

PROPOSED FORMATION OF AN ADDITIONAL STORAGE LAGOON
AT WESTS NURSERIES, MALLARD ROAD, LOW FULNEY,
SPALDING, PE12 6ND.
FLOOD RISK ASSESSMENT

Page 2	Introduction.
Page 2	Environment Agency (EA) Flood Zones
Page 3	Application Site
Page 3	Sequential Test
Pages 4 - 5	Strategic Flood Risk Assessment
Page 5	Information from Environment Agency
Pages 5 - 6	Existing Flood Alleviation Measures
Page 6	Existing Ground Levels
Pages 6 – 7	Potential Sources of Flooding
Page 7	Extent of Known Flooding
Page 7	Probabilities and Trends of Flooding
Page 7	Residual Risk – Extreme Events
Pages 8 – 9	Climate Change
Page 9	Summary of Flood Risk
Page 10	Conclusions and Recommendations
Page 11	Location Plan
Page 11	Plan of IDB Drains
Page 12	Plan of Proposed Storage Lagoon

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This flood risk assessment has been prepared solely to support a planning application for the formation of a storage lagoon at West Nurseries, Mallard Road, Low Fulney. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete, or if it is used for any other purposes other than for which it was originally commissioned.

Introduction

Following the flooding that took place in Mallard Road in 2018 the LLFA (Lincs CC) have commissioned a report (presumed to be a Section 19 report) to try to identify the causes of the flooding. During the compilation of this report discrepancies were found in the development carried out in 2011 by West Nurseries under Planning Application No H16-0804-10. Following this an inspection was carried out by representatives of South Holland IDB, Lincolnshire County Council and South Holland DC and a letter has been received from South Holland District Council confirming that the development has not been carried out as detailed in the planning application.

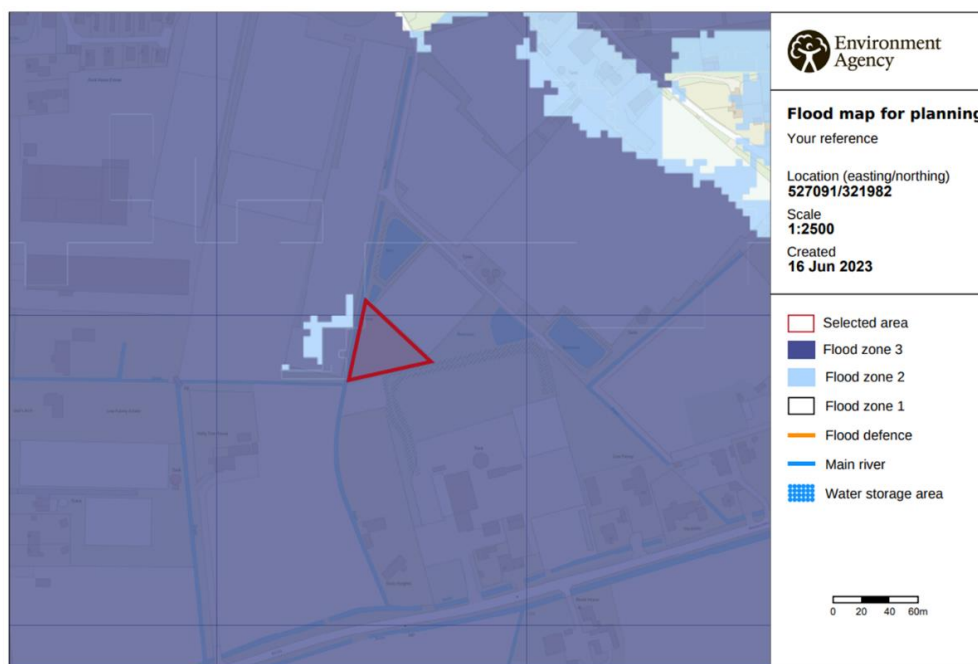
A planning application is due to be submitted to South Holland District Council for the construction of an additional storage reservoir on the south west side of the site to provide additional storage of rainwater after heavy rainfall, which will address the discrepancies that have been identified by the Council.

The site of the proposed development is within Flood Zone 3 as shown on the Environment Agency's Flood Zone map.

