metec
CONSULTING ENGINEERS

ENERGY STATEMENT / SUSTAINABILITY & SHADING ANALYSIS REPORT

for the

PROPOSED HYDE PARK COMMUNITY SPORTS CENTRE

at

HYDE ROAD
DALKEY
DUBLIN

For

HYDE PARK COMMNUNITY SPORTS CENTRE TRUST

La Vallee House
Upper Dargle Road
Bray, Co. Wicklow
A98 W2H9
Ireland

p: 00 353 (0)1 204 0005
e: info@metec.ie
w: www.metec.ie

issue no.	issue date	pages	issued for	by	approvals checked	approved
00	19/01/2021	40	Planning	LG	SC	MR

PART 1

ENERGY STATEMENT / SUSTAINABILITY REPORT

CONTENTS

EXECUTIVE SUMMARY

This Energy Statement has been prepared by METEC Consulting Engineers to support the planning application for the proposed Hyde Park Community sports centre development at Hyde Park, Dalkey, Co. Dublin by the Hyde Park Community sports centre Trust. The Community Sports Centre is located at Hyde Park, Dalkey and is owned and managed by Dun Laoghaire Rathdown County Council. The project is subject to the planning requirements applicable to the Dun Laoghaire Rathdown County Development Plan 2016-2022.

This report aims to satisfy the legislative planning requirements by addressing how the overall energy strategy of the proposed development has been approached in a holistic manner, striving to meet the highest standards of sustainable building design such as passive solar design, high efficiency systems and use of renewable energy technologies.

This report also addresses how the proposed development will comply with the current edition of Technical Guidance Document (TGD) Part L 2017 for Buildings Other Than Dwellings.

Summary of the proposed Sustainability targets:

Building Energy Rating (BER) using SEAI's NEAP Methodology.	Targeting an A2 BER
LEED BD+C: New Construction v4	Targeting LEED Gold (V4)

Summary of the Energy Performance Quality Assurance checks carried out:

TGD part L 2017 Section 1.1 – Limitation of CO2 emissions Compliance approach in terms of reducing overall primary consumption and CO2 emissions.	✓
TGD part L 2017 Section 1.2 – Renewable Energy Technologies Compliance in terms of meeting Renewable energy production.	✓
TGD part L 2017 Section 1.3 – Building Fabric. Compliance in terms of fabric insulation, thermal bridging and air permeability.	✓
TGD part L 2017 Section 1.4 – Building Services Compliance in terms of building services plant efficiency, controls, artificial lighting, insulation of pipes, ductwork and storage vessels.	✓
TGD part L 2017 Section 1.5 – Construction Quality and Commissioning of Building Services Commissioning of space heating and water heating systems.	✓
TGD part L 2017 Section 1.6 – User Information. Provision of operation and maintenance information to building occupants.	✓

1.0 INTRODUCTION

This Energy Statement has been prepared by METEC Consulting Engineers to support the planning application for the proposed Hyde Park Community sports centre development at Hyde Park, Dalkey, Co. Dublin by the Hyde Park Community sports centre Trust. The Community Sports Centre is located at Hyde Park, Dalkey and is owned and managed by Dun Laoghaire Rathdown County Council. The project is subject to the planning requirements applicable to the Dun Laoghaire Rathdown County Development Plan 2016-2022.

This report aims to satisfy the legislative planning requirements by addressing how the overall energy strategy of the proposed development has been approached in a holistic manner, striving to meet the highest standards of sustainable building design such as passive solar design, high efficiency systems and use of renewable energy technologies.

This report also addresses how the proposed development will comply with the current edition of Technical Guidance Document (TGD) Part L 2017 for Buildings Other Than Dwellings. The principles underpinning Part L compliance are energy demand reduction through passive measures and increased supply from renewable and efficient sources. The proposed design will follow this principle.

2.0 DESCRIPTION OF THE PROPOSED WORKS

The proposed development seeks permission for the demolition of the existing sports facilities and the construction of a new community sports facility to contain a sports hall, cafe, gym, changing rooms, meeting facilities, physio rooms and ancillary plant and storage space. All associated site works.

3.0 REFERENCE DOCUMENTS

Throughout the Planning, Design and Construction phases for this project the following legislative and best practice documents will be referenced to ensure that energy efficiency, carbon emissions, local environmental policies, recognised sustainable design practices remain at the forefront of the design development.

Figure 3.0.1

4.0 BUILDING PERFORMANCE SIMULATION MODEL

A building performance simulation model for Hyde Park Community sports centre development has now been constructed. This allows us to run simulations to advise the client and the design team in terms of the optimum thermal and solar performance of the building fabric. It also allowed us to advise on the achievement of TGD Part L of the Building Regulations and LEED (Leadership in Energy and Environmental Design).

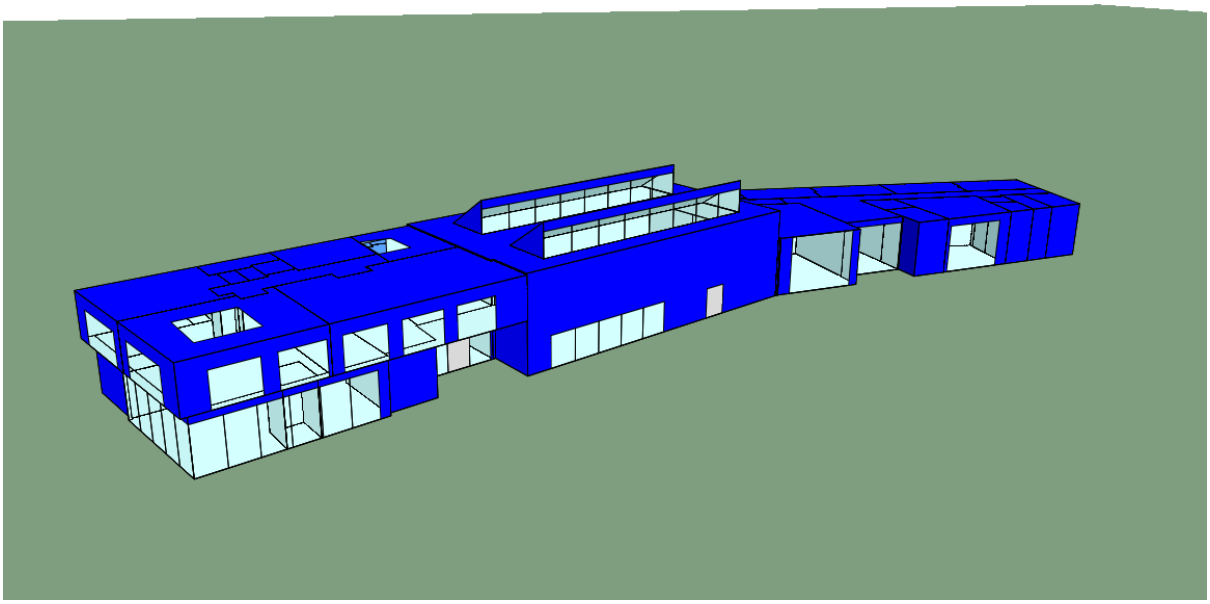


Figure 4.0.1 – 3D model image for the IES VE Building Performance Simulation model for the Hyde Park Community sports centre Development. The software is approved by the SEAI for Part L and BER calculations.

5.0 SUSTAINABILITY BRIEF

The current design intent is to target the following sustainability metrics for this proposed project;

- Compliance with energy code Part L 2017 of the Building Regulations.
- A2 Building Energy Rating (currently only 0.2% of non-domestic buildings in Ireland with registered BER's have achieved an A2 rating or better).
- LEED BD+C: New Construction v4 (currently only 16 buildings in Ireland have certified under LEED v4). Gold Level Certification being pursued.

The design intent is to also focus on reducing the overall potable water consumption and to generate on-site renewable energy by means of heat pumps.

Environmental Rating Systems which this development is seeking to achieve.

6.0 PART L OF THE BUILDING REGULATIONS COMPLIANCE

The proposed development shall meet, and where possible exceed the requirements within the current edition of Technical Guidance Document Part L of the Building Regulations for Buildings other than Dwellings.

6.1 BUILDING ENVELOPE

BUILDING FABRIC THERMAL PERFORMANCE

In order to achieve the Sustainability targets for this project the thermal performance of the building envelope will be upgraded to a performance specification that greatly exceed the minimum requirements which are set out in Technical Guidance Document Part L of the Building Regulations (2017).

Fabric Elements	**Area Weighted Average Elemental U-Value (W/m² °K)**	
	Min. TGD Part L 2017 requirements (Table 1)	**Improved Specification that will be targeted for Hyde Park Community sports centre**
Existing Building (Material Alterations Works)		
Flat Roof (Warm Roof)	0.20	≤0.15
External Walls	0.21	≤0.18
Ground Floor	0.21	≤0.15
Windows, Doors & Rooflights	1.6	≤1.4 (Including Frame)
Curtain Walling	1.8	≤1.4 (Including Frame)

Table 6.1.1

THERMAL BRIDGING

To avoid excessive heat losses and local condensation problems, reasonable care should be taken to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations. Any thermal bridge should not pose a risk of surface or interstitial condensation.

BUILDING ENVELOPE AIR PERMEABILITY

Building Air Tightness / Air Permeability		
	Hyde Park Community sports centre Target	**Min. TGD Part L 2017 requirements**
Air Permeability	≤ 3.0 m³ / (h.m²) @ 50Pa (target).	≤ 5.0 m³ / (h.m²) @ 50Pa

Table 6.1.2

GLAZING SOLAR SPECIFICATION

Windows / Curtain Walling Solar Specification		
Element	**Hyde Park Community sports centre Target**	**Min. TGD Part L 2017 requirements**
G-Value	0.35-0.45	No specific value given

Table 6.1.3

A G-Value for the glazing in the range of 0.35 – 0.45 will ensure that the extent of unwanted solar gain is significantly reduced which in turn also reduces the cooling loads. A G-Value of this range is the optimum balance in terms of solar and light transmittance. A g-value of 1.0 represents full transmittance of all solar radiation while 0.0 represents a window with no solar energy transmittance.

6.2 BUILDING SERVICES (MECHANICAL AND ELECTRICAL SYSTEMS)

BUILDING SERVICES (MECHANICAL AND ELECTRICAL SYSTEMS)

The intent is to ensure that the building services design strategy is to utilise as many sustainable design options and energy efficient features that are technically, environmentally and economically feasible for the project. Making the right decisions in relation to design / construction can contribute greatly to the sustainability of a building over its lifetime, which will lead to cost savings in the future and raise comfort levels for the future occupants of this development.

VENTILATION CENTRAL PLANT

Hyde Park Community sports centre will be served with dedicated Air Handling Units. All fans specified will come complete with Variable Speed Drives. Specific Fan Powers (SFPe) specified will be ≤1.6 Watts / litre / second which is in line with the minimum energy efficiency standard (Non-Domestic Building Services Compliance Guide: 2013 edition + Table 4 in TGD Part L 2017 – maximum specific fan power in air distribution systems).

Minimum fresh air ventilation rates (compliant with the Irish Building Regulations and CIBSE will be provided by means of a number 100% outside air Air Handling Units, supply and return ventilation system complete with high heat recovery efficiency plate heat exchangers / thermal wheel. Heat recovery will be utilised to transfer energy from the extract air to the supply air with little or no cross contamination of air streams.

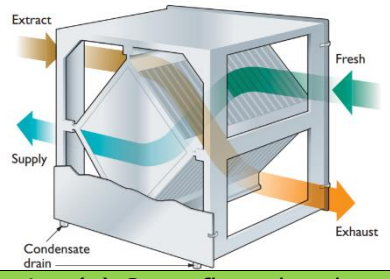
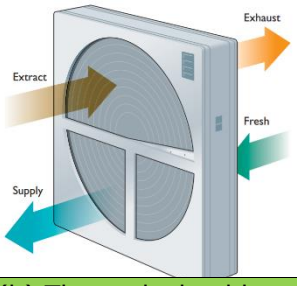
	
Option (a) Cross flow plate heat exchanger heat recovery	Option (b) Thermal wheel heat recovery

Table 6.2.1

Heating & Cooling Strategy – Café, Gym, Fitness Areas and Team Analysis rooms.

[VRF System with Heat Recovery]

The Café, Gym, Fitness Areas and Team Analysis rooms will be heated and cooled by means of Variable Refrigerant Flow (VRF) fan coil units with EC motors. Output is controlled by measuring the return temperature and adjusting the flow of hot or cold refrigerant through the fan coil unit to deliver the necessary heating or cooling. Figure 6.2.1 below shows how the fan coil unit and other ventilation services are positioned within the ceiling void.

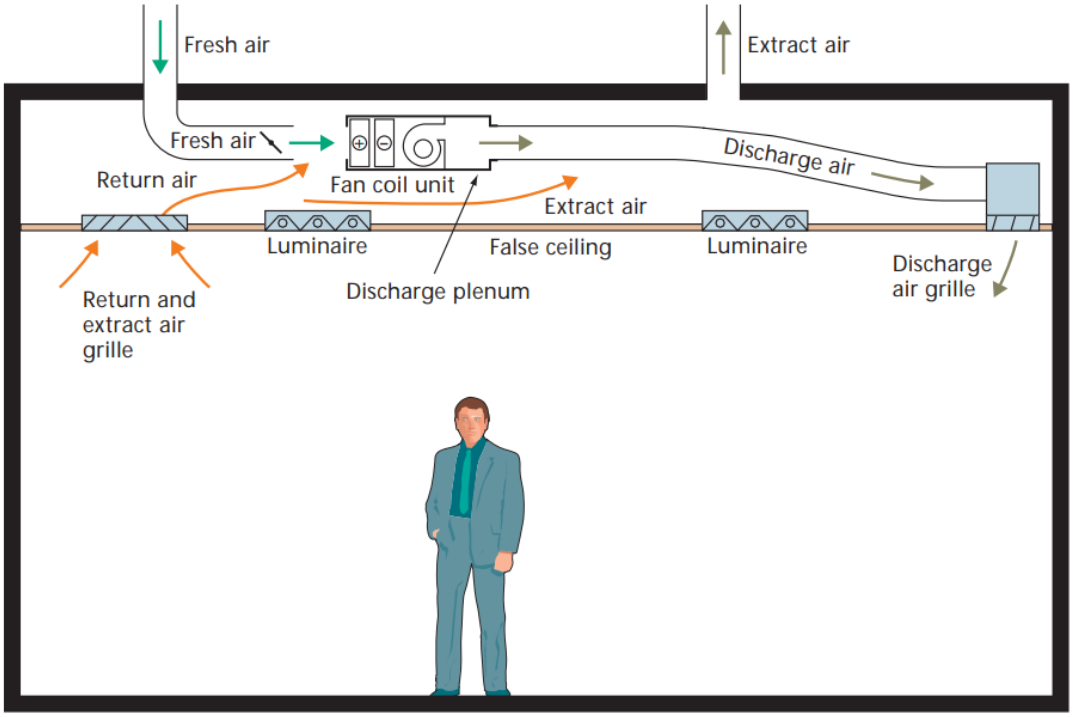


Figure 6.2.2 Operation of a VRF Fan Coil Unit in a ceiling void.

