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Client: Mr and Mrs Perkins
Flood Risk Assessment for the Proposed Development at Waterfields, Seaton Road, Wickhambreaux, Kent

May 2022

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Flood Risk Assessment for the Proposed Development at Waterfields, Seaton Road, Wickhambreaux, Kent

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Contents Page

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1 Background and Scope of Appraisal

Flooding is a major issue in the United Kingdom. The impacts can be devastating in terms of the cost of repairs, replacement of damaged property and loss of business. The objectives of the Flood Risk Assessment (FRA) are therefore to establish the following:

- whether a proposed development is likely to be affected by current or future flooding from any source.
- whether the development will increase flood risk elsewhere within the floodplain.
- whether the measures proposed to address these effects and risks are appropriate.
- whether the site will pass Part B of the Exception Test (where applicable).

Herrington Consulting has been commissioned by Mr and Mrs Perkins to prepare a Flood Risk Assessment (FRA) for the proposed development at **Waterfields, Seaton Road, Wickhambreaux, Kent, CT3 1RW.**

This appraisal has been undertaken in accordance with the requirements of the National Planning Policy Framework (2021) and the National Planning Practice Guidance Suite (August 2021) that has been published by the Department for Communities and Local Government. The *Flood Risk and Coastal Change* planning practice guidance included within the Suite represents the most contemporary technical guidance on preparing FRAs. In addition, reference has also been made to Local Planning Policy.

To ensure that due account is taken of industry best practice, this FRA has been carried out in line with the CIRIA Report C624 ‘Development and flood risk - guidance for the construction industry’.

2 Development Description and Planning Context

2.1 Site Location and Existing Use

The site is located at OS coordinates 622208, 158668, off Seaton Road, in Wickhambreaux. The site covers an area of approximately 3.75ha and currently comprises a residential dwelling and associated undeveloped open space to the east of the dwelling. The location of the site in relation to the surrounding area is shown in *Figure 2.1*.

Figure 2.1 – Location map (contains Ordnance Survey data © Crown copyright and database right 2022).

The site plan included in Appendix A.1 of this report provides more detail in relation to the site location and layout.

2.2 Proposed Development

The proposals for development comprise of a property extension (Figure 2.2) and a 'net zero energy project'. The energy project consists of a ground sourced heat pump and a ground mounted solar array (Figure 2.3).

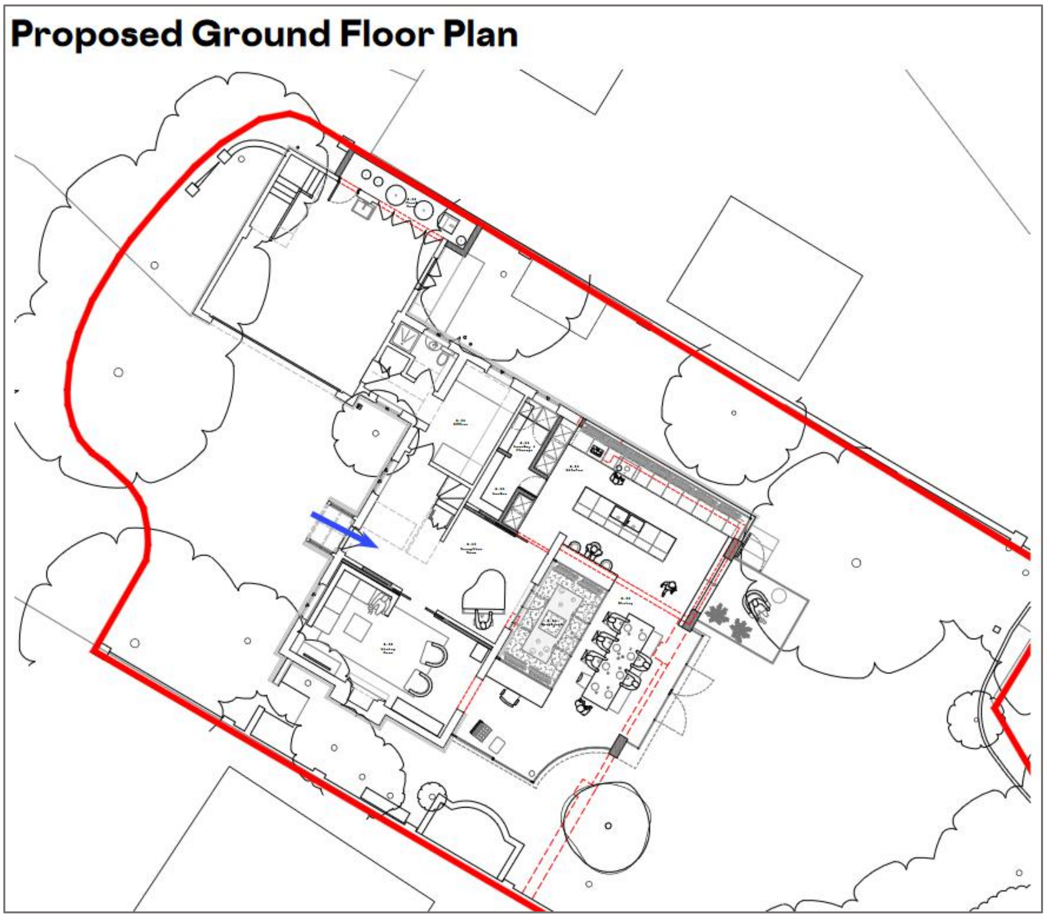


Figure 2.2 – Proposed dwelling extension.

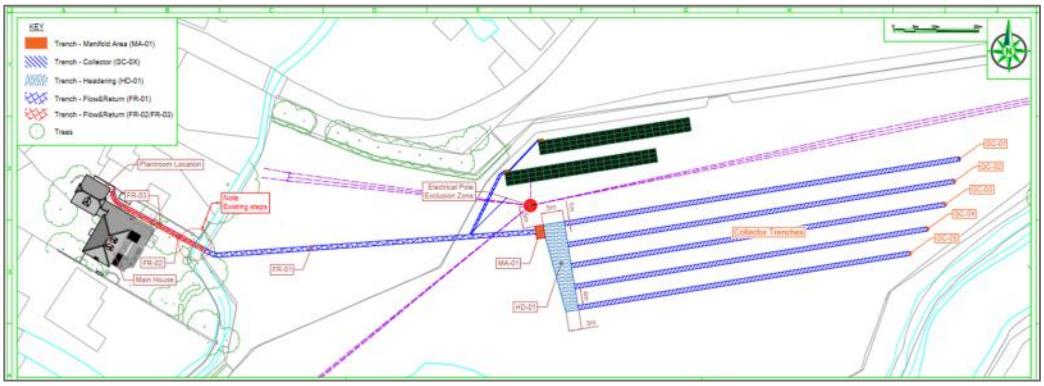


Figure 2.3 – Proposed solar array and ground source heat pump layout

Further drawings of the proposed scheme are included in Appendix A.1 of this report.

3 Definition of Flood Hazard

3.1 Site Specific Information

Information from a wide range of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

Site specific flood level data provided by the EA – The EA has provided the model results of the Little Stour Modelling and Mapping Study carried out in 2012, updated to account for new climate change allowances in 2016 (by others), which have been referenced as part of this appraisal.

Information contained within the SFRA – The Canterbury County Council SFRA (2019) contains detailed mapping showing historic flood records for a wide range of sources. This document has been referenced as part of this site-specific FRA.

Information on localised flooding contained within the SWMP – A Surface Water Management Plan (SWMP) is a study to understand the risk of flooding that arises from local surface water flooding, which is defined by the Flood and Water Management Act 2010 as flooding from surface runoff, groundwater, and ordinary watercourses. Such a document has been prepared for Canterbury (2012) and has therefore been referenced as part of this site-specific FRA.

Information provided by Southern Water – Southern Water has provided the results of an asset location search for the site. The response is included in Appendix A.2.

Site specific topographic surveys – A site-specific topographic survey has not been undertaken at this stage; however, inspection of aerial height data (LiDAR) records show that the land levels of the site vary between 3.4m and 5.2m Above Ordnance Datum Newlyn (AODN). The land levels generally fall towards the Little Stour.

Geology – Reference to the British Geological Survey (BGS) map shows that the underlying solid geology in the location of the subject site is Margate Chalk Member (chalk). Overlying this are superficial deposits of Alluvium (clay, sand, and gravel).

Historic flooding – Information contained within the Canterbury County Council SFRA and the EA's 'Recorded Flood Outlines' GIS layer indicates that part of the development site was flooded during an event in 2000/01, when the Little Stour overtopped its banks. Since this event, defences have been constructed and/or improved.

3.2 Potential Sources of Flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table 3.1 at the end of this section summarises the risks associated with each of the sources of flooding.

Flooding from Rivers, Ordinary or Man-Made Watercourses – The site lies within Flood Zone 3 of the Little Stour (main river) as shown on the EA's 'Flood Map for Planning' (Figure 3.1).

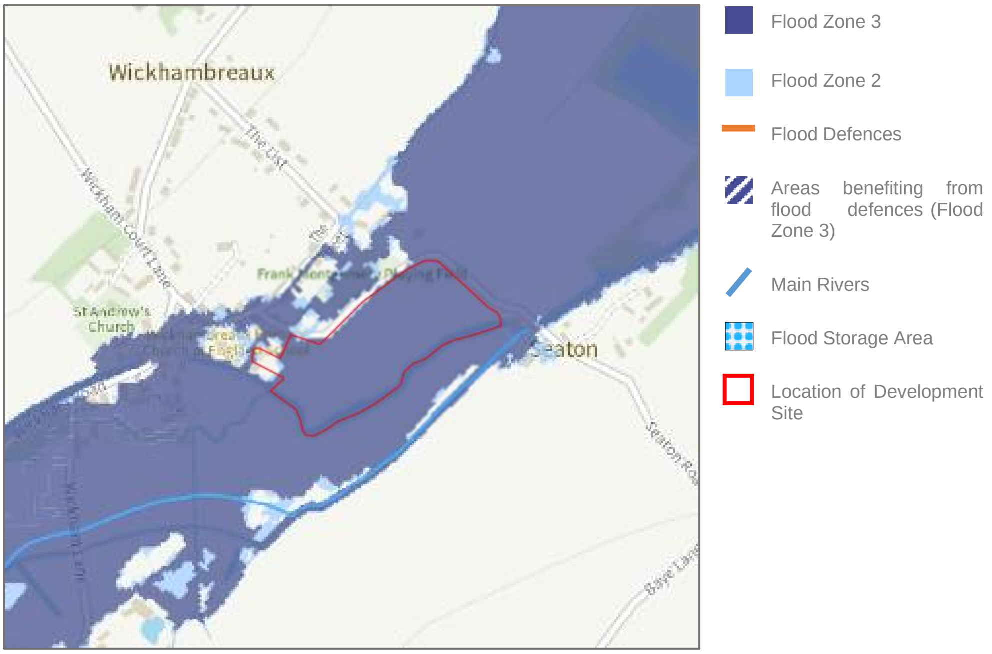


Figure 3.1 – EA's 'Flood Map for Planning' (© Environment Agency).

Additionally, OS mapping shows that the Blackhole Dyke (ordinary watercourse) crosses the site (Figure 3.2). Consequently, the risk of flooding from this source has been examined in more detail in Section 5 of this FRA.