The Environment Agency have stated that a flood risk assessment is required as specified in the Practice Guidance to the National Planning Policy Framework Development and Flood Risk as the site is within flood zone 3. The site is within a defended area as specified on the South Holland District Council's Strategic Flood Risk Assessment (SKDC SFRA) map and is located in the South Holland Welland Internal Drainage Board District.

Environment Agency (EA) Flood Zones

The map below is taken from the Environment agency website and shows the flood zones in this area.



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It can be seen that that the site of the proposed lagoon is in Flood Zone 3.

Application Site

The site is located approximately 1.2km metres east of the bank of the Coronation Channel which defends this area from high fluvial water levels. The National Grid Reference of the site is 518543 308630.

The position and extent of the site is shown on the plan at the end of this document.

As the site is within a defended area the proposed development can be considered to be within Flood Zone 3(a) as defined in Table 1 of the Technical Guidance.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, a development consisting of a storage lagoon can be classified as “water compatible development”.

If Table 3 of the Guidance (shown below) is considered it can be seen that water compatible development is satisfactory in Flood Zone 3(a).

<u>Flood Zones</u>	<u>Flood Risk Vulnerability Classification</u>				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Sequential Test

The aim of the Sequential Test, as set out in the Planning Practice Guidance, is to ensure that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The flood zones as defined in the Strategic Flood Risk Assessment for the area provide the basis for applying the Test. The aim is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

As the storage lagoon will be an integral part of the operation at West Nurseries it is not possible to be relocated in an area in a lower flood zone.

Strategic Flood Risk Assessment

The Strategic Flood Risk Assessment (SFRA) written for the South Holland District Council (SHDC) in 2010 provides details of the actual flood risk in the Council's area. This information has not been updated and reference to the maps in this document give the following information for the actual flood risk and hazard at the site for the 1% fluvial event and 0.5% tidal event.

For the present day	Depth of flooding ... zero
	Extent of flooding .. Low or medium flood probability
	Peak Velocity Nil
For year 2115	Depth of flooding ... 0 – 500mm
	Extent of flooding....High
	Peak Velocity 0.1 – 1.25m/sec

The maps showing the residual flood hazard were revised in the 2016 update of the South Holland District Council Strategic Flood Risk Assessment which can be found on the website of the South East Lincolnshire Joint Planning Committee. The residual hazards are as follows for the 1% fluvial or 0.5% tidal event probability:

For the present day	Depth of flooding ...zero
	Extent of flooding .. Low or medium flood probability
	Hazard..... None
	Peak Velocity .. Nil
For the year 2115	Depth of flooding ...250mm – 500mm
	Extent of flooding .. High
	Hazard..... 0.75 – 1.25 (danger for some)
	Peak Velocity .. 0 – 0.3 m/sec

Figure 16 of the general maps shows that the site is not within the rapid inundation zone.

Maximum flood level and bank levels in the River Welland

Tables in the SFRA show the following details of the defence bank on the east side of the tidal section of the River Welland north of the A16 road bridge and 2.7km west of the development site, between chainage 19.8km and 20.8km.

	2007	2055	2115
Peak 1 in 200 year extreme tide level	5.98m OD	6.31m OD	7.12m OD
Peak 1 in 1,000 year extreme tide level	6.27m OD	6.60m OD	7.41m OD

With an average defence crest level between 7.80 and 7.90 m OD the freeboards are as follows:

	2007	2055	2115
Peak 1 in 200 year freeboard	1870mm	1540mm	730mm
Peak 1 in 1,000 year freeboard	1580mm	1250mm	440mm

Tables in the SFRA show the following details for the defence bank on the east side of the Coronation Channel at chainage 1.5 km which is 2.7km west of the site.

	2007	2115
Peak 1 in 100 year flood level	4.34m OD	4.69m OD
Peak 1 in 1,000 year flood level	4.37m OD	4.69m OD

The bank levels on this section vary between 5.50m OD and 6.0m OD. Therefore it can be seen there is a minimum freeboard of 800mm to the predicted design maximum levels in 2115.

The Wash banks are at least 20.0 km north of the site. The tidal defences are earth banks with an average level of 7.80m OD. The maximum predicted 1 in 200 year tide level in 2115 in the SFRA is 7.11m OD.

Information from Environment Agency

The Environment Agency has produced mapping which shows the maximum hazard, depth and velocity predicted following breaching of the tidal defences of the tidal River Welland north west of the site. The EA have stated that the site would not be affected by overtopping of the defences.