The operation of a VRF fan coil unit requires a supply of heated or cooled refrigerant to be supplied to the fan coil unit.

Depending on the time of year and with variable occupancy levels, the heating or cooling needs of the building will be constantly changing. To overcome this in a sustainable manner, the VRF system is capable of recovering heat from areas which require cooling and directing this heat to areas requiring heating. This is known as "Simultaneous Heating & Cooling" or "3 pipe VRF" and saves significant amounts of energy over the course of the year when operating in heat recovery mode. Hyde Park Community sports centre will have such a system installed in areas requiring heating and cooling such as the Café, Gym, Fitness Areas and Team Analysis rooms.

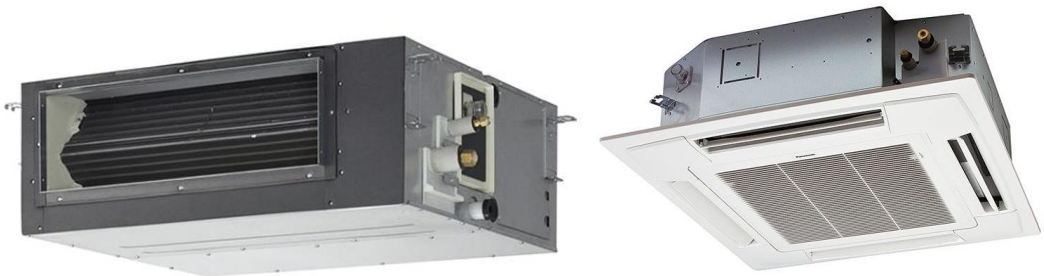


Figure 6.2.3 – Typical VRF Indoor Units

Figure 6.2.4 – Typical VRF Outdoor Unit

Heating Strategy – Changing Rooms, Shower Areas & Sports Hall
[Air to Water Heat Pumps supplying Radiators, UFH or Radiant Panels]

The design intent is to utilise high efficiency Heat Pump technology to provide space heating to the changing rooms, shower areas, sports hall. Heat will be emitted to the spaces via a mixture of radiators, underfloor heating and radiant panels as appropriate for the space.

An air to water heat pump extracts heat from the outside air and to converts this low-grade heat into high grade, usable heat via the refrigerant cycle. The heat pump then transfers this energy to a water circuit for space heating. As some of the energy is extracted from the outside air, the efficiency of this system, measured using a metric called SCOP (Seasonal Coefficient of Performance) is very favourable in terms of energy and running costs. For example, typically, one unit of grid supplied electricity will generate between 3 & 4 units of heating depending on the system.

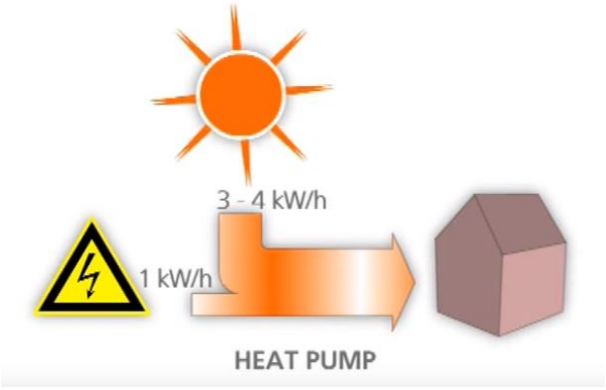


Figure 6.2.5 – Heat Pump Energy Balance Illustration

Figure 6.2.6 – Typical Air to Water Heat Pump Installation

DOMESTIC HOT WATER

The proposed development will have a need for significant volumes of hot water and also a need to produce it in an energy efficient manner.

Traditionally, natural gas has been the preferred fuel for producing hot water in large volumes. There are issues with such an approach going forward as natural gas is a fossil fuels and there is currently no alternative to natural gas which can eliminate the need for the consumption of fossil fuels.

The Design Team are looking at various approaches using a Heat Pump to produce hot water in sufficient volume in an energy efficient manner. Heat Pump technology is rapidly improving and there are currently heat pumps on the market which can produce hot water efficiently. There is an added advantage to using heat pumps in this manner, as the national electricity grid continues to decarbonise, the building will become more environmentally friendly in time and as such is future proofed.

LIGHTING DESIGN

Lighting to be provided by LED luminaires. Good lighting design has a double benefit as it can help reduce internal heat gains, thus reducing the AC Loads.

The design intent shall be to encourage the maximum use of daylight and to avoid unnecessary artificial lighting, particularly when spaces are unoccupied, having regard to the need to ensure that the operation of automatically switched lighting systems does not endanger occupants in a building. Lighting controls in buildings should follow the guidance in BRE Digest 498 Selecting Lighting Controls. As best practice occupancy control shall be provided throughout and photoelectric dimming where the spaces are daylit. Lighting controllers with low parasitic power will be specified for this project.

The design intent is to maintain installed lighting loads of 6 - 8 watts / m^2.

VERTICAL TRANSPORTATION - LIFTS

Where new lifts are specified an analysis of the transport demand and usage patterns for the building shall be carried out to determine the optimum number, and size of lifts. Where new lifts are specified, they shall be capable of achieving the following;

- Operating in standby mode during off-peak and idle periods. For example, the power side of the lift controller and other operating equipment such as lift car lighting, user displays and ventilation fans switch off when the lift has been idle for a prescribed length of time.
- The lift car lighting and display lighting provides an average lamp efficacy (across all fittings in the car) of >55 lamp lumens/circuit Watt.
- The lift uses a drive controller capable of variable speed, variable-voltage, and variable-frequency (VVVF) control of the drive motor.

7.0 LEED (LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN)

Hyde Park Community sports centre is targeting a LEED Gold rating for this building under the BD+C: New Construction v4 scheme. LEED is an internationally recognised green building certification system, providing third-party verification that a building was designed and built using strategies aimed at improving performance across all of the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Developed by the U.S. Green Building Council (USGBC), LEED provides building owners and operators with a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED is flexible enough to apply to all building types – commercial as well as residential. It works throughout the building lifecycle – design and construction, operations and maintenance, tenant fit out, and significant retrofit.

LEED provides a point system to score green building design and construction. The system is categorised in five basic areas: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Buildings are awarded points based on the extent of various sustainable strategies that are achieved. The more points awarded, the higher the level of certification achieved; from Certified, Silver, Gold to Platinum.

8.0 BUILDING ENERGY RATING (BER)

A building energy rating is a rating on the overall energy efficiency of a building (residential or commercial). The rating is similar to the energy label on your fridge and is denoted on scale of A to G, with A1 being the most energy efficient and G being the least energy efficient. Our client is targeting a BER of A2 for this building.

Only 0.2% of the registered BER's for non-domestic buildings in Ireland are A2-Rated (which includes A1+A2 BER's). This will ensure that the Hyde Park Community sports centre building will be in the top 0.2% of energy efficient non-domestic buildings in Ireland.

The data below was obtained by METEC from the Central Statistics office (https://www.cso.ie/en/releasesandpublications/er/ndber/non-domesticbuildingenergyratingsq32019/).

NON-DOMESTIC BERs BY GRADE (On Public Register and Not Expired - Current)

Energy Rating	Quantity
A1	14
A2	89
A3	636
B1	1,114
B2	2,563
B3	4,397
C1	7,130
C2	6,898
C3	5,588
D1	7,017
D2	5,345
E1	3,641
E2	2,801
F	3,757
G	7,099
Total	**58,089**

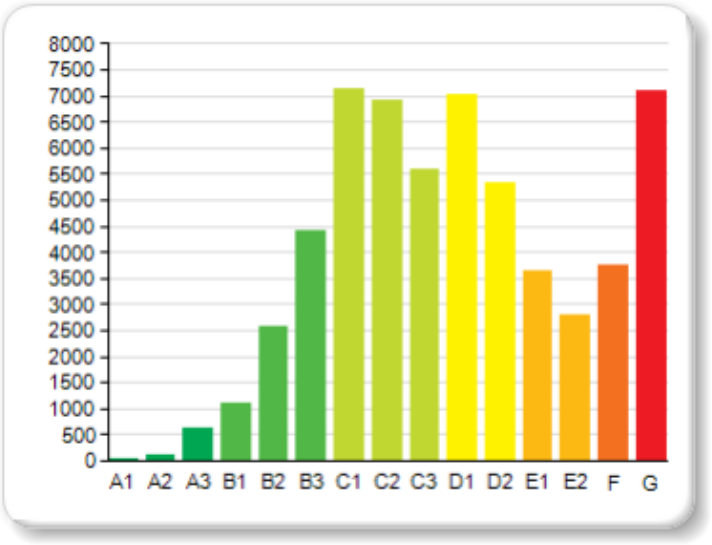


Figure 8.0.1

Valid Building Energy Ratings by Rating (as of 08/02/2020)

9.0 POTABLE WATER CONSERVATION MEASURES

Potable water is a valuable natural resource therefore its consumption in buildings should be conserved. Beginning in pre-design and continuing throughout the design phases, the Design Team is committed to identify opportunities to reduce potable water consumption for this project.

The Design Team will explore how to reduce potable water loads in the building and accomplish related sustainability goals. This exercise will assess and estimate the project's potential non-potable water supply sources and water demand volumes, including the following:

- Indoor water demand. Assess flow and flush fixture design case demand volumes
- Outdoor water demand. Assess landscape irrigation design case demand volume calculated
- Supply sources. Assess all potential non-potable water supply source volumes, such as on-site rainwater and municipally supplied non-potable water.

	
Dual Flush Toilets	Sensor Taps
	
Low Flush & Waterless Urinals	Shower Outlet Flow Regulator to achieve 6 litres per minute or less.

Figure 9.0.1

Figure 9.0.1 Examples Sanitary ware fixtures and fittings that will be reviewed in detail in order to help reduce potable water consumption for this project.

10.0 SUSTAINABLE MODES OF TRANSPORTATION

Our Client, Hyde Park Community sports centre Trust and the design team recognise the importance of creating a sustainable development which interplays between good urban design, accessibility to sustainable modes of transportation, maximising the links between existing social and community infrastructure and the most efficient use of energy and natural resources.

This development is well located next to the Glenageary DART Station giving access to the South Eastern, Northern, Western & South Western Rail Commuter Rail Corridors. There are numerous Dublin Bus and Bus Eireann bus routes within a short distance making access to the building from all areas of Dublin possible. These bus routes will encourage the future building users and visitors to consider sustainable modes of transport when wishing to visit the building.

ENCOURAGING CYCLING

Encouraging building visitors and staff to cycle to & from the site is a key aim of our client and dedicated secure space for parking bikes will be provided at the main entrance to the building. There are also shower and drying room facilities provided which will assist cyclists.

