



## **Flood Consequence Assessment**



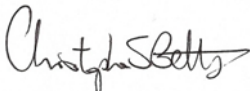
**Matrix Park, Swansea Enterprise Park, Swansea**

On behalf of

Starburst (UK) Limited

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## Quality Management

<b>Prepared by:</b>	Keelan Serjeant	
<b>Reviewed by:</b>	Michael Willis	
<b>Authorised by:</b>	Chris Betts	
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Hydrogeo Ltd,  
Unit 4 Waddington House,  
Llanover Business Centre, Llanover,  
Abergavenny NP7 9HA  
T: 01873 856 813  
E: [info@hydrogeo.co.uk](mailto:info@hydrogeo.co.uk)  
W: [www.hydrogeo.co.uk](http://www.hydrogeo.co.uk)

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## Appendices

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***Appendix 1***            ***Proposed Site Layout***

***Appendix 2***            ***Topographical Survey***

# 1 Introduction

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## 1.1 Background

This Flood Consequence Assessment (FCA) has been prepared by Hydrogeo at the request of Starburst Ltd, to support a planning application for the proposed development at Matrix Park, Swansea Enterprise Park, Swansea.

This FCA has been carried out in accordance with guidance contained in Technical Advice Note 15 Development and Flood Risk (TAN15)<sup>1</sup> and associated Development Advice Maps. This FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

## 1.2 Technical Advice Note 15 (TAN15)

One of the key aims of TAN15 is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall.

A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FCA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate; and
- satisfy the justification test, including the acceptability of consequences.

A revised TAN15 is due to be implemented in the near future. This will be supported by the new Flood Map for Planning, which includes climate change information to show how this will affect flood risk extents over the next century. It shows the potential extent of flooding assuming no defences are in place.

## 1.3 Report Structure

This FCA has the following report structure:

- Section 2 details the sources of information that have been consulted;

- Section 3 describes the location area and the existing and proposed development;
- Section 4 outlines the flood risk to the existing and proposed development;
- Section 5 outlines the mitigation measures used to reduce the flood risk;
- Section 6 justifies the location of the development; and
- Section 7 presents a summary and conclusions.



## 2 Sources of Information

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### 2.1 Discussion with Regulators

Consultation and discussions with the relevant regulators have been undertaken during this FCA including Natural Resources Wales, the Local Planning Authority (LPA) and the Sewerage Undertakers.

#### 2.1.1 Natural Resources Wales

The Flood and Water Management Act 2010 gives Natural Resources Wales a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. Natural Resources Wales is the statutory consultee with regards to flood risk and planning.

Natural Resources Wales Flood Risk Standing Advice and TAN15 have been consulted and reviewed during this FCA. This has confirmed the level of FCA required and that a surface water drainage assessment is to be undertaken. Information regarding the current flood risk at the application site and local flood defences has been obtained from Natural Resources Wales. Natural Resources Wales have provided the Swansea Vale 5 V1.0 2024 model which is the current best available model.

#### 2.1.2 Swansea Council

Swansea Council is the LPA and therefore, has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by Swansea Council regarding flood risk was consulted to assess the mitigation policies in place.

#### 2.1.3 Welsh Water/Dŵr Cymru

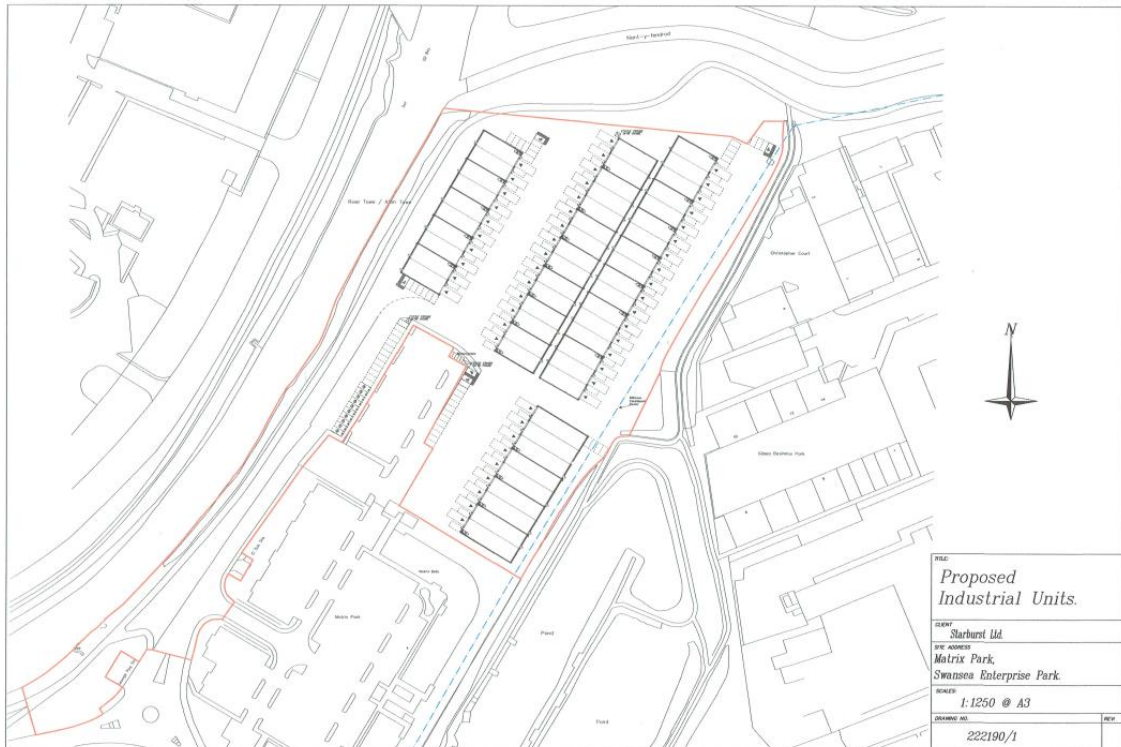
Welsh Water/Dŵr Cymru is responsible for the disposal of waste water and supply of clean water for this area. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

## 3 Location & Development Description

### 3.1 Site Location

The site is located at Matrix Park, Swansea Enterprise Park, Swansea (see Figure 3-1). The National Grid Reference (NGR) of the approximate centre of the site is 267068, 196489.

**Figure 3-1 Site Location**



### 3.2 Existing Development

The site currently comprises previously developed vacant brownfield land.

### 3.3 Proposed Development

The proposed development is for the erection of industrial units as shown in Figure 3.1 (see Appendix 1).

### 3.4 Ground Levels

A topographical survey of the site has recently been undertaken (see Appendix 2). The site falls from north to south with ground levels ranging between 9.45 metres Above Ordnance Datum (mAOD) and 10mAOD. The majority of the site ground levels are above 9.50mAOD. The site entrance has a ground level of 7mAOD rising to 8.50mAOD to the north.

### **3.5 Catchment Hydrology/Drainage**

The River Tawe is located immediately adjacent to the western boundary of the site. The Nant-y-Fendrod is located approximately 70m to the north of the site which is a tributary of the River Tawe. There are two ponds located adjacent to the south eastern boundary of the site.

### **3.6 Ground Conditions**

The British Geological Survey (BGS) map indicates that the superficial deposits consist of Alluvium – clay, silt, sand and gravel. The bedrock underlying the site consists of the Swansea Member – sandstone.

It is expected that made ground is present at the site due to the brownfield nature of the site.

## 4 Flood Risk

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### 4.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

### 4.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within TAN15 recommends that the effects of climate change are incorporated into FCA. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the CL-03-16 - Climate change allowances for Planning purposes<sup>1</sup>.

The 9th of January 2014 Welsh Government letter to all Chief Planning Officers (CPO) in Wales and CL-03-16 - Climate change allowances for Planning purposes clarifies and refers to the Natural Resources Wales recommendations that the lifetime of development for residential development is 100 years, and for other development it is considered to be 75 years. Therefore, a lifetime of 75 years (i.e. 2099) has been adopted within this FCA.

However, the actual lifetime of the proposed development type is typically in the order of 30 to 35 years. The landowner/developer has extensive experience of many similar industrial unit developments across a large portfolio of sites in South Wales. Buildings older than 30 years are reaching obsolescence and require redevelopment because of the following:

- Buildings become worn out, the rental values drop and the void periods between occupiers becomes longer.
- The design, shape and format of the building often become obsolete as occupier requirements change over time.
- The structure of the buildings start to fail, with frames and cladding rusting away and floor slabs starting to break up.
- The buildings become out of date from a compliance point of view and do not meet the standards set by the authorities or the requirements expected and often demanded by occupiers.
- Buildings insurance becomes a lot more expensive, difficult to obtain and the policy excess increases.
- Maintenance costs increase both financially and in terms of time.

Table 4-1 show the peak river flow allowances for this river basin district. The design fluvial flood event for the site is the 1 in 100 year (+30%) event (i.e. lifetime of 75 years).

