summer holidays for school buildings etc., user disruption will be inevitable and varying degrees of decant will be required in order to deliver the works.

## **7. Background reading/external references**

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- 7.1 Background reading and external references can be found in the Appendix 1- Full Business Case and in section 10.1 of the Full Business Case.

## **8. Appendices**

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- 8.1 Appendix 1- 'Implementation of an EnerPHit informed approach to selected City of Edinburgh Council operational buildings- Tranche 1: full business case'.
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# The City of Edinburgh Council

## Implementation of an EnerPHit informed approach to selected City of Edinburgh Council operational buildings- Tranche 1

### Full Business Case

#### Document Information

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#### Document history

Version	Issue date	Changes
0.1	20/01/2022	Draft first version issued to City of Edinburgh Council stakeholders for comments
0.2	27/04/2022	Draft second version issued to the Scottish Government and to SFT for review and comments- main body of text excluding appendices
0.3	04/05/2022	Draft third version in pdf (with appendices) issued to the Scottish Government, SFT and selected City of Edinburgh Council stakeholders for review and comments
0.4	01/08/2022	Draft fourth version issued to City of Edinburgh Council stakeholders for comments/review on changes made to the draft business case further to comments received from the Scottish Government and SFT

#### Document Review

Role	Name	Review status
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Reviewer	Kyle Drummond	Comments provided 21/01/2022 & 21/07/2022
Reviewer	Rebecca Andrew	Comments provided 28/02/2022 & 29/07/2022
Reviewer	Claire Marion	Comments provided 21/01/2022, 24/01/2022 & 22/07/2022
Reviewer	Jamie Black	Comments provided 26/01/2022, 27/01/2022 & 22/07/2022
Reviewer	Marcin Kaminski	Comments provided 09/02/2022 & 22/07/2022
Reviewer	Paul Jones	Comments provided 25/05/2022
Reviewer	Laura Skinner	Comments provided 28/07/2022

**Document sign-off**

Role	Name	Sign-off date
Senior Responsible Officer (SRO)	Peter Watton	

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Figure 10: Summary of Programme Outcomes, Targets, Measurements and % of Annual Payment

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## Section 1: Executive Summary

- 1.1. This detailed business case, prepared in line with the HM Treasury “Five Case” model and Scottish Government/SFT guidance on Business Cases, seeks approval from two different audiences:
  - It seeks formal approval from the City of Edinburgh Council (“the Council”) to deliver a programme to retrofit selected operational Council buildings to an ‘EnerPHit’ informed standard and to deliver the works at an estimated cost of £61.83m over five years from 2022/23 to 2027/28 (“the programme”)
  - It also seeks formal approval from the Scottish Government and ministers for the Council and the Scottish Government to enter into a formal agreement whereby the Council will deliver the programme with support from the Scottish Government including the provision of a £10m grant to the Council upon achievement of pre-agreed programme outcomes
- 1.2. Adopting an EnerPHit informed approach as the preferred strategic way forward for the future retrofitting of the Council’s operational portfolio has been agreed in principle by the Council’s Asset Management Board via approval of the paper titled ‘Addressing the Net Zero Operational Carbon Target across the Operational Estate’ dated 17 November 2020.
- 1.3. This business case proposes that in line with the Council’s sustainability target of achieving Net Zero by 2030, the Council will deliver a programme to implement an EnerPHit informed approach for up to 12 buildings by 2027/28. The programme’s delivery will achieve ‘green growth’ via the achievement of agreed outcomes.
- 1.4. Following the initial investment by the Council, demonstrable achievement of the agreed programme outcomes will unlock £10m revenue payments from Scottish Government over a period of 15 years.
- 1.5. This detailed business case sets out the case for change and will evaluate a range of options to contribute towards meeting the Council’s 2030 Net Zero target with respect to Council operational buildings. It will look at EnerPHit and other buildings retrofit standards such as the Net Zero Public Sector Buildings Standard as possible standards to follow when retrofitting the council’s wider operational estate. It should be noted that this programme is only the first tranche of Council buildings planned for retrofits. The Council is currently planning other tranches of retrofits which are expected to progress in parallel with this first tranche of works. It is expected that the lessons learned from the programme will help the Council in its decision-making and budget setting when prioritising the rest of the operational estate when planning retrofits.
- 1.6. The programme will deliver sustainability and emissions reductions benefits for the Council, for Edinburgh more widely and even on a national level. The programme will also contribute to the fulfilment of the key carbon reduction initiatives as set out in the Council’s Emissions Reduction Plan (CERP) and the city-wide Climate Strategy. The programme will provide a road map to the incremental or complete upgrade the build fabric of existing buildings.

- 1.7. The programme is however focused on building fabric interventions and the change of existing buildings heating sources to low or zero carbon heating sources and is not a 'panacea programme' for the Council's CERP. The programme excludes other CERP initiatives such as the study of heat networks, renewables, hydrogen etc. all of which will be explored under different programmes. For instance, the Council's Climate Strategy commits that the new City Heat and Energy Partnership will work with communities and developers to deliver heat networks that meet the needs of key public sector buildings and major new developments across the city (focussing initially on major new developments at Granton Waterfront and the BioQuarter).
- 1.8. Should approval be granted for the programme to proceed, the Council will seek to enter the next phase: preparing detailed designs for the 12 buildings, followed by development of the necessary project tender specifications and procurement information for each building. Thereafter, works implementation will be carried out in 4 phases over a 5-year period, with Phase 1 works implementation expected to commence in Q4 2022/23 with the entire programme expected to be completed around Q3 2027/28.

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## Section 2: Introduction

### 2.1 The Full Business Case

- 2.1.1. This full business case sets out a proposal to invest up to £61.83m over the next five years (2022/23 to 2027/28) in the implementation of an EnerPHit informed approach programme for 12 City of Edinburgh Council operational buildings. This comprises £51.83m of Council funds, supported by £10m from the Green Growth Accelerator programme
- 2.1.2. The business case process is organised around a Five Case structure designed to systematically ascertain that the investment proposal:
- is supported by a compelling case for change - the 'strategic case'
  - optimises value for money - the 'economic case'
  - is commercially viable - the 'commercial case'
  - is fundable and affordable - the 'financial case'; and
  - is achievable and deliverable - the 'management case'
- 2.1.3. The purpose of this detailed business case is to:
- identify the investment option with respect to building retrofit options that optimises value for money;
  - prepare the investment proposal for procurement;
  - plan the necessary funding and management arrangements for the successful delivery of the project;
  - inform a proposal to the Council's Committee to seek agreement to approach the market with a request for proposals and finalise the arrangements for implementation of the programme;
  - inform a proposal to seek approval from the Scottish Government (including Scottish Government ministers) on Green Growth Accelerator funding

### 2.2 The Green Growth Accelerator Programme/Fund

- 2.2.1 The Green Growth Accelerator (GGA) was first announced in the 2019 Programme for Government by the Scottish Government. The GGA aims to *'unlock £200 million of additional local government investment in infrastructure projects to support Scotland's transition to an inclusive, net-zero emissions economy'*.
- 2.2.2 A first tranche of GGA Pathfinder Projects, set across a variety of low carbon infrastructure projects, was announced by Scottish Government Ministers on 8<sup>th</sup> October 2021. The Council's bid, titled 'Implementation of EnerPHit informed approach to selected operational buildings' was successfully selected as one of the GGA Pathfinder Projects.

2.2.3 For the Council the GGA fund is a welcome financial stimulus for the Council to proceed fully with its Net Zero ambitions for buildings. The Council had always planned to transform its operational buildings retrofit strategy to contribute to the 2030 Net Zero target but what the GGA fund has done is to catalyse and accelerated the programme of works. If it were not for the GGA funding the programme would likely would have proceeded but at a slower pace and in a smaller scale.

2.2.4 The Council was awarded £10m of GGA revenue funding from the Scottish Government to partially cover the cost of the programme. The GGA funding model is for revenue payments to the Council over an agreed period subject to the achievement of pre-agreed programme defined outcomes. These revenue payments cover both the amount awarded and borrowing costs.

## **2.3 The Council's Green Growth Accelerator Programme**

2.3.1 The Council's GGA programme will result in the retrofit of up to 12 buildings to an EnerPHit informed standard within the next five years- focusing on improvements to the building fabric and investments in low/zero carbon heating primary plant.

2.3.2 Upon completion of works the 12 buildings will be more energy efficient and able to facilitate the deployment of low/zero carbon heating primary plant. The implementation of both improvements to the building fabric and the conversion of buildings primary plant to a low or zero emissions heating source are integral to the success of the programme and together, these interventions will significantly lower the total amount of energy used in the buildings and minimise their carbon emissions.

2.3.3 The 12 selected Council operational buildings are:

- Brunstane Primary School;
- Ferryhill Primary School;
- Greengables Family Centre;
- Greengables Nursery;
- Hermitage Park Primary School
- Hillwood Primary School
- Liberton Nursery
- Lorne Primary School
- Moffat Nursery;
- North West Local Office;
- South East Local Office;
- Trinity Academy (Block A: Victorian Block)

2.3.4 The Council's EnerPHit programme has been conceived as a pioneering operational buildings retrofit programme to address several sustainability and Net Zero challenges. It is anticipated that the knowledge gained in implementing the works could then be shared and transferred to other Local Authorities in Scotland. One of the programme's outputs will be to monitor the number of times the Council will need engage with other Scottish Local

Authorities to promote Green Growth and to share knowledge and experience in forums such as the regular Scottish Heads of Property (SHOPS), Convention of Scottish Local Authorities (COSLA) forums or similar Scottish Local Authority forums.

- 2.3.5 This business case sets out the multiple benefits and outputs that the programme will seek to deliver for the Council and for the Scottish Government on a national level more widely, such as:
- funding the required capital investment in the Council's Net Zero ambitions and targets;
  - achieving real and demonstrable greenhouse gas emissions reductions for the Council's buildings;
  - enhancing the skills and knowledge of the Council's operatives and the supply chain on matters related to sustainability and Green Growth;
  - contributing to the strategic development and objectives of the overarching Council Emissions Reduction Plan (CERP); and
  - future-proof the Council's operational portfolio by delivering long-lasting and sustainable building improvements to the selected buildings

The programme will 'pathfind' reasonable routes for retrofitting the Council's operational estate and the heating plants contained therein at scale. The learning from this programme will help formulate the Council's Net Zero approach for the Council's wider operational portfolio.

- 2.3.6 One of the key indicators of success of the programme will be to monitor the reductions on carbon emissions as a direct result of changing to low or zero heating source for each building and that future regulations will focus on direct emissions arising at the point of use- therefore not including emissions from electricity generation. This aligns with the Scottish Government's Heat in Buildings Strategy that states '*We will bring forward proposals for regulating, to the extent that devolved powers allow, to require the installation of zero or very near zero emissions heat in existing buildings from 2025, with a backstop of 2045*'.

## **2.4 An EnerPHit informed Standard**

- 2.4.1 EnerPHit is the Passivhaus comfort, quality and energy standard for building retrofits. EnerPHit allows the Council to upgrade the comfort, thermal and energy performance of buildings and will be a key enabler and contributor if the Council is to meet its main Net Zero target by 2030.
- 2.4.2 EnerPHit standards focus on building fabric improvements to existing buildings and are based on the five main principles of:
- improved thermal insulation;
  - energy efficient windows;
  - comfort ventilation, heat recovery & energy efficient heating system & circulation;
  - airtightness & reduction of air leakages; and
  - reduction of thermal/cold bridges

2.4.3 EnerPHit is not the only buildings retrofit standard and the Council had considered the use of other standards such as:

- The Association for Environment Conscious Building (AECB) Retrofit Standard
- A Europe-wide research project retrofit standard known as EuroPHit
- British Standards Institution (BSI)
- Net Zero Public Sector Building Standard (NZPSBS) that is a new standard developed and led by SFT

However it was decided that EnerPHit would be the default standard for this tranche 1 programme of works where possible although this does not preclude the consideration on the use of other standards for the wider operational estate.

Refer to Appendix C- Comparison of Different Retrofit Standards for a review on the perceived pros and cons of each of these standards.

2.4.4 While the programme will help to contribute to the Council's Net Zero ambitions, it is not the only programme and there are likely to be other similar Council retrofit programmes in the future. With this programme being the first Net Zero and sustainable operational buildings retrofit programme for the Council, it is uncertain at this early stage how replicable the EnerPHit informed approach is for the remaining operational estate. However, in terms of affordability and practicality, it is already evident that it will be unrealistic to apply an EnerPHit informed approach for the entire operational estate and that alternative retrofit approaches would need to be adopted.

## **2.5 Delivery via the Council's Asset Management Works Programme**

2.5.1 The Council has an existing operational buildings refurbishment programme known as the Asset Management Works (AMW) programme. The AMW programme was initiated in January 2018 and is a five-year building retrofit programme with a capital budget totalling £124.5m to upgrade operational property condition.

2.5.2 This programme was designed to first stabilise, and then upgrade, the condition of the Council's operational estate to a safe and satisfactory condition and to address the backlog of maintenance issues.

2.5.3 The AMW programme has been identified by the Council as the most appropriate delivery vehicle for the GGA Programme works delivery.

2.5.4 The AMW programme is now in its final (5<sup>th</sup>) year of the original five-year period and for the past four years the Council's Asset Management team and Capital Projects Delivery team have acquired the requisite experience and resources to deliver the AMW programme works.

- 2.5.5 It therefore makes sense and is better value for the Council to embed the EnerPHit programme works delivery into the AMW programme to deliver both buildings condition improvements and any EnerPHit informed improvements at the same time. This has essentially led to an extension of the AMW programme by another 5 years.

## **2.6 Financial and Commercial Arrangements**

- 2.6.1 The Financial Case chapter of the business case models the estimated costs and income of the programme. The costs are primarily project delivery investment capital costs including programme delivery fees of the Council's delivery teams. It is estimated that the programme will cost approximately £61.83m to deliver over a five-year period from 2022/23 to 2027/28.
- 2.6.2 The programme costs will be met from a combination of Council capital budgets and GGA funding. Further details are provided at the financial section of this business case.
- 2.6.3 The various contractual and commercial arrangements required for the delivery of the programme will be entered into in a manner that secures best value for the Council while also complying with the relevant procurement regulations and making the most of any Green skills and job opportunities for the supply chain.
- 2.6.4 It is expected that the existing AMW programme framework contracts cannot be used for this programme's delivery due to the complexity and specific skillsets required of the suppliers for this programme. Specific and bespoke technical delivery requirements will be developed and included as procurement requirements and the delivery for each of the 12 buildings will be competitively tendered based on both cost and technical requirements.

## Section 3: Strategic Case (The Case for Change)

### 3.1 Introduction to the Strategic Case

3.1.1 This section of the business case sets out the strategic rationale for proceeding with the programme: providing the background to the programme, setting-out the aims of the programme, and demonstrating how the programme fits with the Council's relevant commitments, strategies, and policies.

### 3.2 Vision

3.2.1 The Council's ambition is to achieve Net Zero by 2030 as part of a Council wide sustainability drive. Net Zero refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere and Net Zero is reached when this balance is achieved. The most significant part of this ambition is to reduce carbon emissions.

3.2.2 Existing operational buildings form a large part of the Council's portfolio of buildings and therefore how the Council chooses to retrofit these buildings will be integral to the Council achieving this target. It is estimated that operational buildings represent more than 60% of the Council's emissions (63% pre-COVID-19) and emissions from operational buildings is by far the Council's largest emissions source, primarily from heating these buildings from carbon intensive fossil fuel sources such as gas.

3.2.3 To best achieve a reduction in carbon emissions, both retrofitting to decrease demand for heat and switching to low/zero carbon sources are required.

3.2.4 EnerPHit has been selected by the Council as the selected approach for modelling and retrofitting buildings to decrease heat demand while retaining comfort and quality standards.

### 3.3 Background on the Council's 2030 Net Zero Target

3.3.1 The Scottish Government has declared a Climate Emergency and set a new legally binding national Net Zero target by 2045. Scotland also hosted the UN Climate Change Conference of the Parties 26 (COP26) in November 2021 which showcased Scotland as a global leader in the fight against climate change and renewed the focus on a green recovery from COVID-19..

3.3.2 In May 2019, the Council declared a Climate Emergency and committed to work towards a target of Net Zero emissions by 2030 for both city and corporate emissions.

- 3.3.3 The Council's Citywide 2030 Climate Strategy and Implementation Plan was subsequently approved at the Council's Policy & Sustainability Committee on 30 November 2021- refer to [Appendix A- Background Reading and External References](#).
- 3.3.4 In February 2021, the Council published its new Business Plan, Our Future Council, Our Future City, with "Becoming a sustainable and net zero city" being one of the three strategic priorities, alongside "Ending poverty by 2030" and "Wellbeing and Equalities".
- 3.3.5 Both the Council and the Scottish Government's targets are challenging and will require a step change in the way the Council approaches building retrofitting works with regard to building specifications and the monitoring of energy use.
- 3.3.6 The principles of the programme are very much in alignment with the Council's Business Plan, the 2030 Climate Strategy and the Council's Carbon Emissions Reduction Plan (CERP)- refer to [Appendix A- Background Reading and External References](#). Indeed, the need to adopt an EnerPHit approach for the Council's operational buildings is one of the key emission reduction initiatives in the CERP- taking cognisance of the fact that the Council's operational buildings are by far the largest Council emissions source.
- 3.3.7 The 2030 Climate Strategy notes that '*energy to heat and power Edinburgh's buildings is one of the biggest sources of greenhouse gas emissions in the city*'. The strategy has a strong focus on buildings, with "net zero energy generation and energy efficient buildings" being one of the key chapters, and the first strategic priorities (out of 7) being "we will accelerate energy efficiency in homes and buildings". To this end, the strategy commits to establishing an 'Energy Efficient Public Buildings Partnership' to "collaborate on retrofit, align investment plans and encourage confidence in, and planning for, the business and skills supply chain needed to deliver". The Council will play a leadership role in this partnership and the EnerPHit programme will be key to share knowledge with city partners.
- 3.3.8 There are essentially two elements to addressing this challenge: reducing the energy demand of buildings as far as practically possible (primarily via improved energy efficiency) and fulfilling buildings' future energy demands from clean sources- in particular a shift away from fossil fuels. The most recent Council carbon footprint calculations (2020/2021) estimate Council buildings account for 63% of the Council's total emissions.
- 3.3.9 For the Council's operational buildings, natural gas is the predominant source of space heating across Council buildings. To date, there is no clear strategy for the decarbonisation of the gas grid whereas in recent years there has been an increase in the decarbonisation of the electricity grid along with an increase in microgeneration.
- 3.3.10 Between 2010/11 and 2019/20, the carbon content of a unit of electricity (in kgCO<sub>2</sub>e/kWh) decreased by 47%. Depending on the projections, the electricity grid is expected to decarbonise further to reach 15g of CO<sub>2</sub>e/kWh or less in 2040, against 231gCO<sub>2</sub>e/kWh in 2021.

3.3.11 To meet the Council's 2030 target, it is essential that for future buildings retrofits the Council considers both the reduction of thermal demand and the decarbonisation of heat by changing the primary heating source from gas to electricity where possible- i.e. the use of air source heat pumps. By doing this, the Council are effectively electrifying heat. However, it should be noted that the study of heat networks is outside the scope of this programme and is being looked at by the Council under a different programme.

3.3.12 In considering the impact of this project on the Net Zero target, it is important to note the counterfactual position. In the absence of EnerPHit, upgrades to Council buildings would use latest technologies and comply with current standards and there would be an incremental reduction in CO2 emissions. EnerPHit's whole building approach, with a focus on sustainability is a step change and results in far greater reductions.

### **3.4 Background on the Council's Operational Estate**

3.4.1 The Council's operational estate has grown organically over the years and is diverse, with assets of different functions, age, design, construction type and condition. The number of buildings, coupled with a legacy of underinvestment, has resulted in a complex portfolio of around 600 buildings in varying conditions. It is estimated that around 30% of the Council's operational buildings are heritage buildings and are over 100 years old and another 40% built within the last 50 years.

3.4.2 In January 2018, a new five-year programme, the Asset Management Works (AMW) programme, was approved to upgrade operational property condition. This programme was designed to first stabilise and then upgrade the condition of the Council's operational estate to a safe and satisfactory condition and to address the backlog of maintenance issues. The AMW programme was approved with a five-year indicative capital budget totalling £124.5m to identify, plan, commission and deliver the capital Asset Management Works.

3.4.3 The AMW programme is now in its final year of the original five-year period. The benefits so far have been positive with the programme's completed projects having a significant beneficial impact in improving asset condition and resilience and enhancing the user environment for the operational estate. While the AMW programme is a buildings condition focused that has led to some Net Zero and sustainability improvements, it is currently not a buildings Net Zero and sustainability enhancement programme.

3.4.4 Since 2021, the Council's strategy for new build operational buildings is that all newly designed buildings would have to be designed to a Passivhaus standard by default as part of the Council Emissions Reductions Plan (CERP) commitment. Justification needs to be provided and Council Committee agreement is required for any newly designed operational building which could not be designed to conform to the Passivhaus standard.

3.4.5 The strategic direction and objectives of the programme have been agreed in principle via a number of Council Board and Council Committee papers:

- Council's Board paper entitled 'Addressing the Net Zero Operational Carbon Target across the Operational Estate' approved by the Asset Management Board on 17 November 2020
- Council's Finances and Resources (F&R) Committee paper entitled 'Feasibility of Deep Energy Retrofit of Operational Council Buildings' approved by the F&R Committee on 6 December 2019
- Council's Carbon Emissions Reductions Plan (CERP) approved by the Policy & Sustainability Committee on 30 November 2021

### **3.5 A Strategic Change in the AMW Programme**

3.5.1 The Council's sustainability drive towards a Net Zero target by 2030 will have a significant impact on the strategic direction of the AMW programme and the Council's operational buildings portfolio in general. This is not surprisingly given there are 600+ existing Council operational buildings- all of which need to be reviewed in terms of their individual operational carbon footprint and their individual contribution to the Council's Net Zero target.

3.5.2 Accordingly, this will mean that the main driver behind the formation of the AMW Programme in the first place- that of managing the assets condition of operational buildings and the mitigation of asset risk; will be augmented by the additional drivers of low carbon and energy efficiency considerations. Practically, where in the past Council buildings have been selected for inclusion in the programme based on an analysis of their asset condition/asset risk only, in the future buildings will be selected based not only on asset condition but also upon low carbon and energy efficiency considerations and their potential contribution to low carbon targets.

3.5.3 The present AMW programme delivers lifecycle replacement elements (windows, roofs, building services etc.) to current statutory standards. The specifications and standards used are focused on minimum condition requirements and fall short of bringing the estate up to the necessary low energy standard to meet the Net Zero target. Future works delivered by the AMW programme will therefore need to be informed by the wider Net Zero agenda set by the Council.

