FLOOD RISK ASSESSMENT

Proposed King Prawn Hatchery
Decoy Farm,
Spalding Road
Crowland,
Lincolnshire,
PE6 0LX

RM ASSOCIATES

10 Main Street
Thorpe on the Hill
Lincoln
LN6 9BG
Tel 01522 681728
Mobile 07967 304737
Email: ray.rmassociates@gmail.com
August 2022 Version 1

RMA

Contents

INTRODUCTION 1
APPLICATION SITE 1
Table 1: Flood Zones Definition 2
Table 2: Flood Risk Vulnerability Classification 2
Site Levels 2
DRAINAGE AUTHORITIES 2
Environment Agency 2
Flood Zones 3
Flood Map for Planning (Source EA) 3
Risk of Flooding from Rivers & Sea 4
Risk of Flooding from Rivers & Sea Map (Source EA) 4
Tidal Flooding 4
Areas at Risk From a Breach to Tidal Defences Wash Frontage Map (Source EA) 4
Fluvial Flood Risk 5
Fluvial Defences 5
River Welland 5
River Welland Node Map 5
Breach Analysis to Welland Washes Defences 6
Residual Flood Hazard South Holland District present day (1% fluvial/0.5% tidal) Map 7
Residual Flood Hazard South Holland District 2115 (1% fluvial/0.5% tidal) Map 7
Residual Flood Depth South Holland District 2115 (1% fluvial/0.5% tidal) Map 8
Floor Levels 8
North level Internal Drainage Board 9
Extract from North Level IDB Drainage Map 9
FLOODING FROM OTHER SOURCES 10
RESIDUAL RISKS 10
SURFACE WATER FLOODING 11
Risk of Flooding from Surface Water Map (Source EA) 11
SEQUENTIAL APPROACH 12
Table 3: Flood Risk Vulnerability and Flood Zone ‘Compatibility’ 12
Sequential Test and Exceptions Test 12
HISTORIC FLOODING 13
Historic Flood Map 13
CLIMATE CHANGE 13
Peak River Flow Allowances 13
Table 1 Peak Rainfall Intensity 14
Table 2 Peak Sea Level Rise 14
DRAINAGE STATEMENT 14
FLOOD RESILIENCE CONSTRUCTION 14
CONCLUSION 15

Figures

Plan 1 Location Plan
Plan 2 Proposed Site Plan
Plan 3 Proposed Floor Plan Growout Building
Plan 4 Proposed Elevations Growout Building
Plan 5 Proposed Floor Plans Process Building
Plan 6 Proposed Elevations Process Building
Plan 7 Proposed Offices & Welfare Facilities Process Building
Plan 8 Proposed Floor Plans Hatchery Building
Plan 9 Proposed Elevations Hatchery Building
Plan 10 Proposed Offices & Welfare Facilities Hatchery Building
Plan 11 Proposed Drainage Plan & Topographical Survey

FLOOD RISK ASSESSMENT FOR PROPOSED KING PRAWN HATCHERY, DECOY FARM, SPALDING ROAD, CROWLAND. PE6 0LX

INTRODUCTION

The Government has placed increasing priority on the need to take full account of the risk associated with flooding at all stages of the planning and development process. This seeks to reduce the future damage to property and the risk to life from incidents of flooding. Their expectations relating to flooding are contained in the National Planning Policy Framework July 2021, (NPPF), which identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications by avoiding inappropriate development in areas at risk from flooding and to direct development away from areas at highest risk.

The NPPF provides that development in areas at risk of flooding should be avoided and seeks to direct development away from areas at highest risk. There is a sequential, risk-based approach to the location of development avoiding where possible, flood risk to people and property managing any residual risk and taking account of the impacts of climate change.

This document has been prepared solely as a flood risk assessment and drainage statement on behalf of the client, Flo-Gro Systems Limited., to support the planning application. RM Associates accepts no responsibility or liability for any use of this document other than by the client, for the purposes for which it was originally commissioned and prepared. If any unauthorised Third Party comes into possession of this report; they rely on it at their own risk and RM Associates owe them no duty of care or skill. All comments contained in this report, including any conclusions are based upon information available at the time of writing the report. RM Associates accepts no liability if additional information exists or becomes available after the time of writing this report. This document is the copyright of RM Associates. The reproduction or transmission of all or part of this document, whether by photocopying or storing in any medium by electronic means or otherwise, without the prior written consent of RM Associates is prohibited.

This report contains public sector information licensed under the Open Government Licence v3.0.

APPLICATION SITE

The proposed site is located at Decoy Farm, Spalding Road, Crowland, PE6 0LX. within the administrative area of South Holland District Council. The National Grid Reference is TF26172 13061. **Plan 1**

This flood risk assessment has been prepared for a planning application for the erection of a King Prawn hatchery Phase 1 comprising of 2 No Growout Building, a Hatchery a Process Building, and Store. **Plans 2, 3, 4, 5, 6, 7, 8, 9, & 10**

The Site would be classed as Major Development applying the National Planning Policy Guidance (NPPG) as the site is to be developed for more than 1000m^2.

The National Planning Policy Framework Guidance NPPG defines three levels of flood risk depending upon the

annual probability of fluvial flooding occurring.

Zone 1 – Low Probability (<0.1%)

Zone 2 – Medium Probability (0.1 – 1.0%)

Zone 3 – High Probability (>1.0%)

The proposed development site is shown to be within Flood Zone 3 High Probability' as detailed on the Environment Agency's Flood Zone Maps **without defences**, and as defined in Table 1 of NPPG**.**

Table 1: Flood Zones Definition

Flood Zone 3- High Probability
Definition Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for uses in times of flood Flood Risk Assessments requirements All proposals in this zone should be accompanied by a Flood Risk Assessment. Policy aims 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 appropriate application of sustainable drainage techniques. • relocate existing development to land with a lower probability of flooding. • create space for flooding to occur by allocating and safeguarding open space for flood storage.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed commercial use for the site is classified as “Less Vulnerable”, Table 1 of NPPG states that such uses are permitted in this zone.

Table 2: Flood Risk Vulnerability Classification

Less Vulnerable
• Police ambulance and fire stations that are not required to be operational during flooding • Buildings used for shops, financial, professional, and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable” and assembly and leisure. • Land and buildings used for agricultural and forestry. • Waste treatment (except land fill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works that do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flood events are in place).

Site Levels

From the topographical survey the land levels at the site vary from 0.85 – 1.30mODN with the average ground level being 0.90mODN.Spalding Road at the site entrance is 2.35mODN. **Plan 11**

DRAINAGE AUTHORITIES

Environment Agency

The Environment Agency has permissive powers for reducing the risk of flooding from designated main rivers and from the sea.

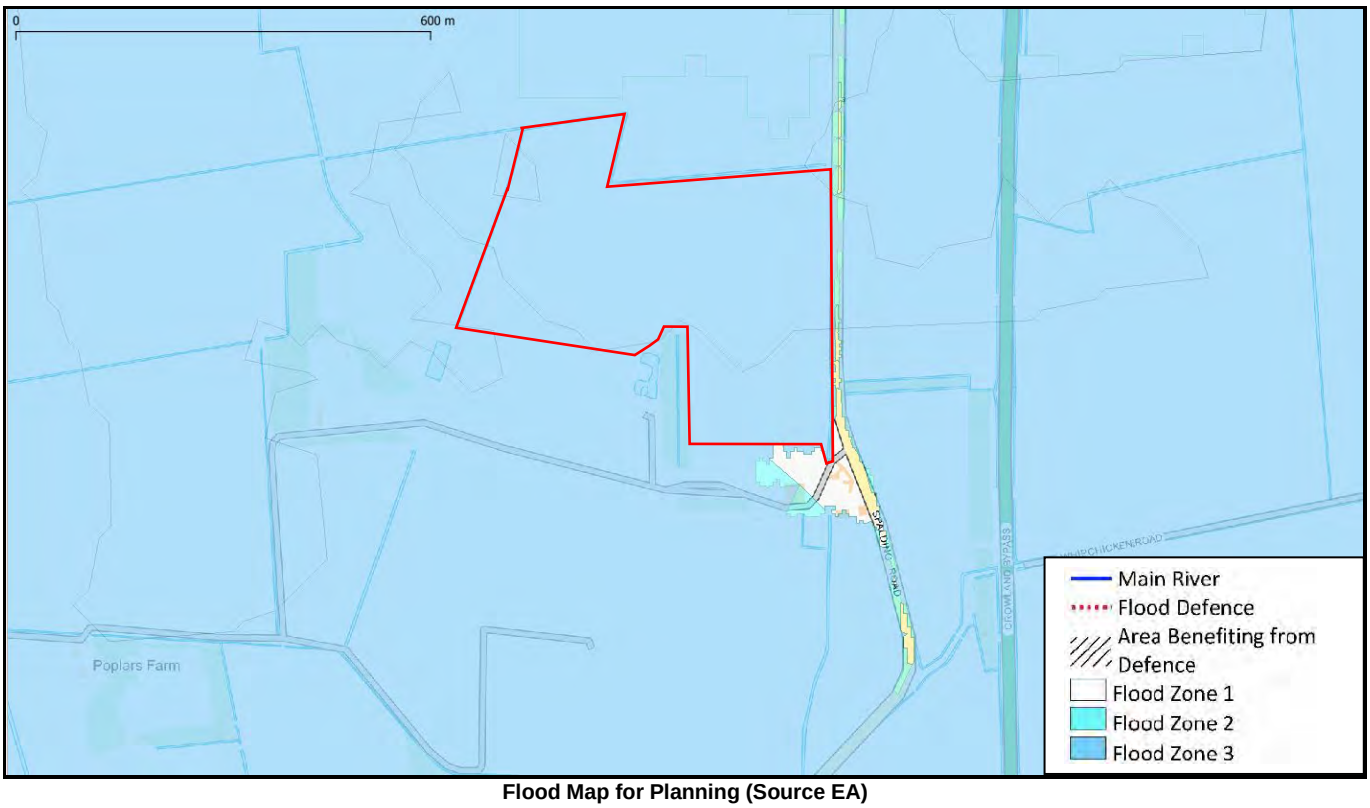
The following potential sources of flooding affecting the development site have been identified as:

- From the River Welland
- North Level Internal Drainage Board Drains

The flood zone maps indicate that the area would be flooded without flood defences.). The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. In some locations, such as around the fens and the large coastal floodplains there are many kilometres of raised flood defences. To meet the requirements of the National Planning Policy Framework, these defences are removed in their entirety to produce the Flood Map for Planning (Rivers and Sea). The map therefore shows the full extent of areas that would be at risk of flooding if no defences existed, and water could spread out across the floodplain.

Flood Zones

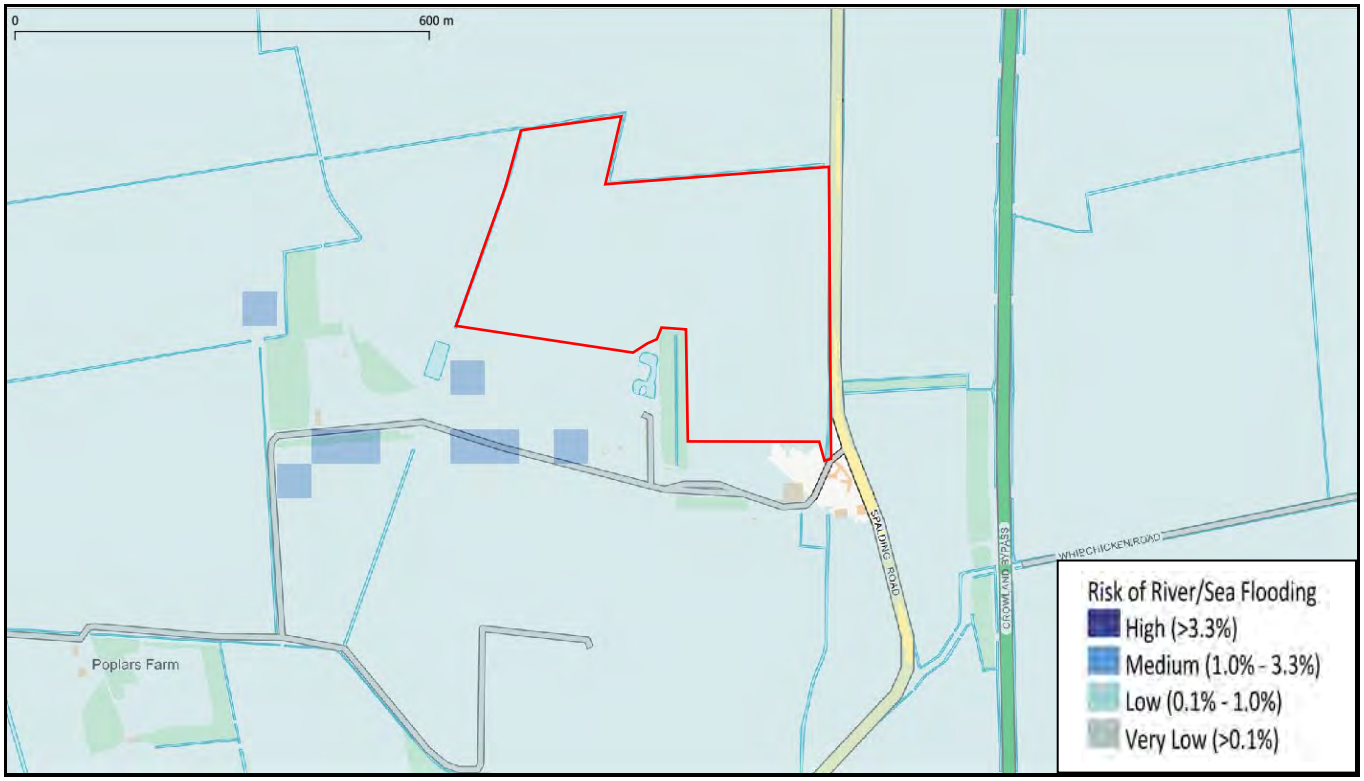
These maps show that the site is not considered at risk from tidal/fluvial flooding as it is all located within an area zoned as Flood Zone 3a.The maps indicate that the area would be flooded without flood defences, which are in place, (with an annual probability of more than 0.5% i.e., return frequency of less than 1 in 200 years for tidal flooding or more than 1.33% return frequency of less than 1 in 100 years for fluvial flooding).