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<sup>1</sup> <https://gov.wales/climate-change-allowances-and-flood-consequence-assessments>

**Table 4-1 Peak River Flow Allowances**

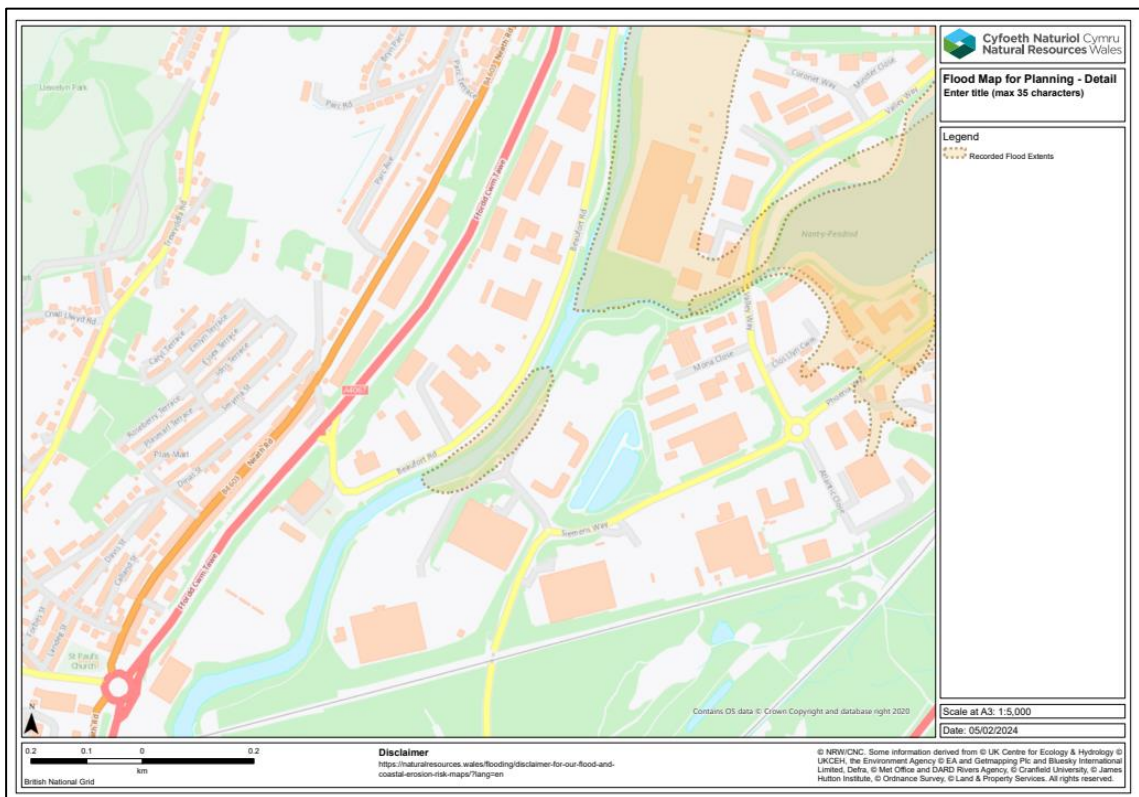
River Basin District	Allowance Category	Total Potential Change Anticipated by the 2020s	Total Potential Change Anticipated by the 2050s	Total Potential Change Anticipated by the 2080s
Western Wales	Upper end estimate	25%	40%	75%
	Central estimate	15%	25%	30%
	Lower end estimate	5%	10%	15%

### 4.3 Historic Flooding

The Natural Resources Wales records show that the majority of the site has not historically flooded however, a small section of the site on the western boundary flooded in December 1979 (see Figure 4-1). This area is located immediately adjacent to the River Tawe and is associated with areas of lower topography.

These records do not give an indication of depth of flooding on the site. The British Hydrological Society “Chronology of British Hydrological Event” has no information on flooding within the vicinity of the site. No other historical records of flooding for the site have been recorded.

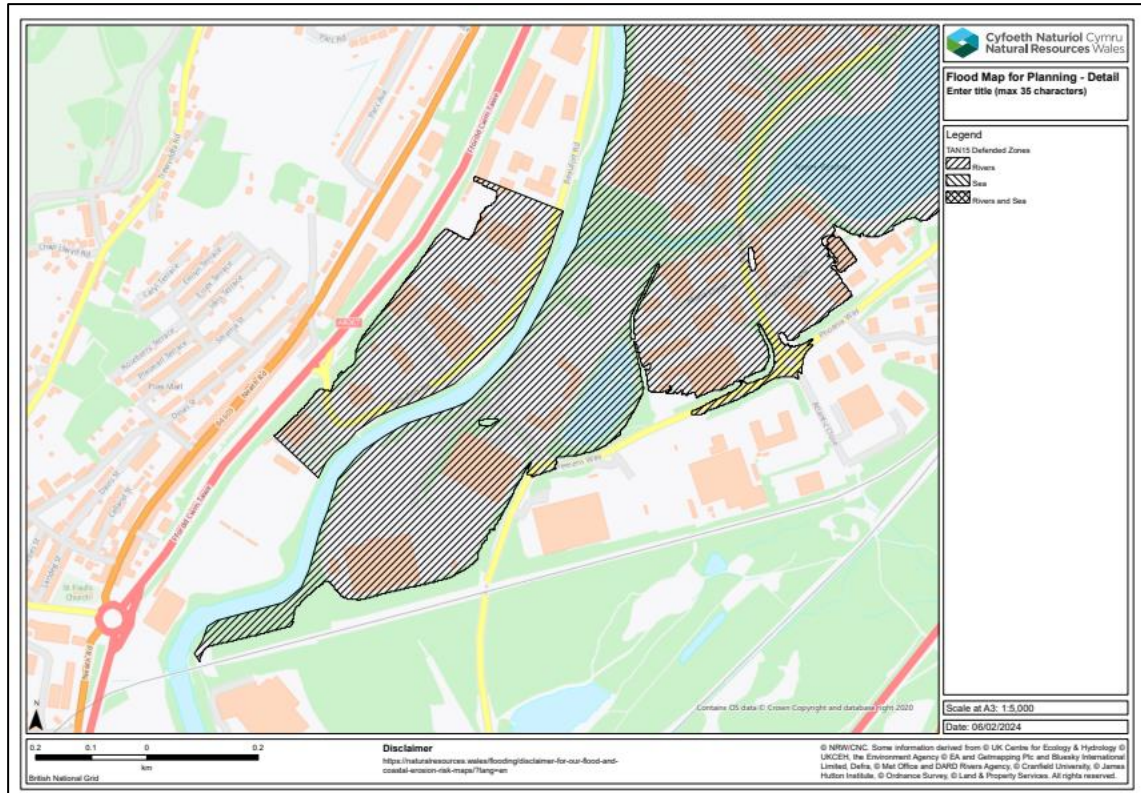
**Figure 4-1 Natural Resources Wales Historic Flood Map**



#### 4.4 Existing and Planned Flood Defence Measures

The site is currently protected against flooding by existing flood defence measures. The site is located within the TAN15 Defended Zone against rivers (see Figure 4.2), these flood defences provide a provide a 1 in 100 year Standard of Protection (SoP). The flood risk posed to the site will be further mitigated by using a number of risk management measures to manage and reduce the overall flood risk at the site, these are discussed in Section 5.0.

**Figure 4-2 Natural Resources Wales Flood Defence Map**



#### 4.5 Development Advice Map

The Development Advice Map (DAM) which accompanies TAN15 shows that the majority of the site is located within Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences (see Figure 4.3). The zone indicated on the DAM would only be as a result of a failure, or breach of the flood defences, causing inundation. A small proportion of the site is located within Zone B: Areas known

to have been flooded in the past evidenced by sedimentary deposits.