The maps of breaching show the following predictions for hazard, maximum depth and maximum velocity at the development site:

	Maximum Hazard	Maximum Depth	Maximum Velocity
1 in 200 year in 2006	No hazard	zero	zero
1 in 1000 year in 2006	No Hazard	zero	zero
1 in 200 year in 2115	0.75 – 1.25	250mm – 500mm	0 - 0.3m/sec
1 in 1000 year in 2115	0.75 – 1.25	250mm – 500mm	0 - 0.3m/sec

Existing Flood Alleviation Measures

The site is within a defended flood plain, as defined in Appendix 1 of the Environment Agency's "Policy and Practice for the Protection of Flood Plains", which is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding occurring due to overtopping or failures of the defences is considered to be very low.

The site is located approximately 1.2 km east of the Coronation Channel which is a fluvial channel connected to the River Welland and is maintained by the Environment Agency.

The site is located approximately 2.7km south of the tidal section of the River Welland and is maintained by the Environment Agency.

There are smaller watercourses in this area that are maintained by South Holland IDB.

Existing Ground Levels

The ground level on the site is approximately 3.00m ODN

Potential Sources of Flooding

The potential sources of flooding to the site are:-

1. Failure or overtopping of tidal defences of the River Welland.
2. Failure or Overtopping of the Coronation Channel.
3. High water levels in IDB drainage channels.

1. Failure or overtopping of tidal defences of the River Welland or the Wash

The east bank of the tidal section of the River Welland is approximately 2.7 km from the site and the updated SFRA indicates that if a breach were to occur in the tidal defences flood depths of between 250mm and 500mm could occur on the proposed site of the lagoons in a 1 in 200 year event in 2115.

It is likely that the A16 road would provide a barrier to the flow which should reduce the predicted impact of flooding from a breach in the River Welland.

2. Failure or Overtopping of the Coronation Channel

The SFRA states that the maximum design level in the Coronation Channel is 4.69m OD. The minimum crest level of the east bank of the Channel is 5.14m OD, which gives a minimum freeboard of 450mm. However, generally there is a freeboard of 600 mm along this bank of the Channel.

If the Channel were to breach water would flow eastwards towards the site. However, it would be retained for a short time by the A16 which is higher than the surrounding land.

With the site being 1.2 km from the Coronation Channel the risk from this source can be considered to be low.

3. High Water Levels in IDB drains

Although the whole of this area is below high tide level and levels in the rivers, the retained water levels in the drainage channels ensure that the risk of flooding is extremely low. South Holland IDB maintain a system of sluices, pumping stations, and drainage channels which convey surface water into the River Welland, the Wash and the River Nene to control water levels throughout the South Holland IDB area.

The site is on the northern boundary of the catchment area of Wisemans Pumping Station in the South Holland IDB. The dyke on the west side of the proposed lagoon flows southwards and discharges into the IDB maintained drain alongside Weston Hills Road. This drain flows eastwards and flows into the Wheatmere Drain (B35) which is located 250 metres east of Mallard Road. This drain flows southwards into the South Holland Main Drain (B30). The water level in the South Holland Main Drain is controlled by Wisemans Pumping Station.

Wisemans Pumping Station is operated and maintained in excellent condition by South Holland IDB and the likelihood of flooding due to this source is low. IDB systems are designed to provide a freeboard of between 600mm and 1000mm to all land in a 1 in 10 year return period rainfall event. South Holland IDB watercourses generally state that their watercourses provide a standard of 1 in 100 years with a freeboard of 300mm in urban areas. In an extreme event water levels will rise but this will be a slow process and it would be at least 24 hours before levels were high enough to begin to flood low land in the area, and after this the level of the flood water would need to rise another 1.0 metre before the development site would be affected.

The channels maintained by South Holland IDB in urban areas are classified as high priority watercourses and as such receive a higher maintenance priority.

There are possibilities of failure of outfall sluices, but these are mitigated by the high level of maintenance given to these structures by the IDB. If a failure did occur the IDB would immediately be warned of the problem by their telemetry system and take action to repair the fault or to bring in temporary pumps to reduce the risk of any flooding in the area. Similarly any failures of culverts or other blockages would be dealt with immediately.

Therefore the risk of flooding from IDB drainage channels can be considered to be extremely low.

Extent of Known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties being flooded from either the River Welland, the Coronation Channel or South Holland IDB drains in the last thirty years.