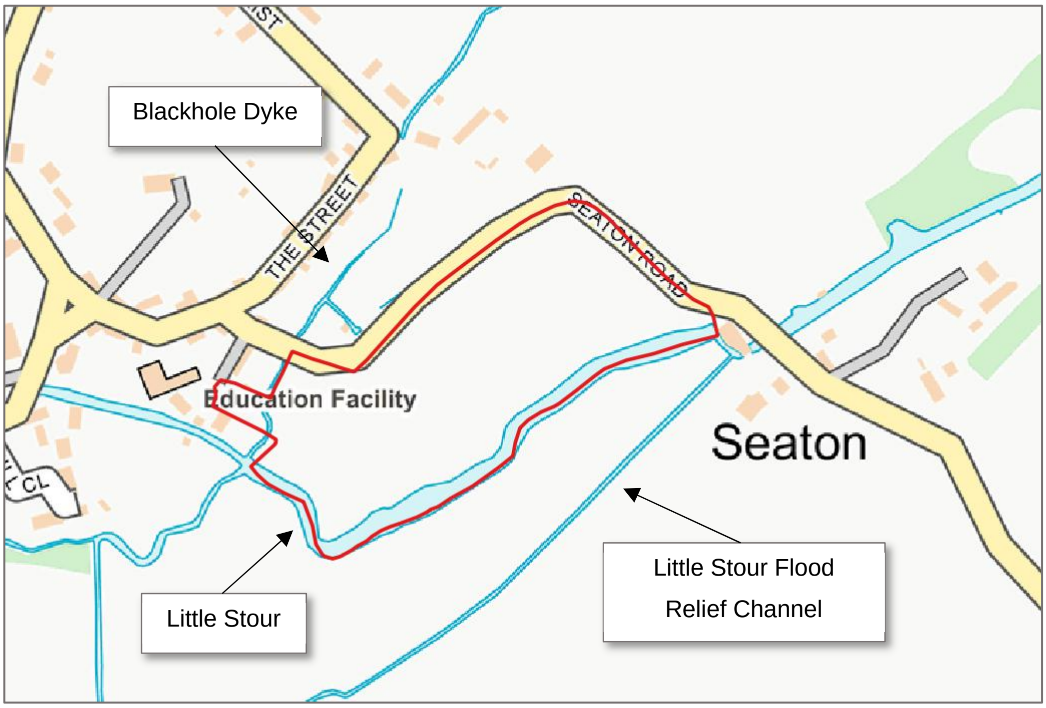


Figure 3.2 – Map of the watercourse network adjacent to the site

Flooding from the Sea – The site is located a significant distance inland and is elevated well above predicted extreme tide levels. Consequently, the risk of flooding from this source is considered to be *low*.

Flooding from Surface Water – Surface Water, or overland, flooding typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This mechanism of flooding can occur almost anywhere but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions.

The EA's 'Flood Risk from Surface Water' map (Figure 3.3) shows the development site is located in an area classified as having a 'very low' to 'high' risk of surface water flooding. Consequently, the risk of flooding from this source has been appraised in more detail below.

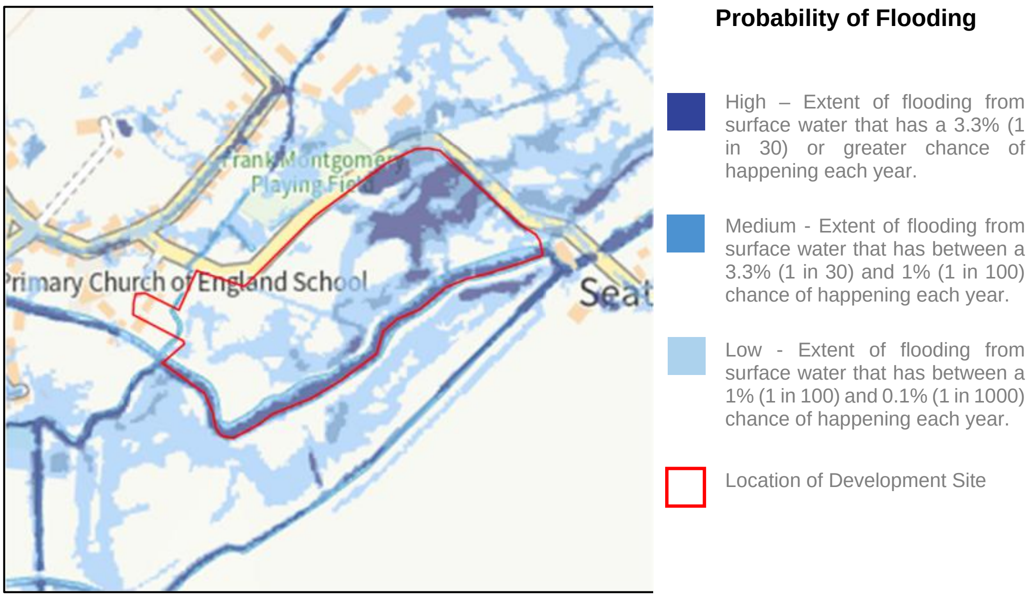


Figure 3.3 – EA's 'Flood Risk from Surface Water' map (© Environment Agency).

The EA's mapping shows that surface water is predicted to flow across part of the site towards the Little Stour, and that much of the east of the site is affected by flooding during the 'low' risk scenario, with floodwater accumulating near to the river. However, the EA mapping does not take into account the influence of the adjacent Little Stour, which in reality would drain surface water away from the site. On this basis, the EA mapping is considered to overestimate the risk of flooding from surface water.

If the watercourses were full to capacity following an extreme rainfall event, the lower lying areas of the site could flood, however, this would be attributed to flooding from fluvial sources. The risk of flooding from fluvial sources is therefore discussed above and is assessed further in Section 5.

Whilst the EA's mapping is thought to overestimate the risk of surface water flooding, there is the possibility that some of the rain falling on the site itself could accumulate within any topographic depressions. Notwithstanding this, the solar array will be elevated above the ground level and therefore the accumulation of water on the site would not have a detrimental impact.

Taking into account the above and given that there are no records of flooding at the site from surface water within the SFRA, the risk of flooding from this source to the proposed development is considered to be low.

Flooding from Groundwater – Water levels below the ground rise during wet winter months and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land, as well as reactivating flow in 'bournes' (streams that only flow for part of the year).

The underlying geology in this area is Margate Chalk Member with overlying superficial deposits of Alluvium. The site is located adjacent to the Little Stour and therefore the groundwater level in this area is hydraulically linked to the water level within the river itself. Consequently, for groundwater to emerge on site, the water level within the river would have already exceeded the bank height of the river, and therefore, any flooding on-site would be attributed to the river itself (i.e., fluvial flooding). As there are no records of groundwater flooding at the site during the very wet periods of 2000/01 or 2002/03, it is concluded that the risk of above ground flooding from groundwater in isolation is *low*.

Notwithstanding this, the proposals do include below ground infrastructure with the ground source heat pump collector flow and return pipes installed at a depth of approximately 1m. The applicant has confirmed that when past excavations were undertaken on site, groundwater was struck in places at approximately 0.8m below ground level and therefore could be affected by groundwater flooding when the groundwater table is elevated. However, the applicant has confirmed that the heat pump system is capable of, and in fact is more efficient, in wet soils. As a result, it is not considered necessary to provide further mitigation to manage the impact of groundwater flooding to the collector pipes.

Flooding from Sewers – In urban areas, rainwater is typically drained into surface water sewers or sewers containing both surface and wastewater known as "combined sewers". Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

Inspection of the asset location mapping provided by Southern Water (Figure 3.4) identifies that the sewers in this area are foul only. There are no known records of flooding from sewers in this area. Additionally, the topography of the land within the site and the surrounding area suggests that any above ground flooding that might occur as a result of a surcharged sewer would not pond at the site but would rather flow to the lower lying land in the south. The risk of flooding from this source is therefore considered to be *low*.

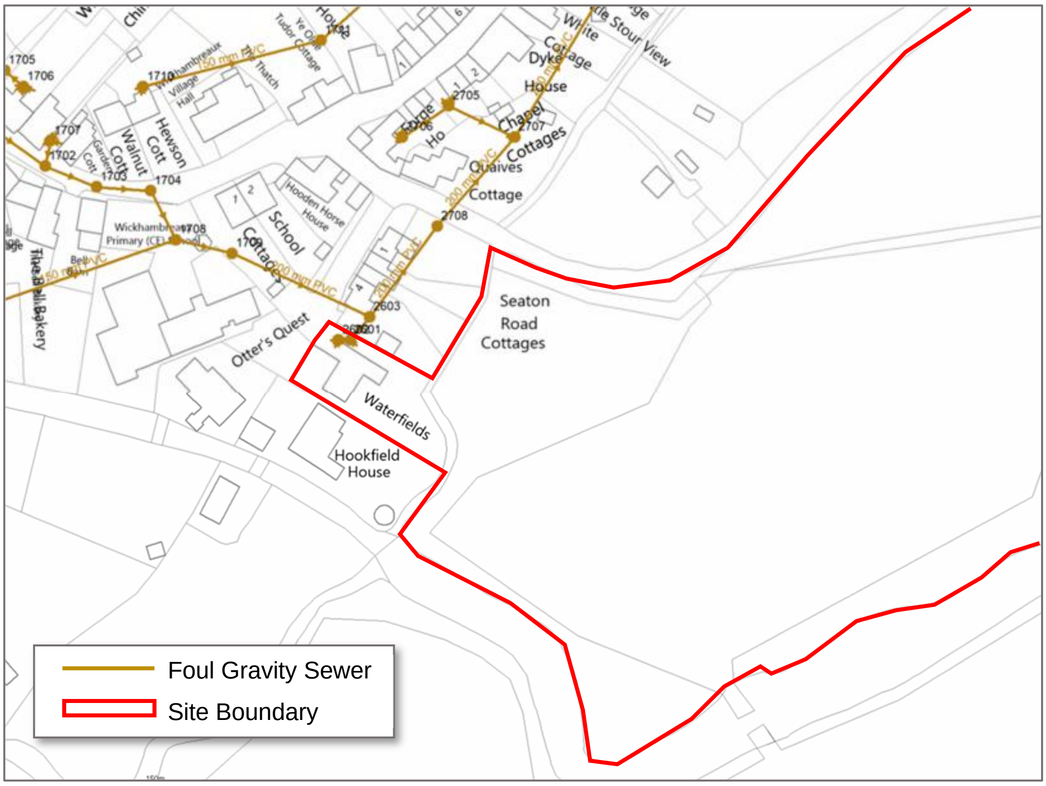


Figure 3.4 - Asset location mapping provided by Southern Water (a full-scale copy can be found in Appendix A.3).

Flooding from Reservoirs, Canals, and Other Artificial Sources – Non-natural or artificial sources of flooding can include reservoirs, canals, and lakes, where water is retained above natural ground level. In addition, operational and redundant industrial processes including mining, quarrying, sand and gravel extraction, may also increase the depth of floodwater in areas adjacent to these features.

The potential effects of flood risk management infrastructure and other structures also needs to be considered. For example, reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

Inspection of the OS mapping for the area shows that there are no artificial sources of flooding within close proximity to the site. In addition, the EA's 'Flood Risk from Reservoirs' map shows that the site is not within an area considered to be at risk of flooding from reservoirs. Therefore, the risk of flooding from this source is considered to be *low.*

A summary of the overall risk of flooding from each source is provided in Table 3.1 below.