### **3.6 The EnerPHit Standard**

3.6.1 For new build construction, the Council is already using the Passivhaus standard - a low energy and low carbon building comfort standard- to meet the Net Zero challenge for all future operational new build and as part of the Council's CERP commitments. All new builds going forward have to be designed to a Passivhaus standard by default and Council Committee

agreement is required for any new build operational building that is not designed to a Passivhaus standard.

- 3.6.2 Recognising the value of the Passivhaus standard, the Council has identified the EnerPHit standard, which is a retrofit specific version of the Passivhaus standard, as the most appropriate for deep energy retrofit of the Council's operational estate. This is further explained in the economic case section of the business case.
- 3.6.3 EnerPHit is the Passivhaus comfort, quality and energy standard that focuses on retrofits on existing buildings. The comfort and quality criteria are what deliver the low energy performance that EnerPHit is known for. EnerPHit standards are based on an integrated and holistic design methodology, borne of rigorous criteria for comfort, quality and energy.
- 3.6.4 EnerPHit is based on a building's elemental approach and focuses on improving the building fabric, the heating source and typically centres on improving thermal insulation, installation of energy efficient windows, comfort ventilation, heat recovery, airtightness, reduction of thermal bridging and energy efficient heating systems and circulation. [Appendix B- EnerPHit '5 Principles' Diagram](#) provides an illustration of the typical EnerPHit principles.
- 3.6.5 The adoption of an EnerPHit informed approach for the operational estate will have an increasing bearing on the AMW programme, as the programme, being the Council's existing buildings refurbishment delivery vehicle is seen as the ideal delivery mechanism to implement future EnerPHit works.
- 3.6.6 Not all existing Council operational buildings will be suitable for an EnerPHit informed approach however for reasons such as heritage value, impact on users and capital cost etc. A building's suitability to adopt an EnerPHit informed approach is dependent on a building's construction type, its design/layout and its current condition. For some buildings it is simply not cost nor carbon effective to apply an EnerPHit informed approach as the capital costs, resources and carbon involved will far outweigh any benefits achieved by adopting EnerPHit. Different buildings will benefit from different interventions and some will be greater than others.
- 3.6.7 Despite this however, applying an EnerPHit informed approach and implementing the tools, systems and methodologies that are the basis of EnerPHit will lead to benefits from the rigour and consistency of the EnerPHit informed approach, even for those buildings that will not actually target the specific metrics to meet the standard.
- 3.6.8 From the learnings of implementing this programme, the Council hope to gain an understanding on the replicability of the programme in the context of the wider operational estate- i.e. an idea on the type of building that could be retrofitted to an EnerPHit standard (or an EnerPHit informed standard) and which could not. This is how the tranche 1 programme will inform the wider Council buildings retrofitting strategy.

### **3.7 Net Zero Public Sector Buildings Standard**

- 3.7.1 As set out above, the Council has identified the EnerPHit standard as the most appropriate for deep energy retrofit of the Council's operational estate. However, the Council recognises the Net Zero Public Sector Buildings Standard (NZPSBS), which was developed by the Scottish Futures Trust in collaboration with Health Facilities Scotland and Zero Waste Scotland (with input from the Scottish construction and public sectors) and adopted by the Scottish Government in November 2020, as another standard that is also relevant to the programme.
- 3.7.2 The NZPSBS supports the development and delivery of "major" new build/refurbishment projects to improve people's lives, communities and the places they live and work in; minimise construction-embodied carbon; cut operational energy use compared to current regulatory requirements; support growth (and flexibility) of zero emissions energy supplies; enabling improved experiences for building users; and collect/share data.
- 3.7.3 Specific elements of the NZPSBS include enhancing the client brief to set world class energy performance as a core objective, increasing onsite low and zero emissions generation beyond current practices, and optimising self-supply from renewables with energy storage/demand response.
- 3.7.4 A central principle of the NZPSBS that is strongly applicable to the programme is 'verified and transparent performance reporting'. As a GGA Pathfinder, it is imperative that the programme outcomes are accurately measured and easily interpretable. It is anticipated that other key elements of the NZPSBS could be adopted not only for this programme but for future tranches of Council retrofit programmes.

### **3.8 Programme Scope**

- 3.8.1 The programme focuses on 12 Council buildings which will be retrofitted to an EnerPHit informed standard. The works will first involve the undertaking of EnerPHit feasibility studies and will culminate in feasibility reports for each of the 12 buildings taken to what is known as the EnerPHit Retrofit Plan (ERP) stage. The ERP will report on the steps, principles and costs for various EnerPHit intervention options.
- 3.8.2 The feasibility reports for 11 of the 12 selected Council buildings have been completed (exception is Hermitage Park Primary School) which have allowed the Council to select the optimal intervention for each building, understand approximate costs for each building's intervention options, prioritise works and the order to proceed with the detailed design, procurement of the works and finally works implementation.

3.8.3 The 12 Council's operational buildings selected for the programme are:

1. Brunstane Primary School;
2. Ferryhill Primary School;
3. Greengables Family Centre;
4. GreengablesNursery;
5. Hermitage Park Primary School
6. Hillwood Primary School
7. Liberton Nursery
8. Lorne Primary School
9. Moffat Nursery;
10. North West Local Office;
11. South East Local Office;
12. Trinity Academy (Block A: Victorian Block)

3.8.4 The 12 buildings were chosen on the basis that collectively, the 12 buildings in terms of their building 'archetype' such as building age, building form, building construction type and building function etc. are representative of the Council's wider operational estate. Refer to section 3.4 for a background of the Council's operational estate.

3.8.5 The Council will use a phased delivery approach to deliver the programme. With this being a pioneering programme utilising an EnerPHit standard that has never used by the Council before, a phased approach is considered to be sensible and practical given there will be a steep learning curve for not only Council officers/operatives but also the supply chain that needs to deliver the works.

3.8.6 The phased works delivery approach will take place over a 5-year period commencing from 2022/23 to 2027/28 and each building is expected to take around 21 months to deliver from award of contract. The number of buildings expected to be delivered in each year of the 5-year programme is as follows:

- 2022/23 to 2024/25- 2 buildings to be delivered to works completion
- 2023/24 to 2025/26- 3 buildings to be delivered to works completion
- 2024/25 to 2026/27- 4 buildings to be delivered to works completion
- 2025/26 to 2027/28- 3 buildings to be delivered to works completion

By 2027/28- 12 buildings will be delivered to works completion.

## 3.9 Case for Change

3.9.1 Given the Council has set itself an ambitious target of achieving Net Zero by 2030; and as the Council's existing buildings portfolio generate a large part of the Council's annual greenhouse gas emissions (more than 60%), it is imperative the operational carbon outputs and sustainability benefits be considered and where possible be realised in all future buildings retrofit works.

3.9.2 It is imperative that the Council has clear strategies for carbon emissions demand reduction and decarbonising heat whilst delivering best value. This

programme provides this for the Council's operational buildings and allows the pragmatic testing of the EnerPHit approach into deliverable and tangible benefits.

- 3.9.3 The 12 Council operational buildings included in the programme are seen as prototypes/exemplars in the establishment of a process and approach for the future retrofitting of the Council's operational buildings. The experience and knowledge gained from implementing the programme can be then utilised for the rest of the Council's operational portfolio and will allow the building of a skilled internal team within the Council and allow the knowledge to be shared with the supply chain and other Local Authorities across Scotland.
- 3.9.4 Major shifts in the Council's operational buildings Asset Management Strategy (AMS) and the Council's strategy towards buildings retrofits are required. The traditional AMS for operational buildings has been a focus on asset/building condition and minimising risk. The updated AMS will consider both Net Zero Carbon/sustainability and building condition as the two primary drivers in formulating future buildings interventions.
- 3.9.5 Should this programme not proceed, the Council will not have the opportunity to gain practical experience to learn from and to identify the most appropriate standard and approach to sustainably retrofit the Council's wider operational estate. This programme allows the Council to determine if EnerPHit is a realistic and deliverable retrofit standard for use on the Council's wider operational portfolio or if alternative standards needs to be considered. This will lead to delays in deciding the Council's future buildings retrofit strategy and which puts the contribution of the operational buildings to achieve the Council's Net Zero target at risk.

### **3.10 Summary of the Strategic Case**

- 3.10.1 There is a strategic rationale for the Council to proceed with the programme. The programme will deliver sustainability and emissions reductions benefits for the Council, for Edinburgh more widely and even on a national level. The programme will also contribute to the fulfilment of the key carbon reduction initiatives as set out in the Council's CERP and the city-wide Climate Strategy. The programme will provide a road map to the incremental or complete upgrade of the building fabric of existing buildings and this programme is necessary for the Council to gain the strategic and practical experience from actually implementing retrofitting works to enable the development of a realistic retrofitting strategy for the wider operational estate.

## Section 4: Economic Case

### 4.1 Introduction to the Economic Case

4.1.1 This section of the business case demonstrates that the programme secures best value and represents the best option available and assesses the wider financial and non-financial benefits of each of the options.

### 4.2 Background on the Economic Case

4.2.1 The purpose of this part of the economic case is to undertake a more detailed analysis of the costs, benefits and risks of the considered options. The intention is to demonstrate the relative value for money likely to be provided by the preferred option in delivering the programme. This analysis includes:

- cost benefit analysis of the monetary benefits and costs
- assessment of any intangible benefits and costs, and
- assessment of risk and uncertainty

### 4.3 Rationale for Selecting an EnerPHit Informed Approach

4.3.1 Adopting an EnerPHit informed approach is considered by the Council to be the best and most practical option for the Council's existing operational portfolio as the EnerPHit standard is widely recognised across the UK and Europe buildings design and construction industries.

4.3.2 To date in the UK there are more examples of residential/domestic buildings which have been retrofitted to an EnerPHit standard than non-residential, especially in Scotland.

4.3.3 There are alternative low energy/low carbon retrofit standards and methodologies for buildings which could have been used instead of the EnerPHit, such as:

- The Association for Environment Conscious Building (AECB) Retrofit Standard
- A Europe-wide research project retrofit standard known as EuroPHit
- British Standards Institution (BSI)
- Net Zero Public Sector Building Standard (NZPSBS) that is a new standard developed and led by SFT

Refer to [Appendix C- Comparison of Different Retrofit Standards](#) for a summary of the various retrofit standards and methodologies which were considered by the Council including the perceived advantages and disadvantages of each standard.

- 4.3.4 The EnerPHit standard was chosen by the Council as the most suitable standard for the Council to follow on the basis that it is an internationally recognised and highly reliable standard. The use of the EnerPHit standard was also recommended by the Council's consultants 'Architype Limited' who are a UK-based architectural firm with experience in sustainable and Net Zero building design.
- 4.3.5 From a practical and consistency viewpoint, the Council are already using the Passivhaus standard for new builds and it makes sense to use the equivalent Passivhaus standard for retrofits- 'EnerPHit' as the selected standard for Council buildings retrofits. Applying the Passivhaus standard for new-builds and EnerPHit for retrofits ensure commonality in design principles; consistency in Net Zero works and will lead to operational benefits such as a standardised approach in the running and maintenance of buildings.
- 4.3.6 The use of an EnerPHit informed approach as the Council's default approach does not necessarily mean that the other different retrofit standards are excluded for consideration altogether. Should an EnerPHit informed approach not be possible then alternative retrofit standards such as the NZPSBS would be considered.

#### **4.4 Programme Delivery- Outsourced or Council Managed or Both?**

- 4.4.1 Three options for delivering the programme were compared with the 'do nothing' option: 1) fully outsourced delivery 2) Council internally led delivery and 3) a hybrid arrangement of Council internal led delivery with support from external EnerPHit consultants.
- 4.4.2 The hybrid delivery option consisting of Council led delivery with external consultant support was determined to be the best option, delivering a better financial return and a good balance of risk and project management control.
- 4.4.3 A hybrid delivery option further allows the opportunity for the Council to build up knowledge and develop within the Council a skilled workforce that is adept in delivering future EnerPHit programmes or projects within the Council, with less dependency on external consultants in the future. The hybrid delivery option further allows two-way knowledge transfer with benefits for both the Council and the supply chain.

## 4.5 Buildings Prioritisation and Selection Process

- 4.5.1 A buildings selection process and methodology based on best-value was used by the Council in selecting buildings for the programme and again in the prioritisation and phasing of the shortlisted buildings for works implementation.
- 4.5.2. The 12 buildings were selected on the basis that they are representative of the era, type and function of the Council's buildings in its wider operational portfolio. By undertaking the feasibility studies to the 12 buildings, the knowledge gained by applying bespoke EnerPHit informed solutions to each building type could then be applied to the wider operational portfolio.
- 4.5.3 Each building will require a specific EnerPHit solution tailored to that building and no two buildings are the same. As an example, a Council heritage or legacy type building is more likely to require an internal wall insulation solution should wall insulation improvements are required due to planning and conservation constraints. A more modern building requiring wall insulation improvements is likely to use external wall cladding (known as over-cladding).
- 4.5.4 The Council developed a 2-Stage buildings selection and prioritisation process for selecting buildings for the EnerPHit feasibility studies and then for prioritising the order for the 12 buildings in which EnerPHit informed works will be carried out:
- Stage 1- 12 buildings were selected out of the 600+ Council operational buildings (of which around 400 have heating)
  - Stage 2- Out of the 12 shortlisted buildings, the order in which the buildings are then prioritised for works
- 4.5.5 For building selection and prioritisation, the Council developed and used an objective buildings selection methodology known as a 'Best Value Matrix' to assess and score each building based on best value principles. The scoring is an indicator on which building represents the best value and offers the most benefits to the Council should it be retrofitted to an EnerPHit informed standard. Refer to [Appendix D- Buildings Selection Best-Value Matrix and Methodology](#).
- 4.5.6 Each short-listed building was then assessed and scored using 10 'Best Value Matrix' criteria and the buildings and their scores were then ranked in order of highest (best-value) score to lowest (worst-value) score. The rankings formed an approximate prioritisation order in which the building works are recommended to be carried out. The 10 best-value criteria include:
1. Consideration on whether a building has had significant maintenance or refurbishment spend in recent years. A building that has had little investment spent on it is more likely to be prioritised over a building that has had a lot of investment in recent years.
  2. Consideration on the current asset condition of a building. It is considered to be of better value to select a building that is already in a poor condition or approaching poor condition to undergo EnerPHit

- works, since the retrofit works could then address both Net Zero Carbon/sustainability and condition improvements at the same time.
3. Consideration on a building's current energy rating/performance and its Energy Performance Certificate (EPC). There will be better value and greater return on the investment in selecting a building for EnerPHit informed works that has existing poor energy rating/performance.
  4. Consideration on the operational strategy of a building- it is poor value from the Council's perspective to invest in a Council building only to then find the same building is surplus to the Council's operational requirements and the building is then rationalised, transferred or sold off to a third party or even demolished. The future operational strategy of a building is therefore a key selection criteria.
  5. Consideration on whether a building is already targeted for future retrofits and if the planned retrofit works are 'EnerPHit compatible'- that is, if the planned retrofit works align with the main EnerPHit principles. For example, if the planned retrofit works include wholesale window replacement works, then it is considered good value to look into the possibility of installing energy efficient windows (one of the 5 EnerPHit principles) at the same time as opportunity works.
  6. Consideration on a building's existing energy use per m2. It is better value to select a building for EnerPHit approach works if the building has an existing high energy load.
  7. Consideration on a building's deliverability and affordability.
  8. Consideration on how well the EnerPHit improvements to a building align with the buildings operability and building user requirements and how it would fit with the Council's overall Asset Management Strategy.
  9. Consideration on whether a building uses a fossil fuel heating source as its current primary heating plant, with the logic being that a building that uses a fossil fuel such as gas as its primary heating source should then be targeted for replacement with a non-fossil fuel heating plant such as a heat pump (that uses electricity). The main benefit/value that comes with replacing a building's primary heating plant to a heat pump is mainly the carbon emissions reductions that comes with the replacement.
  10. Consideration of what extent a building (in terms of its building archetype, size and age etc.) is representative of the Council's wider operational portfolio so that they offer the greatest opportunity for learning.

## **4.6 Benefits Realisation and Outcomes**

- 4.6.1 The successful implementation of the programme is expected to bring about multiple benefits and beneficial outcomes for the Council, for Edinburgh and for Scotland in general:
- Greenhouse gas emissions reduction benefits and contribution to Net-Zero ambitions
  - More 'green' and sustainable buildings with improved buildings comfort, resilience and futureproofing
  - Promotion of 'green' jobs and new opportunities
  - Promotion of sustainability and Net Zero knowledge and skillsets

- Strategic alignment with the Council’s Net Zero policy and ambitions
- Reputational benefits with the Council being seen as a leader across Local Authorities in Scotland

4.6.2 These programme benefits will be monitored as programme performance Key Performance Indexes (KPIs) and will be measured before and after the EnerPHit improvement works as programme outcomes. A summary of the GGA Project/Programmes Outcomes outlining the identified outcomes, how these outcomes will be monitored/measured, assumptions made which underpin the outcomes analysis, an explanation of how each outcome relates to GGA payments from the Scottish Government and the proposed % of this outcome that is linked to the GGA annual repayment can be found in [Appendix E- GGA Project/Programme Outcomes Summary](#)

## 4.7 Carbon Emissions Reduction Benefits

4.7.1 The programme will deliver low carbon and energy efficiency interventions focusing on thermal demand reduction via energy efficiency enhancements complemented by the replacement of existing fossil fuel primary plant to low/zero carbon primary plant (heat pumps).

4.7.2 Upon completion, the programme is forecasted to deliver year-on-year operational carbon emissions reductions: approximately 802 accumulated tonnes of CO<sub>2</sub>e savings between 2022/23 to 2027/28 consisting of approximately 33 tonnes of CO<sub>2</sub>e savings by 2024/25; 86 tonnes of CO<sub>2</sub>e savings by 2025/26; 271 tonnes of CO<sub>2</sub>e savings by 2026/27 and 411 tonnes of CO<sub>2</sub>e savings by 2027/28 (2027/28 is the first year in which the project carbon emissions reduction benefits will be fully realised) is provided in Figure 1- Projected Emissions Reductions Savings from 2022/23 to 2027/28. Refer to Figure 1 and [Appendix F- Programme CO<sub>2</sub> Emissions Reductions Summary](#).

4.7.3 The methodology, assumptions and analysis used in the calculation of the emissions reductions and the Programme Carbon Emissions Reductions Analysis is summarised in [Appendix G: Methodology used to calculate CO<sub>2</sub> savings](#)

Estimated kilo-tonnes CO<sub>2</sub> equivalent saved from 2022/23 to 2027/28

No.	Delivery Phase	EnerPHit T1 Building Description	2022/23 (kilo-tonnes CO <sub>2</sub> )	2023/24 (kilo-tonnes CO <sub>2</sub> )	2024/25 (kilo-tonnes CO <sub>2</sub> )	2025/26 (kilo-tonnes CO <sub>2</sub> )	2026/27 (kilo-tonnes CO <sub>2</sub> )	2027/28 (kilo-tonnes CO <sub>2</sub> )	TOTAL
1	Phase 1	Lorne Primary School Main Building	Works Start	Works	0.029	0.027	0.031	0.036	0.123
2		Brunstane Primary School Main Building	Works Start	Works	0.005	-0.001	0.010	0.025	0.038
3	Phase 2	North West Local Office Main Building		Works Start	Works	0.050	0.052	0.056	0.158

4		Greengables Nursery Main Building		Works Start	Works	0.005	0.006	0.007	0.018
5		Greengables Family Centre Main Building		Works Start	Works	0.006	0.006	0.007	0.019
6	Phase 3	South East Local Office Main Building			Works Start	Works	0.070	0.075	0.146
7		Ferryhill Primary School Main Building			Works Start	Works	0.007	0.019	0.026
8		Liberton Nursery Main Building			Works Start	Works	0.023	0.024	0.047
9		Hillwood Primary School Main Building			Works Start	Works	0.066	0.069	0.135
10	Phase 4	Trinity Academy Victorian Block (Block A)			Works Start	Works	0.045	0.045	0.045
11		Hermitage Park Primary School Main Building			Works Start	Works	0.036	0.036	0.036
12		Moffat Nursery Main Building			Works Start	Works	0.013	0.013	0.013
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>0.033</b>	<b>0.086</b>	<b>0.271</b>	<b>0.411</b>	<b>0.802</b>

**Figure 1- Projected Emissions Reductions Savings from 2022/23 to 2027/28**

4.7.3 The year-on-year projected emission reductions (cumulative) from 2022/23 to 2027/28 based on 4 Phases of completion are:

- 2022/23 (complete)- 0 tonnes of CO2 equivalent saved
- 2023/24 (No Phases complete)- 0 tonnes of CO2 equivalent saved
- 2024/25 (Phase 1 complete)- 33 tonnes of CO2 equivalent saved
- 2025/26 (Phases 1 and 2 complete)- 86 tonnes of CO2 equivalent saved
- 2026/27 (Phases 1, 2 and 3 complete)- 271 tonnes of CO2 equivalent saved
- 2027/28 (Phases 1, 2, 3 and 4 complete)- 411 tonnes of CO2 equivalent saved

The above projected emission reductions will become part of the agreed programme outcomes for the GGA revenue repayment model that the Council will agree with the Scottish Government.

4.7.4 Upon full completion of the programme, it is estimated that a total of 802 tonnes of CO2 equivalent will have been saved from 2022/23 to 2027/28 via implementing the programme. These savings will extend far beyond 2027/28 however and once the programme is completed the investments made will lead to carbon savings for these buildings for decades to come.

4.7.5 In estimating and analysing the amount of CO2 equivalent saved by the programme, the following assumptions have been made:

- The Gross Internal Area (GIA) of the Council's operational buildings is approximately 900,000m<sup>2</sup>. This comprises of around 600 operational buildings of which around 400 are heated

- The 'Middle of the Road' EnerPHit informed intervention option is used as the basis for the CO2 emissions calculations for all 12 buildings
- CO2 emissions pertain to a building's operational carbon only- embodied carbon savings are excluded from the scope of this programme. However, embodied carbon was considered in the feasibility reports to demonstrate best practice in retrofit options appraisal and life cycle assessment
- Gas and electricity usage figures are measured in kWh
- CO2 equivalent emissions are measured in units of kgCO2e
- UK Electricity Grid Emission Factor and Gas Grid Emission Factors are measured in units of kgCO2e/kWh
- Historic emission factors are published by BEIS (<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020>)
- Future electricity grid emission factors are based on the BEIS 2032 Emissions Factor (0.035 kgCO2e/kWh) based on BEIS Projections to 2100 supporting the Treasury Green Book supplementary appraisal guidance on valuing energy use and greenhouse gas (GHG) emissions. (Table 1 – Grid average – Consumption-based – Commercial/Public Sector)
- The savings do not include any energy savings due to future potential solar PV generation- nor any other future renewable energy source
- The savings do not include any energy savings due to future connection to a heat network
- Energy savings will be realised via the electrification of the heating system using air-source heat pumps for the 12 buildings
- The assumed Coefficient of Performance (COP) for air-source heat pumps is assumed to average 2.2
- The assumed cost of carbon used in the economic case analysis is £245/tonne of CO2

It should be noted that the above assumptions represent an initial estimation and they will need to be refined on a building by building basis in the future. It is expected that the principles and lessons learned from this programme can be used to replicate the outcomes across the operational estate.