Flood Map for Planning (Source EA)

Risk of Flooding from Rivers & Sea

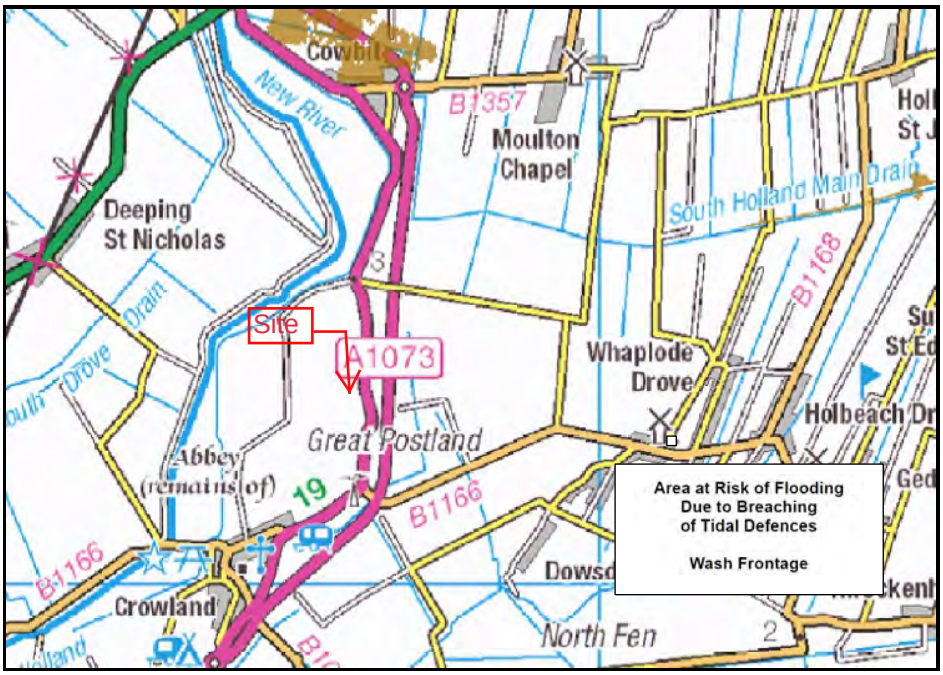
The Risk of flooding from Rivers and Sea shows that the site is at Low risk. **Low risk** means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail.



Risk of Flooding from Rivers & Sea Map (Source EA)

Tidal Flooding

The site is not shown to be affected by tidal flooding on the areas at risk map from a breach to the tidal defences.



Areas at Risk From a Breach to Tidal Defences Wash Frontage Map (Source EA)

Fluvial Flood Risk

The main risk of flooding is therefore from flooding from Main River.

Fluvial Defences

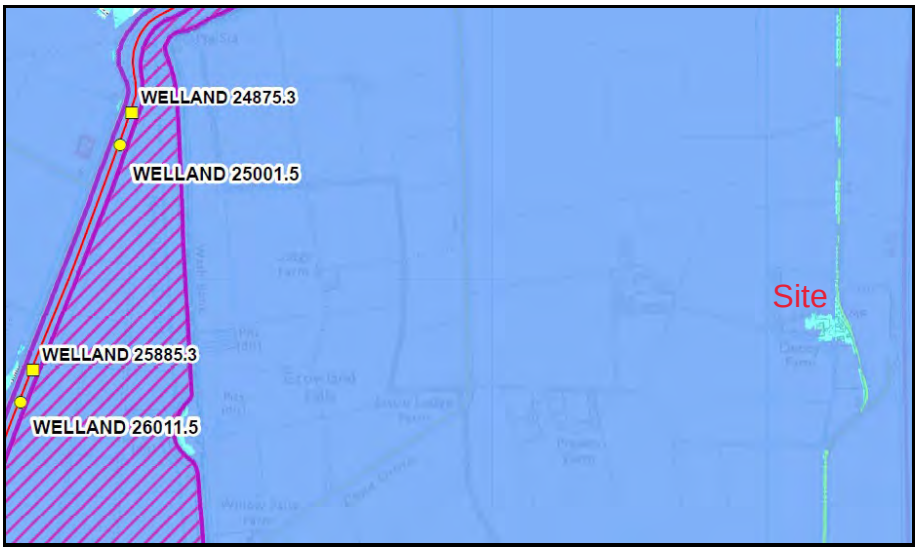
In this particular area, the main risk of flooding is from a breach to the Crowland washlands embankment which lies some 1700m west of the site with the River Welland lies some 575m further to the west.

The fluvial defences protecting the site consist of Crowland-Cowbit Washes and embankment. They are in fair condition and reduce the risk of flooding to a 1% (1 in 100) chance of occurring in any year. The Environment Agency inspect these defences routinely to ensure potential defects are identified.

River Welland.

The site is located approximately 1700m from the River Welland Crowland Washes, a controlled flood storage area on the River Welland. Flood levels in the Washes are governed by the level in the River Welland and the structures which control flow of water between them. The Wash lands are located to the east of the River Welland and the right bank is lower than the left bank any over topping on this stretch of river will therefore be into the Washlands.

The fluvial levels flow for these node points are taken from the Lower River Witham Model (2009). and are the most up-to-date currently available. The Environment Agency aims to review their models on a regular basis.



River Welland Node Map

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

			Annual Exceedance Probability - Maximum Water Levels (mODN)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
WELLAND 23739	524413	314381	3.77	4.09	4.31	4.57	4.69	4.71	4.71	4.75	4.72	4.72	4.75
WELLAND 25001.5	523648	313490	3.79	4.12	4.34	4.60	4.73	4.75	4.76	4.79	4.77	4.77	4.79
WELLAND 26011.5	523285	312552	3.81	4.14	4.37	4.63	4.78	4.81	4.82	4.84	4.83	4.83	4.84

Fluvial Flood Flows (m^3/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m^3/s).

			Annual Exceedance Probability - Maximum Flows (m^3/s)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
WELLAND 23612.8	524512	314459	51.70	67.79	77.78	94.44	114.32	116.89	122.97	119.48	121.77	118.62	124.62
WELLAND 24875.3	523690	313608	49.99	66.11	75.98	94.08	117.55	121.59	125.85	124.42	125.46	124.05	127.98
WELLAND 25885.3	523331	312669	49.23	65.35	75.14	94.18	120.10	125.21	128.67	128.51	128.79	128.24	130.56

Breach Analysis to Welland Washes Defences

Taking the precautionary approach, the Hazard Rating following a breach which in Flood Risk Assessment (FD 2320) Guidance for New Development Phase 2 R& D Technical Report these are classified as low <0.75, moderate 0.75 - 1.25, significant 1.25 - 2.00 and extreme >2.0 based upon an empirical measure of velocity and depth.

HR = d x (v + 0.5) +DF

Where V = Flood flow velocity (m/sec) D = Flood depth (m)

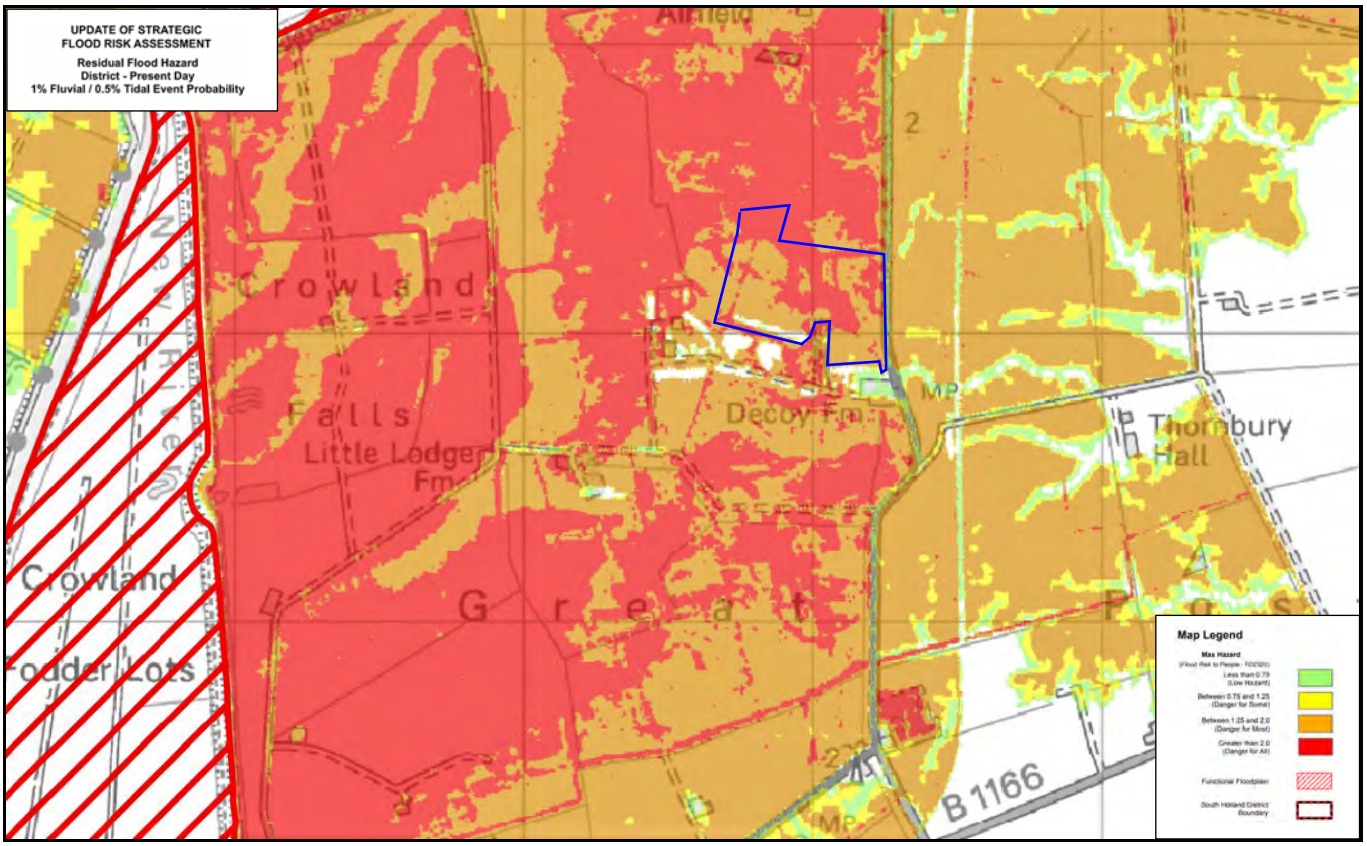
DF = A debris factor included to represent the greater damage, or risk of injury to people, that can occur if debris is swept along with the water. = 0.5 for depths <0.25 or 1.0 for depths.

For the degree of Flood Hazard to be classified as low HR must be <0.75

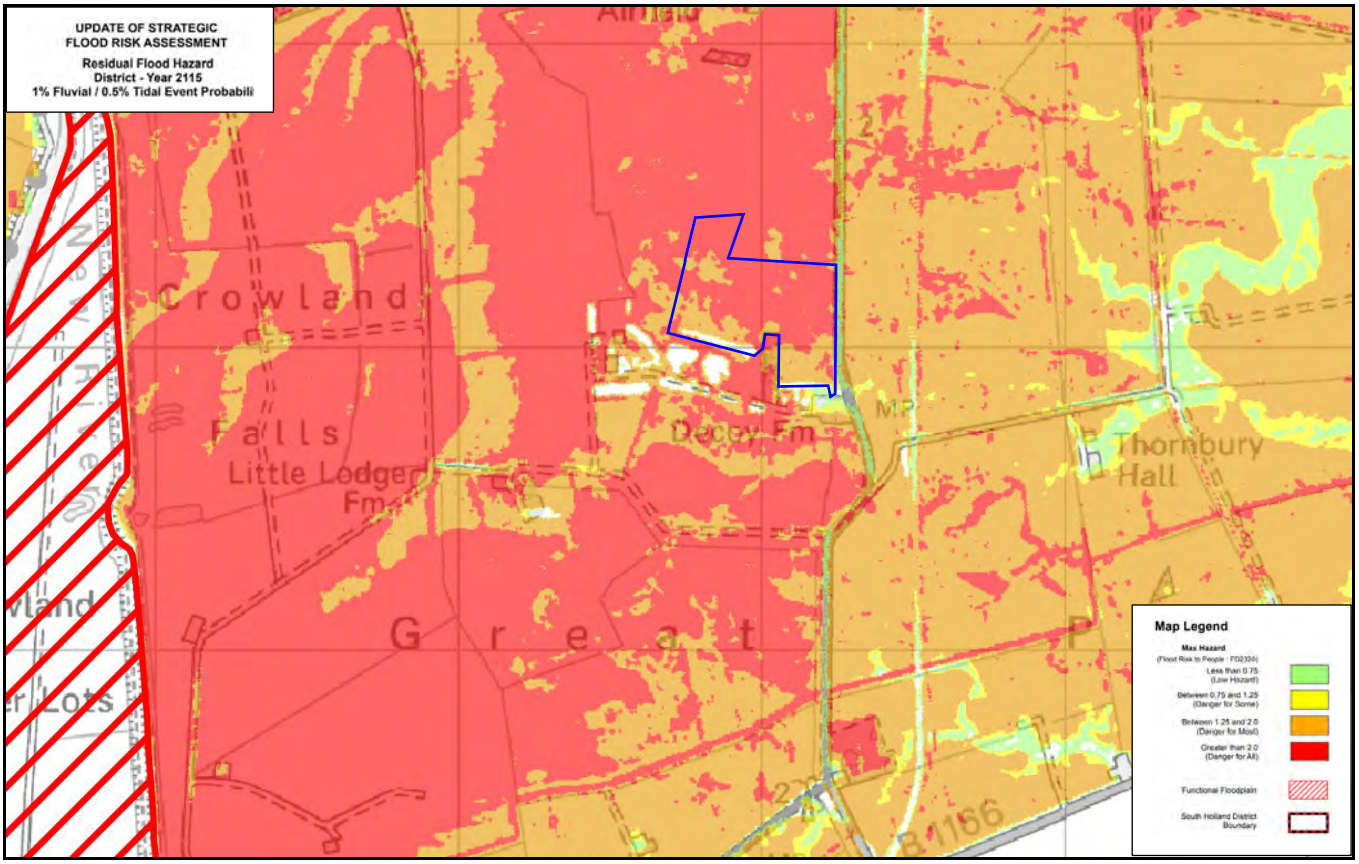
Flood Hazard			Description
	<0.75	Low	**Caution –** Flood Zone with shallow flowing water or deep standing water.
	0.75 – 1.25	Moderate	**Danger for Some -** (i.e. children) Danger Flood Zone with deep or fast flowing water.
	1.25 – 2.0	Significant	**Danger for Most –** Danger Flood Zone with deep fast flowing water.
	>2.0	Extreme	**Danger for All** – Extreme Danger Flood Zone with deep fast flowing water.