Source of Flooding	Initial Level of Risk	Appraisal method applied at the initial flood risk assessment stage
Rivers, Ordinary and Man-Made Watercourses	Appraised further in Section 5	OS mapping, the EA's 'Flood Map for Planning' and aerial height data.
Sea	Low	OS mapping and the EA's 'Flood Map for Planning'
Surface Water	Low	EA's 'Flood Risk from Surface Water' map, historic records contained within the Canterbury County Council SFRA, aerial height data, and OS Mapping
Groundwater	Low	BGS Geology of Britain map, Defra Groundwater Flood Scoping Study, aerial height data and information provided by the applicant
Sewers	Low	Aerial height data, asset location data provided by Southern Water and historic sewer records contained within the SFRA
Artificial Sources	Low	OS mapping and EA's 'Flood Risk from Reservoirs' map

Table 3.1 – Summary of flood sources and risks.

3.3 Existing Flood Risk Management Measures

The EA's 'Spatial Flood Defences' layer indicates that the development site benefits from natural high ground alongside the Little Stour's River channel. Additionally, the site benefits from the Little Stour Flood Relief Channel (as shown on Figure 3.2) which was constructed in 2001 between Littlebourne and Wickhambreux. The flood relief channel is managed by a sluice that is situated in Littlebourne and opened when pre-determined flow volumes and river height levels are reached.

Further improvements were made in 2016 with the construction of a penstock to control flows between the Little Stour and Blackhole Dyke. In 2016 the EA also improved the banks to the northern side of the Little Stour (within the site boundary), using 80 tonnes of clay to repair and raise the bank.

4 Climate Change

The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past, present, and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall could be expected.

These effects will tend to increase the size of Flood Zones associated with rivers, and the amount of flooding experienced from other inland sources. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels. It will also increase the extent of the area at risk should sea defences fail. Changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events are also predicted.

4.1 Planning Horizon

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on the extreme flood level that is commensurate with the planning horizon for the proposed development. The NPPF and supporting Planning Practice Guidance Suite state that residential development should be considered for a minimum of 100 years. The development that is the subject of this FRA is for a extension and infrastructure to support a residential dwelling. The development is therefore considered as residential and a design life of 100 years has been assumed.

4.2 Potential Changes in Climate

Peak River Flow

Recognising that the impact of climate change will vary across the UK, the allowances show the anticipated changes to peak flow by management catchment. Management catchments are sub-catchments of river basin districts. The proposed development site is covered by the **Southeast River Basin District**, as defined by the EA 'River Basin District' maps, and is located in the **Stour Management Catchment**, as defined on the EA's 'Peak River Flow' map.

For each Management Catchment, a range of climate change allowances are provided for three different time epochs. For each epoch there are three climate change allowances defined. These represent different levels of statistical confidence in the possible emissions scenarios on which they are calculated. The three levels of allowance are as follows:

- Central: based on the 50th percentile
- Higher Central: based on the 70th percentile
- Upper End: based on the 95th percentile

The EA has provided guidance regarding the application of the climate change allowances and how they should be applied in the planning process. The range of allowance for the Management Catchment in which the development site is located are shown in Table 4.1 below.

Management Catchment Name (River Basin District)	Allowance Category	2020s	2050s	2080s
Stour (Southeast)	Upper End	40%	55%	101%
	Higher Central	25%	30%	55%
	Central	18%	20%	**38%**

Table 4.1 – Recommended peak river flow allowances for each epoch for the Stour Management Catchment (1981 to 2000 baseline).

For less vulnerable development with a design life of 100 years in Flood Zone 3, a 'Central' climate change allowance is recommended. From Table 4.1 above, it can be seen that the recommended climate change allowance for this site is a **38%** increase for all peak river flows.

5 Probability and Consequence of Flooding

5.1 The Likelihood of Flooding

When appraising the risk of flooding to new development it is necessary to assess the impact of the 'design flood event'. Flood conditions can be predicted for a range of return periods, and these are expressed in either years or as a probability, i.e., the probability that the event will occur in any given year, or Annual Exceedance Probability (AEP). The design flood event is taken as the 1 in 100 year (1% AEP) event for fluvial flooding, including an appropriate allowance for climate change (refer to Section 4.2).

The EA has previously provided the modelling outputs from the Little Stour and Nailbourne Modelling Study (2012 – updated to include new climate change allowances in 2016) which has been referenced as part of this appraisal. The site benefits from the improvements made to the Little Stour channel, and the Little Stour Flood Relief Channel and therefore the 'defended' scenario is considered to provide the most appropriate representation of the risk of flooding onsite.

It should be acknowledged that, whilst the Little Stour modelling was updated in 2016 to account for changes to climate change allowances, the updated modelling did not include the improvements made to the riverbank on site and the penstock introduced to manage flows within the Blackhole Dyke. As such, the model results likely overestimate the risk of flooding on site. Nevertheless, in the absence of up-to-date modelling, the Little Stour modelling has been referenced to appraise the risk of flooding on site.

The 1 in 20 year Flood Event – Functional Floodplain

The functional floodplain is defined by the NPPF as land where water has to flow or be stored in times of flood during events that have a probability of occurrence of 1 in 20 (5%) or greater in any one year.

Inspection of the model outputs for the 1 in 20 year return period event shows that part of the site is subject to flooding during this event (i.e. within the 'functional floodplain'). However, the proposed dwelling extension and solar array are located on part of the site located outside the' functional floodplain'. The ground source heat pump collector pipes are located within the extent of flooding during this event, but it should be acknowledged that the pipes are buried and do not alter the above ground profile of land within the floodplain – and are water compatible by design, i.e., heat transfer within the ground source heat pump system is also more efficient when located within saturated soils. On balance, it is considered that the pipes are located in an appropriate location and will not alter the onsite or offsite flood risk profile.

The Design Flood Event

When appraising the risk of flooding to new development it is necessary to assess the impact of the 'design flood event'. The design flood event is taken as the 1 in 100 year (0.5% AEP) event for fluvial flooding, including an appropriate allowance for climate change (refer to Section 4.2).

Section 4.2 has identified that for a less vulnerable development situated within Flood Zone 3, a 38% increase in peak river flow has to be applied to the 1 in 100 year flood event to account for climate change throughout the lifetime of the development (i.e. design flood event). As the guidance on climate change allowances has recently been updated, this scenario has not been modelled as part of the Little Stour Modelling Study. In absence of an event with the recommended allowance, a conservative approach has been adopted, by applying the 1 in 100 year return period event including a 45% allowance for climate change (i.e. the closest available modelled climate change scenario to the recommended allowance) as the design flood event. Figure 5.1 below shows the maximum predicted flood extent for the site under this design scenario.

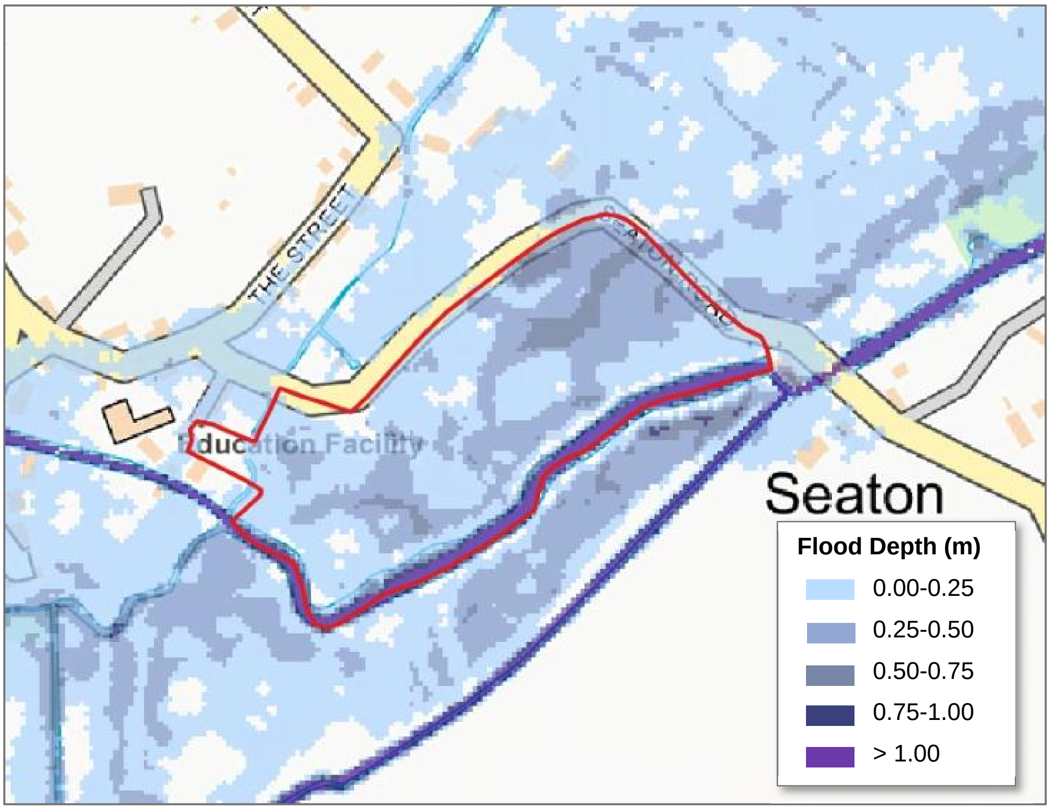


Figure 5.1 – Maximum predicted extent and depth of flooding during the design flood event. (© Environment Agency - contains Ordnance Survey data © Crown copyright and database right 2022).

Figure 5.1 shows that the existing dwelling and proposed extension are located outside the extent of flooding. However, the majority of the rest of the site is shown to be subject to flooding during this event.

The maximum flood level recorded on site varies across the site as floodwater is shown to be flowing across the site. The flood level varies from 3.6m AODN to 4.9m AODN. When the varying flood level is compared to the ground level, it can be seen that the depth of flooding in the area of the proposed solar array is less than 0.25m, and where the ground source heat pump collector pipes are located up to 0.5m. As discussed in the following sections, any electrical kiosk will be raised above the flood level.

5.2 Time to Inundation and Rate of Rise of Floodwater

Inspection of the model files identifies that floodwater first reaches the site 3 hours into the design flood event with water flowing along Seaton Road into the northwest corner of the site. The model files show that water rises slowly on site, with a further 20 hours passing before the peak flood level is reached.

6 Offsite Impacts and Other Considerations

6.1 Displacement of Floodwater

The construction of a new building within the floodplain has the potential to displace water and to increase the risk elsewhere by raising flood levels. A compensatory flood storage scheme can be used to mitigate this impact, ensuring the volume of water displaced is minimised.

It has been identified that the dwelling extension is located outside the extent of flooding, the collector pipes are below ground, and the solar array is raised above the design flood level. As such, it is only the 'legs' of the solar array that could be subject to flooding. The legs cover an insignificant area, and therefore it is considered the impact of the structures on floodwater displacement will be negligible when considering the size of the site. As such it is concluded that the compensatory floodplain storage is not required.

6.2 Public Safety and Access

The NPPF states that safe access and escape should be available to/from new developments located within areas at risk of flooding. The Practice Guide goes on to state that access routes should enable occupants to safely access and exit their dwellings during design flood conditions and that vehicular access should be available to allow the emergency services to safely reach the development.

The proposed property extension is outside the predicted extent of flooding during the design flood event and therefore safe access to/from the extension is achievable. When the solar array and ground source heat pump are considered, it has been identified that the area where these elements are located could be subject to flooding from the Little Stour. As such, safe access to these areas may not be available at the peak of the design event.

Access to the energy infrastructure will not be required during a flood event, nevertheless, it is recommended that the residents sign up to the EA's Flood Warnings Service (Refer to Section 7.4) to ensure they are aware of conditions which could result in flooding.