## **4.8 More 'Green' and Sustainable Buildings in the Council's Estate**

- 4.8.1 The programme will result in more of the Council's buildings retrofitted to a 'green' and sustainable standard. The Council's ambition is to have all future new buildings built to a Passivhaus standard by default and upon completion of this programme will also have a first tranche of buildings which are retrofitted to an EnerPHit standard.
- 4.8.2 The increase in the quantum of the Council's building portfolio built to a green and sustainable standard (in terms of floor area m<sup>2</sup>) as a direct result of this programme is summarised in Figure 2- Projected Increase in Floor Area (m<sup>2</sup>)

of Buildings retrofitted to an EnerPHit informed Standard from 2022/23 to 2027/28.

Estimated Increase in Floor Area (m <sup>2</sup> ) of buildings retrofitted to an EnerPHit informed standard from 2022/23 to 2027/28								
No.	Delivery Phase	EnerPHit T1 Building Description	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
1	Phase 1	Lorne Primary School	Works Start	Works	1979	1979	1979	1979
2		Brunstane Primary School Main Building	Works Start	Works	2417	2417	2417	2417
3	Phase 2	North West Local Office Main Building		Works Start	Works	3871	3871	3871
4		Greengables Nursery Main Building		Works Start	Works	312	312	312
5		Greengables Family Centre Main Building		Works Start	Works	295	295	295
6	Phase 3	South East Local Office Main Building			Works Start	Works	3564	3564
7		Ferryhill Primary School Main Building			Works Start	Works	2490	2490
8		Liberton Nursery Main Building			Works Start	Works	370	370
9		Hillwood Primary School Main Building			Works Start	Works	1799	1799
10	Phase 4	Trinity Academy Block A				Works Start	Works	2868
11		Hermitage Park Primary School Main Building				Works Start	Works	2343
12		Moffat Nursery Main Building				Works Start	Works	357
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>4396</b>	<b>8874</b>	<b>17097</b>	<b>22665</b>

**Figure 2- Projected Increase in Floor Area (m<sup>2</sup>) of Buildings retrofitted to an EnerPHit informed Standard from 2022/23 to 2027/28**

- 4.8.3 The total projected floor area (cumulative and in m<sup>2</sup>) of Council buildings that will be retrofitted to an EnerPHit informed standard from 2022/23 to 2027/28 is 22,665m<sup>2</sup>, with year-on-year breakdowns as follows:
- By end 2024/25- approx. 4,396m<sup>2</sup> of Council buildings are targeted to be retrofitted to an EnerPHit informed standard
  - By end 2025/26- approx. 8,874m<sup>2</sup> of Council buildings are targeted to be retrofitted to an EnerPHit informed standard
  - By end 2026/27- approx. 17,097m<sup>2</sup> of Council buildings are targeted to be retrofitted to an EnerPHit informed standard
  - By end 2027/28- approx. 22,665m<sup>2</sup> of Council buildings are targeted to be retrofitted to an EnerPHit informed standard

The above projected floor area (m<sup>2</sup>) will become part of the agreed programme outcomes for the GGA revenue repayment model that the Council will agree with the Scottish Government.

By way of context, the above represents a small percentage (3%) of the Council's gross internal floor area of operational buildings of approximately 807,207m<sup>2</sup> that includes the Council's Public Private Partnership (PPP) and Design, Build, Finance & Maintain (DBFM) operational properties. However, it

is anticipated that the lessons learned from implementing this small selection of buildings will help formulate the retrofitting strategy for the wider estate.

- 4.8.4 Although a building area metric (in m<sup>2</sup>) in terms of the floor area of Council buildings retrofitted to an EnerPHit informed standard may not be entirely indicative of the emissions reductions 'saved' this building metric is generally representative of a good, sustainable and energy efficient building design that can be used as an alternative performance metric.

## 4.9 Promotion of Green Jobs and Opportunities

- 4.9.1 The delivery of this programme will lead to new green jobs and opportunities being created both within the Council and on the supply chain side (both contractors and consultants).
- 4.9.2 Within the Council, it is expected that this programme will require the formation of a new team dedicated to the programme and two small teams will need to be formed- one for strategic development/programme sponsorship and another for programme works delivery. Together, both teams will work to deliver the programme to completion. Refer to [Appendix H: Council Programme Management and Delivery Organogram](#)
- 4.9.3 The programme is expected to result in the recruitment of minimum two new trainees or apprentices linked to the programme throughout the programme's duration. In addition, a Programme Manager will be appointed to manage the strategic development and sponsorship of the programme. Refer to [Appendix I: Increase in Green Jobs & Opportunities \(Council\)](#).
- 4.9.4 Outwith the Council, the programme is expected to create and activate 'green jobs' and opportunities for the supply chain (both Professional Services Framework consultants and contractors). Refer to [Appendix J: Increase in Green Jobs & Opportunities \(Supply Chain\)](#).

Refer to Figure 3- Summary of Programme Estimated New Green Jobs & Opportunities from 2022/23 to 2027/28

Summary of Programme Estimated New Green Jobs & Opportunities from 2022/23 to 2027/28								
No.	New Green Jobs & Opportunities Description	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Total
1	Number of estimated Council Green jobs and opportunities due to the programme	2	4	6	6	4	2	24
2	Number of estimated supply chain Green jobs and opportunities due to the programme	4	22	37	46	56	28	193

<b>Total</b>	<b>6</b>	<b>26</b>	<b>43</b>	<b>52</b>	<b>60</b>	<b>30</b>	<b>217</b>
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**Figure 3- Summary of Programme Estimated New Green Jobs & Opportunities from 2022/23 to 2027/28**

The above projected new green jobs and opportunities will become part of the agreed programme outcomes for the GGA revenue repayment model that the Council will agree with the Scottish Government.

4.9.5 The Council will ensure that Community Benefits clauses such as the requirement to create Green apprenticeships and work placements and the requirement to embed Net Zero and/or sustainability training and knowledge enhancement will be added to future works contracts as contract requirements.

#### **4.10 Promotion of Sustainability and Net Zero Knowledge/Skillsets**

4.10.1 The programme, being the first such EnerPHit programme in the Council; will require the upskilling and knowledge enhancement of both Council staff and the supply chain staff/operatives who would benefit from the EnerPHit knowledge gained and lessons learned in implementing the programme.

4.10.2 Due to the lack of current in-house EnerPHit knowledge and experience, the adoption of an EnerPHit informed approach for future Council retrofits will initially require support from experienced external Passivhaus/EnerPHit qualified design teams. As EnerPHit becomes the default approach for future Council retrofits however it is essential that in-house staff are suitably upskilled. A Council EnerPHit Training and Upskilling Plan is set out in Figure 4- Summary of Council EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28.

<b>Summary of Council EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28</b>								
<b>No.</b>	<b>Training and Upskilling Description</b>	<b>2022/23</b>	<b>2023/24</b>	<b>2024/25</b>	<b>2025/26</b>	<b>2026/27</b>	<b>2027/28</b>	<b>Total</b>
1	Number of Council staff targeted to be trained to an intermediate or above EnerPHit/Passivhaus standard (trained externally with certification)	4	0	0	0	0	0	4
2	Number of Council staff targeted to be trained to a basic EnerPHit/Passivhaus standard (trained internally by qualified Council staff and without certification)	20	20	20	20	20	20	120
<b>Total</b>		<b>24</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>124</b>

**Figure 4- Summary of Council EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28**

- 4.10.3 It is expected that the majority of the Council's Sustainable Construction Delivery team- a team consisting of building surveyors, project managers, architects and M&E designers as well as the Council's Strategic Asset Planning team will require some form of EnerPHit knowledge enhancement training and upskilling. This is important given that it is anticipated that an EnerPHit informed approach would eventually become a critical process for all future Council buildings retrofitting works.
- 4.10.4 This programme will lead to a step-change in the way the Council will approach future building retrofits and all future retrofits will as a minimum consider EnerPHit as the default approach- with PHPP models informing future works and estate strategies. In view of this, EnerPHit/Passivhaus know-how is required not only on a project delivery level but also on a strategic level.
- 4.10.5 The Council will plan and budget for two levels of EnerPHit/Passivhaus training. The first level will be to an intermediate level and this level training will be targeted at the Council delivery and strategic teams within the Council who will use the acquired EnerPHit knowledge as part of their daily works when delivering future retrofit works. This level of training will typically be conducted by external trainers and require some form of certification as verification of having attained EnerPHit competency training.
- 4.10.6 The second level will be to a more basic level and this training is aimed at those in the Council who have a vested interest in Council buildings/property, the benefits of an EnerPHit approach and for whom a basic understanding of EnerPHit would be beneficial to the Council in the long term. This level of training would be suitable for Council staff in the buildings maintenance (FM), Estates and Investments teams and for the building users. The Council will make further queries on this type of introductory training with bodies such as the Passive House Institute and the Passivhaus Trust to establish a benchmark standard for this type of training.
- 4.10.7 It is expected that through a planned and extensive programme of EnerPHit/Passivhaus training and upskilling that the Council will over the course of the programme build up the requisite skillsets and knowledge within the Council to both design and deliver future buildings to an EnerPHit informed approach, though until such time reliance on external EnerPHit certified consultants will still be necessary.
- 4.10.8 The supply chains involved in the project will also need to be upskilled to deliver the programme. It will be specified as a contract requirement that the contractors undertaking the works will be required to carry out EnerPHit/Passivhaus training sessions on both a designer/practitioner level and on an introductory level. The expected numbers of supply chain operatives required to attend and acquire EnerPHit/Passivhaus training are summarised in Figure 5- Summary of Supply Chain EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28.

Summary of Supply Chain EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28								
No.	Training and Upskilling Description	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Total
1	Number of supply chain staff targeted to be trained to an intermediate EnerPHit/Passivhaus level or above (certified EnerPHit/Passivhaus designer or practitioner level)- one for each building project	0	1	2	2	4	3	12
2	Number of supply chain staff targeted to be trained to an introductory EnerPHit/Passivhaus level (trained internally by qualified supply chain staff and without certification)	0	0	20	20	40	30	110
<b>Total</b>		<b>0</b>	<b>1</b>	<b>22</b>	<b>22</b>	<b>44</b>	<b>33</b>	<b>122</b>

**Figure 5- Summary of Supply Chain EnerPHit Training and Upskilling Plan from 2022/23 to 2027/28**

4.10.9 The Council has committed to engage with and to share the knowledge gained from the programme with other Local Authorities in Scotland. The Council plan to engage with other Scottish Local Authorities at least 3 times a year via meetings to share knowledge and lessons learned from the GGA Pathfinder Project/Programme as per Figure 6- Summary of Council planned Knowledge Share & Engagement with other Scottish Local Authorities from 2022/23 to 2027/28.

Summary of Council planned Knowledge Share & Engagement with other Scottish Local Authorities from 2022/23 to 2027/28								
No.	Sustainability, Net Zero knowledge/skillsets Benefits Description	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Total
1	Number of times per year CEC have engaged with other Local Authorities in Scotland either via meetings or workshops to promote Green Growth and to share knowledge and lessons learned from the Pathfinder Project	3	3	3	3	3	3	18
<b>Total</b>		<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>18</b>

**Figure 6- Summary of Council planned Knowledge Share & Engagement with other Scottish Local Authorities from 2022/23 to 2027/28**

The projected numbers of training and upskilling of both Council and supply chain personnel as well as the numbers of knowledge share and engagement with other Scottish Local Authorities will become part of the agreed programme outcomes for the GGA revenue repayment model that the Council will agree with the Scottish Government.

## **4.11 Alignment with the Council's Net Zero Policy and Ambitions**

- 4.11.1 The programme fully aligns with Edinburgh 2030 Climate Strategy and the Council's Emissions Reduction Plan (CERP) and the successful delivery of the programme is key to the success of the CERP.
- 4.11.2 In delivering transformational EnerPHit informed upgrades for up to 12 Council buildings the programme will promote an EnerPHit informed approach and methodology for the rest of the Council's operational portfolio.
- 4.11.3 The successful delivery of the programme will bring reputational benefits to the Council being the first Scottish Council to undertake such an extensive programme of EnerPHit informed retrofits for operational buildings.
- 4.11.4 Besides Net Zero and sustainability benefits, the programme will result in improvements to the building fabric of the 12 buildings. The EnerPHit standard is very much a comfort standard and the programme will ultimately bring other socio-economic benefits for the users of these buildings due to an enhanced building environment from a comfort perspective. The majority of the selected buildings are education buildings so the users will include the general public as well as Council staff. Expected benefits include a better learning environment for the children who attend the schools and nurseries.

## **4.12 The EnerPHit Feasibility Studies**

- 4.12.1 A key part in developing the economic case and in establishing the benefits of the programme outcomes involved the undertaking of EnerPHit feasibility studies to each of the 12 buildings.
- 4.12.2 The critical first step of the feasibility studies is to establish a reliable base case model or baseline for each of the buildings. This was done as part of an overall EnerPHit feasibility study package of works using various objective and subjective approaches, including:
  - 360° photo-surveys and 3D laser surveys
  - Airtightness/air leakage testing and thermographic imaging
  - Desktop review of condition surveys, buildings energy usage data, buildings maintenance and other available buildings performance data
  - Consultation workshop with each building's user and maintainer such as the Head Teacher, Business Manager and Facilities Management Teams (maintenance teams) to establish a buildings normal operating pattern, the number of electrical appliances in each building and the typical energy usage from such equipment
  - Intrusive building surveys and opening-up works to identify selected construction details and make-up- e.g. external wall make-up and thickness including the thickness of wall insulation
- 4.12.3 With the buildings baseline data, the Council was then able to carry out; via the appointed EnerPHit lead consultant, EnerPHit modelling and analytical

works to each building using an EnerPHit base modelling tool known as Passivhaus Planning Package (PHPP) modelling. PHPP modelling allows the EnerPHit consultant to model various options to optimise the thermal and energy performance of a building via a building elemental approach that focuses on the building fabric and the heating source.

- 4.12.4 The PHPP modelling and other associated EnerPHit analytical works such as costing of the various options were then captured in an overall Feasibility Report and Plan known as the EnerPHit informed Retrofit Plan or EiRP.
- 4.12.5 An EnerPHit approach and PHPP modelling allows the Council to identify the optimal energy targets for energy retrofit interventions across the operational estate- i.e. EnerPHit standard targets a buildings energy usage of 25kWh/m<sup>2</sup>. It is difficult to ascertain at this point the percentage of Council buildings which can meet this energy usage target, but what it does is to set a benchmark energy standard for buildings and through the feasibility studies it is likely that certain archetypes of buildings will be found to be unsuitable for upgrade to a fully certified EnerPHit standard.

### **4.13 EnerPHit Informed Intervention Options and Appraisal**

- 4.13.1 The EiRP contains a series of EnerPHit intervention options for each building. Besides the 'Do Nothing' approach, a range of three different levels of intervention and investment were produced for each building with three different levels of EnerPHit approaches:
- Minimal Approach- essentially a 'Do Minimum Approach'
  - Middle of the Road Approach
  - Full EnerPHit Approach- a 'deep' energy retrofit approach
- 4.13.2 The Feasibility Reports include detailed appraisals for each of the intervention options and include the estimated costs required to bring a particular building to each of the three EnerPHit intervention option levels. With the completion of the Feasibility Reports, the knowledge gained from the study of the 12 buildings (which are selected on the basis that they are representative of buildings in the Council's wider estate ) will further provide an indication on the potential costs to bring the wider estate up to the target energy standard informed by the three different levels of EnerPHit approaches.
- 4.13.3 The completion of the feasibility studies will provide further insight into the scale of the Net Zero challenge ahead for the Council; in particular the considerable capital cost required should the Council decide to adopt an EnerPHit informed approach for all Council operational buildings. It will outline the complexities of dealing with public sector building refurbishment, highlighting the difficulty of addressing competing tensions and priorities with regards to the reduction carbon emissions across the Council's operational estate.
- 4.13.4 For each of the EnerPHit intervention options the following building performance criteria were analysed and modelled for each building:
- Operational energy demand

- Operational energy costs
- Operational carbon emissions
- Embodied carbon emissions
- Capital costs required for each of the three levels of interventions

4.13.5 Selection of the focus and degree of the interventions at each level/option was influenced primarily by the following:

- The proportion to which each element contributed to overall heat losses as assessed in the PHPP models (i.e. if the greatest heat loss was through the walls, greater levels of insulation provision were recommended and modelled accordingly compared to other elements of the building)
- The condition of the building fabric and services. If replacement was due anyway to a certain building element, it would be a higher priority than an element recently replaced
- The impact of the proposed intervention on the building layout and/or fabric based on 'best value' principles, e.g. if the model showed that the biggest thermal heat loss in a building is through a building's roof, the modelling would recommend the optimal thickness of roof insulation needed
- Achieving a balance of interventions across the building to minimise hygro-metric risks to the building fabric

4.13.6 One of the key findings from the EnerPHit Feasibility Studies is that the 'Minimal Approach' intervention option to EnerPHit is unlikely to be recommended as the option to proceed with future works. As the name suggests, the 'Minimal Approach' recommends the bare minimum by way of intervention and in most cases involve the replacement of existing gas-based heating systems to heat pumps, with very little building fabric interventions.

4.13.7 Although the Minimal Approach option will still offer significant emissions savings, it is not a wholistic and integrated EnerPHit approach and there will be many disbenefits should this approach be taken, such as the following:

- This option does little to improve the energy and thermal performance of the overall building fabric
- This option will not reduce the energy load of a building and based on current energy pricing, will result in a significant and unsustainable increase in energy costs
- The future performance and the effectiveness of the heat pump as a building's primary heating source will be affected. A heat pump is generally most effective for a stable ambient indoor temperature and is not as responsive compared to say a conventional gas boiler system. By changing to a heat pump only and very little else, the size and number of heating equipment such as radiator panels will be impractical and it will have an adverse impact on the usability of the building's internal space
- This option does little in terms of building user comfort and a building's future operability which are two key EnerPHit primary drivers
- This option does little to futureproof a building for future energy efficiency and to facilitate future Net Zero works

- This option raises the risk of exposing the Council to an undersized electricity network due to increased and unpredictable electrical loads. The increase in electric loads associated with this approach, if adopted across the City, would risk significant pressure on the electricity supply network and there may be short and medium-term capacity issues

#### **4.14 Identifying a Common EnerPHit Solution and Approach**

- 4.14.1 From undertaking the feasibility studies, it very quickly became obvious that there is no one-size-fits-all approach when it comes to identifying a single common EnerPHit solution or in coming up with a consistent EnerPHit buildings specification that could be applied to all buildings. Instead a bespoke EnerPHit approach that is tailored to each building is required.
- 4.14.2 Identifying a single EnerPHit approach or target for the whole estate is inappropriate, due to the following differences for each building:
- An individual building's requirement and condition
  - The implications of an individual building's phasing and decant etc.
  - An individual building's impact on users
  - An individual building's impact on its building fabric
  - An individual building's capital cost
- 4.14.3 Instead, what is required is a clear methodology for decision-making and a process to establish the best approach for each building and to create a road map for future deep energy retrofits that is building specific but an approach that is repeatable across the estate.
- 4.14.4 For the Council's existing estate, the key will be to focus on reducing building energy requirements thereby reducing energy loads. This will mitigate any energy cost increases per unit and will reduce the required connected loads to the electricity grid.
- 4.14.5 The Council's priorities will influence which of the three EnerPHit intervention options is the most appropriate option for each building. The completed feasibility reports recommend the Council use a selection methodology known as the 'Total Performance Index' as a transparent and consistent approach by which the Council assess and decide which of the three EnerPHit options is the optimal solution for each building.

#### **4.15 The Total Performance Index**

- 4.15.1 The Total Performance Index involves a number of steps and assessment criteria:
- Assessing and rating each of the three options in relation to a number of criteria including cost, energy & carbon, user comfort etc. Some ratings were objectively based on quantifiable data while others were subjective and based on professional knowledge and experience. This is the 'Criterion Index'

- It will then be up to the Council to determine a weighting to each of these criteria to reflect Council corporate priorities. This is the 'Criterion Weighting'
- Multiplying the Criterion Index by the Criterion Weighting gives the 'Performance Index' for each criteria
- The 'Total Performance Index' for each option is the sum of all the individual 'Performance Indices'

4.15.2 The Total Performance Index allows each of the three EnerPHit options to be compared on a transparent, consistent, like-for-like basis to identify the 'optimal' level of EnerPHit intervention for a building.

4.15.3 The Total Performance Index process can potentially be repeated for all buildings thereby providing a consistent approach that can then be applied across the estate once the Council has established its priorities and therefore the weightings to be applied.

4.15.4 The Total Performance Index will be used to help the Council decide which of the three EnerPHit intervention options is the optimum intervention option for each building based on best value and the return in benefits on the capital investment.

#### **4.16 Sensitivity Analysis**

4.16.1 It is recognised that the economic case will be sensitive to wider market conditions and the project will be subject to external economic influences and factors which are out-with the Council's control; for instance the determination of future gas and electricity unit rates.

#### **4.17 Summary of the Economic Case**

4.17.1 The economic case describes the rationale used for the selection of buildings for the project; which are based on best-value principles. It outlines the key project outcomes which will be generated via implementation of the project and the methodologies used and analysis works behind the projected outcomes. These same outcomes will be used as the basis of the benchmark outcomes which will be used to unlock Scottish Government GGA funding support.

## Section 5: Financial Case

### 5.1 Introduction to the Financial Case

- 5.1.1 The financial case aims to assess the affordability of the programme to the Council. This includes the capital cost of each project, the possibility of revenue savings through operating costs and the risks posed by this investment.
- 5.1.2 The capital costs of retrofitting the 12 buildings have been modelled using cost plans produced by consultants for the preferred intervention for each building. Inflation and optimism bias have been considered within the phased plan based on the information currently available to provide an overall cost.
- 5.1.3 The revenue implications of these interventions have also been considered through the change in annual energy costs following the EnerPHit intervention. As buildings move from a dual energy supply to just electricity and the effect of the changing electricity price on these changes.
- 5.1.4 Funding for this programme is available through the Council's Capital Building Project, along with income from the Green Growth Accelerator (GGA) Funding from the Scottish Government. This case sets out the payment scheme through aligned outcomes.

### 5.2 Project Costs and Assumptions

- 5.2.1 The financial case assumes that of the three EnerPHit options, the Middle of the Road approach is currently the most likely intervention to be used. This approach is therefore used for capital cost budgeting and revenue projections for all 12 buildings.