APPENDIX A – PRELIMINARY BUILDING ENERGY RATING (BER)

Virtual Environment 7.0.12 (SBEMIE v5.5.h.1)

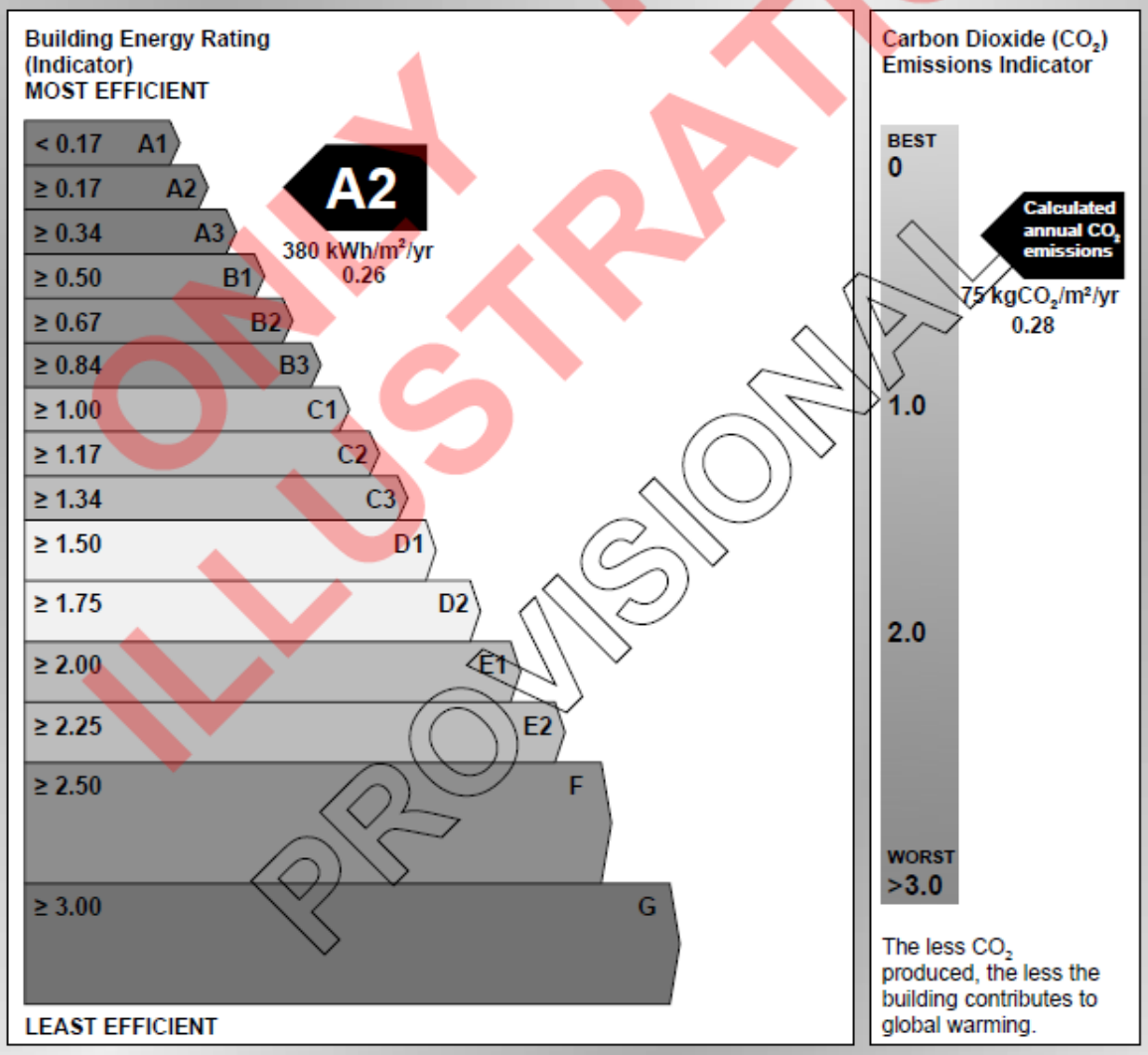
Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is: **A2**

Dalkey Village Community Hub
Hyde Road
Dalkey
Co. Dublin
A96 X795

The Building Energy Rating (BER) is an indicator of the energy performance of this building. It covers energy use for space heating and cooling, water heating, ventilation and lighting, calculated on the basis of standard operating patterns. It is accompanied by a CO_2 emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO_2 emissions, relative to what would apply for a similar building generally satisfying the Building Regulations 2005. 'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

BER Number:	voidvoidvoid	Date of Issue:	13 Mar 2020
Useful Floor Area (m^2):	1788.1	Valid Until:	12 Mar 2022
Main Heating Fuel:	Grid Supplied Electricity	BER Assessor No.:	105959
Building Environment:	Heating and Mechanical Ventilation	Assessor Company No.:	104998
		Assessor Scheme:	SEAI
Building Type:	General Assembly and Leisure, Night Clubs, and Theatres		



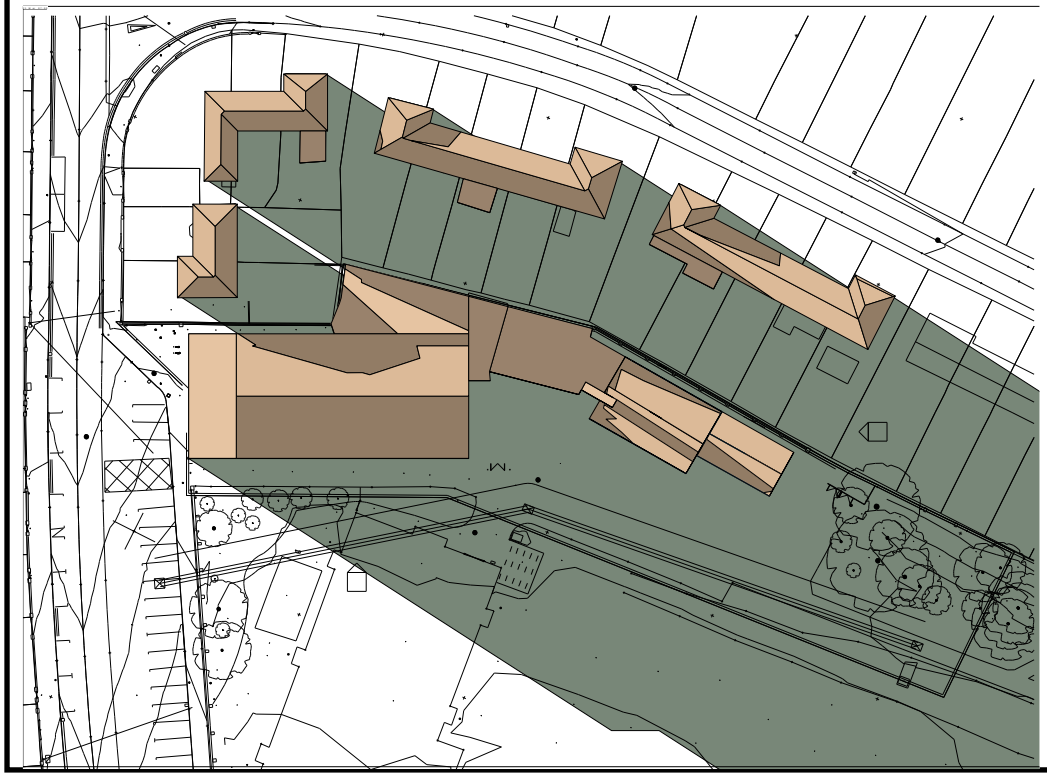
IMPORTANT: This provisional BER is calculated on the basis of pre-construction plans and specifications provided to the BER assessor, and using the version of the assessment software quoted above. The BER assigned to this building on completion may be different, in the event of changes to those plans or specifications, or to the assessment software.

PART 2

SHADING ANALYSIS
(EXISTING Vs PROPOSED)

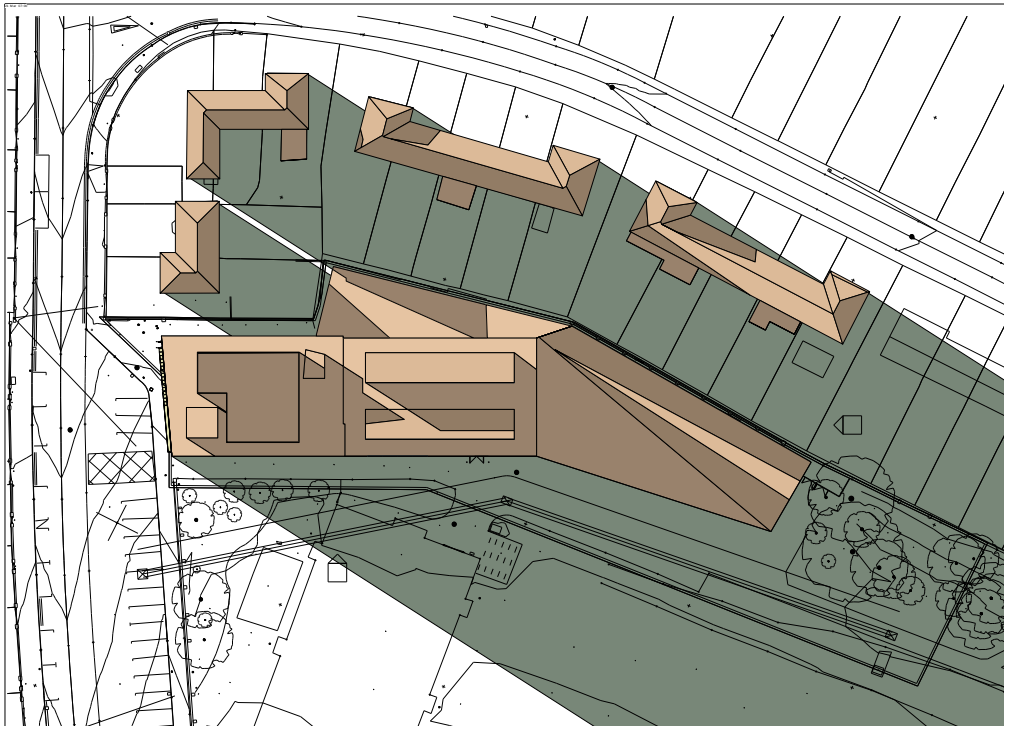
Existing Building

Suncast image:
View time = 21 Mar 07:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 95.69 alt = 3.70
Eye: azi = 333.00 alt = 90.00



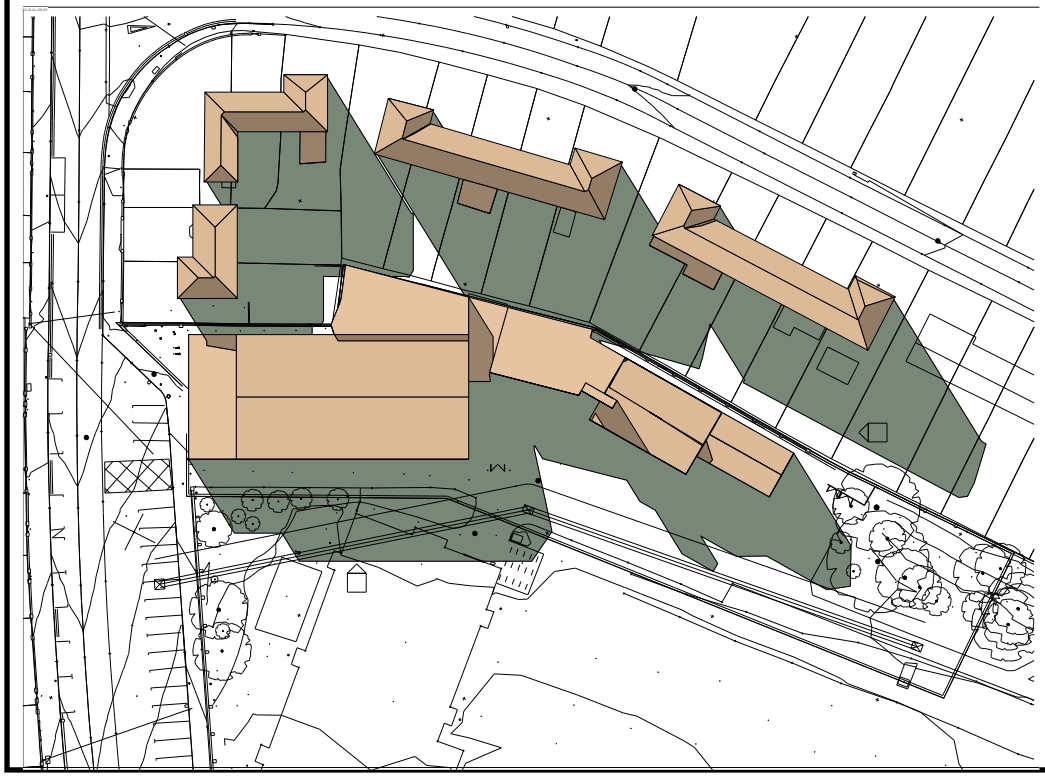
Proposed Development

Suncast image:
View time = 21 Mar 07:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 95.69 alt = 3.70
Eye: azi = 333.00 alt = 90.00



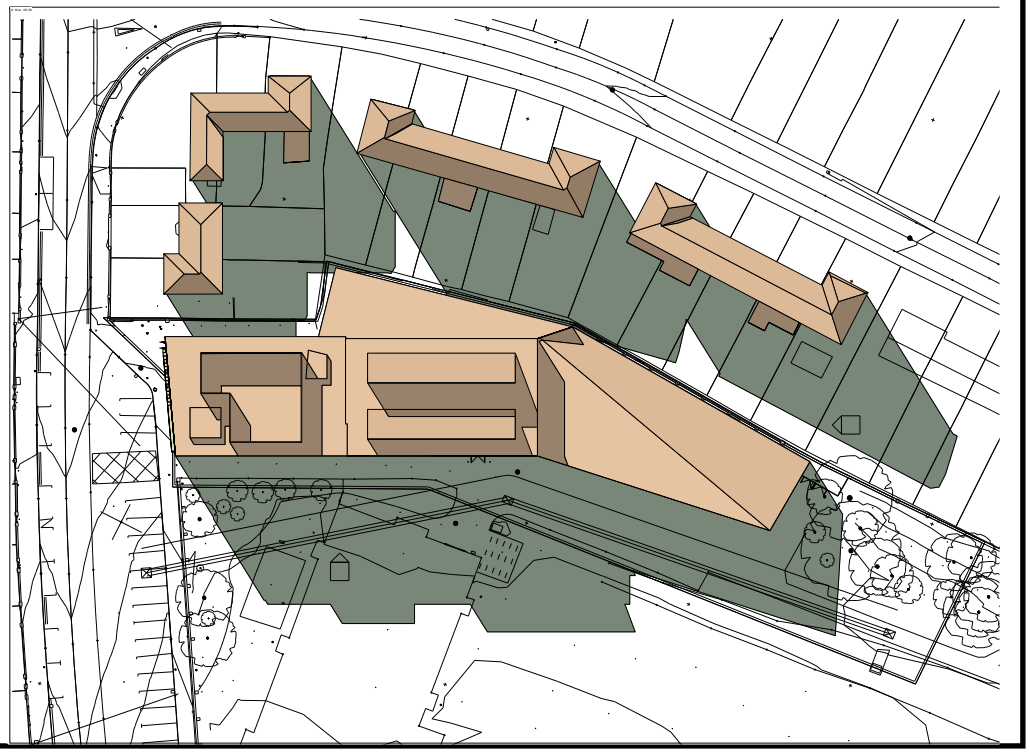
Existing Building

Suncast image:
View time = 21 Mar 09:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 121.19 alt = 20.55
Eye: azi = 333.00 alt = 90.00