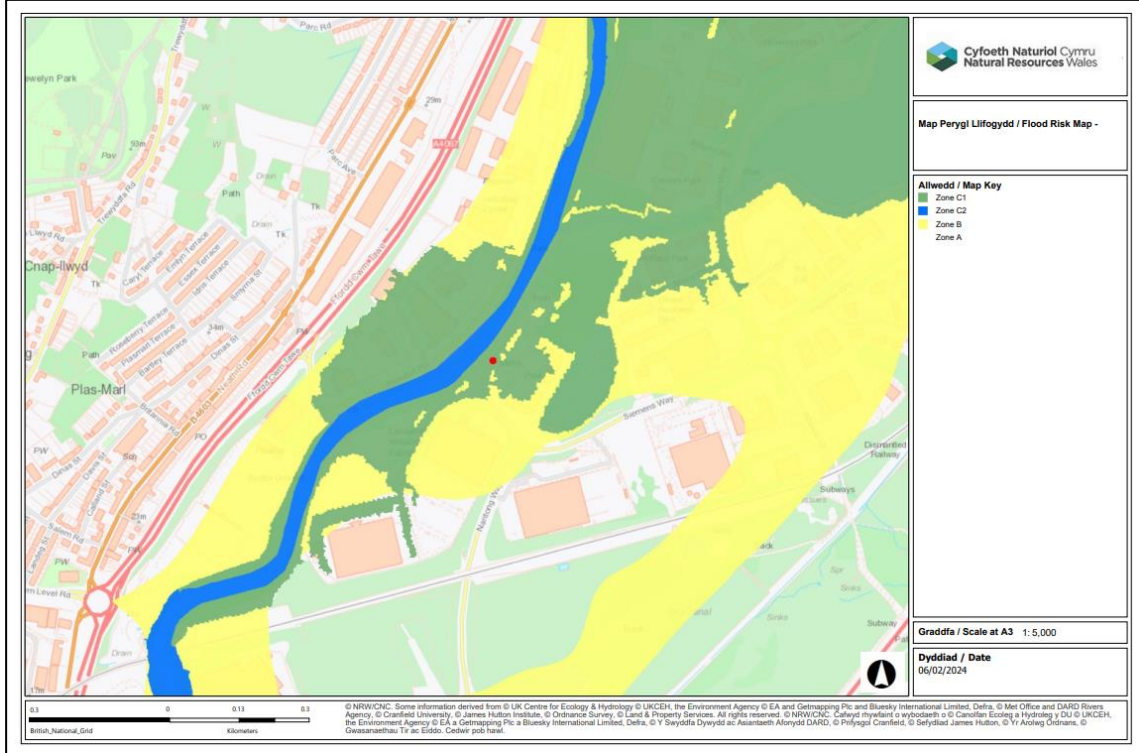
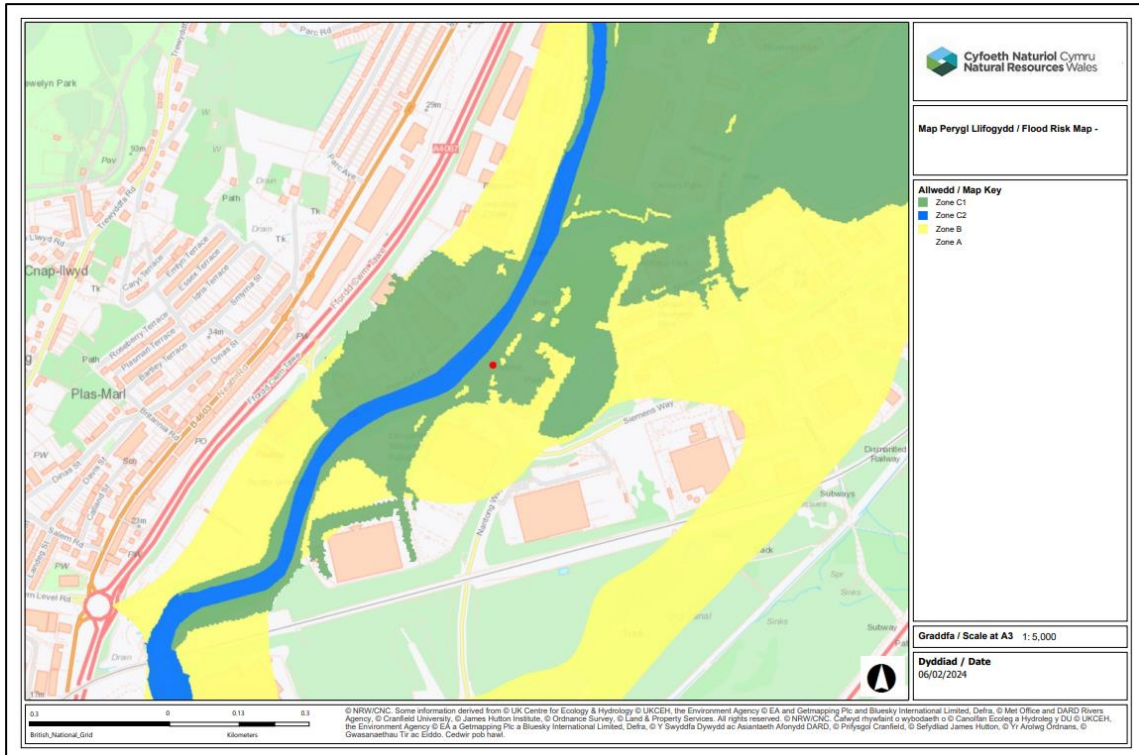


Table 4-2 describes the composition and use of the DAM zones to control and manage development.

**Figure 4-3 Development Advice Map**



**Table 4-2 Development Advice Map Zones**

Description of Zone	Zone	Use within the Precautionary Framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Natural Resources Wales extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.



Description of Zone	Zone	Use within the Precautionary Framework
Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

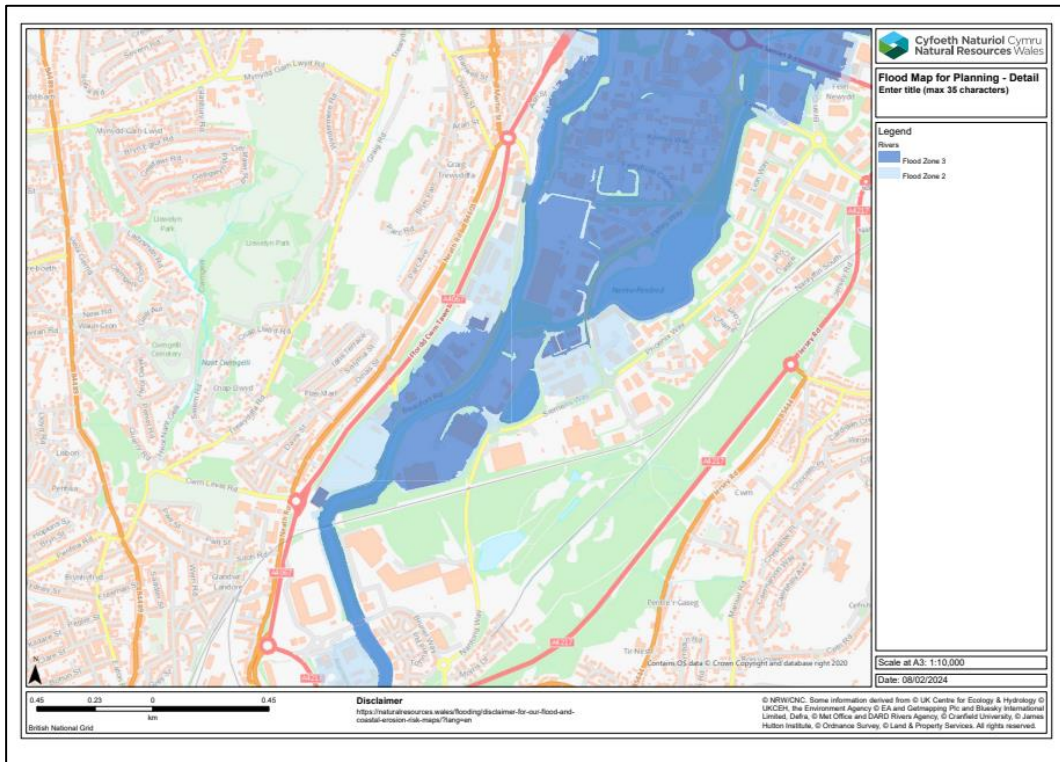
#### 4.6 Flood Map for Planning

The Flood Map for Planning (FMfP) has no official status for planning purpose. Natural Resources Wales may use the FMfP data as the 'best available information' on flood risk to inform their planning advice. The FMfP shows that the site is located within the following:

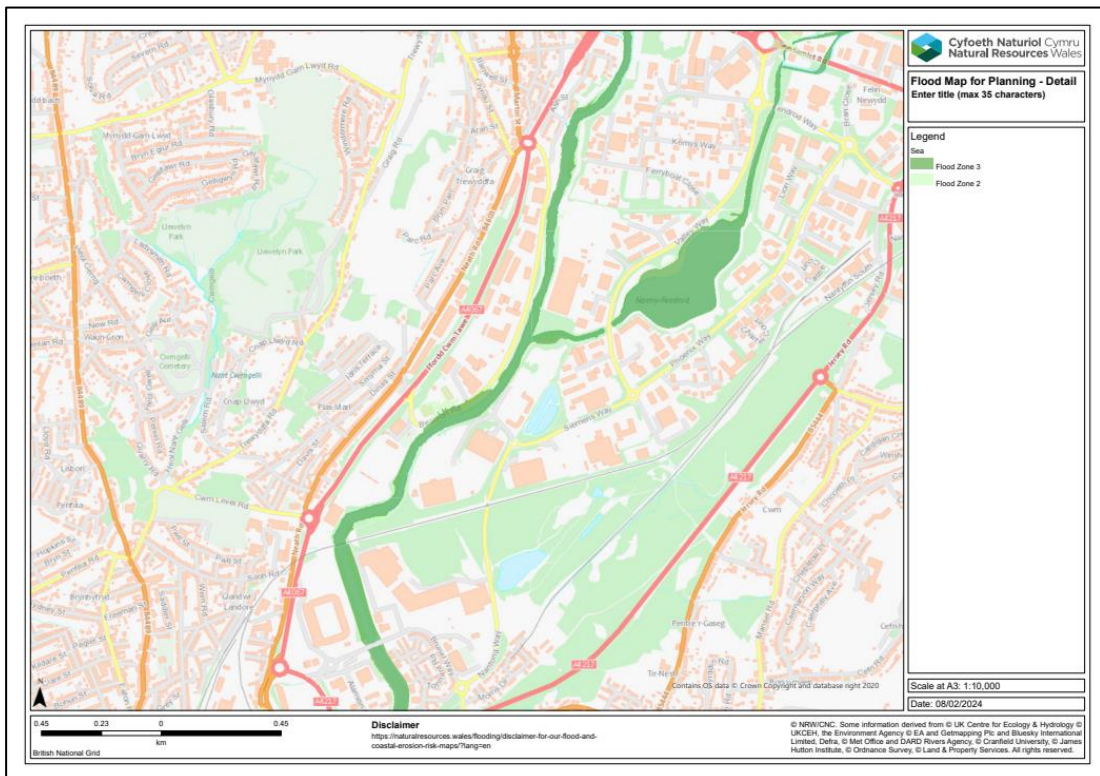
- Rivers: Flood Zone 3 with a 1 in 100 (1%) annual probability of flooding from rivers in a given year, including the effects of climate change (see Figure 4-4). The zone indicated on the FMfP would only be as a result of a failure, or breach of the flood defences, causing inundation.
- Sea: Flood Zone 1 with less than 1 in 1000 (0.1%) chance of flooding from the sea in a given year, including the effects of climate change (see Figure 4-5).
- Surface water and small watercourses: Flood Zone 1 with less than a 1 in 1000 (0.1%) annual probability of flooding from surface water and/or small watercourse in a given year, including the effects of climate change (see Figure 4-6).

