



FOUL AND SURFACE WATER DRAINAGE STRATEGY

FOR
**PRIORY GRANGE NURSING HOME
KENELM ROAD, RHOS-ON-SEA
LL28 4EE**

ON BEHALF OF
**ROSEWOOD HEALTH CARE
LTD**

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Foul and Surface Water Drainage Strategy for Priory Grange Nursing Home, Rhos-on-Sea

2467/01r1

	Initial Issue 10th January 2025	Revision A	Revision B
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Contents

Table of Contents

1.0	Introduction.....	4
2.0	The Site	2
3.0	Sources of Flooding and Flood Risk	3
4.0	Proposed Drainage Strategy.....	7
5.0	Mitigation Measures	8
6.0	Sustainable drainage systems (Suds) and surface water quality	8
7.0	Conclusions.....	10

Appendices

Appendix A – Indicative Drainage Layout; Drawing 2467-01/SK01

1.0 INTRODUCTION

This Site-Specific Flood Risk Assessment has been prepared to accompany a planning application for the construction of a new residential nursing home on an existing brownfield site.

The assessment investigates the potential flood risk impacts of the proposed development in accordance with the national planning policy framework as set out in Planning Policy Wales.

This FRA is considered proportionate to the degree of flood risk and to the scale, nature and location of the development. This FRA has been prepared in accordance with Environment Agency Report SC030219 Rainfall Runoff Management for Developments, published October 2013, and takes into account the potential impacts of climate change over the lifetime of the development.

The report has been initially prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Associates. For the avoidance of any doubt, where ARP Associates enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Associates consent.

2.0 THE SITE

- 2.1 The site is located on Kenelm Road, in Rhos-on-sea.
- 2.2 The site is presently occupied by private residential dwellings together with the associated driveways and gardens.
- 2.3 The site is bounded by residential properties to the north, south and west, and Kenelm Road to the east.
- 2.4 The approximate grid reference of the site is E284165, N379815.
- 2.5 Figure 1 shows the site location.

