Falkirk Council

KINNEIL HOUSE WALLED GARDEN

Landscape Masterplan Report

R01
MARCH 2021

PUBLIC

Falkirk Council

KINNEIL HOUSE WALLED GARDEN

Landscape Masterplan Report

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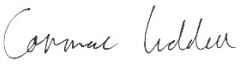
Signature				
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APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

WSP have been commissioned by Falkirk Council to produce a landscape masterplan for Kinneil Walled Garden (hereafter referred to as the Site). The Site and its potential are identified within the Falkirk Local Development Plan as the following:

BUS01 Kinneil Walled Garden (MIR ref 196) 1 ha site: Proposed Uses: Leisure/ Tourism/ Community Growing

"New business site. Opportunity for tourism-related business within historic walled garden subject to site becoming surplus to Council requirements. Walled garden is Category C listed. Antonine Wall World Heritage Site covers northern part of the site. Other listed buildings including Kinneil House and Duchess Anne Cottages lie adjacent. Sensitivity required in relation to these historic environment features, and also adjacent residential properties. Site also identified as community growing opportunity. Flood risk assessment will be required".

This forms the basis of the commissioning of the report, which also builds on previous stages of work and consultation undertaken in 2019 and 2020.

Through the initial analysis and consultation, it was clear that plans for the Site need to be flexible to respond to multiple uses, changing community requirements and available funding. To enable this flexibility, a spatial framework, rather than a fixed masterplan, is required. This sets out a structure for a coherent but adaptable space for future phased development within the Site. As part of this, this report aims to identify a phased delivery plan of the key components or actions which are required to enable the framework to be successful and enable the next development steps.

Project Aim

To provide a coherent, legible and adaptable space for the local community whilst respecting the historic setting, and privacy of local residents.

The objectives of this project are to:

- Understand the existing characteristics of the Site;
- Incorporate consultees key requirements and concerns;
- Define a spatial framework to guide and shape future development on the Site;
- Identify the key infrastructure changes required to enable the framework; and
- Identify budget costs for the enabling works.

This report is therefore set out in four main sections:

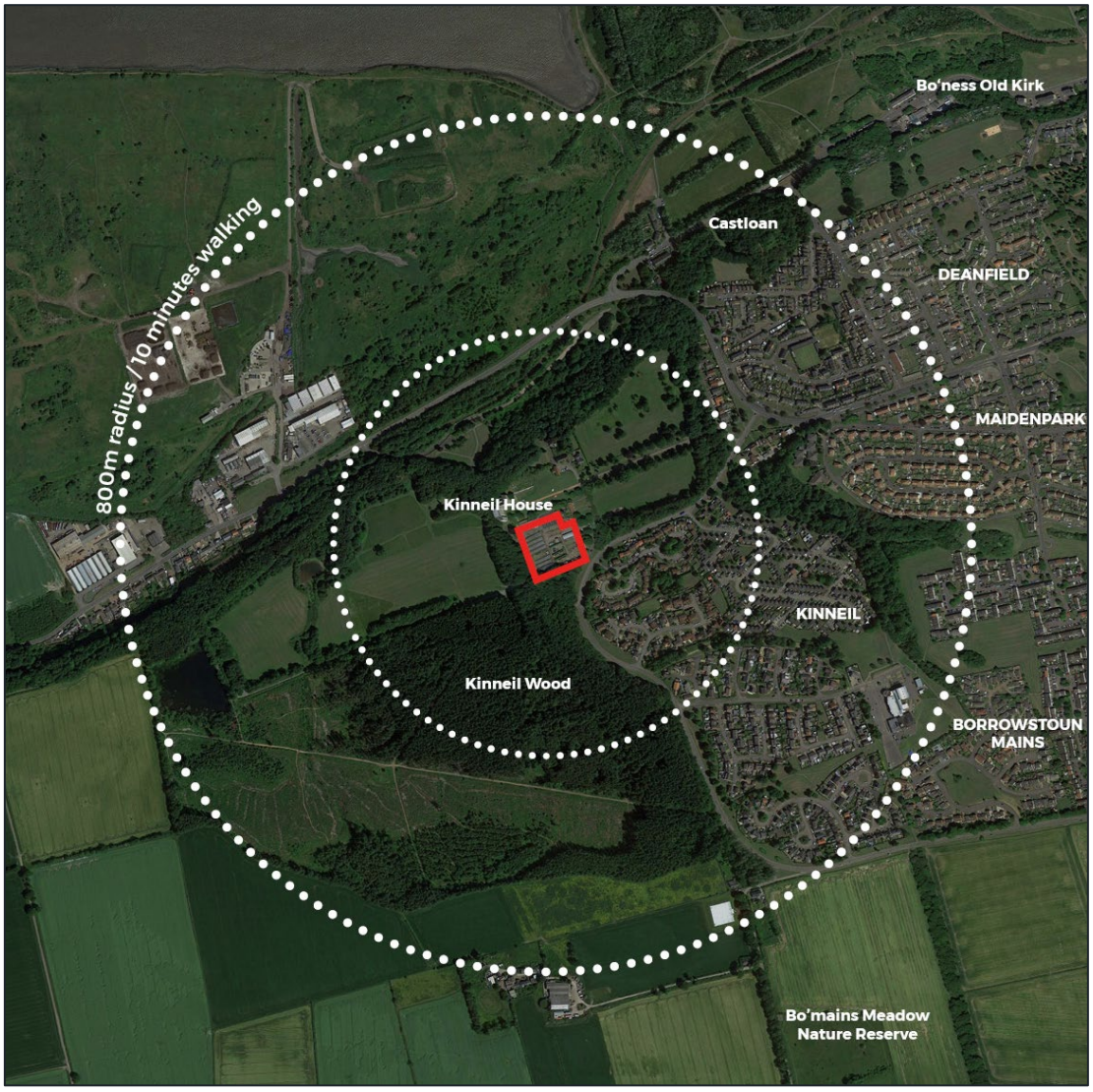
1) Overview of site analysis, consultation and work done to date;
2) The spatial framework;
3) Phased delivery plan, including budget costs; and
4) Summary and next steps.

2 SITE ANALYSIS OVERVIEW

2.1 SITE CONTEXT

The Site lies in the Kinneil Estate which includes the historic Kinneil House, located west of Bo'ness in east-central Scotland (**Figure 1**). The house is protected as a Category A listed building. The Kinneil Estate is open to the public and also incorporates a section of the Roman Antonine Wall. **Appendix A** presents the Site analysis work produced as part of the first stage of this commission which has fed into the spatial framework discussed in **Section 3**.

Figure 1 - Site Location



The future of Kinneil Walled Garden has been stuck in limbo since the closure of the Council's plant nursery in June 2019. There is currently no public access to the Site despite its location within a popular recreational park and grounds of the Kinneil estate.

2.2 EXISTING SITE OPERATIONS

There are currently a few ongoing operations within the Site:

- Sustainable Thinking Scotland (STS) (a charity) have a lease for a large proportion of the Site for biochar production, food growing for the local food bank and other community led activities.
- A local cycle group are using one of the portakabins on the Site for storage.
- Falkirk Council use one of the sheds on the Site for storage of materials.

In addition, the large glass greenhouse on the Site is currently vacant and available for lease. Also to note, no.6 Duchess Anne Cottage that lies at the north east corner of the Site is owned by Falkirk Council but has no current residents or users.

2.3 CONSULTATIONS

Prior to the commissioning of this report, consultations regarding the future of the site were held, including a Stakeholder Consultation in June 2019, and a Virtual Public Consultation from October to December 2019. As part of this commission, consultations with key stakeholders took place in early 2020. These, along with previous consultations, have been considered and used to inform the framework proposal set out within this report.

2.3.1 COMMUNITY

On the 11th of March 2020 a drop-in consultation session was held within Kinneil Walled Garden to understand the local communities' views on the Site. Local community group members, local residents and stakeholders attended. Key responses included:

- Importance of any proposals tying into the wider estate context;
- Drainage issues within the Site including surface runoff pouring down onto residents' gardens;
- General infrastructure upgrades necessary for future uses including parking, toilet facilities and sewage;
- Any opening up of the Site to more visitors will need to consider boundaries of privacy; and
- Retention of existing structures for storage, community use and clubs etc.

2.3.2 OTHER STAKEHOLDERS

Kinneil Estate is located within a Roman Empire UNESCO World Heritage Site and the Antonine Wall route runs near to the Site. Archaeological digs have previously taken place within the Site. Proposals will need to consider potential effects upon the Antonine Wall, setting of Kinneil House and the original estate design.