#### Capital Costs Assumptions

- 5.2.2 The estimated capital costs for each building is based on the findings from EnerPHit Feasibility Reports and the EnerPHit Retrofit Plan (ERP) which were carried out to each building.
- 5.2.3 Based on the preferred option, the total capital cost to deliver 12 buildings to an EnerPHit informed approach from 2022/23 to 2027/28 has been estimated at £39.78m in 2021/22 prices. Details of the estimated costs for each building for each of the intervention options of 'Do Nothing', 'Middle of the Road' and 'Full EnerPHit' can be found in [Appendix K: Capital Cost Estimates for each Intervention Option](#).
- 5.2.4 The works will be undertaken through 4 phases over 5 years. The costs have been increased to reflect inflation over this period. A rate of 4% per annum has been used.

5.2.5 The cost reports include 15% for contingency. An allowance for optimism bias has been added at the rate of 33%. The HM Treasury Green Book does not cover retrofit specifically, so the figure has been chosen based on balancing the Council's previous experience in retrofit and the new technology being implemented through this project.

5.2.6 The total cost estimate including inflation and optimism bias is £61.83m as set out below in Figure 7- Estimated Total Capital Cost for EnerPHit Tranche 1 Buildings (£000).

Estimated Total Capital Cost for EnerPHit Tranche 1 Buildings					
Building	Cost (£000)	Inflation (£ at 4% per annum)	Inflated Cost (£000)	Optimism Bias (£ at 33%)	Cost including OB & inflation (£000)
Lorne Primary School	2,697	246	2,943	971	3,915
Brunstane Primary School	6,245	570	6,815	2,249	9,064
North West Local Office	3,281	443	3,724	1,229	4,953
Greengables Nursery & Family Centre	2,187	295	2,482	819	3,301
South East Local Office	3,398	613	4,011	1,324	5,334
Ferryhill Primary School	4,819	869	5,688	1,877	7,565
Liberton Nursery	1,249	225	1,474	486	1,960
Hillwood Primary School	3,562	642	4,204	1,387	5,592
Trinity Academy	6,395	1,455	7,850	2,591	10,441
Hermitage Park Primary School	4,639	1,056	5,695	1,879	7,574
Moffat Nursery	1,306	297	1,603	529	2,132
<b>Total</b>	<b>39,778</b>	<b>6,711</b>	<b>46,489</b>	<b>15,341</b>	<b>61,830</b>

Figure 7- Estimated Total Capital Cost for EnerPHit Tranche 1 Buildings

5.2.7 Each building's works delivery is scheduled to take 21 months and the capital costs have been phased across the financial years based on the construction period within the Programme Management Plan.

5.2.8 The capital cost phasing for the programme can be found below in Figure 8- EnerPHit Tranche 1 Programme Capital Cost Phasing (£000).

EnerPHit Tranche 1 Programme Capital Cost Phasing						
	2022/23 (£000)	2023/24 (£000)	2024/25 (£000)	2025/26 (£000)	2026/27 (£000)	2027/28 (£000)
Lorne Primary School	186	2,237	1,491	-	-	-
Brunstane Primary School	431	5,179	3,452	-	-	-
North West Local Office	-	236	2,830	1,887	-	-
Greengables Nursery & Family Centre	-	157	1,886	1,258	-	-
South East Local Office	-	-	254	3,048	2,032	-
Ferryhill Primary School	-	-	360	4,323	2,882	-
Liberton Nursery	-	-	93	1,120	747	-
Hillwood Primary School	-	-	266	3,195	2,130	-
Trinity Academy	-	-	-	497	5,966	3,998
Hermitage Park Primary School	-	-	-	361	4,328	2,885
Moffat Nursery	-	-	-	102	1,218	812
<b>Total by Year</b>	<b>617</b>	<b>7,809</b>	<b>10,632</b>	<b>15,791</b>	<b>19,303</b>	<b>7,695</b>

## Figure 8- EnerPHit Tranche 1 Programme Capital Cost Phasing

### Revenue Cost Assumptions

- 5.2.9 The total 2019/20 energy usage for each of the 12 buildings and the estimated annual energy usage (for both gas and electricity) following intervention improvements for each of the 4 intervention options of Do Nothing, Do Minimum, Middle of the Road and Full EnerPHit are summarised in [Appendix L: Buildings Annual Energy Usage and Savings Summary](#). Due to Covid-19 and its impact on Council buildings operations for 2020/21, 2019/20 energy usage data has been used as a more accurate annual energy benchmark for all 12 buildings. These energy use savings could then be converted to revenue cost savings.
- 5.2.10 As part of the EnerPHit feasibility reports, two quantity surveying consultants, Doig & Smith and Currie & Brown, were asked to forecast and model the revenue implications of the EnerPHit informed works. A summary of the findings including the annual revenue expenditure for each of the 12 buildings in terms of their annual energy and heating costs for 2019/20 and the estimated annual energy and heating costs following interventions (based on 2020/21 unit rates) can be found in:
- [Appendix M: Intervention Option 1 Implications Appraisal](#)
  - [Appendix N: Intervention Option 2 Implications Appraisal](#)
  - [Appendix O: Intervention Option 3 Implications Appraisal](#)
  - [Appendix P: Intervention Option 4 Implications Appraisal](#)

It can be seen that based on December 2021 real energy unit rates, it is forecasted that revenue costs for options 1 and 2 (Do Nothing and Do Minimum options) will generally see a rise post intervention. Option 3- the Middle of the Road option will see a mix of revenue cost increases and decreases while option 4- full EnerPHit option will result in revenue cost decreases for all 12 buildings. These forecasts help the Council to decide which option for each building is the 'value for money' option.

- 5.2.11 A key focus of the project is to reduce the Council's reliance on fossil fuels. A main component of the programme works will involve changing from the existing gas boilers to an electric heat pump system and therefore there will be a major shift from gas usage to electricity usage for all the project's buildings.
- 5.2.12 While the buildings themselves are expected to be more energy efficient and require a lower heat load following EnerPHit informed works, the costs of electricity are higher than the cost of gas. Electricity prices in 2021/22 are £0.138 per kWh predicted to rise 18% to £0.168 per kWh in 22/23. Gas prices are £0.0277 per kWh, which are predicted to rise in 22/23 to £0.0555 per kWh (50%).
- 5.2.13 Figure 9 summarises the change in annual energy costs expected for each building following completion of retrofit. Energy prices are calculated based on 22/23 prices.

Comparison in Energy Costs between Preferred Option and Do Nothing Option							
Building	Do Nothing Annual Energy Cost			Preferred Option Annual Energy Cost			Change in energy cost
	Elec cost	Gas Cost	Total cost	Elec Cost	Gas cost	Total cost	
Lorne Primary School	5,585	23,911	29,496	22,874	-	22,874	(6,622)
Brunstane Primary School	5,928	24,065	29,994	22,252	-	22,252	(7,742)
North West Local Office	30,045	20,968	51,014	41,361	-	41,361	(9,653)
Greengables Nursery & Family Centre	2,431	13,048	15,479	9,032	-	9,032	(6,447)
South East Local Office	26,345	21,659	48,004	40,715	-	40,715	(7,289)
Ferryhill Primary School	11,295	22,719	34,014	29,115	-	29,115	(4,899)
Liberton Nursery	2,393	5,627	8,020	5,215	-	5,215	(2,805)
Hillwood Primary School	6,256	23,084	29,340	18,829	-	18,829	(10,511)
Trinity Academy	7,276	35,559	42,835	31,559	-	31,559	(11,276)
Hermitage Park Primary School	10,592	39,089	49,681	31,884	-	31,884	(17,798)
Moffat Nursery	1,379	6,974	8,354	4,618	-	4,618	(3,736)
<b>Total</b>	<b>109,526</b>	<b>236,705</b>	<b>346,232</b>	<b>257,454</b>	<b>-</b>	<b>257,454</b>	<b>(88,777)</b>

**Figure 9- Comparison in Energy Costs between Preferred Option and Do Nothing Option**

- 5.2.14 This analysis shows that the energy costs for all 12 buildings are estimated to reduce following the implementation of an EnerPHit informed retrofit. However, as energy costs are expected to continue to rise, any saving in Council revenue budgets will be short-term. It is assumed that provision for energy prices increases is included in the Council's long-term financial planning process, as this cost would be incurred whether the business case is progressed or not.
- 5.2.15 The forecasted rise in energy prices suggests that the differential between gas and electricity prices is likely to narrow as focus on non-fossil fuel power continues. While this supports the financial case for EnerPHit, it has not been quantified in the above analysis due to the volatility of gas and electricity prices in the past year.
- 5.2.16 The maintenance costs associated with the EnerPHit informed works are expected to be similar to those incurred on current technology. For example, if a gas boiler were to be replaced with a heat pump, the maintenance regime,

interventions required and costs to maintain the heat pump would not be too dissimilar to that of the original gas boiler (based on standard maintenance specifications such as SFG20)

## 5.3 Funding Solutions

- 5.3.1 The full cost of the project can be funded from a combination of Council budgets and Green Growth Accelerator funding.

### Council Capital Budget

- 5.3.2 [The Council's Sustainable Budget Strategy](#), was approved at the Council's budget meeting in February 2022. This provides £51m of council capital funding and £10m from the Green Growth Accelerator Funding awarded by Scottish Government, as set out in section 5.3.4.

- 5.3.3 The Council's £51m contribution will be funded through a combination of general capital grant and borrowing, supported by Council revenue budgets. The Council acknowledges the financial support potentially available from the Scottish Green Public Sector Estate Decarbonisation Scheme in relation to this programme. The Council is considering seeking a zero interest loan from the Scottish public sector energy efficiency loan scheme, albeit while noting that as the loan scheme has circa £10 million available for lending each year, it would likely only be able to form a small part of the overall funding package, likely complementing Public Works Loan Board (PWLB) loans. The Council will also keep a watching brief on other relevant funding opportunities.

### Green Growth Accelerator Funding

- 5.3.4 The Green Growth Accelerator (GGA) Fund aims to unlock £200 million of additional investment in infrastructure projects to support Scotland's transition to an inclusive Net Zero Carbon emissions economy. The Council was awarded GGA revenue funding from the Scottish Government to support £10 million of investment.
- 5.3.5 The GGA funding model provides revenue payments over an agreed period, aligned with the generation of green growth, and subject to the achievement of pre-agreed programme defined outcomes. The Council's preference is for a 15-year agreement based on the expected asset life of the EnerPHit informed improvements with outcomes as defined in Figure 10 below.
- 5.3.6 In order to fund the up-front investment, the Council needs to borrow £10m in addition to the £51.83m already identified in its capital budget. The annual revenue cost associated with this would be £890,427 assuming an interest rate of 4.1955% (current pool rate) and a loan duration of 15 years.
- 5.3.7 The Council will enter into a funding agreement with the Scottish Government which will detail duration and value of the revenue payments. This would be an annual payment of £890,427 based on an interest rate of 4.1955% (current pool rate).

5.3.8 It is assumed that annual funding payments will commence on the completion of Phase 1 in line with achievement of agreed outcomes for the phase. The Council will propose the following four outcomes-based metrics to the Scottish Government.

Summary of Programme Outcomes, Targets, Measurements and % of Annual Payment				
Outcome	Metric	Performance targets	Basis for measurement	% of annual payment
1	Greenhouse gas emissions reduction benefits and contribution to Net-Zero ambitions (tonnes of CO <sub>2</sub> saved upon completion of each phase-cumulative)	Phase 1- 33t Phase 2- 86t Phase 3- 271t Phase 4- 411t	Comparison of energy usage (kWh) to “do nothing” model and baseline consumption figures to calculate tonnes of CO <sub>2</sub> saved	50%
2	More ‘green’ and sustainable buildings with improved buildings comfort, resilience and futureproofing (Cumulative m <sup>2</sup> of GIFA at EnerPhit informed standard upon completion of each phase)	Phase 1- 4000m <sup>2</sup> Phase 2- 8500m <sup>2</sup> Phase 3- 17000m <sup>2</sup> Phase 4- 22500m <sup>2</sup>	Measurement of building after EnerPhit informed interventions	30%
3	Promotion of ‘green’ jobs and new opportunities and other community benefits (Number of new FTE per Phase- in-year targets)	Phase 1- 46 Phase 2- 33 Phase 3- 71 Phase 4- 69	Number of FTE employed as result of GGA programme	10%
4	Promotion of sustainability and Net Zero knowledge and skillsets (Number of people gaining Passivhaus/ EnerPHit qualifications or undergone sustainability training- in-year targets)	Phase 1- 42 Phase 2- 42 Phase 3- 64 Phase 4- 53	Number of employees & supply chain personnel who have either gained a Passivhaus/EnerPHit qualification or undergone sustainability training	10%
<b>Total</b>				<b>100%</b>

**Figure 10- Summary of Programme Outcomes, Targets, Measurements and % of Annual Payment**

While the carbon emissions savings over the 4 phases of the programme are relatively modest, the actual carbon emissions savings should be looked at over the life of the building which is assumed to be minimum 60 years post-intervention. In other words, there will not only be carbon emissions savings during the 15-year period that the Council has proposed for the GGA revenue repayment period but there will be continued savings beyond the 15-year period.

5.3.9 The phasings timings are as follows:

- Phase 1- End November 2024
- Phase 2- End November 2025
- Phase 3- End November 2026
- Phase 4- End November 2027

Details of how the carbon emission savings targets relate to financial years will be confirmed by the Council. For instance, if a project is completed in November of a financial year, only 4 months of carbon savings would be accrued in that financial year.

- 5.3.10 In the event that Phase 1 outcomes are not fully achieved, the grant will be reduced proportionately. However, the Council will seek to agree a clawback mechanism whereby any grant withheld would be recouped should targets be exceeded in future years or phases.

## **5.4 Financial Risks and Sensitivities**

- 5.4.1 There are a number of risks within the finances which have been considered in line with the costs of this programme.
- 5.4.2 This most significant financial risk for the programme is that capital costs are higher than those modelled. This could be due to a number of factors including; design changes, the outcome of the procurement exercise, increases in price of materials and/or labour or delays in the supply chain. Assumptions in the model are based on market information and allowances have been included for contingency and optimism bias. If, however, costs were £10m more than modelled, additional borrowing costs of £419,550 per year would need to be found. This could be mitigated by a realignment of the Council's wider capital budget.
- 5.4.3 The payment of GGA funding from the Scottish Government is dependent on reaching our outcomes set out above, a failure to meet all or some of these will lead to a reduction in the income we receive. The outcomes have been designed in line with the Programme Plan and are achievable based on the work being carried out. There will also be a clawback mechanism to enable the Council to reclaim grant should targets be exceeded in future years and phases. A 10% shortfall in the GGA funding will result in a revenue budget pressure of £89,043 per annum.
- 5.4.4 Similarly, the claim value of the annual GGA payment has been calculated to include interest at the Council's loans fund pool rate. Should the interest secured be higher than this amount, the Council would need to fund the difference from its own revenue budget. This risk is mitigated by the fact that the GGA sum is small in relation to the Council's overall borrowing level, and any additional cost will be contained within the overall budget for loans charges.
- 5.4.5 There is the risk that the energy savings will not be realised, this could be due to the energy modelling being incorrect. Additionally, the energy savings are based on the building being used in the most efficient way, there is risk that energy consumption will not reduce due to building user behaviour. It is expected that once construction is complete all building users will receive training in any new systems which effect energy savings and therefore this should be minimal.

- 5.4.6 Additional revenue costs could be incurred if any decant costs are required. Allowance for this has not been included in the original cost plans or the financial model. The works programme has been planned to include two summer holidays and two Easter holidays within the construction period to take advantage of the fact that for school buildings and nursery buildings there are likely to be less impact to the building users during the Easter and summer holidays.

## **5.5 Summary of the Financial Case**

- 5.5.1 The financial case shows that the programme can be funded from the Council's Capital Programme, supported by GGA funding. The payment of the funding has been considered with the annual payment expected to start after the completion of Phase 1 works.
- 5.5.2 At this time, the programme is unlikely to generate significant revenue savings due to decreasing operating costs. The switch from gas boilers to fully electric heating systems will increase the electricity used in each building, where currently electricity prices are higher than those of gas. Although it is expected the associated work will help reduce the amount of heating required within each building.
- 5.5.3 It is expected that future maintenance costs will remain consistent with the current values, and therefore will not have an effect on the revenue demands of the 12 buildings.
- 5.5.4 A number of risks have been considered and mitigation for this put in place. The cost of any of these materialising will require a realignment of the Council's current capital budget.

## Section 6: Commercial Case

### 6.1 Introduction to the Commercial Case

- 6.1.1 This section of the business case sets out a high-level outline of the Procurement Strategy for the programme.
- 6.1.2 The Procurement Strategy considers aspects such as regulatory responsibilities, market conditions, procurement process and community benefits aspirations alongside considerations related to risk, fair works practices and contract standard forms.
- 6.1.3 The Procurement process chosen will have accessibility as a key element to encourage the participation of a range of providers including Small and Medium Sized (SME) contractors.
- 6.1.4 Contracting structures put in place shall aim to achieve fair sustainable prices for both the Council and the supply chain throughout the life of the programme.

### 6.2 Overview of the Regulatory Context

- 6.2.1 The Council, as a local authority, is subject to the Public Contracts (Scotland) Regulations 2015. The regulations outline expectations for how competitive tendering should be managed by public sector bodies.
- 6.2.2. The Council is also subject to the 2014 Procurement Reform Act (updated in 2021) this is a legal instrument considering sustainable procurement responsibilities.
- 6.2.3 The programme will be carried out in full adherence to these regulations.
- 6.2.4 There are no anticipated state aid issues and the Council will be competitively tendering all the individual sites that fall under the programme remit. The beneficiary will be the Council as a local authority and not a commercial entity.

### 6.3 Market Conditions

- 6.3.1 EnerPHit is a relatively new retrofitting approach in Scotland, especially in relation to non-residential buildings therefore there are no known examples of completed commercial operational buildings retrofitted to an EnerPHit informed standard in Scotland at this time. However, St Sophia's Primary School in East Ayrshire is targeted for completion at the end of 2022 and once complete will be the first EnerPHit school in the UK.

- 6.3.2 Despite the standard being new to market, it is considered that the skillsets and technology which are required to deliver EnerPHit works should not be beyond the skillsets of a competent and skilled contractor. For example; a contractor may already be familiar with installing retrofit elements such as triple glazed windows as these are often used on refurbishment projects that while not under the standard label of EnerPHit have operational similarities in practice.
- 6.3.3 It is acknowledged that an element of toolbox training will need to take place in order to ensure contractors fully understand that a building designed to an EnerPHit informed standard has specific and careful specifications for building elements which should not be deviated from. In order to achieve the standard, quality assurance and rigorous testing will be required throughout works delivery.

## **6.4 Procurement Approach**

- 6.4.1 There are no suitable sectoral Framework Agreements available for use at present which consider EnerPHit in non-residential premises.
- 6.4.2 With that in mind the Council intends to absorb the EnerPHit specifications into the re-advertising of an internal refurbishment and new build works Framework Agreement which is required for November 2022.
- 6.4.3 The first step of this process will be market engagement, initially a Prior Information Notice (PIN) will be published to identify competent refurbishment contractors capable of undertaking the works.
- 6.4.4 Following this initial market engagement, the Council will host a Bidders Event to explain the standards and answer any contractor queries.
- 6.4.5 Following the Bidders event, the Framework Agreement will be published and open for contractors to apply.
- 6.4.6 The precise Lot structure of the Framework Agreement is yet to be determined. The Council intends to ensure that the Framework Agreement maximises SME accessibility and publish several Lots however decisions must be guided by contractor presence and interest in these areas balanced with risk mitigation.
- 6.4.7 Once the Framework Agreement is in place, individual EnerPHit site contracts will be awarded via mini competition amongst interested and suitably qualified contractors with capacity.
- 6.4.8 It is intended that several contractors should benefit from work. Both to fulfil the principle to promote Green Growth which is a fundamental part of this business case and to mitigate risk for the Council. It is necessary to understand the level of contractor interest and capacity via engagement before a specific strategy can be finalised to achieve this target.

## **6.5 Contracting Approach**

- 6.5.1 EnerPHit requirements need a complex design process by EnerPHit qualified architectural firms. EnerPHit designs will typically take 25% longer than standard detailed design to complete.
- 6.5.2 The Council has engaged a Design Team on our internal Professional Services Framework Agreement to commence the design process for the programme across all sites to RIBA Stage Two to test feasibility.
- 6.5.3 Post RIBA Stage Two, it is intended that the other Design Teams on our Professional Services Framework Agreement are given the opportunity to tender for the completion of works for most of the individual sites.
- 6.5.4 It is our intention to supervise the works closely and work with both the design team and the contractor in fulfilment therefore it is intended that the Standard Building Contract with Quantities for use in Scotland 2016 (SBCC) will be adopted.

## **6.6 Community Benefits**

- 6.6.1 The works stage of each requirement will include a Community Benefits Clause that will impose a requirement on the winning contractor to provide specific and measurable economic, social and environmental related community benefits.
- 6.6.2 Contractors shall submit tailored community benefits proposals for each of the sites after precise advice on areas of optimal need are prepared by the Council's Community Benefits Contract Manager who oversees community benefit delivery across the city as well as community consultation with stakeholder groups.
- 6.6.3 Contractor proposals shall outline intentions in relation to fulfilment.
- 6.6.4 For example; areas which may be of interest would be the following:
- Improving Education
  - Improving Employability
  - Supply Chain
  - Community
  - Area Specific Benefits/Bidder Suggestion
- 6.6.5 Providers are encouraged to suggest benefits of an appropriate social value that they consider to be suitable. The lists of deliverable benefits may be amended and updated throughout the duration of individual contracts as gaps arise in community benefit requirements.

## **6.7 Fair Works Practices**

6.7.1 Contractors shall be asked as part of the tender process to describe how they shall commit to progressing towards adopting each of the five Fair Work First criteria for workers (including any agency or sub-contractor workers) engaged in the delivery of this Contract. These criteria are:

- Appropriate channels for effective voice, such as trade union recognition
- Investment in workforce development
- No inappropriate use of zero-hours contracts
- Action to tackle the gender pay gap and create a more diverse and inclusive workplace
- Payment of the real Living Wage

6.7.2 Contractors are expected to include current policies and planned actions that demonstrate how they shall meet each of criteria and how they will report on, and demonstrate progress, to the Council during the lifetime of the Framework Agreement that EnerPHit projects are awarded from.

## **6.8 Pricing Methodology**

6.8.1 Contractors shall be asked to provide capped profit and overhead percentages at Framework Agreement level to apply to individual site projects. Mini competitions shall then be conducted in relation to site costs based on detailed designs.

## **6.9 Next Steps**

6.9.1 Should this business case be approved; the Council will engage Design teams to proceed with the Detailed Design stage where they shall prepare the specifications for individual sites.