The 2017 Update to SHDC, SFRA has carried out a Tidal & Fluvial Hazard Mapping, for the District, following a breach to the defences. The present-day for the Residual Flood Hazard, Depth and Velocity District –1% fluvial and 0.5% Tidal Event Probability show that the site where the proposed buildings are to be located is within hazard area of between 1.25 – 2.0 (Danger for Most), Depth of flooding 1.0 – 1.6m, velocity 0 - 0.3m/sec.

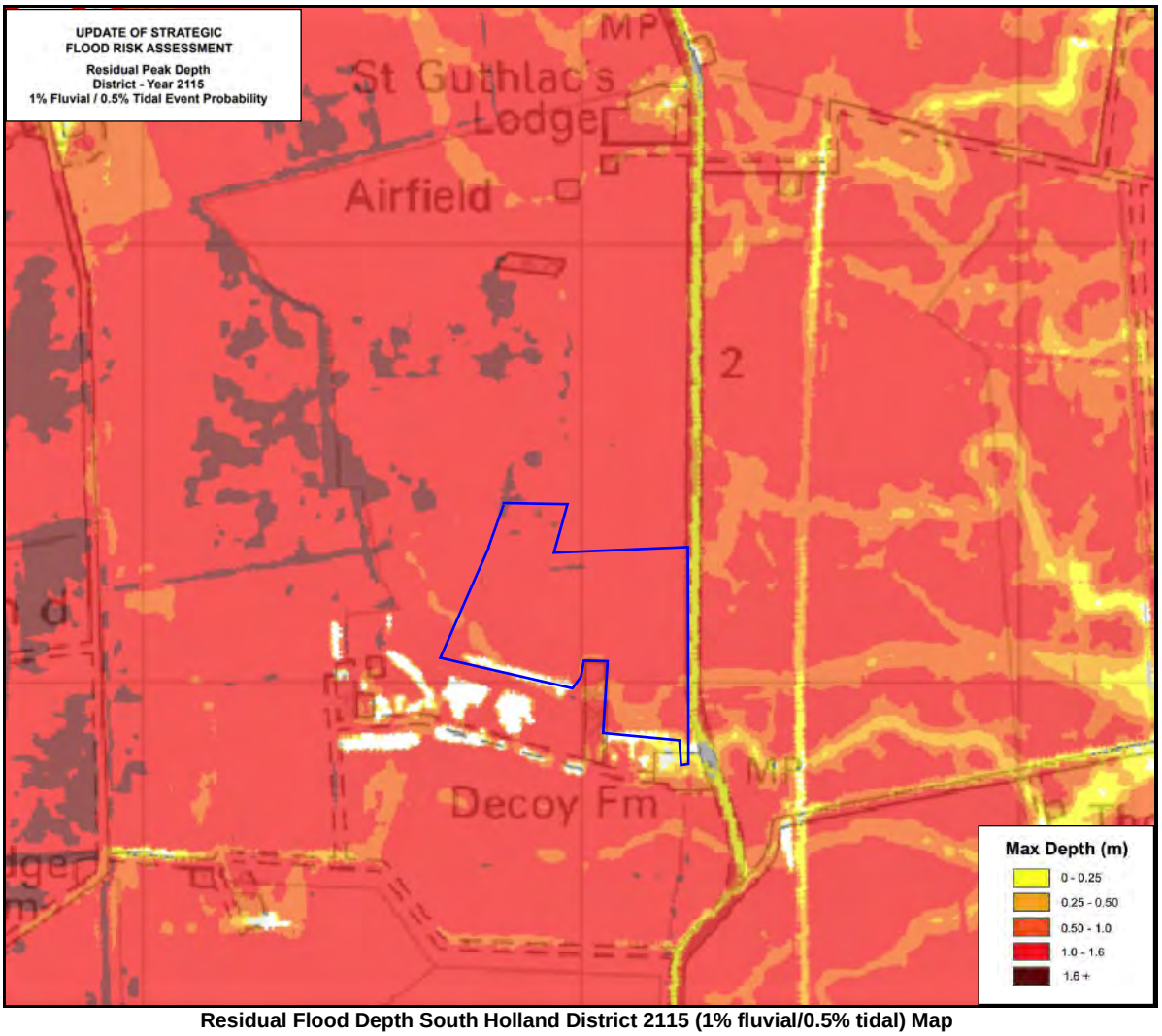
With climate change (2115) the Residual Flood Hazard, Depth and Velocity District –1% fluvial and 0.5% Tidal Event Probability show that the site where the proposed buildings are to be located is within hazard area of between 1.25 – 2.0 (Danger for Most) Depth of flooding1.0 – 1.6 m, velocity 0 - 0.3m/sec



Residual Flood Hazard South Holland District present day (1% fluvial/0.5% tidal) Map



Residual Flood Hazard South Holland District 2115 (1% fluvial/0.5% tidal) Map



Residual Flood Depth South Holland District 2115 (1% fluvial/0.5% tidal) Map

Floor Levels

The Environment Agency recommends that appropriate mitigation measures / flood resilience techniques are incorporated in the design of the development. For Less Vulnerable uses ideally the FFL to be above the flood level where this is not practicable the floor level for single storey buildings should be set as high as practicable above the existing ground level, minimum of 300mm, with flood resilient construction used to a height of 300mm above the predicted flood level and if possible a place of safe refuge at high level should be provided.

Due to the topography of the site for the development and particular the length of the Grow Out buildings some parts of the building will be set below the natural ground level, flood resilient construction will be incorporated to a minimum height of 300mm above the predicted flood level. This accords with the South East Lincolnshire standing advice matrix, Cell D4 for (Hazard rating Danger for Most). A safe refuge for all employees is available at first floor level within the Process and Hatchery buildings.

South Holland District Council

In order to inform the process of risk assessment and site selection the District Council commissioned Haskoning UK Ltd Consultants to prepare a Strategic Flood Risk Assessment in December 2002.They have carried out an update of this report and this report was published in January 2010 and this was further updated in February 2017.

This Flood Risk Assessment has taken the results of the (2017) updated South Holland Strategic Flood Risk Assessment (SHSFRA) into account in its findings.

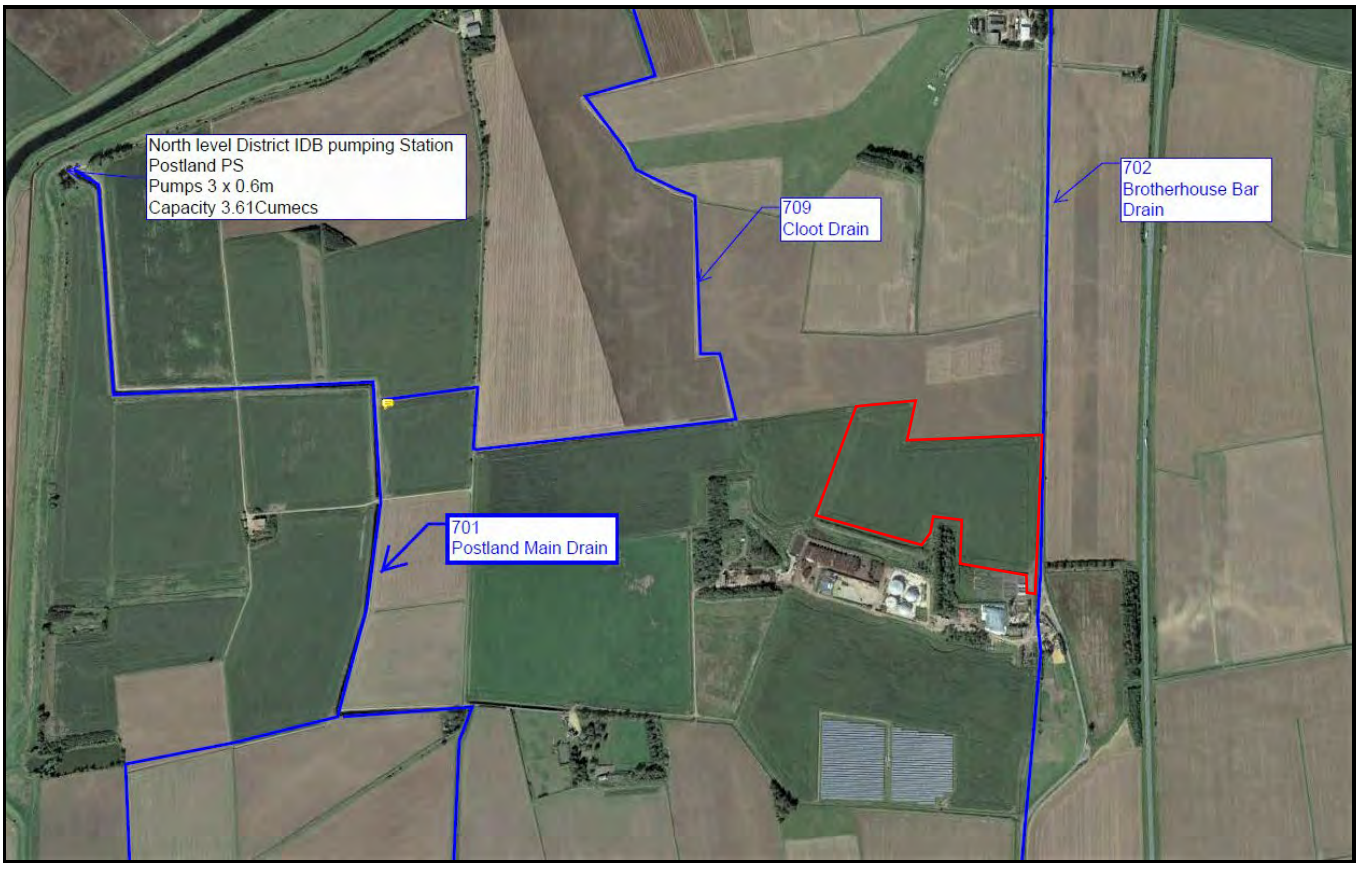
The whole of the tidal flooding information has been replaced by the mapping from the latest Environment Agency Tidal Hazard mapping. Where the mapping for an area contains both fluvial and tidal components, the more severe of the two has been presented.

North level Internal Drainage Board

The site lies within the administrative area of the North Level Internal Drainage Board who has powers under the Land Drainage Act to carry out measures to alleviate flooding in Districts with special drainage needs other than Main River.

The site is within the Postland drainage area which drains to Postland Pumping Station constructed in 1973 as part of the North Level Major Improvement Scheme, originally designed to evacuate surplus water from an agricultural area of 2567 hectare. In more recent years with the residential expansion of Crowland, 6.5 hectares of urban run-off now discharges directly into the drainage system. To accommodate this extra flow, the drainage channel has been increased in size to store surplus water without increasing pump capacity, this work being funded by the developers.

Alongside the eastern Boundary there is a riparian maintained watercourse into which the outflow from the attenuation lagoons will discharge.



Extract from North Level IDB Drainage Map

The Board's prior written consent will be required for any of the following works:

- No person without the previous consent of the Board shall erect any building or structure, whether temporary or permanent, or plant any tree, shrub, willow or other similar growth within 9 metres of the landward toe of the bank where there is an embankment or wall or within 9 metres of the top of the batter where there is no embankment or wall, or where the watercourse is enclosed within 9 metres of the enclosing structure.

- No person shall, without the previous consent of the Board, for any purpose, by means of any channel, siphon, pipeline or sluice or by any other means whatsoever, discharge of any surface water or treated effluent into the District or, whether directly or indirectly, increase the flow or volume of water in any watercourse in the District.

- The erection or alteration of any mill dam, weir or other like obstruction to the flow, or erection or alteration of any culvert within the channel of a riparian watercourse.

FLOODING FROM OTHER SOURCES

Flooding is a natural process and can happen at any time from sources other than watercourses and the sea.

- Flooding from land can occur from intense rainfall, often over short duration of time that is unable to soak into the ground or enter the drainage system. However, with the natural topographic nature of the ground being flat, with no high ground around the site this will not cause any rapid inundation of the site and is likely only lead to local ponding of shallow depth and low velocity. It is concluded that flooding from this source is limited to minor isolated cases and is not of strategic significance as regards to flood risk.

- The area is not known to suffer from any groundwater problems.

- Flooding from sewers can occur from overloading from heavy rainfall caused by blockages or having inadequate capacity. There are no public sewers in the vicinity of the site.

- Non-natural or artificial sources of flooding such as reservoirs, lakes, or canals where water is stored above natural ground level could cause flooding if the structure fails or is over topped. There are no known sources within the vicinity of the site.

RESIDUAL RISKS

There is always a possibility of a flood more than that allowed for which might conceivably cause some flooding to the properties. However, such an event would have a very low probability and the risk of flooding to the property would be extremely small. It is therefore considered that the residual risks associated with flooding are not significant.