6.3 Proximity to Watercourse

Under the Water Resources Act 1991 and Land Drainage Byelaws, any proposals for development in close proximity to a 'main river' would need to take into account the EA's requirement for an 8m buffer zone between the river bank and any permanent construction such as buildings or car parking etc.

All development is located more than 8m from the Little Stour and Blackhole Dyke. As such, the development will not compromise any of the EA's maintenance or access requirements.

7 Flood Mitigation Measures

The key objectives of flood risk mitigation are:

- to reduce the risk of the development being flooded.
- to ensure continued operation and safety during flood events.
- to ensure that the flood risk downstream of the site is not increased by increased runoff.
- to ensure that the development does not have an adverse impact on flood risk elsewhere.

The following section of this report examines ways in which the risk of flooding at the development site can be mitigated.

Mitigation Measure	Appropriate	Comment
Careful location of development within site boundaries (i.e., Sequential Approach)	✓	Refer to Section 7.1
Raising floor levels	x	Not Appropriate – Refer to section 7.2
Land raising	x	Not required
Compensatory floodplain storage	x	Not required
Flood resistance & resilience	✓	Refer to Section 7.3
Alterations/ improvements to channels and hydraulic structures	x	Not required
Flood defences	x	Not required
Flood warning	✓	Refer to Section 7.4
Surface water management	x	Refer to Section 7.5

Table 7.1 – Appropriateness of mitigation measures.

7.1 Application of the Sequential Approach at a Local Scale

The sequential approach to flood risk management can also be adopted on a site based scale and this can often be the most effective form of mitigation. For example, on a large scheme this would mean locating the more vulnerable dwellings on the higher parts of the site and placing parking, recreational land or commercial buildings in the lower lying and higher risk areas.

The sequential approach has been applied on site by locating the solar array as far from the Little Stour as possible and a raised area of the site. The proposed property extension is also located outside the extent of flooding in a lower risk area of the site.

7.2 Raising Floor Levels

The proposals include the extension of the existing dwelling, and therefore the EA's Flood Risk standing advice for minor extensions applies. The advice states that floor levels "should be either no lower than existing floor levels or 300 millimetres (mm) above the estimated flood level."

Inspection of the scheme drawings shows that the extension will be elevated to the same level as the existing ground floor level, and therefore the extension is in accordance with the EA's guidance.

7.3 Flood Resistance and Resilience

Flood Resistance or 'dry proofing', where flood water is prevented from entering the building. For example, using flood barriers across doorways and airbricks, or raising floor levels. These measures are considered appropriate for 'more vulnerable' development where recovery from internal flooding is not considered to be practical.

Flood Resilience or 'wet proofing', accepts that flood water will enter the building and allows for this situation through careful internal design for example raising electrical sockets and fitting tiled floors. The finishes and services are such that the building can quickly be returned to use after the flood. Such measures are generally only considered appropriate for some 'less vulnerable' uses and where the use of an existing building is to be changed and it can be demonstrated that no other measure is practicable.

The proposed extension is located in Flood Zone 1 and is not predicted to flood during the design flood event. Therefore, it is not considered necessary to include flood resistance and resilience measures within the extension. The proposed solar array panels will be elevated 550mm above the ground level (300mm above the flood level) and as such are also not predicted to be subject to flooding. Notwithstanding this, the following measures are proposed to manage the impact of floodwater on any infrastructure proposed within the flood extent:

- Inverters and other vulnerable controls will be mounted higher on the tables
- Water activated cut-off switch which quickly and conveniently disconnects the DC power from solar panels to the inverters in the event floodwaters rise above 250mm.

- Sufficient spacing between the table legs supporting the panels to minimise any potential flow disruption during a flood event.

7.4 Flood Warning

The EA operate a flood forecasting and warning service in areas at risk of flooding from rivers or the sea, which relies on direct measurements of rainfall, river levels, tide levels, in-house predictive models, rainfall radar data and information from the Met Office. This service operates 24 hours a day, 365 days a year.

Whilst the probability of an event of sufficient magnitude to cause floodwaters to reach the levels discussed in this report is very low, the risk of such an occurrence is always present. With the sophisticated techniques now employed by the EA to predict the onset of flood events the opportunity now exists for all residents within the flood risk area to receive early flood warnings.

Whilst the extension is outside the predicted extent of flooding and the solar panels raised above the design flood level, this forewarning could be sufficient to inform residents of conditions which may result in flooding within the field and allow residents to prepare the infrastructure for a flood event where necessary. It is therefore recommended that the residents of the site sign up to the EA's Flood Warning Service either by calling 0345 988 1188, or by visiting;

www.gov.uk/sign-up-for-flood-warnings

7.5 Surface Water Management

The general requirement for all new development is to ensure that the runoff is managed sustainably, and that the development does not increase the risk of flooding at the site, or within the surrounding area. In addition, the NPPF states that sustainable drainage systems should be incorporated in areas at risk of flooding and therefore, use of SuDS has been considered with the aim of minimising the risk of flooding both on and off site.

Considering the solar array, the solar panels will be mounted 550mm above the ground. Due to the type of development, SuDS would typically not be required as rainfall landing on top of the cells will be directed onto the existing ground surface. It is likely that under lower return period events much of the surface water will be absorbed into the surface layer of the ground and vegetation, before water collects and flows overland towards the Little Stour. This process replicates the existing greenfield behaviour and as such, the development is not considered to cause a negative or detrimental impact.

The proposals also include the construction of an extension to the existing property. As the proposed replacement extension will increase the built footprint of the building slightly, it is recommended that the opportunity to include water butts, or planters is explored where possible. The primary aim of specifying SuDS would be to reduce the rate of discharge from the site where possible and ensure there is no increase in risk of flooding offsite as a result of the development in accordance with the principles promoted by the NPPF.

8 Sequential and Exception Test

8.1 The Sequential Test

The NPPF states that the Local Planning Authority (LPA) should apply the sequential approach as part of the identification of land for development in areas at risk from flooding. The overarching objective of the Sequential Test is to ensure that lower risk sites are developed before sites in higher risk areas. When applying the Sequential Test, it is also necessary to ensure that the subject site is compared to only those sites that are available for development and are similar in size.

This requires a comprehensive knowledge of development sites within the district and is generally applied as part of the Local Plan process. However, when applying the Sequential Test to sites that have not been assessed as part of the Local Plan it is necessary to apply a bespoke test, and the Flood Risk Assessment can help to provide additional evidence to better quantify the true risk of flooding, enabling an informed judgement to be made.

In this case a Sequential Test assessment has not been undertaken in support of this FRA, however, the proposals are for the extension to an existing property and addition of energy infrastructure to support the existing dwelling. The extension to an existing dwelling is considered ‘minor development in relation to flood risk’ which as per Paragraph 168 of the NPPF does not require the Sequential Test or Exception Test to be applied.

The net zero energy project is provided to support the function of the existing dwelling and therefore also cannot be located elsewhere. As such, it is considered there is evidence that the Sequential Test can be passed.

8.2 The Exception Test

According to the NPPF, if it is not possible, consistent with wider sustainability objectives, for the development to be located in areas at lower risk, the Exception Test may have to be applied. The application of the Exception Test will depend on the type and nature of the development, in line with the Flood Risk vulnerability classification set out in the NPPG. This has been summarised in Table 8.1 below.

Flood Risk Vulnerability Classification	Zone 1	Zone 2	Zone 3a	Zone 3b
Essential Infrastructure – Essential transport infrastructure, strategic utility infrastructure, including electricity generating power stations.	✓	✓	e	e
High Vulnerability – Emergency services, basement dwellings, caravans and mobile homes intended for permanent residential use.	✓	e	×	×
More Vulnerable – Hospitals, residential care homes, buildings used for dwelling houses, halls of residence, pubs, hotels, non-residential uses for health services, nurseries and education.	✓	✓	e	×
Less Vulnerable – Shops, offices, restaurants, general industry, agriculture, sewerage treatment plants.	✓	✓	✓ (shaded)	×
Water Compatible Development – Flood control infrastructure, sewerage infrastructure, docks, marinas, ship building, water-based recreation etc.	✓	✓	✓	✓

Key :

✓ Development is appropriate

× Development should not be permitted

e Exception Test required

Shaded cell represents the classification of this development

Table 8.1 - Flood risk vulnerability and flood zone compatibility.

The property extension is not subject to the Exception Test as per Paragraph 168 of the NPPF. Furthermore, from Table 8.1 above it can be seen that the solar array falls into a classification that does not require the Exception Test to be applied. Notwithstanding this, Paragraph 167 of the NPPF requires all development in Flood Zones 2 and 3 to be subject to an FRA and to meet the requirements for flood risk reduction. This has been the primary focus of this document.

9 Conclusions and Recommendations

The aim of this report is to determine whether the proposed development at Waterfields off Seaton Road in Wickhambreux is sustainable in terms of flood risk and how mitigation measures can be incorporated into the building to ensure the development is safe for its lifetime.

The proposals include the extension of the existing property, which is classified as householder development and is considered to be minor development (in terms of flood risk). Therefore, both the Sequential Test and Exception Test are not applicable for this element. The proposals also include the addition of a solar array and ground source heat pump. As these elements are to be subservient to the main dwelling, i.e. used to provide electricity/heat to the existing dwelling, it is not possible for these elements to be located elsewhere. The Sequential Test is also considered passed for this part of the development. Notwithstanding this, the NPPF does require all developments within Flood Zones 2 and 3 to be subject to an FRA, to seek opportunities to reduce the risk of flooding.

The risk of flooding has been considered across a wide range of sources and it has been identified that the risk of flooding to the proposed development is low. It is only during an extreme event that the wider site could be subject to flooding from the Little Stour. The proposed property extension is located outside the extent of flooding during the design flood event and therefore, mitigation is not considered strictly necessary for the extension. The solar array and ground source heat pump collector pipes are located within the extent of flooding; however, the collector pipes are underground and not impacted by the location within the floodplain. The solar array is elevated above the flood level.

Nevertheless, the applicant has confirmed that measures will be included to manage the impact of flooding on the proposed infrastructure (refer to Section 7.3). It is also recommended that the residents sign up to receive the EA's Flood Warnings to ensure that they are aware of conditions which could result in flooding onsite.

As the proposed extension will increase the built footprint onsite, it is recommended that the opportunity to include water butts or planters is considered to reduce the rate of discharge from the site where possible, and to ensure there is no increase in risk of flooding offsite as a result of the development. In regard to the solar array, the panels are raised above ground and any rain falling in the area will simply continue to discharge into the ground and to the Little Stour, as is the case currently. As a result, the solar array is not considered to increase the risk onsite or to the surrounding area.