6.9.2 The Council's Commercial Procurement Services department will work with the assigned Programme Manager to ensure the appointment of suitable and experienced contractors to deliver both the detailed design and project works implementation.

## Section 7: Management Case

### 7.1 Introduction to the Management Case

7.1.1 This section of the business case sets out how the programme will be managed, including governance, risk and health and safety. It also sets out the detailed proposals for how programme performance such as the programme benefits and outcomes will be measured and reported.

### 7.2 Programme Governance

7.2.1 The strategic governance of the programme will be led by the Council's Director of Sustainable Development in the Council's Place Directorate, who will appoint a Programme Manager to manage and oversee the programme for the duration of the 5-year programme. The Director of Sustainable Development will be the Council's appointed Senior Responsible Officer (SRO) for the programme.

7.2.2 A GGA Pathfinder Programme Governance Group will be established within the Council to manage and deliver the programme with representatives from the Council's Sustainable Development's Strategic Asset Planning, Sustainable Construction Delivery (SCD), Finance and Procurement services. There will be regular Programme Group meetings and oversight will be provided by the Sustainable Development Service Director.

7.2.3 The Council has an existing EnerPHit consultancy framework that will be called upon to deliver the EnerPHit Detailed Design for each individual project in the programme and the Detailed Design and procurement of the works will be managed internally by SCD, SAP with assistance from Commercial. A new Programme Manager will be appointed to lead the strategic development and who will act as the overall programme coordinator and sponsor to deliver the programme to completion- refer to [Appendix H: Council Programme Management and Delivery Organogram](#)

7.2.4 The composition of the GGA Pathfinder Programme Group will be kept under review for the duration of the programme to ensure it has the appropriate competencies and representation from each of the stakeholders. The Programme Group is tasked with programme delivery; decision making will still be required from the Council committees as appropriate.

7.2.5 Authority to initiate the development and proceed with this programme comes from the approval of separate Council Committee papers:

- Approval to make the GGA bid was approved by the Council Corporate Leadership Team on 11 August 2021 via a report titled 'Green Growth Accelerator- Pathfinder projects'
- A paper titled 'Sustainable Capital Budget Strategy 2022-2032' approved by the Council's Finance and Resources Committee in

February 2022 confirmed the necessary capital financing approval needed to proceed with this programme

- 7.2.6 Approval for the programme to proceed is targeted to be granted by the Council Committee by summer 2022 under a paper submittal to one of the Council's Committees. Should final approval be granted and the programme proceed, delegated authority will be granted to the Council's Service Director of Sustainable Development to enter into any agreements and take any actions required to deliver the programme. Subsequently, regular annual updates on the programme will be provided with additional updates on specific issues as required via the business bulletins of the relevant committees.
- 7.2.7 The Council is required to maintain regular dialogue with the Scottish Government and SFT's GGA Executives. GGA Executives will be kept updated on the programme progress throughout delivery by the Programme Manager.
- 7.2.8 For each individual project within the overall programme, the Council will set up regular Investment Steering Groups (ISGs). The purpose of the ISG is to ensure that each project meets the business case and is delivered on time, to budget and to the required quality. The ISG is corporately accountable for the success of the project and has responsibility and authority for the implementation of the project stages through to completion. ISG responsibilities include ensuring that the project is delivered holistically from both a capital cost and operational revenue cost perspective and to ensure the required resources are in place to meet design and construction quality expectations and commitments. The SRO will be responsible for chairing the ISGs.
- 7.2.9 Each project within the programme will be delivered on the principles of Projects IN Controlled Environments 2 (PRINCE2).

### **7.3 Outcomes Governance and Monitoring**

- 7.3.1 The GGA Grant Agreement will be based on the standard Scottish Government grant agreement. Ongoing governance arrangements including monitoring performance against agreed outcomes will be captured in the grant agreement.
- 7.3.2 The GGA Grant Agreement will contain clear clauses in relation to the following:
- The outcomes that will underpin the grant agreement
  - The implications of targets being partially met or not met (including pro-rata calculations)
  - Mitigations for not achieving outcomes
  - The conditions under which the agreement will lapse; e.g. not achieving key dates (if any)
  - Reporting requirements and how these drive the (claims) process
- 7.3.3 The Council's assigned Programme Manager will be the Council's GGA Grant Agreement coordinator and contact window with the responsible Scottish Government representatives and will be responsible for setting the GGA

outcomes, agreeing the measurement of outcomes and the ongoing performance management of outcomes during the programme's duration.

- 7.3.4 The GGA Grant Agreement governance will typically consist of the following:
- Post signing of the Grant Agreement and delivery of the first aspects of the programme. A formal project/programme steering group will be formed which will meet bi-annually. The steering group will consist of Local Authority project owners, SFT representatives and Scottish Government representatives
  - Programme outcomes will be measured on an annual basis according to the schedule of outcome delivery
  - Annual payments will be made according to the grant agreement (likely at the end of each fiscal year in March)
  - Each project in the programme will have a bespoke agreement on the measurement of outcomes. In each case it is likely that when all outcomes have been achieved, the remaining payments will be made until the end of the agreement without the need for ongoing monitoring.

## 7.4 Works Programme

- 7.4.1 The works implementation will be carried out in 4 phases and it is planned that there will be separate works delivery contracts for each of the 12 buildings. Phase 1 site works consisting of retrofitting works to two selected buildings are planned to begin in Q4 2022/23 and is expected to be completed by no later than Q3 2024/25. The other works phases will follow thereafter and the entire programme is currently planned to be completed by Q3 2027/28. The full programme can be found in [Appendix Q: Green Growth Accelerator EnerPHit Tranche 1 Programme](#).

## 7.5 Programme Delivery Management

- 7.5.1 The programme will be led throughout by the Council's assigned Programme Manager who will have the designated authority to act on behalf of Sustainable Development's Service Director. The Programme Manager will report directly to Sustainable Development's Strategic Asset Improvement Manager.
- 7.5.2 The Programme Manager shall also be the designated project coordinator with other third parties associated with the programme; such as Scottish Government and Scottish Futures Trust (SFT) representatives. Accordingly, the Project Manager will be responsible for ensuring that the agreed programme outcomes and deliverables to access payment to the Green Growth Accelerator funds are achieved.
- 7.5.3 A new GGA Pathfinder Project/Programme team will be formed in the Council. Refer to [Appendix H: Council Programme Management and Delivery Organogram](#) for the proposed team structure and organogram. The team will

include at least one apprentice throughout the duration of the programme to promote green learning and opportunities.

- 7.5.4 The Programme Manager and the GGA Pathfinder Project//Programme team will work closely with the GGA Pathfinder Project//Programme Working Group to manage the delivery of the programme to completion. As each project within the programme transitions from the strategic phase to works delivery/construction phase SCD will take on more project delivery and management responsibilities but the Programme Manager will remain as the overall responsible person for the programme.

## **7.6 Health and Safety Management**

- 7.6.1 Health and Safety Management will be a highly important consideration throughout the programme, particularly during the retrofitting/construction phase that is expected to commence in Q4 2022/23. During construction SCD will provide oversight of the retrofitting works. This will include monitoring of health and safety practices on the construction site with any unsafe practices being raised with the successful contractors as a matter of urgency.
- 7.6.2 Like the other buildings retrofit projects in the Council each project in the programme will be subject to the Construction Design and Management (CDM) Regulations 2015.
- 7.6.3 Each project in the programme will also need to comply with the recommendations as set out in the 2018 Building Standards Compliance and Enforcement Review (“the Cole Report”) around strengthening compliance with statutory building standards and addressing non-compliant construction work will be utilised to ensure the retrofitting works being carried out are safe. The contractor(s) awarded the retrofitting works will be responsible for ensuring the works are carried out in accordance with all relevant regulations. Measures taken will include:
- Requiring works delivery contractors to provide the Council with copies of its Compliance Plan and Construction Compliance Notification Plan
  - Requiring works delivery contractors to provide the Council with digital photographic evidence of all fire-stopping installations where applicable
  - Engaging with the Scottish Fire and Rescue Service throughout the construction process and requiring a Fire Certificate for the works
- 7.6.4 Particular attention will be given to the selection of any external cladding chosen for the works (should a building be re-clad/over-clad as part of the works) to ensure this has a high level of fire resistance. This will be addressed in the works specifications with statutory permissions where appropriate.

## **7.7 Cost Management**

- 7.7.1 The works delivery contractors are ultimately responsible for managing costs in relation to the delivery of the programme works. Regular cost monitoring of the programme will be carried out by the Programme Manager with financial

reporting at the regular Working Groups. The appointed Council SCD works delivery team (with a joint duty of care) will provide cost management during the construction phase to ensure that design, Health & Safety and Cole Report considerations are met.

- 7.7.2 The professional fees of the Council's SCD team in delivering this programme have already been factored in as part of the overall project costs for each building and is estimated at 15%.

## **7.8 Environmental Management**

- 7.8.1 With the project being a GGA Pathfinder Project/Programme, environmental management including the monitoring of carbon emissions reductions is already embedded in the project as the programme's main deliverables and outcomes.

## **7.9 Stakeholder Management**

- 7.9.1 Refer to section 7.3: Outcomes Governance and Monitoring for stakeholder management arrangements with the Scottish Government and SFT representatives. For Council internal stakeholder management, the Programme Manager will be the lead and will conduct both informal and formal consultation with key project stakeholders via the GGA Pathfinder Project/Programme Working Groups. GGA Pathfinder Project/Programme Working Groups will be held at regular intervals to programme completion.
- 7.9.2 The main impact on each of the building's stakeholders and the community will be during the works delivery/retrofitting phase. It is unclear at this point if full decants or partial decants of the affected buildings will be required for the works to proceed as the level of decant will be dependent on the detailed EnerPHit interventions targeted for each specific building. For instance, if a building is designed to have wall insulation installed on the external façade (known technically as over-cladding), then the disruptions to the building users would be less than say, internal wall insulation that would be fitted internally. The level of decanting required for each building will not be known until after the EnerPHit Detailed Design stage.

## **7.10 Communications and Change Management**

- 7.10.1 The Programme Manager will be the main point of contact for external stakeholders such as the Scottish Government and SFT representatives to ensure consistency in messaging/approach relating to the programme for all stakeholders that could include Elected Members and the media.
- 7.10.2 The Programme Manager will be expected to work closely with the Council's Communications Team throughout the duration of the project.

- 7.10.3 The Programme Manager will also be the main point of contact with Council internal stakeholders and ensure there is early engagement and consultation with each of the affected building's users and stakeholders for communications management and to manage expectations. An Engagement Plan will be developed for each individual building prior to works delivery to take into account each building's user requirements, the effects of the works on building operations, individual building circumstances and stakeholders.
- 7.10.4 To ensure the works during the works delivery phase are delivered in a safe manner and that each building's operational disruptions are kept to a minimum (including for example any affected school activities for the school buildings), there will be regular project coordination meetings between the Programme Manager, SCD and the buildings users' representatives and there will be regular dialogue and communications. For a school building this will mean regular project coordination meetings with the affected school's Head Teacher and Business Manager.
- 7.10.5 Where a building project will displace and affect community users e.g. such as community activities taking place out-with school hours in a school building, the project delivery teams will liaise with the School Lets team to offer alternative venues where possible. The project delivery teams will work with Council stakeholders to ensure alternative arrangements are made for any necessary school or community services- e.g. for school buildings the provision of breakfast clubs and after-school care for continuity of provision of service.
- 7.10.6 To promote the GGA Pathfinder Project/Programme and to better communicate the programme to reach a wider audience, the Council has compiled a GGA Pathfinder Project/Programme promotional video to explain the objectives of the programme and to explain how this programme is supported and partially funded by the Scottish Government via the GGA fund.
- 7.10.7 With the programme being a key component of the Council's Carbon Strategy and the CERP, and with the programme delivery duration expected to span from 2022/23 to 2027/28, there will be annual updates on the programme status to the relevant Council Committees.

## **7.11 Risk Management**

- 7.11.1 A Risk Register has been developed for the programme and is set out in [Appendix R: Programme Risk Register](#) of this business case. Multiple risks to the programme have been identified as having actions to be taken to mitigate each (where appropriate). The top four risks (with the highest risk scores) associated with this programme are:
1. The entire Pathfinder Project/Programme delivery is delayed.
  2. Actual programme delivery costs are higher than projected. This could be due to higher programme costs due to the impacts of Covid-19.
  3. Ensuring adequate Quality/Inspection regime on site (in particular maintaining the air-tightness control layer).

4. External factors which are outwith the Council's control which could affect the project 'buy in' and the pace of future delivery.

7.11.2 Risk Management and in particular the programme's identified high and medium risks will be tabled and discussed with the programme stakeholders at the regular GGA Pathfinder Project/Programme Working Groups as an agenda standing item.

7.11.3 The Council's risk scoring and risk ratings methodology is summarised in [Appendix S: Council Risk Ratings/Scoring Guide \(for reference\)](#)

## **7.12 Benefits Measurement and Management**

7.12.1 The direct benefits for the Council from the programme are principally sustainability and Net Zero benefits. With the programme benefits and outcomes being closely linked to the release of future GGA funding, measurable outcomes targets will be set which will be measured, monitored, and reported upon throughout the duration of the programme as mentioned in the economic case section of the report.

7.12.2 No specific targets have been set around the financial benefits to the Council but the expectation is that the Council will realise benefits over the lifespan of the buildings which have undergone EnerPHit approach interventions.

## **7.13 Key Programme Management and Governance Documents**

7.13.1 The key programme management and governance documents, which this business case has been prepared with due regard to are summarised in [10.1 Appendix A- Background Reading and External References](#).

## **7.14 Summary of the Management Case**

7.14.1 In summary, measures are in place for the governance and management of the programme from its current stage through to completion. Strategies and Management Plans will be put in place for the management of key aspects of the programme such as Health and Safety Management, Communications and Change Management and Risk Management.

## Section 8: Conclusions & Recommendations

### 8.1 Conclusions & Recommendations

- 8.1.1 It is concluded that the programme aligns with the Council's strategic aims; that the programme secures best value and represents the best option available; that the programme is affordable and fundable; that the programme is commercially viable and can be procured in line with relevant regulations and that the programme is deliverable.
- 8.1.2 The programme is expected to deliver both financial and sustainability benefits for the Council with a focus on sustainability/Net Zero benefits. The programme will make contributions to address several key Council challenges and priorities, particularly the contribution that this programme will make towards the achievement of the Council's sustainability target of achieving Net Zero by 2030. This programme is aligned to Edinburgh 2030 Climate Strategy and the successful delivery of this programme is a key part of the Council's Emissions Reductions Plan or CERP. Overall, the programme is a good strategic fit with a case for change.
- 8.1.3 The programme is judged to be the best way of addressing the key Net Zero challenges in retrofitting the Council's existing portfolio of operational buildings (which form the majority of the Council's non-housing portfolio buildings) and in delivering the benefits. Alternative buildings retrofitting standards were assessed and were judged to be less suitable, with the EnerPHit standard of retrofitting operational buildings to be superior to the alternatives considered (including a 'Do Nothing' option).
- 8.1.4 The programme will be a pioneering EnerPHit buildings programme for the Council, for Edinburgh and for Scotland as a whole and it is no coincidence that the Scottish Government has selected the programme as one of their six national GGA Pathfinder Projects/Programmes.
- 8.1.5 Should this business case be approved and the programme proceed, the programme will be the Council's first EnerPHit retrofit programme. The implementation of this programme will set the direction, 'pave the way' and will build up the skillsets and experience needed within the Council to apply a similar EnerPHit informed approach to the Council's large stock of existing operational buildings.
- 8.1.6 The programme is expected to offer small financial returns on the initial capital investment with respect to the reduction of future buildings operational and running costs in the short-term. This is mainly due to the switch from gas to electricity as the primary heating source for many of the buildings and with the current high unit cost of electricity compared to gas.
- 8.1.7 The programme will however, offer other non-financial benefits such as making significant contributions to the reduction of carbon emissions for the

selected operational buildings and it provides futureproofing and buildings resilience for the future. The programme reduces the need to offset emissions and thus reduce offsetting costs. The programme will improve and build up EnerPHit knowledge and experience in the Council, create new sustainability related jobs and opportunities and will lead to reputational benefits for the Council.

- 8.1.8 The programme will lead to a cultural and behavioural shift in the way the Council will approach future operational buildings retrofits. The traditional approach with regards to capitalised retrofitting of buildings is one that has been focused on improving or maintaining buildings to a good asset condition- and thereby managing buildings asset risk. The programme will help bring about a new 'enhanced retrofitting' regime- one that considers not only asset condition and asset risk but also Net Zero/sustainability considerations.
- 8.1.9 Provision for the capital funding required to proceed with the programme has already been made as part of a 'Sustainable Capital Budget Strategy 2022-2032' paper that was presented to the February 2022 Finance & Resources Committee. The capital funding required for the project is estimated to be approximately £61.830m over 5-years from 2022/23 to 2027/28.
- 8.1.10 The Council has further secured funding from the Scottish Government for the programme- the GGA fund to the value of £10m that will help to part fund the programme. The payment will however be revenue payment and payment will be made in arrears subject to certain agreed programme outcomes and deliverables being achieved through programme delivery.
- 8.1.11 Detailed governance arrangements will be developed prior to the delivery of the programme, including Risk Management, Health and Safety Management, Stakeholder Management, Communications & Change Management and Benefits Management. Overall, it is considered that adequate arrangements are in place to enable the programme to be successfully delivered by the Council.

## Section 9: Next Steps

### 9.1 Recommended Next Steps

- 9.1.1 Should approval be granted for the programme to proceed, the Council will proceed with the Detailed Design and Procurement stages and seek to enter into the various agreements required to deliver the programme of works based on the proposed 4-phases arrangement.
- 9.1.2 An immediate priority will be appointing the members of GGA Pathfinder Project/Programme Team and in particular the appointment of the Programme Manager to proceed with the next stage of this new programme. As retrofitting/site works are planned to begin in Q4 2022/23, it will be necessary to make these appointments expeditiously.
- 9.1.3 A series of Specific, Measurable, Achievable, Relevant and Time-Based (SMART) programme level outcomes/metrics (such as projected carbon emission reductions) and programme level metrics will be proposed by the Council and these metrics agreed with the Scottish Government. The agreed metrics and outcomes will be measurable such that it could be demonstrably proved that these metrics/outcomes have been met as the programme phases are being completed.
- 9.1.4 Considerable EnerPHit preparation and capital planning/analysis for the programme have already been completed, with all the EnerPHit feasibility studies for the 12 selected buildings either been completed or nearing completion. Should this business case be approved, the focus on Detailed Design and specifications development and procurement will be on the proposed Phase 1 works that are Brunstane Primary School and Lorne Primary School.
- 9.1.5 With both Phase 1 buildings being school properties and with the site works not due to commence until Q4 2022/23, the first significant window for disruptive works in the schools will be the 2023/2024 schools Easter and summer holidays, although where possible the works should continue over the course of the year, where they can co-exist with an operational school environment.
- 9.1.6 Steps have already been taken by the works delivery teams with respect to the training and upskilling of Council resources to deal with the expected considerable volume of planned EnerPHit informed works in the future. The training and upskilling will be expanded as part of an EnerPHit Training and Upskilling Plan- not only to the works delivery teams but to those who would be closely involved in this programme.

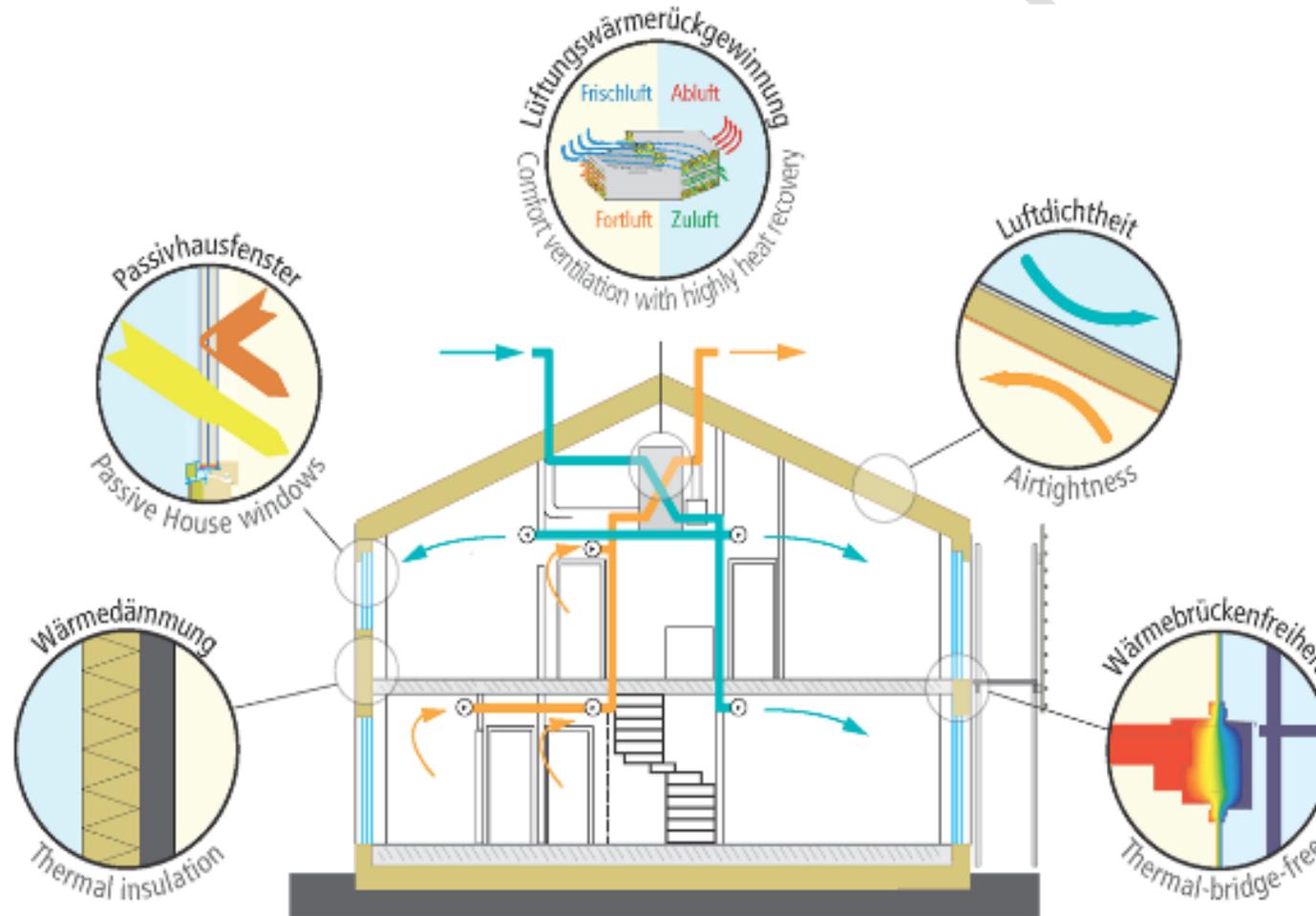
## Section 10: Appendices

- 10.1 [Appendix A: Background Reading and External References](#)
- 10.2 [Appendix B: EnerPHit '5-Principles' Diagram](#)
- 10.3 [Appendix C: Comparison of Different Retrofit Standards](#)
- 10.4 [Appendix D: Buildings Selection Best-Value Matrix and Methodology](#)
- 10.5 [Appendix E: GGA Project/Programme Outcomes Summary](#)
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- 10.7 [Appendix G: Methodology used to calculate CO2 emissions savings](#)
- 10.8 [Appendix H: Council Programme Management and Delivery Organogram](#)
- 10.9 [Appendix I: Increase in Green Jobs & Opportunities \(Council\)](#)
- 10.10 [Appendix J: Increase in Green Jobs & Opportunities \(Supply Chain\)](#)
- 10.11 [Appendix K: Capital Cost Estimates for each Intervention Option](#)
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- 10.13 [Appendix M: Intervention Option 1 Implications Appraisal](#)
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- 10.16 [Appendix P: Intervention Option 4 Implications Appraisal](#)
- 10.17 [Appendix Q: Green Growth Accelerator EnerPHit Tranche 1 Programme](#)
- 10.18 [Appendix R: Programme Risk Register](#)
- 10.19 [Appendix S: Council Risk Ratings/Scoring Guide \(for reference\)](#)