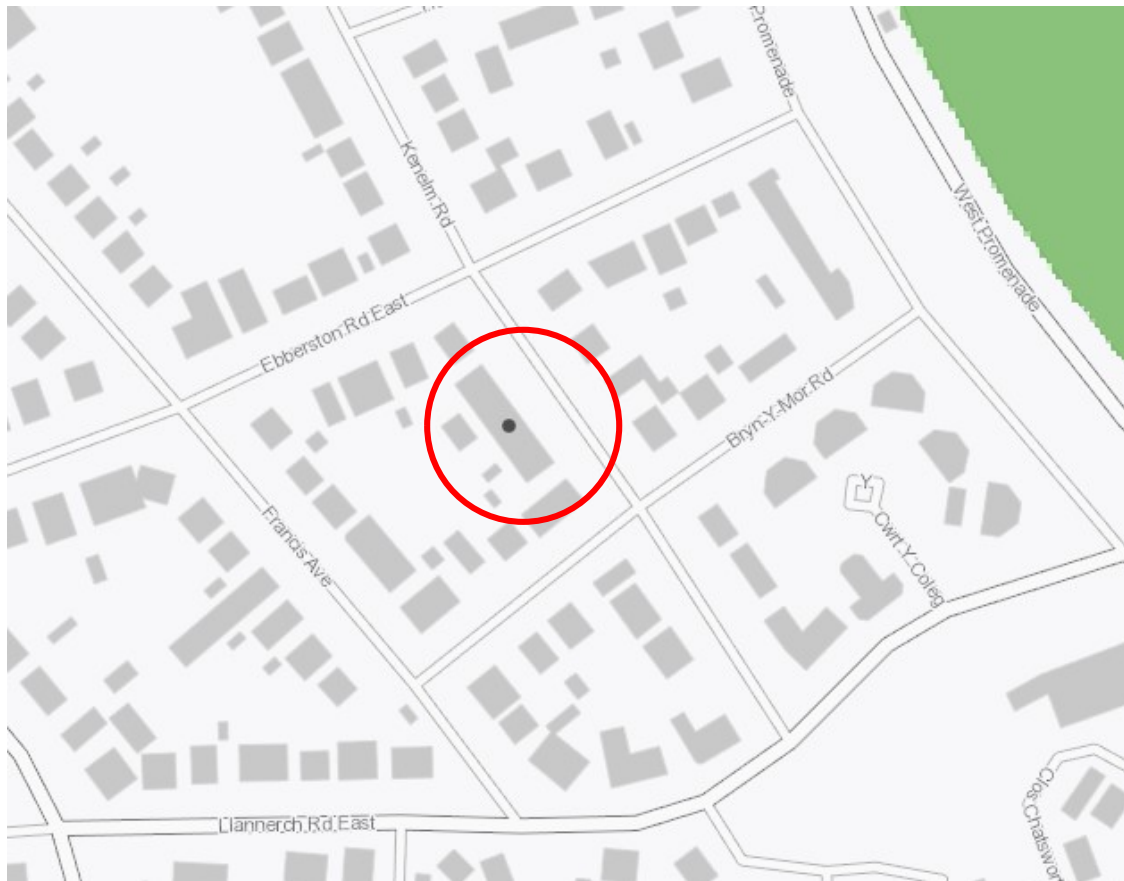


Figure 1: Site Location Plan

3.0 SOURCES OF FLOODING AND FLOOD RISK

Flooding from Rivers & the Sea (Fluvial & Coastal flooding)

- 3.1 The most recent flood data has been obtained from Natural Resources Wales to develop a relevant analysis of the site location.
- 3.2 Fluvial flooding occurs when high flows exceed the capacity of the river channel and spill out onto the floodplain, usually after a period of prolonged or heavy rainfall. Coastal Flooding is caused by extreme tidal conditions including high tides and storm surges.
- 3.3 The site is located within land assessed as having less than a 1 in 1000 annual probability of river or sea flooding.
- 3.4 The Flood Risk Assessment Wales map is shown in Figure 2. Flooding from rivers and the sea is considered as a 'Very Low' risk.