Table 4-3 provides details of the FMfP Flood Zones. The zone indicated on the FMfP would only be a result of a failure, or breach of the flood defences, causing inundation.

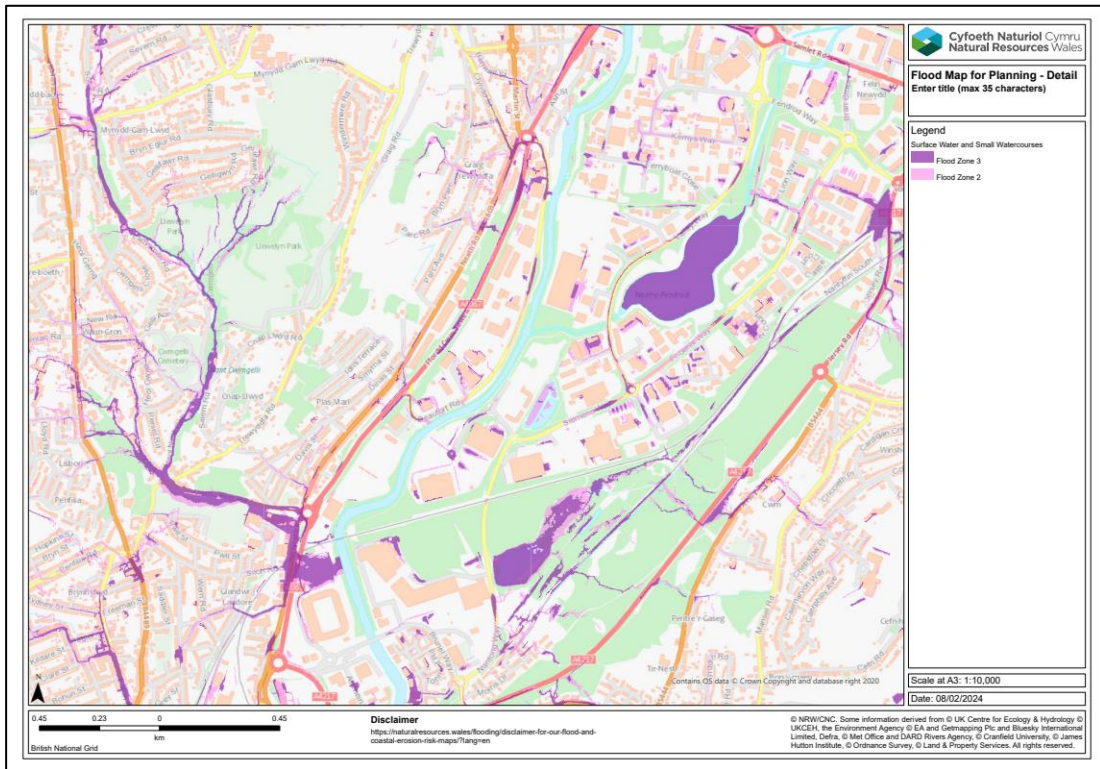
**Figure 4-4 Flood Map for Planning: Rivers**



**Figure 4-5 Flood Map for Planning: Sea**



**Figure 4-6 Flood Map for Planning: Surface Water and Small Watercourses**



**Table 4-3 Flood Map for Planning Zones**

Flood Zone	Explanation
Rivers - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Rivers - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Sea - Flood Zone 2	Areas with 0.1% to 0.5% (1 in 1000 to 1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.
Sea - Flood Zone 3	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.
Surface Water and Small Watercourses - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.
Surface Water and Small Watercourses - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

## 4.7 Flood Risk Vulnerability

Applying the Flood Risk Vulnerability Classification in Figure 2 of TAN15, the proposed development is classified as being 'less vulnerable'. The proposed development is deemed to be appropriate for this location.

## 4.8 Fluvial (river) Flooding

Fluvial flooding from the River Tawe and the Nant-y-Fendrod therefore poses the primary, but unlikely, flood risk to the site. Natural Resources Wales has provided the current modelled data for this area.

### *Defended Scenarios*

The site is protected against fluvial flooding by flood defence measures which provide a SoP of 1 in 100 years. The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the defended 1 in 100 year (+30%) and 1 in 1000 year events therefore, the flood risk posed to the site can be considered a residual flood risk.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.15m with areas of deeper water immediately adjacent to the River Tawe (<0.60m).

### *Undefended Scenarios*

Considerable investment has been made in the provision of the flood defences to protect this stretch of river from fluvial flooding. However, the flood defences can only protect up to a point, they may malfunction, can be breached and have a finite structure life. Therefore, there is a residual risk of fluvial flooding.

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the undefended 1 in 100 year (+30%) and 1 in 1000 year events.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.60m.

### *Summary*

The site is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free during the vast majority of flood events during the lifetime of the proposed development. The mechanism for flooding from fluvial flooding is generally prolonged episodes of high rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event.

The site is located where the onset of flooding is gradual as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2. The speed of inundation and rate of floodwater rise would be low.

Given the scale and nature of the proposed development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low actual and residual flood risk to the site. Therefore, the risk of fluvial flooding is considered to be of **medium significance**. The risk of fluvial flooding will be further mitigated by using a number of risk management measures to manage and reduce the overall flood risk at the site (see Section 5).

#### 4.9 Tidal (coastal) Flooding

The site is not located within the vicinity of tidal flooding sources and the FMfP shows that the site is located within Flood Zone 1 for sea flooding. Therefore, the risk from tidal flooding is considered to be **not significant**.

#### 4.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).

Given the nature of the soils in the area and the lack of historical data on groundwater flooding within this area there is a very low risk of groundwater flooding. Also no below surface infrastructure and buildings are located or are proposed for the site. Therefore, the risk of groundwater flooding is considered to be **not significant**.

#### 4.11 Surface Water (pluvial) Flooding

Surface water flooding tends to occur sporadically in both location and time such surface water. The site is not situated on and adjacent to areas of permeability and areas with geology which may result in surface water flooding. The FMfP shows that the site is located within Flood Zone 1 for surface water and small watercourse flooding therefore, the risk of from surface water flooding is considered to be **not significant**.

#### 4.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

Any existing sewers located within the vicinity of the will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