## 10.1 Appendix A- Background Reading and External References

1. The Council's paper entitled 'Addressing the Net Zero Operational Carbon Target across the Operational Estate' approved by the Asset Management Board on 17 November 2020
2. Link to the Council's 'Council Emissions Reduction Plan' (CERP) approved at the Council's Policy & Sustainability Committee on 30 November 2021  
[CERP](#)
3. Link to the Council's Citywide 2030 Climate Strategy approved at the Council's Policy & Sustainability Committee on 30 November 2021  
[Citywide 2030 Climate strategy](#)
4. Link to the December 2019 Finance and Resources Committee Report on the Feasibility of Deep Energy Retrofits of Operational Council Buildings  
[Finance and Resources Committee, Friday 6 December 2019, Feasibility of Deep Energy Retrofit of Operational Council Buildings](#)  
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## 10.2 Appendix B- EnerPHit '5-Principles' Diagram



EnerPHit typically focuses on: 1) Improved thermal insulation; 2) Energy efficient windows; 3) Comfort ventilation, heat recovery & energy efficient heating system & circulation; 4) Airtightness and 5) Reduction of thermal bridging

## 10.3 Appendix C: Comparison of Different Retrofit Standards

No.	Building Retrofit Standard and Methodology Description	Key Metrics of the Standard	Perceived Advantages of this Standard	Perceived Disadvantages of this Standard
1	 <p><b>EnerPHit</b> Passive House Institute</p>	<p><u>Energy Demand Certification Method</u></p> <ol style="list-style-type: none"> <li>1) Heating demand: <math>\leq 25\text{kWh/m}^2\text{a}</math></li> <li>2) Cooling demand: equal to PH</li> <li>3) PER: demand <math>\leq 60 + (\text{QH-QH,PH}) \cdot f \cdot \text{PER,H} + (\text{QC-QC,PH}) \cdot 1/2 (+/- 15\text{kWh/m}^2\text{a Compensation of deviation by different amount of renewable generation) (Plus: } \leq 45\text{...}, \text{ Premium: } \leq 30\text{...})</math></li> <li>4) Airtightness (n50): <math>\leq 1 \text{ h}^{-1}</math></li> <li>5) Frequency of overheating (<math>\leq 250</math>) <math>&lt; 10\%</math></li> </ol> <p><u>Building Component Certification Method</u></p> <p>U-Value Requirements:</p> <ol style="list-style-type: none"> <li>1) Envelope ground U-Value (Ext Insul): <math>0.15 \text{ W}/(\text{m}^2\text{K})</math></li> <li>2) Envelope ambient U-Value (Ext Insul): <math>0.15 \text{ W}/(\text{m}^2\text{K})</math></li> <li>3) Envelope ambient U-Value (Int Insul): <math>0.35 \text{ W}/(\text{m}^2\text{K})</math></li> <li>4) Windows Wall Installed: <math>0.85 \text{ W}/(\text{m}^2\text{K})</math></li> <li>5) Windows Pitched Roof Installed: <math>1.00 \text{ W}/(\text{m}^2\text{K})</math></li> <li>6) Windows Flat Roof Installed: <math>1.10 \text{ W}/(\text{m}^2\text{K})</math></li> <li>7) Glazing g-value: <math>U_g \cdot g \cdot 1.6 \leq 0</math></li> <li>8) Solar load during cooling period: <math>100 \text{ kWh/m}^2\text{a}</math></li> <li>9) Minimum heat recovery: <math>75\%</math></li> </ol>	<p><u>Energy Demand Certification Method</u></p> <ol style="list-style-type: none"> <li>1) Highly rigorous standard achieved through the use of PHPP modelling software to ensure a minimal performance gap between the designed proposal and final building</li> <li>2) Internationally recognised as a highly reliable, rigorous standard</li> </ol> <p><u>Building Component Certification Method</u></p> <ol style="list-style-type: none"> <li>1) Alternative route to certification which allows a higher overall heating demand but sets out specific U-Values which must be achieved for each of the building components. if not possible to meet the overall heating demand due to constraints of working with an existing building</li> <li>2) Allows flexibility when working with the constraints and possible unknowns of working with an existing building</li> </ol>	<p><u>Energy Demand Certification Method</u></p> <ol style="list-style-type: none"> <li>1) Stringent standard which can be very difficult to achieve on some retrofit projects</li> <li>2) Requires input from specialist consultants and independent certifiers to achieve certification which can be a lengthy and protracted process</li> </ol> <p><u>Building Component Certification Method</u></p> <ol style="list-style-type: none"> <li>1) Can be more onerous to evidence and achieve all of the specified building component U-Values</li> </ol>
2	 <p><b>Association for Environment Conscious Building (AECB)</b></p>	<ol style="list-style-type: none"> <li>1) Heating &amp; cooling: <math>\leq 50\text{kWh/m}^2 \text{ a}</math> or <math>\leq 100 \text{ kWh/m}^2 \text{ a}</math> (with exemption)</li> <li>2) Primary Energy: NA</li> <li>3) Primary Energy Renewable: NA</li> <li>4) Airtightness (n50): <math>\leq 2 \text{ h}^{-1}</math></li> <li>5) Thermal Bridges: Psiexternal</li> <li>6) Summer overheating: <math>&lt; 10\%</math></li> <li>7) Surface Condensation: <math>0.75</math></li> </ol>	<ol style="list-style-type: none"> <li>1) Less onerous standard to achieve than EnerPHit although still uses the PHPP software for design assessment</li> <li>2) Lower certification costs since self-certification is possible, with only an independent energy consultant required to approve the certification documents</li> </ol>	<ol style="list-style-type: none"> <li>1) Sets lower energy standard overall than the EnerPHit standard</li> <li>2) Less stringent evidencing and certification process</li> </ol>

3	  	<p>The EuroPHit project was a Europe wide research project, applying the EnerPHit standard to a range of retrofit projects which informed the development of the ERP and the step-by-step certification process. Key metrics:</p> <ol style="list-style-type: none"> <li>1) Same final targets as EnerPHit standard achieved through a step-by-step retrofit process. The first retrofit stage must fulfill the following requirements to achieve pre-certification: <ol style="list-style-type: none"> <li>a) EnerPHit Retrofit Plan (ERP) must be submitted which sets out the step-by-step plan to achieve the EnerPHit standard. The first modernisation step must have been completed according to the ERP</li> </ol> </li> <li>2) To meet the pre-certification requirements for the first retrofit stage, the energy demand must have been reduced in one of the following ways: <ol style="list-style-type: none"> <li>a) Heating/cooling demand: <math>\leq 20\%</math> or <math>40\text{kWh}/(\text{m}^2\text{a})</math> reduction</li> <li>b) Primary Energy or Primary Energy Renewable: <math>\leq 20\%</math> reduction</li> <li>c) Modernisation in accordance with the ERP: <math>\leq 1</math> x property unit modernised (in a building with several owners)</li> <li>d) New extension has been added in accordance with the ERP</li> <li>e) Leakage detection has carried out</li> </ol> </li> </ol>	<p><u>Step-by-Step Approach to EnerPHit</u></p> <ol style="list-style-type: none"> <li>1) Either Energy Demand or Building Component Certification Route can be pursued</li> <li>2) Costs to fund stages of work can be spread over a longer period of time, allowing easier cost management</li> <li>3) Allows elements of the building to be replaced when convenient or when they have reached the end of their lifespan, reducing the upfront and possibly avoidable cost of upgrading all building components at once</li> <li>4) Allows the opportunity to review the effectiveness of the retrofit measures following each stage and subsequent works to respond to this feedback</li> </ol>	<p><u>Step-by-Step Approach to EnerPHit</u></p> <ol style="list-style-type: none"> <li>1) Risk that some building elements which have already been upgraded will be damaged during later construction works to carry out further retrofit measures</li> <li>2) Likely to result in higher overall costs due to less efficient construction process and more complex multi-stage programme planning</li> <li>3) Upgrading building components in stages may not allow the upgraded elements to function effectively until all measures have been implemented</li> <li>4) Greater disruption to the building user, with multiple periods of time when the building must be vacated (although this may suit schools if works can be undertaken during the summer holidays)</li> </ol>
4	 <b>British Standards Institution (BSI)</b>	<p>Suite of UK buildings retrofit standards</p>	<ol style="list-style-type: none"> <li>1) Assesses up to 30 improvement strategies individually from a payback and carbon efficiency point of view i.e. fabric improvements, services improvements, etc.</li> </ol>	<ol style="list-style-type: none"> <li>1) Does not allow for 'whole-house' or 'whole building' type approach</li> <li>2) Currently going through consultation stage, so draft guidance</li> </ol>
5	 <b>Net Zero Public Sector Buildings Standard (NZPSBS)</b>	<p>A voluntary Standard produced by SFT that supports public bodies meet their Net Zero commitments with Scottish Government recommended targets. Note that early targets will be set by participants with Government approval.</p> <p>Participants to contact Scottish Government to determine the current targets applicable to its building categories and sector. Applicants to commit to achieving these targets which are separated into 6 stages</p>	<ol style="list-style-type: none"> <li>1) The Standard is intended to be sufficiently flexible to be applied under a wide range of procurement routes, delivery mechanisms, finance options and accounting treatments. As a general guide, the responsibility to meet targets is owned by the lead participant for which the building is designed and operated.</li> </ol>	<ol style="list-style-type: none"> <li>1) Different routes delivery mechanisms, finance options and accounting treatments can lead to difficulty in comparing like for like approaches. The Council has strict guidelines on acceptable procurement routes which may exclude some options.</li> <li>2) The document establishes a standard methodology to achieve a Net Zero Public Sector Building Standard rather than being a standard itself with tangible and specific metrics or targets to meet. As such, it can be open to interpretation rather than setting hard targets and metrics.</li> </ol>

## 10.4 Appendix D: Buildings Selection Best-Value Matrix and Methodology

No.	EnerPHit Works Implementation Selection Index Question	Selection Index Category	Selection Criteria Scoring (The higher the scoring the more likely the building is to be selected for EnerPHit works implementation)	Selection Index Scoring Description	Selection Index Scoring Logic	Selection Index Percentage out of 100 (%)
1	What is the current EPC rating of the building?	Technical (Energy and Net Zero Carbon considerations)	A-0 (Black) B- 1 (Red) C- 1 (Red) D- 2 (Amber) E- 2 (Amber) F- 3 (Green) G- 3 (Green)	The Energy Efficiency Certificate (EPC) rating of a building is a measure of how energy efficient (in terms of running cost) a building is. An 'A' rated building is a very energy efficient building (low running costs) and a 'G' rated building is not energy efficient (high running costs)	An existing building with a poor EPC rating will see the most benefits (both energy efficiency and Low Carbon) if it is retrofitted to EnerPHit standards therefore it will be scored higher than a building with an existing good EPC rating	10%
2	Will this building be used by CEC in the future as a long-term CEC asset in its current form (to maximise our EnerPHit capital investment)?	Operational and strategic considerations	Yes- 3 Maybe/Unsure- 2 No- 1	A building/asset that will be used by CEC for the foreseeable future will see the best value and return on the EnerPHit capital investment- i.e. we should not EnerPHit a building and then a few years later the building is then demolished, sold off or redeveloped. We want CEC to reap the full value of our investment	The longer a building is expected to be in CEC ownership/stewardship the higher the scoring as it would see a better return on the investment	10%
3	Is this building targeted for major building fabric capital lifecycle works within the next five years?	Technical (Condition/risk based consideration)	Yes- 3 Maybe- 2 No- 1	A building/asset that is due a major condition-based capital lifecycle works investment within the next five years anyway is considered to be better value and better return on our investment. EnerPHit is essentially 'opportunity works' which should be undertaken at the same time as the condition-based works	If a building is scheduled for major building fabric capital lifecycle works anyway within the next five years the scoring for that building will be higher. This is based on the logic that we are getting a better return (both condition and energy/Net Carbon Zero improvements) on our investment	10%
4	Are the planned lifecycle works 'EnerPHit Compatible' with the 5 main EnerPHit principles? (Thermal insulation, energy efficient windows, energy efficient heating system, airtightness & reducing thermal bridges)	Technical (Energy and Net Zero Carbon considerations)	3 or more compatibility- 3 2 principles compatibility- 2 At least 1 compatibility- 1 None compatibility- 0	A building/asset that is due a major condition-based capital lifecycle works investment within the next five years and which the works are compatible with EnerPHit principles of (Thermal insulation, energy efficient windows, energy efficient heating system, airtightness & reducing thermal bridges)	The more items of planned capital lifecycle works which are compatible with the 5 EnerPHit principles, the higher scoring that building will be. For example, a building that has planned boiler replacement and roofing replacement works will be scored higher compared to a building that has planned toilet refurbishment works only	10%
5	Of the 12 properties, where does the building rank in terms of its energy use per m2? (ranked 1st to 12th from highest energy use to lowest)	Technical (Energy and Net Zero Carbon considerations)	1st, 2nd, 3rd & 4th- 3 5th, 6th, 7th & 8th- 2 9th, 10th, 11th & 12th- 1	A building/asset that has high annual energy costs (in particular gas consumption costs) per m2 is likely to be less energy efficient	The higher a building's existing energy use per m2, the higher the scoring as the biggest benefit is by targeting works to buildings which are the least energy efficient and which have high energy consumption rates per m2	10%

6	Deliverability & Affordability- given current cost pressures how affordable in terms of capital funding is this building compared to the other Tranche 1 buildings? What is its ranking out of 12 (lowest to highest capital investment cost)?	Deliverability and Affordability considerations	1st, 2nd, 3rd & 4th- 3 5th, 6th, 7th & 8th- 2 9th, 10th, 11th & 12th- 1	At the time of writing, the EnerPHit works in the Asset Management Works programme are currently unfunded, with the biggest capital cost pressure in 2022/23 and 2023/24. In view of this, smaller EnerPHit projects (by estimated cost and contract value) are preferred in the first two years of the EnerPHit programme	The lower the estimated EnerPHit cost of a building the higher the scoring as it is better in CEC's short -term affordability and deliverability	10%
7	What is the building's current condition rating?	Technical (Condition/risk based consideration)	Condition A- 0 Condition B- 1 Condition C- 2 Condition D- 3	A building/asset's current condition rating, based on Scottish Government's 'Core Facts' scoring; is a good indicator of value as it is better value to EnerPHit a poor condition building than a building that is in already good condition	The poorer the condition of the building, the higher the scoring as it is better in terms of value to EnerPHit a poor condition building while incorporating Net Zero Carbon considerations at the same time	10%
8	If this building is retrofitted to an EnerPHit standard, how well will the EnerPHit improvements align with the buildings operability and building user requirements and how the building fits into CEC's overall Property & Asset Management Strategy?	Operational and strategic considerations	Good alignment- 3 Medium alignment- 2 Poor alignment- 1	A building that closely aligns with CEC's overall Property & Asset Management Strategy is one that is likely to prove good value in terms of attracting capital investment. These are buildings which due their building type, functionality and location are expected to remain as a CEC operational building for years to come- i.e. they are not 'under review' or 20-minute neighbourhood buildings for which their future is uncertain. In addition, for some buildings, the EnerPHit principles may be at odds with the operational model of the building. For example for nursery buildings, EnerPHit's principle of minimising unnecessary air leakage losses is at odds with CEC nursery's 'Free Flow' policy	A building with an operational strategy that is considered to closely align with the EnerPHit principles will be scored higher as they are considered to be more suitable in adopting an EnerPHit approach	10%
9	What is the primary heating plant used in this building and does it offer Low Zero Carbon benefits if selected for EnerPHit?	Technical (Energy and Net Zero Carbon considerations)	Gas or Oil only- 3 Both Gas & Electric- 2 Electric only- 1	A building/asset that has fossil fuel primary heating plant such as gas or oil as its main source of heating has the greatest potential for decarbonisation and to reduce carbon emissions	If a building uses gas or oil as its primary heating plant fuel source then it will be scored high as the potential to reduce carbon emissions and meet Net Zero Carbon targets will be greatest. A building that uses electricity as its primary heating source will be scored low and a building that uses both gas and electricity will be scored medium	10%
10	Of the 12 properties, where does the building rank in terms of its current carbon emissions per m2?	Technical (Energy and Net Zero Carbon considerations)	1st, 2nd, 3rd & 4th- 3 5th, 6th, 7th & 8th- 2 9th, 10th, 11th & 12th- 1	A building/asset that has high annual carbon emissions per m2 is one that will see the biggest Net Zero Carbon and carbon emissions reductions benefits should an EnerPHit informed approach be adopted	The higher a building's existing carbon emissions per m <sup>2</sup> , the higher the scoring as the biggest benefit is by targeting works to buildings which have the highest carbon emissions figures per m2	10%

Based on this Buildings Selection Methodology, the following scores were calculated for each building:

Site/Building Description	EnerPHit Criteria Scoring & Ranking	Selected for Tranche 1 Feasibility Study?
1) Greengables Nursery and Family Centre	23 out of 24(1st =)	YES
2) Hermitage Park Primary School	23 out of 24 (1st=)	YES
3) Moffat Nursery	23 out of 24 (1st=)	YES
4) South East Local Office	23 out of 24 (1st=)	YES
5) North West Local Office	22 out of 24 (5th=)	YES
6) Ferryhill Primary School	22 out of 24 (5th=)	YES
7) Lorne Primary School	21 out of 24 (7th=)	YES
8) Hillwood Primary School	21 out of 24 (7th=)	YES
9) Trinity Academy Secondary School	19 out of 24 (10th=)	YES

The above 9 building sites (10 buildings) were selected together with the two pilot buildings- Liberton Nursery and Brunstane Primary School for inclusion in the Council's EnerPHit Tranche 1 programme of works

## 10.5 Appendix E: GGA Project/Programme Outcomes Summary

No.	Outcome Description	Unit of measure proposed for this project outcome	How and when will these outcomes will be monitored and measured?	Assumptions made which underpin the outcomes analysis	How will these outcomes relate to GGA project payments from the Scottish Government?	Proposed % of this outcome that is linked to the GGA annual repayment (Cumulative % should be 100%)
1	CO2 emissions reduction benefits and contribution to Net-Zero ambitions	Kilotonne CO2 equivalent saved (per building) per year and cumulatively throughout the project delivery period	Using 2019/20 (pre-Covid) annual gas and electricity consumption figures for each building as baseline figures, the new and actual annual gas and electricity consumption figures expended after completion of interventions will be used as the basis to calculate CO2 equivalent emissions savings (in kgCO2e/kWh) compared to the modelled 'Do Nothing' option for the equivalent year of completion	<p>1) Future electricity emissions factors (in kgCO2e/kWh) are based on BEIS projections (Data Tables 1-19 Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal)</p> <p>2) It is assumed the carbon intensity of the gas grid remains constant over time at 0.18316 kgCO2e/kWh</p> <p>3) Energy savings resulting from the EnerPHit-informed retrofit works are based on the following high-level assumptions:</p> <p>a) Electrification of heating system using heat pumps (no estimation for connection to a heat network).</p> <p>b) The assumed Coefficient of Performance (COP) for air-source heat pumps is assumed to average 2.2.</p> <p>c) Actual 2019/20 consumption data for the 12 targeted buildings is used as a pre-Covid baseline (based on automatic meter readings).</p> <p>e) The fabric improvements after EnerPHit informed interventions as well as the electrification of heat will reduce energy consumption overall (decrease in gas consumption and increase in electricity consumption).</p> <p>g) Of the 4 EnerPHit intervention options, the 'Middle of the Road' intervention option (Option 3) has been assumed to be the intervention option that will be adopted for all 12 buildings and therefore the CO2 emissions reductions calculations have been based on this intervention option.</p> <p>h) The modelled percentage reduction achieved with Option 3 (compared to Option 1 - Do nothing), is then multiplied with historic 2019/20 energy usage (metered)</p> <p>4) It is assumed 10% of the historic gas consumption is used for catering (from CTV019) for Brunstane, Lorne and Ferryhill PS and won't be electrified as part of the GGA project.</p>	<p>1) Upon the completion of EnerPHit informed interventions for each of the 12 buildings included in the pathfinder project, the annual actual gas and electricity consumption for each building will be reported (based on automatic meter readings) and the reduction in gas and electricity usage after interventions will be used to calculate CO2 equivalent emissions (in kgCO2e/kWh).</p> <p>2) Following the interventions to each building, the actual CO2 emissions savings (based on 1 above) will be compared to the estimated CO2 emissions and the actual CO2 emissions savings need to be equal to or exceed the estimated CO2 emissions figures for this project outcome to be deemed to be achieved.</p> <p>3) Should the actual CO2 emissions savings be less than the estimated CO2 emissions savings figures, then the percentage of outcomes completion for each building will be calculated as 'Actual CO2 emissions savings/Estimated CO2 emissions savings x 100%'.</p>	50% (i.e. 50% of the agreed annual GGA revenue repayment sum will be paid out upon successful achievement of this project outcome)