A number of properties in Mallard Road have been flooded in the last ten years due to a build up surface water in this area. The proposed lagoon will ensure that surface water from the West Nurseries site will not exacerbate the existing risk.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low.

Residual Risk – Extreme Events

The residual risk from extreme events is very low on this site. The major risk to the site is from a breach or overtopping of the fluvial defences of the Coronation Channel.

Climate Change

The recommendations for flood depths in this flood risk assessment use information provided by the Environment Agency which was produced in 2006. The EA have issued new guidance on recommended contingency allowances for predicted sea rises, fluvial flows and rainfall intensities which from 19th February 2016 needs to be considered in the FRA.

1) Flooding from Tidal River Welland

The FRA has identified the main source of flooding where the new climate change recommendations could affect the predictions of flood levels in 2115 at the development site is flooding from the tidal River Welland.

The contingency allowance in metres for the years 2055 and 2115 using 1990 as a baseline in the SFRA compared with the guidelines is as follows

Year	SFRA	2013 guidance	Revised 2016 guidance
2055	0.33	0.395	0.412
2115	1.14	1.205	1.24

Therefore it can be seen that the revised guidance increases the maximum allowance for sea rise in 2115 by 100mm for the maps in the SFRA and 40mm for maps issued by the Environment Agency. The SFRA maps predict flood depths of between 250mm and 500mm on this site in a 1 in 200 year event in 2115. The small increase shown above will not change this map significantly.

2) Flooding from the Coronation Channel

The latest advice published in July 2021 on peak river flow climate change allowances for the Welland Catchment are reproduced below.

Epoch	Years	Allowance		
		Central	Higher Central	Upper End
2020's	2015 - 2039	5%	10%	22%
2050's	2040 - 2069	4%	10%	26%
2080's	2070 - 2125	17%	28%	53%

For water compatible development the Central allowances should be used.

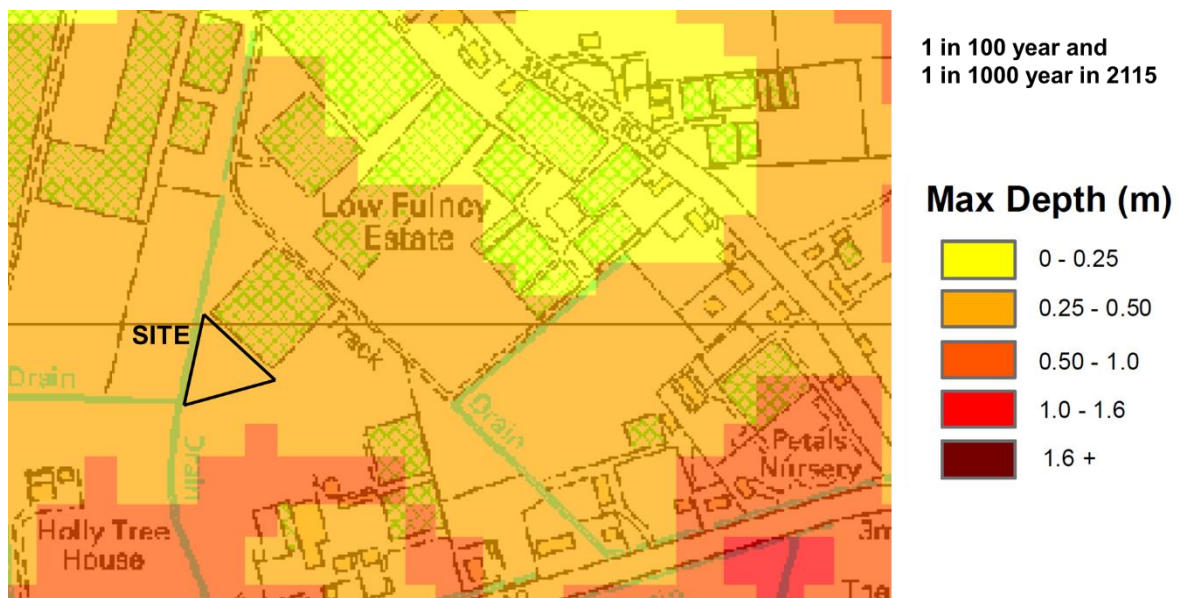
Referring to page 4 the predicted 1 in 100 year present day flood level is 5.36m ODN and the level with 20% increase for climate change is 5.38m ODN, an increase of 20mm. The most likely reason for this very small increase is that any additional volumes of water flowing into the river will overtop the defences and therefore not cause a significant increase in water level in the river. Therefore a 28% increase in the flows will not lead to a significant increase in water level and lead to additional flood risk to the development site.