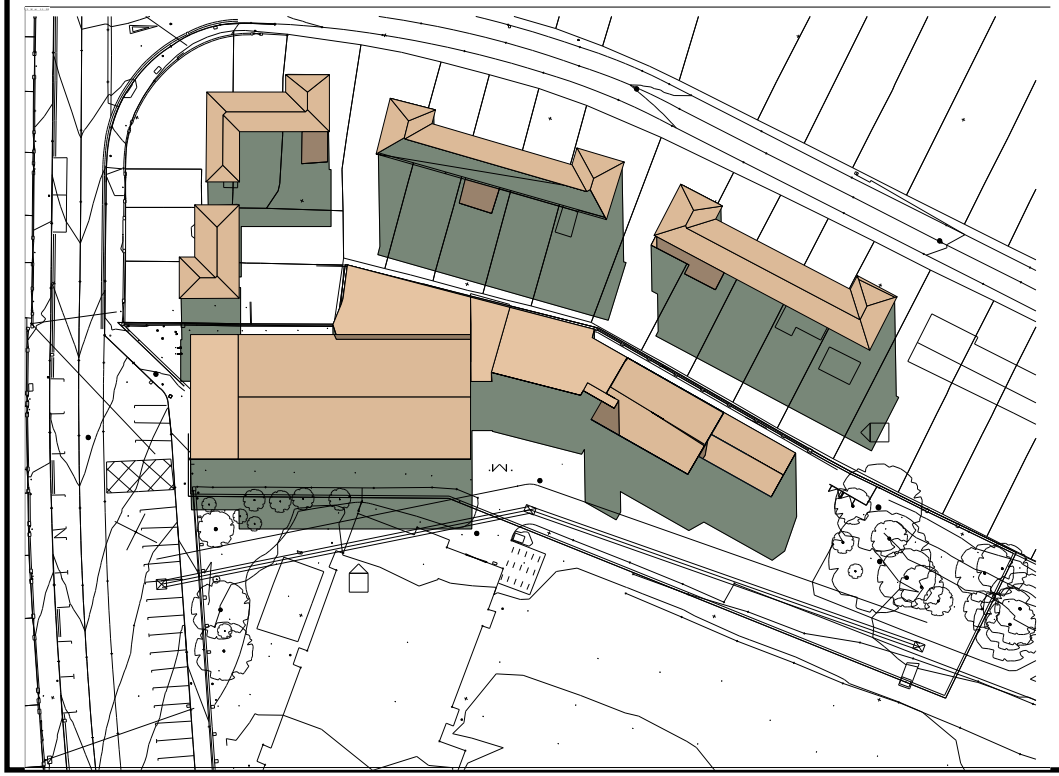
Proposed Development

Suncast image:
View time = 21 Mar 09:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 121.19 alt = 20.55
Eye: azi = 333.00 alt = 90.00



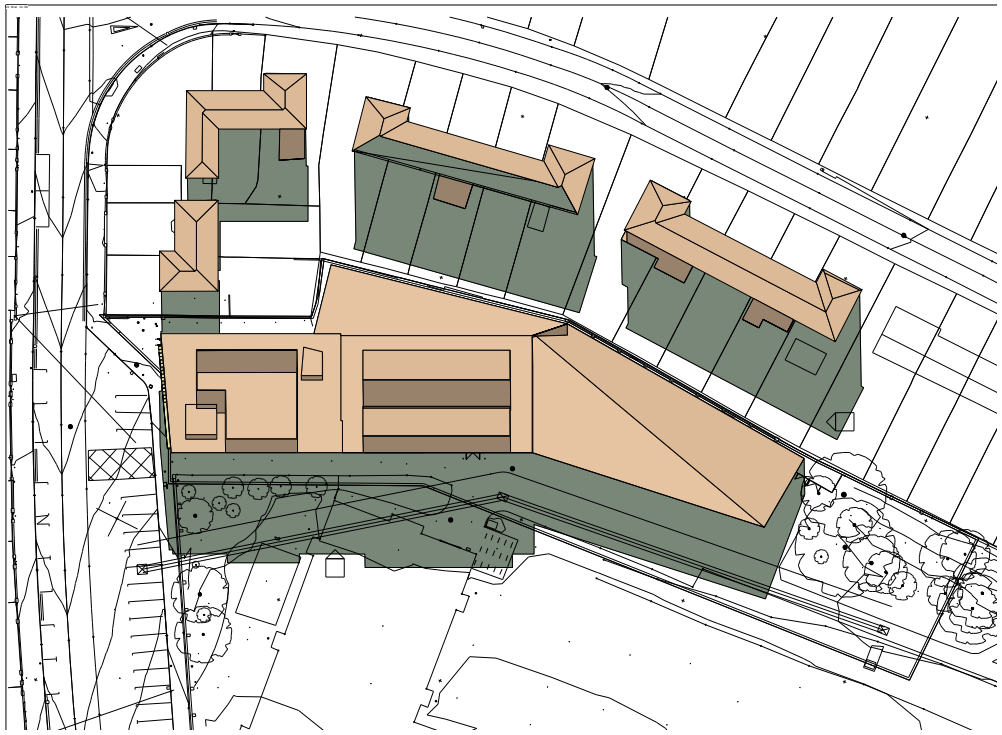
Existing Building

Suncast image:
View time = 21 Mar 11:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 152.01 alt = 32.81
Eye: azi = 333.00 alt = 90.00



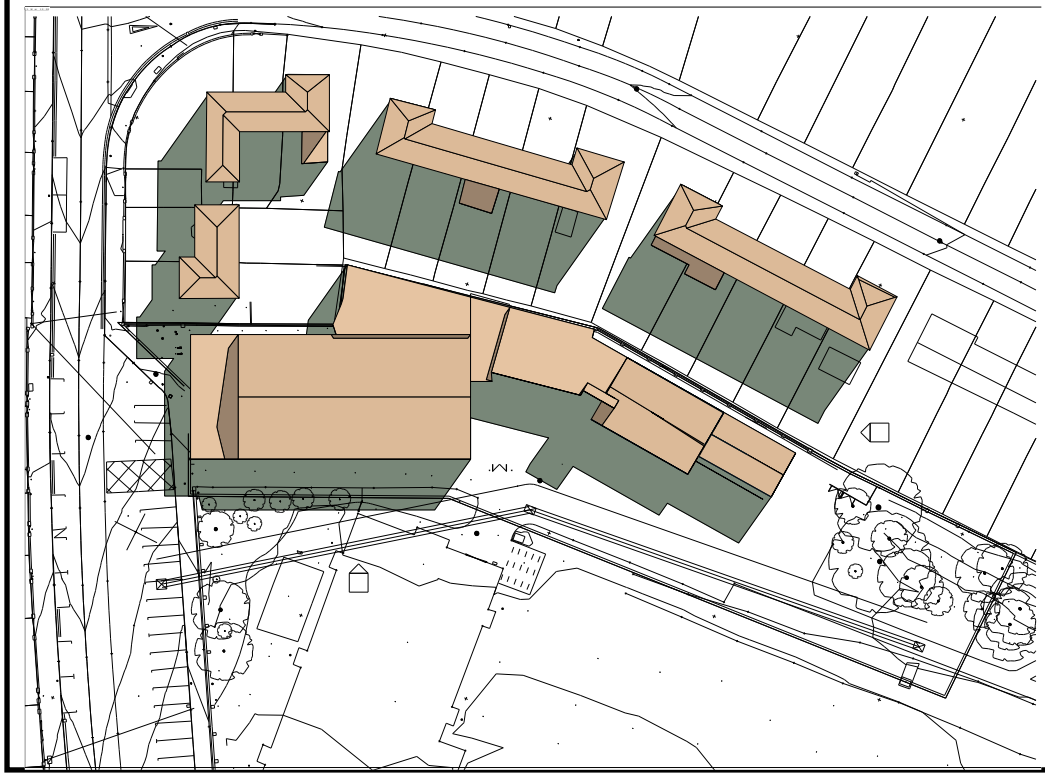
Proposed Development

Suncast image:
View time = 21 Mar 11:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 152.01 alt = 32.81
Eye: azi = 333.00 alt = 90.00



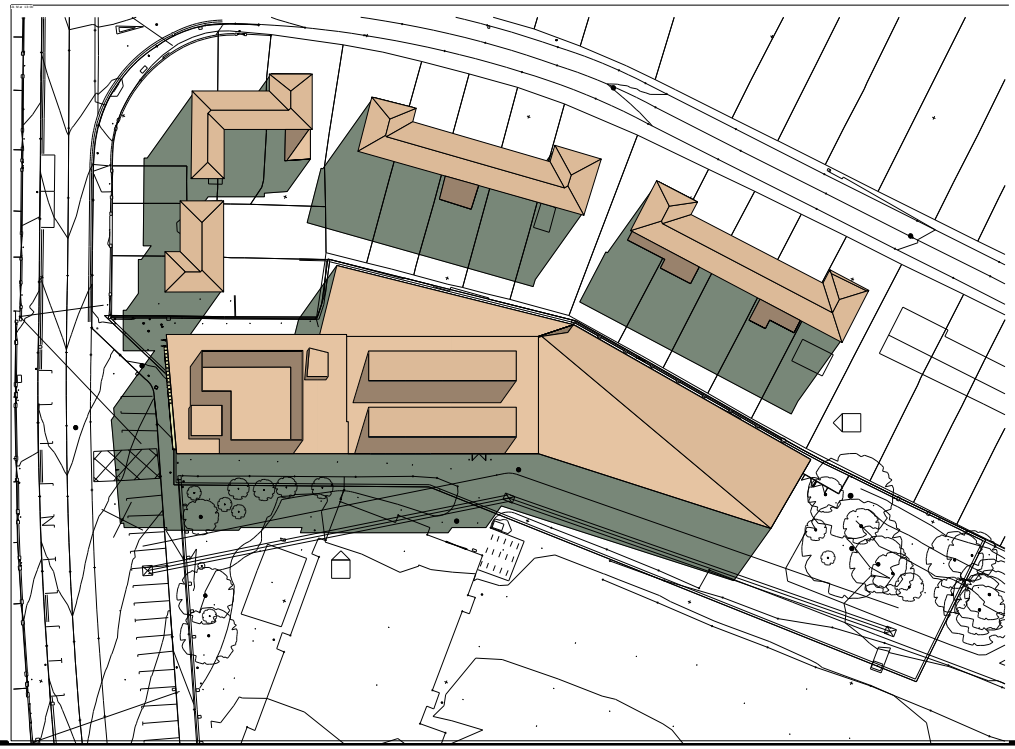
Existing Building

Suncast image:
View time = 21 Mar 13:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 188.36 alt = 35.88
Eye: azi = 333.00 alt = 90.00



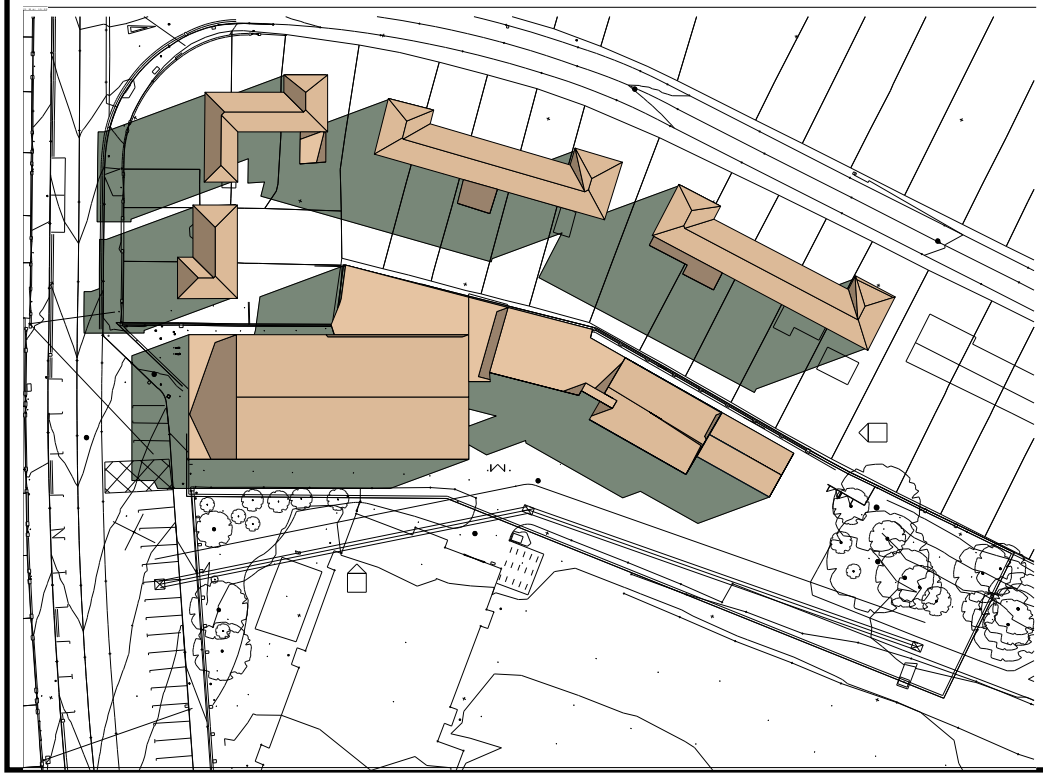
Proposed Development

Suncast image:
View time = 21 Mar 13:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 188.36 alt = 35.88
Eye: azi = 333.00 alt = 90.00