2	More 'green' and sustainable buildings (in terms of GIA) with improved buildings comfort, resilience and futureproofing	m2 of building Gross Internal Area (GIA) retrofitted to an EnerPHit informed standard per year and cumulatively throughout the project delivery period	Once a building has undergone EnerPHit informed interventions, the GIA of a building will be surveyed and measured	Of the 4 EnerPHit intervention options, the 'Middle of the Road' intervention option has been assumed to be the intervention option that will be adopted for all 12 buildings.	<p>1) Upon the completion of EnerPHit informed interventions for each of the 12 buildings included in the pathfinder project, the GIA of each building that has undergone EnerPHit interventions will be measured/confirmed and will be compared (as a percentage) to the overall GIA of the building before works.</p> <p>2) The actual GIA of a building that has undergone EnerPHit interventions needs to be equal to the overall GIA of the building before works.</p> <p>3) Should the actual GIA of a building that has undergone EnerPHit interventions be less than the overall GIA of the building before works, then the percentage of outcomes completion for each building will be calculated as 'Actual GIA of a building that has undergone EnerPHit interventions / Overall GIA of the building' before works x 100%'.</p>	30% (i.e. 30% of the agreed annual GGA revenue repayment sum will be paid out upon successful achievement of this project outcome)
3	Promotion of 'green' jobs and new opportunities	Number of Full-Time Equivalent (FTE) of an employee (both standard employee and an apprentice employee) per year and cumulatively throughout the project delivery period	The number of FTEs for standard and apprentice level employees employed by both CEC and the supply chain as a direct result of the GGA project, evidenced by employment records and project organograms	<p>1) CEC will need to form a new GGA project delivery team (both strategic development/coordination and works implementation delivery) throughout the project delivery period.</p> <p>2)The requirement to include the promotion of new green jobs/green opportunities and apprenticeships will be included in the tender documents for the new project contracts on the supply chain side.</p>	<p>1) Upon the completion of EnerPHit informed interventions for each of the 12 buildings included in the pathfinder project, the number of FTEs (both standard and apprentice employee) employed by CEC and by the supply chain during the project delivery will be recorded and compared to the estimated number of FTEs.</p> <p>2) The actual number of FTEs employed during the project delivery of a particular building needs to be equal or greater than the number of estimated FTEs.</p> <p>3) Should the actual number of FTEs employed during the project delivery be less than the number of estimated FTEs, then the percentage of outcomes completion for each building will be calculated as 'Actual number of FTEs employed during the project deliver / The number of estimated FTEs' x 100%'.</p>	10% (i.e. 10% of the agreed annual GGA revenue repayment sum will be paid out upon successful achievement of this project outcome)
4	Promotion of sustainability and Net Zero knowledge/skillsets and other	1) Number of CEC employees trained to a Passivhaus/EnerPHit certified practitioner or designer level per year and cumulatively throughout the project delivery period.	<p>1) The number of CEC employees trained to a Passivhaus/EnerPHit certified practitioner or designer level.</p> <p>2) The number of CEC employees trained to a Passivhaus/EnerPHit</p>	<p>1) CEC will develop an EnerPHit/Sustainability Training and Upskilling Plan throughout the project delivery period.</p> <p>2) The requirement to promote sustainability and Net Zero knowledge/skillsets and other community benefits will be included in the tender documents for the new project contracts on the supply chain side.</p>	1) Upon the completion of EnerPHit informed interventions for each of the 12 buildings included in the pathfinder project, the number of people who have undergone EnerPHit training and upskilling (both certified practitioner/designer and introductory levels) by CEC and by the supply chain during the project delivery will	10% (i.e. 10% of the agreed annual GGA revenue repayment sum will be paid out upon successful achievement of

	community benefits	<p>2) Number of CEC employees trained to a Passivhaus/EnerPHit introductory standard level (in-house training by CEC Passivhaus/EnerPHit certified practitioner or designer) per year and cumulatively throughout the project delivery period.</p> <p>3) Number of external supply chain operatives trained to a Passivhaus/EnerPHit certified practitioner or designer level per year and cumulatively throughout the project delivery period.</p> <p>4) Number of external supply chain operatives trained to a Passivhaus/EnerPHit per year to an introductory standard level and cumulatively throughout the project delivery period.</p> <p>5) Number of meetings (either in-person or online) CEC have engaged with other Scottish Local Authorities to promote Green Growth and to share EnerPHit knowledge.</p>	<p>introductory standard level.</p> <p>3) The number of external supply chain involved in the project being trained to a Passivhaus/EnerPHit certified practitioner or designer level.</p> <p>4) The number of external supply chain involved in the project being trained to a Passivhaus/EnerPHit introductory standard level.</p> <p>5) The number of meetings CEC have engaged with other Scottish Local Authorities to promote Green Growth and to share EnerPHit knowledge.</p>		<p>be recorded and compared to the estimated number.</p> <p>2) The actual number of people upskilled or trained as a direct result of the GGA project needs to be equal or greater than the estimated number.</p> <p>3) Should the actual number of people upskilled or trained as a direct result of the GGA project be less than the estimated number, then the percentage of outcomes completion for each building will be calculated as 'Actual number of people upskilled or trained during the project delivery / The estimated number' x 100%'.  </p>	this project outcome)
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## 10.6 Appendix F: Programme CO2 Emissions Reductions Summary

Buildings Outcomes Yearly Breakdown- CO2 Emissions Reductions Summary (Kilotonne CO2 equivalent saved)										
Number	Delivery Phase	Building Description	CO2 Emissions Reductions (Kilotonne CO2 equivalent saved)							
			2022/23 Estimated - based on 2022 EF	2023/24 Estimated - based on 2023 EF	2024/25 Estimated - based on 2024 EF	2025/26 Estimated - based on 2025 EF	2026/27 Estimated - based on 2026 EF	2027/28 Estimated - based on 2026 EF	Estimated Total 2022/23 to 2027/28- based on future EF projections	Total Actual
1	Phase 1	Lorne Primary School	Works start	Works	0.029	0.027	0.031	0.036	<b>0.123</b>	TBC
2		Brunstane Primary School Main Building	Works start	Works	0.005	-0.001	0.010	0.025	<b>0.038</b>	TBC
3	Phase 2	North West Local Office Main Building		Works start	Works	0.050	0.052	0.056	<b>0.158</b>	TBC
4		Greengables Nursery Main Building		Works start	Works	0.005	0.006	0.007	<b>0.018</b>	TBC
5		Greengables Family Centre Main Building		Works start	Works	0.006	0.006	0.007	<b>0.019</b>	TBC
6	Phase 3	South East Local Office Main Building			Works start	Works	0.070	0.075	<b>0.146</b>	TBC
7		Ferryhill Primary School Main Building			Works start	Works	0.007	0.019	<b>0.026</b>	TBC
8		Liberton Nursery Main Building			Works start	Works	0.023	0.024	<b>0.047</b>	TBC
9		Hillwood Primary School Main Building			Works start	Works	0.066	0.069	<b>0.135</b>	TBC
10	Phase 4	Trinity Academy Block A				Works start	Works	0.045	<b>0.045</b>	TBC
11		Hermitage Park Primary School Main Building				Works start	Works	0.036	<b>0.036</b>	TBC
12		Moffat Nursery Main Building				Works start	Works	0.013	<b>0.013</b>	TBC
<b>TOTAL</b>					<b>0.033</b>	<b>0.086</b>	<b>0.271</b>	<b>0.411</b>	<b>0.802</b>	

## 10.7: Appendix G: Methodology used to calculate CO2 savings

### 1) Objective

To clarify the methodology used to calculate the expected CO2 emissions savings for each of the 12 Green Growth Accelerator (GGA) Pathfinder Project buildings after completion of the EnerPHit informed interventions included in the project.

### 2) Assumptions

1. The 'Middle of the Road' EnerPHit informed intervention option is used as the basis for the CO2 emissions calculations for all 12 GGA project buildings.
2. CO2 emissions pertain to a building's operational carbon only- embodied carbon is excluded.
3. Gas and electricity usage figures are measured in kWh.
4. CO2 equivalent emissions are measured in units of kgCO2e
5. UK Electricity Grid Emission Factor and Gas Grid Emission Factors are measured in units of kgCO2e/kWh.
6. Historic emission factors are published by BEIS (<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020>)
7. Future electricity grid emission factors are based on the BEIS 2032 Emissions Factor (0.035 kgCO2e/kWh) based on BEIS Projections to 2100 supporting the Treasury Green Book supplementary appraisal guidance on valuing energy use and greenhouse gas (GHG) emissions. (Table 1 – Grid average – Consumption-based – Commercial/Public Sector)

### 3) Methodology

1. To calculate 'the estimated CO2 savings for each building', we need to multiply the estimated kWh saved with the CO2 emission factor in the corresponding year- i.e. if a building's retrofitting works to an EnerPHit informed standard commences in 2024 and the works are completed in 2025, the formula to calculate the estimated carbon savings after completion of works is : 2025 emissions (if there had been no retrofit) - 2025 emissions (after retrofit). In other words:

**Intervention Option 1 (Do Nothing) energy consumption (in kWh)\* Year of works completion emission factor (based on BEIS projections) – Option 3 (Middle of the Road) Intervention energy consumption(in kWh)\* Year of works completion emission factor**

**This will be the 'Estimated CO2 savings for each building'- 'A'**

2. The same approach should be used to calculate the estimated CO2 savings for each building for both gas and electricity.
3. Upon completion of the EnerPHit informed interventions, the actual metered gas and electricity usage figures following completion of interventions for each building will be used to calculate the 'actual CO2 emissions after interventions' using the following formula:

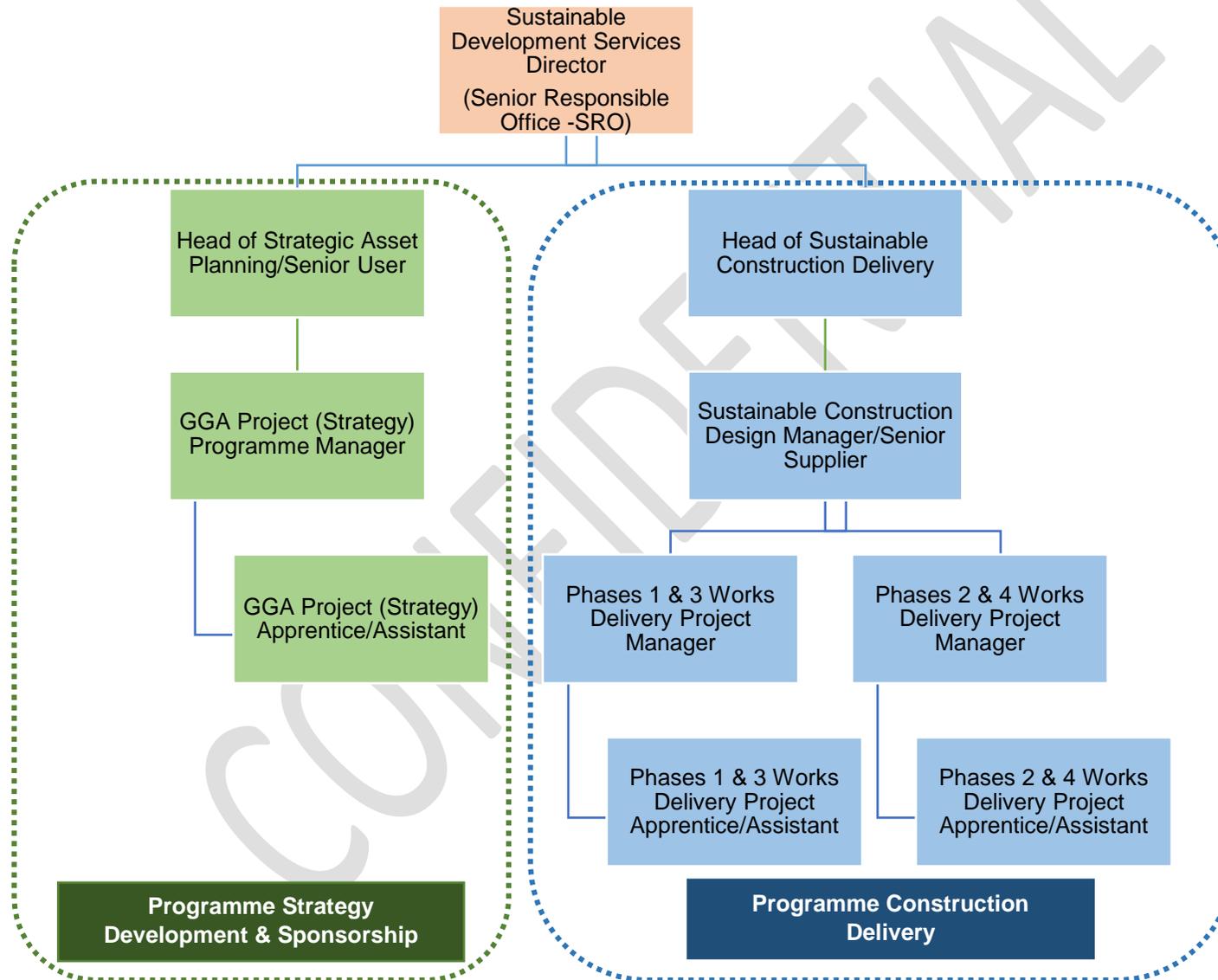
Intervention Option 1 (Do Nothing) energy consumption (in kWh)\* Year of works completion emission factor (most recent BEIS factor, no longer based on projections) - Actual metered energy consumption (in kWh)\* Year of works completion emission factor (most recent BEIS factor, no longer based on projections)

This will be the 'Actual CO2 savings for each building'- 'B'

4. Comparing between 'A' and 'B' CO2 savings will demonstrate if the estimated CO2 savings have been met/achieved by the EnerPHit informed works.

Estimated Energy Savings between 'Do Nothing' (Option 1) and 'Middle of the Road' (Option 3) Interventions										
No.	Delivery Phase	Building Description	Building GIFA (m2)	Gas Savings (kWh)	Electricity Savings (kWh)	Total Gas 2019/20 (kWh)	Total Elec 2019/20 (kWh)	Modelled gas savings (%)	Modelled electricity savings (%)	Cooking Facilities
				Total Estimated	Total Estimated	Historic metered usage		Based on modelled energy savings between Do Nothing (1) and Middle of Road (3)		Historic metered usage assumed cooking equipment when there is a kitchen onsite
1	Phase 1	Lorne Primary School	1,979	280,910	-169,161	312,122	54,652	90%	-310%	Gas (2 meters)
2		Brunstane Primary School Main Building	2,417	379,654	-487,516	421,838	177,058	90%	-275%	Gas
3	Phase 2	North West Local Office Main Building	3,871	358,212	-106,806	358,212	283,589	100%	-38%	-
4		Greengables Nursery Main Building	312	55,261	-34,931	55,261	11,795	100%	-296%	-
5		Greengables Family Centre Main Building	295	52,250	-27,490	52,250	11,152	100%	-247%	-
6	Phase 3	South East Local Office Main Building	3,564	481,664	-144,765	481,664	265,402	100%	-55%	-
7		Ferryhill Primary School Main Building	2,490	273,317	-347,231	303,685	220,076	90%	-158%	Gas (2 meters)
8		Liberton Nursery Main Building	370	134,747	-12,324	134,747	10,451	100%	-118%	-
9		Hillwood Primary School Main Building	1,799	424,360	-97,223	424,360	48,378	100%	-201%	-
10	Phase 4	Trinity Academy Block A	2,868	445,429	-406,313	445,429	121,733	100%	-334%	-
11		Hermitage Park Primary School Main Building	2,343	380,738	-368,357	380,738	110,361	100%	-334%	Electricity
12		Moffat Nursery Main Building	357	86,139	-35,762	86,139	14,764	100%	-242%	-

## 10.8: Appendix H: Council Programme Management and Delivery Organogram



## 10.9: Appendix I: Increase in Green Jobs & Opportunities (Council)

No.	Delivery Phase	Building	Estimated Cost (£000)	2022/23		2023/24		2024/25		2025/26		2026/27		2027/28	
				2022/23 Estimate New FTE	2022/23 Estimate New FTE-Apprentice	2023/24 Estimate New FTE	2023/24 Estimate New FTE-Apprentice	2024/25 Estimate New FTE	2024/25 Estimate New FTE-Apprentice	2025/26 Estimate New FTE	2025/26 Estimate New FTE-Apprentice	2026/27 Estimate New FTE	2026/27 Estimate New FTE-Apprentice	2027/28 Estimate New FTE	2027/28 Estimate New FTE-Apprentice
1	Phase 1	Lorne Primary School	3,915	1	1	1	1	1	1						
2		Brunstane Primary School Main Building	9,064												
3	Phase 2	North West Local Office Main Building	4,953			1	1	1	1	1	1				
4		Greengables Nursery Main Building	3,301												
5		Greengables Family Centre Main Building													
6	Phase 3	South East Local Office Main Building	5,334					1	1	1	1	1	1		
7		Ferryhill Primary School Main Building	7,565												
8		Liberton Nursery Main Building	1,960												
9		Hillwood Primary School Main Building	5,592												
10	Phase 4	Trinity Academy (A)	10,441							1	1	1	1	1	1

11		Hermitage Park Primary School Main Building	7,574													
12		Moffat Nursery Main Building	2,132													
<b>Total per financial year</b>					1	1	2	2	3	3	3	3	2	2	1	1

Notes:

1) Blue numbers denote the number of CEC Full Time Equivalent required for EnerPHit Strategic Development and EnerPHit coordination required per year.  
2) Red numbers denote the number of CEC Full Time Equivalent required for EnerPHit Project Delivery/Construction Management during works implementation/construction required per year

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## 10.10: Appendix J: Increase in Green Jobs & Opportunities (Supply Chain)

No.	Delivery Phase	Building	Estimated Cost (£000)	2022/23		2023/24		2024/25		2025/26		2026/27		2027/28	
				2022/23 Estimate New FTE	2022/23 Estimate New FTE-Apprentice	2023/24 Estimate New FTE	2023/24 Estimate New FTE-Apprentice	2024/25 Estimate New FTE	2024/25 Estimate New FTE-Apprentice	2025/26 Estimate New FTE	2025/26 Estimate New FTE-Apprentice	2026/27 Estimate New FTE	2026/27 Estimate New FTE-Apprentice	2027/28 Estimate New FTE	2027/28 Estimate New FTE-Apprentice
1	Phase 1	Lorne Primary School	3,915	3	1	36									
2		Brunstane Primary School Main Building	9,064												
3	Phase 2	North West Local Office Main Building	4,953			3	1	23							
4		Greengables Nursery Main Building	3,301												
5		Greengables Family Centre Main Building													
6	Phase 3	South East Local Office Main Building	5,334					6	2	57					
7		Ferryhill Primary School Main Building	7,565												
8		Liberton Nursery Main Building	1,960												
9		Hillwood Primary School Main Building	5,592												
10	Phase 4	Trinity Academy (A)	10,441							5	2	56			



## 10.11: Appendix K: Capital Cost Estimates for each Intervention Option

No.	Delivery Phase	EnerPHit T1 Building Description	Building Gross Floor Area (m2)	Minimal Approach		Middle of the Road		Full EnerPHit Approach		Comments
				Cost (£)	Cost/m2 (£)	Cost (£)	Cost/m2 (£)	Cost (£)	Cost/m2 (£)	
1	Phase 1	Lorne Primary School Main Building	1,979	2,347,000	1,186	2,697,000	1,363	4,291,000	2,169	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 22/02/2022
2		Brunstane Primary School Main Building	2417	2,947,500	1,220	6,245,300	2,584	7,750,200	3,207	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 10/09/2021
3	Phase 2	North West Local Office Main Building	3871	2,453,000	634	3,281,000	848	5,498,000	1,421	Final cost estimates from Currie & Brown Feasibility Estimate Report V4 dated 23/02/2022
4		Greengables Nursery Main Building	312	1,064,000	1,753	2,187,000	3,603	3,143,000	5,178	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 22/02/2022
5		Greengables Family Centre Main Building	295							
6	Phase 3	South East Local Office Main Building	3564	2,421,000	679	3,398,000	953	5,296,000	1,486	Final cost estimates from Currie & Brown Feasibility Estimate Report V4 dated 25/02/2022
7		Ferryhill Primary School Main Building	2490	2,681,000	1,077	4,819,000	1,935	6,734,000	2,704	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 22/02/2022
8		Liberton Nursery Main Building	370	597,100	1,576	1,249,200	3,297	1,445,500	3,814	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 10/09/2021
9		Hillwood Primary School Main Building	1799	2,110,000	1,173	3,562,000	1,980	5,237,000	2,911	Final cost estimates from Currie & Brown Feasibility Estimate Report V2 dated 08/02/2022
10	Phase 4	Trinity Academy Block A	2868	4,767,000	902	6,395,000	1,211	8,598,000	1,628	Final cost estimates from Currie & Brown Feasibility Estimate Report V3 dated 02/02/2022
11		Hermitage Park Primary School Main Building	2343	2,748,339	1,173	4,639,140	1,980	6,820,473	2,911	No cost estimates are available for Hermitage Park Primary School as part of the Tranche 1 works. Assume the same unit rate cost per m2 as Hillwood Primary School that is a primary school of similar area and building configuration
12		Moffat Nursery Main Building	357	873,000	2,446	1,306,000	3,659	1,561,000	4,373	Final cost estimates from Currie & Brown Feasibility Estimate Report V2 dated 22/02/2022
		<b>Total</b>	<b>22,665</b>	<b>25,008,939</b>	<b>N/A</b>	<b>39,778,640</b>	<b>N/A</b>	<b>56,374,173</b>	<b>N/A</b>	

Notes:

- 1) Indicated cost/m2 (£) are average costs for Minimal Approach, Middle of the Road and Full EnerPHit Approach Costs
- 2) No cost estimates are available for Hermitage Park Primary School as part of the Tranche 1 works. Assume the same unit rate cost per m2 as Hillwood Primary School that is a primary school of similar area and building configuration
- 3) The Middle of the Road costs estimates have been used for the business case cost estimates
- 4) Costs above include 15% for contingency. An allowance for optimism bias has been added at the rate of 33%. An inflation rate of 4% per annum is assumed.