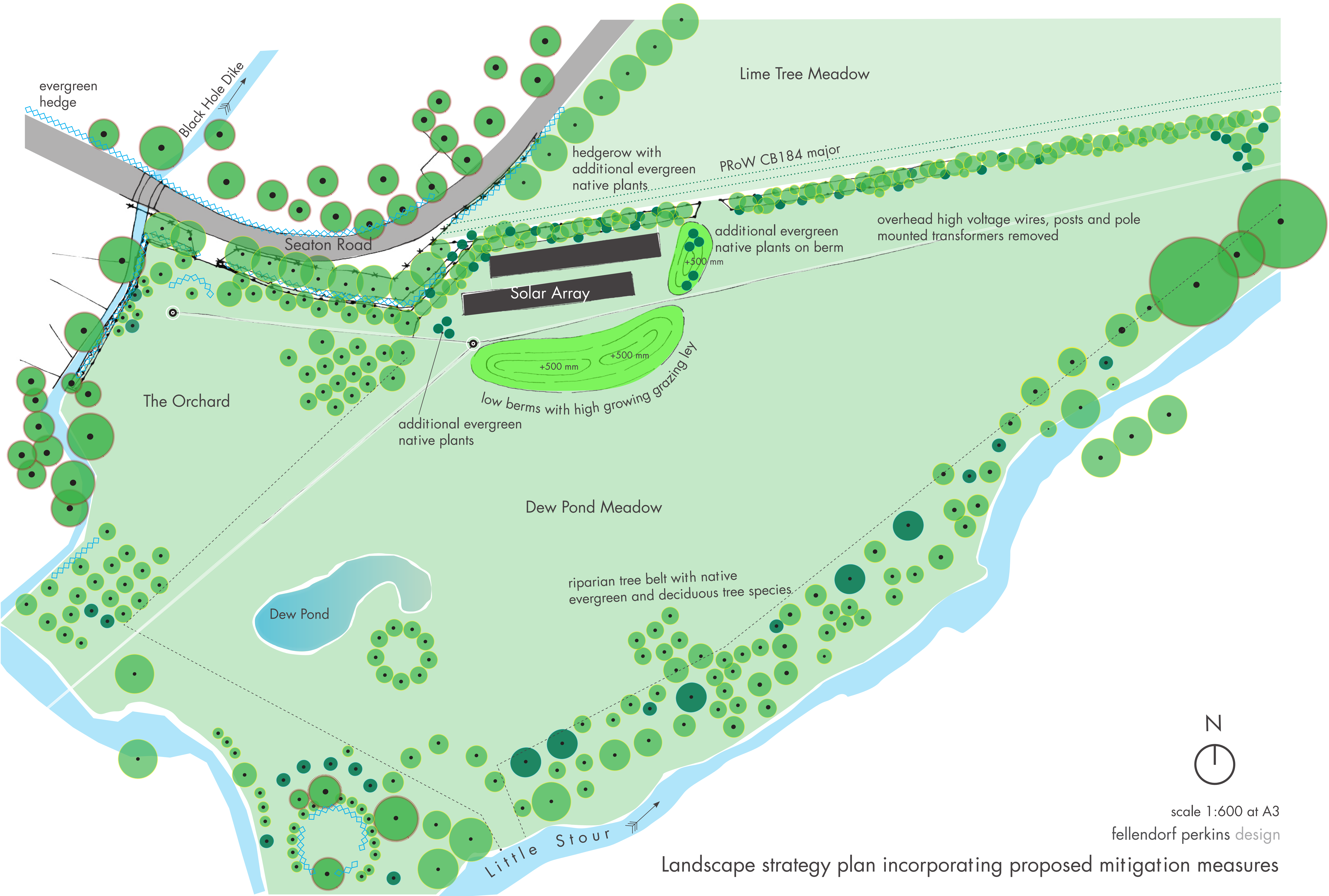
With the above mitigation measures incorporated into the design of the development, the proposals will meet the requirements of the NPPF and its Planning Practice Guidance and will therefore be acceptable and sustainable in terms of flood risk.

10 Appendices

Appendix A.1 – Drawings

Appendix A.2 – Southern Water Asset Location Data

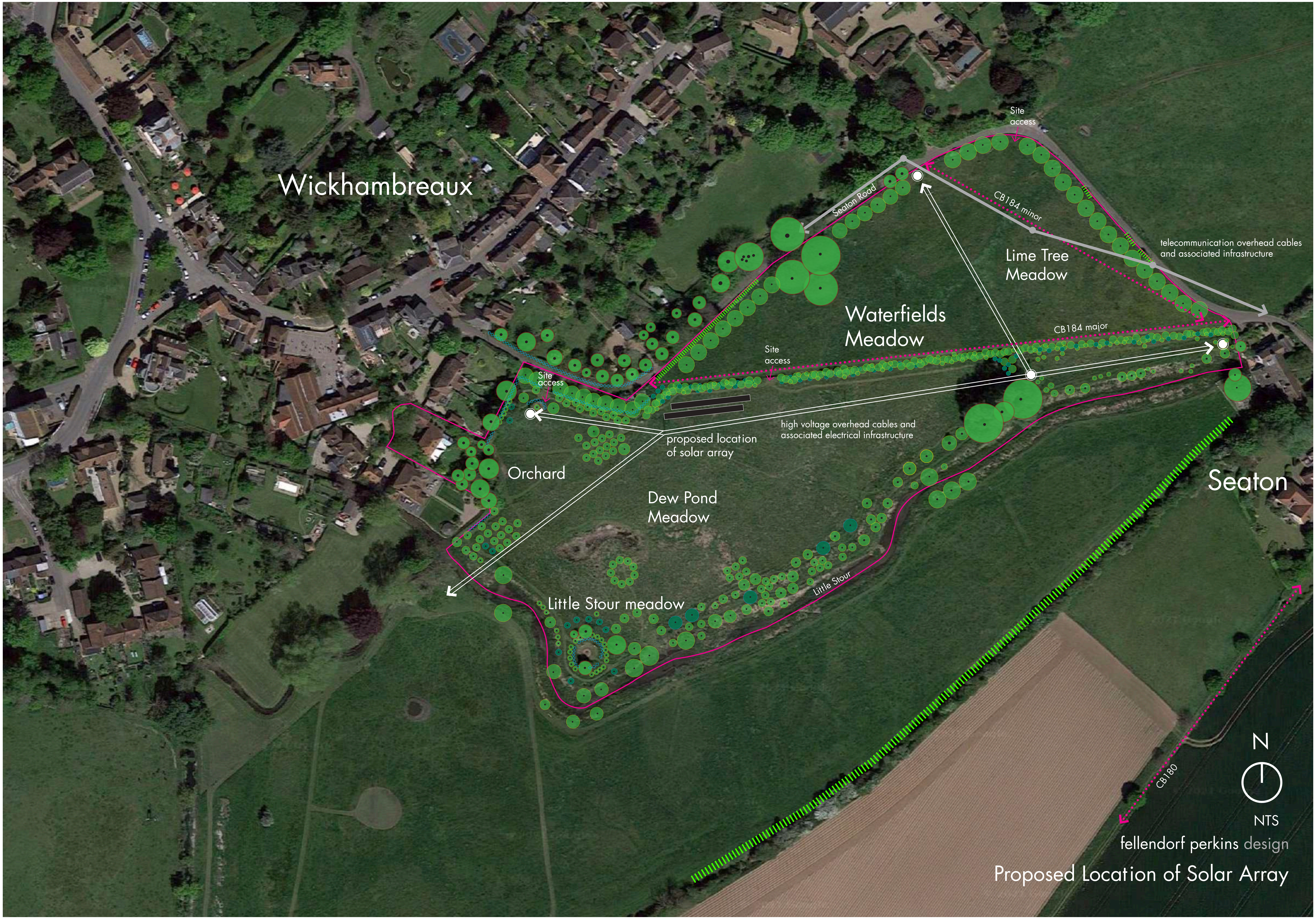
Appendix A.1 – Drawings

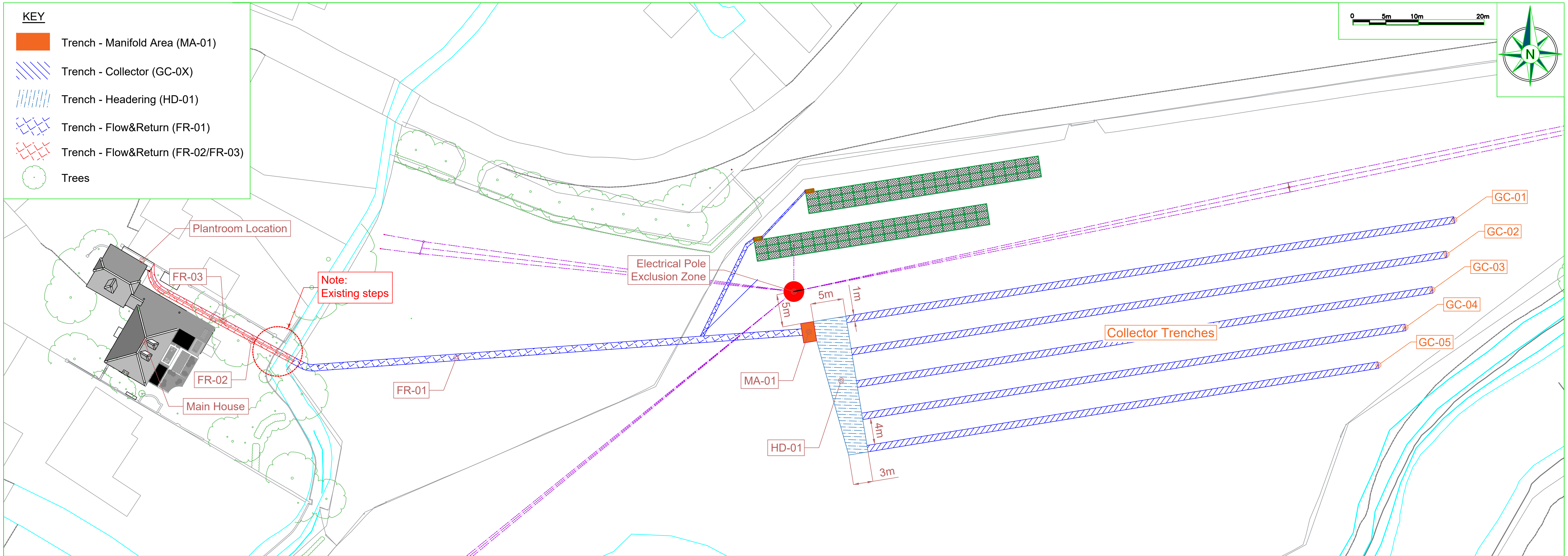


scale 1:600 at A3

fellendorf perkins design

Landscape strategy plan incorporating proposed mitigation measures


Wickhambreaux
Site access
Seaton Road
CB184 minor
Lime Tree Meadow
telecommunication overhead cables and associated infrastructure
Waterfields Meadow
CB184 major
Site access
Site access
proposed location of solar array
high voltage overhead cables and associated electrical infrastructure
Orchard
Dew Pond Meadow
Seaton
Little Stour
Little Stour meadow
CB180
N
NTS
fellendorf perkins design
Proposed Location of Solar Array



GEOTHERMAL NOTES

Initial Backfill

1. Bedding shall be free from sharp objects.
2. Initial backfill with sand or soft earth, not rubble (must be free from sharp rocks/objects).

Final Backfill

3. Final backfill may consist of any qualifying material that satisfies any other requirement.

Trenches

4. Trench bottom along its length must not undulate.
5. Trench width minimum 1m (unless stated on the schematic).
6. Trench depth minimum 1m from working ground level (unless stated on the schematic)
7. Trench bend radius minimum 2m unless stated on the schematic.
8. Trench lengths as indicated on the schematic.
9. The Flow & Return trench must either rise steadily or fall steadily with no high points along its length.
10. The Collector/Header trenches must fall steadily from the manifold pit location to avoid air locks.
11. Water, waste and utility lines should be laid in a separate trench.
12. Where there is a potential for crossover (for a run not longer than 3m) a minimum separation of 400mm should be maintained for all other pipework, and if possible the pipework should be insulated.
13. All water services must be protected with thermal insulation min 1m prior and after crossing point with the geothermal pipes.

