



Remediation Strategy Report

Site: 5 Park Row, Cwmavon,
Neath Port Talbot

Prepared For: David & Marie Rees

Issue Date: September 2022

Job No: 16881/RS

REPORT TITLE : **Remediation Strategy Report: Proposed Residential Development, 5 Park Row, Cwmavon, Neath Port Talbot**

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03	27/09/2022	Update to gas remediation and capping system detail

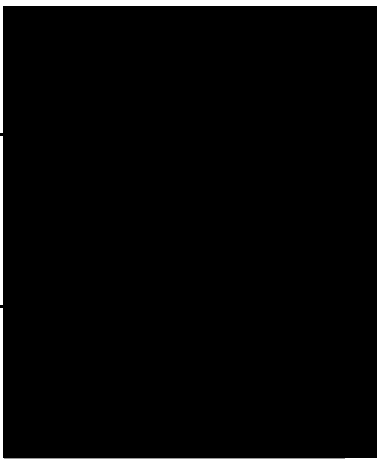
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SECTION 1 Introduction and Proposed Development

1.1 Introduction

David and Marie Rees (the Client) are proposing the residential development of land occupied by 5 Park Row located in Cwmavon.

TFW Group Limited (Terra Firma) have been commissioned by Go Concept Designs on behalf of the client to prepare a Remediation Strategy report for the site.

Previous investigations and assessments have identified that remediation of contamination is required for the development. This report presents a Remediation Strategy for the site based on these previous investigations and assessments.

1.2 Objectives

The objective of the Remediation Strategy is to detail the remedial steps that are required to render the site fit for its intended use.

In summary, the following remediation requirements have been identified and are covered in detail in this report.

- Installation of capping system in landscape and garden above made ground soils

1.3 Previous Investigations and Assessments

The Remediation Strategy is based on the findings of previous investigations and assessments. This report shall be read in conjunction with the following documents.

TFW Group Ltd Phase 1 Desk Study 15568, September 2021

TFW Group Ltd Soakaway Letter Report 15568, September 2021

TFW Group Ltd Geotechnical and Geoenvironmental Report 16881, November 2021

1.4 Roles and Responsibilities

Table 1.1 Roles and Responsibilities

Role	Organisation
Client	David and Marie Rees
Architect	GO Concept Designs Ltd
Structural and Civil Engineer	Rodgers Leask Engineers
Local Authority	Neath Port Talbot County Borough
Geotechnical & Geoenvironmental Consultant	TFW Group Ltd
Validator	TFW Group Ltd

1.5 Limitations and Exceptions of Investigation

This report has been prepared for the sole internal reliance of the Client and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of TFW Group Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. TFW Group Limited does not provide legal advice and the advice of lawyers may be required.

It is not within the scope of TFW Group Limited to:

- Provide Method Statements and Risk Assessments for the site remediation, preparation and development.
- Design, assess or install utility service trench fill and pipes for potable water supply beneath the site.

1.6 Quality Assurance

The quality and environmental aspects of the assessment and investigation comply with UKAS Accredited ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Site Characteristics

The following subsection information has been summarised from previous investigation and assessments listed in **Section 1.3**.

2.1 Site Location and Description

The development site is irregular in shape and locates off Park Row, Cwmavon. The site centres on an approximate National Grid Reference of 278110 192670, occupying a plan area of approximately 0.2 Hectares.

The existing dwelling is located in the eastern half of the site and sits upon a plateau which is elevated from Park Row. The western part of the site consists of a large open grassed garden area. A parking area is located on the southern part of this area which is set topographically below the garden and separated by a small retaining wall.

The site is surrounded by residential development. Park Row locates on the site's southern boundary which provides vehicle access to the site.

The site elevation is approximately 71m AOD and remains mostly flat across the majority of the main site plateau. The site falls off to the south with an approximate fall of 2m to the access road of Park Row.