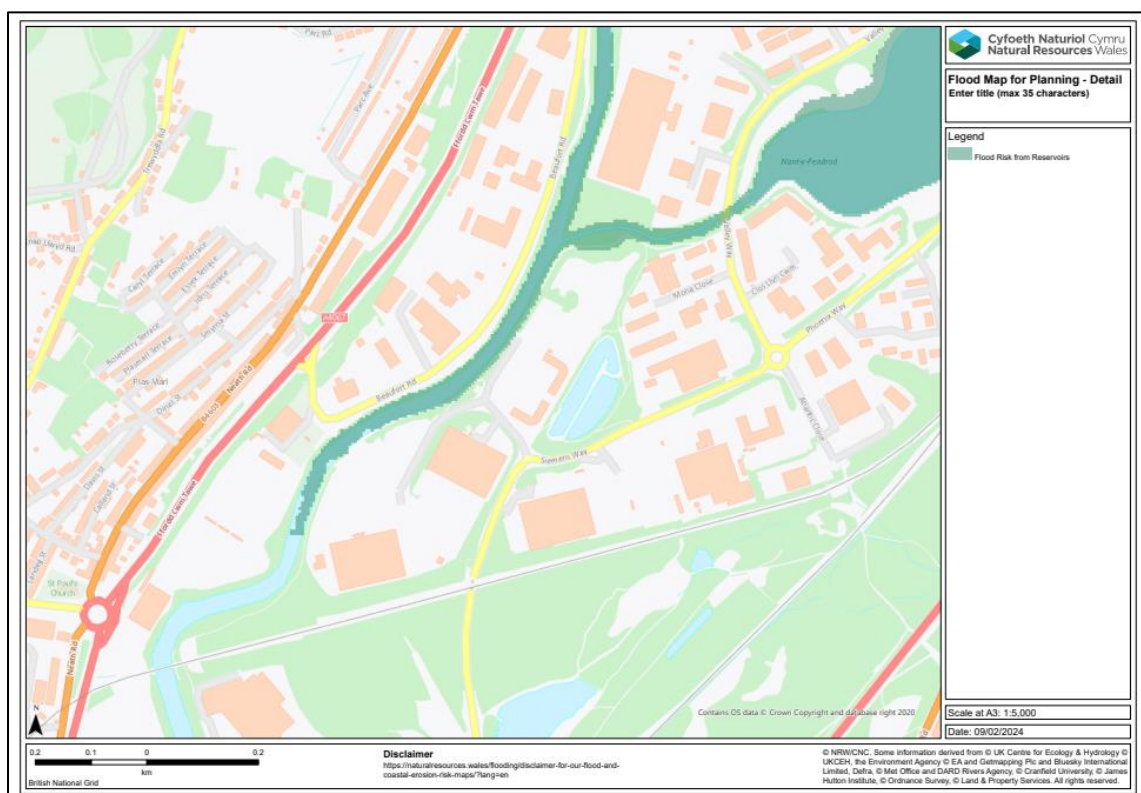
Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years.

The provision of adequate level difference between the ground levels and the invert levels of sewers would reduce the annual probability from this source to 1 in 100 years. The risk of sewer flooding is considered to be **not significant**.

#### 4.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

Reservoirs are located within the vicinity of the site. The Natural Resources Wales Reservoir flood map shows that the site is not at risk of reservoir flooding (see Figure 4-7). The hazard is well managed through effective legislation and it is unlikely that the impact zone downstream of these reservoirs should preclude the proposed development. The risk of flooding from artificial drainage systems/infrastructure failure flooding is considered to be **not significant**.

**Figure 4-7 Natural Resources Wales Reservoir Flood Map**



#### 4.14 Effect of the Development on Flood Risk

Based on the available information, the site is located within the TAN15 Defended Zone and existing flood defences provide a SoP of 1 in 100 years. There is therefore currently no presence of flood flow routes or floodplain storage on the site. The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+30%) and 1 in 1000 year events.

The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. There will be a gain in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.

## 4.15 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4-44.

**Table 4-4 Risk Posed by Flooding Sources**

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial (river) Flooding	Yes	River Tawe/ Nant-y-Fendrod	Low
Tidal (coastal) Flooding	No	None Reported	Not significant
Groundwater Flooding	No	None Reported	Not significant
Surface Water (pluvial) Flooding	No	None Reported	Not significant
Sewer Flooding	No	None Reported	Not significant
Flooding from Artificial Drainage Systems/Infrastructure Failure	Yes	Reservoirs	Not significant

The site is unlikely to flood except in extreme conditions. The primary, but unlikely, flood risk to the site is from fluvial flooding from the River Tawe. The DAM shows that the majority of the site is located within Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. A small proportion of the site is located within Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits.

The FMfP shows that the site is located within Flood Zone 3 for fluvial flooding, with a 1 in 100 (1%) annual probability of flooding from rivers in a given year, including the effects of climate change.

The site is currently protected against flooding by existing flood defence measures. The site is located within the TAN15 Defended Zone against rivers, these flood defences provide a provide a SoP of 1 in 100 years. The zone indicated on the DAM and the FMfP would only be as a result of a failure, or breach of the flood defences, causing inundation.

The proposed development is classified as being 'less vulnerable'. The proposed development is deemed to be appropriate for this location.

### *Defended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the defended 1 in 100 year (+30%) and 1 in 1000 year events therefore, the flood risk posed to the site can be considered a residual flood risk.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.15m with areas of deeper water immediately adjacent to the River Tawe (<0.60m).

### *Undefended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the undefended 1 in 100 year (+30%) and 1 in 1000 year events.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.60m.

Given the scale and nature of the proposed development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low actual and residual flood risk to the site. Therefore, the risk of fluvial flooding is considered to be of **low significance**. The risk of fluvial flooding will be further mitigated by using a number of risk management measures to manage and reduce the overall flood risk at the site (see Section 5).

The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.



## 5 Risk Management

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### 5.1 Introduction

In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

A number of techniques and mitigation strategies to manage and reduce the overall flood risk in the area will be used. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the proposed development on flood risk generally; and;
- Minimal disruption to natural heritage.

### 5.2 Finished Floor Levels

The proposed finished floor level of the units will set as a minimum of 0.50m above the ground levels of the site. In order to further mitigate against the fluvial flood risk, it is recommended that the occupants of the building implement a Flood Warning and Evacuation Plan to a safe area away from the buildings during times of flood. A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

### 5.3 Flood Resistance and Resilience Measures

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

To make the buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials.

To improve the buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level.

### 5.4 Flood Warning and Evacuation Plan

A Flood Warning and Evacuation Plan (FWEP) outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed.

The FWEP is a 'live' document and therefore should be periodically reviewed and updated to provide advice and guidance to occupants in the event of an extreme flood. The FWEP

will therefore reduce the vulnerability of the occupants to flooding and makes them aware of the mechanisms of flooding at the site. A Flood Warden will be designated from the occupants of the site who will monitor flood levels and keep occupants and visitors informed and will decide whether to initiate the FWEF.

The site is located in a flood risk area; therefore, the site will participate in Natural Resources Wales flood warning telephone service. The site will register contact details with the Natural Resources Wales Flood Warnings Service in order to receive Flood Warnings. Natural Resources Wales operate a free flood warning service providing alerts by phone, text or email when flooding is anticipated providing an opportunity for owners to take necessary precautions, giving enough time for the building to be safely evacuated and mitigation measures to be put in place.

All occupants of the site will be made aware of the Natural Resources Wales Floodline telephone number and the Flood Warning Codes and their meaning. The manager of the site will carry out the role of Flood Warden for the site and ensure they have an understanding of the flood mechanisms of the site and will ensure that the safety of the occupants and visitors will not be compromised.

Natural Resources Wales uses Flood Warnings Codes. They can be issued in any order, usually ending with an 'all clear'. They are issued by Natural Resources Wales through their website and Floodline Warning Direct. The flood warning will be passed onto the occupiers and visitors of the site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

The likelihood of a rapid river level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal. Natural Resources Wales, with its current flood warning system, to provide forewarning of two (2) days of a pending flood event. The speed of inundation and rate of floodwater rise would be low.

In order for the following evacuation procedures to be effective:

- The site will register contact details with the Natural Resources Wales Flood Warning Service (Floodline 0345 988 1188) in order to receive Flood Warnings.
- The flood warning will be passed onto the occupants and visitors of the site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

## 5.5 Safe Access and Egress Routes

Access routes should be such that occupants can safely access and exit their properties in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

The site is one of the last places in the area to flood and remains flood free when other areas close by are flooded. The site is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free for the vast majority of flood events during the lifetime of the proposed development.

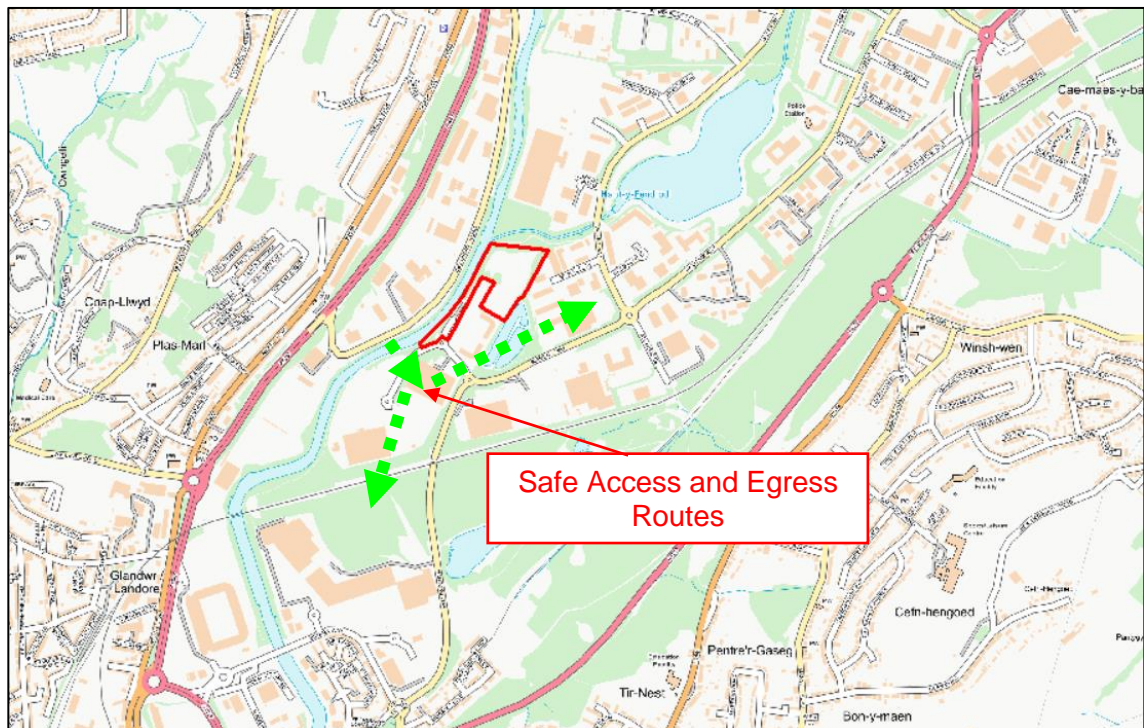
Safe access and egress routes, including emergency access can be maintained for vehicles and/or by foot. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event. The site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk

## Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Given that the site is located within a flood warning area, site users would be aware of the flood risk and should have more than sufficient time to evacuate the site before flooding of the access road would be expected. Therefore, the lead time of the flooding will provide site users with more than ample time to evacuate the site and seek safe refuge outside the floodplain. Figure 5-1 shows that a safe access and egress routes can be maintained. In the event of a Flood Warning, vital belongings, including waterproof clothing and necessary essentials will be collected. It should be ensured that all occupiers and visitors to the site are accounted for, and then exit the site using the routes shown in Figure 5-1.

People should make their way to areas outside of the flood zone to the south west of the site. Facilities such as community centres, shops etc. are located within the areas shown in Figure 5-1 which may be used in the event of a flood event. Therefore, safe access and egress from the site will be possible in accordance with TAN15 and Natural Resources Wales guidance.

**Figure 5-1 Safe Access and Egress Routes**



## 5.6 Residual Risk

The proposed development of the site can be justified in accordance with TAN15 as it can be demonstrated that the consequences of flooding can be managed down to a level which is acceptable for the nature and type of site. The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. As such, the residual risk is considered to be acceptable for the lifetime of the development.

## 6 Justifying the Location of the Development

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### 6.1 Justification Test

The Justification Test sets out the details required to justify siting a new development in an area believed to be at risk of flooding and is defined in Section 6 of TAN15. The required criteria a site / development must fulfil are:

- i) its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or
- ii) its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and

- iii) it concurs with the aims of PPW and meets the definition of previously developed land; and,
- iv) the potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 found to be acceptable.

The proposed development has been assessed against the requirements of the Justification Test, as shown below

- The site is located within Zone C1 - Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
- The development is suitable in size and location. The proposed redevelopment of the site will provide an improved employment use compared to the existing situation and will help encourage economic impetus that will in turn help deliver a stronger service function and mix of employment uses. The site proposals remain consistent with the relevant planning policies.
- This site redevelopment will help to regenerate the region and will help to deliver the Council's objectives. This site will help encourage economic impetus.
- The wider area surrounding the proposed development site is affected by a very similar, and in many cases, higher risk of flooding. The application is for a new, suitable flood-resilient design. From the above it is shown that there are overriding sustainability reasons for the development to be granted planning permission within these sites.
- The proposed development is classified as being 'less vulnerable'. The proposed development is deemed to be appropriate for this location.
- The site is defined as previously developed land.
- The potential consequences of a flooding event for the particular type of development have been considered within this FCA. This FCA details the potential

consequences of flooding from all sources taking into account the proposed development type has been considered and has been found to be acceptable.

- The development proposals should be considered by the LPA to satisfy the Justification Test as set out in TAN15.

## 6.2 Assessment of Acceptability Criteria

New development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less of an issue. However, in some areas where developable land is in short supply, there can be an overriding need to build in areas that are at risk of flooding.

There is an indicative frequency threshold of flooding below which flooding of developed may not be allowed (see Table A1.14 of TAN15) and flood consequences during an extreme flood (see Table A1.15 of TAN15).

There is an indicative frequency threshold of flooding below which flooding of developed may not be allowed (see Table A1.14 of TAN15) and indicative flood consequences during an extreme flood (see Table A1.15 of TAN15).

The site is currently protected against flooding by existing flood defence measures. The site is located within the TAN15 Defended Zone against rivers, these flood defences provide a provide a SoP of 1 in 100 years. The zone indicated on the DAM and the FMfP would only be as a result of a failure, or breach of the flood defences, causing inundation.

### *Defended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the defended 1 in 100 year (+30%) and 1 in 1000 year events therefore, the flood risk posed to the site can be considered a residual flood risk.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.15m with areas of deeper water immediately adjacent to the River Tawe (<0.60m).

### *Undefended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the undefended 1 in 100 year (+30%) and 1 in 1000 year events.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.60m.

The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event. The site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

The maximum rate of rise of floodwater will therefore be less than 0.30m/hr and the maximum speed of inundation will be more than 2 hours and will be less than the indicative tolerable limits shown within Table A1.15 of TAN15.

It is considered that the buildings have been elevated as far as is practicable, accounting for the site constraints. The consequences of flooding can be acceptably managed for the lifetime of the development. The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. Therefore, the site is compliant with A1.14 and A1.15 of TAN15.

## 7 Summary and Conclusions

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### 7.1 Introduction

This report presents an FCA in accordance with TAN15 for the proposed development at Matrix Park, Swansea Enterprise park, Swansea, SA6 8RE.

### 7.2 Flood Risk

The site is unlikely to flood except in extreme conditions. The primary, but unlikely, flood risk to the site is from fluvial flooding from the River Tawe. The DAM shows that the majority of the site is located within Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. A small proportion of the site is located within Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits.

The FMfP shows that the site is located within Flood Zone 3 for fluvial flooding, with a 1 in 100 (1%) annual probability of flooding from rivers in a given year, including the effects of climate change.

The site is currently protected against flooding by existing flood defence measures. The site is located within the TAN15 Defended Zone against rivers, these flood defences provide a provide a SoP of 1 in 100 years. The zone indicated on the DAM and the FMfP would only be as a result of a failure, or breach of the flood defences, causing inundation.

The proposed development is classified as being 'less vulnerable'. The proposed development is deemed to be appropriate for this location.

#### *Defended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the defended 1 in 100 year (+30%) and 1 in 1000 year events therefore, the flood risk posed to the site can be considered a residual flood risk.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.15m with areas of deeper water immediately adjacent to the River Tawe (<0.60m).

#### *Undefended Scenarios*

The Natural Resources Wales data shows that the site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+30%) and 1 in 1000 year events. The site will be flood free during the undefended 1 in 100 year (+30%) and 1 in 1000 year events.

A small proportion of the site may be inundated with floodwater during the defended 1 in 1000 year (+30%) event. This is confined to the lower areas of the site and may result in a depths of water of less than 0.60m.



Given the scale and nature of the proposed development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low actual and residual flood risk to the site. Therefore, the risk of fluvial flooding is considered to be of **low significance**. The risk of fluvial flooding will be further mitigated by using a number of risk management measures to manage and reduce the overall flood risk at the site.

The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. There will be a gain in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.

### 7.3 Risk Management

The flood risk at the site will be reduced by the following risk management measures:

**Finished Floor Levels:** The proposed finished floor level of the units will set as a minimum of 0.50m above the ground levels of the site. In order to further mitigate against the fluvial flood risk, it is recommended that the occupants of the building implement a Flood Warning and Evacuation Plan to a safe area away from the buildings during times of flood. A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

**Flood Resistance and Resilience Measures:** To make the buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials.

To improve the buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level.

**Flood Warning and Evacuation Plan:** A Flood Warning and Evacuation Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed. The site will register contact details with the Natural Resources Wales Flood Warning Service (Floodline 0345 988 1188) in order to receive Flood Warnings.

**Safe Access and Egress Routes:** Safe access and egress routes, including emergency access can be maintained for vehicles and/or by foot. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event. The site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

Given that the site is located within a flood warning area, site users would be aware of the flood risk and should have more than sufficient time to evacuate the site before flooding of the access road would be expected. Therefore, the lead time of the flooding will provide site users with more than ample time to evacuate the site and seek safe refuge outside the floodplain. In the event of a Flood Warning, vital belongings, including waterproof clothing, necessary medication and essentials will be collected. It should be ensured that all occupiers and visitors to the site are accounted for, and then exit the site

People should make their way to areas outside of the flood zone via the site to the south east. Therefore, safe access and egress from the site will be possible in accordance with TAN15 and Natural Resources Wales guidance.

#### **7.4 Justifying the Location of the Development**

The development proposals should therefore be considered by the LPA to satisfy the Justification Test and the Acceptability Criteria as set out in TAN15.

#### **7.5 Conclusion**

In conclusion, the proposed development would be expected to remain dry in all but the most extreme conditions. Providing the recommendations made in this FCA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable, and the development would be in accordance with the requirements of TAN15.

This FCA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of TAN15. The development should not therefore be precluded on the grounds of flood risk.