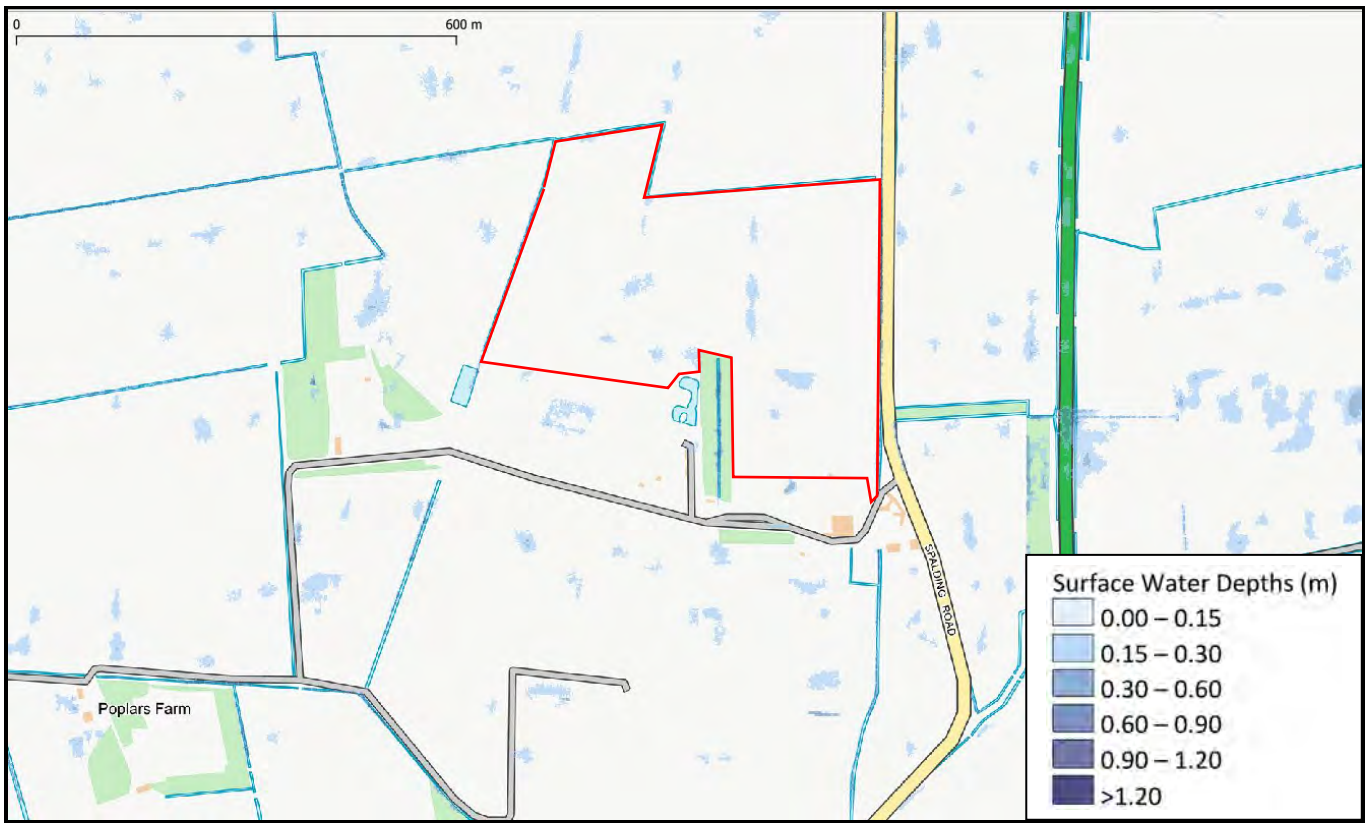
SURFACE WATER FLOODING

The proposed development site is shown on the Low-Risk scenario Surface Water flood maps, for the 1 in 1000-year event, not to be affected from surface water flooding.
The maps for surface water and revised maps for river and sea flooding define the risk as High, Medium, Low and Very Low. The chance of flooding for the area defined in any given year is shown below:

- **High:** greater than 1 in 30 (3.3%).
- **Medium:** between 1 in 100 (1%) and 1 in 30 (3.3%).
- **Low:** between 1 in 1000 (0.1%) and 1 in 100 (1%).
- **Very Low:** less than 1 in 1000 (0.1%)

The proposed development site is shown on the Low-Risk scenario Surface Water flood maps, for the 1 in 1000-year event, not to be affected from surface water flooding.

Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area with low depressions shown to be affected.



Risk of Flooding from Surface Water Map (Source EA)

There is a caveat on the Defra Data website, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they are indicative, these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

The Environment Agency and the Lead Local Flood Authority (custodians of the surface water flood risk dataset) have subsequently confirmed that the published high-level data should not be used on a site-specific basis and that mapping is only suitable for National to County Scale use.

SEQUENTIAL APPROACH

When applying the sequential approach for flood risk in accordance NPPF the site of the development would fall into Flood Zone 3 (High Probability) as the site is shown to be within the fluvial flood plain as shown on the Environment Agency's Flood Map without defences in place.

The Environment Agency categorise land into one of three Flood Zones.

- Flood Zone 1 is land outside the 0.1% floodplain (with a chance of flooding of less than 0.1% chance in any given year)

- Flood Zone 2 is land that falls between the 1 in 100-year extent and the 1 in 1000-year extent (a chance of flooding between 1% and 0.1% in any given year).

- Flood Zone 3a is land which falls within the 1 in 100-year flood extent (has a 1% chance of a flood occurring in any given year).

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed development for commercial use is classified as, "Less Vulnerable" with Table 1 of NPPG stating that such uses are appropriate in this zone (as summarised in Table 3 NPPG).

Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Flood Zone 1	✓	✓	✓	✓	✓
	Flood Zone 2	✓	✓	Exception Test Required	✓	✓
	Flood Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Flood Zone 3b Functional Floodplain	Exception Test Required	✓	✗	✗	✗

Sequential Test and Exceptions Test

NPPF Guidance Paragraphs 159 - 169 requires development within high areas of flood risk be determined using a sequential risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account the impacts of climate change.

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The NPPF states that development should not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. It is important to note that the Sequential Test does not specifically mean that sites such as this cannot be developed, rather that sites at less risk should be developed first.

A Sequential test has been prepared by others is included within the Design and Access Statement.

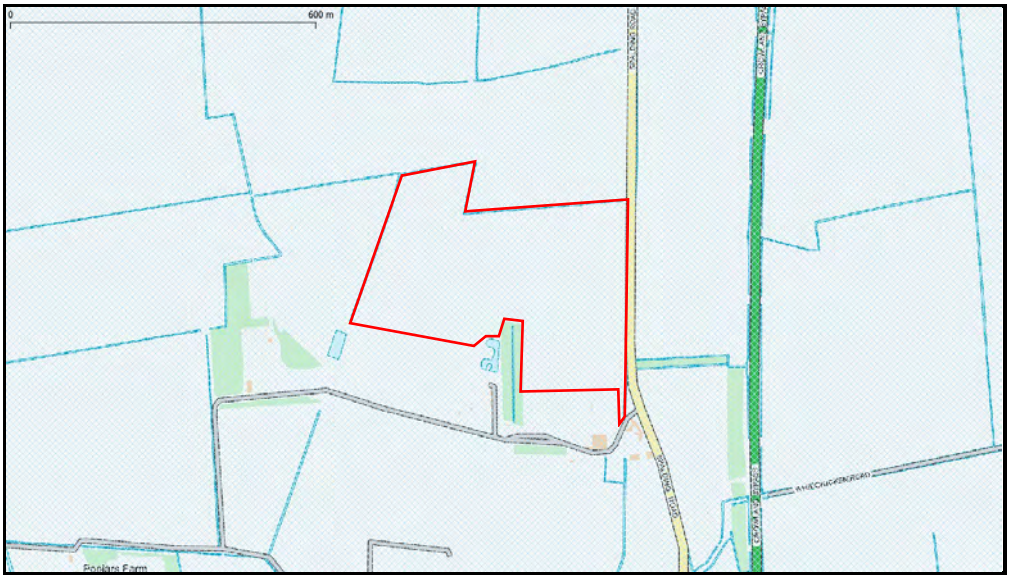
With the development being for Less Vulnerable uses the Exception Test is not required.

This Flood Risk Assessment in terms of making the development safe, would be sufficient to mitigate against flood risk and demonstrates that the development will be safe for its lifetime, and it will not increase flood risk elsewhere.

Given the above, it is concluded that the Sequential Test is satisfied.

HISTORIC FLOODING

The site is shown on the historic flood map as being affected by flooding from the March 1947 flood on the River Welland.



Historic Flood Map

CLIMATE CHANGE

Global warming is now recognised that it is likely to affect the frequency and severity of extreme events as both tidal and fluvial flooding. The Climate change allowances in the NPPF Guidance was updated on the 20th of July 2021.

Peak River Flow Allowances

For flood risk assessments use the Management Catchment Climate Changes for the peak river flow map. Management catchments are sub-catchments of River Basin Districts. The site is located within the Welland

Management Catchment within the Anglian River Basin District, for sites within Flood Zone 2 or 3a and for "Less Vulnerable" land uses, the Central allowances figures, in the Table below, should be used.

Peak River flow allowances within the Management Catchment Allowances				
River Basin District /Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015 to2039)	Total potential change anticipated for '2050s' (2040 to2069)	Total potential change anticipated for '2080s' (2070 to2115)
Anglian/ Welland	Upper End	22%	26%	53%
	Higher Central	10%	10%	28%
	Central	5%	4%	17%

The effect of global warming on peak rainfall allowances is given in Table 1.

Table 1 Peak Rainfall Intensity

Table 1 Peak rainfall intensity allowance in small and urban catchments (1961 to1990 baseline)			
Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

The annual sea rise due to climate change is given in NPPF and the recommended contingency allowances are stated in Table 2.

Table 2 Peak Sea Level Rise

Table 2 Peak Sea level allowance for each epoch in (mm) per year with cumulative sea level rise for each epoch in brackets (use 1981to 2000 baseline)						
Area of England) (Use River Basin	Allowance	2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125	Cumulative Rise 2000 to 2125 (m)
Anglian	Higher Central	5.8 (203mm)	8.7 (261mm)	11.6 (348mm)	13 (390mm)	1.20m
Anglian	Upper End	7 (245mm)	11.3 (339mm)	15.8 (474mm)	18.1 (543mm)	1.6m

DRAINAGE STATEMENT

A drainage statement for the site has been prepared by **Stafford Infrastructure Engineering** and should be read in conjunction with this Flood Risk Assessment.

FLOOD RESILIENCE CONSTRUCTION

Any impact of damage to the properties can be foreseen and mitigated against by relatively simple design and construction techniques. There are two forms of flood protection works: -

- **Flood-resistance or proofing works**- these try to reduce the amount of water entering a building.

- **Flood-resilient works**: - these reduce the amount of damage caused by water entering the building.

The proposed development will have the following resilient measures incorporated in the construction in accordance with “Improving the flood performance of new buildings” CLG (2007).

- Water, electricity, and gas meters: should be located above the predicted flood level. Electrical services: electrical sockets, heating systems: boiler units and ancillary devices should be installed at least 500mm above the ground floor level to minimise damage to electrical services Electric ring mains should be installed at first floor level with drops to ground floor sockets and switches.

- The ground floor to be constructed with a solid concrete floor with no voids beneath and no low-level wall vents.

- Avoid the use of mineral fibre insulation to the ground floor level (walls & floor) and use a rigid closed cell material as these retain integrity and have low moisture take-up.

- Where possible, all service entries should be sealed (e.g., with expanding foam or similar closed cell material). Closed cell insulation should be used for pipes which are below the predicted flood level.

- Use standard gypsum plasterboard up to the predicted flood level (plus freeboard of 50mm) as a sacrificial material fixed horizontally for easy removal and replacement.

- As this site is in an area that is capable of receiving flood warnings from the Environment Agency Floodline Warning Direct system. It is recommended that the property Owner contact the Environment Agency’s Floodline on 0345 988 1188 to register the property to receive advance warning of flooding by telephone, mobile, fax, SMS text, email or pager. The Environment Agency aim to issue a ‘severe flood warning’ approximately 2 hours before existing defences are overtopped.

CONCLUSION

- The site does have the protection of flood defences which are well maintained by the Environment Agency.

- The site for the proposed development is shown to be within Flood Zone 3 ‘High Probability' as detailed on the Environment Agency's Flood Zone Maps without defences.

- The 2017 update to SHDC, SFRA has carried out a Tidal & Fluvial Hazard Mapping, for the District, following a breach to the defences. The present-day for the Residual Flood Hazard, Depth and Velocity District –1% fluvial and 0.5% Tidal Event Probability show that the site where the proposed development is to be located is within hazard area of between 1.25 – 2.0 (Danger for Most), Depth of flooding 1.0 – 1.6m, velocity 0 - 0.3m/sec. With climate change (2115) the Residual Flood Hazard, Depth and Velocity District –1% fluvial and 0.5% Tidal Event Probability show that the site where the proposed development is to be located is within hazard area of between 1.25 – 2.0 (Danger for Most) Depth of flooding 1.0 –

1.6 m, velocity 0 - 0.3m/sec

- It is proposed that the ground floor area will have flood resilient construction incorporated to a minimum height of 300mm above the predicted flood level.

- The Flood Risk Vulnerability Classification in Table 2 of NPPG the proposed commercial development is classified as “Less Vulnerable”, with Table 1 of NPPG stating that such uses are appropriate in this zone. For Less Vulnerable uses the Exception Test is not required.

- The hatchery and process buildings are of two storey construction with accommodation at first floor level. This will provide a refuge for staff if the area becomes flooded after a major breach of the fluvial defences. In the event of a flood incident, the safest option would be for staff to remain in the building and use the internal staircases to make their way to the upper floor area which would provide a safe haven. Staff should not attempt to leave the building and make their way through flood water, unless instructed to do so by the emergency services.

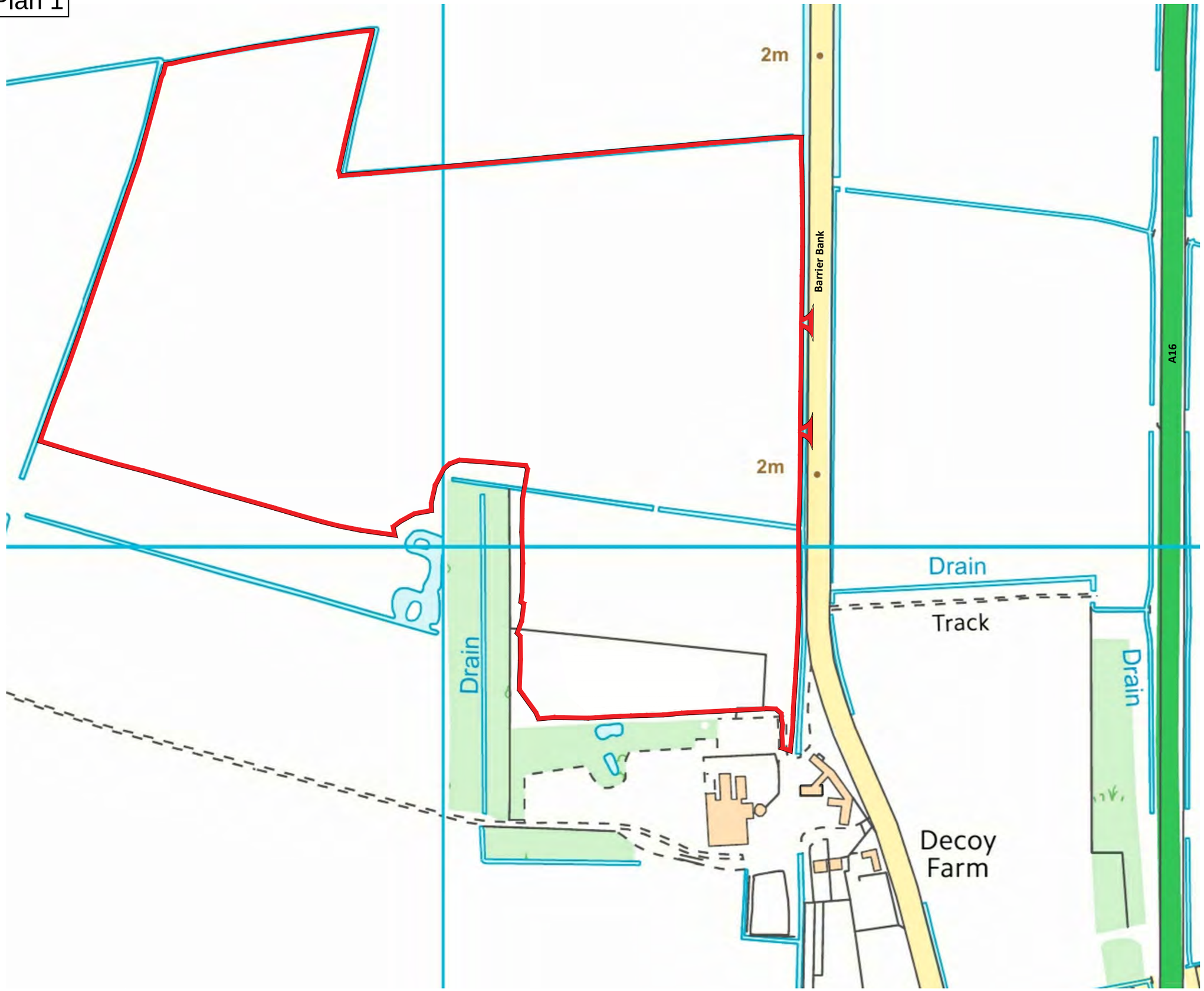
- Any impact of damage to the property can be foreseen and mitigated against by relatively simple design and construction techniques. They will be constructed using materials which are flood resilient construction as outlined in the report.