Historic Environment Scotland (HES), Falkirk Community Trust and The Friends of Kinneil are actively involved with the Kinneil Estate. It is noted that any proposals for the Site will need to be discussed and approved with all the above stakeholders.

2.4 WORKS UNDERWAY

There are currently ongoing works within the Site which are not part of the framework proposal but are important considerations that will inform the overall development strategy. These are described below.

2.4.1 WALL REPAIRS

The wall which forms the boundary of the Site has been neglected over the years, and in some sections is damaged and unsafe. The wall has been assessed and is currently under repair and restoration to address these issues. As part of these repairs, multiple trees have been removed along the northern side. This has substantially altered the character of the Site, opening up views out to and from the estate landscape along this northern edge.

2.4.2 ACCESS

There is currently one main entrance on the east side of the Site that is used by both vehicles and pedestrians. It also provides access to the rear of the private properties that lie in the north east corner of the Site. There are two historic pedestrian entrances that are currently blocked providing no access. These are located on the western side of the north wall, and in the middle of the west wall. As part of the wall repairs the reinstatement of these entrances are planned. Within the Site, these entrances are obscured by existing structures, and which without intervention would limit access and create a poor walking connection and spatial flow. Opening up these pedestrian entrances is seen as a key enabler to begin the development of the Site.

Outside the Site, new footpaths are proposed to connect the existing estate paths to these entrances. These works do not form part of this masterplan but are obviously a key consideration in the design.

3 SPATIAL FRAMEWORK

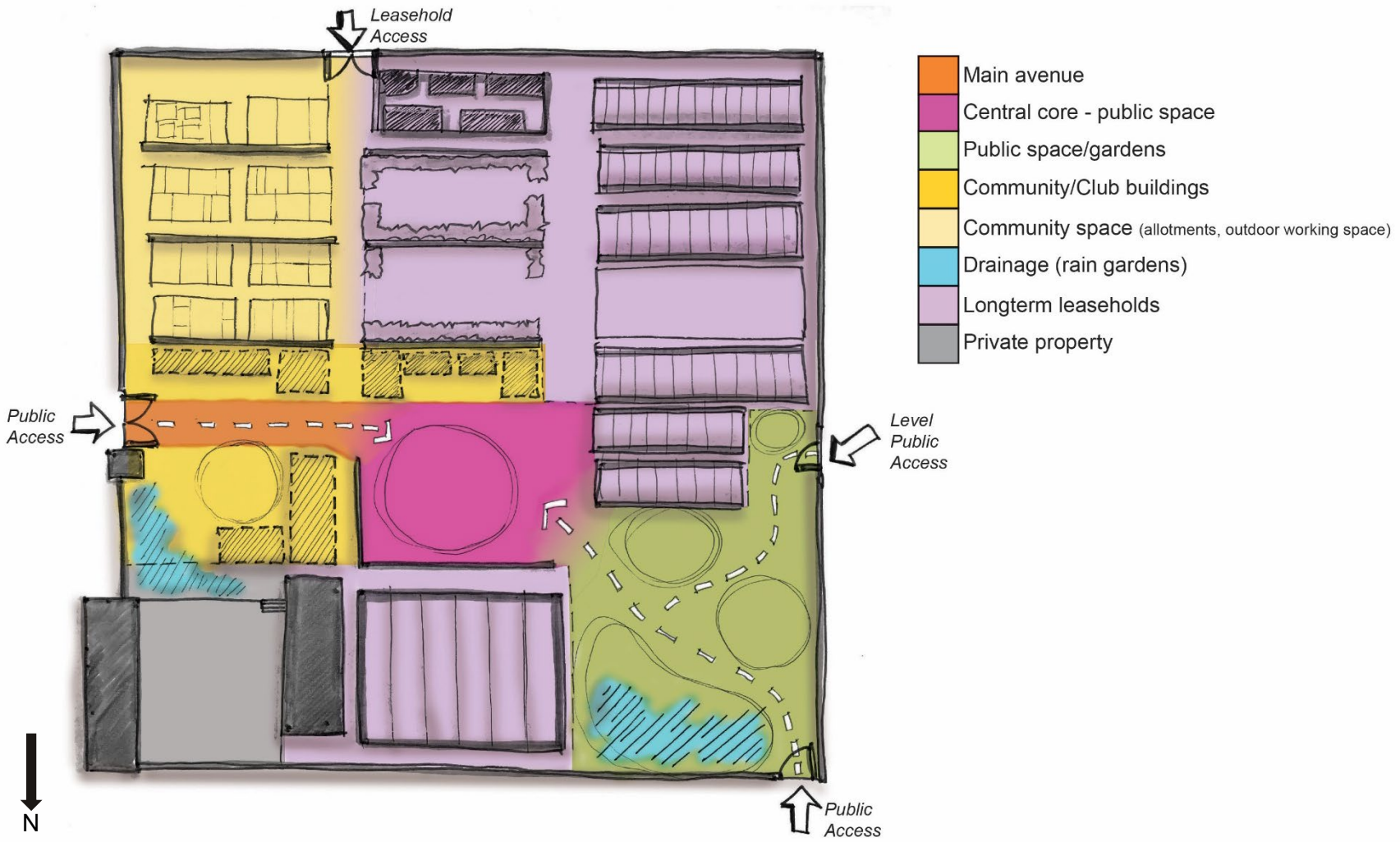
3.1 OVERVIEW

Through the research and consultation undertaken to date, there was a general consensus that the Site should be used to benefit the community and the wider public, and acknowledge the rich history of the estate, but not to the detriment of the privacy of residents that live at the edge of the Site.

As explained in the introduction, a spatial framework is seen as the best way forward, to guide and shape the future development of the Site. **Figure 2** illustrates the spatial framework for the short and medium-term. It identifies public, private and community spaces, and within those, key spaces that will help the development of the Site retain a structure and create an inviting hub to the Site. This plan retains the current STS leasehold, with some adaptions that are considered necessary for the successful development of the site. These are discussed in the following sections.

The proposed spatial framework is the first step in enabling coherent development of the Site and providing a catalyst for community and commercial enterprises to invest and become part of the Site. Detailed design of the spaces, interfaces and edges would be part of future phases of work.

Figure 2 – Spatial Framework Plan



3.2 THE SPACES

The spatial framework (**Figure 2**) proposes that the Site is essentially split between public, community and private uses. Community uses could include commercial aspects where these fit in with the aims of the Site and could benefit the community, such as a café or bike hub.

The public areas connect with the access points to Kinneil House and estate, allowing a flow of movement through the northern half of the Site within a number of different spaces, but retaining separation from the STS leasehold and the private residents.

The key spaces are described below.

Main Avenue: Whilst a very small extent of 'avenue' this is a crucial part of the Site that is seen first when entering from the main entrance. Development along the avenue sets the character of the Site and needs to be attractive and welcoming. The height of buildings off this route should not be more than approximately 3m in height to avoid enclosing the space and retaining light and views in the area to the south.

Central Core: The centre of the Site is an important space to anchor the development of the Site and provide a transition between public, community and private spaces. This area could be used for pop-up events, cafes, and outdoor meeting space for example. It currently exists as hard landscape but could be furnished with moveable planters and seating that can adapt accordingly.

Gardens (NW corner of site): This space directly connects with the access to Kinneil House and into the centre of the Site. It will need to accommodate drainage which could be in the form of a rain garden which has multi-benefits (see Section 4 below). This space could be developed as ornamental gardens, provide space for historic interpretation areas (noting proximity to Antonine Wall).

Community Spaces: The key area for community and club uses has been designated along the main avenue, and the south east quarter of the Site as potential outdoor working space such as allotments, bee-keeping, and outdoor classrooms for example. Other uses could include solar PV panels and other renewable energy providing measures. These spaces are currently divided by retaining walls and levelled areas which form good size plots. As noted above, main community and club buildings and structures would be ideally kept to along the avenue and at a height that does not enclose or prevent the long distant views from the south east quarter.

Private – Local Residents: An area has been allocated to retain a buffer from the rear gardens of the local residents. The orientation of the Site is such that any solid barrier would shade the rear gardens and so this has been avoided. However, to help retain privacy but also combat drainage issues in this area, a rain garden (see Section 4) is proposed in this area. This would still retain access to the rear of the property for deliveries and maintenance.

There is currently a vacant cottage within this private area (6 Duchess Anne Cottage) which has potential opportunities for community, commercial or residential use in the long term. Any public or commercial uses for the cottage would have to carefully consider the interface with the adjoining private residents.

Leaseholds: the framework acknowledges STS's leasehold as a key part of the rejuvenation of the site and catalyst for other development. However, there are some structures that lie within the leasehold that will prevent or limit other development through blocking access or hindering movement. These are discussed in Section 4 and also shown on the aerial view in **Figure 3**.