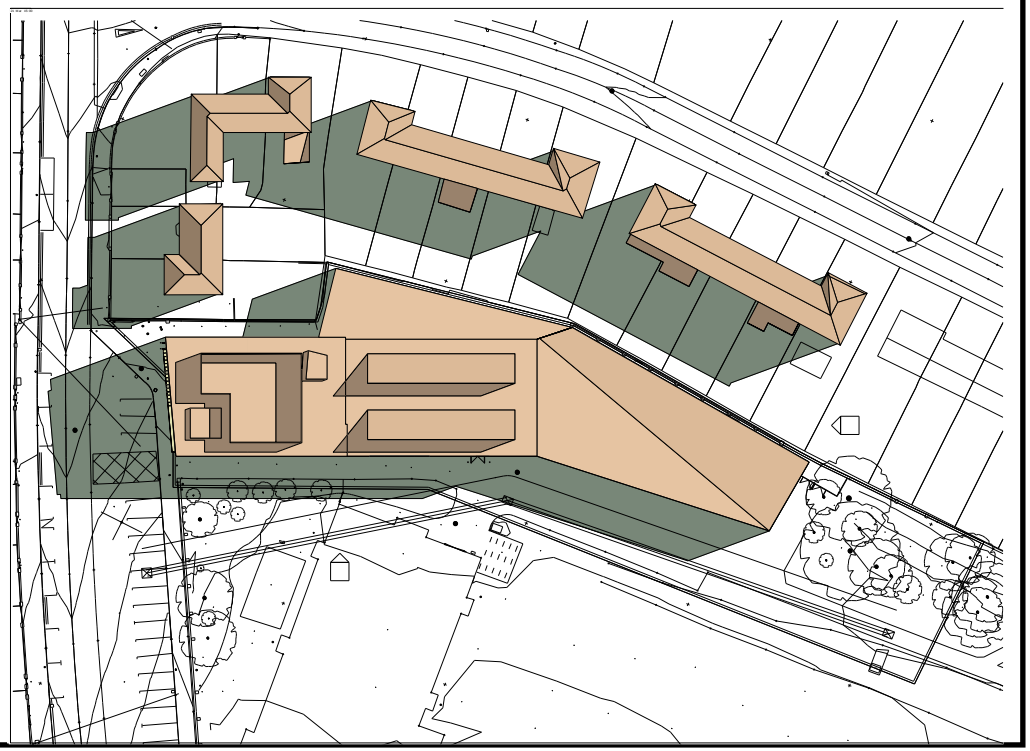
Existing Building

Suncast image:
View time = 21 Mar 15:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 222.75 alt = 28.14
Eye: azi = 333.00 alt = 90.00



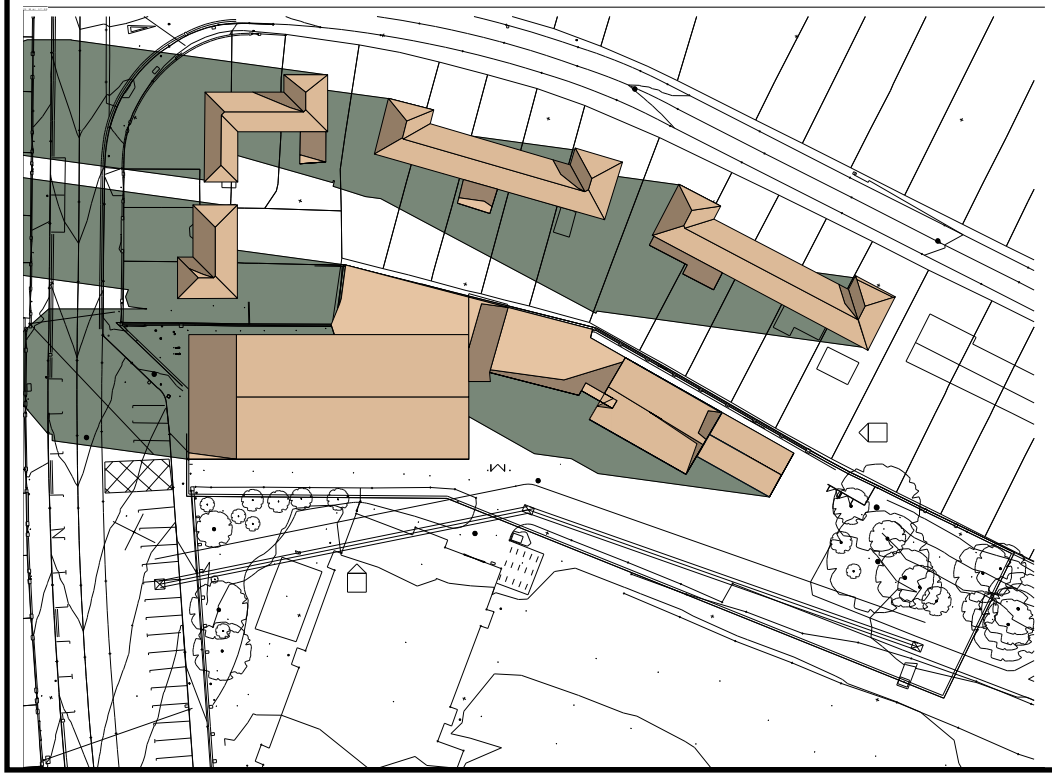
Proposed Development

Suncast image:
View time = 21 Mar 15:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 222.75 alt = 28.14
Eye: azi = 333.00 alt = 90.00



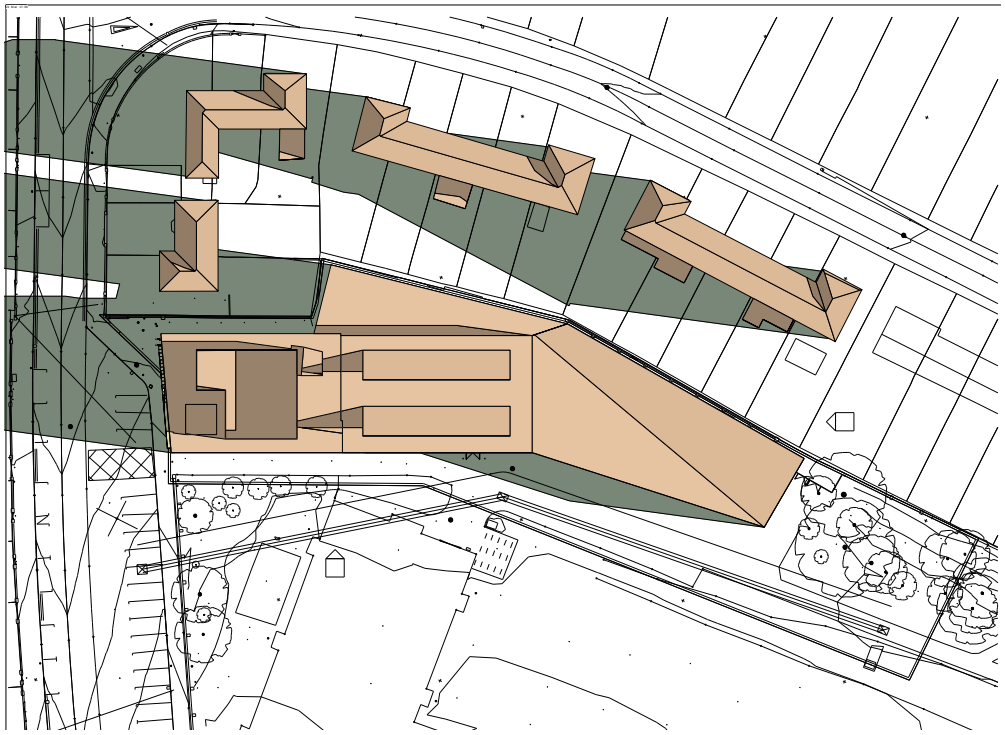
Existing Building

Suncast image:
View time = 21 Mar 17:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 250.75 alt = 13.26
Eye: azi = 333.00 alt = 90.00



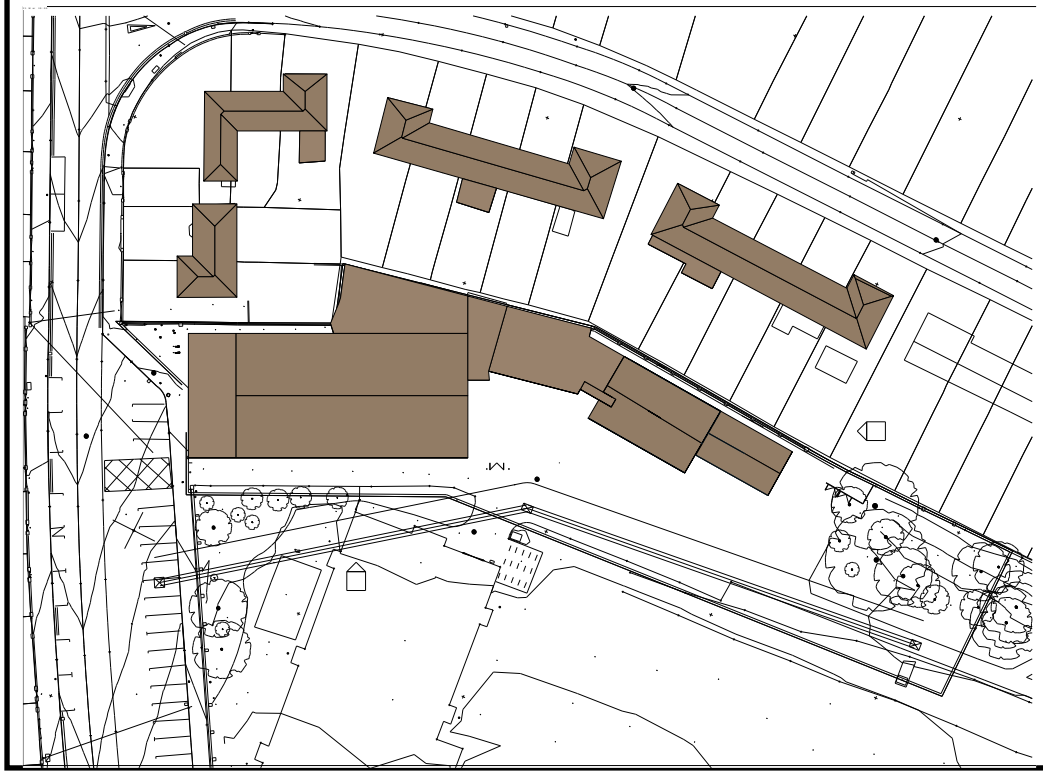
Proposed Development

Suncast image:
View time = 21 Mar 17:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 250.75 alt = 13.26
Eye: azi = 333.00 alt = 90.00



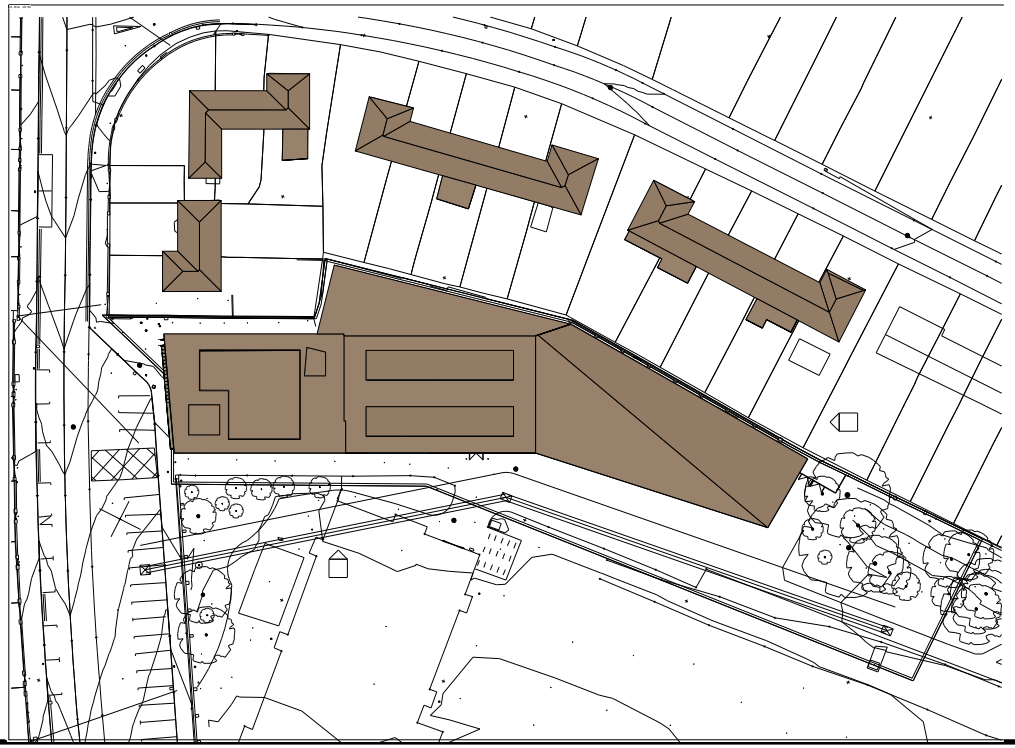
Existing Building

Suncast image:
View time = 21 Mar 19:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun is not up
Eye: azi = 333.00 alt = 90.00



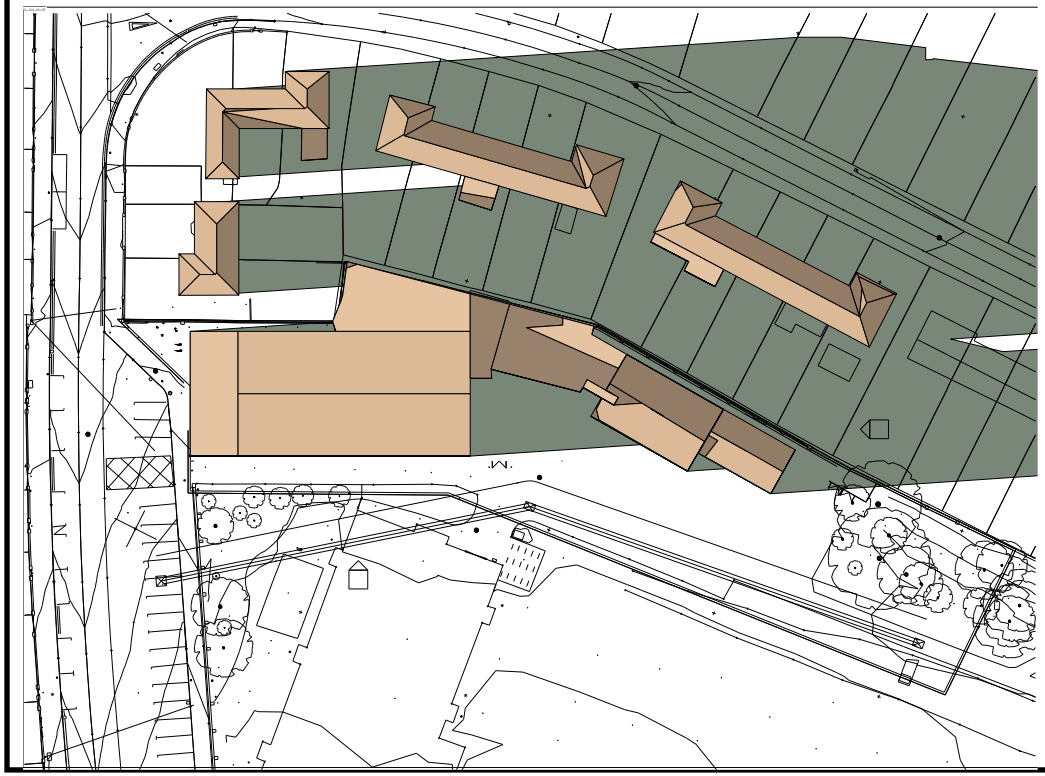
Proposed Development

Suncast image:
View time = 21 Mar 19:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun is not up
Eye: azi = 333.00 alt = 90.00