- Flooding from other sources is unlikely to affect the site.

- No obvious constraints have been identified that may impact the proposed development and the type of mitigation measures that can be used to reduce the flood risk, there is no increase in the flood risk to others. Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation is maintained for the lifetime of the development.

- It is therefore concluded that the proposed development can be constructed, safely and sustainably, to meet the requirements of NPPF.

Plan 1



Notes

Copyright
© Robert Doughty Consultancy Limited.
All rights described in the Copyright, Designs and Patents Act 1988 have been asserted.

Ordnance Survey Map
© Crown Copyright. OS Licence No: AR 100010613.

N

0 20 40 60 80 100m

Rev	Description	Date
-	-	-

rdc
Robert Doughty Consultancy

32 High Street, Helpringham
Sleaford, Lincolnshire, NG34 0RA

Tel: 01529 421646
Email: admin@rdc-landplan.co.uk
Web: www.rdc-landplan.co.uk

Client
Flo-Gro Systems Ltd

Project
Decoy Farm
Crowland

Drawing
Location Plan

Scale @ A3	Date
1: 2500	01/09/22

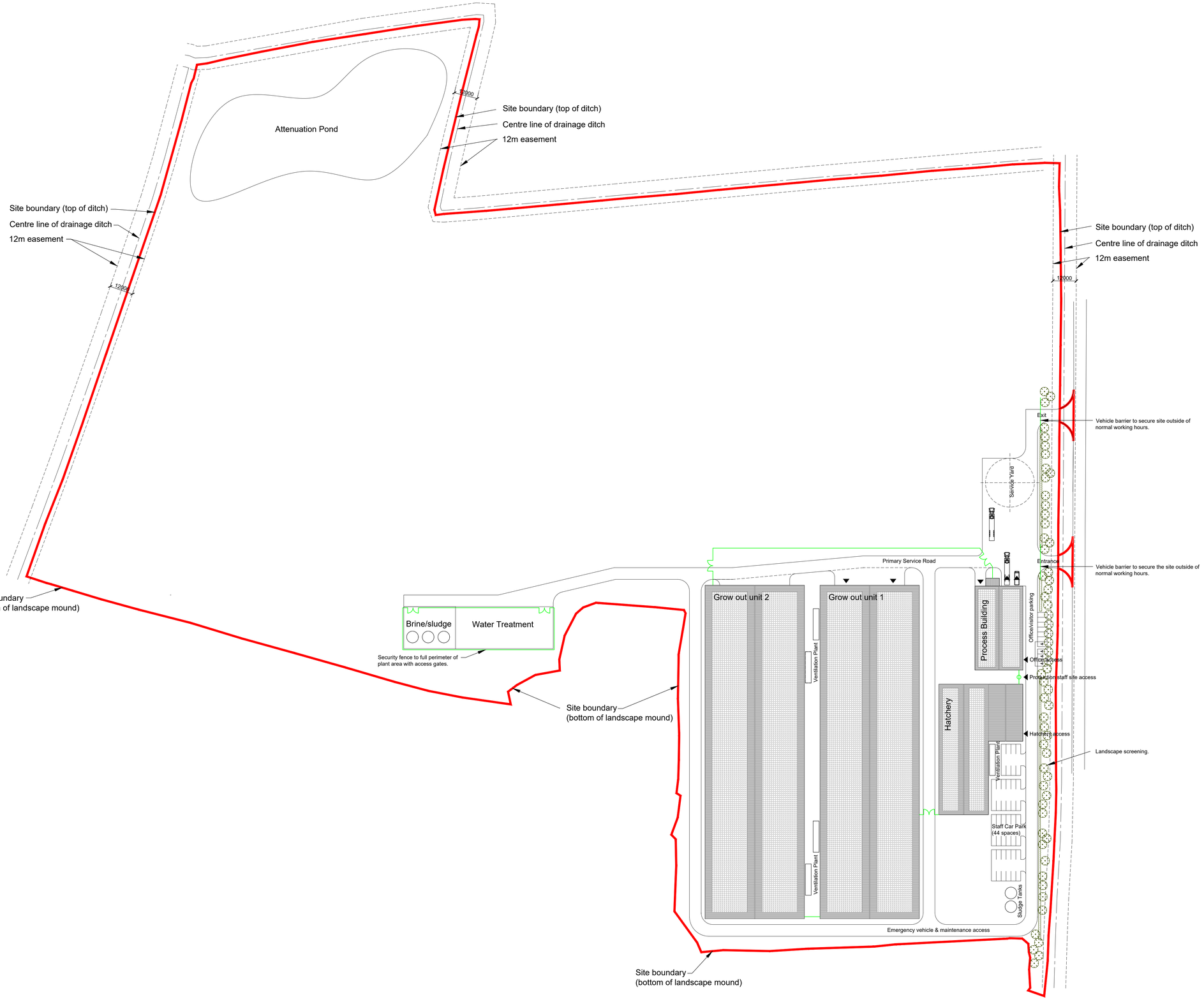
Drawn By	Checked By
WW	LMS

Job Number	Status	Purpose of Issue
1513-1	PL	Planning

Drawing No.	Rev
1513-1_PL_LP01	-

Plan 2

© Copyright Barron Design Ltd.



10m 100m

SCALE 1:1000

Grow Out Units:
Plastisol coated steel walls and roof (Colour: Olive Green RAL 6003)
For further details refer to Morspan drawings:
2022-Flogro-Grow-Plan
2022-Flogro-Grow-Elevations

Hatchery:
Plastisol coated steel walls and roof (Colour: Olive Green RAL6003)
For further details refer to Morspan drawings:
2022-Flogro-Hatchery-Plan
2022-Flogro-Hatchery-Elevations

Process Building:
Plastisol coated steel walls (Colour: Mushroom RAL9001)
Plastisol coated steel roof (Colour: Olive Green RAL6003)
For further details refer to BDL drawings:
P674.300 Floor Plan
P674.301 Roof Plan
P674.302 Elevations

Storage Buildings:
Plastisol coated steel walls and roof (Colour: Olive Green)
For further details refer to BDL drawings:
P674.400 Plans
P674.401 Elevations

PV Panels:
All roofs to have PV panels (subject to confirmation by the specialist supplier).

Water Treatment:
Water treatment plant and equipment as LAT drawings:
LAT2500-GA-Typical

Sludge Tanks:
Polyester powder coated metal tanks (approx. 6m diameter x 3.0m high) - colour: Green RAL 6005.

Roads:
Primary access road to be bitmac to HGV specification;
Emergency access road to be pervious bitmac;
Service yard to be concrete to HGV specification;

Security fence:
Security fence to be 2.4m twin mesh security fence and posts (colour Green RAL 6005)

Landscaping:
Soft landscaping to be limited to grass seeding throughout.
Landscape screening to be provided along the main road boundary, including native tree and hedge planting.

Cycle shelters:
To be Broxap Apollo or similar (colour Green RAL 6005) with ebike charging points.

Electric Vehicles:
Charging points to be provided at 10% of all car parking spaces (ducts and infrastructure to be installed to all parking spaces for charging points to be expanded with demand).

Vehicle Barrier:
To be Barriers Direct Lockable manual arm barrier.

Revision:				
P3	Revised to Client comments.	CB	KM	25.08.22	Prelim
P2	Parking revised, landscaping indicated, RAL references added.	CB	KM	22.08.22	Prelim
P1	Planning Issue.	CB	KM	04.08.22	Prelim

Barron Design
28 Cathedral Road, Cardiff, CF11 9LJ|4 Oak Drive, Marford, LL12 8XT
www.barrondesign.co.uk|CIAT Chartered Practice No. F2683

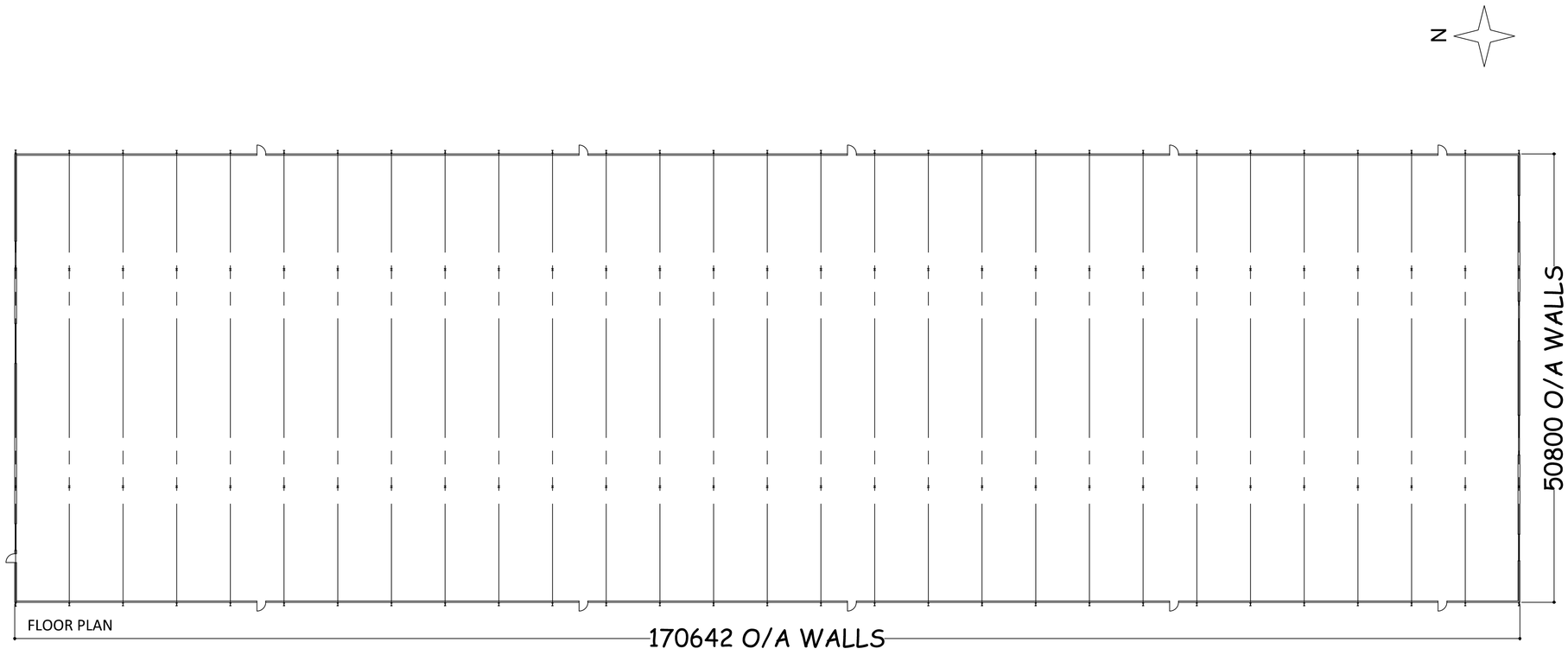
Project
New Development at Decoy Farm
FloGro Systems Ltd.