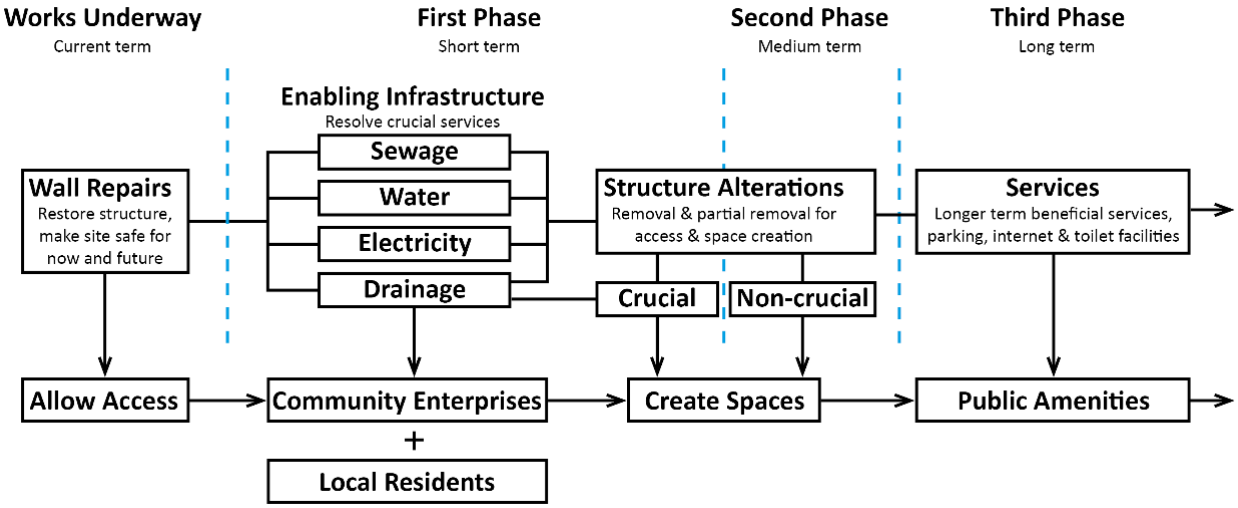
Figure 3 – Plots and Boundaries

4 PHASED DELIVERY PLAN

To enable this spatial framework, there are key infrastructure-based challenges that require resolution in the first instance. These enabling works are considered the critical issues that will allow the Site to be opened up to wider development. Equally there are other challenges that require resolution but are not urgent to the Site's initial functional development.

It is therefore envisaged that this delivery plan is comprised of short, medium and long term phases. These are shown in **Figure 4** and will be looked at within this section in detail.

Figure 4 – Flowchart of Proposed Phased Delivery Approach

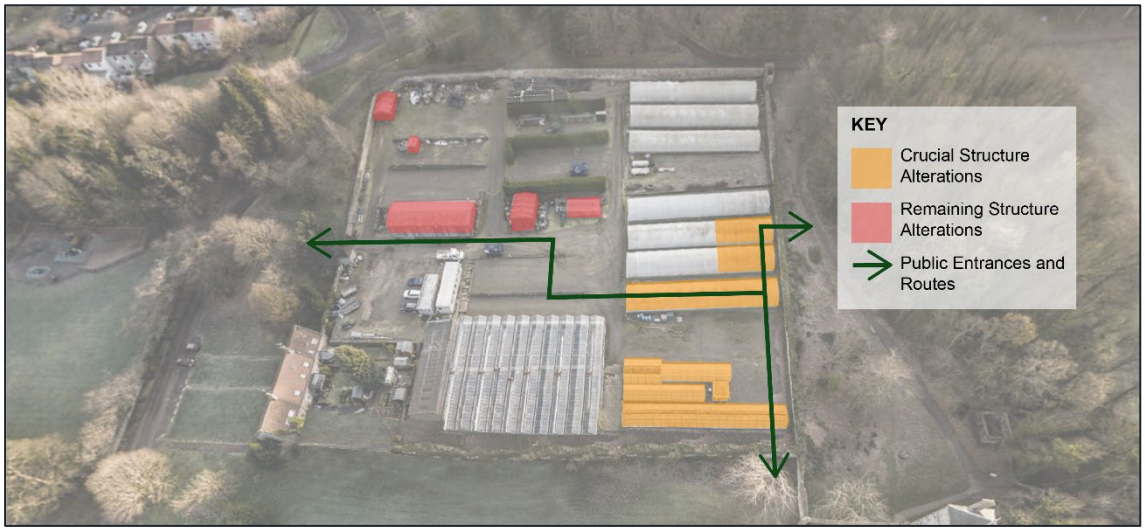


4.1 ENABLING WORKS (FIRST PHASE)

4.1.1 CRUCIAL STRUCTURE ALTERATIONS

There are currently multiple structures and buildings within the Site. Careful consideration is needed to decide the future of these, assessing their current condition, asset potential and long term usability. However, there are some structures that through their location will directly affect design decisions within the first phase of the proposal. As such decisions on the future of these need to be taken in this initial phase. The structures are highlighted in orange in **Figure 5**.

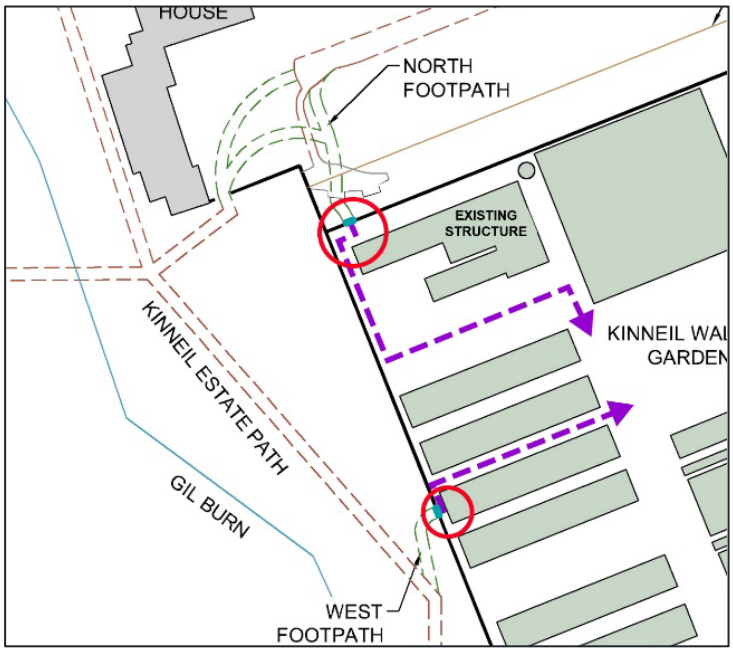
Figure 5 – Proposed Structure Alterations



The glass tunnel structure in the north west corner sits in front of the proposed northern pedestrian entrance. This and the existing water retention tank mean that any route from this entrance would have to snake round the narrow gap between this structure and the wall (**Figure 6**). This would be an unpleasant experience for users and would likely deter people from venturing into the Site from this entrance. The drainage report also suggests that this area would be the best location for an attenuation area as part of the Site's drainage solution. Therefore, there is strong justification that this structure be either altered or removed completely.

Similarly, the new pedestrian entrance on the west side currently has a row of three polytunnels in front of it, making access difficult within the Site, as shown on **Figure 6**. The condition of these structures is poor with the plastic covering worn out and cracking. These could either be shortened in half to allow easier access, relocated on Site or removed completely.

Figure 6 – Pedestrian Route Options



4.1.2 STRUCTURE REMOVAL IMPLICATIONS

STS currently utilise much of the Site including parts of the polytunnels and glasshouses identified for removal. Therefore, further discussion is necessary for their views on the future of the Site, and what combined options are best. Mitigation options could include looking at other areas within the Site to account for the loss of this space.

4.1.3 DRAINAGE

The current drainage problems on Site are a concern for the residents of the cottages in the north east section of the Site. The Surface Water Drainage Evaluation report (**Appendix B - 68104-WSP-DOC-0501**) suggests that a drainage feature is installed at the low end of the Site in the form of either a swale landscaped bioretention area or filter drain. This would help direct surface water runoff towards attenuation in the north west corner. An outfall then would connect the drainage system to the adjacent watercourse for runoff which cannot be managed on Site. See **Figure 7**.

Figure 7 – Proposed Drainage Feature

4.1.4 SITE DRAINAGE DESIGN

Based on the drainage report, a proposed option is shown in **Figure 8**. To stop surface water flowing into the resident's gardens, a wetland swale (also known as a Rain Garden) along the edge of the existing carpark is proposed (**Figures 8 and 9**). This will collect water during heavy rainfall whilst providing an attractive natural feature within the Site. Proposed planting within this swale area will act as a natural buffer providing privacy for the residents from visitors to the Site, whilst allowing for vehicular access to the cottage back gardens for coal deliveries etc.