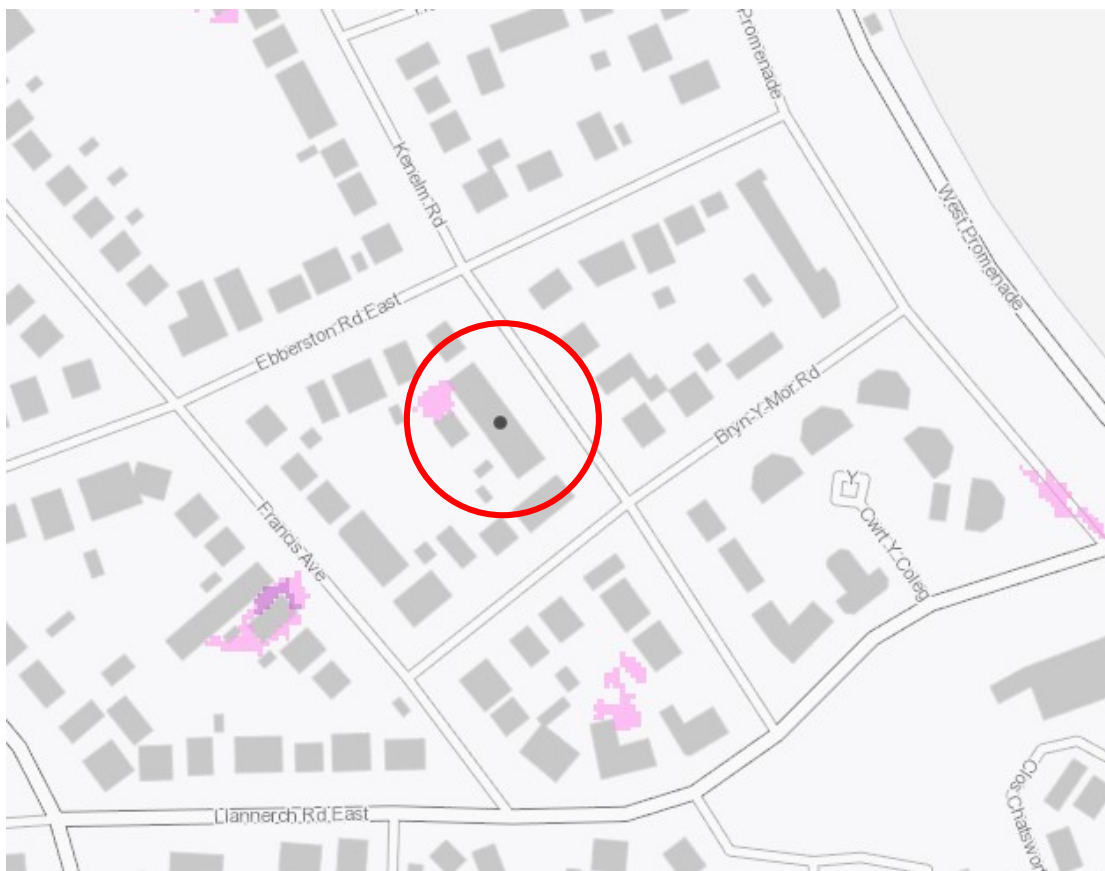


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Figure 2: Flooding from Rivers & the Sea

Flooding from Land (Pluvial Flooding)

- 3.5 This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.
- 3.6 The Flood Risk Assessment Wales map showing Risk of Flooding from Surface Water is shown in Figure 3.
- 3.7 The map is not definitive and is based on the best information available to Natural Resources Wales, such as ground levels and drainage.
- 3.8 The finished floor levels of the proposed buildings will be set higher than the surrounding land, roads and parking areas, and the ground will be designed to fall away from any proposed buildings.
- 3.9 The map indicates that the site has a 'very low' or 'low' chance of flooding from surface water. This area has a chance of flooding ranging from below 1 in 1000 (0.1%) to 1 in 100 (0.1% to 1%).
- 3.10 The proposed development will not alter the flood routes or topography of the site.
- 3.11 Flooding from land is therefore considered a 'low' risk.



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Figure 3: Flooding from land

Flooding from Groundwater

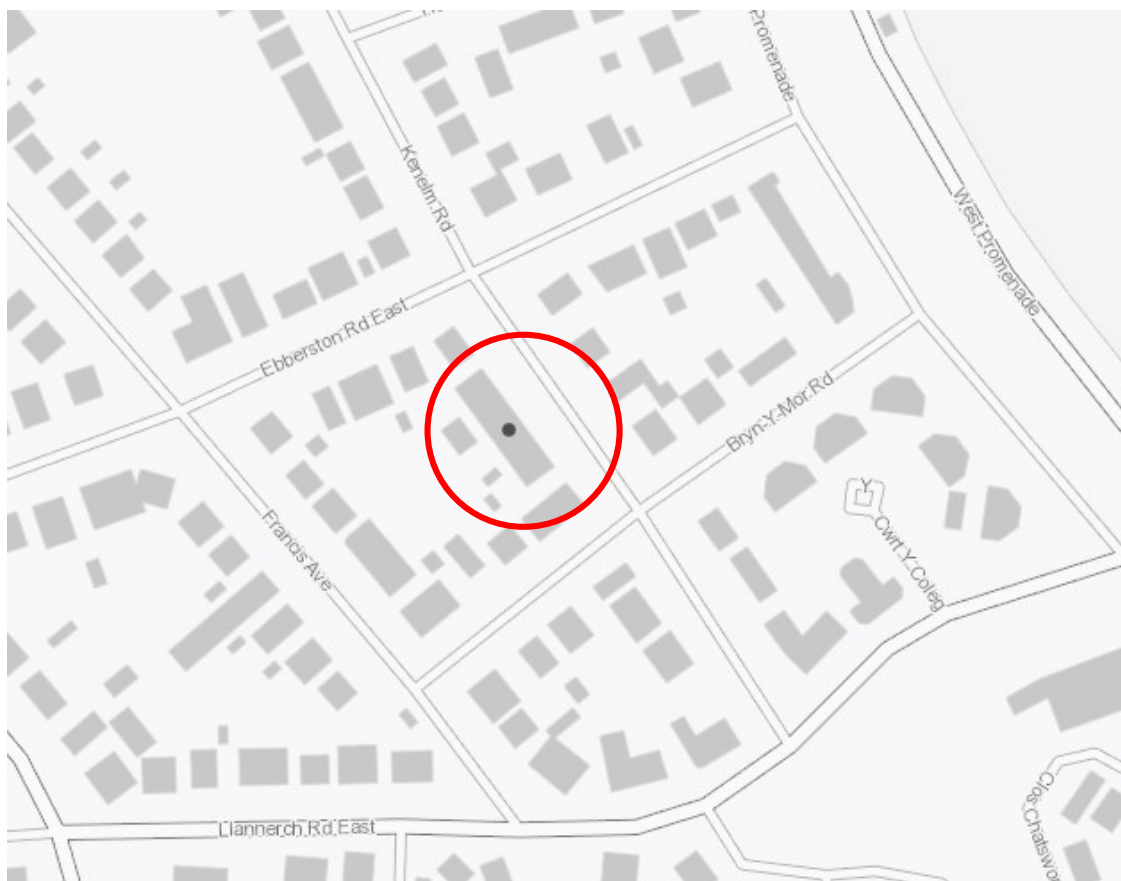
- 3.12 Groundwater flooding occurs when water levels in the ground rise above surface levels, and is more likely to occur in low lying areas.
- 3.13 The finished floor levels of the proposed buildings will be set higher than the surrounding land, roads and parking areas, and the ground will be designed to fall away from any proposed buildings.
- 3.14 Flooding from ground water is considered very low risk.