Drawing Title
Proposed Site Plan
PHASE 1

Drawn By:	Checked By:	Date:	Scale:
CB	CB	04.08.22	1:1000 @ A1

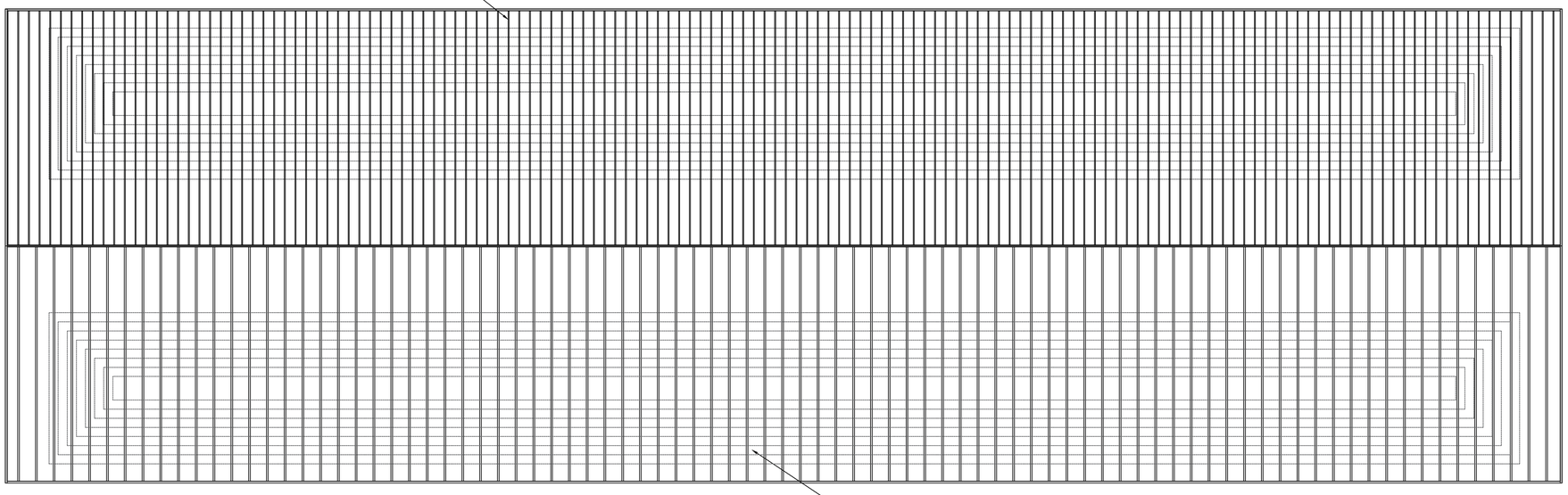
Job No.	Drawing No.:	Revision:
P674	201	P3

Plan 3



FLOOR PLAN

ROOF: EXTERNAL BOX PROFILE PVC COATED STEEL SHEETING.
(COLOUR : TO LOCAL AUTHORITY APPROVAL)
INTERNAL BOX PROFILE POLYESTER COATED STEEL SHEETING.
GLASS FIBRE INSULATION IN VOID



ROOF PLAN

PV PANELS TO BE INSTALLED ON BOTH ROOF SLOPES
FINAL SIZE AND LAYOUT OF ARRAY TO BE DETERMINED
BY SUPPLIER

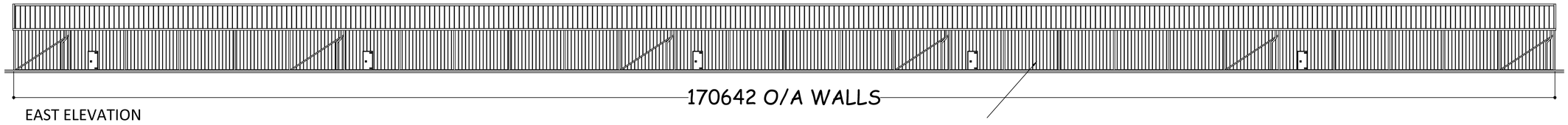
Morspan
CONSTRUCTION LTD
TEL: 01291 672334 FAX: 01291 673928
Enquiries@morspan.co.uk www.morspan.com

TITLE:
NEW DEVELOPMENT AT DECOY FARM
FLOGRO SYSTEMS LTD

GROWOUT UNIT
ROOF & FLOOR PLAN

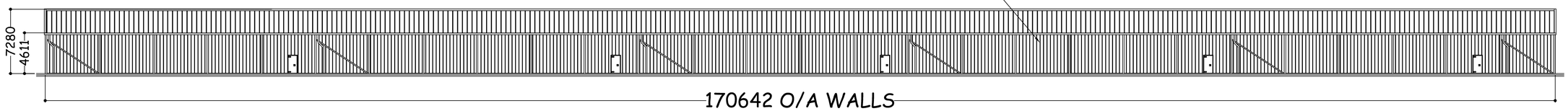
DATE: 26/07/22	Job No. 2022–Flogro
DRWN BY: T.G.A	
SCALE: 1:300 @ A1	
DRWG No:2022–FLOGRO–GROW PLAN	
CLIENT: FLOGRO LTD	

Plan 4



EAST ELEVATION

SIDES: EXTERNAL BOX PROFILE PVC COATED STEEL SHEETING.
(COLOUR : TO LOCAL AUTHORITY APPROVAL)
INTERNAL BOX PROFILE POLYESTER COATED STEEL SHEETING.
GLASS FIBRE INSULATION IN VOID

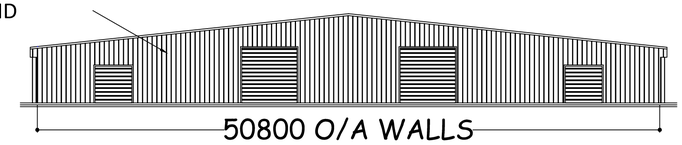


WEST ELEVATION

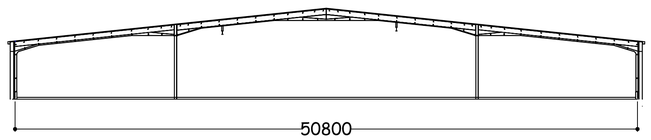
GABLE ENDS: EXTERNAL BOX PROFILE PVC COATED STEEL SHEETING.
(COLOUR : TO LOCAL AUTHORITY APPROVAL)
INTERNAL BOX PROFILE POLYESTER COATED STEEL SHEETING.
GLASS FIBRE INSULATION IN VOID



NORTH ELEVATION



SOUTH ELEVATION



INDICATIVE SECTION

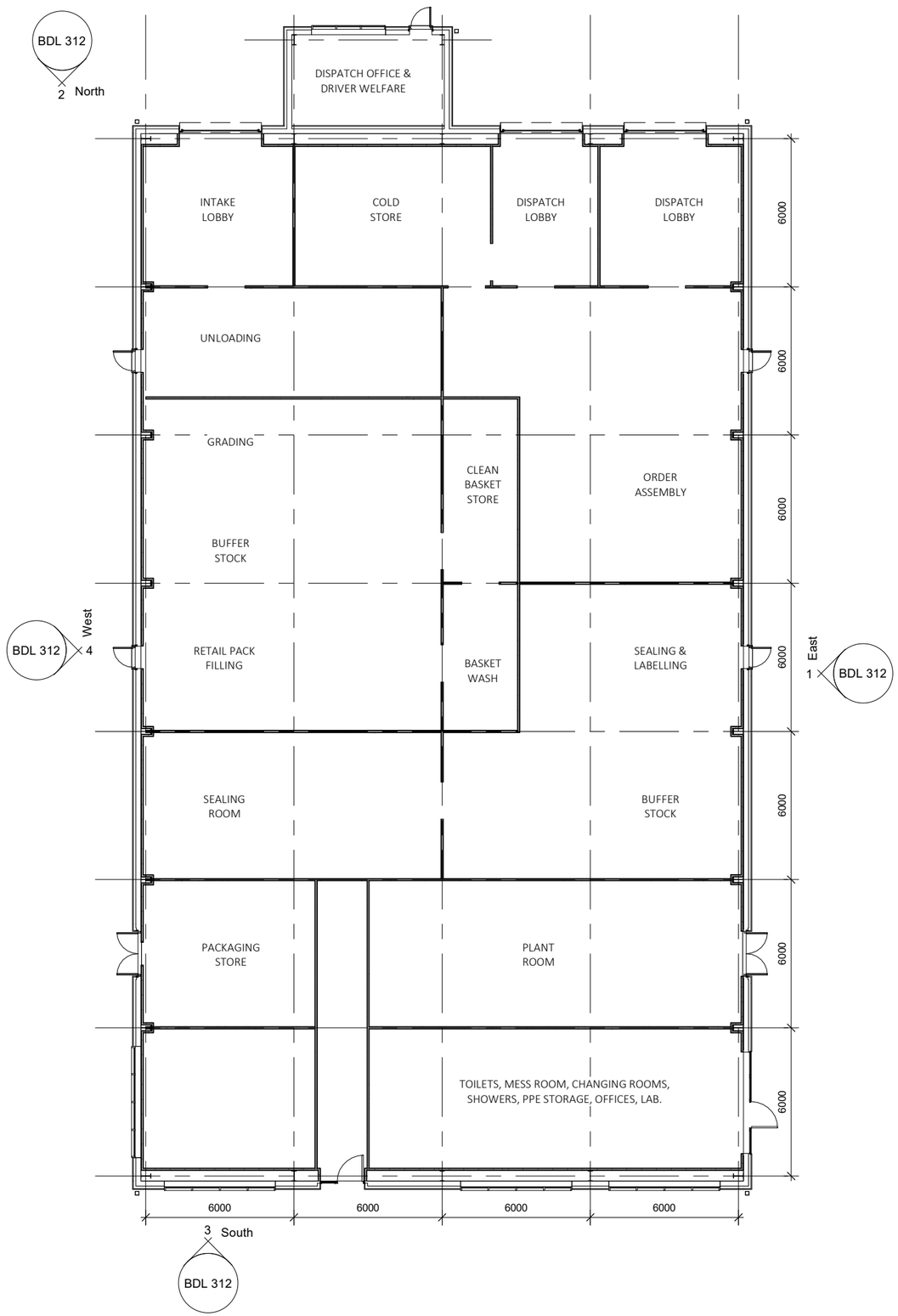
Morspan
CONSTRUCTION LTD
TEL: 01291 672334 FAX: 01291 673928
Enquiries@morspan.co.uk www.morspan.com

TITLE:
NEW DEVELOPMENT AT DECOY FARM
FLOGRO SYSTEMS LTD

GROWOUT UNIT
ELEVATIONS

DATE: 26/07/22	Job No. 2022–Flogro
DRWN BY: T.G.A	
SCALE: 1:250 @ A1	
DRWG No:2022–FLOGRO–GROW ELEVATIONS	
CLIENT: FLOGRO LTD	

Plan 5



5m 20m

Rev	Date	Description	Dr	Ch

Barron Design

Address 28 Catherdral Road, Cardiff, CF11 9LJ
4 Oak Drive, Marford, LL12 8XT
Website barrondesign.co.uk
CIAT Chartered Practice Number F2683

Client FloGro Systems Ltd.

Project New Development at Decoy Farm Process Building

Project No P674

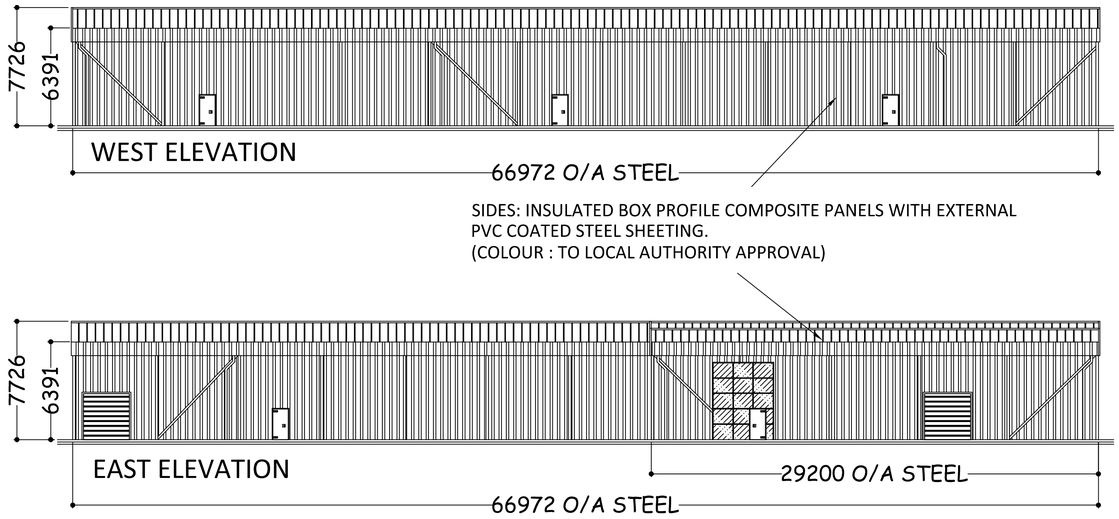
Drawing Process Building Floor Plans Phase 1

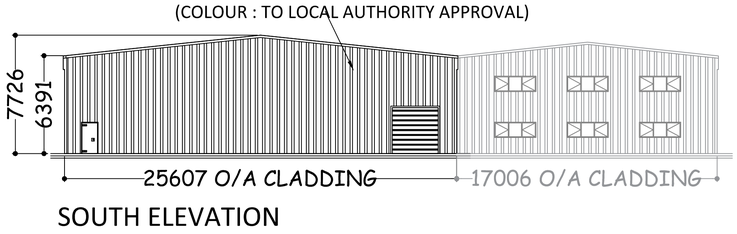
Issue Status Planning

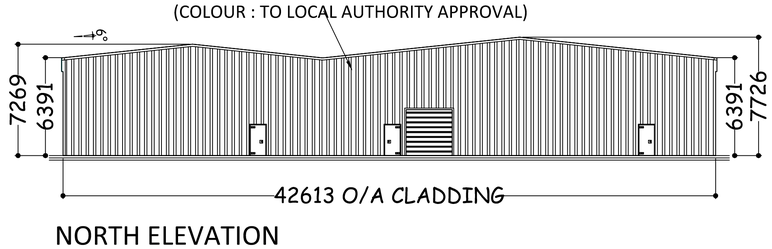
A3 1 : 200

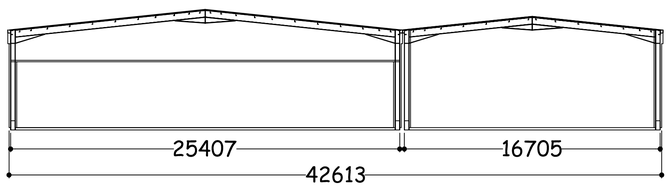
Drawing No BDL 310 Rev

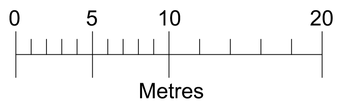
Plan 6











Morspan
CONSTRUCTION LTD
TEL: 01291 672334 FAX: 01291 673928
Enquiries@morspan.co.uk www.morspan.com

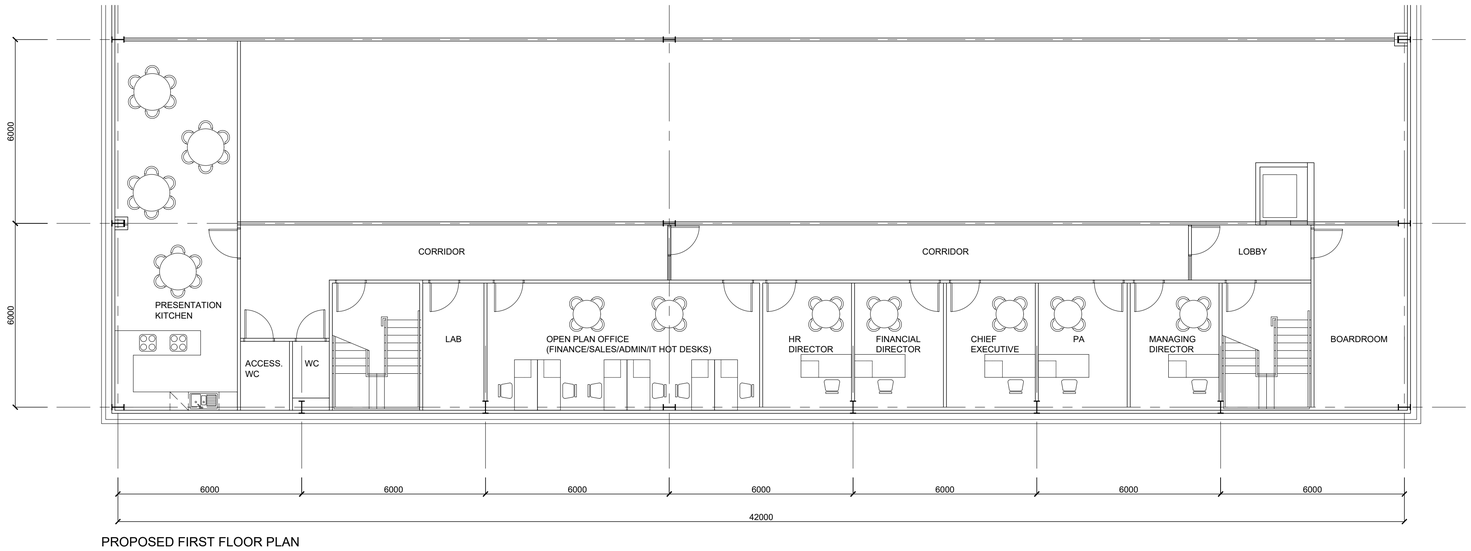
TITLE:
NEW DEVELOPMENT AT DECOY FARM
FLOGRO SYSTEMS LTD