The proposal suggests that the glasshouse structure in the northwest section of the Site is removed completely. This will allow for a large attenuation area to provide storage of water during heavy rainfall. This 'rain garden' would welcome visitors accessing the Site from the north entrance and allow for a pleasant recreational space within the Site. The wet areas are proposed to be built up from the existing ground to protect any archaeological remains and would only have sitting water after a heavy period of rain.

The remaining sections of the drainage solution will be in the form of a filter drain, which will run behind the existing storage and large greenhouse, connecting the swale and rain garden together. This allows for these structures to be retained without impact on them. Any excess water that is unable to be retained within the Site's drainage system can be decanted into the adjacent water course via a heavily controlled outlet.

A second drainage option for the Site is shown in **Figure 9**. This proposes to partially retain the glasshouse structure in the northwest section of the Site. The largest section would be removed creating space for a smaller rain garden to be established. Further work would be required to assess the practicalities within the small space, as well as how access would work for the greenhouse and maintained for the structure.

Figure 8 – Proposed Drainage Design Option 1

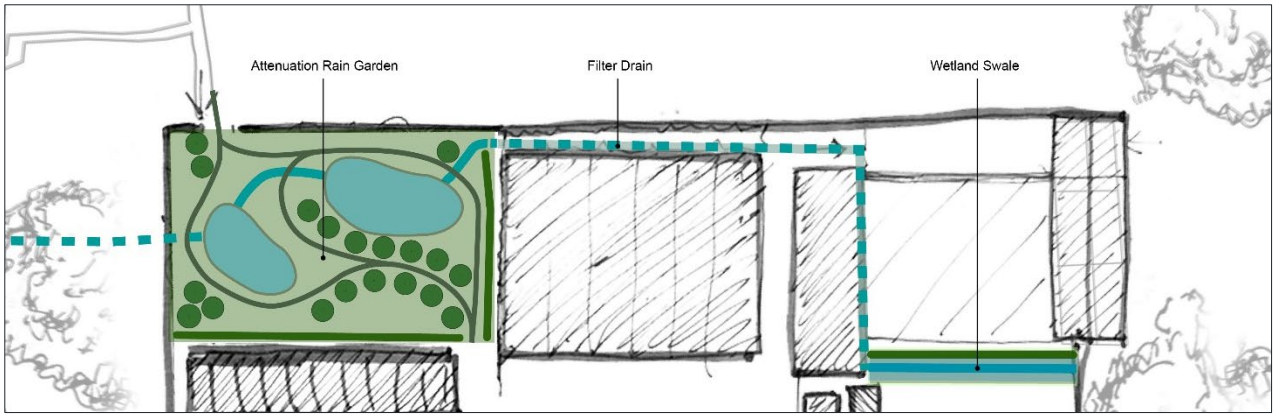
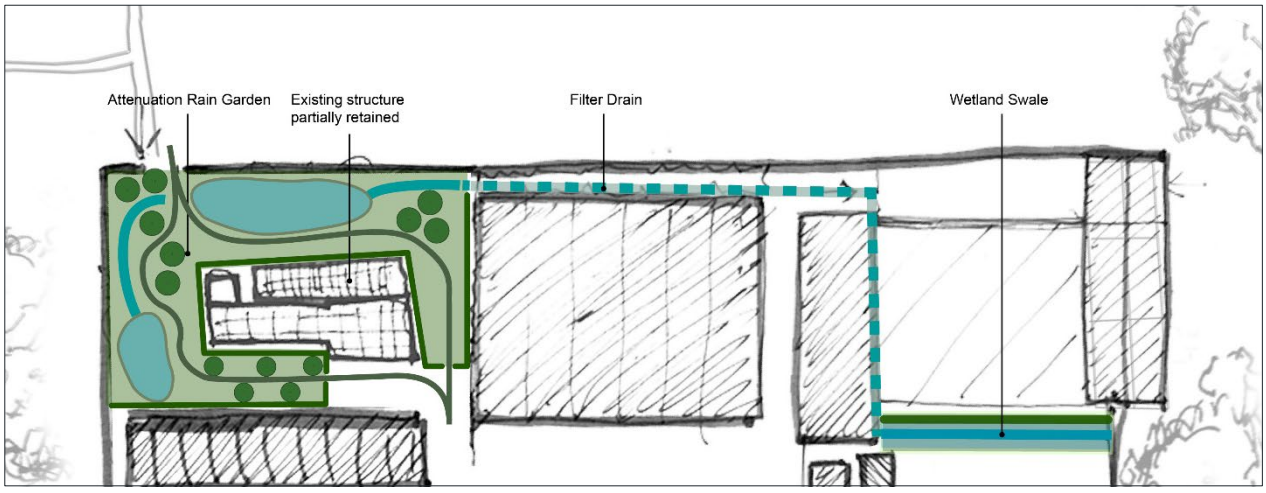


Figure 9 – Proposed Drainage Design Option 2



4.1.5 SITE DRAINAGE DESIGN CONCLUSIONS

The two drainage options proposed give a high-level overview of what could be achieved to resolve the drainage issues whilst creating an area of high quality, public greenspace within the Site. Careful detailed development and design of these indicative concepts would be needed to ensure that the space successfully works with the interfaces of the surrounding historic, commercial and public uses.

4.1.6 OTHER CRUCIAL SERVICES

There are a variety of services that need to be resolved initially before other developments can happen. Specialists will be needed to advise regarding what solutions there are to connect the Site to the various services.

Electricity access

There is existing electricity connections to the cottages and other buildings within Kinneil Estate. There is potential to look at renewable forms of electricity such as solar and wind on Site, which

would also make it future ready. Electricity connection points would be needed across the Site to enable multiple community and public uses.

Toilet Facilities

There is currently an accessible toilet a short walk from the Site within the visitors' centre. There is an existing accessibility toilet on Site, but this is not currently usable. It is not seen as crucial that further toilet facilities are required in this first phase, however, it would only be of benefit to reopen the accessibility toilet as early as possible. STS have 'dry' toilets which are for their use only, but as a sustainable approach, it could be an option to consider additional 'dry' toilets within the Site.

Water Access

Water is another service that is vital for the Site to be able to attract a wide range of potential users. There is mains water to the cottages on Site, and further investigation would need to be carried out as to what the current wider availability is. An extension to this network would be required to provide water access points in multiple plots of the Site. Connecting to mains supply would provide drinking water and would be necessary for potential food and drink uses such as a café. Alternatively, or in combination with this, the existing water retention tank could be utilised and expanded. This would allow for a sustainable water supply; however it would only be useable for certain uses such as irrigation.

4.1.7 ENABLING INFRASTRUCTURE REQUIRED OUTCOMES

At the end of this first phase the services discussed need to be resolved to advance any further development proposals on the Site:

- Structure removal that is crucial for the Site's development, whilst considering the use by existing tenants;
- Electricity on Site including multiple access points for community enterprises;
- Drainage issues be fully resolved and integrated into the framework design, to benefit local residents and create a welcoming space for visitors; and
- Water available on Site to allow for a range of community enterprises.

4.1.8 ANTICIPATED BUDGET COSTS

Item	Budget Cost	Comments
Drainage Survey and Design	£2,500	
Drainage Installation:		
• Rain Garden (circa 30 x 10m)		
Excavation for attenuation pond and channel	£1,500	Volume of 300m^3
Footpaths - resin bound gravel with timber edgings	£4,500	Area of 60m^2

Planting including shrubs and semi mature root balled trees	£9,000	20no. trees
Grass/wildflower seeding	£1,200	240m^2
• Filter drain	£8,750	70m length
• Swale	£1,050	30m length
Removal of glasshouse and surrounding sheds	£26,640	
Removal of 1no. polytunnels	£12,480	
Shortening of 2no. polytunnels	£7,800	
Power survey and design (Electricity)	£2,500	Indicative costing depending on existing connections
Installation of electricity points	£20,000	Cost calculated on assumption of a network across the site with multiple points
Drinking water and foul water connection survey	£2,500	
Provision of drinking water and foul water connections across the Site	£ 10,000	
Indirect costs - prelims, OH&P, risk, fees etc	£22,084	
TOTAL	**£132,504**	

4.2 STRUCTURE ALTERATIONS (SECOND PHASE)

This second phase considers the existing buildings highlighted for removal in **Figure 5** to enable the layout in the spatial framework.