The site location can be seen on **Figure 2.1**

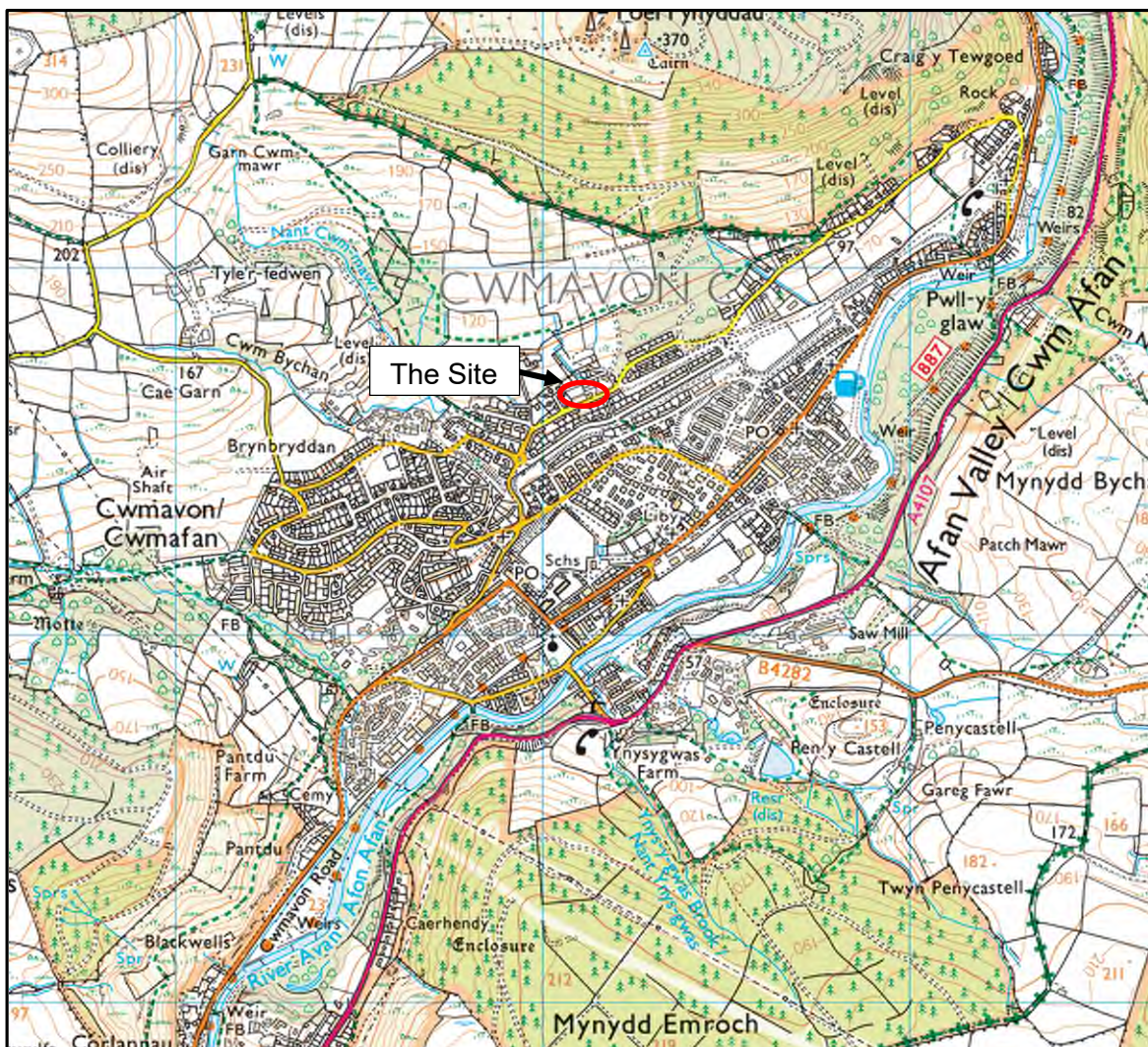


Figure 2.1 Site Location (January 2022)

2.2 Site History Summary

The site was previously occupied by gardens of a row of terraced housing. The housing was demolished in the 1970's. The existing building was constructed in the early 1990's.

2.3 Geology and Ground Conditions

The 1:50,000 scale British Geological Map of the area (Sheet 249) was consulted for geology underlying the site. The site is shown to be underlain the South Wales Middle Coal Measures Formation.

The ground conditions encountered during the site investigation can in general be summarised as shown in **Table 2.1**

Table 2.1 Summary of Ground Conditions (March 2017)

Depth (m)			Thickness (m)	Stratum
0.00	-	0.1/0.2	0.1/0.2	MADE GROUND. Grass over brown organic-rich sandy slightly gravelly CLAY with some roots. Gravel is angular mudstone, sandstone and rare brick.
0.1/0.2	-	1.25/1.5	Absent/1.4	MADE GROUND. Very soft to soft brown slightly sandy slightly gravelly CLAY . Gravel is angular sandstone and occasional concrete. Low cobble content of angular concrete.
1.25/1.5	-	1.9/2.0	Absent/0.65	Soft grey and orangish brown sandy slightly gravelly CLAY . Gravel is angular sandstone.
0.2/2.0		>2.0/>4.0	-	Very stiff grey and orangish brown sandy slightly gravelly CLAY with low cobble content/ very dense brown slightly clayey very gravelly SAND . Gravel is angular sandstone.

2.4 Radon

No radon protective measures are required for new developments on the investigation site.

2.5 Hydrogeology and Hydrology

The nearest surface water feature locates off site 36m to the northwest.

The bedrock deposits beneath the site have an aquifer designation of secondary aquifer – A.

The hydraulic gradient will be at its steepest during periods of heavy rainfall and aquifer recharge.

Groundwater was encountered in WS04 at 2.5m, recorded as a very slow inflow.

2.6 Identified Contamination

2.6.1 Made Ground Soils

Laboratory soil test results highlight exceedances of asbestos (chrysotile), arsenic, lead, naphthalene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)Anthracene when compared to human health guidelines for a residential with plant uptake scenario. Exceedances were located in WS01 (0.5m), WS02 (0.1m), WS03 (0.5m), WS04 (0.1m), WS04 (0.5m).

2.6.2 Ground and Mine Gas

There is a potential risk to the site from ground gas and mine gas from the infilled land and past shallow mining respectively. Gas protection measures suitable to cater for Gas Characteristic Situation 2 should be designed and installed on all future development on site.

SECTION 3 Sources of Contamination Requiring Remediation

The summary of the refined conceptual site model is presented in **Table 3.1** and based on findings of previous investigations and assessments, detailing significant pollutant linkages requiring remediation or mitigation.

Table 3.1 Summary of Significant Pollutant Linkages

Source	Pathway	Receptor
S1 – Made ground	P1 – Direct soil and dust ingestion P2 – Consumption of home grown produce P3 – Dermal contact P4 – Inhalation of dust and vapours P10 – Inhalation of asbestos fibres	R1 – Construction and maintenance workers R2 – Future site users (residents) R3 – Passers-by or neighbouring site users
S2 – Infilled land	P8 – Horizontal and vertical migration of ground gasses and vapours	R2 – Future site users (residents)
S3 – Mine workings	P7 – Artificial contaminant pathway (borehole, grout hole) P8 – Horizontal and vertical migration of ground gasses and vapours	R2 – Future site users (residents)

SECTION 4 Proposed Remedial and Mitigating Measures

4.1 General

Based on the finding of previous investigations and assessments and the identified pollutant linkages the following remedial measures have been devised for the site.