HATCHERY UNIT
ELEVATIONS

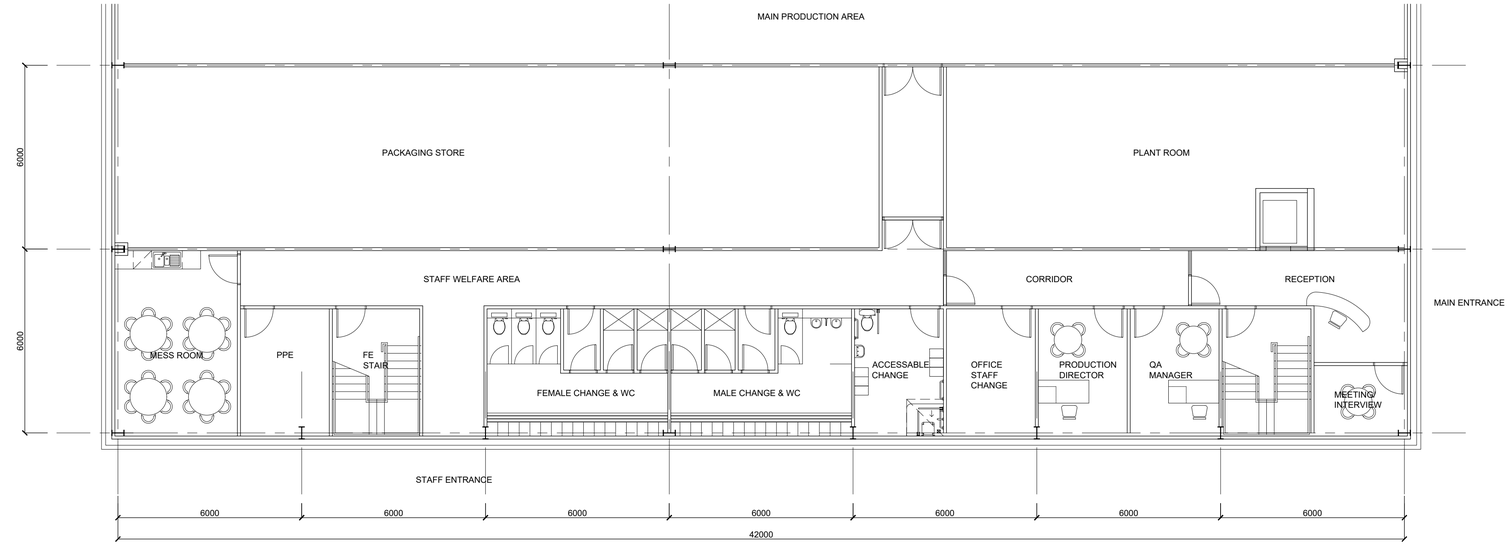
DATE: 30/08/22	Job No. 2022–Flogro
DRWN BY: T.G.A	
SCALE: 1:200 @ A1	
DRWG No: 2022–FLOGRO–HATCH ELEVATIONS r1	
CLIENT: FLOGRO LTD	

Plan 7

© Copyright Barron Design Ltd.



PROPOSED FIRST FLOOR PLAN



PROPOSED GROUND FLOOR PLAN

1m 10m

SCALE 1:100

Revision:				
P1	First issue of drawing.	CB	KM	08.08.22 Prelim

Barron Design

28 Cathedral Road, Cardiff, CF11 9LJ|4 Oak Drive, Marford, LL12 8XT
www.barrondesign.co.uk|CIAT Chartered Practice No. F2683

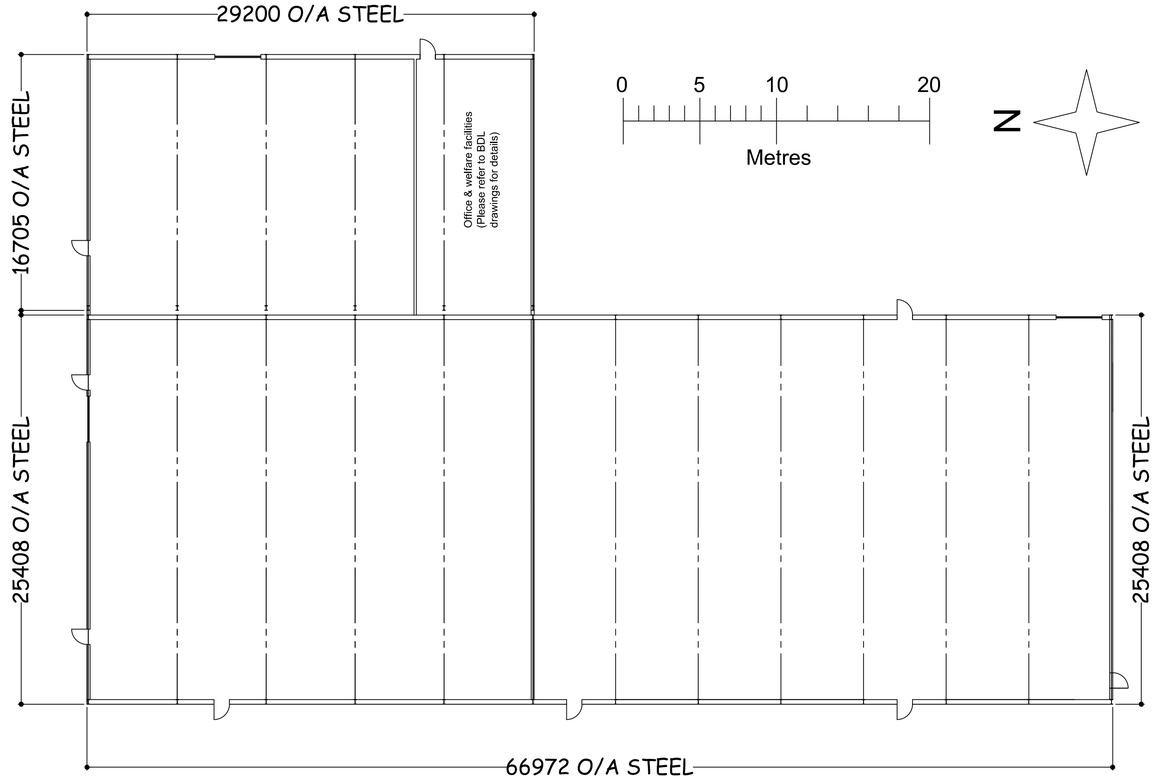
Project
New Development at Decoy Farm
FloGro Systems Ltd.

Drawing Title
PROCESS BUILDING
Office & Changing Room Layout

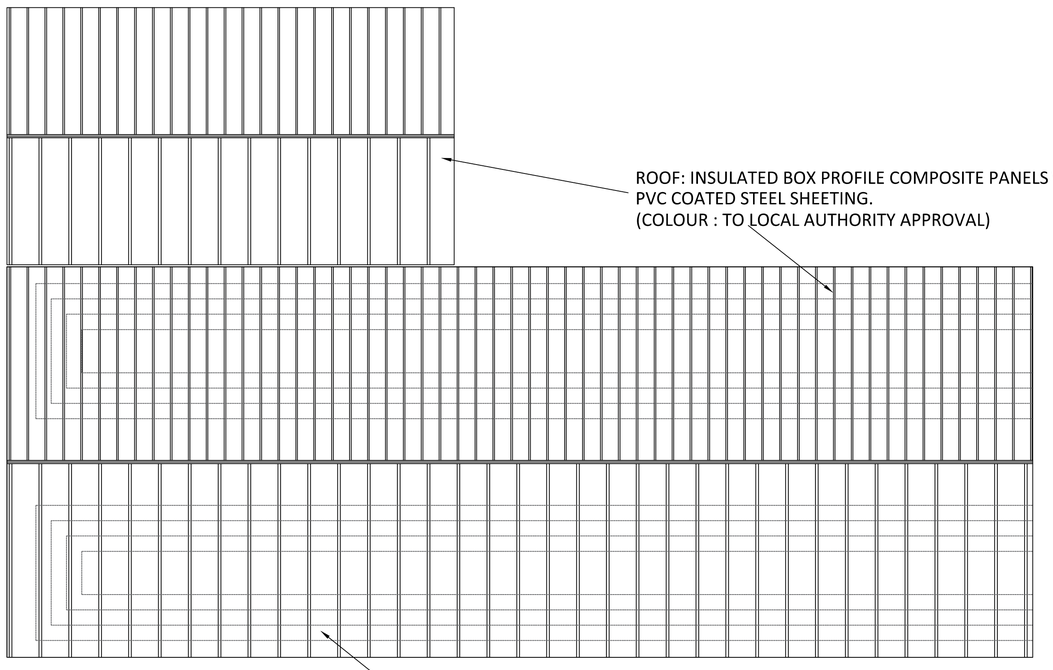
Drawn By:	Checked By:	Date:	Scale:
CB	KM	08.08.22	1:100 @ A1

Job No.:	Drawing No.:	Revision:
P674	303	P1

Plan 8



FLOOR PLAN



ROOF PLAN

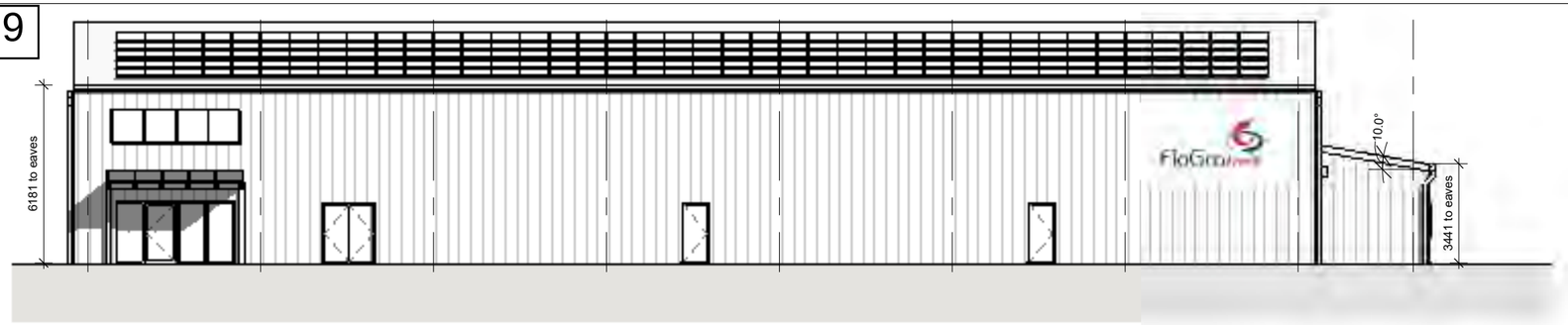
Morspan
CONSTRUCTION LTD
TEL: 01291 672334 FAX: 01291 673928
Enquiries@morspan.co.uk www.morspan.com

TITLE:
NEW DEVELOPMENT AT DECOY FARM
FLOGRO SYSTEMS LTD

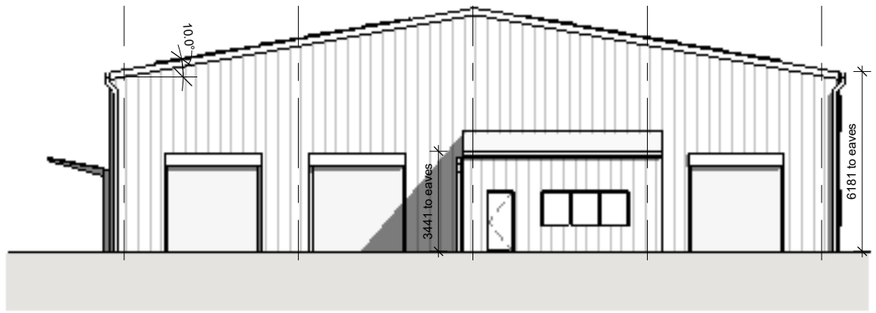
HATCHERY UNIT
ROOF & FLOOR PLAN

DATE: 30/08/22	Job No. 2022–Flogro
DRWN BY: T.G.A	
SCALE: 1:200 @ A1	
DRWG No:2022–FLOGRO–HATCH PLAN r1	
CLIENT: FLOGRO LTD	

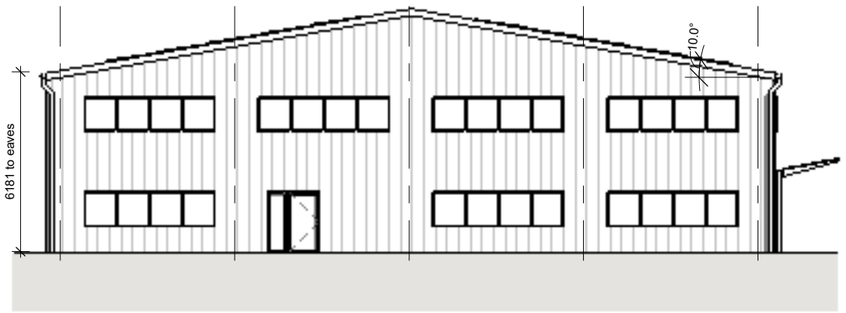
Plan 9



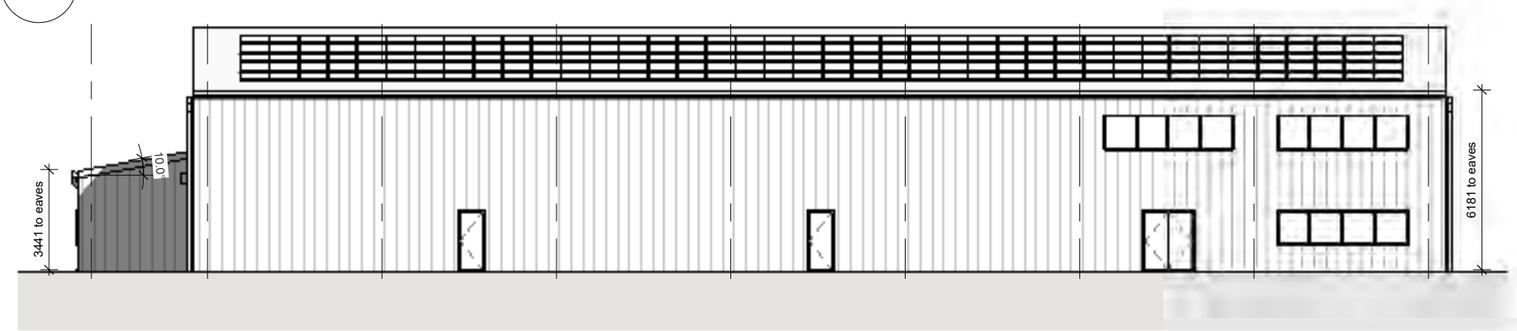
1 East
1 : 200



2 North
1 : 200



3 South
1 : 200



4 West
1 : 200

Elevation Materials:

- External walls to be box profile with PVC coated steel sheeting (colour TBD).
- Aluminium framed windows (colour TBD).
- Steel roller shuttered loading doors (colour TBD).
- Aluminium framed glazed entrance doors (colour TBD).
- Steel flush framed personel doors (colour TBD).
- Highline gutter and sqaure profiled rainwater goods (colour TBD).