The River Welland is an embanked watercourse between Spalding and Market Deeping. There are flood reservoirs on the east side of the River called the Cowbit and the Crowland Washes. Excess water would flow into these Washes through two large syphons. In this scenario the Washes would fill up and also water would be flooding over lower banks of the River. The increases in rainfall leading to this would also lead to significant flooding in the upper part of the River Welland Catchment. In the scenarios greater than 1 in 100 years it is unlikely that there will be any significant increase in the water level in the River. Therefore the consequence will not be different to the maps produced in the SFRA.

Regarding the effect of climate change on IDB systems, Welland and Deepings IDB, and all IDB's, are aware that climate change will affect the operations of pumping stations, sluices and drainage channels. Pumping stations and sluices only have a 30 year life and will need to be refurbished or rebuilt within this timespan. It is assumed that Welland and Deepings IDB will continue to review the modelling they have already carried out and when the Board consider these refurbishments adequate arrangements will be made to incorporate the latest climate change projections in order that Board continues to provide the same standard of service as the present day.

Summary of Flood Risk

The Environment Agency plan (shown below) of predicted depths of flooding in a 1 in 200 year and 1 in 1000 year fluvial or tidal event in 2115 shows flood depths of between 250mm and 500mm at the site.



The Environment Agency have stated that their policy is to continue to maintain tidal banks in the future with at least a 1 in 200 year standard of service.

The risk of flooding to the proposed building from IDB drains can be considered low.

The IDB have adequate arrangements to bring in contractors and use their own staff if a failure of any part of the sluices occurred.

The proposed development is not in a functional flood plain as defined by PPS 25.

Conclusions and Recommendations

The site will only be flooded with depths between 250mm and 500mm if breach occurs in the tidal River Welland or the Coronation Channel.

The construction of the lagoon will reduce the risk of surface water flooding in this area of West Nurseries site.

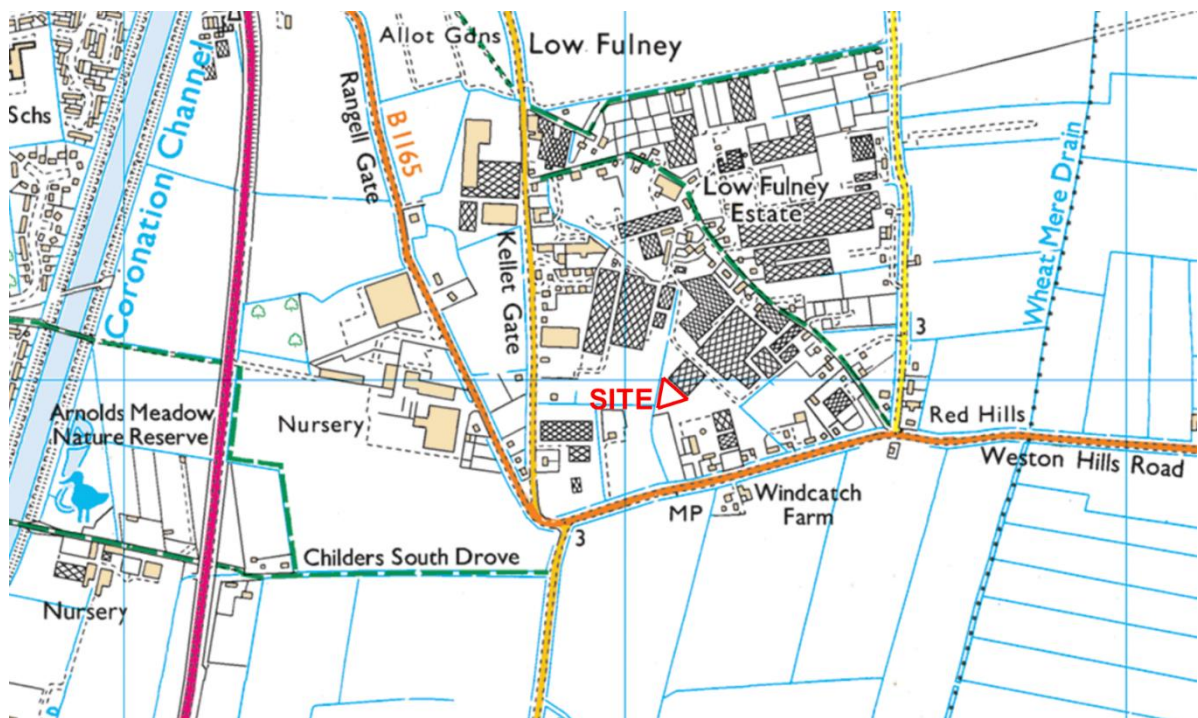
The occupier of the property should register with the Environment Agency's Floodline Warnings Direct Service.