Specific validation requirements for the proposed remedial measures are discussed in the following section.

4.2 Made Ground Soils

4.2.1 Protection of Construction & Maintenance Workers and Passers-by or Neighbouring Site Users

The potential production of soil dust asbestos (chrysotile), arsenic, lead, naphthalene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)Anthracene contaminants during construction works presents a risk to construction and maintenance workers as well as passers-by or adjacent site users through, direct soil and dust ingestion, dermal contact, inhalation of dust and naphthalene.

A selection of mitigating measures are presented below to disrupt the contaminant pathway to the receptor.

- Dust suppression and measures to dampen the material
- Site perimeter screening
- Suitable PPE for site workers

It is therefore essential that the contractor puts in place adequate measures to ensure the safety of all workers.

All utility service channels placed within made ground soils on site should be lined with inert material to sever the link between the source and the receptor.

These measures should be detailed in the contractor's Risk Assessment and Method Statements as well as the contractor's Construction Management Plan.

4.2.2 Protection of Future Site Users (Residents)

Future site users will be potentially at risk from direct soil and dust ingestion, dermal contact and inhalation of dust and vapours from soils containing asbestos (chrysotile), arsenic, lead, naphthalene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)Anthracene contaminants, during excavation of made ground soils while undertaking gardening activities. Future site users are also at risk from the consumption of home grown produce grown within contaminated made ground soils.

Complete removal of the contaminant source would prove to be uneconomical given the low level of risk identified and the volume of affected soils therefore the installation of a capping system is proposed to interrupt the link between the source and receptor.

The capping system should be installed above Made Ground soils only in garden and landscaped areas and comprise 600mm thick capping layer of imported clean inert soils. The capping soil should be directly underlain by a double no-dig barrier comprising a geo-grid and a geotextile membrane. Beneath areas of the site due to be covered by hard-standing or developed upon, no remedial measures are required.

Validation of the capping system and imported materials will be required.

4.2.3 Protection of Construction Materials (Potable Water Supply Pipes)

Potable water supply pipes are at risk of degradation when in contact with made ground soils containing arsenic, lead, naphthalene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)Anthracene contaminants.

It is recommended that a Potable Water Supplier should complete an assessment in accordance with UK Water Industry Research guidance; Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR Report Ref: 10/WM/03/21. The assessment should determine the selection of Water Supply Pipe material.

4.3 Ground Gas

4.3.1 Protection of Future Site Users (Residents)

Future site users are at risk of asphyxiation from the migration and accumulation indoors of ground gas. In addition, future site users are at risk from the migration, indoor accumulation and explosion of gas.

Gas protection measures suitable to cater for Gas Characteristic Situation 2 should be designed and installed on all future development on site.

The ground gas protection system should be designed, verified, installed and validated in accordance with the British Standard 8485:2015+A1:2019 and CIRIA guidance C735:2014.

It is recommended that a specialist consultant is retained to prepare a risk assessed ground gas protection system Verification Plan for the proposed development. The Verification Plan will detail the required protection measures based on the perceived risk associated with the complexity of design, experience of the installer, size of the site and gas characteristic situation. The Verification Plan also details the step-by-step process and requirements to allow for the completion of a Validation Report. Terra Firma offer Verification and Validation services.

4.4 Hydrocarbon Vapours

4.4.1 Protection of Future Site Users (Residents)

Due to elevated concentration of Naphthalene, it is recommended that a hydrocarbon vapour barrier also be installed on all future developments at the site.

With respect to volatile organic compounds (Naphthalene) encountered at the site, ground gas protection elements should be selected based on guidelines presented in CIRIA C748:2014. In addition, NHBC guidance may also need to be adopted depending on the requirements of the proposed development guarantor.

As with the gas protection measures, it is recommended that a specialist consultant is retained to prepare a risk assessed hydrocarbon vapour protection system Verification Plan for the proposed development. The Verification Plan will specify the membrane and describe the reasons for its use. The maximum allowable permeation rates of the critical chemicals should be determined from the risk assessment and should be specified and used to demonstrate that there is no unacceptable risk (this should include permeation rates at joints). A summary of the risk assessment should be reported within the verification plan.

The Verification Plan also details the step-by-step process and requirements to allow for the completion of a Validation Report. Terra Firma offer Verification and Validation services.

SECTION 5 Validation of Remedial and Mitigating Measures

The following remedial measures will require verification and inclusion within a Validation Report:

- Capping system (importation of soils and installation)
- Potable water supply pipe (assessment and installation)

5.1 Capping System

Following the importation and placement of 600mm of clean inert material in the soft landscaped and gardens areas underlain by a double no-dig barrier comprising a geo-grid and a geotextile membrane, verification of the capping thickness and no-dig barrier should be undertaken.

Validation of the capping system will comprise photographic evidence clearly showing the thickness and depth of individual strata, and the presence of the no-dig barrier. In addition, samples will be obtained at this point for validation testing of imported soils in accordance with **Section 5.1.1**.

A validation report including a description of the works undertaken, validation photographs and chemical validation test results shall be presented upon completion.

5.1.1 Imported Soil Validation

Importation of soils will be required to provide a capping layer of clean inert material in identified landscaped and garden areas.

All imported soils, aggregate or stone that are not virgin quarry stone should be validated as suitable for use. Imported materials exempt from validation testing should be accompanied by a transfer note. Transfer notes should be retained and submitted for inclusion within the Validation Report upon completion of the works.