Flooding from Sewers

- 3.15 Flooding due to lack of capacity of the public sewerage system in the event of heavy rain also needs to be taken into account. Any surcharge from the existing or proposed drainage network will follow the same path as existing overland flow routes.
- 3.16 All existing sewer connections are to be unaltered.
- 3.17 Flooding from sewers is therefore considered low risk.

Flooding from Reservoirs

- 3.18 The Flood Risk Assessment Wales map, Figure 4, shows that the site is outside the area of maximum extent of flooding from reservoirs.
- 3.19 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925.
- 3.20 All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975, Natural Resources Wales ensure that reservoirs are inspected regularly and essential safety work is carried out.
- 3.21 Reservoirs are inspected in accordance with the Reservoirs Act 1975; it is not pragmatic to design developments to deal with the results of a reservoir failing due to how unlikely it is to occur and the extent of the resulting flooding.
- 3.22 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning.
- 3.23 The shading illustrates that the site is located not within an area that would be affected by reservoir failure.
- 3.24 Flooding from reservoirs is considered a 'very low' risk.



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Figure 4: Flooding from reservoirs

4.0 PROPOSED DRAINAGE STRATEGY

Surface water

- 4.1 In accordance with the Statutory Standards for Sustainable Drainage Systems, the following hierarchy of surface water drainage options has been considered:
- Collection for re-use
 - Discharge into the ground (infiltration);
 - Discharge to a surface watercourse;
 - Discharge to a surface water sewer;
 - Discharge to a combined sewer.
- 4.2 Rainwater butts shall be provided to the proposed buildings for rainwater re-use. The enhanced construction costs that would be necessary to install full rainwater harvesting systems mean that it is unlikely to be a sustainable drainage solution for the development.
- 4.3 In accordance with current policy, infiltration has been considered for surface water disposal. Based on the limited local borehole records obtained from the British Geological Survey the ground conditions on site are considered likely to consist of made ground overlying silty clay. The clay is likely to provide a low rate of infiltration on the site hence discharge to ground is not likely to be viable. The permeability on site is to be investigated as part of the Phase 2 Site Investigations.
- 4.4 Opportunities for discharge to a surface watercourse has been considered. The nearest surface watercourse is approximately 370m to the southeast of the site. Direct discharge of surface water to the Sea has also been considered, with the Irish Sea located 200m to the northeast of the site. The unnamed watercourse and the Irish Sea are located across 3rd party land, beyond the site boundary, and as such do not provide a viable option for surface water discharge.
- 4.5 Welsh Water sewer records are to be obtained. It is assumed that there is an existing sewer on Kenelm Road. The existing surface water drainage scenario on the site is to be confirmed by CCTV survey. It is assumed that the existing properties will have positive connections to network. We propose that surface water flows from the development will discharge via existing connections to network, subject to agreement with Welsh Water and confirmation of the existing scenario.
- 4.6 The proposed site is currently occupied by the existing residential buildings with an approximate impermeable area of 610m². Based on a brownfield discharge rate of 140 l/s/ha this provides an existing run off rate of approximately 8.5 l/s. In accordance with current guidance, and to provide 30% betterment to the existing discharge rates, we propose a reduction in run-off rates to give an allowable discharge from the site of 6 l/s.
- 4.7 It is therefore the intention to limit the discharge of surface water flows from the site into the existing network sewer using a flow control device fitted in the final manhole, before connecting into the existing sewer, limited to a peak discharge of 6 l/s.

- 4.8 Attenuation storage will be provided on site for extreme rainfall events for the 1 in 100 year storm event with an allowance of 40% increase due to climate change. Calculations will be provided when details of the final impermeable area are available.

Foul Water

- 4.9 Foul water flows will be separated from surface water and will be collected by a dedicated foul water gravity system, designed in accordance with BS EN 752.
- 4.10 Welsh Water sewer records are to be obtained. It is assumed that there is an existing sewer on Kenelm Road. The existing foul water drainage scenario on the site is to be confirmed by CCTV survey. It is assumed that the existing properties will have positive connections to network. We propose that foul water flows from the development will discharge via existing connections to network, subject to agreement with Welsh Water and confirmation of the existing scenario.
- 4.11 An indicative layout plan of the proposed drainage solution is given in Appendix A.

5.0 MITIGATION MEASURES

- 5.1 Drainage apparatus associated with the development should be regularly inspected and cleared where necessary to reduce the risk of blockages and flooding.
- 5.2 External Surfaces should fall away from any buildings and FFLs should be set a minimum of 150mm above surrounding levels. Overland flow routes will not be affected by the development.

6.0 SUSTAINABLE DRAINAGE SYSTEMS (SUDS) AND SURFACE WATER QUALITY

- 6.1 Planning Policy Wales requires that SuDS are implemented in ‘major development’, if feasible. It must be recognised that not all types of SuDS are feasible or appropriate for all development sites, with factors such as available space, ground conditions, and site gradient influencing the feasibility of their use.
- 6.2 Appropriate measures will need to be incorporated in the surface water drainage system to mitigate the risk of contaminated runoff from the site causing adverse impacts on surface water bodies downstream in accordance with local SuDS guidance.
- 6.3 The use of SuDS in surface water management is an effective means of managing surface water quality whilst providing other benefits, and it is recommended that surface water drainage systems should therefore be designed in accordance with the risk-based approach as outlined in CIRIA C753 The SuDS Manual. The ‘simple index approach’, as discussed below, can be used to make a preliminary assessment of the likely pollution hazard and the likely requirements for mitigation.

6.4 Table 26.2 of The SuDS Manual sets out the ‘Pollution Hazard Indices’ for different proposed land uses. Table 4 summarises the applicable indices for the proposed development.

Table 4. Pollution Hazard Indices for Proposed Development

Proposed Land Use	Pollution Hazard Level	Pollution Hazard Index		
		Total Suspended Solids	Metals	Hydro-carbons
Non-residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads and non residential car parking with infrequent change i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4

6.5 To achieve appropriate pollution mitigation, the selected SuDS components should have a total ‘Mitigation Index’ equal to or greater than the ‘Pollution Hazard Index’ for each contaminant.

6.6 As above, the building roof would be expected to have a very low level of potential contamination. We would recommend that rain garden planters are installed to filter out pollutants from the roof run-off. In addition to this we would recommend suitable leaf debris traps and silt traps. The driveway and car park presents a low risk of potential contamination. We would recommend that permeable paving is installed to control pollutants.

6.7 It is recommended that the requirements for surface water pollution prevention are reviewed at the detailed design stage, with additional treatment components provided if required, including consideration of additional SuDS measures or additional proprietary components, if necessary.

6.8 The final strategy for management of surface water quality will be confirmed at the detailed design stage and agreed with the LLFA.

7.0 CONCLUSIONS

Flood Risk Assessment

- 7.1 The proposals are for a residential development in Zone A and is at a 'very low' risk of fluvial/coastal flooding. Very low risk indicates that the site is in land assessed as having a less than 1 in 1,000 annual probability of river/sea flooding.
- 7.2 The site is in an area which is considered to be at 'low' risk of pluvial flooding. The proposed development will not alter overland flood routes or cause water displacement. External surfaces should fall away from any buildings and FFLs should be set a minimum of 150mm above surrounding levels.
- 7.3 The site is in an area which is considered to be at low risk of flooding if reservoir failure was to occur. Flooding from sewers and groundwater are also low risk.

Drainage Assessment

- 7.4 Based on the local borehole records obtained from the British Geological Survey the ground conditions on site are likely to consist of made ground overlying silty clay. The clay is likely to provide a low rate of infiltration on the site hence discharge to ground is not likely to be viable.
- 7.5 There is no watercourse within proximity of the site boundary that would allow for discharge of surface water.
- 7.6 We propose that surface water flows from the development will discharge via existing connections, in a managed restricted rate, into the existing Welsh Water sewer in Kenelm Road, subject to agreements. We propose to provide 30% betterment to the existing brownfield run off from the site. It is therefore the intention to limit the discharge of surface water flows into the existing network using a flow control device fitted in the final manhole, before connecting into the existing sewer, limited to a peak discharge of 6 l/s.
- 7.7 Attenuation storage will be provided on site for extreme rainfall events for the 1 in 100 year storm event with an allowance of 40% increase due to climate change. Calculations will be provided when details of the final impermeable area are available.
- 7.8 We would recommend that rain garden planters are installed to filter out pollutants from the roof run-off. We would also recommend that permeable paving is installed to control pollutants for the driveway and car park.
- 7.9 Foul water flows will be separated from surface water and will be collected by a dedicated foul water gravity system. We propose that foul water flows from the development will discharge into the existing Welsh Water sewer in Kenelm Road, subject to agreements.
- 7.10 This FRA and Drainage Assessment confirms the proposals are suitable for residential use.

Appendix A









Indicative Drainage Layout; Drawing 2467/01-SK01

ATTENUATION STORAGE FOR THE 1 IN 100YR + 40% CC EVENT. DETAILS TBC SUBJECT TO CONFIRMATION OF PROPOSED IMPERMEABLE AREA

FLOW CONTROL DEVICE LIMITED TO 6 l/s TO BE FITTED TO FINAL SURFACE WATER MANHOLE. COMBINED WATER CONNECTION TO WELSH WATER DRAINAGE NETWORK, SUBJECT TO AGREEMENT

ASSUMED EXISTING WELSH WATER SEWER. ASSUMED EXISTING DRAINAGE CONNECTIONS TO BE MAINTAINED

KEY

-  SURFACE WATER MANHOLE
-  FOUL WATER MANHOLE
-  COMBINED WATER MANHOLE
-  PROPOSED SURFACE WATER SEWER
-  PROPOSED FOUL WATER SEWER
-  ASSUMED WELSH WATER SEWER
-  PROPOSED ATTENUATION STORAGE
-  SITE BOUNDARY

NOTE EXISTING WELSH WATER SEWER DETAILS TO BE CONFIRMED. EXISTING DRAINAGE CONNECTIONS TO BE CONFIRMED BY CCTV TO DETERMINE EXISTING SCENARIO



ARP ASSOCIATES & ARP GEOTECHNICAL LTD

Project
PRIORY GRANGE NURSING HOME RHOS-ON-SEA LL28 4EE
 Title
INDICATIVE DRAINAGE LAYOUT

Scale 1:200@A3	Drawn JB	Checked AH
Date SEPT '24	Status INFORMATION	
Drg. No. 2467/01-SK01	Rev. P1	