Collector Trenches

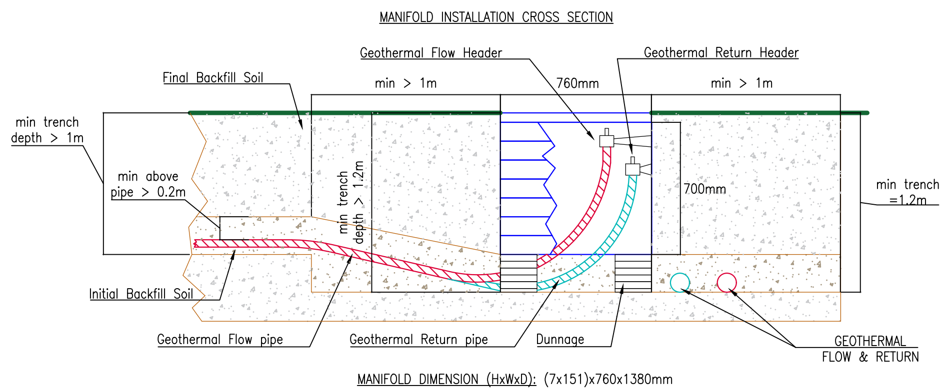
ID	Length	Width	Depth
GC-01	94m	1m	1m
GC-02	92m	1m	1m
GC-03	89m	1m	1m
GC-04	84m	1m	1m
GC-05	79m	1m	1m

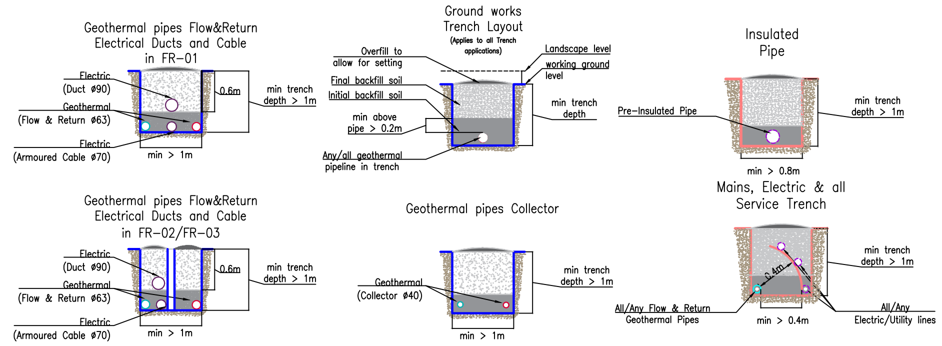
Collectors must have a minimum separation of 4m

Trenches

ID	Length	Width	Depth
HD-01	21m	5m/3m	1m
FR-01	79m	1m	1m
FR-02	27m	0.4m	1m
FR-03	27m	0.4m	1m
MA-01	3m	2m	1.2m

Trenches must have a minimum bending radius of 3m





SPECIFICATION

MANIFOLD:	1x SBK 5 port 2"
HORIZONTAL COLLECTOR:	1000m (5x 200m) Ø40 HDPE100 SDR13.6
FLOW AND RETURN:	222m Ø63 HDPE100 SDR11
GLYCOL THERMOX FPG:	365L
SANITIZER PURACHEM FRM-21:	4L
TOTAL SYSTEM VOLUME:	1458L
TOTAL PRESSURE DROP:	36.1kPa @ 0.98l/s

isoenergy sustainable energy systems
The Stables
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Horley, Surrey, RH6 8JA
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email: energy@iso.co.uk
www.isoenergy.co.uk

Drawing ID: ISO.WAF.GND
Sheet Number: 1/2 — Revision: R2
Scale: 1:600 — Size: A3
Date: 31.03.22 — Drawn By: AG — Checked By:

Project Name: Waterfields
Project ID: 278078/280564 — Project Post Code: CT3 1RW
Client Details: Mark Perkins, Seaton Road, Wickhambreaux, Kent, CT3 1RW

STATUS: Design

REV	Description	BY / CHK	DATE
R0	First Release	DKY / AG	09.07.21 / 27.07.21
R1	Flow and Return Update	DS / AG	14.09.21 / 14.09.21
R2	PV Layout Change	AG	31.03.22

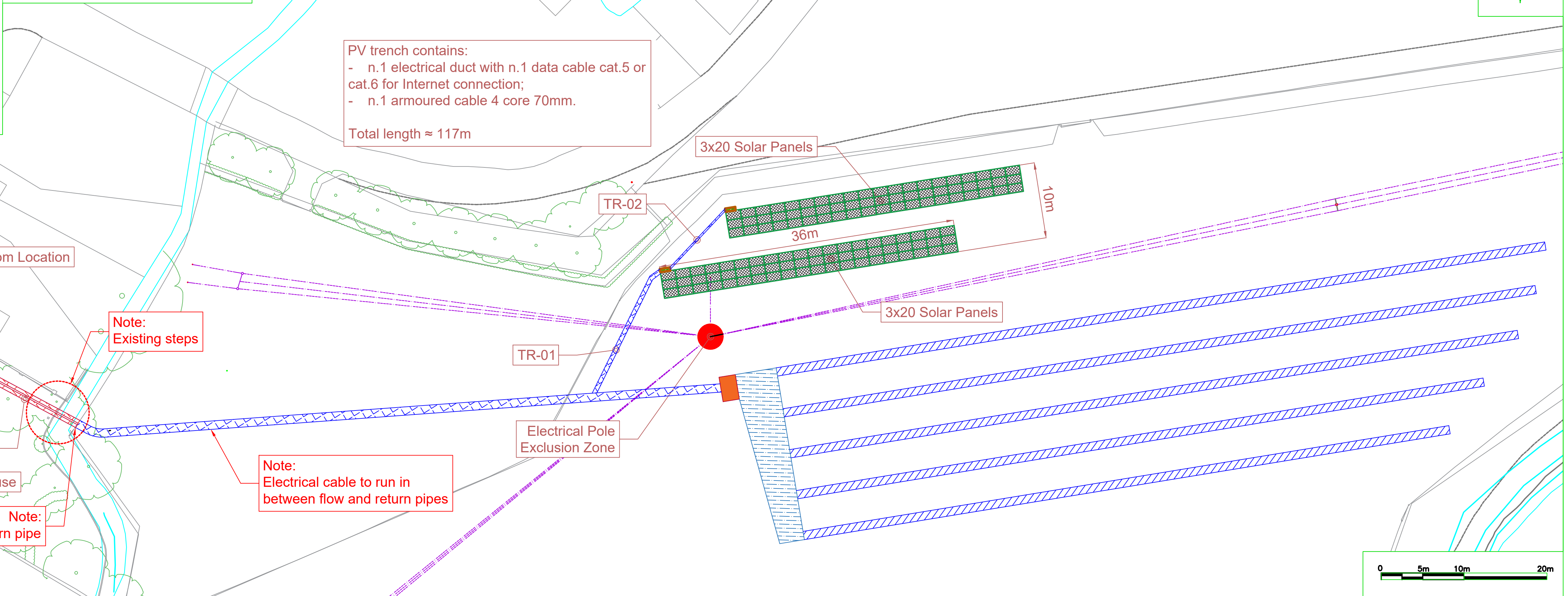
NOTES:

\\helios\Technical\PROJECT FILES\1.CURRENT PROJECTS\Waterfields (GSHP) CT3 1RW\05 – Technical Designs and Drawings\5.2 – Ground Works\ISO.WAF.GND.R2 – Waterfields – CT3 1RW.dwg

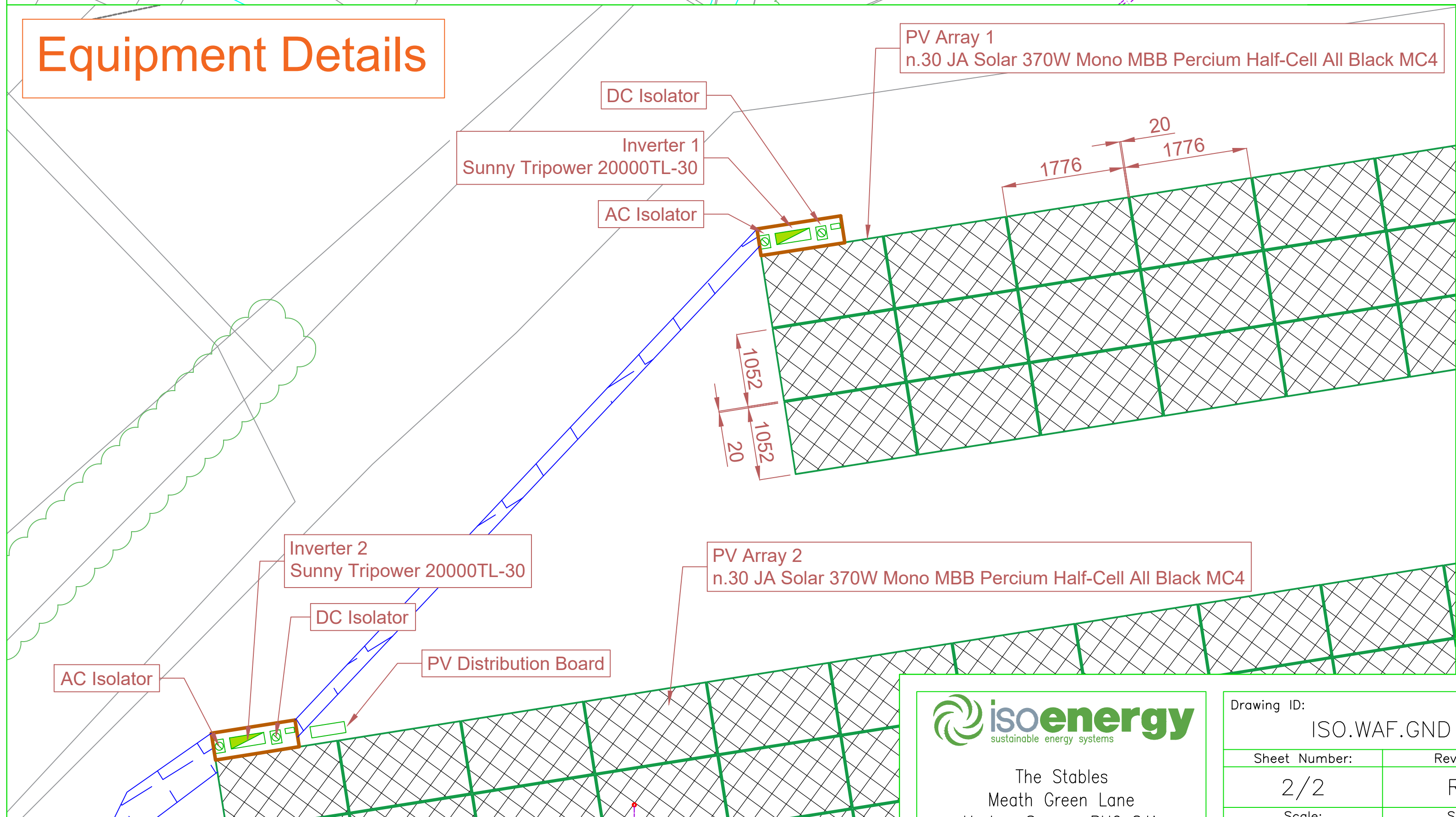
Trenches			
ID	Length	Width	Depth
TR-01	29.5m	0.5m	1m
TR-02	2.4m	0.2m	1m