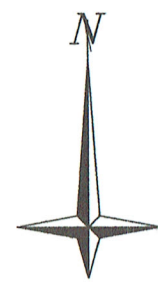
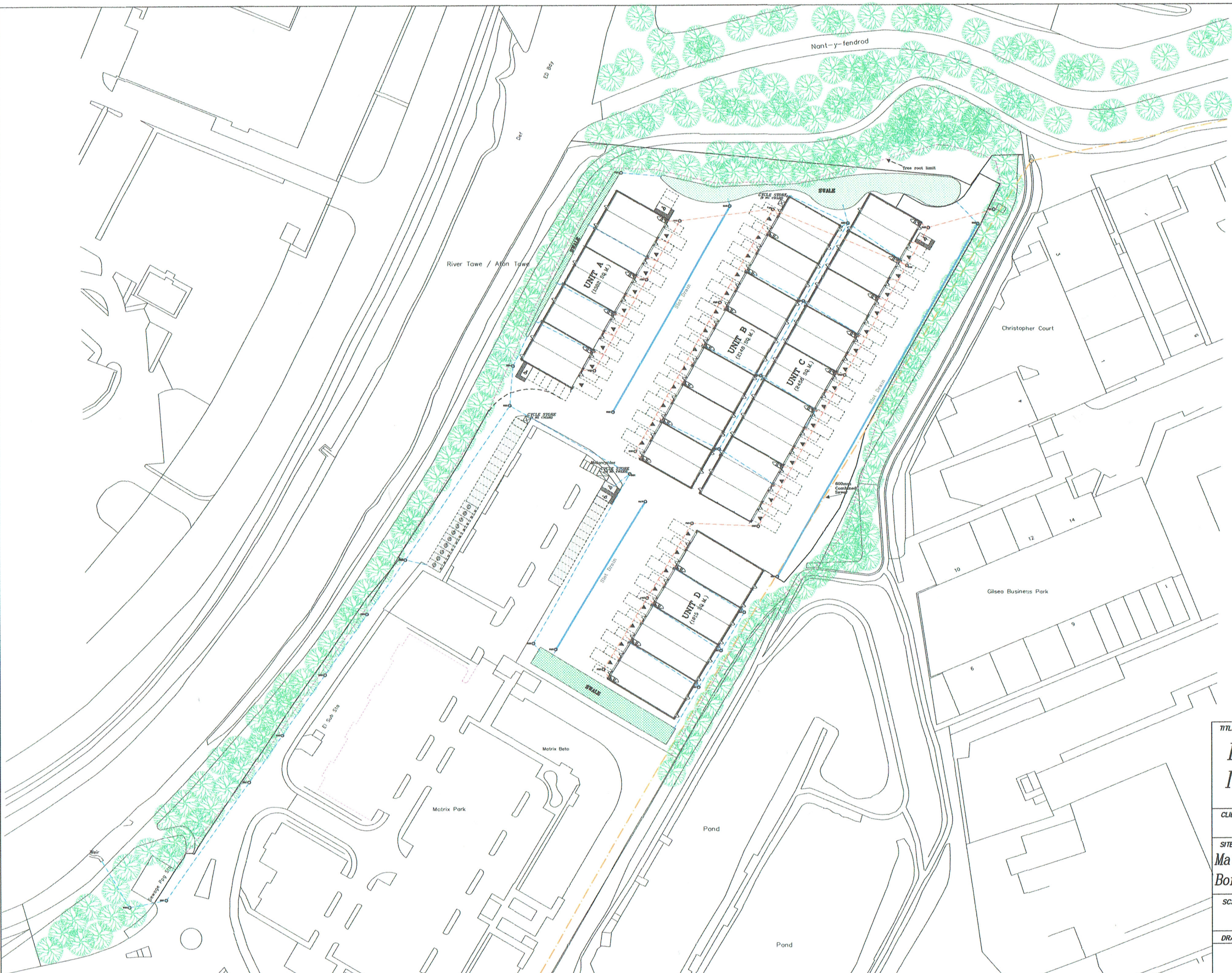
## Appendices

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## Appendix 1

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### Proposed Site Layout



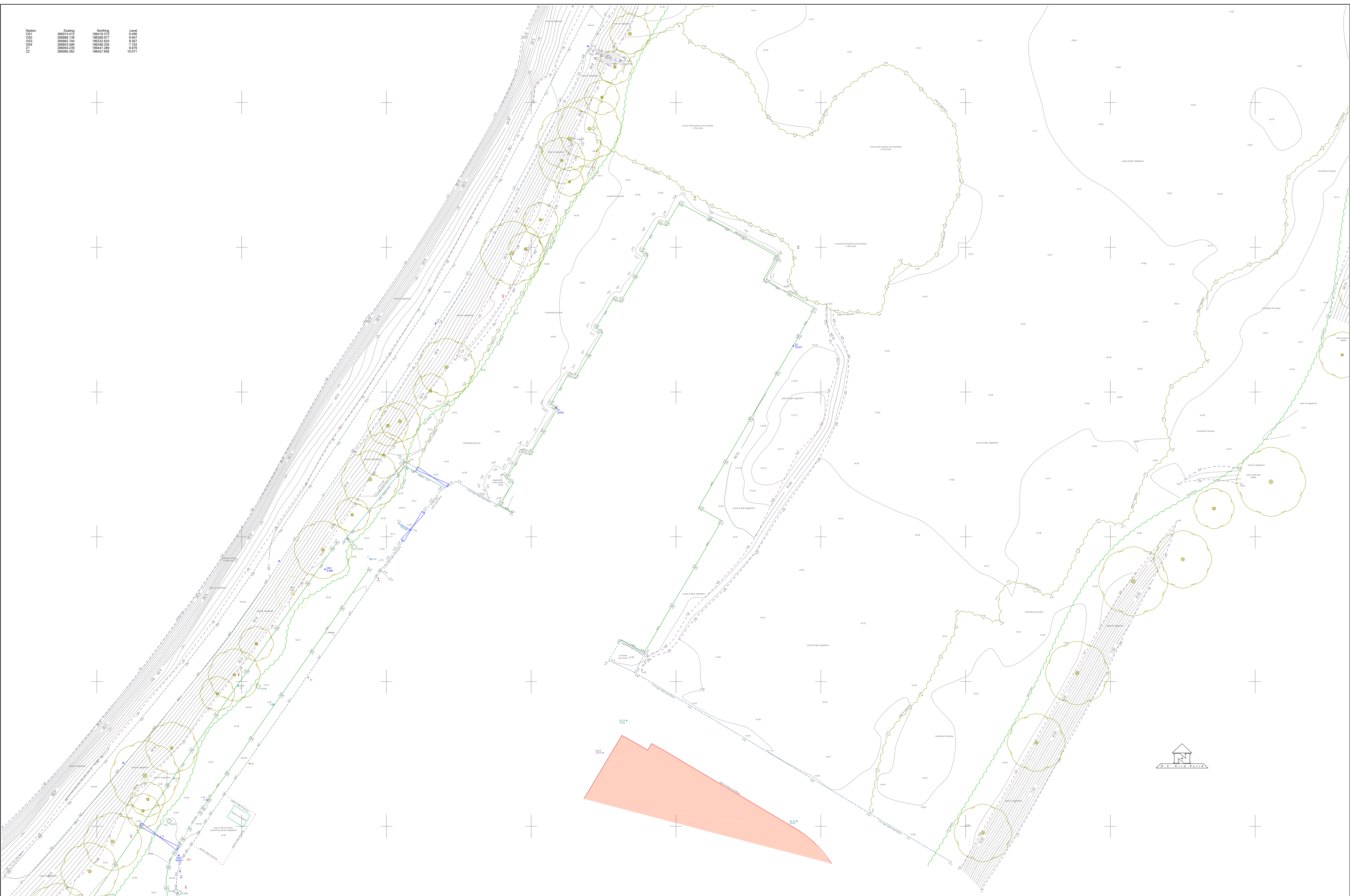
TITLE: <b>Proposed Industrial Units.</b>	
CLIENT <b>Starburst Ltd.</b>	
SITE ADDRESS <b>Matrix Park, Swansea Enterprise Park, Bon-y-Maen, Swansea</b>	
SCALES: <b>1:1250 @ A3</b>	
DRAWING NO. <b>222190/1</b>	REV: <b>B</b>

## Appendix 2

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### Topographical Survey

Station	Easting	Northing	Level
CS1	266214.612	196470.325	9.646
CS2	266289.139	196369.977	9.647
CS3	266262.740	196332.020	9.567
CS4	266243.590	196346.334	7.103
Z1	266264.239	196447.289	9.879
Z2	266295.262	196457.956	10.071



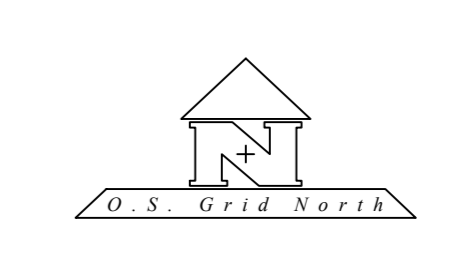
General Survey Legend	
	Survey Station
	Contour Line
	Boundary Line
	Road
	Drainage
	Fencing
	Trees
	Buildings
	Water
	Spot Height
	Bench Mark
	Grid Reference
	Survey Line
	Proposed Road
	Proposed Drainage
	Proposed Fencing
	Proposed Trees
	Proposed Buildings
	Proposed Water
	Proposed Spot Height
	Proposed Bench Mark
	Proposed Grid Reference
	Proposed Survey Line
	Proposed Proposed Road
	Proposed Proposed Drainage
	Proposed Proposed Fencing
	Proposed Proposed Trees
	Proposed Proposed Buildings
	Proposed Proposed Water
	Proposed Proposed Spot Height
	Proposed Proposed Bench Mark
	Proposed Proposed Grid Reference
	Proposed Proposed Survey Line

Notes

Survey Grid: Local Plane Grid related to O.S. National Grid at Survey Control Point Z1.  
 Survey Datum: O.S. Datum Newlyn.  
 North Point: O.S. Grid North.  
 OSGB36 position/orientation and ODN level determined via Network RTK GNSS using the OSTN15/OSGM15 transformations.  
 This survey must only be used in accordance with the instructions for proper use of this survey.