The provider should supply a laboratory analysis report to confirm that the soil/aggregate/stone is suitable for use. Depending on the source and available test data, it may be prudent to independently sample and analyse the materials (if practical) prior to being brought to site.

Sampling and analysis of the soil/aggregate/stone once imported will be required in addition to any taken at source.

In accordance with publication 'Requirements for the Chemical testing of Imported Materials for Various End Uses and Validation of Cover Systems' the number of representative samples required for analysis is dependent on the volume of each source soil. For a volume between 20m³ and 250m³ four samples should be taken. For a volume greater than 250m³, 4 samples per 250m³ should be taken. Where quantities exceed 1000m³ The CLO/EHO should be contacted to agree a sampling scheme.

All samples should be analysed for the determinands listed in **Table 5.1**.

Table 5.1 Validation Criteria

Determinand	Units	Guideline Value (Residential)	Source
Inorganic			
Arsenic	mg/kg	37	1
Boron	mg/kg	290	1
Cadmium	mg/kg	11	1
Chromium III	mg/kg	910	1
Chromium VI	mg/kg	6	1
Copper	mg/kg	2400	1
Lead	mg/kg	200	2
Mercury	mg/kg	40	1
Nickel	mg/kg	180	1
Selenium	mg/kg	250	1
Zinc	mg/kg	3700	1
Asbestos	%	Non Detected	-
Organics – Phenol & PAH			
Phenol	mg/kg	120	1
Naphthalene	mg/kg	2.3	4
Acenaphthylene	mg/kg	170	4
Acenaphthene	mg/kg	210	4
Flourene	mg/kg	170	4
Phenanthrene	mg/kg	95	4
Anthracene	mg/kg	2400	4
Fluoranthene	mg/kg	280	4
Pyrene	mg/kg	620	4
Benzo(a)anthracene	mg/kg	7.2	4
Chrysene	mg/kg	15	4
Benzo(b)fluoranthene	mg/kg	2.6	4
Benzo(k)fluoranthene	mg/kg	77	4
Benzo(a)pyrene	mg/kg	2.2	4
Indeno(123cd)pyrene	mg/kg	27	4
Dibenzo(ah)anthracene	mg/kg	0.24	4
Benzo(ghi)perylene	mg/kg	320	4
Organics – TPH			
PH C5 – C6 Aliphatic	mg/kg	42	4
PH C6 – C8 Aliphatic	mg/kg	100	4
PH C8 – C10 Aliphatic	mg/kg	27	4
PH C10 – C12 Aliphatic	mg/kg	130	4
PH C12 – C16 Aliphatic	mg/kg	1100	4
PH C16 – C21 Aliphatic	mg/kg	65000	4
PH C21 – C35 Aliphatic	mg/kg	65000	4
PH C5 – C7 Aromatic	mg/kg	70	4
PH C7 – C8 Aromatic	mg/kg	130	4
PH C8 – C10 Aromatic	mg/kg	34	4
PH C10 – C12 Aromatic	mg/kg	74	4
PH C12 – C16 Aromatic	mg/kg	140	4
PH C16 – C21 Aromatic	mg/kg	260	4
PH C21 – C35 Aromatic	mg/kg	1100	4
1 - LQM/CIEH Suitable For Use Level (S4UL) 2015			
2 - Defra Category 4 Screening Level (Provisional value)			
4 - S4UL threshold based on 1% soil organic matter			

5.2 Potable Water Supply Pipes

Evidence of the water supply pipe installation should be collected by the Client and provided independently. Evidence should comprise photographs of the water pipe supply installation.

5.3 Ground Gas and Hydrocarbon Vapour Protection Systems

Verification of the ground gas and hydrocarbon vapour protection system design and installation needs to be carried out in accordance with CIRIA publication C735:2014.

Early engagement with a suitably qualified and experienced consultant, preferably during the project design stage, is paramount to achieve this verification process. It will be necessary for a Ground Gas Protection System Verification Plan to be prepared to detail the verification methodology. To satisfactorily Validate the ground gas protection system installation, the 'Verification Plan' methodology is to be followed as prescribed and documented in a Validation Report.

Verification of the gas protection system installation is to be carried out by Terra Firma, or a similarly experienced, qualified, trained, and independent verifier. Documents demonstrating the above shall be included in the Validation Report.

Validation of installed ground gas protection systems by an independent third party will be required upon completion of the development. Validation may only be achieved if processes prescribed in the Verification Plan are undertaken.

SECTION 6 Working Practices

6.1 Protection of Construction Workers

In order that construction workers are protected during site works across the site the following should be adhered to:

1. Compliance with health and safety regulations
2. Provision of Method Statements and Risk Assessments
3. Compliance with Control of Substances Hazardous to Health (COSHH) Assessment
4. Good level of Personal Protection Equipment (PPE)
5. Good level of hygiene by site workers
6. Dust suppression measures
7. Emergency contingencies should be defined prior to commencement of site works

Further guidance for the safe working on contaminated site is presented in CIRIA Report 132:1996.

6.2 Protection of the Environment

During the remediation and construction periods, there is a risk to the environment and adjacent sites from de-watering, excavations, moving contaminated soil, drainage misconnections, discharges of perched groundwater to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washing and oil or chemical spills.

A drainage plan should be devised, identifying manholes to prevent pollutants accidentally reaching surface water sewers. Temporary drainage measures may need to be put in place.

In addition, the following precautions should also be taken.

- All potential chemicals and associated risks and emergency procedures for spills/leaks should be considered in the site risk assessment and the details provided to all site employees.
- Any potential pollutant materials or chemicals/detergents used on site should be adequately stored in suitable containers, with clear labelling.
- Any oil or hazardous substance containers and associated pipe works should be enclosed within a bund.
- Care taken during delivery of materials, with correct supervision and labelling detailing the substance and its quantities.
- All delivery drivers should be informed of procedures and restrictions.
- Any materials on delivery should be covered to ensure there is no spillage.
- Any detergents, paints, chemicals etc should not be allowed to be discharged into surface drains or water courses.
- Washing out and cleaning of concrete/cement plant should be carried out in a contained area with adequate measures to collect all run-off water.
- Security and prevention of vandalism, especially of oil drums/containers.

6.3 Management & Disposal of Soils

During site works excavations of the made ground are anticipated.

All materials excavated should be managed and stored appropriately in a controlled manner to ensure protection of site construction workers and neighbouring site users, and to prevent the transfer of contamination to other areas of the site.

If possible, and if levels allow, and excavated made ground should be retained on site and relocated beneath areas of hardstanding. This would provide the most sustainable approach and avoid landfill and haulage fees, disruption and aggravation of local residents caused by haulage lorries, and would avoid unnecessary CO₂ emissions.

Any movement and transfer of materials on site should be documented in materials management plan, in accordance with 'CL:AIRE Definition of Waste: Development Industry Code of Practice (DoW CoP)'.

Alternatively, excavated made ground may be disposed of at landfill. Prior to disposal classification of the material will need to be completed in accordance with Environment Agency protocol detailed in 'Technical Guidance WM3 – Waste Classification - Guidance on the Classification and Assessment of Waste'.

A contaminated land specialist should supervise and document any earthworks on site.

Waste transfer and disposal must be undertaken by an authorised person. A waste transfer note must accompany each load and records should be maintained for inspection if required

6.4 Groundwater Disposal

Groundwater resulting from dewatering on site does not require offsite disposal and unless it is contaminated can be discharged onto areas of grassland or into sumps and allowed to soak into the ground.

**ANNEX A
Documents**

DRAWINGS



NOTES:



DRAWING STATUS

Planning

PROJECT

New Build Dwelling, 5 Park Row,
Cwmavon

TITLE

Concept Sketch

CLIENT

Delyth Rees

DRAWN BY
Gareth Owen

DATE
16.04.21

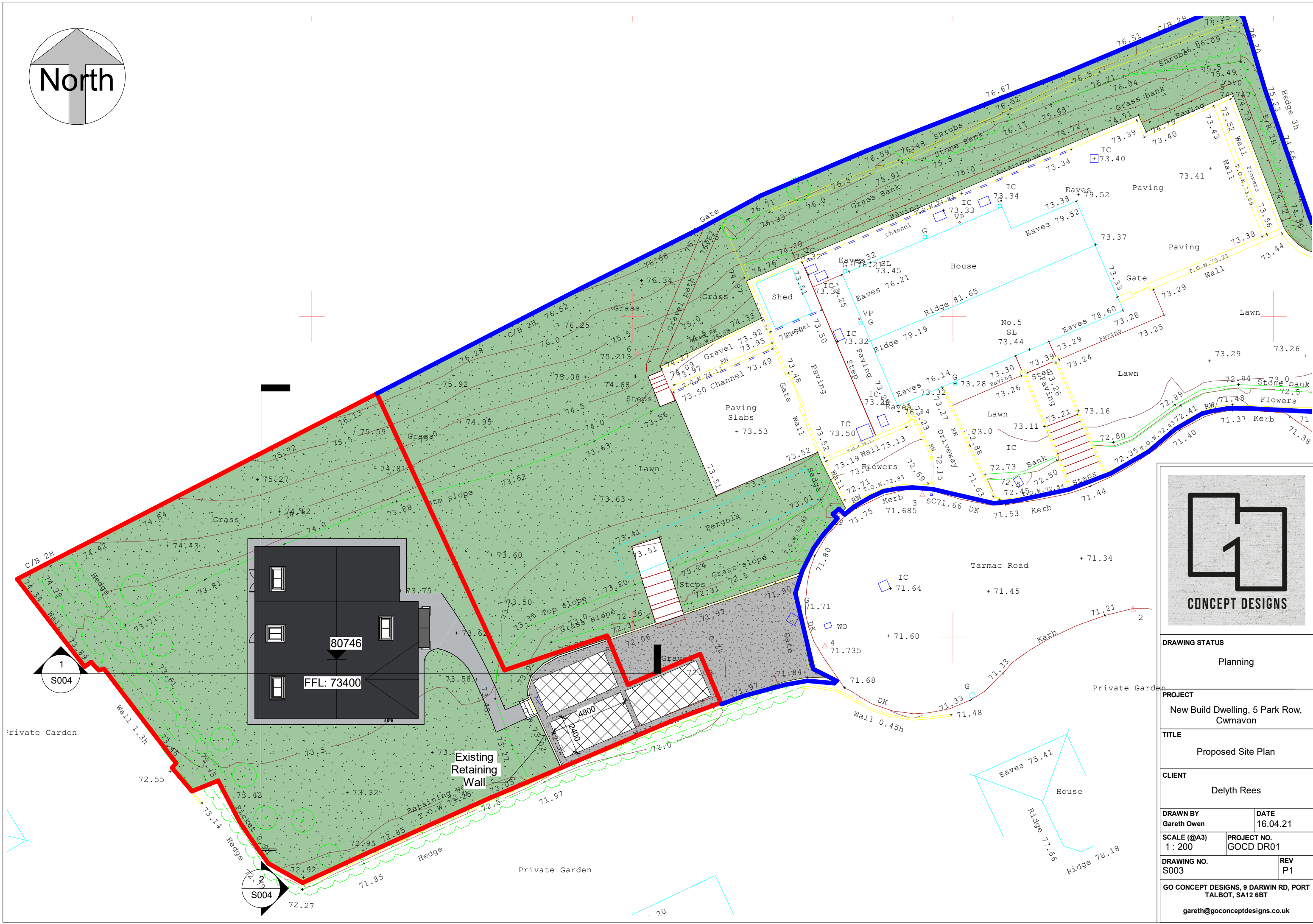
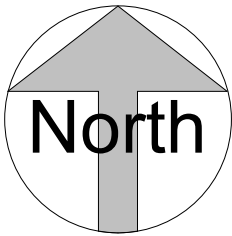
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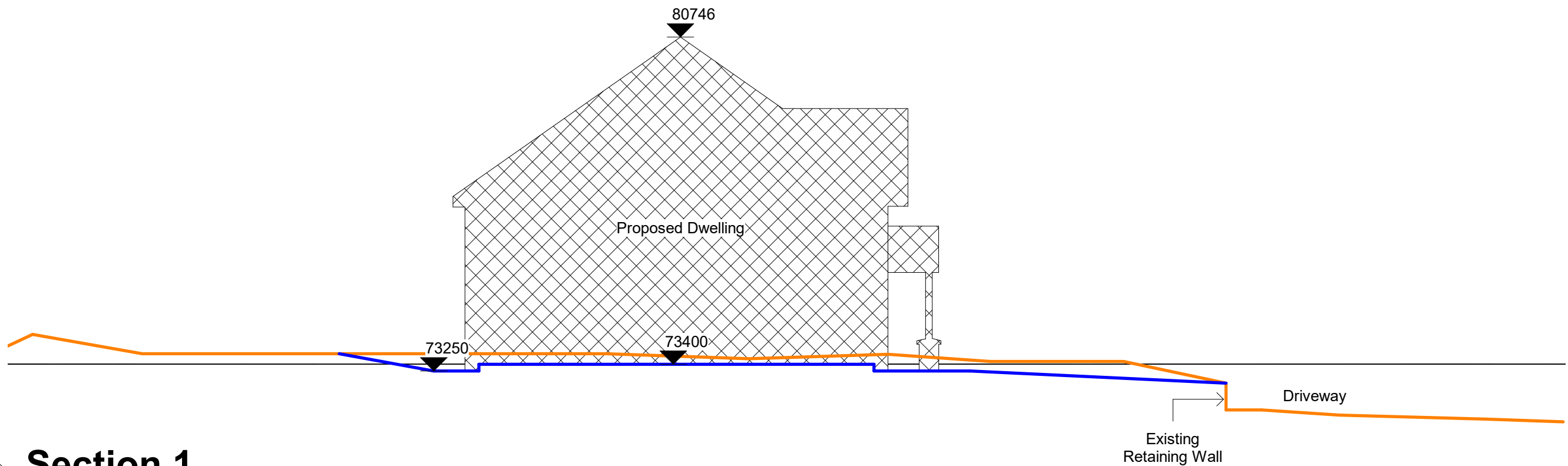
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P1

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gareth@goconceptdesigns.co.uk adriana@goconceptdesigns.co.uk



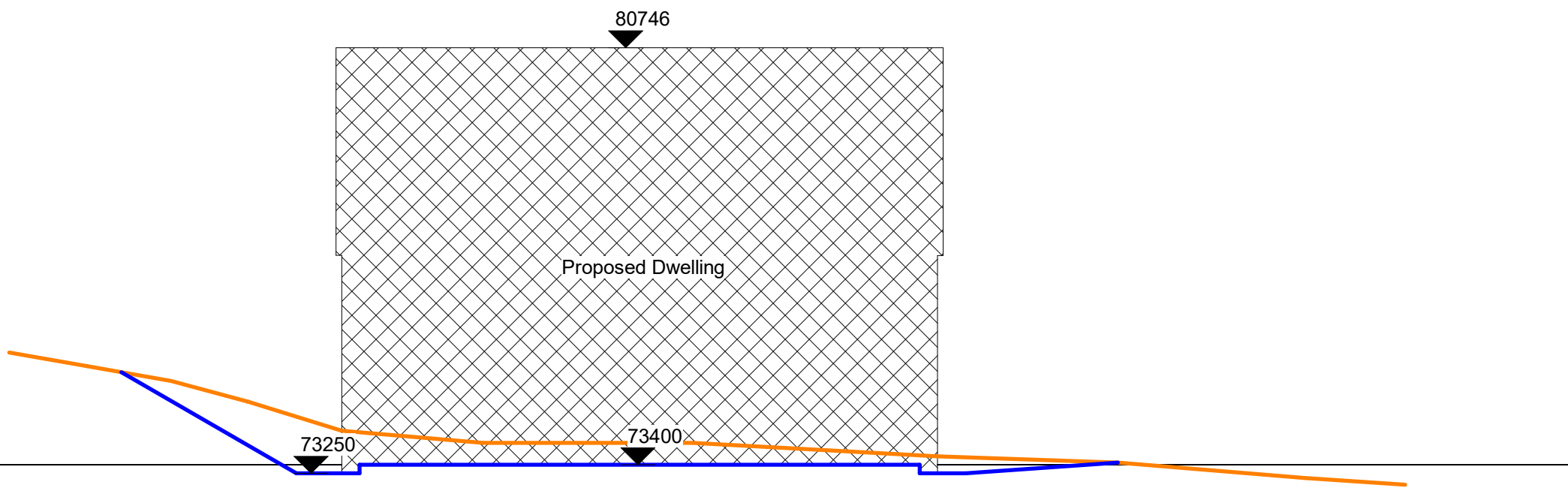
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PROJECT	
New Build Dwelling, 5 Park Row, Cwmavon	
TITLE	
Proposed Site Plan	
CLIENT	
Delyth Rees	
DRAWN BY	DATE
Gareth Owen	16.04.21
SCALE (@A3)	PROJECT NO.
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DRAWING NO.	REV
S003	P1
GO CONCEPT DESIGNS, 9 DARWIN RD, PORT TALBOT, SA12 6BT	
gareth@goconceptdesigns.co.uk	