3D View

PV Overview



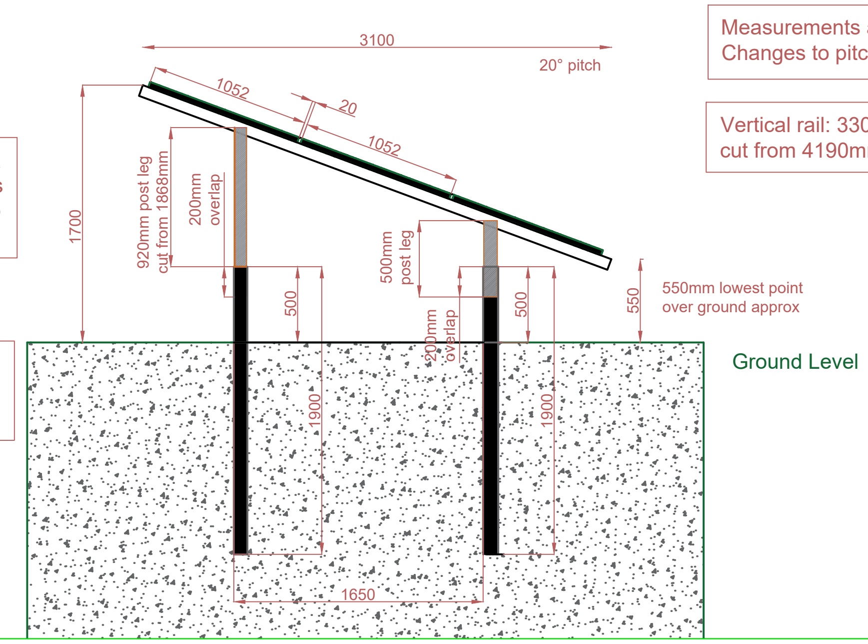
Equipment Details



Flex 4 - showing columns of 3 panels width 1052mm

Minimum overlap of Sigma support to aluminium leg is 200mm - can be greater to lower the table

Showing pile driven Sigma 1900mm with 500 mm above ground level



Measurements are approximate
Changes to pitch and height are possible

Vertical rail: 3300mm approximately cut from 4190mm

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Meath Green Lane
Horley, Surrey, RH6 8JA
Tel: 01293 821345
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Drawing ID:	
ISO.WAF.GND	
Sheet Number: 2/2	Revision: R2
Scale: As Indicated	Size: A3
Date: 31.03.22	Drawn By: AG / Checked By:

Project Name: Waterfields
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NOTES:

\\helios\Technical\PROJECT FILES\1.CURRENT PROJECTS\Waterfields (GSHP) CT3 1RW\05 - Technical Designs and Drawings\5.2 - Ground Works\ISO.WAF.GND.R2 - Waterfields - CT3 1RW.dwg

Existing Floor Plans

Ground Floor

First Floor

Entrance to the house

Access to garden

Existing Elevations

Existing East Elevation

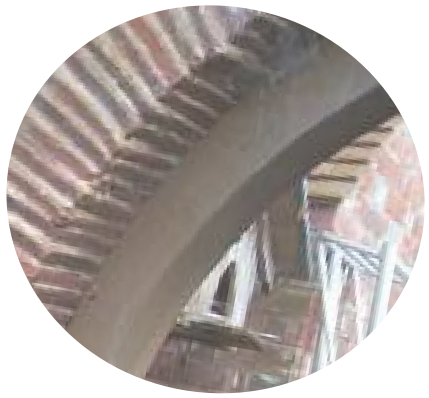
Existing North Elevation

Existing West Elevation

Existing South Elevation

Timber Cladding

Timber Detailing



Brick Detailing

Red Brick

Tiled Roof

Proposed Ground Floor Plan

The proposed design consists of a one and two storey extensions to the rear of the existing house and introduce a Green Energy System, including ground source heat pump and solar PV array.

A small courtyard is proposed to allow for a connection to the outside and allow for sufficient light in the entrance hall and living room.

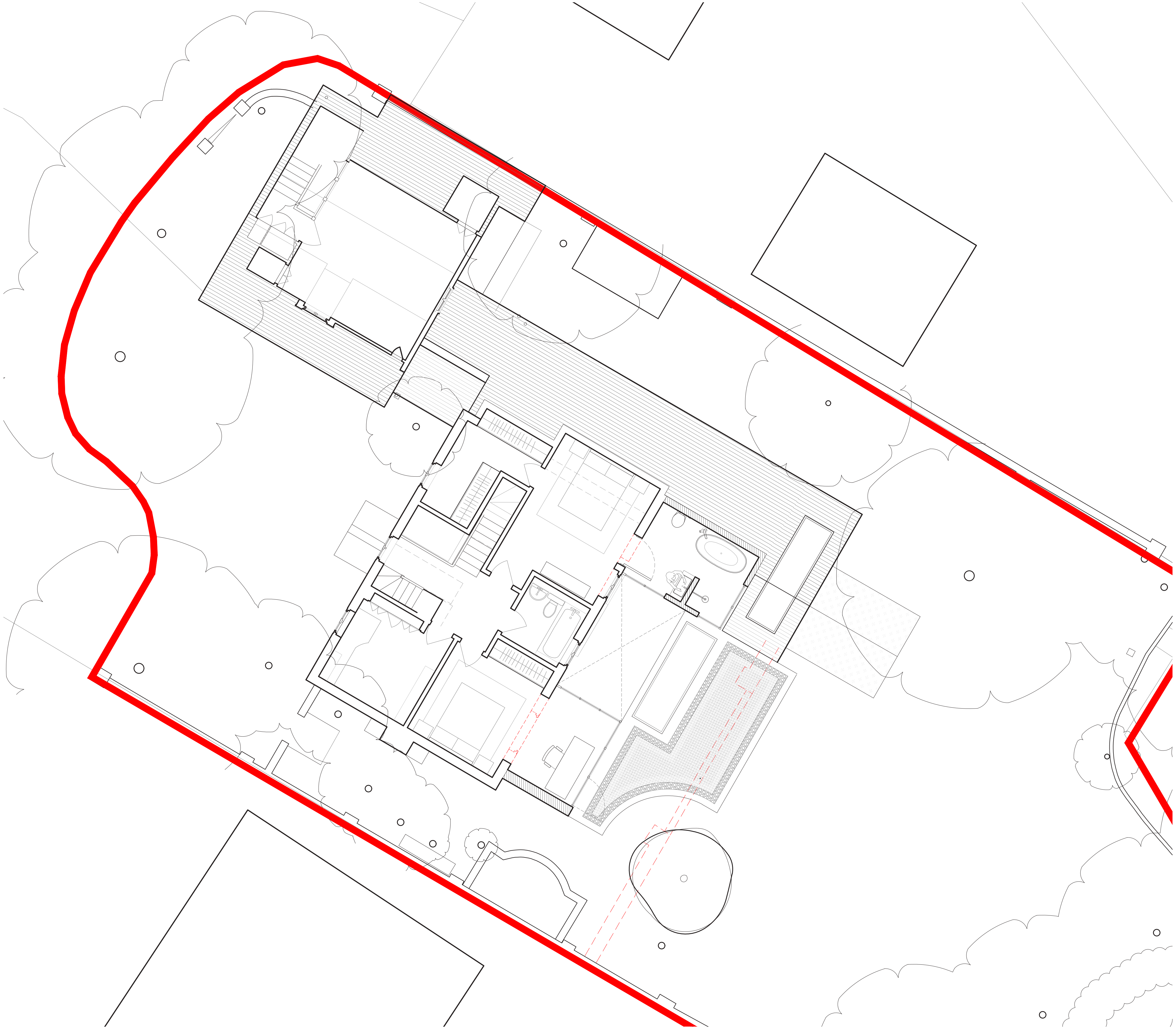
A new kitchen and dining area wraps around the courtyard allowing for seamless circulation around the ground floor.

Main Entrance

Demolished

N

Proposed First Floor Plan

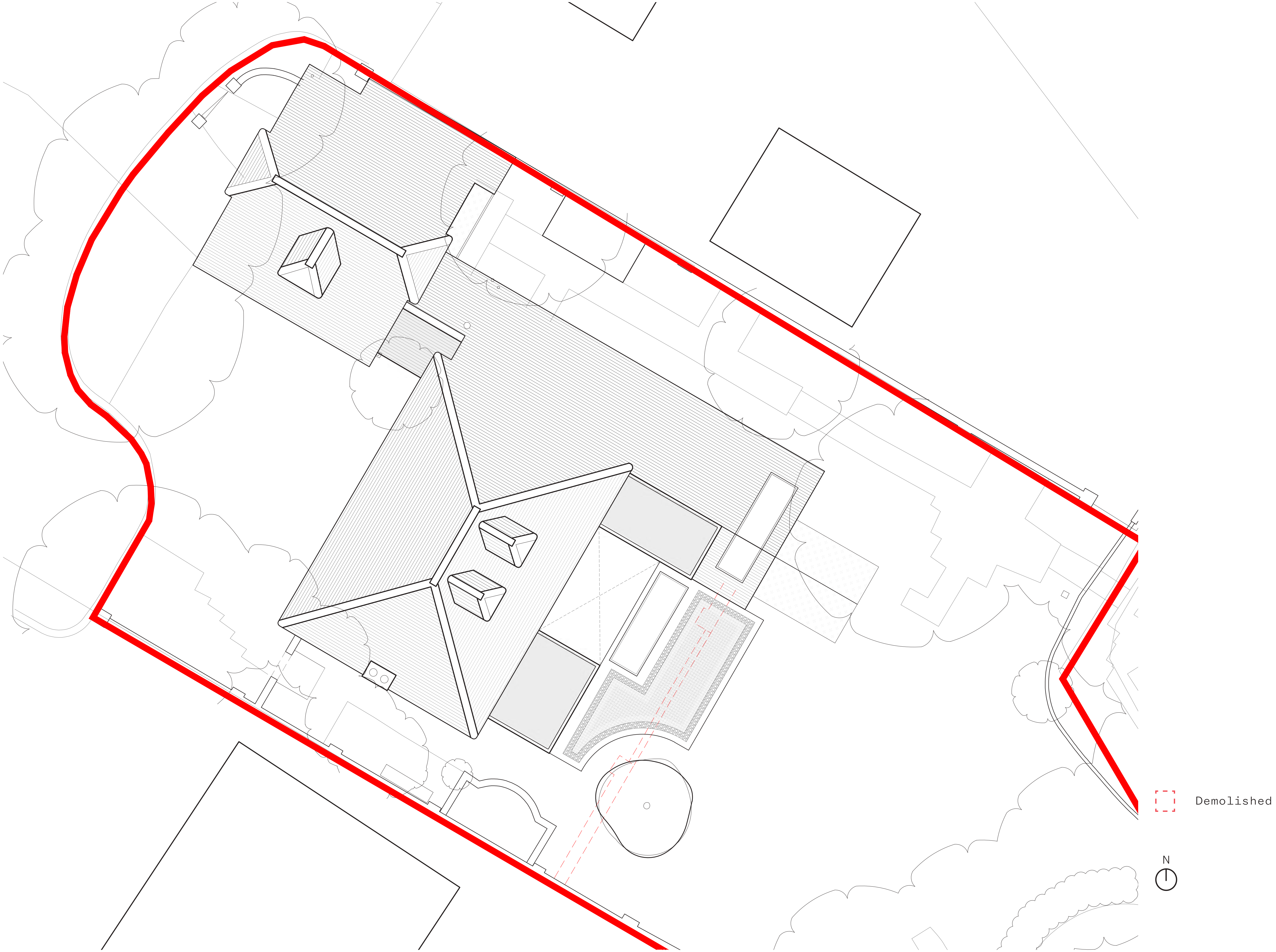


The first floor extension includes space for a desk in one of the bedrooms and the master bedroom gains a new walk-in wardrobe as well as the existing bathroom being moved to the rear of the building.