<b>Matrix Park, Swansea</b>		<b>TOPOGRAPHICAL SURVEY</b>	
Client: Starburst UK Ltd		Zerith Land Surveys Ltd <small>OSGB36 position/orientation and ODN level determined via Network RTK GNSS using the OSTN15/OSGM15 transformations.        This survey must only be used in accordance with the instructions for proper use of this survey.</small>	
Scale: 1:200 @ A0		21921_A	
Date: 2 November 2023		IMM & SC	
Zerith Land Surveys Ltd		<b>Zenith Land Surveys LTD</b>	

Station	Easting	Northing	Level
OS1	266874.412	196419.375	9.405
OS2	266881.179	196389.377	9.617
OS3	266882.740	196332.620	9.567
OS4	266843.929	196346.334	7.163
Z1	266954.239	196447.289	9.879
Z2	266995.352	196457.656	10.071



## Matrix Park, Swansea

### TOPOGRAPHICAL SURVEY

General Survey Legend	
	Survey Station
	Contour Line
	Spot Height
	Boundary
	Road
	Fence
	Water
	Building
	Tree
	Utility
	Obstacle
	Marker
	Local Area

**Survey Grid:** Local Plane Grid related to O.S. National Grid at Survey Control Point Z1.  
**Survey Datum:** O.S. Datum Newlyn.  
**North Point:** O.S. Grid North.  
**OSGB36 position/orientation and ODN level determined via Network RTK GNSS using the OSTN15/OSGM15 transformations.**  
 This survey must only be used in accordance with the [instructions for proper use of this survey](#).

Client	Scale	Surveyed	Drawn
Starburst UK Ltd	1:200 @ A0	IMM & SC	IMM & SC

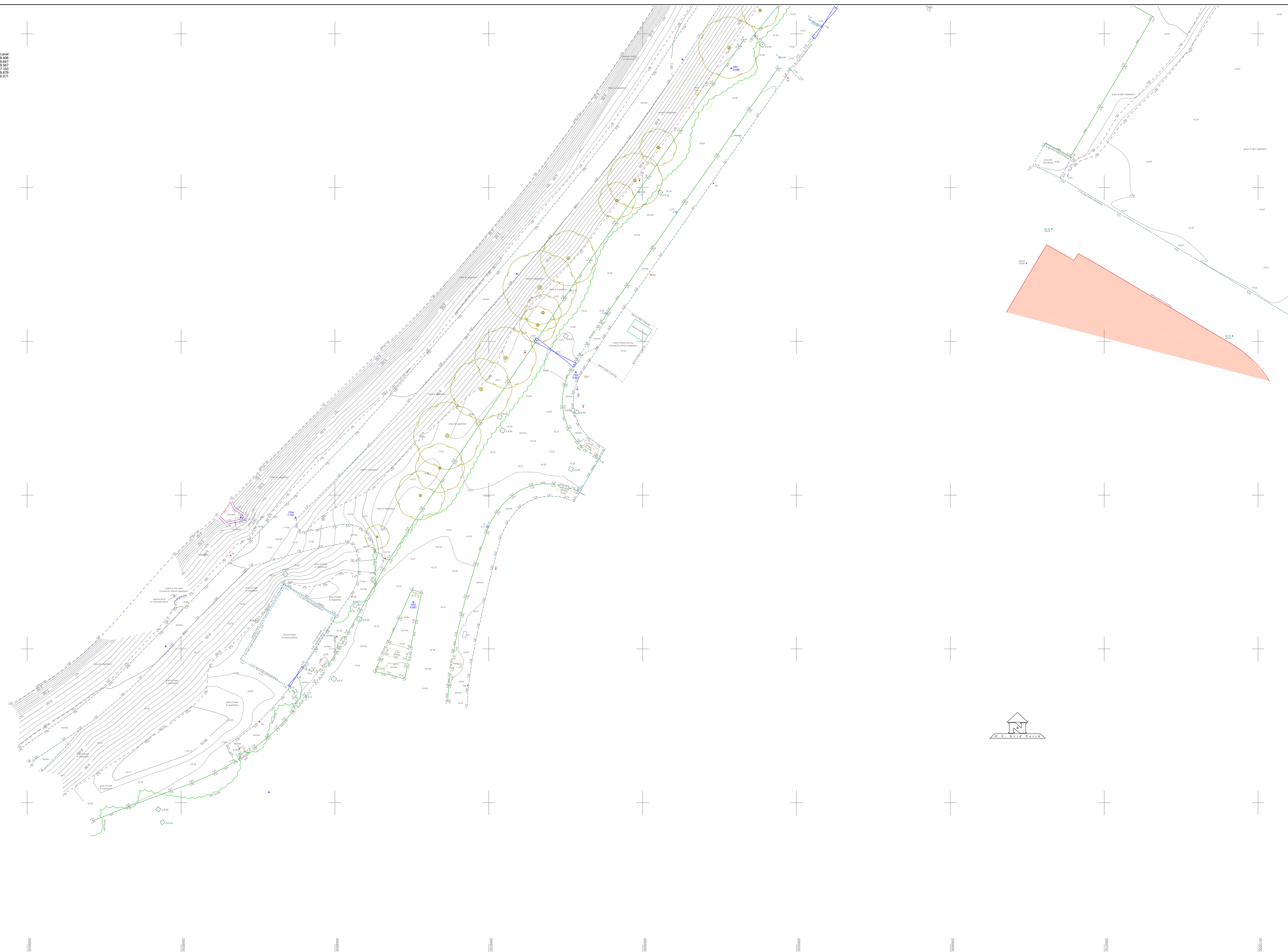
**21921\_A**

Zenith Land Surveys Ltd	
Zenith Land Surveys Ltd 111 The Quadrant, Swansea, SA1 1AA Tel: 01792 521111 E-mail: info@zenithland.com	





Station	Easting	Northing	Level
OS1	266914.412	196419.373	9.450
OS2	266882.740	196332.871	9.567
OS3	266884.280	196461.246	7.103
Z1	266954.239	196447.280	9.879
Z2	266995.262	196437.956	10.071



**General Survey Legend**

Spot Height to ambient	Surface water	Survey Station
Change with feature	Flow direction	Obstacle tree
Edge of feature to ambient	Water level	Obstacle tree
Change surface pattern	Water level	Obstacle tree
Spot Height to ambient	Water level	Obstacle tree
Change with feature	Water level	Obstacle tree
Edge of feature to ambient	Water level	Obstacle tree
Change surface pattern	Water level	Obstacle tree
Spot Height to ambient	Water level	Obstacle tree
Change with feature	Water level	Obstacle tree
Edge of feature to ambient	Water level	Obstacle tree
Change surface pattern	Water level	Obstacle tree

**Notes**

Survey Grid: Local Plane Grid related to O.S. National Grid at Survey Control Point Z1.

Survey Datum: O.S. Datum Newlyn.

North Point: O.S. Grid North.

OSGB36 position/orientation and ODNI level determined via Network RTK GNSS using the OSTN15/OSGM15 transformations.

This survey must only be used in accordance with the [instructions for proper use of this survey](#).

## Matrix Park, Swansea

# TOPOGRAPHICAL SURVEY

Client: **Starburst UK Ltd**

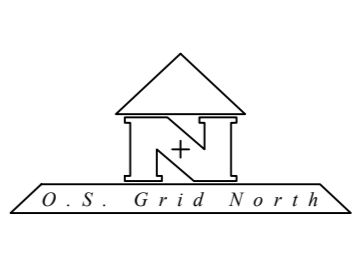
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Date: **2 November 2023**

Service: **IMM & SC**

Drawn: **IMM & SC**

Project: **21921\_A**



Zenith Land Surveys Ltd

Unit 1, The Mill, The Mill Lane, Llanelli, Carmarthenshire, SA31 3JH

Telephone: 01792 211575

Mobile: 07791 211575

E-mail: [info@zenithland.co.uk](mailto:info@zenithland.co.uk)