4.2.1 STRUCTURE REMOVAL OVERVIEW

There are two large storage buildings within a key part of the Site. They are unsightly in character, rusting, poor condition and very tall, blocking views, cutting out light and creating an unpleasant spatial environment (**Figure 10**). These two buildings are the first elements visible from the main entrance (off the 'main avenue'), and their removal would help to improve this key part of the Site and help attract new users and organisations to the Site. Similarly, there is an unused small green house that could be removed or relocated to areas allocated for food production within the Site.

Figure 10 – Existing large warehouse buildings

There is a resident owned garage structure in the southeast corner of the Site. In the short term it would not affect the development of the Site. However, longer term, retaining it and access to it whilst utilising the surrounding space is impractical.

4.2.2 STRUCTURE REMOVAL IMPLICATIONS

The storage buildings are presently used by the council for storing items such as benches and fencing. The buildings are unnecessarily large for this type of use and a smaller structure could provide the same storage without impacting on capacity. It is also understood there may be offsite storage that could also be used. As such other options should be explored for example including the area within the Community Space, which would create strong visual and accessible links with the main avenue.

Discussion with the owner of the garage would be necessary to agree on a solution for its longer-term future. The structure could be potentially be relocated to the northeast of the Site, closer to the cottages. However, the anticipated cost of this would be greater than demolition itself, so potentially a replacement garage would be a more practical solution.

4.2.3 SECOND PHASE REQUIRED OUTCOMES

- Removal of buildings and structures which sit within key areas of the Site and currently detract from the overall spatial environment and prevent further positive development.
- Relocate or remove local resident's garage in south east corner of the Site, with prior agreement from the owner.
- Relocate or remove smaller structures such as the small green house which are currently unused but could potentially be utilised elsewhere on site.

4.2.4 ANTICIPATED BUDGET COSTS

Item	Budget Cost	Comments
Removal of the two large council storage buildings	£14,175	
Removal of small greenhouse	£2,175	
Relocation of small greenhouse	£3,915	
Removal of private garage	£2,550	
Relocation of private garage	£4,590	
Indirect costs - prelims, OH&P, risk, fees etc	£5,481	
TOTAL (Relocation options)	**£28,161**	
TOTAL (Removal options)	**£24,381**	

4.3 OTHER SERVICES (THIRD PHASE)

4.3.1 ADDITIONAL STRUCTURE ALTERATIONS

The main large greenhouse is located within a key space of the Site (**Figure 11**). There are plans for its continued use within the immediate future, with a potential leaseholder currently interested in the structure. However, in the longer term there is potential for it to be demolished for an alternative use in this space such as a Café. Any decision regarding this would be made once the potential leaseholder has vacated the site.

Figure 11 – Main large greenhouse

4.3.2 TOILET FACILITIES AND SEWAGE

Current waste from residents' cottages is stored in a septic tank, and issues were raised during the consultation regarding how this would cope with an increase of connections. There is an existing accessibility toilet on Site, but this is currently not working. There is one public toilet within the visitor centre a short walk from the Site. On-Site toilets however would be seen as a benefit to attract more user groups and would become necessary as the number of people using the Site increases. The toilets could use sustainable methods such as the 'dry' toilets used by STS currently on the Site.

4.3.3 PARKING AND VEHICLE ACCESS

There is currently an informal area allocated for visitor parking within the Site (**Figure 12**). Within the wider estate there are dedicated parking for visitors and walkers of the estate. These are often full during popular times of the year such as at weekends and holidays.

The design proposes to encourage visitors to the Site using other sustainable methods of transport. Opening up pedestrian entrances to the Site will help in this regard. Parking within the Site is intended to be limited to staff of the leaseholds and community enterprises functioning on Site. Similarly access for deliveries and loading will be available but limited to specific periods of the day.

It is understood that a travel/parking strategy for the wider Kinneil Estate has been discussed within community groups. Access and parking for the Site should form part of any further discussions on this.

Figure 12 – Existing informal carpark

4.3.4 INTERNET ACCESS

Most community enterprises require internet access to function, and this will be an important service to attract such communities into the Site. WiFi should ideally be available throughout the Site, and specialist network engineers would be needed to advise on the best way to achieve this.

4.3.5 THIRD PHASE REQUIRED OUTCOMES

- Sewage resolved to alleviate concerns from local residents and provide toilet services for an increase in visitors (as well as attracting future users);
- Limited parking available for leaseholders and community enterprises;
- Other vehicle access for deliveries loading etc. available during redistricted times of the day;
- Internet access available throughout the Site.

4.3.6 ANTICIPATED BUDGET COSTS

Item	Budget Cost	Comments
Demolition of main large glasshouse	£41,580	
Restore existing toilet on Site	£2,300	
Installation of new toilets (2no.)	£15,000	
Wifi installation	£7,000	Indicative assumed costing, next design stage contact network providers to assess true cost
Indirect costs - prelims, OH&P, risk, fees etc	£13,176	
TOTAL	**£79,056**	

5 SUMMARY AND NEXT STEPS

This report has set out the key components and actions that are necessary to enable future development and uses within the Kinneil Walled Garden. This spatial framework and phased delivery plan aims to lay the foundations that will guide and shape the future of the Site into a place which has the local community at its heart. As acknowledged, the spatial framework does not provide detailed design but creates a flexible structure to enable spaces to form to respond to the requirements at the time but remain part of a coherent vision for the whole Site.

The immediate next steps include:

- Further consultation with the current site tenants, Sustainable Thinking Scotland, putting forward the ideas highlighted in this report and continue to work with them.
- Retain involvement of local community and other stakeholders to engage with the proposals.
- Removal of structures identified as crucial to enabling the development of the Site.
- Engage with appropriate engineers to address services and detailed surveys of existing services carried out.
- Development of detailed masterplan (requires committee approval)

5.1 SURVEY LIMITATIONS AND ASSUMPTIONS

All recommendations in this report are based on non-intrusive site visits and desk top survey.

Anticipated budget costs are based on approximate measures provided from Site plans and concept drawings and use a standard industry costing approach. The costs should not be considered to be definitive.

Appendix A

BASELINE ANALYSIS

Immediate context / Underground services

Key:

- Existing vehicular routes
- Existing pedestrian footpaths
- Gil Burn

Key:

- Water
- Electricity
- Gas
- Waste

Baseline Information

Site Dimensions

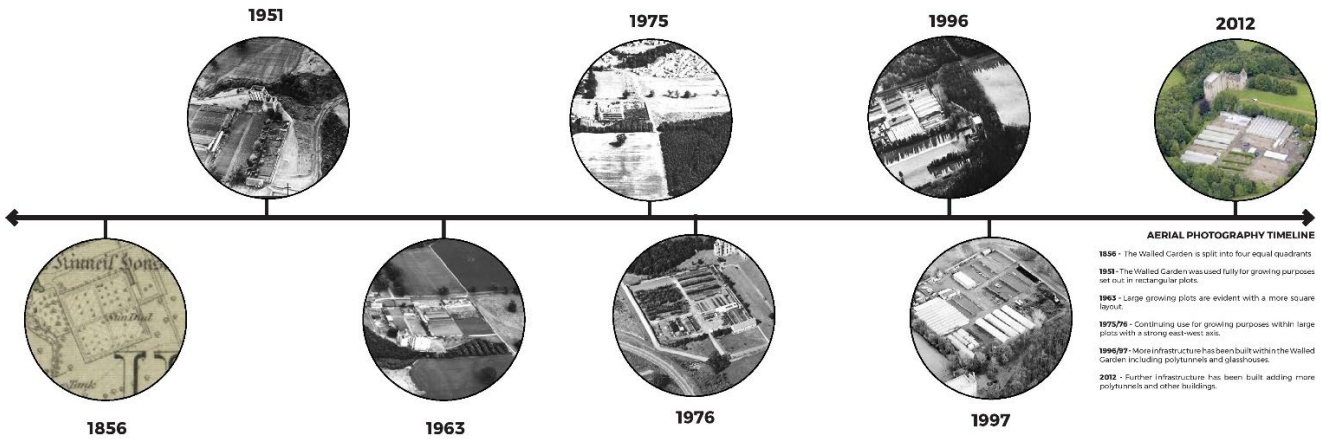

Existing/Potential Access and vehicular circulation

Key:
- Existing site vehicular routes
- Existing site vehicular entrances
- Potential vehicular entrances
- Potential pedestrian entrances