5m 20m

Rev	Date	Description	Dr	Ch

Barron Design

Address 28 Catherdral Road, Cardiff, CF11 9LJ
4 Oak Drive, Marford, LL12 8XT
Website barrondesign.co.uk
CIAT Chartered Practice Number F2683

Client FloGro Systems Ltd.

Project New Development at Decoy Farm Process Building

Project No P674

Drawing Process Building Elevations Phase 1

Issue Status Planning

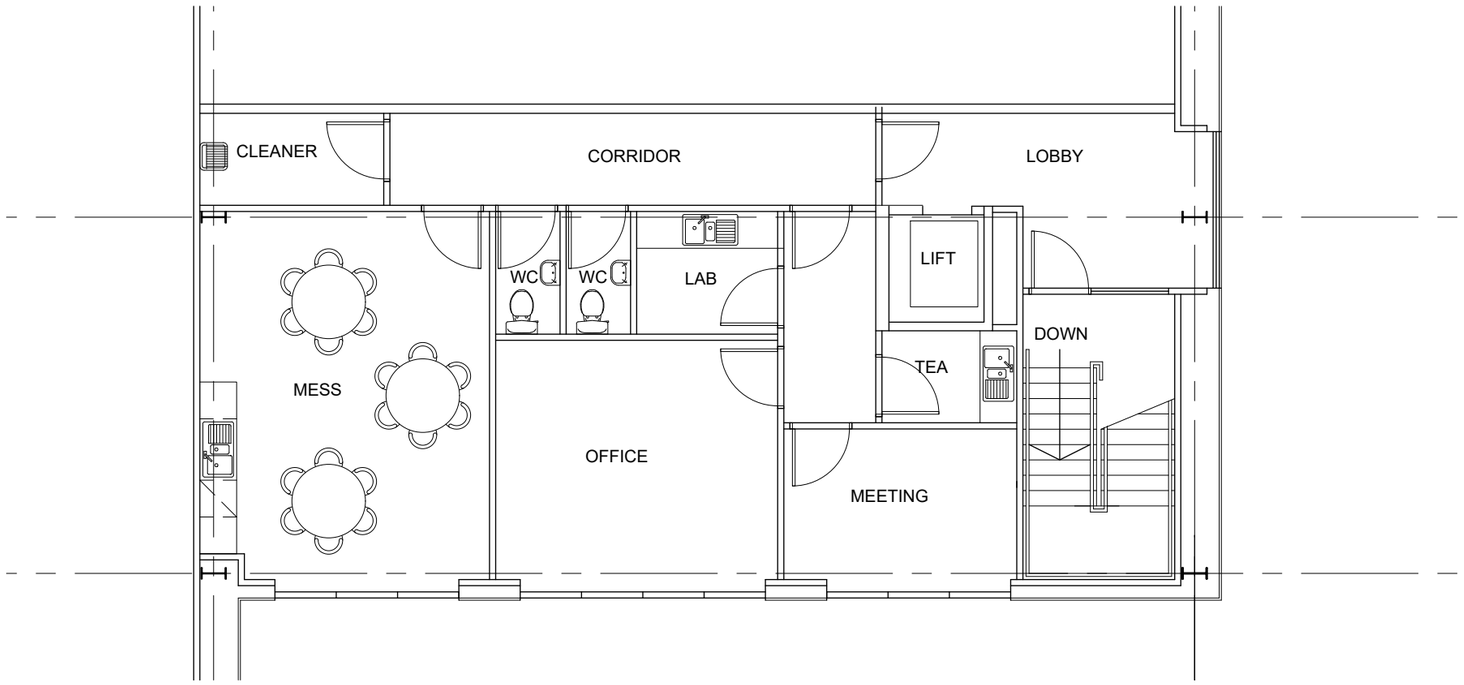
A3 As indicated

Drawing No BDL 312 Rev

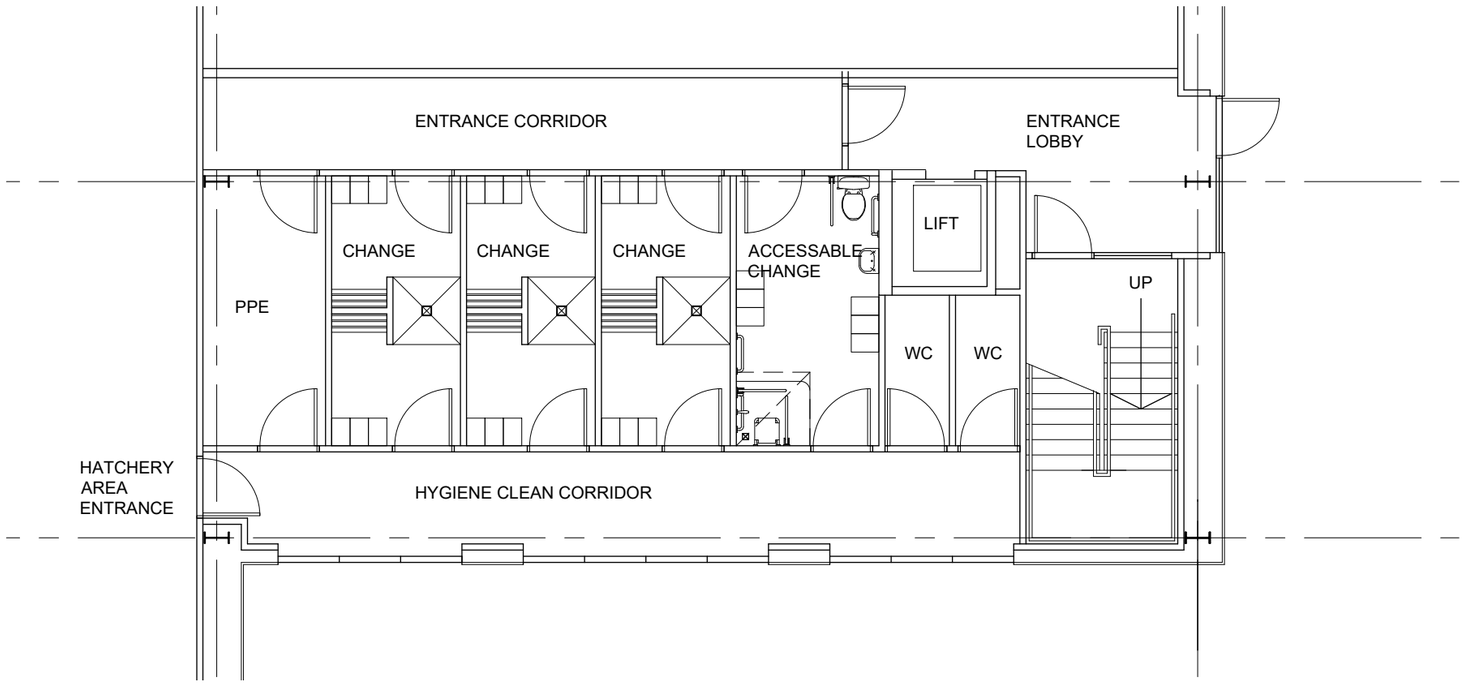
Plan 10

1m 10m

SCALE 1:100



PROPOSED FIRST FLOOR PLAN



PROPOSED GROUND FLOOR PLAN

Revision:

P1	First issue of drawing.	CB	KM	08.08.22	Prelim

Barron Design

28 Cathedral Road, Cardiff, CF11 9LJ|4 Oak Drive, Marford, LL12 8XT
www.barrondesign.co.uk|CIAT Chartered Practice No. F2683

Project
New Development at Decoy Farm
FloGro Systems Ltd.

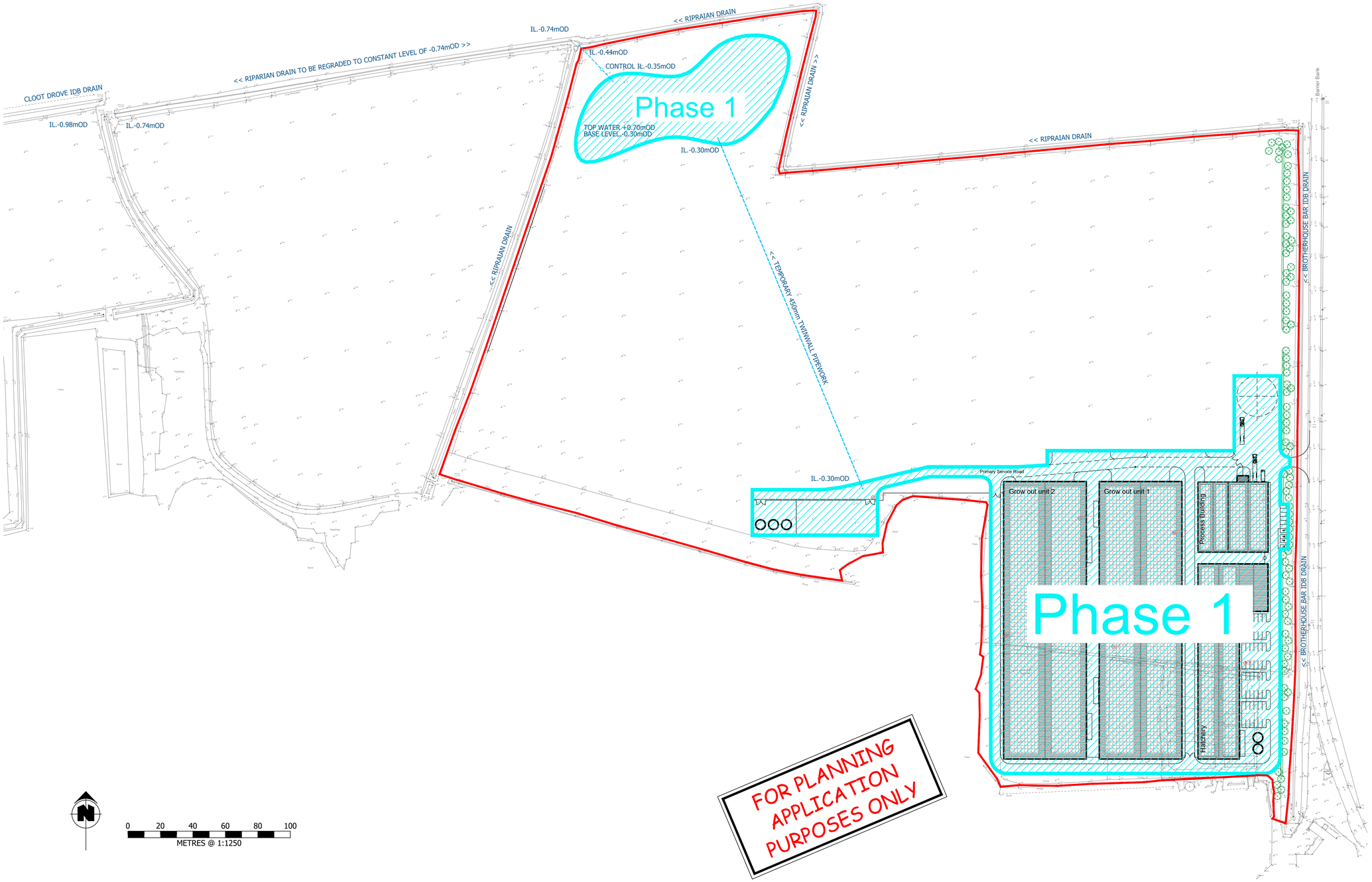
Drawing Title
HATCHERY
Offices and Changing

Drawn By:	Checked By:	Date:	Scale:
CB	KM	08.08.22	1:100 @ A3

Job No.:	Drawing No.:	Revision:
P674	500	P1

FEEDBACK: This drawing is one of a series that have been prepared to define the civil element of the development. If this, or any, drawing in the series could be improved to better communicate the proposed design please do not hesitate to contact Stafford IE.

Plan 11



NOTES:
All dimensions must be checked on site and not scaled from this drawing.

(c) Crown Copyright. All rights reserved. Licence Number AL100037075
The material contained in this drawing has been based upon the Ordnance Survey Map by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office.

	Date	Revisions

© copyright

Design Team Stafford IE
13 GOSTWICK
ORTON BRIMBLES
PETERBOROUGH
PE2 5XF
TEL: 01733 232388, MOBILE: 07710 832745, E-MAIL: terry@staffordie.co.uk

Client

FLO-GRO SYSTEMS Ltd.
St. James House
8 Overcliffe,
Gravesend,
KENT
DA11 0HJ
Tel: 01666 840 980; E: enquiries@flogrosystems.com
www.flogrosystems.com

Job Title

Proposed Commercial Development
Decoy Farm, Spalding Road,
Crowland, Lincolnshire
PE6 0LU

Drawing Title

Drainage Strategy Plan
Phase 1

Date	Scale @ A1	Drawn
Sept.2022	1:1250	TRS

Drg.No.	Rev.
9033-107-2	-