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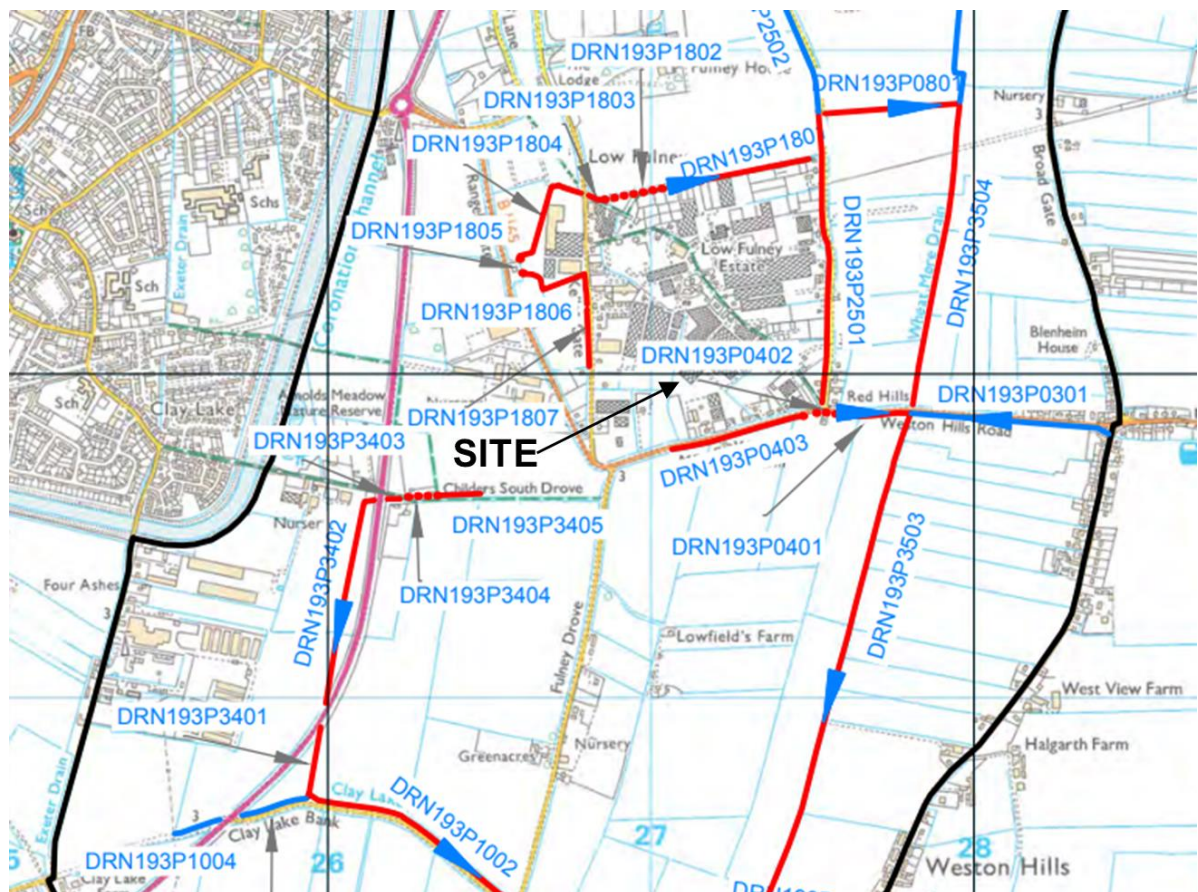
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19th June 2023

Location Plan



Plan of IDB Drainage Channels



Plan of Proposed Storage Lagoon