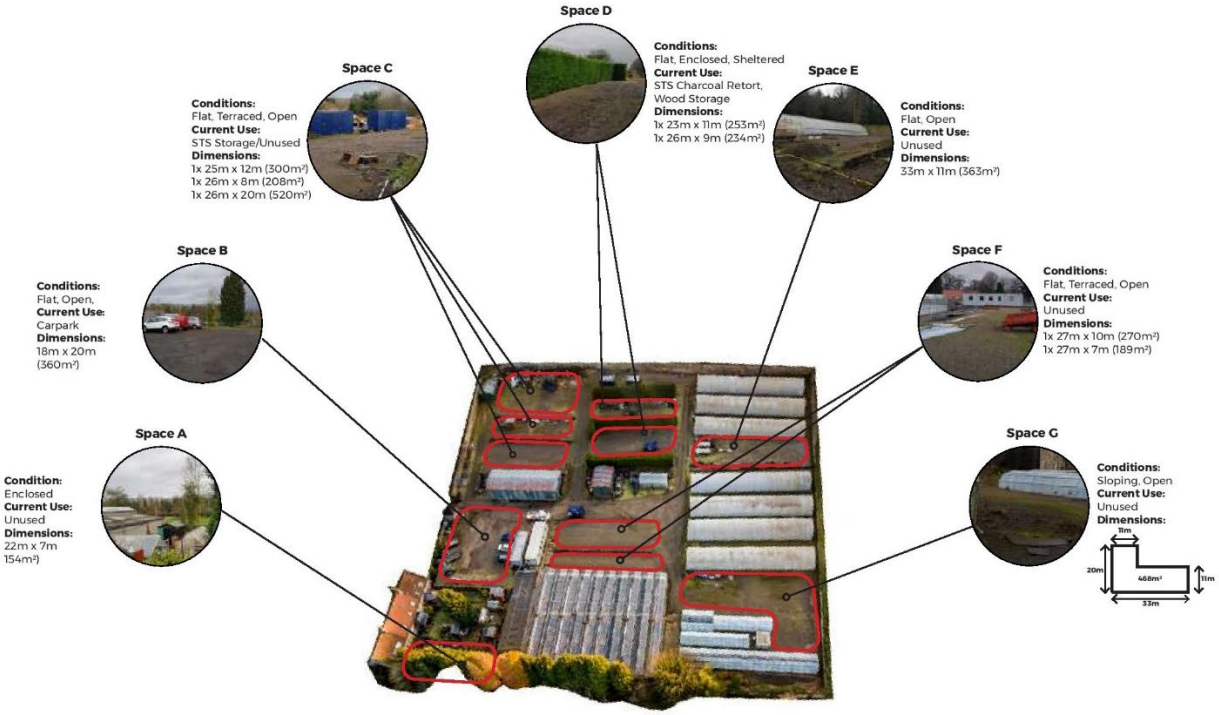

Permanent and Temporary structures

Lease boundaries

Historical Context



Existing Site Conditions



Community Idea Analysis

	Ideas	Approx. Minimum Area Required	Requirements	Potential Implementation Time	Life Span	Indicative Cost
	Community growing/ allotments	Traditional allotment size: 250m² 10 x raised beds: 36m²		0-6 mo.	Reversible	£
	Outdoor learning/ educational activity space	500m²		0-6 mo.	Reversible	££
	Food Bank Farm	1000m² (whole site)		>12 mo.	Permanent	£££
	Honey bee project	150m²		6-12 mo.	Reversible	££
	Skills training venue	70m²		>12 mo.	Permanent	£££
	Visitor Centre, Toilets, Café	100m²		>12 mo.	Permanent	£££
	Training kitchen	50m²		>12 mo.	Permanent	£££
	"Secret Garden"	>100m²		6-12 mo.	Permanent	£ - £££
	"Men's Shed"	30m² per space		0-6 mo.	Reversible	££
	Fruit tree nursery	80m²		0-6 mo.	Permanent	£
	Biochar	170m²		0-6 mo.	Reversible	£

Symbols Key

£ Low Cost · ££ Medium Cost · £££ High Cost · Electricity · Gas · Toilet Facilities · Water · Sun · Sheltered · Restricted From Pubic

Appendix B

DRAINAGE REPORT

PUBLIC

Falkirk Council

KINNEIL HOUSE WALLED GARDEN

Surface Water Drainage Evaluation

68104-WSP-DOC-0501
SEPTEMBER 2020

PUBLIC

Falkirk Council

KINNEIL HOUSE WALLED GARDEN

Surface Water Drainage Evaluation

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70068104

OUR REF. NO. 68104-WSP-DOC-0501

DATE: SEPTEMBER 2020

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FIGURES

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

Kinneil House is a historic house to the west of Bo'ness in east-central Scotland. The house is protected as a Category A listed building. It sits within Kinneil Estate public park, which also incorporates a section of the Roman Antonine Wall.

Figure 1-1 - Site Location

Falkirk Council make use of the house's old walled garden for greenhouses and other landscape material storage. The site ground level is raised above some neighbouring properties and is surrounded on three sides by a wall over 2m tall.

Falkirk Council plan to develop the site to make better use of it by improving access and addressing existing drainage issues.

1.2 SCOPE

This report has been prepared to document the existing drainage on the site and summarise the requirements for drainage in any future development. This will include results of calculations to estimate the volume of runoff during rainfall events.

2 SITE OBSERVATIONS

2.1 INTRODUCTION

A walkover of the site was carried out in September 2020. The purpose of the visit was to identify existing drainage apparatus and evidence of flow paths, flooding etc. Notes from that visit refer to Figure 2-1.

Figure 2-1 - Site Visit Key Locations

2.2 GENERAL

The site is graded such that surface water runs from south to north. The entire site is surfaced with coarse gravel and feels hard packed underfoot. The wall around the perimeter does not appear to have any outlets other than gaps for access.

Location 1 is a parking area for one of the temporary buildings on the site. There is a retaining wall to the north which retains the car park 1-2m above the properties to the north. There are no drainage features stopping runoff from cascading over the wall to the properties below.

Figure 2-2 - Level difference between site and adjacent properties

Location 2 is to be the site of a new access into the walled garden. There is a bricked up old entrance here. The ground on the inside and outside of the wall generally falls away from the wall at this location.

At Location 3 there is a large water tank with an electric pump to provide adjacent green houses with stored rainwater. The site is at a higher level to the ground to the north and the retaining wall is in disrepair. Works are underway to repair the wall.

Location 4 is the high point of the site beside a vehicle access gate. Currently unused. A series of new sustainable office spaces have been installed to the west of this location and reuse the rainwater from the roofs through tanked storage.

Figure 2-3 - Looking North from Location 4

At Location 5 there is a watercourse at the bottom of a deep cut. The slopes are heavily vegetated and no evidence of outfalls to the watercourse were observed.

2.3 EXISTING DRAINAGE

South of Location 1 there is a manhole cover and a gully set in a concrete hardstanding. These are beside a small public bathroom, currently closed. It is presumed that these assets service that facility and connect to the local foul water network. Falkirk Council advise that this foul network connects to a septic tank that serves all the local properties. This is unconfirmed.

Figure 2-4 - Existing drainage assets

3 SURFACE WATER DRAINAGE EVALUATION

On plan the site within the wall is just over 1 hectare. The topographical survey that has been carried out confirms that the ground runs from south, to north.

If it is assumed that the current site is 90% impermeable an estimate can be made for the volume of runoff generated for various storms based on empirical storm intensity records. Additionally, a comparative greenfield runoff estimation can be made to compare the runoff from an undeveloped site.

The UK SuDS online tools have been used to apply the Wallingford and Institute of Hydrology report 124 methods to estimate runoff. The details of these calculations have been included in Appendix A. A summary of the results are as follows.

The current site will generate in the region of 616m^3 of runoff during a 1 in 100 year storm event over and above the equivalent naturally occurring green field runoff volume. Should the site be fully developed this would be the minimum required attenuation that would need to be made available in addition to providing a route for runoff to drain beyond the wall.

Regarding the properties to the north east of the site at a lower level. A drainage feature will be required to collect and convey surface runoff away from the wall at this location to protect the properties below from flood damage.

The watercourse at Location 5 would made a suitable outfall for overflow runoff, but a new connection to it would be required. This would require a length of carrier drain out falling at a suitably positioned headwall on the embankment.

4 DEVELOPMENT DRAINAGE OPTIONS

4.1 REQUIREMENTS

Plans for the development of this site are still in the early stages. In order to provide any new development plan with sufficient surface water drainage capacity to protect from flooding, these requirements should be incorporated into the design:

- All rainfall onto the site must be collected, conveyed and attenuated so that none is permitted to outfall to adjacent properties or undermine the support for the surrounding wall.
- A drainage feature shall be required at Location 1 to intercept runoff above the adjacent properties.
- Some attenuation shall be required on site to delay the discharge of run off to any outfall.
- It is anticipated that providing the full 600m^3 of storage is not practicable and so development of the site must result in a significant reduction in impermeable surface to minimise the surface water runoff to be attenuated.
- A designed outfall to the adjacent watercourse shall be required to ensure site runoff can be effectively managed and conveyed away in a controlled fashion.
- Surface water treatment shall be required to minimise the risk of pollution to the adjacent water course.