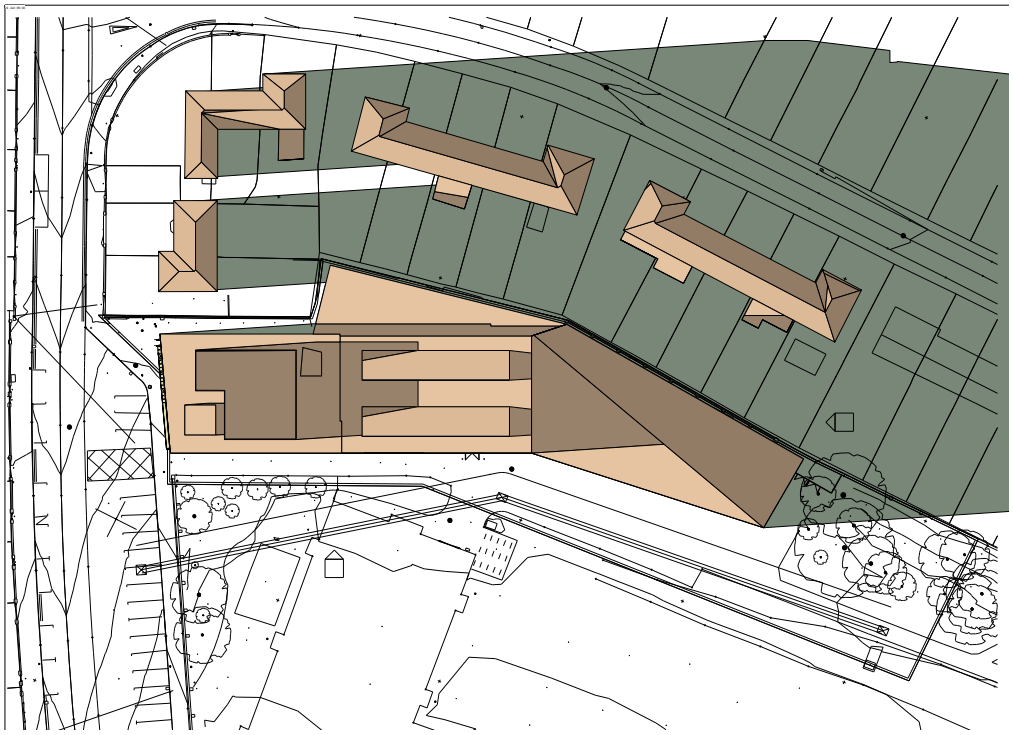
Existing Building

Suncast image:
View time = 21 Jun 05:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 59.17 alt = 6.77
Eye: azi = 333.00 alt = 90.00



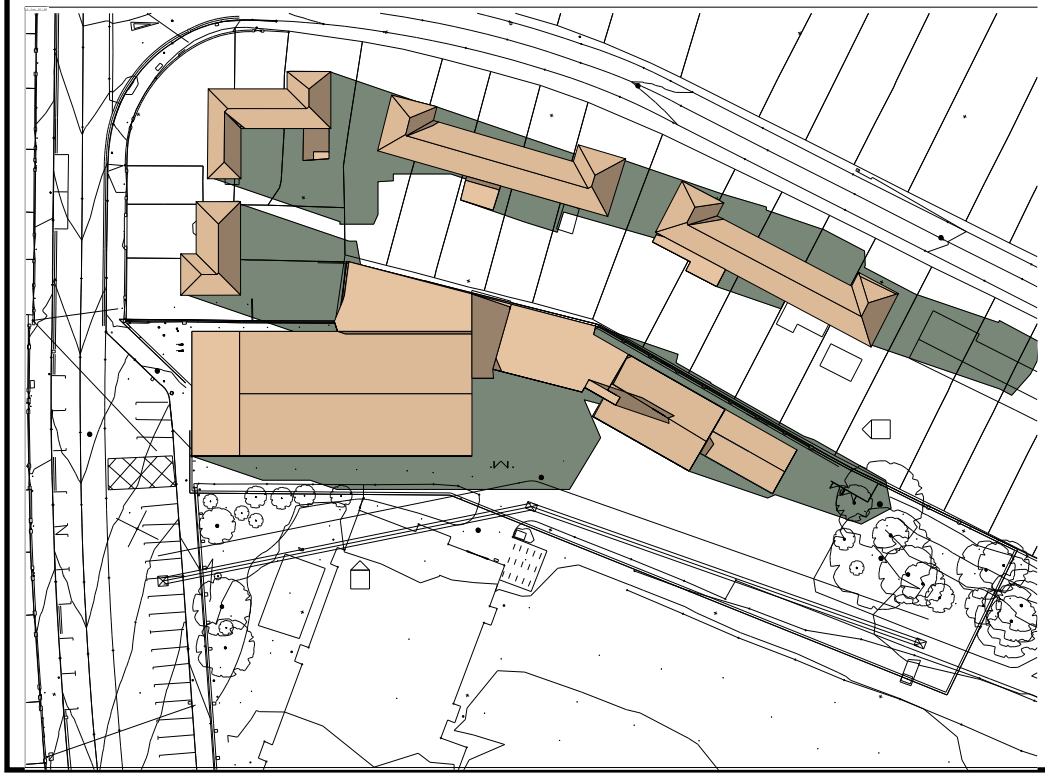
Proposed Development

Suncast image:
View time = 21 Jun 05:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 59.17 alt = 6.77
Eye: azi = 333.00 alt = 90.00



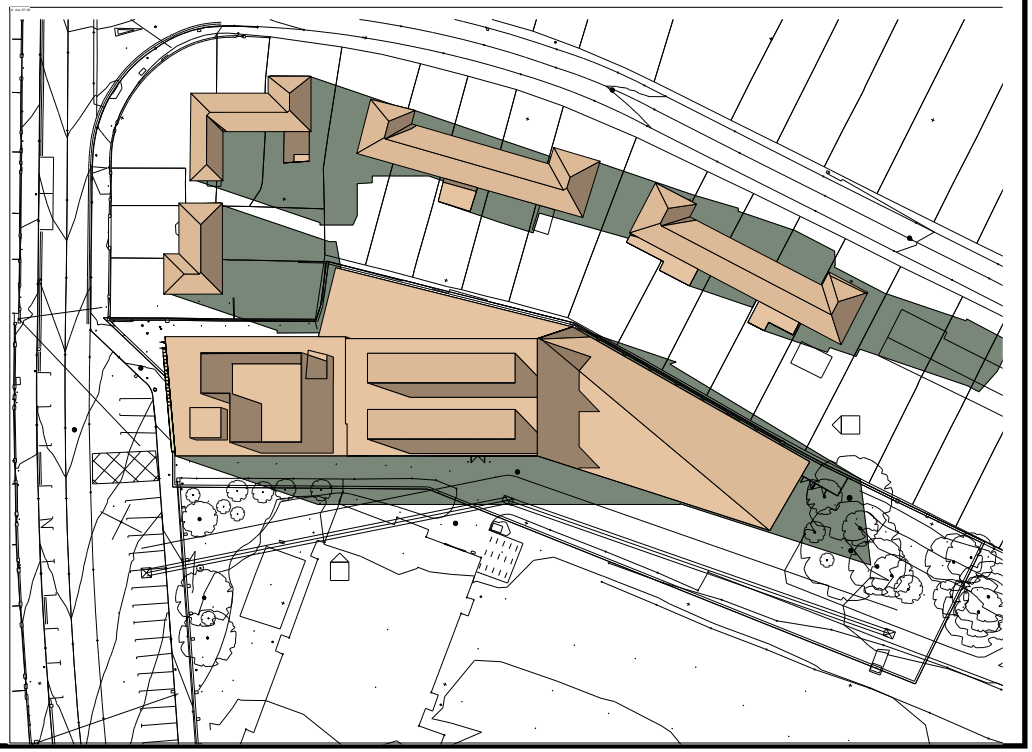
Existing Building

Suncast image:
View time = 21 Jun 07:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 81.84 alt = 23.52
Eye: azi = 333.00 alt = 90.00



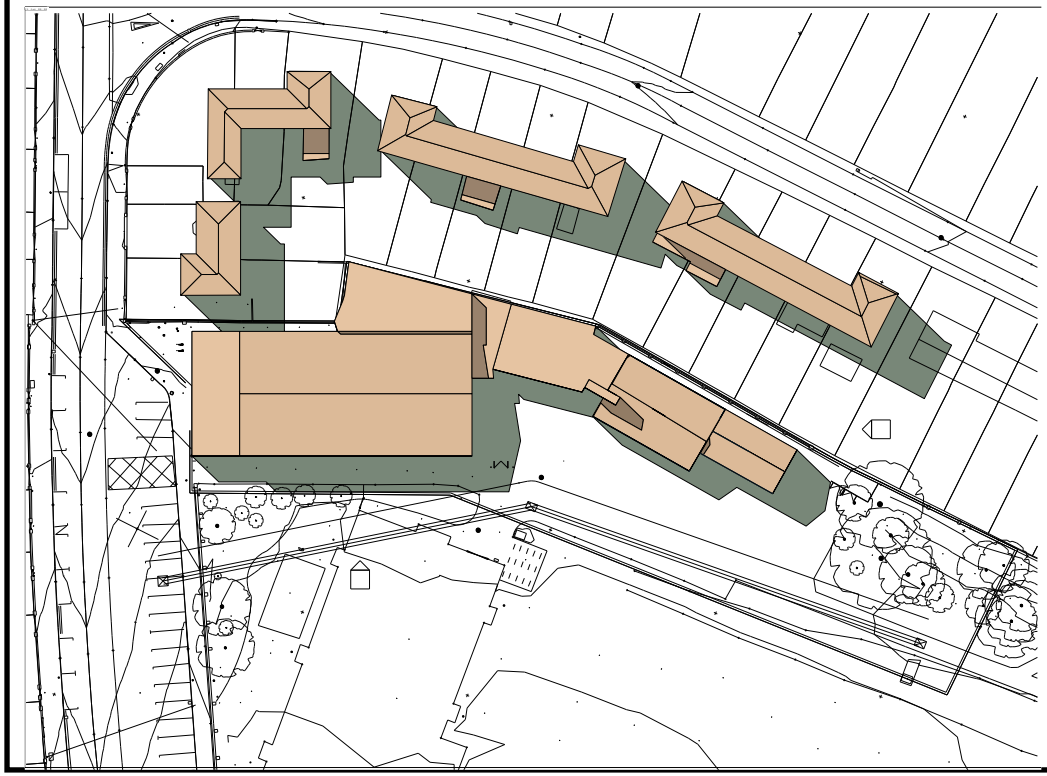
Proposed Development

Suncast image:
View time = 21 Jun 07:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 81.84 alt = 23.52
Eye: azi = 333.00 alt = 90.00



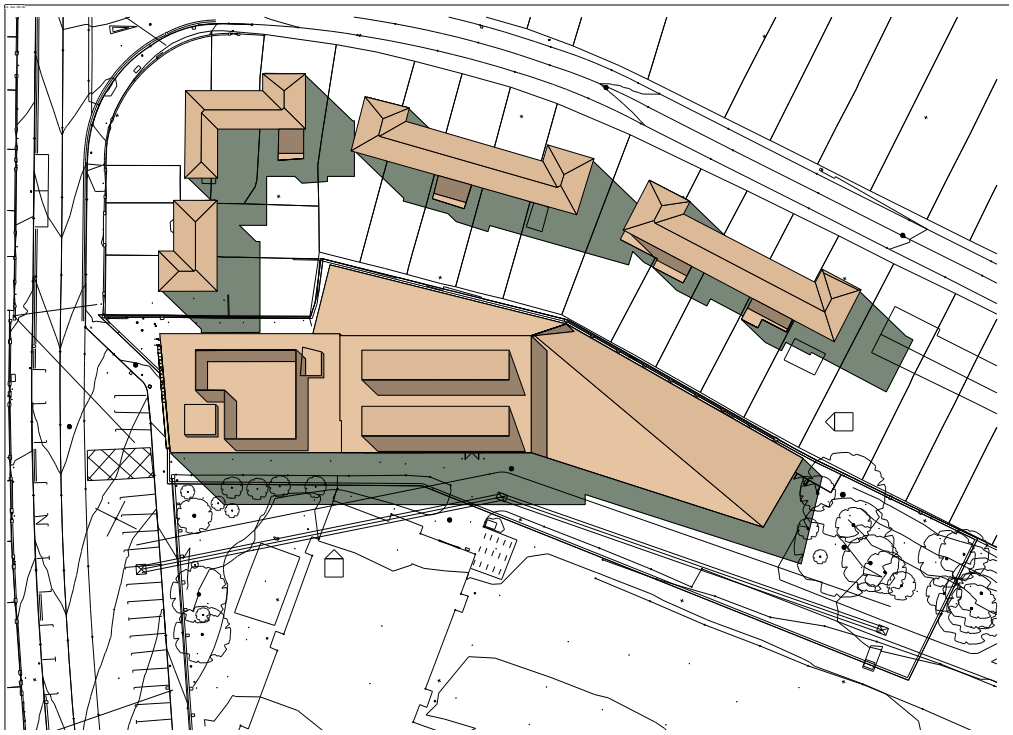
Existing Building

Suncast image:
View time = 21 Jun 09:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 107.00 alt = 41.21
Eye: azi = 333.00 alt = 90.00



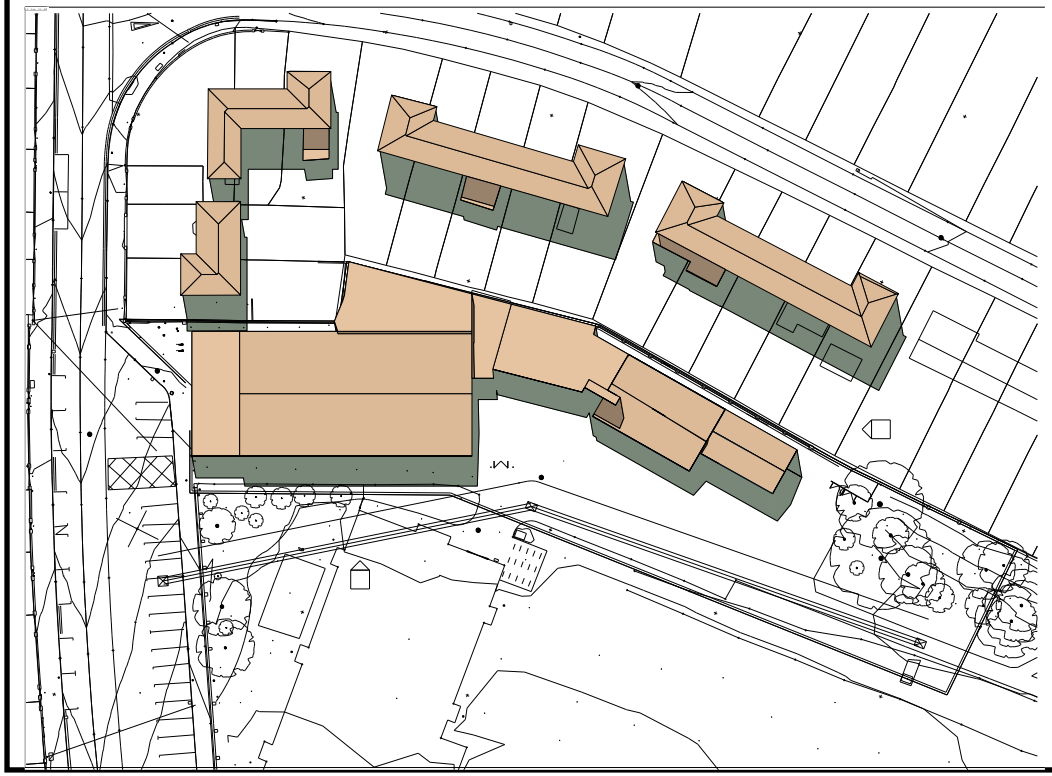
Proposed Development

Suncast image:
View time = 21 Jun 09:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 107.00 alt = 41.21
Eye: azi = 333.00 alt = 90.00



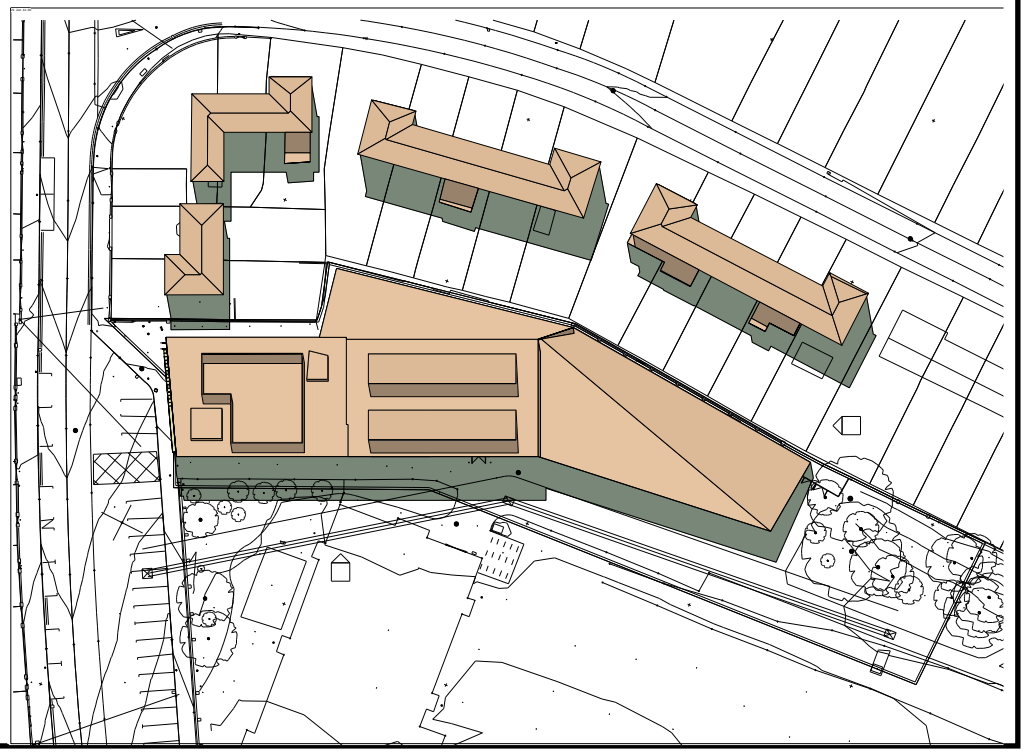
Existing Building

Suncast image:
View time = 21 Jun 11:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 142.91 alt = 55.87
Eye: azi = 333.00 alt = 90.00



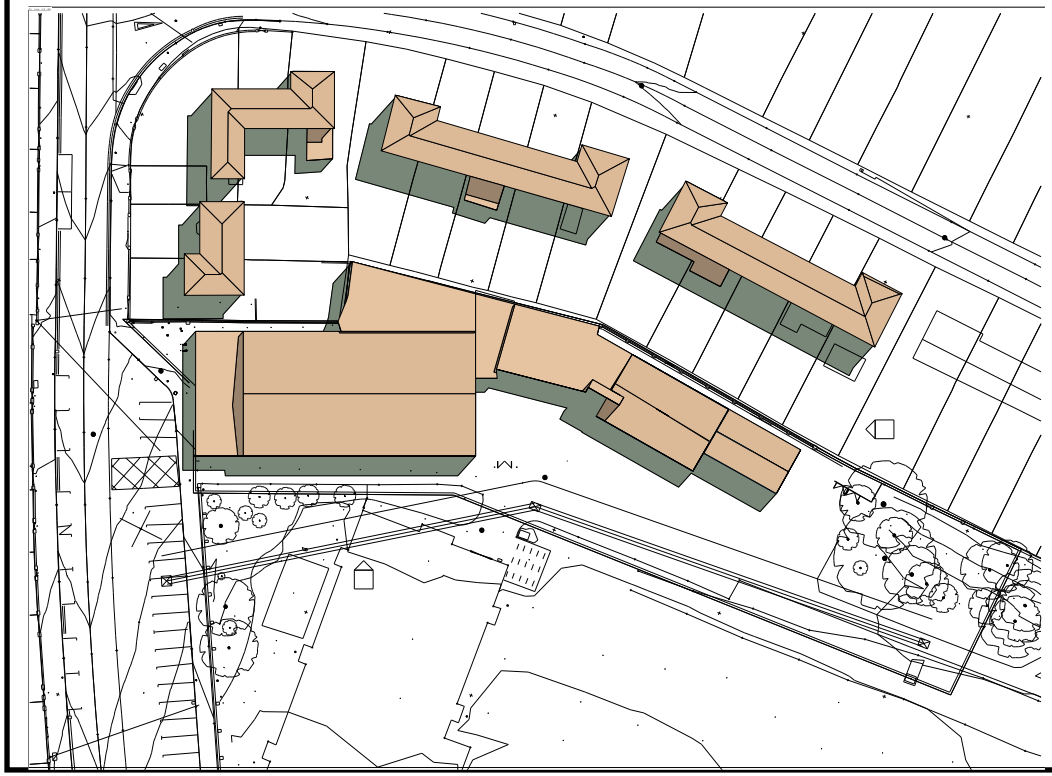
Proposed Development

Suncast image:
View time = 21 Jun 11:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 142.91 alt = 55.87
Eye: azi = 333.00 alt = 90.00



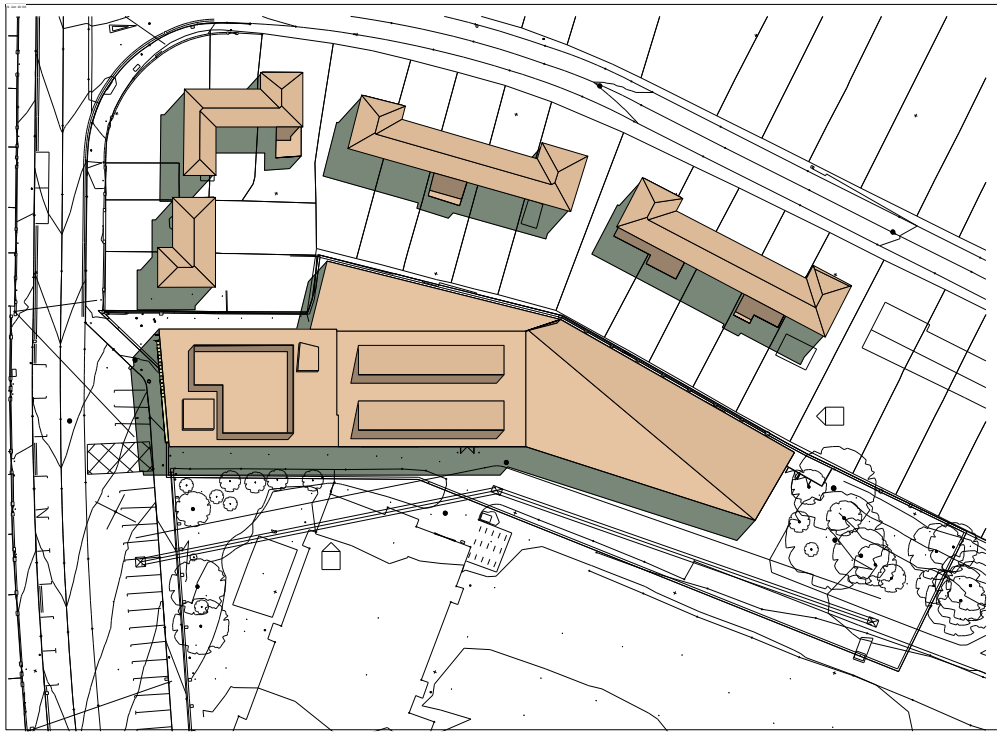
Existing Building

Suncast image:
View time = 21 Jun 13:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 195.17 alt = 59.37
Eye: azi = 333.00 alt = 90.00



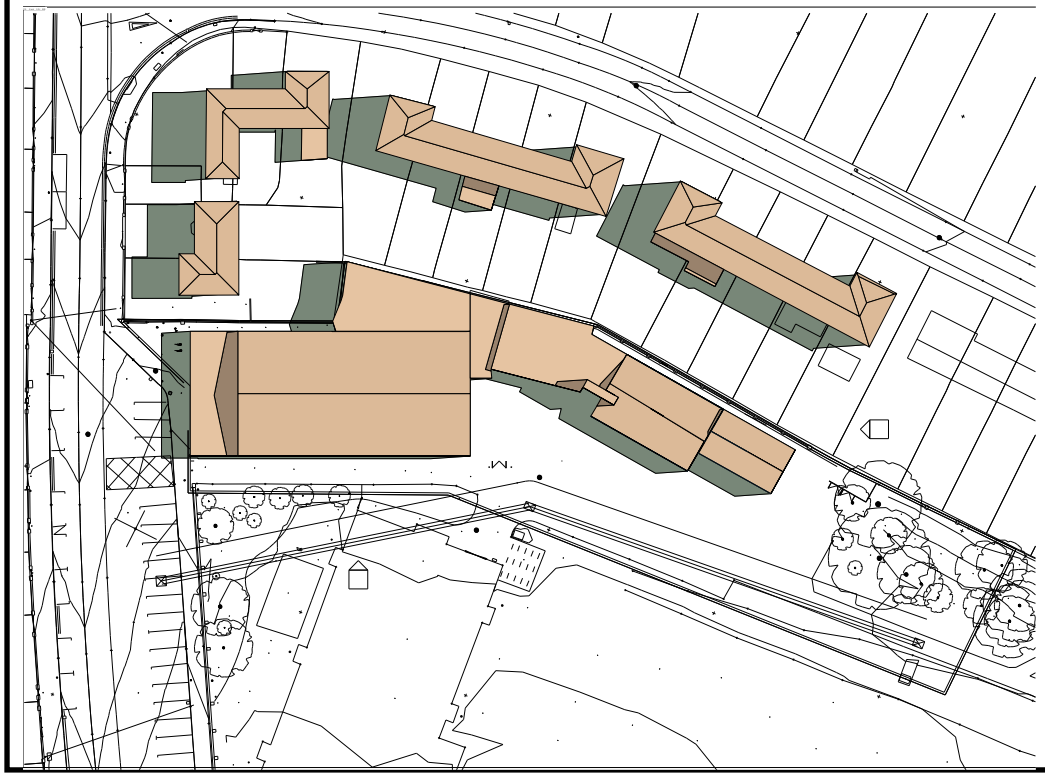
Proposed Development

Suncast image:
View time = 21 Jun 13:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 195.17 alt = 59.37
Eye: azi = 333.00 alt = 90.00



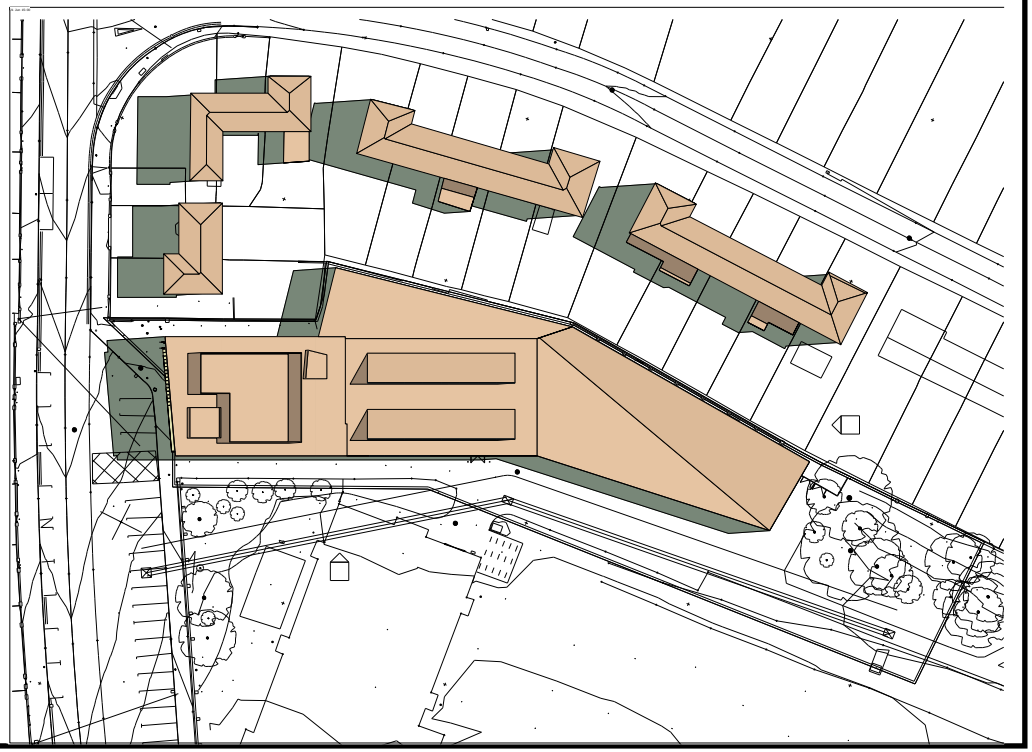
Existing Building

Suncast image:
View time = 21 Jun 15:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 239.11 alt = 48.44
Eye: azi = 333.00 alt = 90.00



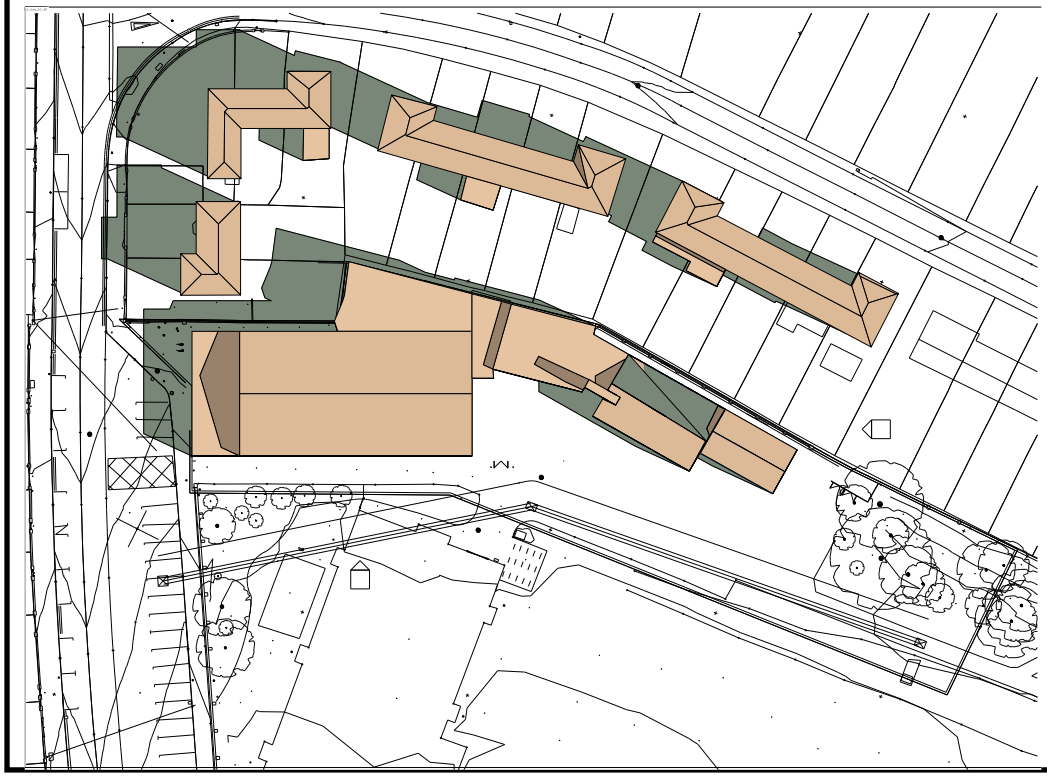
Proposed Development

Suncast image:
View time = 21 Jun 15:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 239.11 alt = 48.44
Eye: azi = 333.00 alt = 90.00



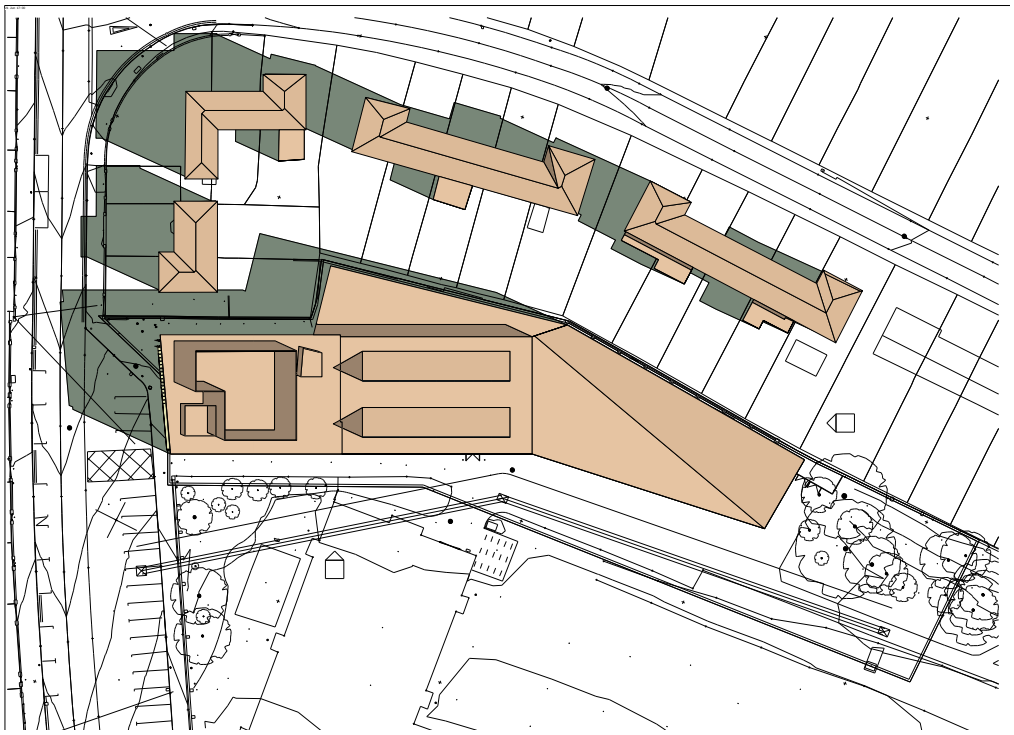
Existing Building

Suncast image:
View time = 21 Jun 17:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 267.68 alt = 31.41
Eye: azi = 333.00 alt = 90.00



Proposed Development

Suncast image:
View time = 21 Jun 17:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 267.68 alt = 31.41
Eye: azi = 333.00 alt = 90.00

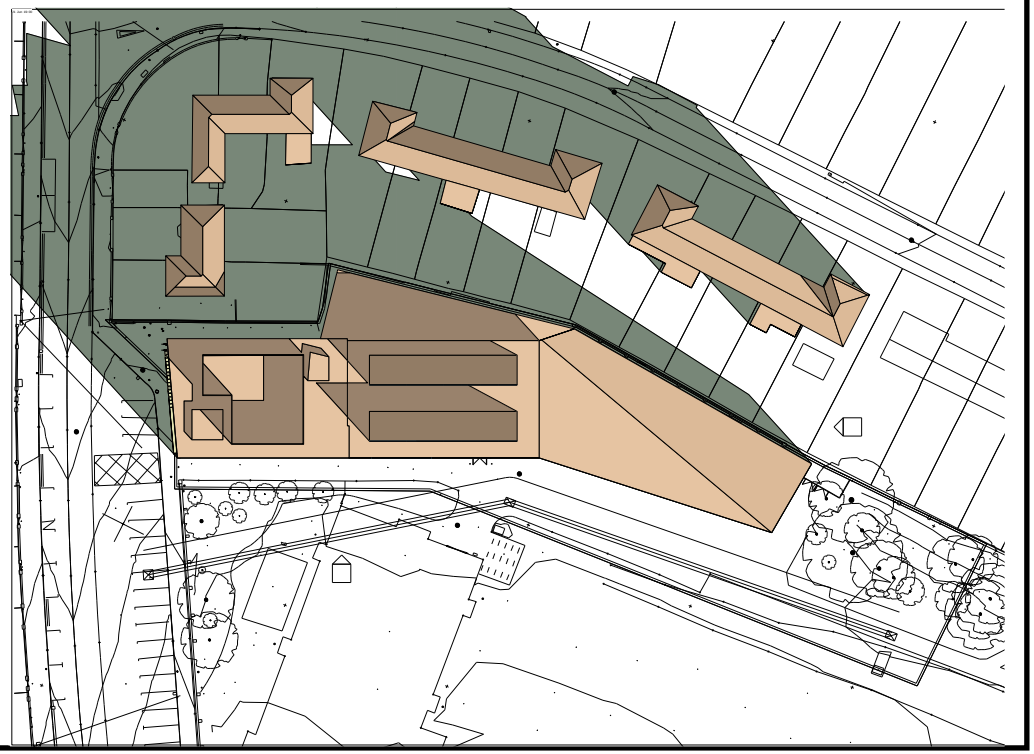


Existing Building

Suncast image:
View time = 21 Jun 19:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 290.77 alt = 13.89
Eye: azi = 333.00 alt = 90.00

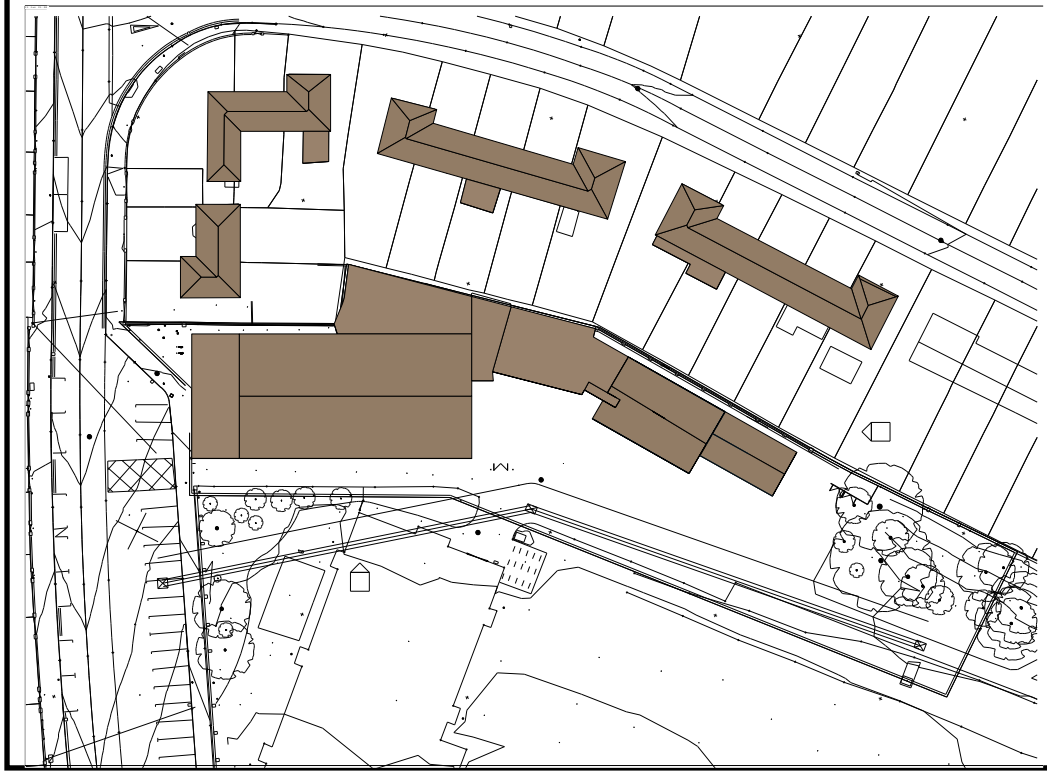
Proposed Development

Suncast image:
View time = 21 Jun 19:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun: azi = 290.77 alt = 13.89
Eye: azi = 333.00 alt = 90.00



Existing Building

Suncast image:
View time = 21 Jun 21:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun is not up
Eye: azi = 333.00 alt = 90.00



Proposed Development

Suncast image:
View time = 21 Jun 21:00
Site Latitude = 53.42
Longitude diff. = -6.27
Model Bearing = 153.00
Sun is not up
Eye: azi = 333.00 alt = 90.00