## 10.12: Appendix L: Buildings Annual Energy Usage and Savings Summary

No.	Delivery Phase	EnerPHit T1 Pathfinder Project Building Description	Building Code	Building GIFA (m2)	Option 1- Do Nothing (As is)		Option 2- Do Minimum		Option 3- Middle of the Road		Option 4- Full EnerPHit	
					Total Gas per annum (kWh)	Total Elec per annum 2019/20 (kWh)	Total Gas per annum (kWh)	Total Elec per annum 2019/20 (kWh)	Total Gas per annum (kWh)	Total Elec per annum 2019/20 (kWh)	Total Gas per annum (kWh)	Total Elec per annum 2019/20 (kWh)
1	Phase 1	Lorne Primary School Main Building	BLD01283	1979	430,828	33,247	0	183,651	0	136,155	0	101,325
2		Brunstane Primary School Main Building	BLD02261	2417	433,610	35,288	0	140,428	0	132,452	0	94,988
3	Phase 2	North West Local Office Main Building	BLD02135	3871	377,810	178,840	0	259,744	0	246,196	0	205,937
4		Greengables Nursery Main Building	BLD00865	312	108,139	7,301	0	36,223	0	28,922	0	20,218
5		Greengables Family Centre Main Building	BLD02292	295	126,968	7,169	0	56,021	0	24,839	0	19,588
6	Phase 3	South East Local Office Main Building	BLD01852	3564	390,258	156,816	0	259,103	0	242,352	0	213,840
7		Ferryhill Primary School Main Building	BLD00740	2490	409,356	67,230	0	203,682	0	173,304	0	138,693
8		Liberton Nursery Main Building	BLD02337	370	101,380	14,245	0	44,326	0	31,043	0	20,313
9		Hillwood Primary School Main Building	BLD02294	1799	415,929	37,239	0	146,079	0	112,078	0	76,458
10	Phase 4	Trinity Academy Block A	BLD02676/01	2868	640,711	43,307	0	243,780	0	187,854	0	160,608
11		Hermitage Park Primary School Main Building	BLD00958	2343	704,212	63,050	0	247,327	0	189,760	0	129,451
12		Moffat Nursery Main Building	BLD01343	357	125,771	8,033	0	37,378	0	27,489	0	21,313
		<b>Total</b>		<b>22665</b>	<b>4,264,972</b>	<b>651,765</b>	<b>0</b>	<b>1,857,741</b>	<b>0</b>	<b>1,532,443</b>	<b>0</b>	<b>1,202,731</b>

## 10.13: Appendix M: Intervention Option 1 Implications Appraisal

Intervention Option 1 (Do Nothing) Implications Appraisal										
No.	Delivery Phase	Building Description	Heating Demand (kWh/m <sup>2</sup> /year [GIFA])	Heating Demand Reduction against Baseline (%)	Annual Operational Costs- using 2021 rates (£)	Annual Operational CO2 Emissions -averaged over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . year [GIFA])	Cumulative Operational CO2 Emissions over 60 years (per m <sup>2</sup> - (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Cumulative Lifecycle CO2 Emissions over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Reduction in Operational CO2 Emissions against Baseline (%)	Total Performance Index Rating
1	Phase 1	Lorne Primary School Main Building	198	N/A	17,137	40.8	2,447	2,746	N/A	5.01
2		Brunstane Primary School Main Building	154	N/A	17,789	34.5	2070	2403	N/A	4.72
3	Phase 2	North West Local Office Main Building	75.3	N/A	35,780	20	1,200	1,400	N/A	3.56
4		Greengables Nursery Main Building	235.4	N/A	3,881	63.9	3,866	4,502	N/A	4.1
5		Greengables Family Centre Main Building	330	N/A	4,686	81	4,812	5,428	N/A	4.5
6	Phase 3	South East Local Office Main Building	86.4	N/A	33,074	22.1	1,326	1,543	N/A	4.37
7		Ferryhill Primary School Main Building	126.7	N/A	20,712	30.7	1,841	2,140	N/A	4.8
8		Liberton Nursery Main Building	340	N/A	4,194	54.8	3290	3578	N/A	4.60
9		Hillwood Primary School Main Building	140.4	N/A	17,260	43.4	2,603	2,899	N/A	3.96
10	Phase 4	Trinity Academy Block A	185	N/A	29,289	41,8	2,505	2,735	N/A	5.13
11		Hermitage Park Primary School Main Building	182.52	N/A	22,438	N/A	N/A	N/A	N/A	N/A
12		Moffat Nursery Main Building	299	N/A	4,770	65.8	3,946	4,562	N/A	3.73

Note:

1) Appraisal was not carried out for Hermitage Park Primary School

## 10.14: Appendix N: Intervention Option 2 Implications Appraisal

Intervention Option 2 (Do Minimum) Implications Appraisal										
No.	Delivery Phase	Building Description	Heating Demand (kWh/m <sup>2</sup> /year [GIFA])	Heating Demand Reduction against Baseline (%)	Annual Operational Costs- using 2021 rates (£)	Annual Operational CO <sub>2</sub> Emissions -averaged over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . year [GIFA])	Cumulative Operational CO <sub>2</sub> Emissions over 60 years (per m <sup>2</sup> )- (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Cumulative Lifecycle CO <sub>2</sub> Emissions over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Reduction in Operational CO <sub>2</sub> Emissions against Baseline (%)	Total Performance Index Rating
1	Phase 1	Lorne Primary School Main Building	155	62%	25,477 (+49%)	4.1	249	N/A	90%	4.72
2		Brunstane Primary School Main Building	81	47%	£20,277 (+14%)	2.7	162	N/A	92%	4.92
3	Phase 2	North West Local Office Main Building	68.4	53%	36,022 (+1%)	3.0	180	N/A	85%	5.3
4		Greengables Nursery Main Building	129	69%	5,008 (+66%)	5.1	312	N/A	69%	5.18
5		Greengables Family Centre Main Building	203.1	58%	7,769 (+66%)	8.6	510	N/A	89%	5.06
6	Phase 3	South East Local Office Main Building	78.4	54%	35,948 (+9%)	3.3	195	N/A	85%	5.28
7		Ferryhill Primary School Main Building	94	57%	27,566 (+33%)	3.6	214	N/A	88%	4.71
8		Liberton Nursery Main Building	218	35%	£6,304 (+50%)	5.4	322	N/A	90%	5.01
9		Hillwood Primary School Main Building	94.8	68%	20,253 (+18%)	3.6	218	N/A	92%	4.71
10	Phase 4	Trinity Academy Blocks A	139	64%	40,170 (+37%)	3.8	228	N/A	91%	4.84
11		Hermitage Park Primary School Main Building	N/A	N/A	26,477 (+18%)	N/A	N/A	N/A	N/A	N/A
12		Moffat Nursery Main Building	156	72%	5,184 (+9%)	4.7	281	951	93%	4.47

Note:

1) Appraisal was not carried out for Hermitage Park Primary School

## 10.15: Appendix O: Intervention Option 3 Implications Appraisal

Intervention Option 3 (Middle of the Road) Implications Appraisal										
No.	Delivery Phase	Building Description	Heating Demand (kWh/m <sup>2</sup> /year [GIFA])	Heating Demand Reduction against Baseline (%)	Annual Operational Costs- using 2021 rates (£)	Annual Operational CO2 Emissions -averaged over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . year [GIFA])	Cumulative Operational CO2 Emissions over 60 years (per m <sup>2</sup> )- (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Cumulative Lifecycle CO2 Emissions over 60 years (kgCO <sub>2</sub> e/m <sup>2</sup> . 60 years [GIFA])	Reduction in Operational CO2 Emissions against Baseline (%)	Total Performance Index Rating
1	Phase 1	Lorne Primary School Main Building	80	72%	18,888 (+10%)	2.8	185	673	92%	6.22
2		Brunstane Primary School Main Building	65	58%	£18,849	2.5	151	684	93%	7.33
3	Phase 2	North West Local Office Main Building	56.7	56%	34,151 (-5%)	2.9	170	485	86%	5.57
4		Greengables Nursery Main Building	103	75%	3,999 (-3%)	4.1	248	977	94%	6.1
5		Greengables Family Centre Main Building	90.4	81%	3,444 (-26%)	3.8	225	954	95%	6.83
6	Phase 3	South East Local Office Main Building	60.8	56%	33,578 (+2%)	3.0	182	523	88%	5.73
7		Ferryhill Primary School Main Building	80.0	63%	23,461 (+13%)	3.0	182	670	90%	5.99
8		Liberton Nursery Main Building	114	66%	£4,308 (+3%)	3.7	220	889	93%	7.63
9	Phase 4	Hillwood Primary School Main Building	72.7	75%	15,532 (-10%)	2.79	167	644	94%	5.68
10		Trinity Academy Blocks A	67	73%	30,946 (+6%)	2.9	176	572	93%	6.27
11		Hermitage Park Primary School Main Building	N/A	N/A	20,194 (-10%)	N/A	N/A	N/A	N/A	N/A
12		Moffat Nursery Main Building	80	79%	3,813 (-20%)	3.5	207	934	95%	5.51

Note:

1) Appraisal was not carried out for Hermitage Park Primary School

## 10.16: Appendix P: Intervention Option 4 Implications Appraisal

Intervention Option 4 (Full EnerPHit) Implications Appraisal										
No.	Delivery Phase	Building Description	Heating Demand (kWh/m <sup>2</sup> /year [GIFA])	Heating Demand Reduction against Baseline (%)	Annual Operational Costs- using 2021 rates (£)	Annual Operational CO2 Emissions -averaged over 60 years (kgCO2 e/m2. year [GIFA])	Cumulative Operational CO2 Emissions over 60 years (per m2)- (kgCO2 e/m2. 60 years [GIFA])	Cumulative Lifecycle CO2 Emissions over 60 years (kgCO2 e/m2. 60 years [GIFA])	Reduction in Operational CO2 Emissions against Baseline (%)	Total Performance Index Rating
1	Phase 1	Lorne Primary School Main Building	38	79%	14,056 (-18%)	2.1	138	654	94%	6.89
2		Brunstane Primary School Main Building	23	85%	£13,994 (-21%)	1.9	112	645	95%	7.75
3	Phase 2	North West Local Office Main Building	25	66%	28,534 (-20%)	2.4	143	472	88%	7.45
4		Greengables Nursery Main Building	72.0	82%	2,795 (-32%)	2.9	173	915	96%	7.5
5		Greengables Family Centre Main Building	71.1	85%	2,717 (-42%)	3.0	177	919	96%	7.5
6	Phase 3	South East Local Office Main Building	30.5	61%	29,627 (-10%)	2.7	160	518	88%	7.44
7		Ferryhill Primary School Main Building	64	71%	18,768 (-9%)	2.4	145	662	92%	7.38
8		Liberton Nursery Main Building	42	88%	£2,890 (-31%)	2.5	148	844	96%	7.60
9		Hillwood Primary School Main Building	49.6	83%	10,597 (-39%)	1.9	114	604	96%	7.5
10	Phase 4	Trinity Academy Blocks A	27	77%	26,482 (-10%)	2.5	150	539	94%	7.34
11		Hermitage Park Primary School Main Building	N/A	N/A	13,687 (-39%)	N/A	N/A	N/A	N/A	N/A
12		Moffat Nursery Main Building	20	84%	2,956 (-38%)	2.7	160	902	96%	7.5

Note:

1) Appraisal was not carried out for Hermitage Park Primary School

## 10.17: Appendix Q: Green Growth Accelerator EnerPHit Tranche 1 Programme

Programme Works Description	Estimated Programme Timeline	Estimated Programme Duration
<b>Phase 1 (Lorne Primary School &amp; Brunstane Primary School)</b>		
Feasibility Study start to completion	Aug 2021 - Mar 2022	8 months
Approval to proceed/budget approval	Jan 2022 - May 2022	6 months
Detailed Design, Tender Package Preparation & Planning Approval start to completion	Apr 2022 - Nov 2022	8 months
Procurement start to completion	Dec 2022 - Feb 2023	3 months
Project site works start to completion	Mar 2023 - Nov 2024	21 months
<b>Phase 2 (North West Local Office, Greengables Nursery &amp; Greengables Family Centre)</b>		
Feasibility Study start to completion	Aug 2021 - Mar 2022	8 months
Approval to proceed/budget approval	Jan 2022 - Jun 2022	6 months
Detailed Design, Tender Package Preparation & Planning Approval start to completion	Apr 2023 - Nov 2023	8 months
Procurement start to completion	Dec 2023 - Feb 2024	3 months
Project site works start to completion	Mar 2024 - Nov 2025	21 months
<b>Phase 3 (South East Local Office, Ferryhill Primary School, Liberton Nursery &amp; Hillwood Primary School)</b>		
Feasibility Study start to completion	Aug 2021 - Mar 2022	8 months
Approval to proceed/budget approval	Jan 2022 - Jun 2022	6 months
Detailed Design, Tender Package Preparation & Planning Approval start to completion (8 months)	Apr 2024 - Nov 2024	8 months
Procurement start to completion	Dec 2024 - Feb 2025	3 months
Project site works start to completion (18 months)	Mar 2025 - Nov 2026	21 months
<b>Phase 4 (Trinity Academy Block A, Hermitage Park Primary School &amp; Moffat Nursery)</b>		
Feasibility Study start to completion	Aug 2021 - Mar 2022	8 months
Approval to proceed/budget approval	Jan 2022 - Jun 2022	6 months
Detailed Design, Tender Package Preparation & Planning Approval start to completion (8 months)	Apr 2025 - Nov 2025	8 months
Procurement start to completion (3 months)	Dec 2025 - Feb 2026	3 months
Project site works start to completion (18 months)	Mar 2026 - Nov 2027	21 months

## 10.18: Appendix R: Programme Risk Register

Risk Register						
No.	Description	Impact	Likelihood	Impact	Risk	Commentary/response
1	The entire Pathfinder Programme/Project delivery is either delayed or the scope reduced, such that the agreed GGA outcomes and targets are not met	Capital spend in future years, including the AMW Programme spend need to be realigned and rebalanced. GGA revenue repayments to the Council will be delayed as programme delivery outcomes will not be achieved	3	4	12	<p>The entire Pathfinder Programme/Project delivery has been pushed back to 2027/28 compared to the originally planned GGA submittal 2025/26 completion year due to the rephrasing of the delivery to 4 phases instead of 3 phases to make the delivery more manageable. There is a risk of further delays due to the continuing impacts of Covid-19 (as is the case with any construction/retrofitting project). The main challenge is that the revenue income stream in the form of GGA revenue repayments will be delayed.</p> <p><b>Response: Treat-</b> capital investment in the AMW programme budget from where this project will funded from has already been realigned and reprofiled and should delivery be delayed it will need to be realigned and reprofiled.</p>
2	Actual programme/project delivery costs are higher than projected. This could be due to higher project costs due to the impacts of Covid-19	The Council will be required to meet funding gaps to proceed with the project	3	4	12	<p>The entire programme/project delivery cost exceeds what has been forecasted, leading to capital budgeting issues.</p> <p><b>Response: Treat-</b> this risk has been mitigated by the completion of EnerPHit Feasibility Reports for each of the project buildings as each of the Feasibility Reports include detailed cost estimates from the QS.</p> <p>Should the delivery costs be higher than projected, the Council will further accelerate the use of the AMW programme future years' budgets or there will be a reduction in scope.</p>
3	Selecting an incorrect retrofit approach for each of the project's buildings	Sub-optimal returns on the capital investment and failure to achieve best-value	2	3	6	<p>The incorrect selection of retrofit option out of the three retrofit options for each building. Once the building is retrofitted to the selected option, it is extremely difficult and costly to change.</p> <p><b>Response: Treat-</b> the Council will use the Total Performance Index as an indicator to select the retrofit option for each building and the Council will select the retrofit option based on best-value principles as well as Cost Benefit Analysis techniques to make sure the correct retrofit option is selected. Each building will have a comprehensive Feasibility Report carried out that details the costs and benefits of each approach. The Feasibility Reports help the Council determine which of the 3 options is the optimal solution.</p>
4	Selecting an incorrect building for EnerPHit implementation works	Sub-optimal returns on the capital and failure to achieve best-value investment	2	3	6	<p>The incorrect selection of building for project works. Once the building is retrofitted to the selected option, it is extremely difficult and costly to change.</p> <p><b>Response: Treat-</b> the Council will use the Buildings Selection Matrix as an objective indicator to select and prioritise buildings for works. The final selection of buildings and the order of the works will be discussed with all key stakeholders to take into account all considerations which may affect a building's selection for works such as strategic considerations, long-term operational considerations and best-value long term considerations.</p> <p>The Feasibility Reports that are produced for each building also help the Council in deciding which building should be prioritised for works.</p>
5	Selecting and implementing an approach to a building	Sub-optimal performance and operation of buildings leading to costly	2	3	6	<p>An incorrect approach while having deep energy and Net Zero Carbon benefits can lead to other building problems and increase the cost of future buildings operations and maintenance.</p>

	which then leads to other buildings performance issues- i.e. interstitial condensation, mould, overheating etc.	maintenance and operational requirements				<b>Response: Treat-</b> good knowledge transfer and understanding the building breathability. Due diligence on current status or condition of property. Possibly need to pre-treat areas of concern. In-situ monitoring for condition with on-site loggers/sensors. Comprehensive air-leakage testing and surveying during the Feasibility Report stage to identify any potential technical issues. Testing required through feasibility stage to inform high level analysis
6	Lack of EnerPHit knowledge and resources within the Council	Leading to poor management of works during both design and delivery stages and as the EnerPHit programme expands	3	3	9	While there is a small core EnerPHit team that has EnerPHit knowledge that is driving the Pathfinder project, there is in general a lack of EnerPHit knowledge within the Council. <b>Response: Treat-</b> use of external EnerPHit experts/consultant's via framework contracts who have the required EnerPHit qualifications and accreditations during Design stages. Knowledge transfer and upskilling programme to ensure Council staff develop EnerPHit knowledge and experience. Appoint dedicated EnerPHit Programme Manager in the Council to lead the programme. Develop closer working and knowledge sharing relationships with other Scottish local authorities.
7	Lack of EnerPHit experience in the supply chain to deliver the project works	The EnerPHit approach is a relatively new approach in Scotland and it is currently unknown if there are sufficient resources in the supply chain to deliver the project as the works delivery will ramp up in future years	3	3	9	<b>Response: Treat-</b> early engagement with Procurement to expand/widen the supply chain. Early engagement with the supply chain to identify suppliers with EnerPHit delivery experience. Work closely with organisations such as the Scottish Futures Trust and the Passivhaus Trust.
8	Air quality risk (if mechanical ventilation is not applied to relate to the relevant air tightness target)	Reduced ventilation to buildings may cause user acceptance issues especially due to Covid-19	3	3	9	<b>Response: Treat-</b> ensure adequate attention is paid to ventilation design (natural and mechanical) in design stages. Ensure ventilation design complies with BB101 as best practice aim (as a quality assured way of ensuring air flow rates are adequate). Allow for robust testing of this in early scope documents for design teams.
9	Ensuring adequate Quality/Inspection regime on site (in particular maintaining the air-tightness control layer)	Sub-optimal performance and operation of buildings leading to costly maintenance and operational requirements. Buildings may not be certified to EnerPHit standards	3	4	12	<b>Response: Treat-</b> ensure suppliers for the works are EnerPHit certified and that full Quality Control and Quality Assurance plans are submitted by the suppliers prior to the works.
10	Risk of poor or inadequate environmental user-controls	Sub-optimal performance and operation of buildings affecting user comfort	3	2	6	<b>Response: Treat-</b> ensure environmental user-controls are simple to use and clearly communicating the correct way to use these controls in the O&M literature. Develop an understanding of asset management and maintenance teams and the users of the building through focused consultation workshops. Development of user guides that are annotated clearly for ease of use and application through operation of building.
11	External factors which are outwith the Council's control which could affect the project 'buy in' and the pace of future delivery	Various external factors outwith the Council's control and which could affect the pace of delivery of the EnerPHit programme- i.e. challenges such as more	4	3	12	<b>Response: Tolerate-</b> communicate with Council Senior Management via forums such as the Sustainability Board to ensure whilst certain decisions will lead to more costly operating and running costs in the short-term, such decisions should be made with Council's 2030 Net Zero Carbon target in mind. Find out if the Scottish Government are offering any funding or incentives to Councils to switch to cleaner energy.

		costly running and operating costs due to the current unit rate of gas being much more lower than that compared to electricity				
12	The risk of future technologies/approaches providing a lower cost solution to demand reduction/net zero challenge	The low energy/Net Zero technology being selected today may prove to be less energy efficient than future technologies due to the pace of innovation	3	3	9	<b>Response: Treat-</b> structure upgrade and innovation programme to maintain a continual focus on research and monitoring to ensure that we are informed about both performance and new opportunities. Where appropriate, seek supporting funding for pilot projects to continue to develop knowledge base.
13	Risk of lack of buy-in, both within the Council for the Council users of the buildings and the general public	Challenges and barriers to the works being implemented, lack of collaboration and buy-in	3	3	6	<b>Response: Treat-</b> early engagement with buildings users and stakeholders. Clear internal communications to highlight challenges and potential risks to Best Value. Public Consultation for wider sustainability approach to seek public 'consent'.
14	Council project personnel leave the organisation or become unavailable	The project is weakened by the loss of skills/experience and background knowledge	3	2	6	<b>Response: Tolerate-</b> no Council personnel is indispensable to the project and ensure there is a team of Council staff involved in this project rather than reliance on individuals.
15	Project scope creep due to others trying to add other works to the EnerPHit	The project loses focus on testing the principles of EnerPHit and instead is side-tracked by other initiatives which are not part of EnerPHit- e.g. the consideration of renewables, hydrogen etc.	3	2	6	<b>Response: Treat-</b> manage expectations of others in the Council. While there are other initiatives which are important to the Council in achieving its Net Zero Carbon target and in achieving the objectives of the Council Emissions Reduction Plan (CERP), it is important that this project is focused and budgeted for EnerPHit improvements alone.  Other initiatives should be treated as parallel separate projects rather than being embedded into this project
16	The Council 'overpromise' on carbon emissions reductions that the programme will deliver	Carbon emissions targets will not be met, jeopardising the Council's own Net Zero Carbon target ambitions and affecting the GGA payment from the Scottish Government which	3	4	12	<b>Response: Treat-</b> careful planning and calculating the expected carbon emissions reductions for each of the 12 buildings based on the feasibility studies reports. Allow some contingency in the carbon emissions calculations so not to overpromise and to manage expectations

## 10.19: Appendix S: Council Risk Ratings/Scoring Guide (for reference)

		Likelihood					
		Rare	Unlikely	Possible	Likely	Almost certain	
Severity Calculation	Impact	Score	1	2	3	4	5
	Catastrophic	5	5	10	15	20	25
	Major	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Minor	2	2	4	6	8	10
	Negligible	1	1	2	3	4	5

### Severity Guidance

Risk Rating	Combined Score	Action	Treatment	Guidance
High	15 - 25	Poses a serious threat. Needs immediate action to reduce / mitigate the risk.	Treat Transfer Terminate	These risks will need to be addressed as a matter of urgency and are likely to require action to reduce the impact and / or likelihood to an acceptable level. These risks will be actively monitored at a senior level.
Medium	9 - 12	Poses a threat and should be pro-actively managed to reduce / mitigate the risk over the medium to long term (within 1 year)	Treat Transfer	Steps should be taken to address these risk as soon as possible, and medium term plans should be put in place to treat the risk - normally this is within 1 year but dependant on the risk identified. Consideration should be given to whether likelihood or consequences can be reduced in a cost effective manner, on a timely basis and resources appropriately targeted.
Low	1 - 8	Poses a low threat and should continue to be monitored.	Tolerate	These risks will not be a priority for treatment and in some cases, it may be acceptable for no mitigating action to be taken. However, the status of these risks should still be reviewed periodically to ensure no changes which would result in the risk increasing.