4.2 AVAILABLE OPTIONS

In order to meet these requirements, it is recommended that the principles of Sustainable Drainage are implemented across the site.

To quote the CIRIA SuDS manual[1]:

Surface water is a valuable resource and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.

The philosophy of sustainable drainage systems is about maximising the benefits and minimising the impacts of surface water runoff in developed areas.

For the purposes of this site, surface water shall be managed for amenity and water quantity. To achieve this, features shall be designed to slow surface water runoff, keep it on the surface wherever possible and synergise with any proposed landscaping features.

Features to be included in any development shall be a combination of the following, with the choice depending on space available and integration with any proposed development features.

Images used in the following examples have been taken from the CIRIA SuDS Manual and this document shall be used as a basis for all technical design.

[1] CIRIA C753 The SuDS Manual 2015 – www.ciria.org

SWALES

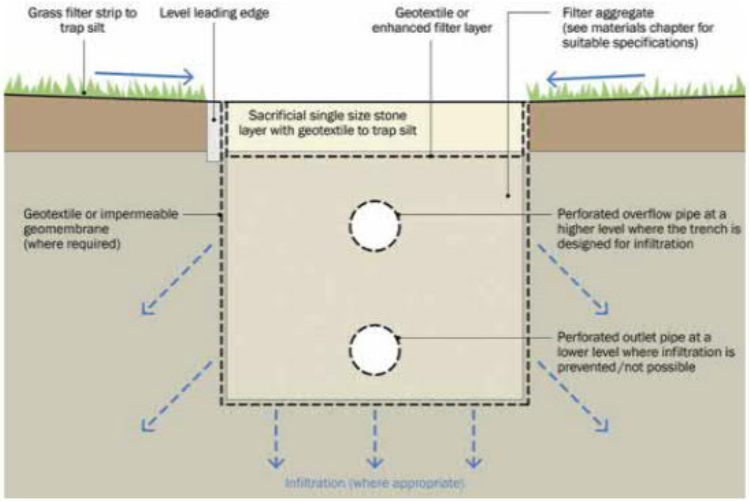
A swale is a broad and shallow grassed channel. They are designed to expose runoff to the maximum possible surface area of grass to:

- Slow the conveyance of runoff
- Remove transported pollutants from the runoff.

In order to work effectively a swale requires a wide cross section. For this site a swale would be between 3 and 6m wide.

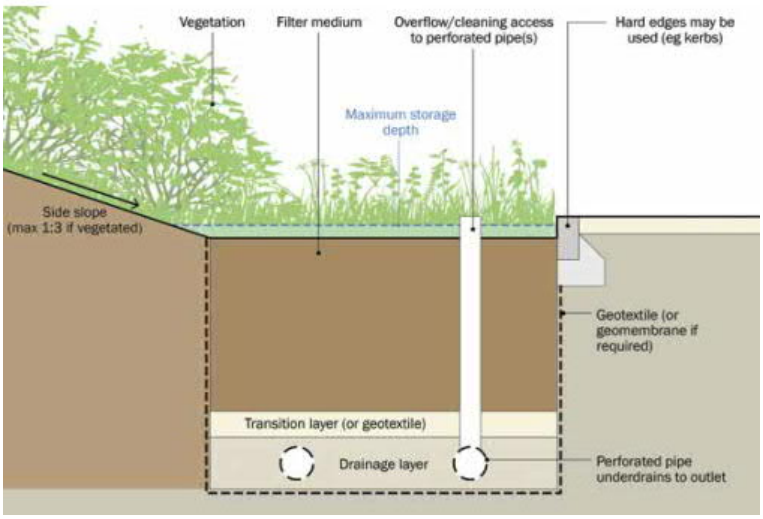
FILTER DRAIN

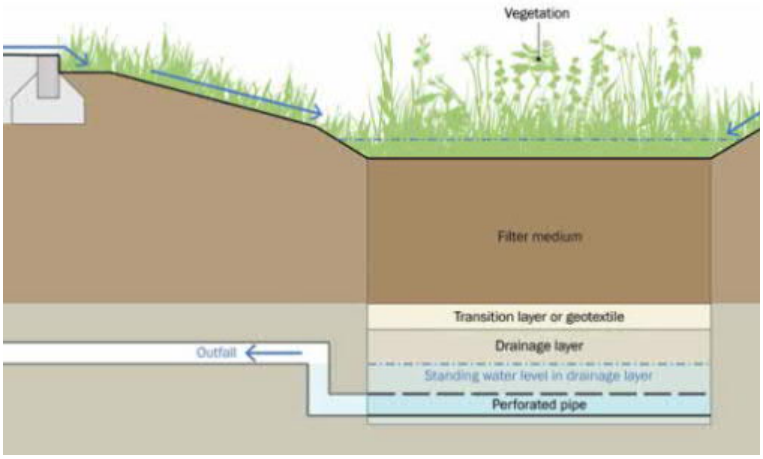
Filter drains are shallow trenches filled with stones or gravel. They are drained via a perforated pipe at the bottom of the trench and can provide storage and treatment of runoff that enters the trench from the surface.



BIORETENTION SYSTEMS

Bioretention systems are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution through the use of engineered soils and vegetation. They are particularly effective in delivering interception.

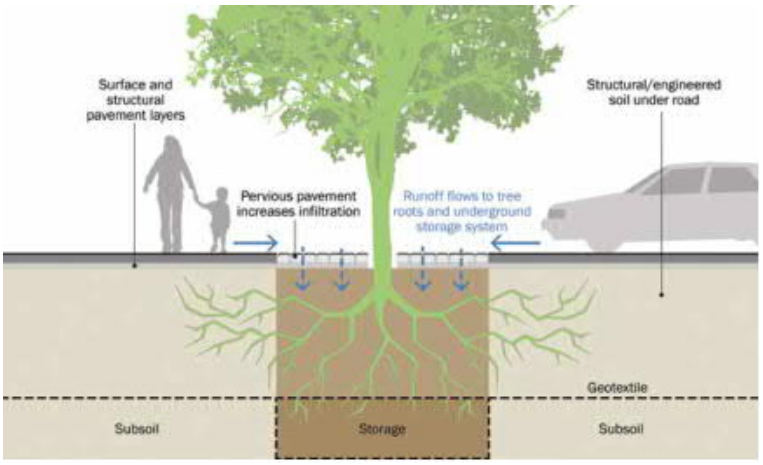




TREES

Trees and their planting structure can hold and use a significant amount of surface water, reducing the volume of runoff to be managed on site.

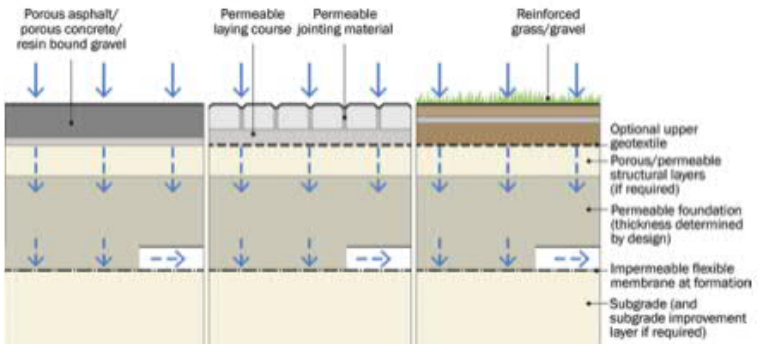
A variety of proprietary root protection systems are available that can protect the trees supporting structure and hold water.



PERVIOUS PAVEMENTS

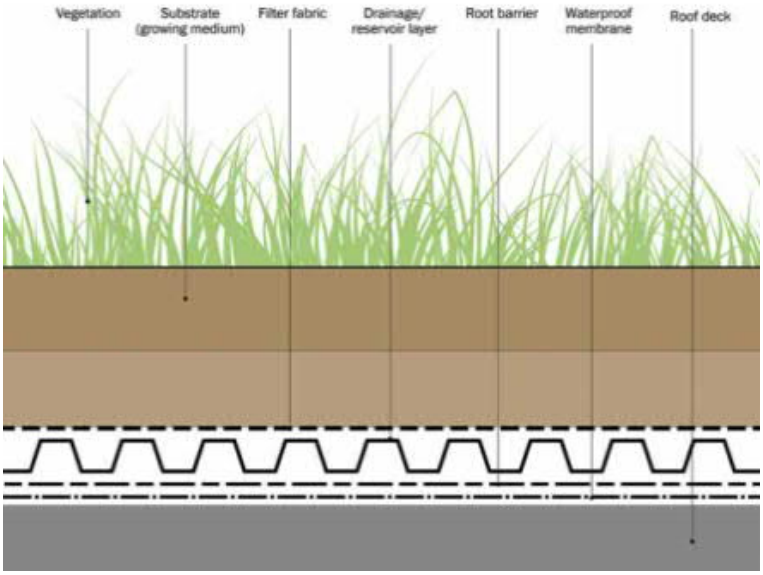
Constructing paved areas that are permeable provides opportunities for storing and slowing surface water within the hard-standing build-up.

Such systems also reduce the amount of pollutants that runoff the hard standing into adjacent drainage features.



GREEN ROOFS

A green roof can, among other benefits, provide a significant drop in runoff from buildings through bioretention.



ATTENUATION

Many options are available for attenuating run off on site for either the long or short term.

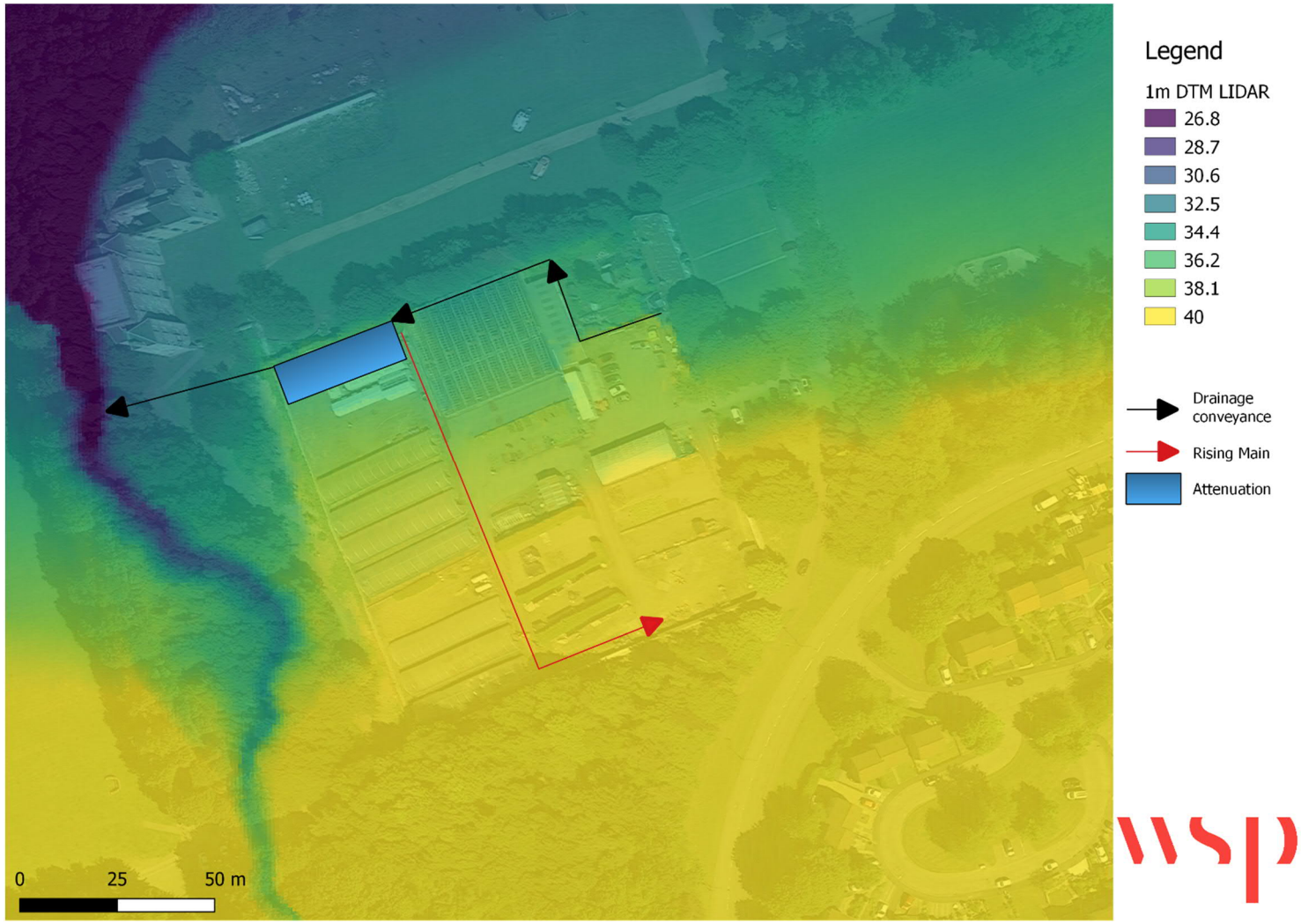
A basin or tank are the most efficient options, providing 100% of their volume for storage. Both require a large amount of space and as big a height difference between the inlet and outlet as is possible.

4.3 DEVELOPMENT PROPOSALS

As the site development proposal progresses space must be made available for drainage. Figure 4-1 illustrates the route surface water shall be directed.

- At the low end of the site a drainage feature must be installed transverse to the slope to direct surface water runoff toward attenuation in the north west corner. This can be either a Swale, a landscaped bioretention area or even a filter drain if space is limited.
- Attenuation will be required at the north west corner. This could be a basin, pond, wetland or even buried tank structure. Its purpose will be to hold back flood waters during high return period storms. This would be separate to the rainwater harvesting tank arrangement (which would only accept roof runoff)
- A new outfall must be made to connect the site to the adjacent watercourse. The purpose would be to provide a heavily controlled outlet to the nearby watercourse for runoff that cannot be managed on site.
- The existing rainwater harvester storage shall be kept. Runoff from structures should be harvested and stored in this tank. There are two options for this tank:
    - Keep the tank at the low point of the site and have structures deliver rainwater via gravity. A pump will be required to deliver stored water. This option would require the least amount of new infrastructure.
    - Move the tank to the top of the site and have a second, smaller, tank at the low point of the site feed the larger with a pump. This option would make the most efficient use of the pump as it would only be required to top up the storage once the smaller tank is full.
- All buildings, landscaping and hardstandings should be designed in such a way as to retain as much rainfall as possible. Drains transverse to the slope of the site shall pick up excess and deliver to attenuation and outfall.

Figure 4-1 - Proposed Drainage Route



5 NEXT STEPS

In order to achieve that which has been discussed it is recommended that the following steps are taken when designing development options.

- Evaluate efficiency of bioretention and rainwater harvesting to establish how much rainwater can be retained on site.
- As a new outfall to a watercourse is considered necessary efforts would be required to evaluate the development proposal drainage strategy to demonstrate that SEPAs General Binding Rules for the Water Environment (Controlled Activities) (Scotland) Regulations 2011have been met. Some consultation with SEPA is anticipated but CAR licences are unlikely to be required.
- Engage Falkirk Councils flooding team to confirm design parameters such as design storm and maximum discharge rates.
- Design and model a SuDS drainage system for the development and test for up to 1 in 200 year return period storms to demonstrate that surface water runoff can be managed by the system.
- There is an excellent opportunity with this development for Sustainable Drainage to be integrated as part of high-quality amenity improvements, led by landscaping design.

Appendix A

RUNOFF ESTIMATE CALCULATIONS

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Peter Roskilly
Site name:	Kinneil House
Site location:	Kinneil

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	56.00666° N
Longitude:	3.63262° W
Reference:	1484205863
Date:	Sep 22 2020 11:41

Site characteristics

Total site area (ha):	1
Significant public open space (ha):	0
Area positively drained (ha):	1
Impermeable area (ha):	0.9
Percentage of drained area that is impermeable (%):	90
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	1
Net impermable area for storage volume design (ha):	0.92
Pervious area contribution to runoff (%):	47

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	51
Rainfall 100 yrs 12 hrs:	--	73.78
FEH / FSR conversion factor:	1.19	1.19
SAAR (mm):	799	799
M5-60 Rainfall Depth (mm):	14	14
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	2	2
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.42	1.42
Growth curve factor 30 year:	1.95	1.95
Growth curve factor 100 years:	2.63	2.63
Q_{BAR} for total site area (l/s):	5.64	5.64
Q_{BAR} for net site area (l/s):	5.64	5.64

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	5

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	5	5
1 in 30 years (l/s):	11	11
1 in 100 year (l/s):	14.8	14.8

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	503	503
Long term storage 1/100 years (m³):	113	113
Total storage 1/100 years (m³):	616	616

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