1

Section 1

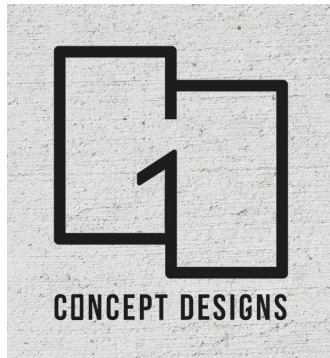
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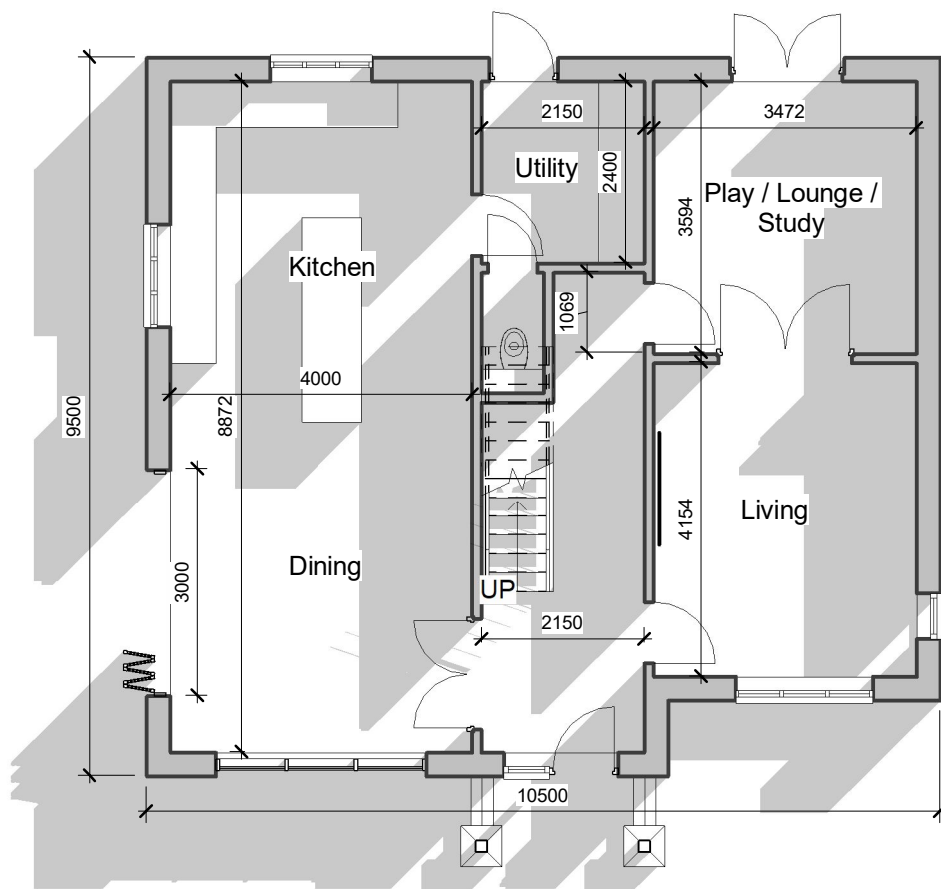
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Section 2

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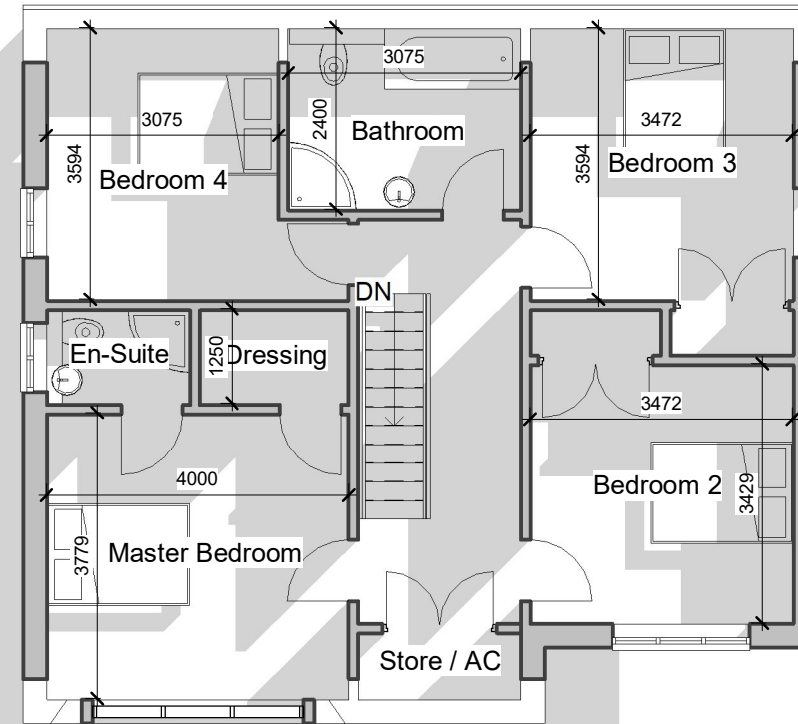
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PROJECT	
New Build Dwelling, 5 Park Row, Cwmavon	
TITLE	
Site Sections	
CLIENT	
Delyth Rees	
DRAWN BY	DATE
Gareth Owen	16.04.21
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DRAWING NO.	REV
S004	P1
GO CONCEPT DESIGNS, 9 DARWIN RD, PORT TALBOT, SA12 6BT	
gareth@goconceptdesigns.co.uk	



1

Proposed Ground Floor

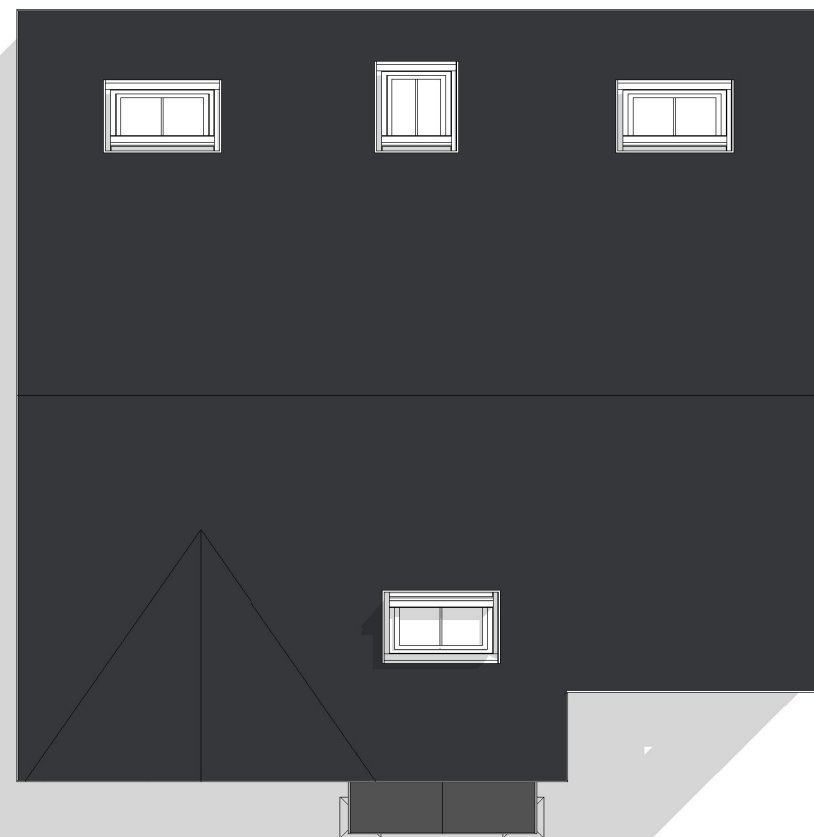
1 : 100



2

Proposed First Floor

1 : 100



3

Proposed Roof

1 : 100

NOTES:



DRAWING STATUS

Planning

PROJECT

New Build Dwelling, 5 Park Row,
Cwmavon

TITLE

Proposed Floor Plans

CLIENT

Delyth Rees

DRAWN BY

Gareth Owen

DATE

16.04.21

SCALE (@A3)

1 : 100

PROJECT NO.

GOCD DR01

DRAWING NO.

B001

REV

P1

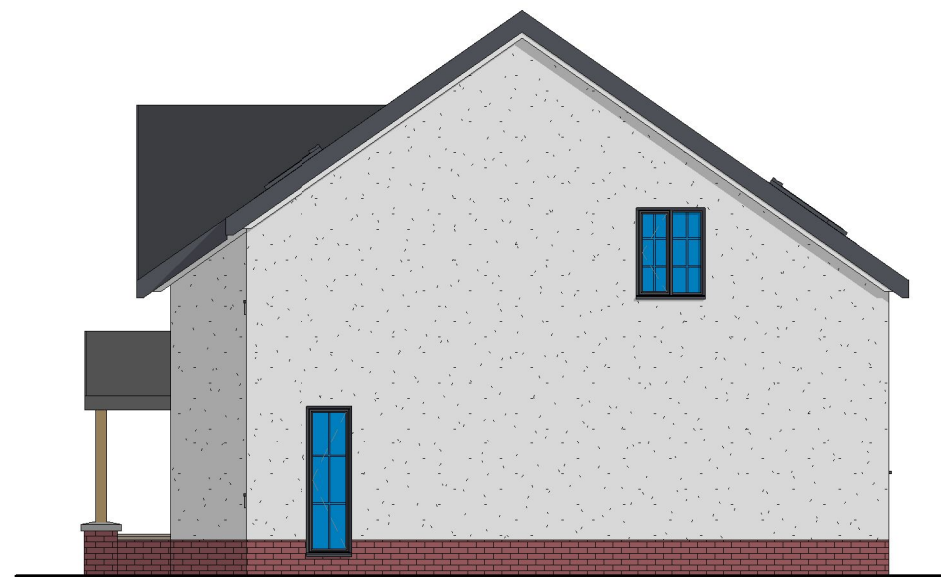
GO CONCEPT DESIGNS LTD, 9 DARWIN RD, PORT TALBOT, SA12 6BT
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1 Proposed Front
1 : 100



2 Proposed Rear
1 : 100



3 Proposed Right
1 : 100



4 Proposed Left
1 : 100

NOTES:



DRAWING STATUS

Planning

PROJECT

New Build Dwelling, 5 Park Row,
Cwmavon

TITLE

Proposed Elevations

CLIENT

Delyth Rees

DRAWN BY

Gareth Owen

DATE

16.04.21

SCALE (@A3)

1 : 100

PROJECT NO.

GOCD DR01

DRAWING NO.

B002

REV

P1

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