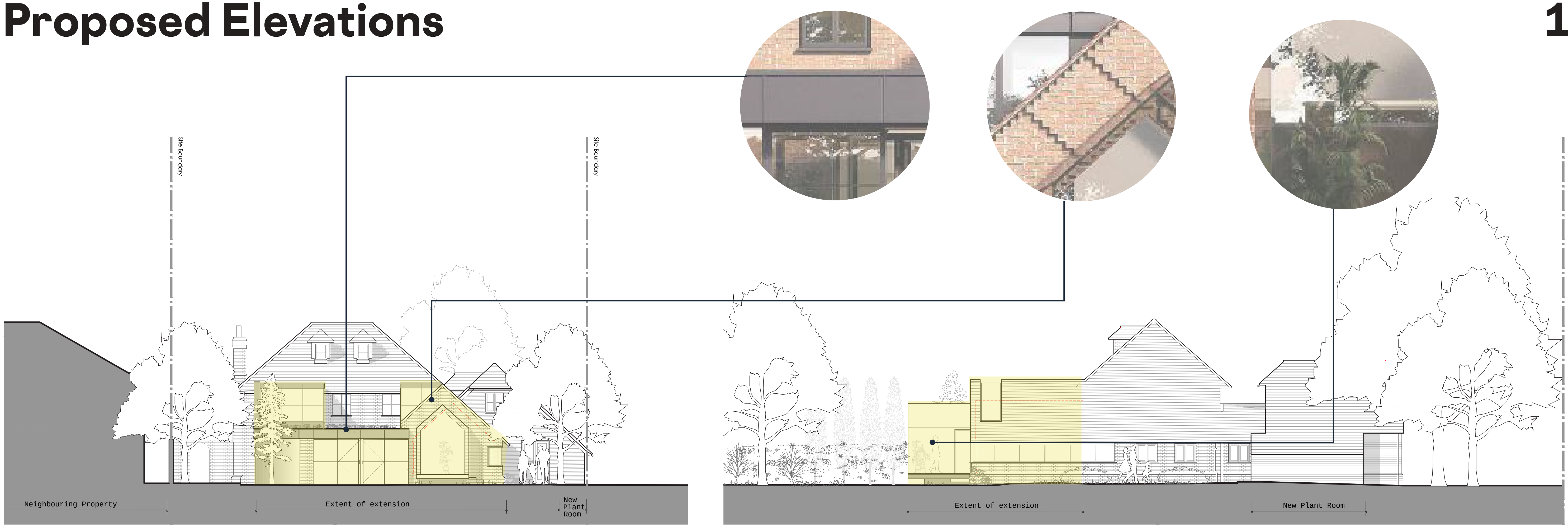
Demolished

N

Proposed Roof Plan



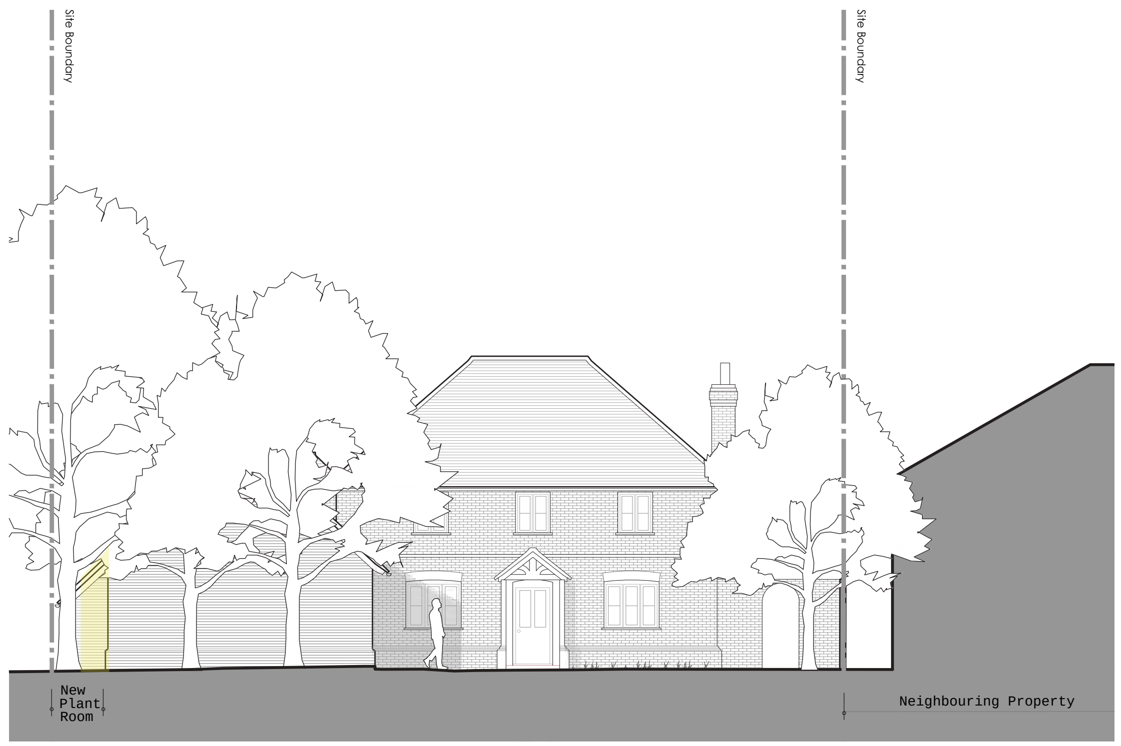
Proposed Elevations



Proposed East Elevation

Proposed North Elevation

Proposed South Elevation

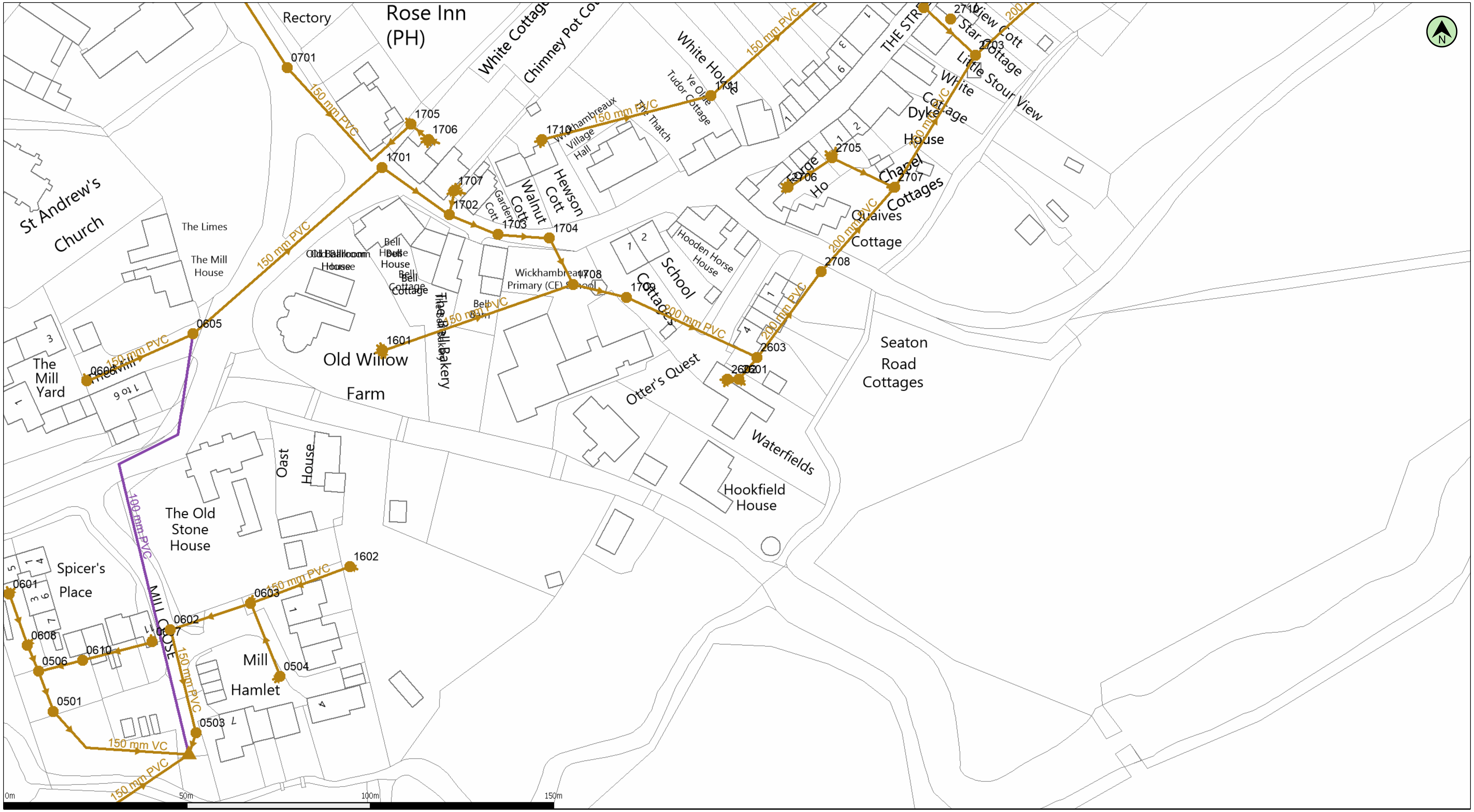


Proposed West Elevation

Proposed Extension

Demolished

Appendix A.2 – Southern Water Asset Location Data



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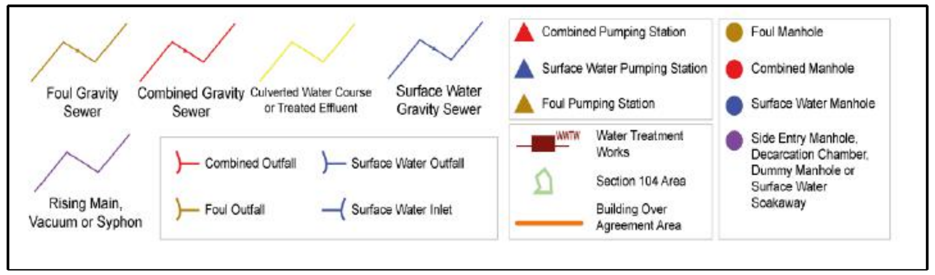
The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



flood@herringtonconsulting.co.uk

EG/3449

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0501	F	5.35	4.17	
0503	F	5.90	4.30	
0504	F	5.41	4.40	
0506	F	5.47	4.33	
0601	F	5.58	4.86	
0602	F	5.42	4.08	
0603	F	5.24	4.11	
0605	F	5.52	4.28	
0606	F	6.00	4.59	
0607	F	5.48	4.68	
0608	F	5.59	4.50	
0610	F	5.31	4.53	
0701	F	6.26	4.88	
1601	F	4.94	4.08	
1602	F	5.55	4.40	
1701	F	5.22	3.80	
1702	F	4.99	3.69	
1703	F	5.00	3.65	
1704	F	5.00	3.56	
1705	F	5.55	4.66	
1706	F	5.57	4.99	
1707	F	5.12	4.33	
1708	F	5.17	3.62	
1709	F	5.17	3.59	
1710	F	5.31	4.40	
1711	F	5.28	3.83	
2601	F	0.00	0.00	
2602	F	0.00	0.00	
2603	F	0.00	0.00	
2701	F	4.42	3.15	
2703	F	4.53	2.93	
2705	F	4.85	3.75	
2706	F	4.89	4.50	
2707	F	4.44	3.26	
2708	F	4.70	3.42	
2710	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert