



Safe Gas Cylinders Site, Fabian Way, Swansea

Flood Consequences Assessment

July 2022

Tulip Engineering Consultancy Limited

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Client Name: Safe Gas Cylinders Ltd.
Document Reference: FCA/01
Project Number: J091

Issue	Date	Author	Comments
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1. Introduction

1.1 Terms of Reference

Tulip Engineering Consultancy was commissioned by Safe Gas Cylinders Ltd to prepare this Flood Consequences Assessment (FCA) to support a planning application for a proposed workshop at the Safe Gas Cylinders site at Fabian Way, Swansea.

The proposal is classed as “less vulnerable” development in Technical Advice Note (TAN) 15 Development & Flood Risk (Welsh Assembly Government, 2004).

An updated TAN15 and accompanying new Flood Map for Planning (FMP) was published in October 2021 and was due to come into force in December 2021, but is now suspended until June 2023. In the interim, the original 2004 TAN15 and Development Advice Map (DAM) continue to direct the development process in relation to planning & flood risk, with the important proviso that the FMP should be considered as the best available information.

The proposed workshop footprint lies in Zone A but close to Zone C2 of the Development Advice Map (DAM) published by Natural Resources Wales (NRW). Zone A is described as “areas considered to be at little or no risk of fluvial or coastal/tidal flooding”. Zone C2 is described as “areas of the flood plain without significant flood defence infrastructure”. The DAM Map does not account for predicted sea level rise due to climate change.

The proposed workshop footprint lies in Zone 3 of the Flood Map for Planning (FMP) also published by NRW. Zone 3 is described as ‘areas with more than 0.5% (1 in 200) chance of flooding from the sea in a given year, including the effects of climate change’.

TAN15 (both 2004 and 2021 versions) requires flood risk to be considered over the lifetime of the development, i.e. climate changes effects need to be considered, and as such the FMP is considered the more relevant reference map for the purposes of this assessment.

The objective of this report is to undertake a study into the hydrological issues affecting the site, and to establish whether and to what extent the flood risk can be managed over the lifetime of the development, using the principles and tests set out in TAN 15.



2. Site Description

2.1 Location

The Safe Gas Cylinders site occupies approximately 6 acres of land and several buildings that were formerly part of the Ford Motor Factory site on Fabian Way in Swansea.

The site forms part of a long-established industrial corridor which was originally the location of the heavy-industry works and associated railways & sidings which rose out of Crymlyn Burrows in the late nineteenth and early twentieth centuries.

The site is accessed from the Fabian Way (A483) dual carriageway which runs east-west some 270m south of the site area. The Ffordd Amazon link road forms the northern boundary of the Safe Gas Cylinders site.

The National Grid Reference for the proposed shed footprint on the site is 270450 193380.

A site location plan is shown in Figure 1.



Figure 1: Site Location

Ordnance Survey Data © Crown Copyright and Database Right 2022

An aerial view of the site is shown in Figure 2.



Figure 2: Aerial View showing proposed Shed footprint

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2.2 Watercourses & Hydrological Environment

The site lies some 700m north of Swansea Bay in the tidally influenced coastal environment.

The disused Port Tennant Canal lies some 250m north of the site. Immediately north of the site are Ffordd Amazon highway drainage ditches.

2.3 Topography

A topographical survey of the Safe Gas Cylinders site undertaken in September 2020 is included in Appendix A. A plan showing contoured ground levels and the proposed workshop outline is also included in Appendix A.

These plans show existing ground levels across the relatively flat site area range between approximately 6.9-7.4m AOD.



2.4 Soils, Geology & Hydrogeology

Local soils are described as floodplain soils, loamy and clayey in texture with naturally high groundwater according to the Cranfield University Soilscales Viewer.

The geology at the site is described as blown sand overlying mudstone, siltstone and sandstone bedrock (South Wales Middle Coal Measures Formation) according to the BGS Geology of Britain Viewer.

The aquifer designation of the sedimentary bedrock is Secondary B (lower permeability layers that may store and yield limited amounts of groundwater). The site is not in a groundwater Source Protection Zone area.



3. Proposed Development

The land is currently used to store gas cylinders and for pressure drum inspection and testing activities.

The development proposal is construction of a new permanent single storey portal frame workshop to store cylinders undercover and to facilitate the expansion of operations on site.

The proposed building footprint measures 48m x 20m and is located on ground comprising part of an existing concrete slab, and part gravel/hardcore (unbound stone).

No new access roads, paths, landscaping or other external works are proposed as part of the new workshop application, with the exception of the suds drainage required to drain the shed roof.

The existing ground level across the proposed building outline ranges between 7.25m at the southern end, dropping to 6.77m at the lowest point (centrally), rising to 7.00m at the northern end of the footprint.

Architectural plans and elevations of the proposed workshop are included in Appendix B.



4. Planning Policy and Flood Risk

4.1 Proposed Development and TAN 15

The Development Advice Map (DAM) is a flood map published by NRW for land use planning purposes. It is used alongside Planning Policy Wales and Technical Advice Note (TAN) 15 to direct new development in respect to flood risk. Together, they form a precautionary framework to guide planning applications.

The DAM map is based on Natural Resource Wales' extreme flood outlines (zone C) and the British Geological Survey drift data (zone B). Zone B data was originally published 2004 and updated in 2017. Zone C data is revised quarterly by ongoing hydraulic modelling and represents areas affected by flooding in events with up to a 1 in 1000 annual chance of occurring (0.1% Annual Event Probability), but no allowance for future climate change.

The Development Advice Map in the vicinity of the proposed development is shown in Figure 3 below.

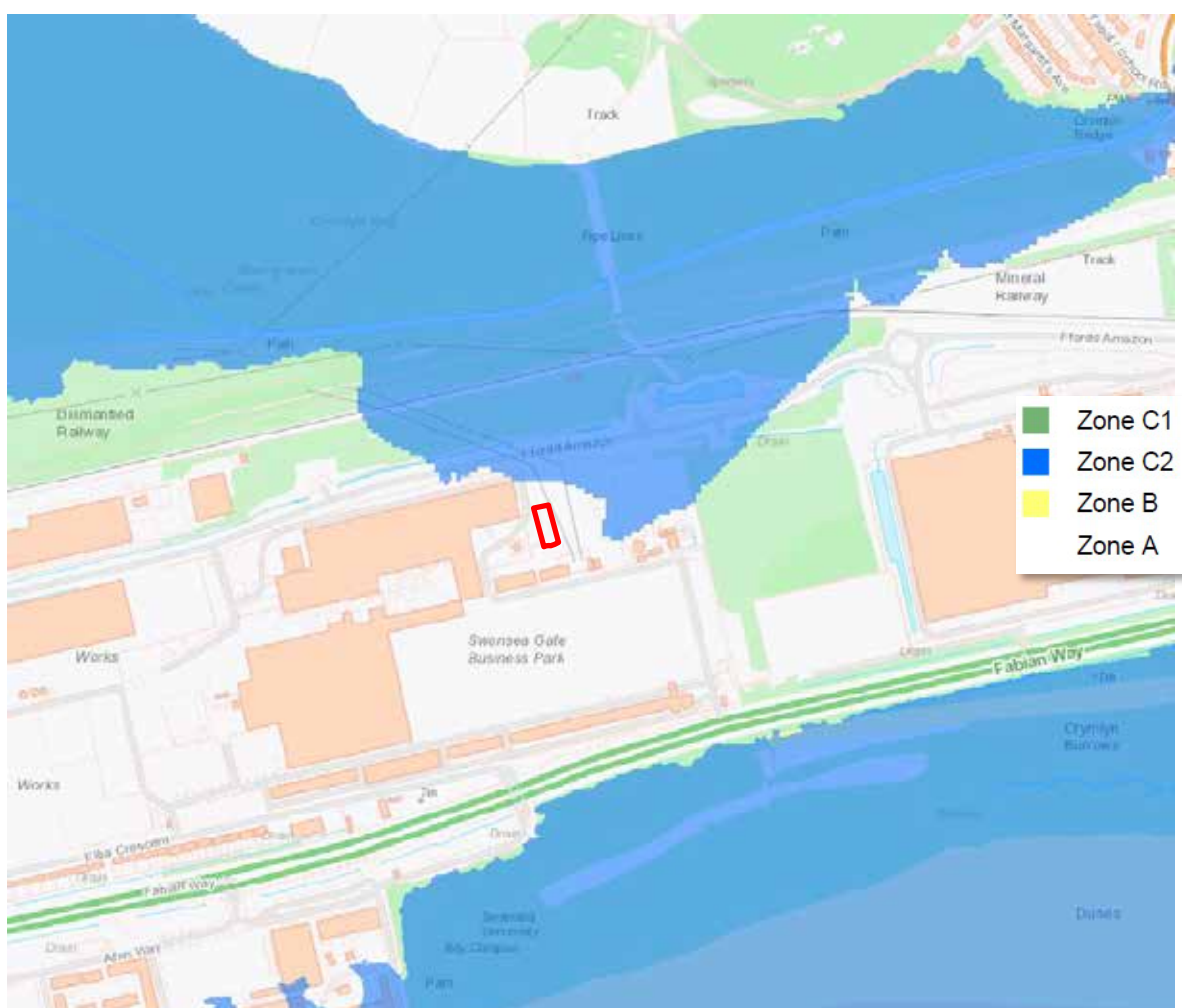


Figure 3: Development Advice Map

© 2022 NRW



The DAM Map shows that the application site lies in zone A (outside the floodplain) but close to zone C2 (areas of the floodplain without significant flood defence infrastructure).

An update to TAN15 and a new Flood Map for Planning (FMP) to replace the DAM was released in October 2021 and was due to come in force on 1st December 2021.

Welsh Government has since suspended the implementation of the new TAN15 & FMP until 1st June 2023. Although the new TAN15 & FMP are not material considerations, Welsh Government and NRW advise that for applications in the interim period (December 2021 to June 2023), due regard is given to the Flood Map for Planning as best available information.

The Flood Map for Planning in the vicinity of the proposed development is shown in Appendix C and in Figure 4 below:



Figure 4: Flood Map for Planning

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The FMP shows that the application site lies in Flood Zone 3, that is areas with more than 0.5% (1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.



This map also shows that flooding from surface water and small watercourses could affect the building footprint area.

4.2 Justification Test

TAN15 Section 6 acknowledges that much urban development in Wales has taken place alongside rivers and in the coastal plain and it is therefore inevitable that some existing development, as in the vicinity of this site, is vulnerable to flooding and falls within Zone C.

TAN15 Section 6 further states that new development should be directed away from Zone C and towards Zone A or otherwise to Zone B.

In this case, the proposed development site lies within Zone A of the current DAM Map and as such a justification test by the planning authority is not required.

It is nevertheless considered that the justification criteria could be achievable at this site since

- The proposed development will assist with the relevant LDP policies and contribute to employment objectives in Swansea
- The proposed site is on previously developed land (not greenfield) and concurs with PPW (presumption in favour of sustainable development)
- This FCA report has been undertaken to demonstrate the acceptability of the proposed development.



5. Flood Risk Review

5.1 Fluvial / Tidal Flood Risk

The FMP indicates that the primary flooding mechanism at the application site location is flooding from the sea (no river/fluviial flooding affecting the site).

The latest national Design Sea Levels dataset (EA Coastal Flood Boundary Conditions, base year 2017) has been used to inform this FCA, using the closest offshore tidal node (ch.482).

In terms of annual increments due to climate change, for the purposes of this FCA the present-day year is 2022 and the future climate-change year to be assessed is 2097, assuming Welsh Government's guide development lifetime of 75yrs for non-residential development.

Using the latest UKCP18 User Interface sea level annual increments for the Swansea Bay area, the resulting extreme sea level estimates are summarised in Table 1:

Flood Event	Still Tidal Flood Level (m AOD)				
	Base year 2017	Present Day 2022		Development Lifetime 2097	
		70 th percentile	95 th percentile	70 th percentile	95 th percentile
0.5% (T200)	6.37	6.48	6.50	6.95	7.15
0.1% (T1000)	6.67	6.78	6.80	7.25	7.45

Table 1: Tidal Flood Levels for TAN15-critical events

A Flood Depth Map illustrating how the site could be affected in the key TAN15-critical events is included in Appendix C of this report.

Development proposals are assessed against 70th percentile levels to inform design levels, and against 95th percentile levels to inform mitigation measures, access and egress routes and emergency evacuation plans.

It should be noted that this still-tide-projection estimation method is typically conservative in that it does not account for 'real world' hydraulic connectivity of areas to tidal water, which is influenced by distance from the coast and intervening natural landforms and buildings.

TAN15 Criteria

Flood-free Development Level

TAN15 guidelines (A1.14) require a flood-free development floor level in the 1 in 200 annual chance flood event (0.5% or T200), over the lifetime of the development.

A floor level set higher than 6.95m AOD would therefore comply with this criterion (70th percentile climate change projection). With due regard to tying into existing ground levels around the proposed building outline, a proposed workshop floor level of between 7.00m – 7.20m AOD would be appropriate, and compliant with TAN15.



Residual Risk

Beyond the 1 in 200 event, the proposed development could be expected to flood under extreme 1 in 1000 annual chance conditions (0.1% or T1000). In this scenario, the extreme flood level of 7.45m is relevant (95th percentile climate change projection). This would result in flooding of the workshop up to a depth 0.25m – 0.45m for a proposed workshop slab level of 7.00 – 7.20m. This is within the guideline tolerable limit of up to 1.0m depth of flooding suggested in A1.15 of TAN15.

Emergency Access / Egress

Emergency access/egress to/from the site needs to be considered in light of TAN15 (A1.15) recommendations.

Figure 5 shows the flat ground level profile along the access road from the Fabian Way site entrance to the proposed workshop (taken from latest publicly available LIDAR data).

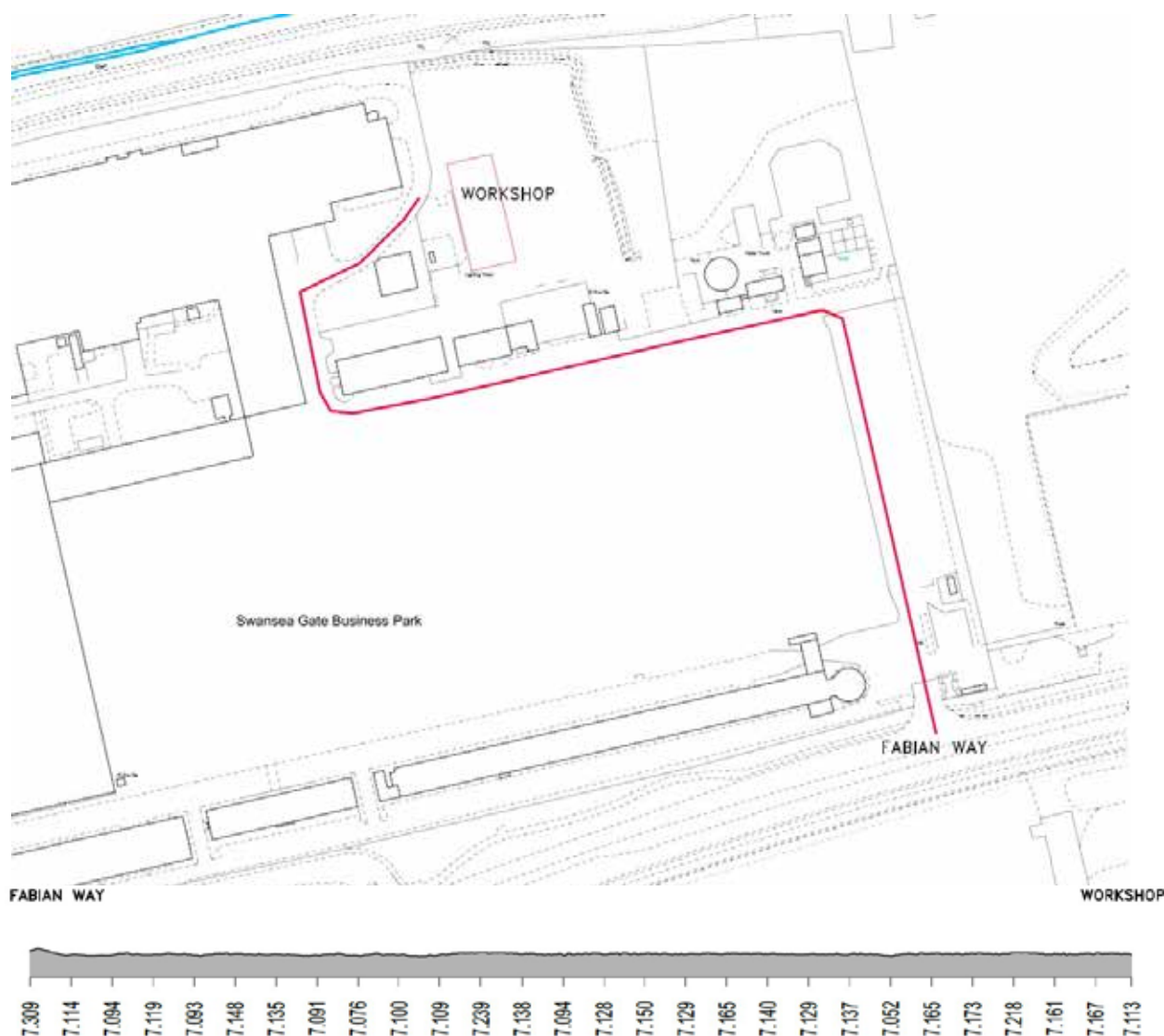


Figure 5: Ground Levels along Access / Egress Route



Floodwater depth along this route would therefore range between 0.14m – 0.40m in an extreme T1000CC flood event (7.45m flood level).

This is again within the guideline tolerable limit of up to 0.6m depth of flooding for emergency services suggested in A1.15 of TAN15.

It should also be noted that the onset of tidal flooding is predictable days in advance, allowing the site operator time to close the site. Furthermore, the diurnal nature of tidal flooding means that the site would be affected for a relatively short period, during which time any site occupants could remain on site in accordance with a Flood Emergency Plan, until floodwaters receded.

No Flooding Elsewhere

With minimal ground level changes proposed to achieve the workshop slab level, a minimal amount of floodwater would be displaced by the presence of the proposed building.

However this small displaced volume is entirely negligible in terms of exacerbating flood levels elsewhere in this coastal environment.

5.2 Flood Risk from Surface Water and Ordinary Watercourses

The Flood Map for Planning indicates that the workshop is at risk of flooding from this source, due to the flat topography of the Safe Gas Cylinders yard area and a local low-point in the proposed workshop footprint area.

However, a workshop slab level slightly higher than the existing ground level is proposed, which will effectively remove the localised low-point and therefore mitigate against this flood risk source.

Furthermore, the proposed development will be served by a new sustainable drainage system requiring SAB approval. The drainage system will include measures to deal with any surface water flood risk.

5.3 Historical Flooding

There are no recorded incidents of historical flooding affecting the site according to NRW's map of historical flood outlines.



6. Conclusions & Recommendations

- The proposed development location is in Zone A but close to Zone C2 of the current Development Advice Map, which does not account for climate change.
- As such, a Justification Test by the LPA is not required, although the proposed development is considered to pass the justification criteria.
- The development is however in Zone 3 of the Flood Map for Planning, which does account for climate change.
- The development proposal of a new workshop building is classed as 'less vulnerable' development in the eyes of TAN15.
- A proposed workshop floor level slightly above existing ground level, at somewhere between 7.00m – 7.20m AOD would remain flood-free in the T200CC event (where peak flood level is 6.95m AOD).
- In the extreme T1000CC event, floodwater level at the workshop could be up to 7.45m AOD, i.e. a floodwater depth of 0.25m – 0.45m above workshop floor level. This is within the 1.0m guideline tolerable flood depth criteria in A1.15 of TAN15.
- Access / egress along the road between Fabian Way and the workshop is also within the guideline tolerable limit of up to 0.6m depth of flooding for emergency services suggested in A1.15 of TAN15.
- The predictable and diurnal nature of tidal flooding means that the site would be affected for a relatively short period, during which time any site occupants could remain on site in accordance with a Flood Emergency Plan, until floodwaters receded.
- The proposed development does not increase flood risk elsewhere in this coastal environment.
- The residual risk is considered manageable in this context, where the onset of flooding is predictable days in advance, allowing the site operator time to close the site.
- Flood resilience measures should be included in the design and construction including raised electrical points
- The developer should provide appropriate signage and prepare a Flood Emergency Plan to make all site occupiers aware of the risk of flooding and actions and/or evacuation procedures to be followed during an extreme event.
- The developer should sign up to NRW's Floodline Warnings Direct Service. This is a free service that provides flood warnings, giving time to prepare, direct by telephone, mobile, email, SMS text message and fax. The tidal flooding context means that the onset of flooding is predictable.

In the context of this less-vulnerable development proposal, the estimated flood levels, and with the above mitigation measures in places, it is considered that the risk and consequences of flooding can be managed to an acceptable degree, and that the application can proceed on the grounds of flood risk.



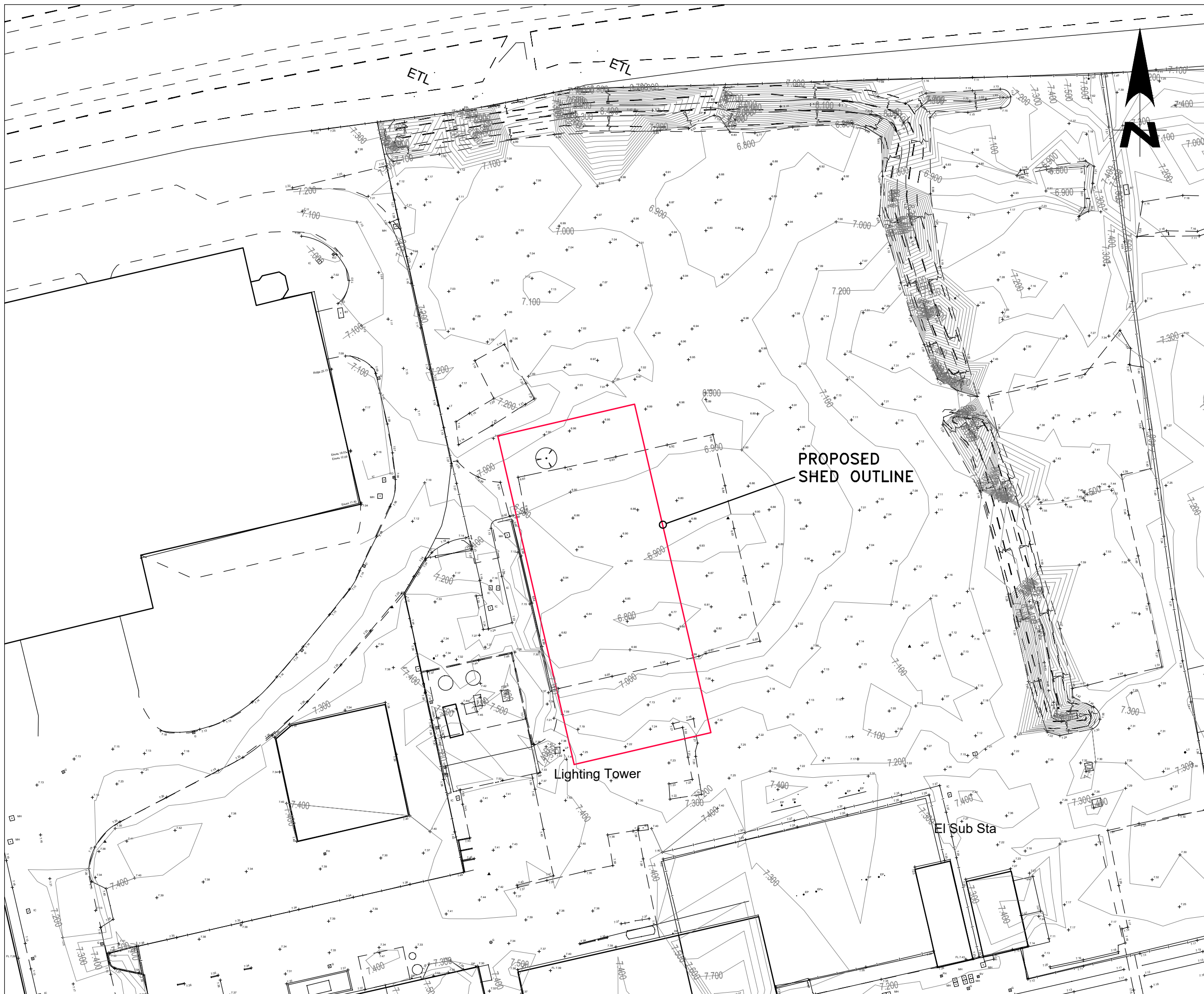
APPENDICES

A. Ground Levels: Topographical Survey, Ground Contour Plan including Building Outline

SURVEY BY
JOHN VINCENT SURVEYS LTD
NIBERIAN HOUSE
MONASTERY ROAD
NEATH ABBEY BUSINESS PARK
NEATH SA10 7DR

SAFE GAS CYLINDERS
SWANSEA
SITE SURVEY

SAFE GAS CYLINDERS
FABIAN WAY
SWANSEA
SA1 8QJ



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CLIENT: SAFE GAS CYLINDERS

PROJECT: NEW SHED

DRG TITLE: SITE GROUND LEVELS

DATE:
15.07.22

STATUS:
SAB

SCALE:
1:500

DRG No. J091/01

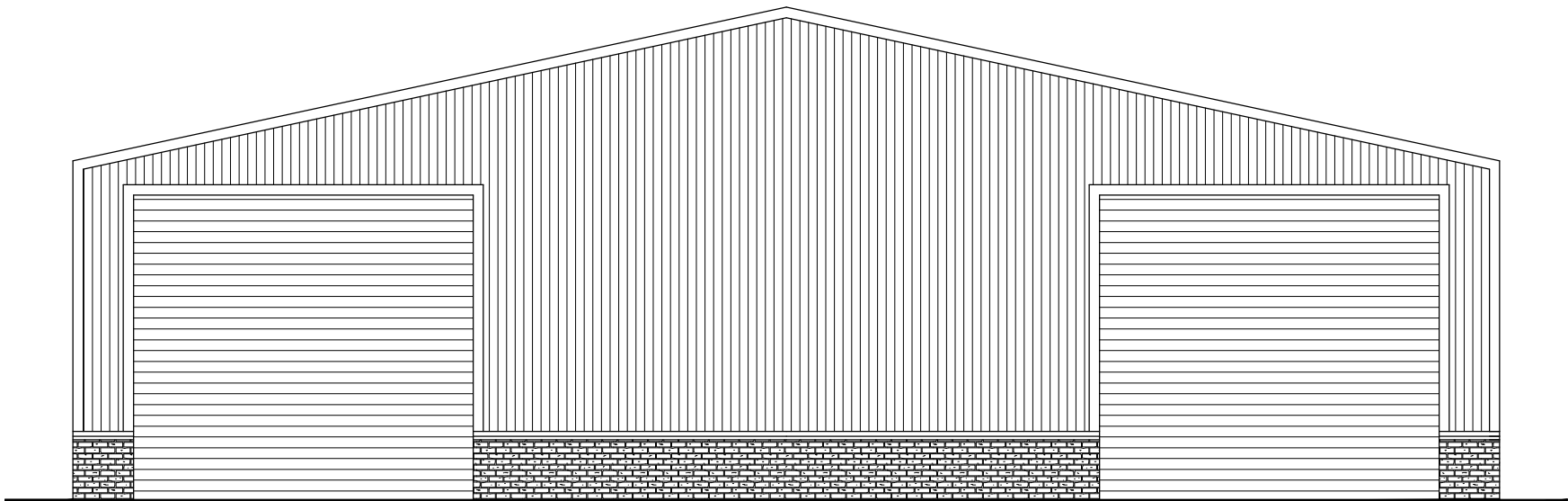
REV. -
A3



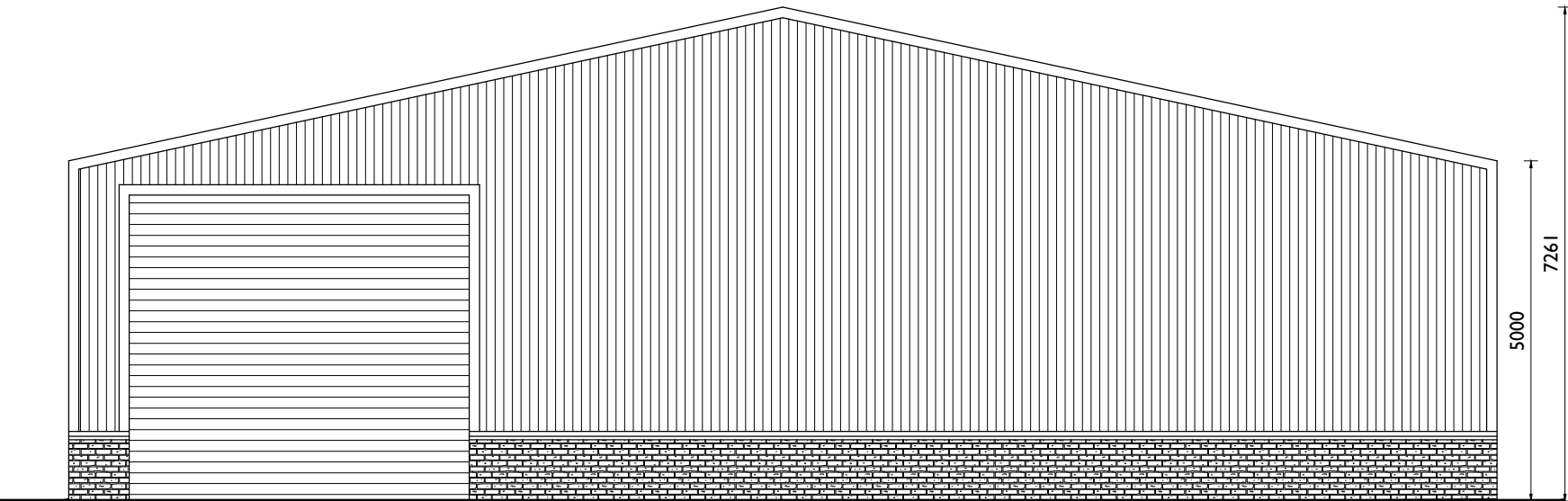
B. Scheme Drawings: Architect's Plans and Elevations

PROPOSED FLOOR PLANS & ELEVATIONS

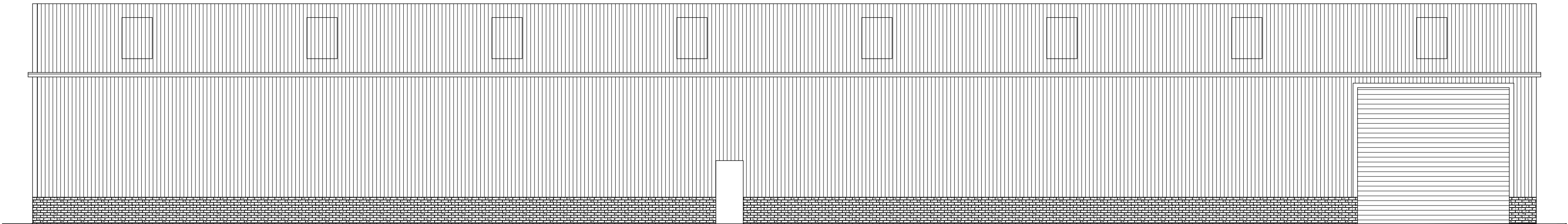
SAFE GAS CYLINDERS LTD, FABIAN WAY, SWANSEA, SAI 8QJ



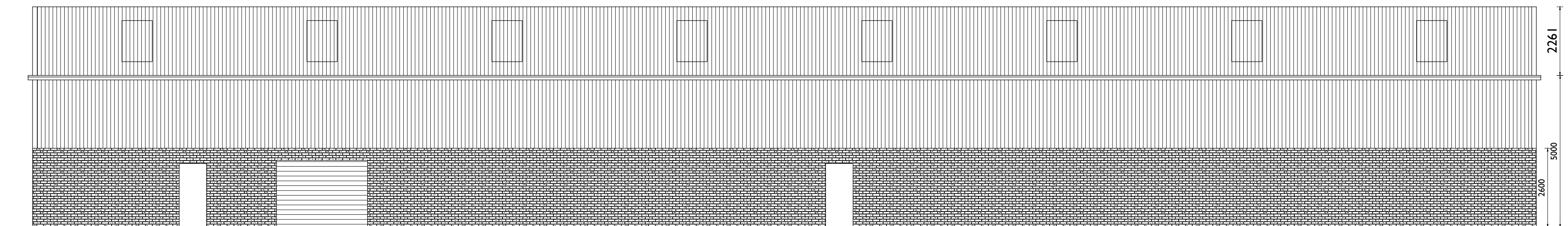
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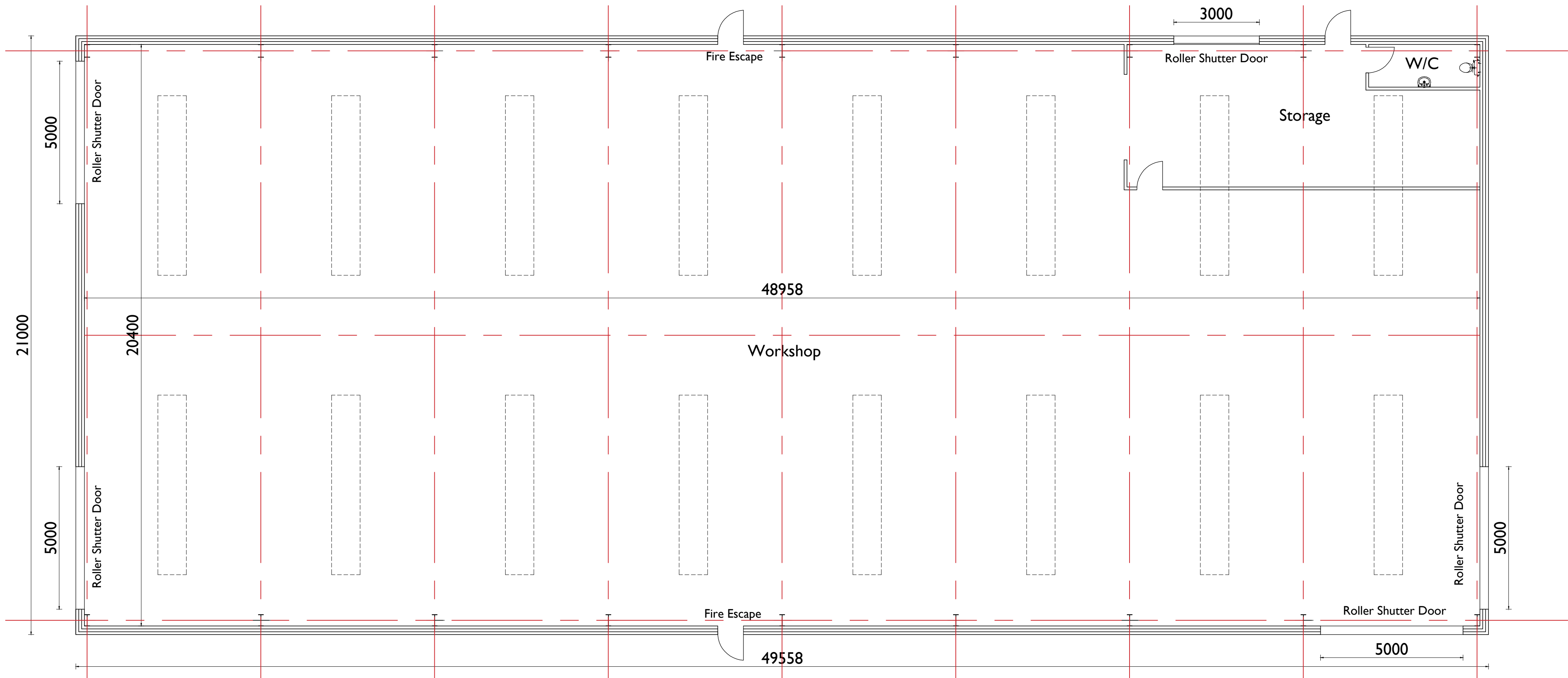
Rear Elevation 1:100



Side Elevation 1:100



Side Elevation 1:100



Ground Floor Plan 1:100

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Revision:	Description:	Date:

External Finishes

Walls - Istock Bristol Brown Facing
Brick, Insulated Box Profile Sheeting
Goose Wing Grey
Roof - Insulated Box Profile Sheeting
Goose Wing Grey
Windows - UPVC
RWG - UPVC

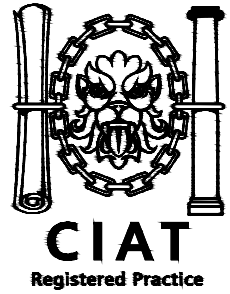
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Client:
Safe Gas Cylinders Ltd

Project Title:
The Proposal of a Workshop
and Wind Turbine at Safe Gas
Cylinders Ltd, Swansea

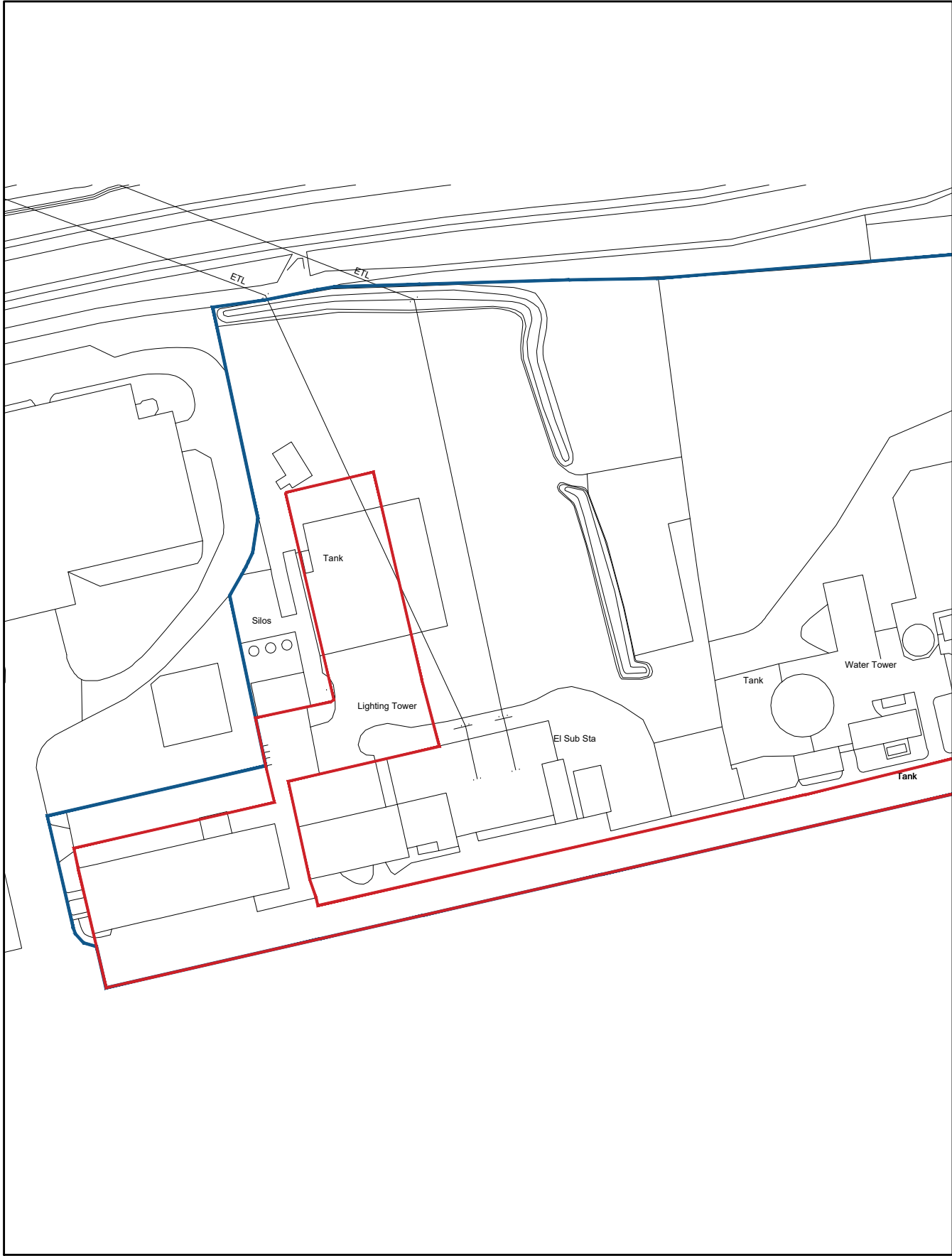
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Proposed Floor Plans &
Elevations

Scale:	Date:
1:100 @ A1	July 2021

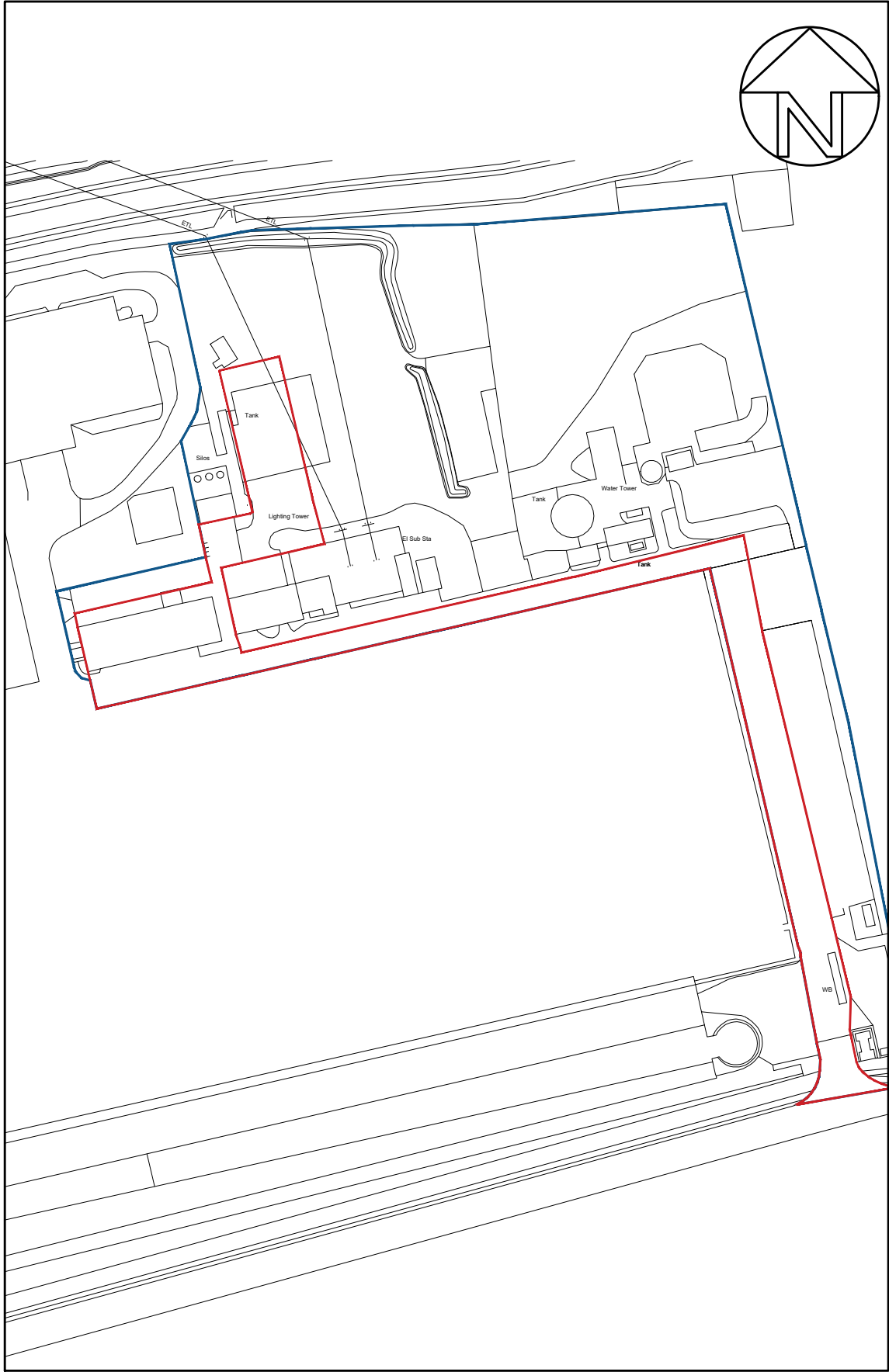
Job No:	Drawing No:	Rev:
902	01	-

SITE BLOCK PLAN & LOCATION PLAN

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Site Block Plan 1:1250



Site Location Plan 1:2000

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Revision:	Description:	Date:

- Application Site
- Land Owned by Applicant

Drawing Status:
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Client:
Safe Gas Cylinders Ltd

Project Title:
The Proposal of a Workshop
and Storage Facility at Safe Gas
Cylinders Ltd, Swansea

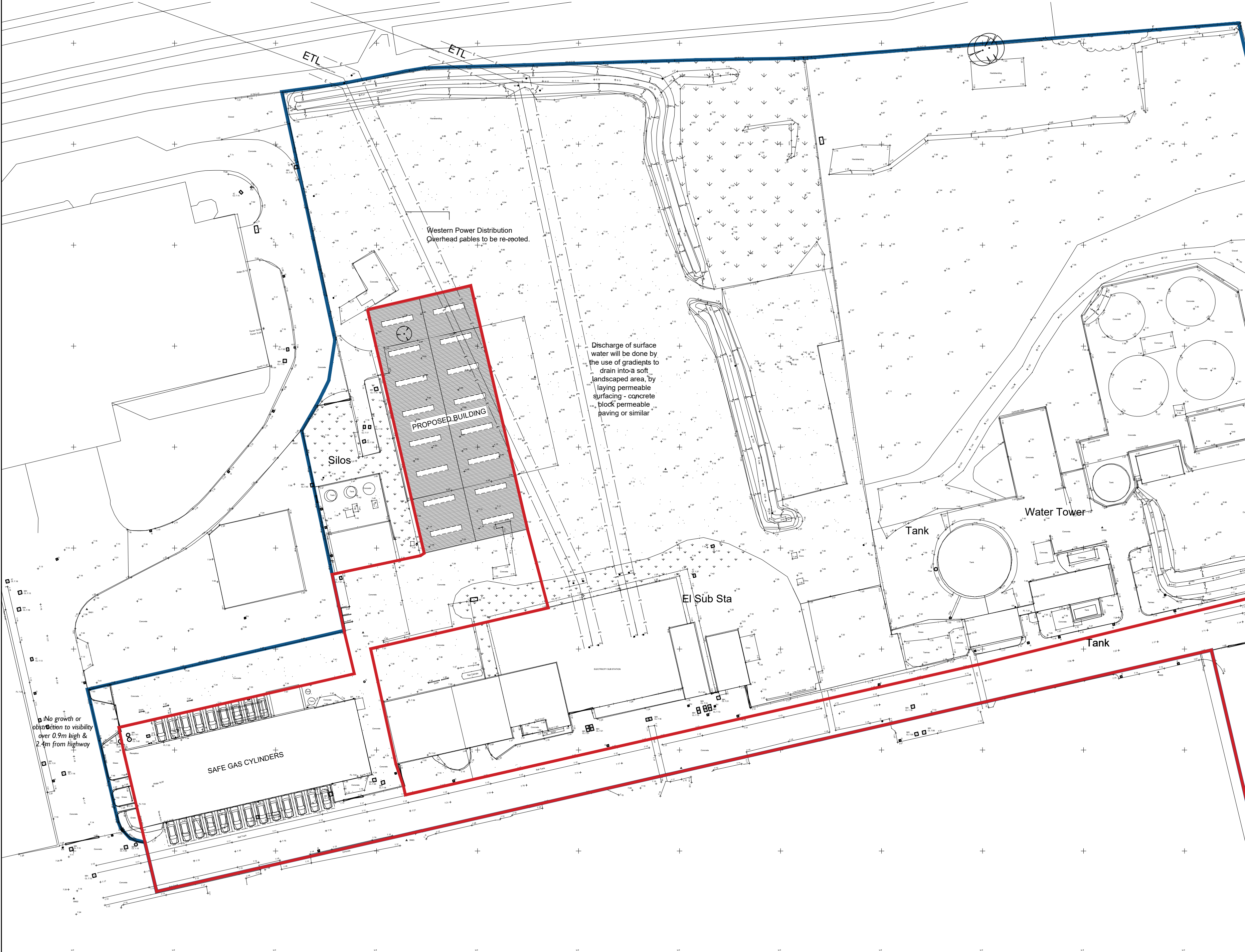
Drawing Title:
Site Block Plan & Location Plan

Scale:
1:1250&1:2000 @ A3
Date:
July 2021

Job No:	Drawing No:	Rev:
902	03	-

PROPOSED SITE PLAN WITH TOPO

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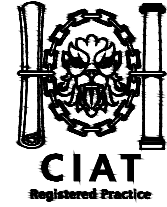
Revision:	Description:	Date:

- Application Site
- Land Owned by Applicant

Drawing Status:
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Client:
Safe Gas Cylinders Ltd

Project Title:
The Proposal of a Workshop and Wind Turbine at Safe Gas Cylinders Ltd, Swansea

Drawing Title:
Proposed Site Plan with Topographical Survey

Scale: 1:500 @ A2	Date: July 2021
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Job No: 902	Drawing No: 04	Rev: -
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Site Plan 1:500



C. Flood Maps: DAM, FMP, Flood Depths Map



Flood Map for Planning
Please enter title

Legend

Flood Defence Location
+ Flood Defences

TAN15 Defended Zones
TAN15 Defended Zones

	Rivers	Rivers
	Sea	Sea
	Rivers and Sea	Rivers and Sea

Rivers
Rivers

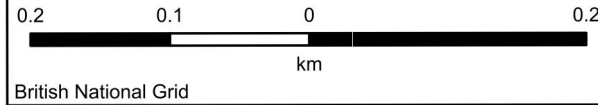
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	Flood Zone 2	Flood Zone 2

Sea
Sea

	Flood Zone 3	Flood Zone 3
	Flood Zone 2	Flood Zone 2

Surface Water and Small Watercourses
Surface Water and Small Watercourses

	Flood Zone 3	Flood Zone 3
	Flood Zone 2	Flood Zone 2

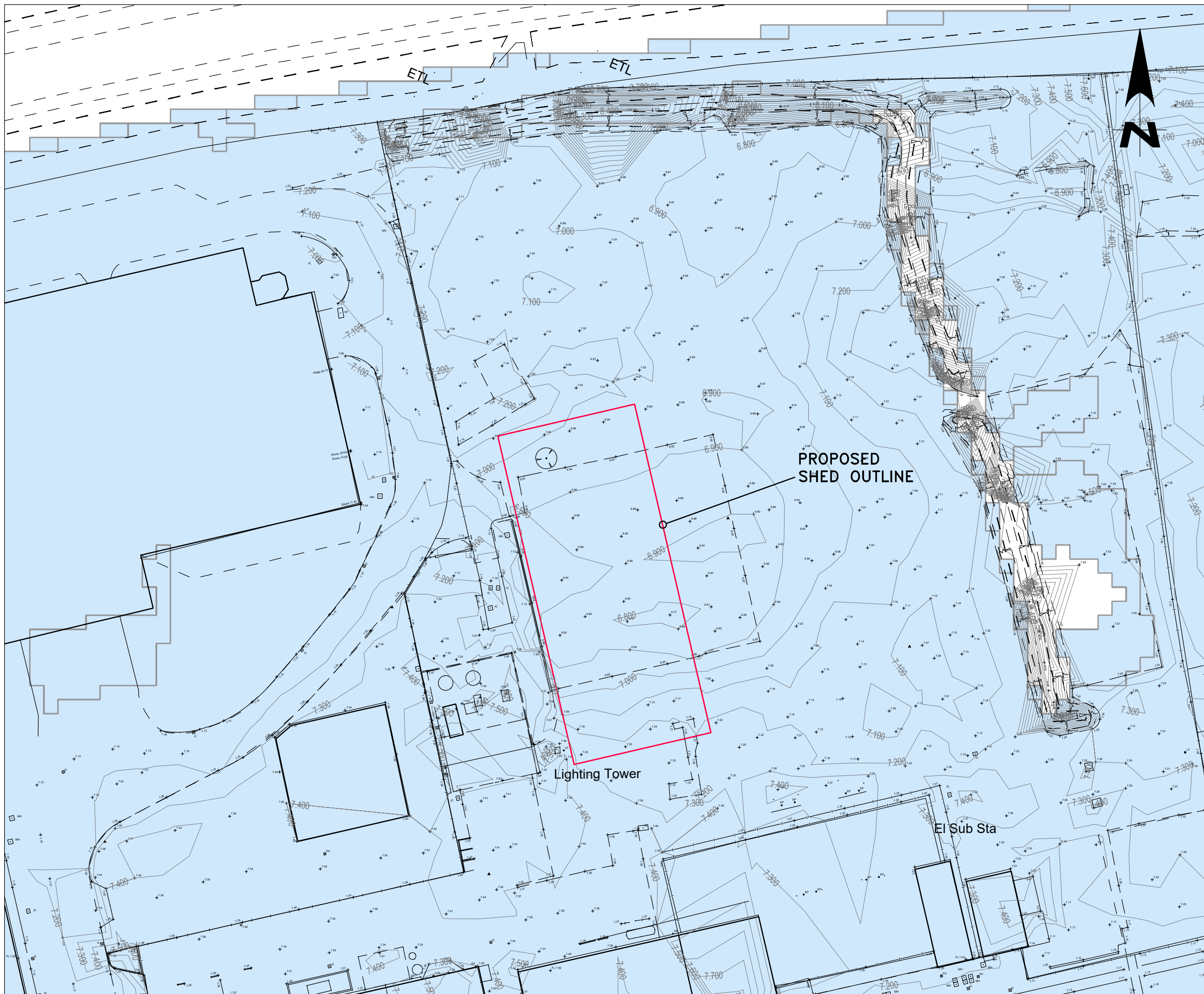


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w: www.tulipengineering.co.uk

CLIENT: SAFE GAS CYLINDERS

PROJECT: NEW SHED

DRG TITLE: **SITE SHOWING
FMP OVERLAY**

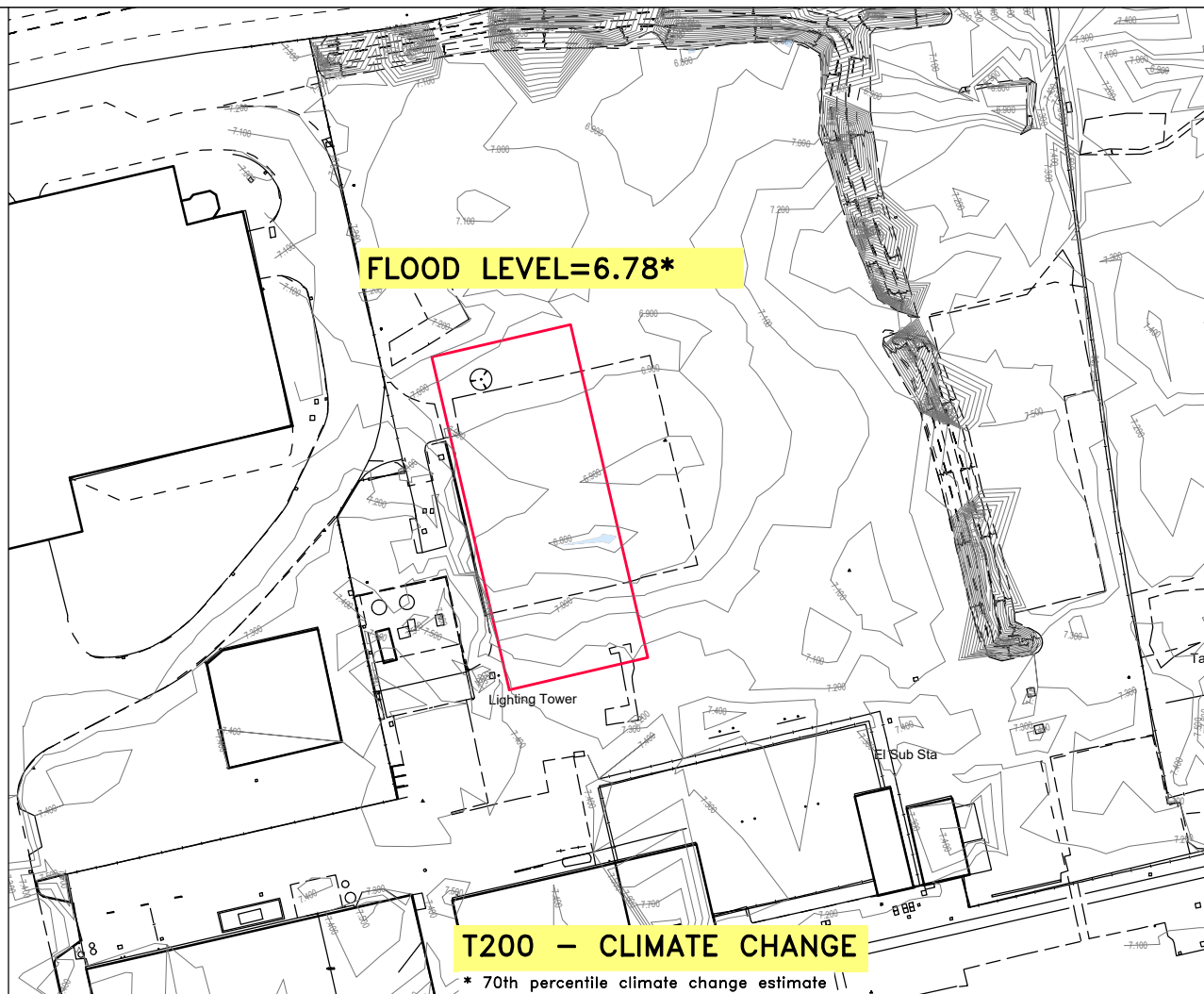
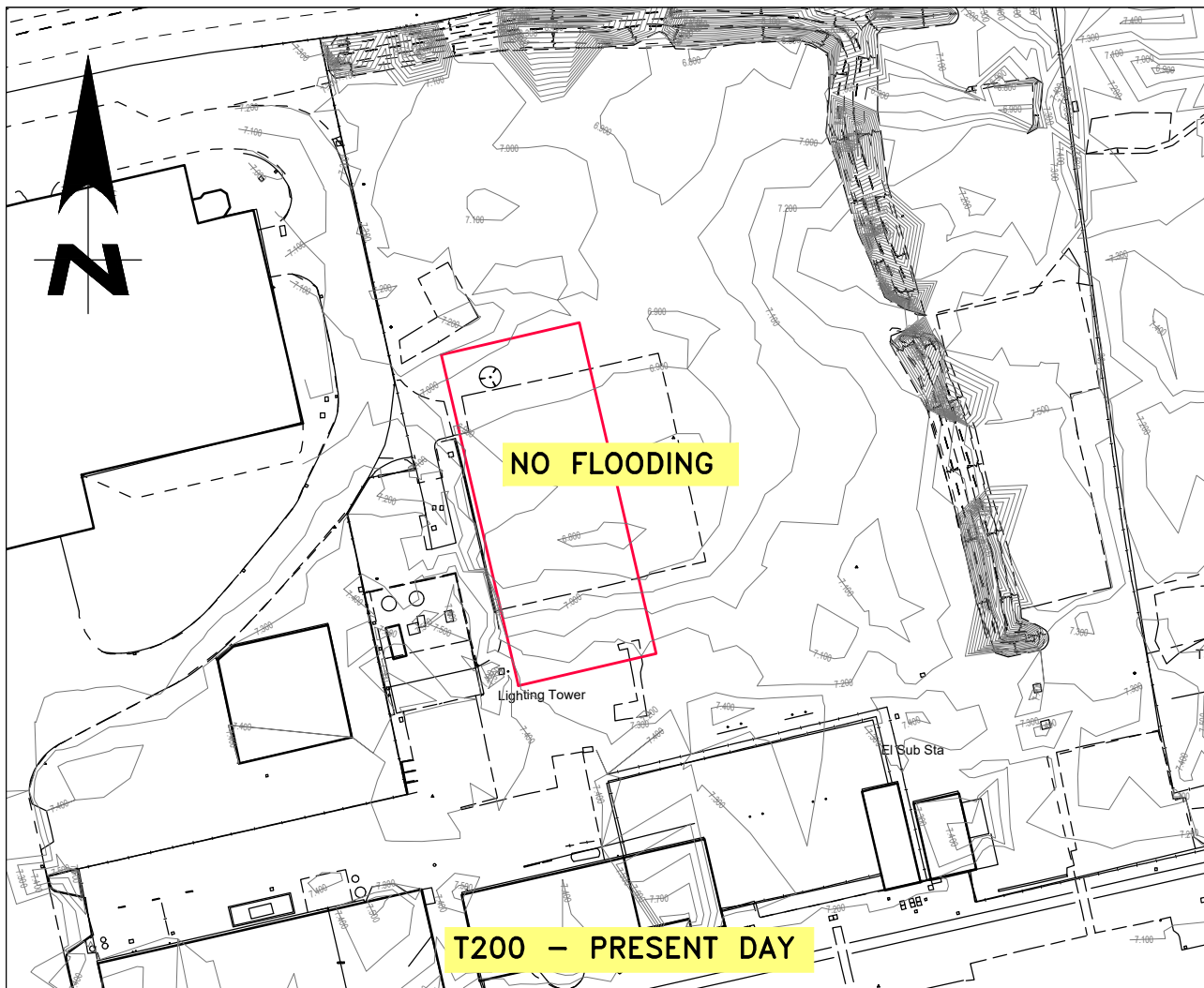
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STATUS:
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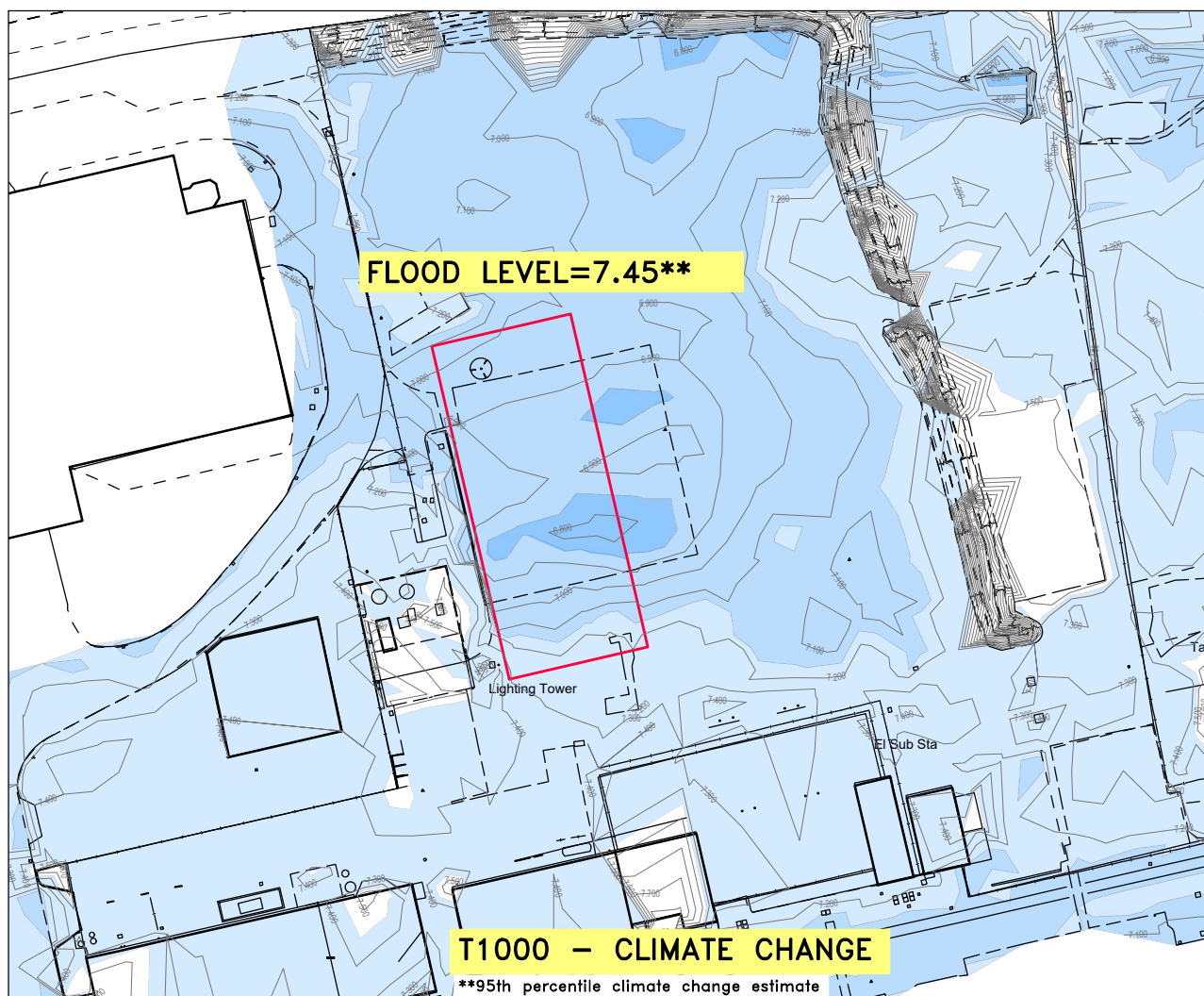
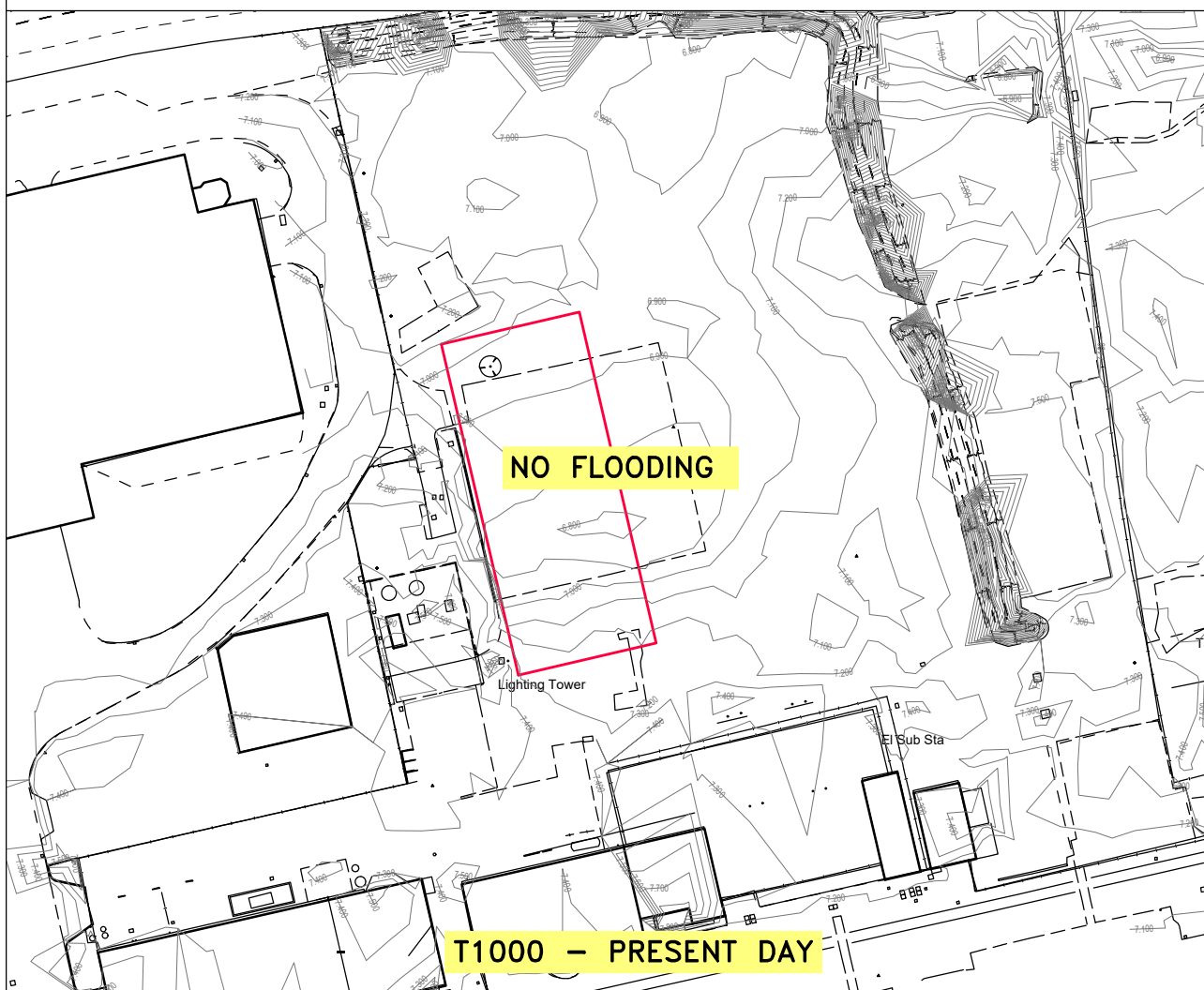
DRG No. **J091/02**

REV. - **A3**



FLOOD DEPTH:

- 0.0 – 0.3m
- 0.3 – 0.6m
- 0.6 – 0.9m



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CLIENT: SAFE GAS CYLINDERS

PROJECT: NEW SHED

DRG TITLE: FLOOD DEPTHS FOR CRITICAL EVENTS

DATE: 15.07.22 STATUS: SAB SCALE: 1:1000

DRG No. J091/03 REV. - SIZE: A3